ENGINEERING DESIGN REPORT

Grand Street Commons Site
1750 22nd Avenue S.
Seattle, Washington

PPCD Nos. 18-2-14708-5 SEA and 18-2-147414-0

Facility Site ID #97763114, Cleanup Site ID #3018

Prepared for: Grand Street Commons, LLC

Project No. 170304 • November 23, 2021 • AGENCY REVIEW DRAFT

Appendices A - K

e a r t h + w a t e r

Aspect
CONSULTING

List of Appendices

A Construction Stormwater General Permit WAR310664

B Contaminated Media Management Plan

C Ecology Contained in Determination (Letter dated June 25, 2021)

D SEPA Determination

E Inadvertent Discovery Plan

F *In Situ* Injection Phase II Field Logs

G Groundwater Time Series Data

H Laboratory Reports

I Shoring and Grading Plan Sets

J Geotechnical Reports

K Report Limitations and Guidelines for Use

APPENDIX A

Construction Stormwater General Permit WAR310664

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • PO Box 330316 • Shoreline, Washington 98133-9716 • (206) 594-0000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

October 7, 2021

Patrick Foley
Grand Street Commons LLC
401 N 26th St, Ste 104
Seattle, WA 98103

Order Docket #	20742
Site Location	Grand Street Commons 1750 22nd Ave S, Seattle, WA 98144

Re: Administrative Order

Dear Patrick Foley:

The Department of Ecology (Ecology) has issued the enclosed Administrative Order (Order) requiring Grand Street Commons LLC to comply with:

- Chapter 90.48 Revised Code of Washington (RCW) - State of Washington Water Pollution Control Act.
- Chapter 173-201A Washington Administrative Code (WAC) - Water Quality Standards for Surface Waters of the State of Washington.
- National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit No. WAR310664.

If you have questions, please contact Maria Zeman at (206) 594-0019 or maria.zeman@ecy.wa.gov.

Sincerely,

Rachel McCrea

Rachel McCrea
Water Quality Section Manager
Northwest Regional Office

Enclosures: Administrative Order Docket #20742

By certified mail 9171 9690 0935 0132 2079 85

ecc: Brendan Lawrence, Grand Street Commons
Andrew Yonkofski, Aspect Consulting LLC
PARIS Permit No. WAR310664

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF AN ADMINISTRATIVE ORDER AGAINST Grand Street Commons LLC Patrick Foley	)))))	ADMINISTRATIVE ORDER DOCKET #20742

To: Patrick Foley
Grand Street Commons LLC
401 N 26th St, Ste 104
Seattle, WA 98103

Order Docket #	20742
Site Location	Grand Street Commons 1750 22nd Ave S, Seattle, WA 98144

The Department of Ecology (Ecology) has issued this Administrative Order (Order) requiring Grand Street Commons LLC to comply with:

- Chapter 90.48 Revised Code of Washington (RCW) - State of Washington Water Pollution Control Act.
- Chapter 173-201A Washington Administrative Code (WAC) - Water Quality Standards for Surface Waters of the State of Washington.
- National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit No. WAR310664.

This is an Administrative Order in accordance with General Condition G12 (Additional Monitoring) as set forth in the Construction Stormwater General Permit (CSWGP). Chapter 90.48.120(2) RCW authorizes Ecology to issue Administrative Orders to accomplish the purposes of Chapter 90.48 RCW.

ORDER TO COMPLY

Grand Street Commons LLC is subject to coverage under NPDES Construction Stormwater General Permit (CSGP) WAR310664 for construction activities associated with the construction site known as Grand Street Commons (1750 22nd Ave S, Seattle, WA 98144). The project consists of 3.3 acres of soil disturbance. The Grand Street Commons redevelopment consists of construction of three new buildings containing a mix of housing with some retail space and underground parking. The receiving waterbody following treatment is the Duwamish Waterway. Grand Street Commons LLC reported that part of the construction site contains contaminated groundwater and soil which has the potential to discharge in stormwater or dewatering water due to the proposed construction activity. The CSGP does not have water quality sampling or benchmarks for the known constituents of concern listed in Table 1; however, the permit requires compliance with Chapter 173-201A Washington Administrative Code (WAC) – Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A).

The Order establishes Indicator Levels for the Grand Street Commons project. Indicator Levels express a pollutant concentration used as a threshold, below which a pollutant is considered unlikely to cause a water quality violation, and above which it may. Indicator Levels in this Administrative Order were derived from WAC 173-201A and the analytical method's minimum quantitation level.

For these reasons and in accordance with RCW 90.48.120(2) it is ordered that Grand Street Commons LLC take the following actions. These actions are required at the location known as Grand Street Commons, located at 1750 22nd Ave S, Seattle, WA 98144. In the event of a permit transfer to another Permittee, compliance with this Administrative Order and the actions listed below is required.

Grand Street Commons LLC must take the following actions to remain in compliance with NPDES Permit WAR310664:

- Install all pre-treatment and treatment systems prior to any discharge of dewatering water or contaminated construction stormwater to the receiving waterbody.
- Capture, contain, and treat all contaminated dewatering water or contaminated construction stormwater prior to discharge to the receiving waterbody.
- Use an Ecology-approved treatment system and media filtration to treat any contaminated dewatering water or contaminated construction stormwater. Ecology must be notified in advance if any changes in the treatment are made, with the exception of routine maintenance.
- All captured sediment from the treatment of the dewatering water or contaminated construction stormwater must be transported to an approved disposal facility based on the level of contamination.

The treatment system must have enough capacity to hold treated dewatering water or contaminated construction stormwater until it has been tested to determine if any of the Indicator Levels listed in Table 1 have been met. No dewatering water or contaminated construction stormwater may be discharged before it has been tested for the parameters listed in Table 1. If any of the Indicator Levels listed in Table 1 are exceeded, the treated dewatering water or contaminated construction stormwater must not be discharged to the receiving waterbody until it has been retested to determine that all parameters are equal to or below the Indicator Levels in Table 1. If any of the Indicator Levels are exceeded after being retested, Grand Street Commons LLC must modify the existing treatment to increase effectiveness, install an additional Ecology-approved treatment system, or truck the contaminated construction stormwater or groundwater off-site for disposal in an approved manner. Grand Street Commons LLC may also discharge to sanitary sewer with the approval of the proper sewer authority.

Once the effectiveness of the treatment system has been determined, Grand Street Commons LLC may revert to a flow-through treatment system after a minimum of two sampling and testing events and upon written approval from Ecology. The flow-through treatment system design and batch sampling results must be submitted to Ecology for review prior to use.

- If a flow-through treatment system is adopted, all dewatering water or contaminated construction stormwater must be sampled weekly while discharging and tested for the parameters listed in Table 1.
- When using a flow-through treatment system, if any of the Indicator Levels listed in Table 1 are exceeded, Grand Street Commons LLC must stop the discharge of treated dewatering water or contaminated construction stormwater to the receiving waterbody until it has been retested to determine that all parameters are equal to or below the Indicator Levels in Table 1. If any of the Indicator Levels are exceeded after being retested, Grand Street Commons LLC must modify the existing flow-through treatment system to increase its effectiveness, install an additional Ecology-

approved treatment system, or truck the contaminated construction stormwater or dewatering water off-site for disposal in an approved manner. Grand Street Commons LLC may also discharge the treated water to sanitary sewer in accordance with the conditions of the discharge authorization from the proper sewer authority.

- Sampling for the contaminants listed in Table 1 must be reported on the required Discharge Monitoring Report (DMR) according to Permit Conditions (S5.B Discharge Monitoring Reports).
- If sampling is conducted more frequently than required by this Order, the results of this monitoring must be included in the calculation and reporting of the data that is submitted in the DMR.
- Any discharge to Waters of the State in exceedance of the contaminant Indicator Levels in Table 1 except for pH criteria must be reported to the Department of Ecology according to Permit Condition S5.F, Noncompliance Notification as follows:
- Immediately notify Ecology of noncompliance by calling the regional 24-hour Environmental Report Tracking System (ERTS) phone number (206) 594-0000 (note that this is a new phone number as of 5/17/2021).
- Cease the discharge until Indicator Levels can be met.
- Submit a detailed, written report to Ecology within five (5) days, unless requested earlier by Ecology. See Permit condition S5.F.3 for the full written report requirements.
- All monitoring data must be prepared by a laboratory registered or accredited under the provisions of Accreditation of Environmental Laboratories, Chapter 137-50 WAC.
- All sampling data must be reported monthly on DMRs electronically using Ecology’s secure online system WQWebDMR, in accordance to permit condition S5.B. If the measured concentration is below the detection level then Grand Street Commons LLC must report single analytical values below detection as “less than the detection level (DL)” by entering “<” followed by the numeric value of the detection level (e.g. “<0.1”). All other values above DL must be reported as the numeric value.
- Contaminated soils excavated during construction will be immediately hauled offsite without stock piling to an approved disposal facility based on the level of contamination. When it is not feasible to immediately haul soils offsite, the soils must be placed in a covered area to minimize contact with stormwater.
- Noncompliance with permit requirements or the provisions of this Order must be immediately reported to the Northwest Regional Office of the Department of Ecology in accordance with Permit Condition S5.F, Noncompliance Notification.
- The Stormwater Pollution Prevention Plan (SWPPP) prepared for Grand Street Commons must be fully implemented and amended as needed for the duration of the project.
- If a modification of the Order is desired, a written request must be submitted to Ecology and if approved, Ecology will issue an amendment to this Order.

Ecology retains the right to make modifications to this Order through supplemental Order, or amendment to this Order, it if appears necessary to further protect the public interest.
This Order does not exempt The Grand Street Commons LLC from any Construction Stormwater General Permit requirement. This Order automatically terminates when NPDES Construction Stormwater General Permit WAR310664 is terminated.

Table 1.

Grand Street Commons LLC must use the specified analytical methods, detection limits (DLs) and quantitation levels (QLs) in the following table for monitoring unless the method used produces measurable results in the sample and EPA has listed it as an EPA-approved method in 40 CFR Part 136. If Grand Street Commons LLC uses an alternative method, not specified in the order and as allowed above, it must report the test method, DL, and QL on the discharge monitoring report.

Pollutant & CAS No. (if available)	Sampling Frequency*	Sample Type	Indicator Level, µg/L unless otherwise noted	Required Analytical Protocol	Detection Level, µg/L unless otherwise noted	Quantitation Level, µg/L unless otherwise noted
PETROLEUM HYDROCARBONS						
Diesel and Oil-Range Hydrocarbons (NWTPH-Dx) [b]	Batch/Weekly	Grab	250 [a]	NWTPH-Dx	250	250
Gasoline- Range Hydrocarbons (NWTPH-Gx)[c]	Batch/Weekly	Grab	250 [a]	NWTPH-Gx	250	250
BTEX (benzene, toluene, ethylbezene and O,M,P xylenes	Batch/Weekly	Grab	2.0 [a]	SW 846 8021/ 8260	1.0	2.0
POLYCYCLIC AROMATIC HYDROCARBONS (PAH) AND CARCINOGENIC PAH'S						
Acenaphthene (83-32-9)	Batch/Weekly	Grab	5.7 [a]	625.1	1.9	5.7
Benzo(a)pyrene (50-32-8)	Batch/Weekly	Grab	7.5 [a]	610/625.1	2.5	7.5
Benzo(b)fluoranthene (3,4-benzofluoranthene) (205-99-2)	Batch/Weekly	Grab	14.4 [a]	610/625.1	4.8	14.4
Chrysene (218-01-9)	Batch/Weekly	Grab	7.5 [a]	610/625.1	2.5	7.5
Fluoranthene (206-44-0)	Batch/Weekly	Grab	6.6 [a]	625.1	2.2	6.6
Fluorene (86-73-7)	Batch/Weekly	Grab	5.7 [a]	625.1	1.9	5.7
Phenanthrene (85-01-8)	Batch/Weekly	Grab	16.2 [a]	625.1	5.4	16.2
Pyrene (129-00-0)	Batch/Weekly	Grab	5.7 [a]	625.1	1.9	5.7
METALS						
Arsenic (7440-38-2)	Batch/Weekly	Grab	69 [d]	200.8	0.1	0.5
Cadmium (7440-43-9)	Batch/Weekly	Grab	42.25 [d]	200.8	0.05	0.25
Chromium, Total (7440-47-3)	Batch/Weekly	Grab	1100 [e]	200.8	0.2	1.0
Lead, Total (7439-94-6)	Batch/Weekly	Grab	220.82 [d]	200.8	0.1	0.5

VOLATILE ORGANIC COMPOUNDS (VOC)						
Acetone (67-64-1)	Batch/Weekly	Grab	5.0 [a]	624/8260	5.0	5.0
2-Butanone (MEK) (78-93-3)	Batch/Weekly	Grab	5.0 [a]	624/8260	5.0	5.0
sec-Butylbenzene (135-98-8)	Batch/Weekly	Grab	1.0 [a]	624/8260	1.0	1.0
tert-Butylbenzene (98-06-6)	Batch/Weekly	Grab	1.0 [a]	624/8260	1.0	1.0
Chloroform (67-66-3)	Batch/Weekly	Grab	4.8 [a]	624.1 or SM6210B	1.6	4.8
1,1-Dichloroethene (75-34-3)	Batch/Weekly	Grab	2.0 [a]	624/8260	1.0	2.0
cis-1,2-Dichloroethene (156-59-2)	Batch/Weekly	Grab	4.8 [a]	624.1	1.6	4.8
1,4-Dioxane	Batch/Weekly	Grab	10 [a]	1624B/624.1	3.33	10
Isopropylbenzene (98-82-8)	Batch/Weekly	Grab	1.0 [a]	624/8260	1.0	1.0
p-Isopropyltoluene (99-87-6)	Batch/Weekly	Grab	1.0 [a]	624/8260	1.0	1.0
2-Hexanone (591-78-6)	Batch/Weekly	Grab	1.0 [a]	8260D/624.1	0.36	1.0
n-Propylbenzene (103-65-1)	Batch/Weekly	Grab	1.0 [a]	624/8260	1.0	1.0
Tetrachloroethene (PCE) (127-18-4)	Batch/Weekly	Grab	12.3 [a]	624.1	4.1	12.3
Trichloroethene (TCE) (79-01-6)	Batch/Weekly	Grab	5.7 [a]	624.1	1.9	5.7
1,1,1-Trichloroethane (71-55-6)	Batch/Weekly	Grab	11.4 [a]	624.1	3.8	11.4
1,3,5-Trimethylbenzene (108-67-8)	Batch/Weekly	Grab	1.0 [a]	624/8260	1.0	1.0
1,2,4 –Trimethylbenzene (95-63-6)	Batch/Weekly	Grab	1.0 [a]	624/8260	1.0	1.0
Vinyl Chloride (75-01-4)	Batch/Weekly	Grab	2.0 [a]	624 /SM6200B	1.0	2.0
CONSTRUCTION STORMWATER GENERAL PERMIT BENCHMARKS						
Parameter	**Sampling Frequency***	**Sample Type**	**Benchmark**	**Analytical Method**		
Turbidity	Batch/Weekly	Grab	25 NTU	SM2130 [f]		
pH	Batch/Weekly	Grab	6.5 - 8.5 SU	SM4500-H^+ B		

NOTES	
a	No applicable surface water criterion, value is laboratory quantitation level.
b	NWTPH-Dx = Northwest Total Petroleum Hydrocarbons – Semi-volatile (“diesel”) for diesel range organics and heavy oils (includes jet fuels, kerosene, diesel-oils, hydraulic fluids, mineral oils, lubricating oils, and fuel oils).
c	NWTPH-Gx = Northwest Total Petroleum Hydrocarbons – Volatile petroleum products including aviation and automotive gasolines, mineral spirits, Stoddard solvent, and naphtha.
d	Acute – Marine Water Toxic Substances Criteria (WAC 173-201A-240). Metals calculated using conversion factors per Table 240.
e	Indicator Level total chromium is actually for hexavalent chromium using Acute – Marine Water Toxic Substances Criteria (WAC 173-201A-240) because there is no water quality standard for total chromium.
f	Or equivalent.
*	If permission granted for flow-through, sampling will then be weekly.

FAILURE TO COMPLY WITH THIS ORDER

Failure to comply with this Order may result in the issuance of civil penalties or other actions, whether administrative or judicial, to enforce the terms of this Order.

YOUR RIGHT TO APPEAL

You have a right to appeal this Order to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do both of the following within 30 days of the date of receipt of this Order:

- File your appeal and a copy of this Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Order on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Your appeal alone will not stay the effectiveness of this Order. Stay requests must be submitted in accordance with RCW 43.21B.320.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel Road SW STE 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 **Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

CONTACT INFORMATION

Please direct all questions about this Order to:

Maria Zeman
Department of Ecology
Northwest Regional Office
PO Box 330316
Shoreline, WA 98133-9716

Phone: (206) 594-0019
Email: maria.zeman@ecy.wa.gov

MORE INFORMATION

- Pollution Control Hearings Board Website
  http://www.eluho.wa.gov/Board/PCHB
- Chapter 43.21B RCW - Environmental and Land Use Hearings Office – Pollution Control Hearings Board
  http://app.leg.wa.gov/RCW/default.aspx?cite=43.21B
- Chapter 371-08 WAC – Practice And Procedure
  http://app.leg.wa.gov/WAC/default.aspx?cite=371-08
- Chapter 34.05 RCW – Administrative Procedure Act
  http://app.leg.wa.gov/RCW/default.aspx?cite=34.05
- Ecology's Laws, rules, & rulemaking website
  https://ecology.wa.gov/About-us/How-we-operate/Laws-rules-rulemaking

SIGNATURE

Rachel McCrea | October 7, 2021

Rachel McCrea
Water Quality Section Manager
Northwest Regional Office

Date

APPENDIX B

Contaminated Media Management Plan

CONTAMINATED MEDIA MANAGEMENT PLAN

Grand Street Commons Site
S1750 22nd Avenue S.
Seattle, Washington
PPCD Nos. 18-2-14708-5 SEA and 18-2-147414-0
Facility Site ID #97763114, Cleanup Site ID #3018

Prepared for: Grand Street Commons, LLC

Project No. 170304 • July 19, 2021

Aspect CONSULTING

earth + water

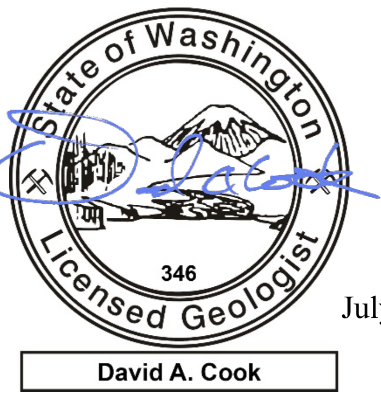
CONTAMINATED MEDIA MANAGEMENT PLAN

Grand Street Commons Site
1750 22nd Avenue S.
Seattle, Washington
PPCD No. 18-2-14708-5 SEA and 18-2-147414-0
Facility Site ID #97763114, Cleanup Site ID #3018

Prepared for: Grand Street Commons, LLC

Project No. 170304 • July 19, 2021

Aspect Consulting, LLC



July 19, 2021

Dave Cook, LG, CPG
Principal Geologist
dcook@aspectconsulting.com

Fasih Khan
Environmental Project Manager
fkhan@aspectconsulting.com

Contents

Contents i

List of Appendices iii

Acronyms and Abbreviations iv

1 Introduction 1

2 Site Characterization Overview 3

2.1 Contaminants of Concern 3

2.2 Soil Contamination 4

2.3 Groundwater Contamination 4

3 Health and Safety Requirements 6

4 Soil Management Recommendations 7

4.1 Contaminated Soil Category – Red Area on Figures 8a, 8c, 9a, 9c, and 10 7

4.2 Contained-In Determination (CID) Soil Category – Purple Area on Figures 9a through 9e 9

4.3 Impacted Soil Category – Orange Area on Figures 8b, 8c, 9b, 9c, and 10 10

4.4 Non-Impacted Soil Category – Green Area on Figures 8b through 8d, 9b through 9e, and 10 11

5 Discovery of Potentially Contaminated Material 13

5.1 Suspected Impacted Soil 13

5.2 Underground Storage Tanks (USTs) 13

5.2.1 Regulated UST Removal Protocol 13

5.3 Other Excavation Discoveries 14

6 Construction Stormwater Management 16

6.1 Contaminated Groundwater and Run-off 16

7 Contact Information 18

References 19

Limitations 20

List of Tables

1 Summary of Select Historical Soil Results: TPH, BTEX, VOCs

2 Summary of Remedial Investigation Soil Results: TPH and BTEX

3 Summary of Remedial Investigation Soil Results: 1,4-Dioxane and VOCs

4 Summary of Remedial Investigation Soil Results: Metals, PAHs, and PCBs

5 Summary of Monitoring Wells Construction and Groundwater Elevations

6 Summary of Remedial Investigation Groundwater Sampling Data

7 Summary of Select Historical Grab Groundwater Results

8 Summary of RI Shallow Groundwater Results: TPH and BTEX

9 Summary of RI Shallow Groundwater Results: 1,4-Dioxane and VOCs

10 Summary of RI Shallow Groundwater Results: Metals

List of Figures

1 Site Location Map

2 Site Plan – Existing Features

3 Remedial Investigation Explorations and Cross-Section Line Overview

4 Summary of MTCA Exceedances in Soil

5 Shallow Groundwater Elevations – March 2020

6 Summary of MTCA Exceedances in Shallow Groundwater

7 Groundwater Monitoring Wells Status Map

8a East Block – Shoring Spoils Handling Plan

8b East Block – Soil Conditions (Elevation 77 to 72 feet)

8c East Block – Soil Conditions (Elevation 72 to 67 feet)

8d East Block – Soil Conditions (Elevation 67 to 62 feet)

9a West Block – Shoring Spoil Handling Plan

9b West Block – Soil Conditions (Elevation 77 to 67 feet)

9c West Block – Soil Conditions (Elevation 67 to 57 feet)

9d West Block – Soil Conditions (Elevation 57 to 47 feet)

9e West Block – Soil Conditions (Elevation 47 to 37 feet)

10 South Block – Soil Conditions (Elevation 72 to 60 feet)

List of Appendices

A June 25, 2021 Contained-In Determination Approval

B Schematic of Construction Stormwater Treatment System

C Report Limitations and Guidelines for Use

Acronyms and Abbreviations

Aspect	Aspect Consulting, LLC
Bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAP	Cleanup Action Plan
CID	contained-in determination
COC	contaminants of concern
Ecology	Washington Department of Ecology
mg/kg	milligrams/kilograms
mg/L	milligrams per liter
µg/L	micrograms per liter
MTCA	Model Toxics Control Act
PCE	tetrachloroethylene
RI/FS	Remedial Investigation/Feasibility Study
TCE	trichloroethylene
UST	underground storage tank
VOC	volatile organic compound

1 Introduction

This Contaminated Media Management Plan (CMMP), prepared by Aspect Consulting, LLC (Aspect) on behalf of Grand Street Commons, LLC (GSC), describes the handling, management, segregation, stockpiling, removal, treatment, and disposal requirements (collectively referred to herein as Management Requirements) for soil and groundwater generated during the remedial excavation and redevelopment project planned at the Grand Street Commons Site (the Site) located at 1750 22nd Avenue South in Seattle, Washington (Figure 1). The GSC Site is listed in the Washington State Department of Ecology's (Ecology) database as Facility/Site ID #97763114 and Cleanup Site ID #3018.

GSC owns 17 King County tax parcels totaling approximately 3.3 acres (herein collectively referred as the Subject Property) located across three blocks (herein referred to as East, West, and South Blocks) that are situated within the Site[1]. The Subject Property is currently vacant except for a one-story building in the northwest portion of the West Block (Figure 2). The Subject Property will be redeveloped with three buildings, which include a transit-oriented mix of affordable and market rate housing with some retail space and underground parking near the planned Judkins Park Light Link Rail Station in the Judkins Park neighborhood of Seattle.

The contaminated soil and groundwater at the Site are a result of historical releases of:

- Tetrachloroethylene (PCE) released from the former Penthouse Drapery dry cleaner located on the northwest portion of the West Block (Figure 2)
- Petroleum hydrocarbons and 1,4-dioxane releases from former bakery- and restaurant-equipment manufacturing operations by Belshaw Bros, Inc (Belshaw) on the East and West Blocks (Figure 2)
- Metals in the fill soil imported by Belshaw at the South Block that was historically utilized as a parking area by Belshaw workers

The GSC Site is being cleaned up in accordance with Prospective Purchaser Consent Decrees (PPCDs) between Ecology, the Washington State Attorney General's Office and GSC, (PPCD No. 18-2-14708-5 SEA) and a PPCD between Ecology, the Washington State Attorney General's Office, and the Mt. Baker Housing Association (MBHA) (PPCD No. 18-2-14714-0). The remedial investigation results have been documented in Aspect's Remedial Investigation and Feasibility Study Report (RI/FS; Aspect, 2021) The cleanup action is defined in Ecology's Cleanup Action Plan (CAP; Ecology, 2021).

[1] Please refer to Figure 2, which depicts Site parcels, the East, West and South blocks, and current features. The Site is defined as locations where contaminated soil or groundwater has come to be located because of release(s) from the Subject Property. Based on the remedial investigation results, the Site comprises the Subject Property and adjacent rights-of-way (22nd Avenue South and likely Rainier Avenue South).

Aspect is GSC's environmental consultant overseeing Site remediation. This CMMP was developed by Aspect to define soil and groundwater Management Requirements. Aspect will have a field representative on-Site during remediation and construction activities to oversee the excavation and removal of contaminated soil and groundwater.

The general contractor and its subcontractors (referred to herein as Contractor) must immediately report any issues, discovery of new conditions, or request for deviations from this CMMP to Aspect. The Contractor and its subcontractors are solely responsible for creating and ensuring compliance with their own Health and Safety Plan (HASP) that meet the requirements of Ecology and all relevant construction health and safety regulations and requirements.

Aspect has developed this CMMP with the intent of minimizing sampling of soils during construction and allowing the direct loading of excavated soils to the extent practicable. However, the soil Management Requirements described in this CMMP are based on available characterization data and, therefore, are estimates for planning purposes. Actual soil category extents will be refined in the field during the excavation of contaminated soil. Soil sampling will be conducted along with field screening to allow segregation, as directed by Aspect's field representative.

2 Site Characterization Overview

This section presents an overview of the contaminants of concern in soil and groundwater, soil conditions, and groundwater conditions at the Site.

2.1 Contaminants of Concern

Releases associated with the former Penthouse Drapery dry cleaner have affected soil and groundwater in the northwest and west portions of the West Block. Additionally, releases associated with the former manufacturing operations by Belshaw have affected soil and groundwater on the north and south portions of the East Block, east portion of the West Block, and south portion of the South Block.

The following contaminants of concern (COCs) are presented in the RI/FS Report (Aspect, 2021):

Soil COCs

- **East Block**. Gasoline- and diesel-range hydrocarbons
- **West Block**. Gasoline- and diesel-range hydrocarbons and PCE
- **South Block**. Cadmium and lead

Groundwater COCs

- **East Block**. Diesel-range hydrocarbons and 1,4-dioxane
- **West Block**. Gasoline- and diesel-range hydrocarbons, benzene, 1,4-dioxane, PCE and its breakdown products (trichloroethylene [TCE] and vinyl chloride [VC])
- **South Block**. None

Naphthalene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and xylenes were also detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A cleanup levels in shallow groundwater within the east-central portion at the West Block. However, these contaminants are co-located with higher concentrations of other COCs within the petroleum hydrocarbon- and/or chlorinated-solvents-contaminated areas. These contaminants will be removed during the remediation for petroleum hydrocarbons and chlorinated solvents. Therefore, these contaminants are not considered primary COCs for the Site (Aspect, 2021).

The RI soil and groundwater analytical results including details of groundwater sampling data are summarized in the attached Tables 1 through 10. The approximate locations of the RI explorations are shown in the attached Figure 3. A graphical summary of the MTCA exceedances in soil and groundwater is shown in Figures 4 and 5, respectively. The groundwater elevations at the Site are presented in Figure 6 and the locations of all groundwater monitoring wells at the Site are shown in Figure 7.

The following sections summarize the RI findings regarding the soil and groundwater quality at the Site.

2.2 Soil Contamination

The following summarizes the soil conditions at the Site.

Petroleum Hydrocarbon-Contamination on East Block. The detected concentrations of gasoline- and/or diesel-range-hydrocarbons exceeded their respective Site Cleanup Levels in soil at three locations (AC-MW-8, AC-SB-10, and AC-SB-13) on the East Block and in one location (AC-SB-12A) at the adjacent 22nd Avenue South (Figure 4). The gasoline- and diesel-range hydrocarbon contaminated soil is present between approximate depths of 7.5 and 15 feet below ground surface (bgs; Elevation 69.5 and 62 feet) in these four locations at the East Block (Table 2 and Figures 8a and 8c).

Petroleum Hydrocarbon-Contamination on West Block. The detected concentrations of gasoline- and diesel-range-hydrocarbons exceeded their respective Site Cleanup Levels in soil at one location (AC-SB-4 in Figure 4) on the West Block between approximate depths of 10 and 15 feet bgs (Elevation 62.5 to 57.5 feet) (Table 2 and Figures 9a and 9c).

Chlorinated Solvent-Contamination on West Block. The detected concentration of PCE exceeded its Site Cleanup Level in soil at three locations (AC-SB-24, AC-MW-29, and AC-DMW-1[2]) on the West Block (Figure 4). The PCE-contaminated soil is present between approximate depths of 5 and 30 feet bgs (Elevation 65.5 to 40.5 feet) at AC-SB-24 and AC-MW-29 (Table 3 and Figures 9a, 9c, 9d, and 9e).

Metals-Contamination on South Block. The detected concentrations of cadmium and lead exceeded their respective Site Cleanup Levels in soil at two locations (DP-7 and DP-23) on the South Block (Figure 4). The cadmium- and lead-contaminated soil is present between approximate depths of 2.5 and 5 feet bgs (Elevation 68 and 65.5 feet) at these two locations (Table 3 and Figure 10).

2.3 Groundwater Contamination

The following summarizes the groundwater contamination at the Site.

Petroleum hydrocarbon- and 1,4-dioxane-Contamination on East Block. The detected concentrations of diesel-range hydrocarbons and 1,4-dioxane exceeded their respective MTCA Method A or B Cleanup Levels in groundwater on south portion of the East Block (Figure 5).

Petroleum hydrocarbon- and 1,4-dioxane-Contamination on West Block. The detected concentrations of gasoline- and diesel-range hydrocarbons, benzene, xylenes,

[2] The PCE exceedance at AC-DMW-1 was observed only in the 60-foot deep sample (Elevation 10.5 feet) from this location. Ecology does not require excavation and offsite disposal of soil represented by this sample. Instead, Ecology recommended a capping remedy (protective cover) for this deeper PCE-contaminated soil similar to the capping of the cadmium- and lead-contaminated soil on the South Block (Ecology, 2021).

and 1,4-dioxane exceeded their respective MTCA Method A or B Cleanup Levels in groundwater on southeast and south portions of the West Block (Figure 5).

Chlorinated Solvents-Contamination on West Block. The detected concentrations of PCE and its breakdown products (TCE and VC) exceeded their respective MTCA Method A Cleanup Levels in groundwater on the west half of West Block (Figure 5).

As noted above in Section 2.1,no COCs were detected at concentrations greater than the Site cleanup levels in groundwater on the South Block.

The groundwater elevations measured at the Site in March 2020 are summarized in Figure 6. The approximate locations and the status of groundwater monitoring wells at the Site is shown in Figure 7.

3 Health and Safety Requirements

The following is a brief summary of construction and safety requirements to be employed when contaminated soil and/or groundwater is encountered during redevelopment construction:

- All persons performing earthwork or subgrade activities during Site cleanup activities must have completed 40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training in accordance with the Occupational Safety and Health Administration Part 1910.120 of Title 29 of the Code of Federal Regulations, and be in possession of a current HAZWOPER certification card.
- The Contractor performing site activities where hazardous materials may be contacted will operate under its own site-specific Health and Safety Plan (HASP). The HASP should include guidelines to reduce the potential for injury, as well as incident preparedness and response procedures, emergency response and evacuation procedures, local and project emergency contact information, appropriate precautions for potential airborne contaminants and site hazards, and expected characteristics of generated waste.
- It is unlikely that concentrations of contaminants in ambient air will exceed Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs) or short-term exposure limits (STELs) for the contaminants listed above, specifically PCE, TCE, VC, and benzene. However, the Contractor performing site activities where hazardous materials may be contacted are responsible for conducting air monitoring and upgrading personal protective equipment (PPE) appropriate to the concentrations detected in air.
- The Contractor will be responsible for performing any air monitoring to evaluate ambient air concentrations relative to the COCs (if needed) and will also be solely responsible for the active air monitoring or health and safety of non-Aspect staff.
- A safety meeting will be conducted prior to the start of each workday to inform workers of changing work conditions, and to reinforce key safety requirements.

All work must be conducted in a manner consistent with federal, state, and local construction and health and safety standards applicable to the Property and to the work being performed. All companies are responsible for the health and safety of their own workers.

4 Soil Management Recommendations

Soil within the locations of the construction shoring and mass excavation at the Site have been delineated into the following management categories (Categories) based on the RI results.

Four Categories have been delineated for soil that will be excavated during the remedial excavation at the GSC Site:

1. Contaminated Soil (exceeding Site cleanup levels) – Red Area
2. Contained-In Determination (CID) Soil (for solvent contamination) – Purple Area
3. Impacted Soil (less than Site cleanup levels) – Orange Area
4. Non-Impacted Soil (no detections or soil with background concentrations of metals) – Green Area

For this CMMP, the above Categories are based on the acceptance criteria for soil disposal facilities (such as Waste Management's transfer station in Seattle, Republic Services transfer station in Seattle, Cadman in Everett, or Waste Management's Wenatchee facility) that are frequently used by Seattle projects, in our experience. Alternate soil disposal facilities may be proposed by the Contractor and must be approved by Aspect.

4.1 Contaminated Soil Category – Red Area on Figures 8a, 8c, 9a, 9c, and 10

Petroleum hydrocarbon-and metals-contaminated soils with concentrations that exceed the Site cleanup levels is included within the Contaminated soil Category, shown in red on Figures 8a, 8b, 9a, 9c, and 10. Specifically, soil meets the definition of Contaminated soil if:

- Contaminants are detected, and the detected concentrations are equal to or greater than the Site cleanup levels.
- Physical evidence of contamination (sheen, odor, staining) is observed as moderate to heavy sheen, odor, and/or staining, and moderate to high photoionization detector (PID) readings.

The Contaminated soil Category has the following handling and disposal requirements:

- **Contaminated Soil Segregation During Shoring Installation and Mass Excavation.** Contaminated soil should be segregated from the CID soil (purple area), Impacted soil (orange area), and Non-Impacted soil (green area) categories (described below) to prevent mixing between categories. An Aspect representative will be onsite during drilling and installation of shoring and during mass excavation to assist with soil segregation by conducting field screening, which will consist of visual inspection, sheen testing, and PID testing. Spoils from shoring installation will be categorized on the East and West Blocks according to Figures 8a and 9a, respectively. No additional segregation will occur during shoring installation.

- **Temporary Stockpiling Permitted**. If needed and practical, it is permissible for Contaminated soil to be temporarily stockpiled on Site prior to loading into trucks or containers for transport. Stockpile requirements are as follows:
- All stockpiles must be separated from underlying soil if the underlying soil is not also within the Contaminated soil category. Materials used for separating stockpiles can include preserving pavement for stockpiling or lining with plastic sheeting of at least 10-mil minimum thickness, or other methods approved by Aspect.
- All stockpiles must be covered and secured with plastic sheeting of 10-mil minimum thickness when not in use, including overnight, and the cover must be anchored to prevent it from being disturbed by wind.
- Contaminated soil stockpiles must be managed for contact with and runoff from stormwater in accordance with the Construction Stormwater Pollution Prevention Plan (CSWPPP) that meets the requirements of a Construction Stormwater General Permit (CSWGP) and accompanying Administrative Order forthcoming from Ecology's Water Quality Program.
- **Loading and Transportation and Tracking.** Contaminated soil will be loaded into dump trucks and trailers or side dump trucks for transport to the selected treatment/disposal facility. A tracking procedure must be developed and implemented and transportation and disposal manifests and weight tickets for every truck or container must be provided to Aspect on at least a weekly basis.
- **Disposal Facilities**. Excavated and loaded Contaminated soil can be transported to the selected disposal facility after approval from any of the following permitted facilities:
- Waste Management's Columbia Ridge Landfill in Arlington, Oregon. A transfer station for this landfill is located in Seattle, Washington.
- Republic Services' Roosevelt Regional Landfill in Klickitat County, Washington. A transfer station for this landfill is located in Seattle, Washington.

Aspect will assist the Contractor in completing the soil profile applications to seek acceptance approval from the selected disposal facility.

Confirmation Soil Sampling. Confirmation soil samples will be obtained by an Aspect field representative at the extents of Contaminated soil for waste characterization and handling purposes. The sampling will verify that all Contaminated soil has been successfully segregated and removed from the Site. Soil samples will be submitted to the laboratory for gasoline-range, or diesel-range-organics testing on a rush (24-hour) turnaround time to verify soil conditions at the excavation limits.

4.2 Contained-In Determination (CID) Soil Category – Purple Area on Figures 9a through 9e

Soil that contains detectable concentrations of PCE associated with the former dry-cleaning operation comprise the CID Soil management category, shown in purple shaded areas on Figures 9a through 9e. The CID soil includes all soil where PCE has been detected at any concentration above the laboratory reporting limits. The CID approval was issued by Ecology via a letter dated June 25, 2021, included as Appendix A.

The CID soil shall be disposed of as a non-dangerous waste (following the conditions outlined in Ecology's CID approval letter) at a permitted Subtitle D landfill facility. The following handling requirements are for CID soil:

- **Soil Segregation During Shoring Installation and Mass Excavation.**

  A representative of Aspect will be on site during shoring installation and during the excavation of the CID soil to assist the Contractor with segregation by conducting field screening, which will consist of visual and olfactory inspection, sheen testing, and PID testing and to collect soil samples.

  Spoils from shoring installation on the West Block will be categorized according to Figure 9a. During soil handling, CID soil should not come in contact with soil in other management Categories to prevent mingling with the Impacted and Non-impacted Soils (discussed below). CID soil cannot be consolidated with any other soil that has not been deemed CID soil.

- **Loading and Transportation and Tracking.** Ecology requires that if CID soil is direct-loaded, the trucks or roll-off bins "must be lined with plastic and properly covered to prevent leaks, spills, or dispersion due to wind." No standing water can be present within the trucks or roll-off bins before transport. Ecology also requires that trucks or containers of CID soil be covered prior to leaving the Site and remain covered until arrival at the disposal facility.

  Trucks or containers must be transported directly from the Site to the disposal facility; no offloading of the CID soil is allowed between the cleanup site and the permitted solid waste landfill. Per Ecology, if roll-off bins are taken to a transfer station, the intermodal containers from the cleanup site must be loaded on to rail cars for disposal at the designated facility. Removal of the contaminated soils from the intermodal containers at the transfer station is not allowed by Ecology.

  A tracking procedure must be developed and implemented by the Contractor and transportation and disposal manifests and weight tickets for every truck or container must be provided to Aspect daily. Ecology has approved disposal of 4,686 tons of CID soil. If additional CID soil is expected to be generated, then, the Contractor must inform Aspect and obtain Ecology's approval for the additional CID soil before transporting it offsite for disposal.

- **Disposal Facilities.** Excavated CID soil must be disposed at a permitted Subtitle D landfill located in Washington State following approval by the facility. CID soil will be loaded into intermodal containers at the Site and transported either to Waste Management's Seattle transfer station or to the Republic Services' Seattle transfer station on chassis and then by rail to either of the following facilities for disposal:

- Waste Management's Columbia Ridge Landfill in Arlington, Oregon.
- Republic's Roosevelt Regional Landfill located in Klickitat County, Washington.

Aspect will assist the Contractor in preparing the soil profile application to gain approval by the disposal facility.

Confirmation Soil Sampling. Confirmation soil samples will be obtained by an Aspect field representative at the presumed bottom of the remedial excavation. Soil samples will be submitted to the laboratory for chemical analysis of PCE on a rush (24-hour) turnaround to verify soil conditions at the excavation limits.

4.3 Impacted Soil Category – Orange Area on Figures 8b, 8c, 9b, 9c, and 10

Soil that contains detectable COCs that are at concentrations below the Site cleanup levels is included within the Impacted soil category, shown in orange on Figures 8b, 8c, 9b, 9c, and 10. Specifically, soil meets the definition of Impacted soil if:

- COCs are detected, but the detected concentrations are less than the Site cleanup levels (excluding dry cleaning solvent contaminated or CID soil which is addressed in Section 4.2).
- Metals are detected at concentrations that exceed the natural background concentrations for the Puget Sound that have been published by Ecology[3], but do not exceed the Site cleanup levels.
- Physical evidence of contamination (sheen, odor, staining) is observed as slight to moderate sheens and low PID readings.

The Impacted soil Category has the following handling and disposal requirements:

- **Soil Segregation During Shoring Installation and Mass Excavation.** Impacted soil should be segregated from the Contaminated, CID, and Non-Impacted soil (described below) Categories to prevent mingling between categories. An Aspect representative will be onsite during shoring installation and excavation to assist the Contractor with soil segregation by conducting field screening, which will consist of visual and olfactory inspection, sheen testing, and PID testing.
- **Temporary Stockpiling Permitted.** If needed and practical, it is permissible for soil excavated from the Impacted soil category to be temporarily stockpiled on Site prior to loading into trucks or containers for transport. Stockpile management

[3] Washington State Department of Ecology, *Natural Background Soil Metals Concentrations in Washington State*, October 1994.

requirements are the same as those described above for the Contaminated soil category (Section 4.1).

- **Loading and Transportation and Tracking.** Soil excavated from the Impacted soil category will be loaded into dump trucks and trailers or side dump trucks for transport to the selected treatment/disposal facility. A tracking procedure must be developed and implemented and transportation and disposal manifests and weight tickets for every truck or container must be provided to Aspect on at least a weekly basis.

- **Disposal Facilities.** Excavated and loaded Impacted soil category (as defined in this document) can be transported to any of the selected disposal facility after approval from the facility:

  - Waste Management's Columbia Ridge Landfill in Arlington, Oregon. A transfer station for this landfill is located in Seattle, Washington.
  - Republic Services' Roosevelt Regional Landfill in Klickitat County, Washington. A transfer station for this landfill is located in Seattle, Washington.
  - CADMAN's facility in Everett, Washington.

  All of the soil in the Impacted soil Category meets CADMAN's permit criteria for Class 2 soil. If requested, Aspect will assist the Contractor in completing the soil profile applications to seek acceptance approval from the selected disposal facility.

4.4 Non-Impacted Soil Category – Green Area on Figures 8b through 8d, 9b through 9e, and 10

Soil with no COCs detected and/or detected at concentrations representative of background conditions for Puget Sound is included in the Non-Impacted management Category, shown in green on Figures 8b through 8d, 9b through 9e, and 10. Soil is considered Non-Impacted if:

- Contaminant concentrations are not detected for any analyte other than metals.
- Metals are detected at or less than the natural background levels for Puget Sound region published by Ecology[4].
- Physical evidence of contamination (sheen, odor, staining) is not observed.

There are no special handling or end-use requirements for this soil. and it can be disposed of at any disposal facility following approval by the facility. It should be noted that some Seattle/Bellevue-area disposal facilities that accept Non-Impacted soil have facility-specific criteria that prevent them from accepting soil with metals at concentrations representative of background. When potential Non-Impacted soil disposal facilities are

[4] Washington State Department of Ecology, *Natural Background Soil Metals Concentrations in Washington State*, October 1994.

identified by the Contractor, the disposal facility criteria should be provided to Aspect for review.

5 Discovery of Potentially Contaminated Material

An Aspect environmental field representative will be onsite during excavation of soil from the Contaminated, CID, and Impacted Soil Categories, but may not be on Site when excavation on the Non-Impacted Soil Categories is occurring. Therefore, it is the responsibility of the Contractor to identify inadvertent discoveries of possible environmental concern and immediately notify Aspect for further instructions.

5.1 Suspected Impacted Soil

It is the responsibility of the Contractor to stop work and contact Aspect if potentially impacted soil is discovered. Equipment operators and laborers will be instructed to immediately report to their supervisors any potential evidence of contamination and cease work in that area pending evaluation by Aspect. Criteria to be used in identifying potentially contaminated soil include (but are not limited to):

- Petroleum hydrocarbon staining, sheen, or chemical color hues in soil or standing water
- The presence of separate-phase petroleum hydrocarbon product or other chemicals
- Vapors causing eye irritation or nose tingling or burning
- The presence of gasoline- or oil-like odors
- The presence of solvent-like odors

If evidence of potential contamination is identified, notify Aspect immediately. Aspect will assist the developer and construction contractor with follow-up environmental monitoring and evaluate the need for field screening and possible segregation of contaminated and clean soils. Section 7 of this CMMP provides contact information to be used upon discovery of suspect impacted soil.

5.2 Underground Storage Tanks (USTs)

At least one documented UST is known to be located on the south portion of the East Block (Figure 8a); however, there is potential for additional undocumented USTs to be encountered during mass excavation or building demolition at the Site. Select USTs are regulated by Ecology (depending on the size, use, and contents of the UST) and require regulatory notification and specific removal requirements; therefore, any removal or handling of discovered USTs must be overseen by Aspect. Generalized protocols for removal of regulated USTs is briefly outlined below.

5.2.1 Regulated UST Removal Protocol

1. **Immediately upon discovery, stop excavation in the UST area and notify Aspect** to discuss next steps.
2. Prior to removal, an International Code Council (ICC)-Certified UST Site Assessor must notify Ecology of the upcoming UST closure and removal. Ecology will provide

written or verbal authorization to proceed with the UST removal. Aspect will provide the UST Site Assessor during construction.

3. Authorized closure and removal consist of several tasks, which will be coordinated by the Contractor:

   a. An ICC-Certified UST Decommissioner must empty and clean the tank of all liquids and accumulated sludges.

   b. A marine chemist must inert the tank of flammable vapors, as directed by the International Fire Code.

   c. A representative of the Seattle Fire Marshal will make a site visit to confirm that these tasks have been completed according to the International Fire Code and provide a written authorization for removal.

   d. The cleaned tank may then be removed from the excavation, crushed, and transported from the Project.

   e. The UST Decommissioner must ensure that the tank atmosphere and excavation area is regularly monitored for flammable vapor concentrations until the tank is removed from both the excavation and the Project.

4. The UST Site Assessor will photo document and visually inspect the tank prior to transport, obtain confirmation soil samples from the excavated UST pit, and assist with segregation and management of suspect impacted soil identified during the UST removal. A Site Check/Site Assessment Checklist will be completed, and an appropriate report will be prepared for submittal to Ecology.

As stated above, Aspect will provide the ICC-Certified Site Assessor, lead communications with Ecology, and is available to assist the Contractor in coordinating and scheduling the UST closure/removal with the other involved parties.

5.3 Other Excavation Discoveries

Examples of other possible excavation discoveries of environmental concern include:

- An undocumented monitoring well
- An unknown underground facility, such as utility vaults or sumps
- Utility line exhibiting evidence of contamination
- Debris or buried waste material exhibiting evidence of contamination, such as drums, paint/oil cans, etc.
- Odors, staining, or other evidence of contamination
- Archeological artifacts (although no artifacts are anticipated based on archeological review by Ecology and inquiries with Department of Archeology and Historic Preservation). If any suspect historical artifacts are discovered, the Contractor must stop work and contact Aspect (an Inadvertent Discovery Plan has been prepared by Ecology [Ecology, 2021a] that will drive next steps)

Aspect is available to discuss discoveries that are suspected as possible environmental concerns. Do not hesitate to contact Aspect's field representative or other point of contact in Section 7 of this CMMP upon discovery.

6 Construction Stormwater Management

This section summarizes the construction stormwater management protocol for the Site.

6.1 Contaminated Groundwater and Run-off

Aspect is leading and overseeing an in-situ injection program to remediate groundwater contamination at the Site in accordance with the Ecology's CAP requirements. The injections are expected to be completed in August 2021. It is likely that groundwater may still contain contaminants during construction at the Site which is set to begin in late August 2021.

Contaminated groundwater is expected to be encountered during shoring installation and mass excavation activities at the Site. Also, incidental run-off that comes in contact with Contaminated, CID, and Impacted soils at the Site will need to be managed and likely treated, prior to discharge to the local storm drain.

Water generated during initial phases of shoring and excavation will be managed by installing a sump in the downslope portion of the excavation at the Site. Additional sumps will be installed as needed, and advanced lower, as excavation proceeds to construction grade(s) at the Site. The location of sumps will be modified during excavation to provide adequate capture of stormwater. All groundwater and stormwater pumped from sumps will be collected in a storage tank for treatment prior to discharge.

The preliminary design of the treatment system (see schematic in Appendix B) utilizes chitosan-enhanced sand filtration (CESF) and granular activated carbon (GAC) to remove the contaminants to the anticipated indicator levels determined by Ecology. The treatment system will initially be operated in batch mode then transition to flow-through operations after system performance has been demonstrated. During batch operations, pumped water will be routed to a storage tank and then recirculated through the GAC vessels to a weir tank for storage and testing prior to discharge. During flow-through operations, effluent from the GAC vessels will be discharged directly. The discharge will meet the requirements of a Construction Stormwater General Permit (CSWGP) from Ecology as mentioned below.

GSC applied to Ecology for a CSWGP under the National Pollutant Discharge Elimination System (NPDES) program in May 2021. As of the writing of this CMMP, a 30-day public comment period mandatory for the CSWGP process is on-going and an Administrative Order from Ecology is expected in August 2021, prior to construction.

All contaminated groundwater and incidental stormwater run-off at the Site will be managed according to the requirements of the CSWGP. The construction stormwater treatment system design will be finalized based on the CSWGP requirements. All required sampling, testing, and reporting will be completed in accordance with the conditions of the CSWGP.

A copy of the CSWGP will be presented as an appendix to this CMMP when available.

Also, Aspect is preparing a Construction Stormwater Pollution Prevention Plan (CSWPPP) that will be finalized upon receipt of the CSWGP from Ecology. The

CSWPPP will be adjusted based on field conditions as needed and Ecology will be informed of such adjustments.

7 Contact Information

This section lists key contacts involved in implementation or changes to this CMMP. In the event of a discovery of USTs, suspect impacted or contaminated soil, or other possible conditions of environmental concern, the Aspect and GSC project managers listed below should be notified as soon as possible. Primary and backup points of contact are provided in the table below.

Project Team Contacts

Name		Title	Phone	Email
Aspect Consulting				
Primary Contact	Rachel Cornwell	Environmental Field Lead	253.453.6042	rcornwell@aspectconsulting.com
Backup Contact	Fasih Khan	Environmental Project Manager	206.413.5411	fkhani@aspectconsulting.com
Backup Contact	Marc Chalfant	Remediation Engineer	206.331.4606	mchalfant@aspectconsulting.com
Alternate Contact	Dave Cook	Principal	206.838.5837	dcook@aspectconsulting.com
WG Clark – General Contractor				
Primary Contact	Dean Kliegl	Field Superintendent	206.979.3888	dkliegl@wgclark.com
Backup Contact	Molly Mahan	Project Manager	206.340.6655	mmahan@wgclark.com
Backup Contact	Bill Navarre	Assistant Field Superintendent	206.713.5238	bnavarre@wgclark.com
Grand Street Commons				
Primary Contact	Brendan Lawrence	Project Manager	206.290.1097	brendan@lakeunionpartners.com
Backup Contact	Joe Ferguson	Principal	206.799.9776	joe@lakeunionpartners.com
Mt. Baker Housing Association				
Primary Contact	Barry Baker	Sr. Housing Developer	208.761.7145	barry@mtbakerhousing.org

References

Aspect Consulting, LLC (Aspect), 2021, Remedial Investigation and Feasibility Study Report, Grand Street Commons Site, 1750 22nd Avenue S, Seattle, Washington, PPCD Nos. 18-2-14708-5 SEA and 18-2-147414-0, Facility Site ID#97763114, Cleanup Site ID#3018, dated June 17, 2021.

Washington State Department of Ecology (Ecology), 2021, Cleanup Action Plan, Grand Street Commons Site, 1750 22nd Avenue S, Seattle, Washington, Facility Site ID #97763114, Cleanup Site ID#3018, dated June 17, 2021.

Washington State Department of Ecology (Ecology), 2021a, Inadvertent Discovery Plan, Grand Street Commons Site, 1750 22nd Avenue S, Seattle, Washington, Facility Site ID #97763114, Cleanup Site ID#3018, dated May 3, 2021.

Limitations

Work for this project was performed for Grand Street Commons LLC (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix B titled "Report Limitations and Guidelines for Use" for additional information governing the use of this report.

TABLES

Table 1. Summary of Select Historical Soil Results: TPH, BTEX, and VOCs

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	VOCs								
			Analyte	Tetrachloroethene (PCE)	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene (TCE)	Trichlorofluoromethane	Vinyl Chloride	1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane
			Concentration Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			MTCA Method A or B Cleanup Level	0.05	1600		0.03	24000	0.67	38	2	5
Exploration Identification	Sample Date	Sample Identification	Sample Depth									
West Block												
PC-PH-SB-1	09/11/2012	SB1-0.25-5.0	0.25 - 5 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U
PC-PH-SB-1	09/11/2012	SB1-6.5-10.0	6.5 - 10 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U
PC-PH-SB-1	09/11/2012	SB1-10.0-16.0	10 - 16 ft	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U
PC-PH-SB-1	09/11/2012	SB1-25.0-30.0	25 - 30 ft	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U
PC-PH-SB-1	09/11/2012	SB1-34.0-35.0	34 - 35 ft	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U
PC-PH-SB-1	09/11/2012	SB1-40.0-45.0	40 - 45 ft	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U
PC-PH-SB-1	09/11/2012	SB1-52.5-55.0	52.5 - 55 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U
PC-PH-SB-1	09/11/2012	SB1-63.5-65.0	63.5 - 65 ft	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U
PC-PH-SB-1	09/12/2012	SB1-70.0-75.0	70 - 75 ft	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U
PC-PH-SB-13	01/04/2013	SB13-34-36	34 - 36 ft	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0013 U	< 0.0014 U	< 0.0010 U	< 0.0010 U	< 0.0010 U
PC-PH-SB-13	01/04/2013	SB13-44-46	44 - 46 ft	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.0012 U	< 0.0013 U	< 0.00092 U	< 0.00092 U	< 0.00092 U
PC-PH-SB-13	01/04/2013	SB13-54-56	54 - 56 ft	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0015 U	< 0.0017 U	< 0.0012 U	< 0.0012 U	< 0.0012 U
PC-PH-SB-13	01/07/2013	SB13-64-66	64 - 66 ft	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U
PC-PH-SB-13	01/07/2013	SB13-74-76	74 - 76 ft	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U
PC-PH-SB-13	01/07/2013	SB13-86-88	86 - 88 ft	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U
PC-PH-SB-13	01/07/2013	SB13-94-96	94 - 96 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U
PC-PH-SB-13	01/07/2013	SB13-104-106	104 - 106 ft	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U

Notes:

ft - feet below ground surface

"--" - Not analyzed

mg/kg - milligrams per kilogram

MTCA - Model Toxics Control Act

U - Analyte not detected at or above Reporting Limit listed.

Table 1. Summary of Select Historical Soil Results: TPH, BTEX, and VOCs

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	VOCs								
			Analyte	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,1-Dichloropropene	1,2,3-Trichlorobenzene	1,2,3-Trichloropropane	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane (EDB)
			Concentration Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			MTCA Method A or B Cleanup Level	18	180	4000			0.033	34	1.3	0.005
Exploration Identification	Sample Date	Sample Identification	Sample Depth									
West Block												
PC-PH-SB-1	09/11/2012	SB1-0.25-5.0	0.25 - 5 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0055 U	< 0.0011 U
PC-PH-SB-1	09/11/2012	SB1-6.5-10.0	6.5 - 10 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0057 U	< 0.0011 U
PC-PH-SB-1	09/11/2012	SB1-10.0-16.0	10 - 16 ft	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0058 U	< 0.0012 U
PC-PH-SB-1	09/11/2012	SB1-25.0-30.0	25 - 30 ft	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.0047 U	< 0.00093 U
PC-PH-SB-1	09/11/2012	SB1-34.0-35.0	34 - 35 ft	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.0045 U	< 0.00090 U
PC-PH-SB-1	09/11/2012	SB1-40.0-45.0	40 - 45 ft	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.0044 U	< 0.00088 U
PC-PH-SB-1	09/11/2012	SB1-52.5-55.0	52.5 - 55 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0053 U	< 0.0011 U
PC-PH-SB-1	09/11/2012	SB1-63.5-65.0	63.5 - 65 ft	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.0039 U	< 0.00077 U
PC-PH-SB-1	09/12/2012	SB1-70.0-75.0	70 - 75 ft	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.0048 U	< 0.00096 U
PC-PH-SB-13	01/04/2013	SB13-34-36	34 - 36 ft	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0051 U	< 0.0010 U
PC-PH-SB-13	01/04/2013	SB13-44-46	44 - 46 ft	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.0046 U	< 0.00092 U
PC-PH-SB-13	01/04/2013	SB13-54-56	54 - 56 ft	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0059 U	< 0.0012 U
PC-PH-SB-13	01/07/2013	SB13-64-66	64 - 66 ft	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.0049 U	< 0.00099 U
PC-PH-SB-13	01/07/2013	SB13-74-76	74 - 76 ft	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0051 U	< 0.0010 U
PC-PH-SB-13	01/07/2013	SB13-86-88	86 - 88 ft	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.0046 U	< 0.00092 U
PC-PH-SB-13	01/07/2013	SB13-94-96	94 - 96 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0056 U	< 0.0011 U
PC-PH-SB-13	01/07/2013	SB13-104-106	104 - 106 ft	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0058 U	< 0.0012 U

Notes:

ft - feet below ground surface

"--" - Not analyzed

mg/kg - milligrams per kilogram

MTCA - Model Toxics Control Act

U - Analyte not detected at or above Reporting Limit listed.

Table 1. Summary of Select Historical Soil Results: TPH, BTEX, and VOCs

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	VOCs								
			Analyte	1,2-Dichlorobenzene	1,2-Dichloroethane (EDC)	1,2-Dichloropropane	1,3,5-Trimethylbenzene	1,3-Dichlorobenzene	1,3-Dichloropropane	1,4-Dichlorobenzene	2,2-Dichloropropane	2-Chloroethyl Vinyl Ether
			Concentration Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			MTCA Method A or B Cleanup Level	7200	11	27	800			190		
Exploration Identification	Sample Date	Sample Identification	Sample Depth									
West Block												
PC-PH-SB-1	09/11/2012	SB1-0.25-5.0	0.25 - 5 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	--	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0055 U
PC-PH-SB-1	09/11/2012	SB1-6.5-10.0	6.5 - 10 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	--	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0057 U
PC-PH-SB-1	09/11/2012	SB1-10.0-16.0	10 - 16 ft	< 0.0012 U	< 0.0012 U	< 0.0012 U	--	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0058 U
PC-PH-SB-1	09/11/2012	SB1-25.0-30.0	25 - 30 ft	< 0.00093 U	< 0.00093 U	< 0.00093 U	--	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.0047 U
PC-PH-SB-1	09/11/2012	SB1-34.0-35.0	34 - 35 ft	< 0.00090 U	< 0.00090 U	< 0.00090 U	--	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.0045 U
PC-PH-SB-1	09/11/2012	SB1-40.0-45.0	40 - 45 ft	< 0.00088 U	< 0.00088 U	< 0.00088 U	--	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.0044 U
PC-PH-SB-1	09/11/2012	SB1-52.5-55.0	52.5 - 55 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	--	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0053 U
PC-PH-SB-1	09/11/2012	SB1-63.5-65.0	63.5 - 65 ft	< 0.00077 U	< 0.00077 U	< 0.00077 U	--	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.0039 U
PC-PH-SB-1	09/12/2012	SB1-70.0-75.0	70 - 75 ft	< 0.00096 U	< 0.00096 U	< 0.00096 U	--	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.0048 U
PC-PH-SB-13	01/04/2013	SB13-34-36	34 - 36 ft	< 0.0010 U	< 0.0010 U	< 0.0010 U	--	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0064 U
PC-PH-SB-13	01/04/2013	SB13-44-46	44 - 46 ft	< 0.00092 U	< 0.00092 U	< 0.00092 U	--	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.0058 U
PC-PH-SB-13	01/04/2013	SB13-54-56	54 - 56 ft	< 0.0012 U	< 0.0012 U	< 0.0012 U	--	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0075 U
PC-PH-SB-13	01/07/2013	SB13-64-66	64 - 66 ft	< 0.00099 U	< 0.00099 U	< 0.00099 U	--	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.0049 U
PC-PH-SB-13	01/07/2013	SB13-74-76	74 - 76 ft	< 0.0010 U	< 0.0010 U	< 0.0010 U	--	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0051 U
PC-PH-SB-13	01/07/2013	SB13-86-88	86 - 88 ft	< 0.00092 U	< 0.00092 U	< 0.00092 U	--	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.0046 U
PC-PH-SB-13	01/07/2013	SB13-94-96	94 - 96 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	--	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0056 U
PC-PH-SB-13	01/07/2013	SB13-104-106	104 - 106 ft	< 0.0012 U	< 0.0012 U	< 0.0012 U	--	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0058 U

Notes:
ft - feet below ground surface
"--" - Not analyzed
mg/kg - milligrams per kilogram
MTCA - Model Toxics Control Act
U - Analyte not detected at or above Reporting Limit listed.

Table 1. Summary of Select Historical Soil Results: TPH, BTEX, and VOCs

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	VOCs								
			Analyte	2-Chlorotoluene	4-Chlorotoluene	Bromobenzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon Tetrachloride	Chlorobenzene
			Concentration Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			MTCA Method A or B Cleanup Level	1600		640		16	130	110	14	1600
Exploration Identification	Sample Date	Sample Identification	Sample Depth									
West Block												
PC-PH-SB-1	09/11/2012	SB1-0.25-5.0	0.25 - 5 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U
PC-PH-SB-1	09/11/2012	SB1-6.5-10.0	6.5 - 10 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U
PC-PH-SB-1	09/11/2012	SB1-10.0-16.0	10 - 16 ft	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U
PC-PH-SB-1	09/11/2012	SB1-25.0-30.0	25 - 30 ft	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U
PC-PH-SB-1	09/11/2012	SB1-34.0-35.0	34 - 35 ft	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U
PC-PH-SB-1	09/11/2012	SB1-40.0-45.0	40 - 45 ft	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U
PC-PH-SB-1	09/11/2012	SB1-52.5-55.0	52.5 - 55 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U
PC-PH-SB-1	09/11/2012	SB1-63.5-65.0	63.5 - 65 ft	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U
PC-PH-SB-1	09/12/2012	SB1-70.0-75.0	70 - 75 ft	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U
PC-PH-SB-13	01/04/2013	SB13-34-36	34 - 36 ft	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U
PC-PH-SB-13	01/04/2013	SB13-44-46	44 - 46 ft	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U
PC-PH-SB-13	01/04/2013	SB13-54-56	54 - 56 ft	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U
PC-PH-SB-13	01/07/2013	SB13-64-66	64 - 66 ft	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U
PC-PH-SB-13	01/07/2013	SB13-74-76	74 - 76 ft	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U
PC-PH-SB-13	01/07/2013	SB13-86-88	86 - 88 ft	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U
PC-PH-SB-13	01/07/2013	SB13-94-96	94 - 96 ft	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U
PC-PH-SB-13	01/07/2013	SB13-104-106	104 - 106 ft	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U

Notes:
ft - feet below ground surface
"--" - Not analyzed
mg/kg - milligrams per kilogram
MTCA - Model Toxics Control Act
U - Analyte not detected at or above Reporting Limit listed.

Table 1. Summary of Select Historical Soil Results: TPH, BTEX, and VOCs

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	VOCs									
			Analyte	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene (cDCE)	cis-1,3-Dichloropropene	Dibromochloromethane	Dibromomethane	Dichlorodifluoromethane	Methylene Chloride	Methyliodide
			Concentration Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			MTCA Method A or B Cleanup Level		32		160		12	800	16000	0.02	
Exploration Identification	Sample Date	Sample Identification	Sample Depth										
West Block													
PC-PH-SB-1	09/11/2012	SB1-0.25-5.0	0.25 - 5 ft	< 0.0055 U	< 0.0011 U	< 0.0055 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0055 U	< 0.0055 U
PC-PH-SB-1	09/11/2012	SB1-6.5-10.0	6.5 - 10 ft	< 0.0057 U	< 0.0011 U	< 0.0057 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0057 U	< 0.0057 U
PC-PH-SB-1	09/11/2012	SB1-10.0-16.0	10 - 16 ft	< 0.0058 U	< 0.0012 U	< 0.0058 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0058 U	< 0.0058 U
PC-PH-SB-1	09/11/2012	SB1-25.0-30.0	25 - 30 ft	< 0.0047 U	< 0.00093 U	< 0.0047 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.00093 U	< 0.0047 U	< 0.0047 U
PC-PH-SB-1	09/11/2012	SB1-34.0-35.0	34 - 35 ft	< 0.0045 U	< 0.00090 U	< 0.0045 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.00090 U	< 0.0045 U	< 0.0045 U
PC-PH-SB-1	09/11/2012	SB1-40.0-45.0	40 - 45 ft	< 0.0044 U	< 0.00088 U	< 0.0044 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.00088 U	< 0.0044 U	< 0.0044 U
PC-PH-SB-1	09/11/2012	SB1-52.5-55.0	52.5 - 55 ft	< 0.0053 U	< 0.0011 U	< 0.0053 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0053 U	< 0.0053 U
PC-PH-SB-1	09/11/2012	SB1-63.5-65.0	63.5 - 65 ft	< 0.0039 U	< 0.00077 U	< 0.0039 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.00077 U	< 0.0039 U	< 0.0039 U
PC-PH-SB-1	09/12/2012	SB1-70.0-75.0	70 - 75 ft	< 0.0048 U	< 0.00096 U	< 0.0048 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.00096 U	< 0.0048 U	< 0.0048 U
PC-PH-SB-13	01/04/2013	SB13-34-36	34 - 36 ft	< 0.0087 U	< 0.0010 U	< 0.0068 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0051 U	< 0.0051 U
PC-PH-SB-13	01/04/2013	SB13-44-46	44 - 46 ft	< 0.0079 U	< 0.00092 U	< 0.0061 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.0046 U	< 0.0046 U
PC-PH-SB-13	01/04/2013	SB13-54-56	54 - 56 ft	< 0.010 U	< 0.0012 U	< 0.0079 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0059 U	< 0.0059 U
PC-PH-SB-13	01/07/2013	SB13-64-66	64 - 66 ft	< 0.0049 U	< 0.00099 U	< 0.0049 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.00099 U	< 0.0049 U	< 0.0049 U
PC-PH-SB-13	01/07/2013	SB13-74-76	74 - 76 ft	< 0.0051 U	< 0.0010 U	< 0.0051 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0051 U	< 0.0051 U
PC-PH-SB-13	01/07/2013	SB13-86-88	86 - 88 ft	< 0.0046 U	< 0.00092 U	< 0.0046 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.00092 U	< 0.0046 U	< 0.0046 U
PC-PH-SB-13	01/07/2013	SB13-94-96	94 - 96 ft	< 0.0056 U	< 0.0011 U	< 0.0056 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0011 U	< 0.0056 U	< 0.0056 U
PC-PH-SB-13	01/07/2013	SB13-104-106	104 - 106 ft	< 0.0058 U	< 0.0012 U	< 0.0058 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0012 U	< 0.0058 U	< 0.0058 U

Notes:

ft - feet below ground surface

"--" - Not analyzed

mg/kg - milligrams per kilogram

MTCA - Model Toxics Control Act

U - Analyte not detected at or above Reporting Limit listed.

Table 2. Summary of Remedial Investigation Soil Results: TPH and BTEX

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	TPHs			BTEX			
			Analyte	Gasoline Range Organics	Diesel Range Organics	Motor Oil Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes
			Concentration Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			MTCA Method A or B Cleanup Level	30	2000	2000	0.03	7	6	9
Exploration Identification	Sample Date	Sample Identification	Sample Depth							
East Block										
DP-1	09/02/2017	DP-1-5.0	5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-1	09/05/2017	DP-1-15.0	15 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-2	09/05/2017	DP-2-5.0	5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-2	09/05/2017	DP-2-10.0	10 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-3	09/05/2017	DP-3-5.0	5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-3	09/05/2017	DP-3-15.0	15 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-17	09/06/2017	DP-17-3.0	3 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-17	09/06/2017	DP-17-10.0	10 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-18	09/06/2017	DP-18-3.0	3 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-18	09/06/2017	DP-18-7.0	7 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-19	09/06/2017	DP-19-2.0	2 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-20	09/06/2017	DP-20-3.0	3 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-21	09/06/2017	DP-21-2.0	2 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-22	09/06/2017	DP-22-3.0	3 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-1	11/08/2017	AC-SB-1-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-1	11/08/2017	AC-SB-1-10.0	10 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-1	11/08/2017	AC-SB-1-20.0	20 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-2	11/09/2017	AC-SB-2-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-2	11/09/2017	AC-SB-2-10.0	10 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-2	11/09/2017	AC-SB-2-20.0	20 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-3	11/07/2017	AC-SB-3-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-3	11/07/2017	AC-SB-3-15.0	15 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-3	11/07/2017	AC-SB-3-35.0	35 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-7	05/15/2019	AC-SB-7-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-7	05/15/2019	AC-SB-7-7.5	7.5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-7	05/15/2019	AC-SB-7-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-8	03/27/2019	AC-SB-8-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-9	03/27/2019	AC-SB-9-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-9	03/27/2019	AC-SB-9-20.0	20 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-10	03/26/2019	AC-SB-10-10.0	10 ft	**1000**	**13000**	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-10	03/26/2019	AC-SB-10-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-11	05/15/2019	AC-SB-11-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-11	05/15/2019	AC-SB-11-7.5	7.5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-11	05/15/2019	AC-SB-11-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-12A	05/15/2019	AC-SB-12A-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-12A	05/15/2019	AC-SB-12A-7.5	7.5 ft	**110**	**900**	< 250 U	< 0.02 U	< 0.02 U	**0.24**	**0.46**
AC-SB-12A	05/15/2019	AC-SB-12A-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-12B	05/15/2019	AC-SB-12B-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-12B	05/15/2019	AC-SB-12B-7.5	7.5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-12B	05/15/2019	AC-SB-12B-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-12B	05/15/2019	AC-SB-12B-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-13	03/29/2019	AC-SB-13-5.0	5 ft	< 5 U	< 50 U	**370**	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-13	03/29/2019	AC-SB-13-7.5	7.5 ft	**100**	**1200**	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-13	03/29/2019	AC-SB-13-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-14	03/25/2019	AC-SB-14-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-15	03/25/2019	AC-SB-15-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-15	03/25/2019	AC-SB-15-20.0	20 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-16	04/01/2019	AC-SB-16-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-16	04/01/2019	AC-SB-16-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-16	04/01/2019	AC-SB-16-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-17	04/01/2019	AC-SB-17-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-17	04/01/2019	AC-SB-17-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-18	03/25/2019	AC-SB-18-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW4	08/29/2017	AC-MW4-5.0	5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW4	08/29/2017	AC-MW4-15.0	15 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW5	11/08/2017	AC-MW-5-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW5	11/08/2017	AC-MW-5-15.0	15 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW5	11/08/2017	AC-MW-5-35.0	35 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW6	11/09/2017	AC-MW-6-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW6	11/09/2017	AC-MW-6-15.0	15 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW6	11/10/2017	AC-MW-6-30.0	30 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW7	11/10/2017	AC-MW-7-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW7	11/10/2017	AC-MW-7-10.0	10 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW7	11/10/2017	AC-MW-7-15.0	15 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-8	03/27/2019	AC-MW-8-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-8	03/27/2019	AC-MW-8-10.0	10 ft	**130**	**2400**	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-8	03/27/2019	AC-MW-8-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-8	03/27/2019	AC-MW-8-20.0	20 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-13	04/02/2019	AC-MW-13-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-13	04/02/2019	AC-MW-13-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-13	04/02/2019	AC-MW-13-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-14	03/26/2019	AC-MW-14-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-14	03/26/2019	AC-MW-14-20.0	20 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-15	05/14/2019	AC-MW-15-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-15	05/14/2019	AC-MW-15-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-15	05/14/2019	AC-MW-15-25.0	25 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U

Table 2. Summary of Remedial Investigation Soil Results: TPH and BTEX

Project No. 170304, Grand Street Commons Site, Seattle, Washington

Analyte Group				TPHs			BTEX			
Analyte				Gasoline Range Organics	Diesel Range Organics	Motor Oil Range Organics	Benzene	Toluene	Ethylbenzene	Total Xylenes
Concentration Unit				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
MTCA Method A or B Cleanup Level				30	2000	2000	0.03	7	6	9
Exploration Identification	Sample Date	Sample Identification	Sample Depth							
West Block										
DP-10	09/05/2017	DP-10-5.0	5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-11	09/05/2017	DP-11-5.0	5 ft	**2.6**	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-11	09/05/2017	DP-11-10.0	10 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-12	09/05/2017	DP-12-5.0	5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-12	09/05/2017	DP-12-7.5	7.5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-13	09/05/2017	DP-13-5.0	5 ft	**4**	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-13	09/05/2017	DP-13-10.0	10 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-14	09/06/2017	DP-14-3.0	3 ft	**4.3**	**100 X**	**870**	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-14	09/06/2017	DP-14-10.0	10 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-15	09/06/2017	DP-15-3.0	3 ft	< 2 U	< 50 U	**460**	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-15	09/06/2017	DP-15-15.0	15 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-16	09/06/2017	DP-16-3.0	3 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-16	09/06/2017	DP-16-10.0	10 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
ACDMW-1	02/15/2020	ACDMW1-5	5 ft	--	< 50 U	< 250 U	--	--	--	--
AC-MW1	08/28/2017	AC-MW1-3.0	3 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW1	08/28/2017	AC-MW1-10.0	10 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW3	08/29/2017	AC-MW3-5.0	5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW3	08/29/2017	AC-MW3-15.0	15 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW9	11/03/2017	AC-MW-9-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW9	11/03/2017	AC-MW-9-20.0	20 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW10	11/06/2017	AC-MW-10-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW10	11/06/2017	AC-MW-10-20.0	20 ft	< 5 U	**100 X**	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW10	11/06/2017	AC-MW-10-35.0	35 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-16	05/14/2019	AC-MW-16-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-16	05/14/2019	AC-MW-16-20.0	20 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-16	05/14/2019	AC-MW-16-25.0	25 ft	**2900**	**730 X**	< 250 U	< 0.03 U	< 0.05 U	**0.43**	**3.14**
AC-MW-16	05/14/2019	AC-MW-16-30.0	30 ft	**11**	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-16	05/14/2019	AC-MW-16-35.0	35 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-17	04/03/2019	AC-MW-17-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-17	04/03/2019	AC-MW-17-20.0	20 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-17	04/03/2019	AC-MW-17-25.0	25 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-18	04/02/2019	AC-MW-18-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-18	04/02/2019	AC-MW-18-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-18	04/02/2019	AC-MW-18-25.0	25 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-18	04/02/2019	AC-MW-18-30.0	30 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-19	04/03/2019	AC-MW-19-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-19	04/03/2019	AC-MW-19-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-19	04/03/2019	AC-MW-19-20.0	20 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-19	04/03/2019	AC-MW-19-25.0	25 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-20	05/13/2019	AC-MW-20-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-20	05/13/2019	AC-MW-20-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-20	05/13/2019	AC-MW-20-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-22	04/04/2019	AC-MW-22-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-22	04/04/2019	AC-MW-22-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-23	05/17/2019	AC-MW-23-5.0	5 ft	--	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-23	05/17/2019	AC-MW-23-20.0	20 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-23	05/17/2019	AC-MW-23-35.0	35 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-28	04/01/2019	AC-MW-28-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-28	04/01/2019	AC-MW-28-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-28	04/01/2019	AC-MW-28-30.0	30 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-29	02/22/2020	ACMW29-5	5 ft	--	< 50 U	< 250 U	--	--	--	--
AC-SB-4	11/06/2017	AC-SB-4-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-4	11/06/2017	AC-SB-4-10.0	10 ft	**650**	**2300**	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-4	11/06/2017	AC-SB-4-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-4	11/06/2017	AC-SB-4-30.0	30 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-5	11/07/2017	AC-SB-5-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-5	11/07/2017	AC-SB-5-20.0	20 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-5	11/07/2017	AC-SB-5-30.0	30 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-5	11/07/2017	AC-SB-5-35.0	35 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-6	11/03/2017	AC-SB-6-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-6	11/03/2017	AC-SB-6-25.0	25 ft	--	--	--	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-SB-21	05/16/2019	AC-SB-21-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-21	05/16/2019	AC-SB-21-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-21	05/16/2019	AC-SB-21-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-SB-22	02/23/2020	ACSB22-5.0	5 ft	--	< 50 U	< 250 U	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-5.0	5 ft	--	< 50 U	< 250 U	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-5	5 ft	--	< 50 U	< 250 U	--	--	--	--
South Block										
DP-4	09/05/2017	DP-4-5.0	5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-4	09/05/2017	DP-4-10.0	10 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-5	09/05/2017	DP-5-5.0	5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-5	09/05/2017	DP-5-10.0	10 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-6	09/05/2017	DP-6-5.0	5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-7	09/05/2017	DP-7-5.0	5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-7	09/05/2017	DP-7-10.0	10 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-8	09/05/2017	DP-8-5.0	5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-8	09/05/2017	DP-8-10.0	10 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-9	09/05/2017	DP-9-3.0	3 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
DP-9	09/05/2017	DP-9-10.0	10 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW2	08/28/2017	AC-MW2-5.0	5 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW2	08/28/2017	AC-MW2-10.0	10 ft	< 2 U	< 50 U	< 250 U	< 0.03 U	< 0.05 U	< 0.05 U	< 0.1 U
AC-MW-24	05/16/2019	AC-MW-24-5.0	5 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-24	05/16/2019	AC-MW-24-10.0	10 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-24	05/16/2019	AC-MW-24-15.0	15 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U
AC-MW-24	05/16/2019	AC-MW-24-30.0	30 ft	< 5 U	< 50 U	< 250 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.06 U

Notes:

TPH - total petroleum hydrocarbons, BTEX - benzene, toluene, ethylbenzene, and xylenes

ft - feet below ground surface

mg/kg - milligrams per kilogram

"-- "- Not analyzed

* - MTCA cleanup level of Gasoline when benzene is present at the Site.

MTCA = Model Toxics Control Act

U - Analyte not detected at or above the listed Reporting Limit.

X - Chromatographic pattern does not match quantitation standard. However, the listed values are considered detections based on field screening evidence (moderate sheen and slight odor).

Bold value indicates analyte detected at the listed concentration.

Blue shading indicates analyte detected at a concentration greater than the corresponding MTCA cleanup level.

Table 3. Summary of Remedial Investigation Soil Results: 1,4-Dioxane and VOCs
Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group		Chlorinated VOCs											Chlorinated VOCs	Other VOCs									
			Analyte	1,4-Dioxane	Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene (DCE)	trans-1,2-Dichloroethene	Vinyl Chloride	Methylene Chloride	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,2-Dichloroethane (EDC)	Trichlorofluoromethane	trans-1,3-Dichloropropene	1,1,1,2-Tetrachloroethane	1,1,2,2-Tetrachloroethane	1,1-Dichloropropene	1,2,3-Trichlorobenzene	1,2,3-Trichloropropane	1,2,4-Trichlorobenzene	1,2,4-Trimethylbenzene	1,2-Dibromo-3-chloropropane
			Concentration Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			MTCA Method A or B Cleanup Level	10	0.05	0.03	160	1600	0.67	0.02		180	4000	2	18	11	24000		38	5			0.033	34	800	1.3
Exploration Identification	Sample Date	Sample Identification	Sample Depth																							
East Block																										
DP-1	09/02/2017	DP-1-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-1	09/05/2017	DP-1-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-2	09/05/2017	DP-2-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-2	09/05/2017	DP-2-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-3	09/05/2017	DP-3-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-3	09/05/2017	DP-3-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-17	09/06/2017	DP-17-3.0	3 ft	< 0.1 U	< 0.025 U	**0.029**	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-17	09/06/2017	DP-17-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-18	09/06/2017	DP-18-3.0	3 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-18	09/06/2017	DP-18-7.0	7 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-19	09/06/2017	DP-19-2.0	2 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-20	09/06/2017	DP-20-3.0	3 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-21	09/06/2017	DP-21-2.0	2 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-22	09/06/2017	DP-22-3.0	3 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-1	11/08/2017	AC-SB-1-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-1	11/08/2017	AC-SB-1-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-1	11/08/2017	AC-SB-1-20.0	20 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-2	11/09/2017	AC-SB-2-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-2	11/09/2017	AC-SB-2-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-2	11/09/2017	AC-SB-2-20.0	20 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-3	11/07/2017	AC-SB-3-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-3	11/07/2017	AC-SB-3-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-3	11/07/2017	AC-SB-3-35.0	35 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-8	03/27/2019	AC-SB-8-5.0	5 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-8	03/27/2019	AC-SB-8-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-9	03/27/2019	AC-SB-9-5.0	5 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-9	03/27/2019	AC-SB-9-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-9	03/27/2019	AC-SB-9-20.0	20 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-10	03/26/2019	AC-SB-10-5.0	5 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-10	03/26/2019	AC-SB-10-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-10	03/26/2019	AC-SB-10-20.0	20 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-10	03/26/2019	AC-SB-10-30.0	30 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-13	03/29/2019	AC-SB-13-7.5	7.5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	**0.49**	< 0.5 U
AC-SB-13	03/29/2019	AC-SB-13-15.0	15 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-13	03/29/2019	AC-SB-13-30.0	30 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-14	03/25/2019	AC-SB-14-5.0	5 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-14	03/25/2019	AC-SB-14-10.0	10 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-15	03/25/2019	AC-SB-15-20.0	20 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-16	04/01/2019	AC-SB-16-5.0	5 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-17	04/01/2019	AC-SB-17-5.0	5 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-17	04/01/2019	AC-SB-17-10.0	10 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-18	03/25/2019	AC-SB-18-10.0	10 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-19	03/26/2019	AC-SB-19-5.0	5 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-19	03/26/2019	AC-SB-19-15.0	15 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW4	08/29/2017	AC-MW4-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW4	08/29/2017	AC-MW4-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW5	11/08/2017	AC-MW-5-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW5	11/08/2017	AC-MW-5-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW5	11/08/2017	AC-MW-5-35.0	35 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW6	11/09/2017	AC-MW-6-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW6	11/09/2017	AC-MW-6-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW6	11/10/2017	AC-MW-6-30.0	30 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW7	11/10/2017	AC-MW-7-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW7	11/10/2017	AC-MW-7-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW7	11/10/2017	AC-MW-7-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-8	03/27/2019	AC-MW-8-5.0	5 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-8	03/27/2019	AC-MW-8-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-8	03/27/2019	AC-MW-8-15.0	15 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-11	03/28/2019	AC-MW-11-15.0	15 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-12	03/28/2019	AC-MW-12-5.0	5 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-13	04/02/2019	AC-MW-13-5.0	5 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-13	04/02/2019	AC-MW-13-15.0	15 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-13	04/02/2019	AC-MW-13-35.0	35 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-14	03/26/2019	AC-MW-14-5.0	5 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-14	03/26/2019	AC-MW-14-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-14	03/26/2019	AC-MW-14-20.0	20 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
West Block																										
DP-10	09/05/2017	DP-10-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-11	09/05/2017	DP-11-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-11	09/05/2017	DP-11-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-12	09/05/2017	DP-12-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-12	09/05/2017	DP-12-7.5	7.5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-13	09/05/2017	DP-13-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-13	09/05/2017	DP-13-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-14	09/06/2017	DP-14-3.0	3 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-14	09/06/2017	DP-14-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-15	09/06/2017	DP-15-3.0	3 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-15	09/06/2017	DP-15-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-16	09/06/2017	DP-16-3.0	3 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-16	09/06/2017	DP-16-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-DSB1	02/03/2020	AC-DSB1-5	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-10	10 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-15	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-20	20 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-30	30 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-44	44 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-50	50 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-60	60 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-70	70 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-80	80 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-90	90 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-100	100 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-5	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-10	10 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-15	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-20	20 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-30	30 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-40	40 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-50	50 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-60	60 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-70	70 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-80	80 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-90	90 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-100	100 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-4	11/06/2017	AC-SB-4-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-4	11/06/2017	AC-SB-4-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-4	11/06/2017	AC-SB-4-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-4	11/06/2017	AC-SB-4-30.0	30 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-5	11/07/2017	AC-SB-5-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-5	11/07/2017	AC-SB-5-20.0	20 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-5	11/07/2017	AC-SB-5-30.0	30 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-5	11/07/2017	AC-SB-5-35.0	35 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-6	11/03/2017	AC-SB-6-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-SB-6	11/03/2017	AC-SB-6-25.0	25 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U

Table 3. Summary of Remedial Investigation Soil Results: 1,4-Dioxane and VOCs
Project No. 170304, Grand Street Commons Site, Seattle, Washington

Exploration Identification	Sample Date	Sample Identification	Sample Depth	1,4-Dioxane	Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene (DCE)	trans-1,2-Dichloroethene	Vinyl Chloride	Methylene Chloride	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,2-Dichloroethane (EDC)	Trichlorofluoromethane	trans-1,3-Dichloropropene	1,1,1,2-Tetrachloroethane	1,1,2,2-Tetrachloroethane	1,1-Dichloropropene	1,2,3-Trichlorobenzene	1,2,3-Trichloropropane	1,2,4-Trichlorobenzene	1,2,4-Trimethylbenzene	1,2-Dibromo-3-chloropropane
Analyte Group					Chlorinated VOCs											Chlorinated VOCs	Other VOCs									
Concentration Unit				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
MTCA Method A or B Cleanup Level				10	0.05	0.03	160	1600	0.67	0.02		180	4000	2	18	11	24000		38	5			0.033	34	800	1.3
AC-SB-20	03/29/2019	AC-SB-20-15.0	15 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-22	02/23/2020	ACSB22-5.0	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-22	02/23/2020	ACSB22-10.0	10 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-22	02/23/2020	ACSB22-15.0	15 ft	--	**0.044**	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-22	02/23/2020	ACSB22-20.0	20 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-22	02/23/2020	ACSB22-25.0	25 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-22	02/23/2020	ACSB22-30.0	30 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-5.0	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-10.0	10 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-15.0	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-20.0	20 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-25.0	25 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-30.0	30 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-5	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-10	10 ft	--	**0.027**	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-15	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-20	20 ft	--	**0.076**	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-25	25 ft	--	**0.095**	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-30	30 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-26	05/12/2021	AC-SB-26-15.0	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-27	05/12/2021	AC-SB-27-15.0	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-28	05/14/2021	AC-SB-28-5.0	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-28	05/14/2021	AC-SB-28-10.0	10 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-28	05/14/2021	AC-SB28-15.0	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-28	05/14/2021	AC-SB-28-20.0	20 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-28	05/14/2021	AC-SB-28-25.0	25 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-28	05/14/2021	AC-SB-28-30.0	30 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-29	05/11/2021	AC-SB-29-5.0	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-29	05/11/2021	AC-SB-29-10.0	10 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-29	05/11/2021	AC-SB-29-15.0	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-29	05/11/2021	AC-SB-29-20.0	20 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-29	05/11/2021	AC-SB-29-25.0	25 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-29	05/11/2021	AC-SB-29-30.0	30 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-30	05/11/2021	AC-SB-30-5.0	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-30	05/11/2021	AC-SB-30-10.0	10 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-30	05/11/2021	AC-SB-30-15.0	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-30	05/11/2021	AC-SB-30-20.0	20 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-30	05/11/2021	AC-SB-30-25.0	25 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-30	05/11/2021	AC-SB-30-30.0	30 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-31	05/11/2021	AC-SB-31-5.0	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-31	05/11/2021	AC-SB-31-10.0	10 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-31	05/11/2021	AC-SB-31-15.0	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-31	05/11/2021	AC-SB-31-20.0	20 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-31	05/11/2021	AC-SB-31-25.0	25 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-31	05/11/2021	AC-SB-31-30.0	30 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-SB-32	05/12/2021	AC-SB-32-15.0	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-5	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-10	10 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-15	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-20	20 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-30	30 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-40	40 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-50	50 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-60	60 ft	--	**0.12**	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-70	70 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-78	78 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-90	90 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-5	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-10	10 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-15	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-20	20 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-30	30 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-40	40 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-50	50 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-60	60 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-70	70 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-80	80 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-90	90 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW1	08/28/2017	AC-MW1-3.0	3 ft	< 0.05 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW1	08/28/2017	AC-MW1-10.0	10 ft	< 0.05 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW2	08/28/2017	AC-MW2-5.0	5 ft	< 0.05 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW2	08/28/2017	AC-MW2-10.0	10 ft	< 0.05 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW3	08/29/2017	AC-MW3-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW3	08/29/2017	AC-MW3-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW9	11/03/2017	AC-MW-9-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW9	11/03/2017	AC-MW-9-20.0	20 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW10	11/06/2017	AC-MW-10-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW10	11/06/2017	AC-MW-10-20.0	20 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	**0.15**	< 0.5 U
AC-MW10	11/06/2017	AC-MW-10-35.0	35 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-16	05/14/2019	AC-MW-16-15.0	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-16	05/14/2019	AC-MW-16-20.0	20 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-16	05/14/2019	AC-MW-16-25.0	25 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	**64**	< 0.5 U
AC-MW-16	05/14/2019	AC-MW-16-30.0	30 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	**0.11**	< 0.5 U
AC-MW-16	05/14/2019	AC-MW-16-35.0	35 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	**0.15**	< 0.5 U
AC-MW-17	04/03/2019	AC-MW-17-10.0	10 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-18	04/02/2019	AC-MW-18-5.0	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-18	04/02/2019	AC-MW-18-10.0	10 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-18	04/02/2019	AC-MW-18-25.0	25 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-18	04/02/2019	AC-MW-18-30.0	30 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-19	04/03/2019	AC-MW-19-5.0	5 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-19	04/03/2019	AC-MW-19-10.0	10 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-19	04/03/2019	AC-MW-19-20.0	20 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-20	05/13/2019	AC-MW-20-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-20	05/13/2019	AC-MW-20-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-20	05/13/2019	AC-MW-20-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-20	05/13/2019	AC-MW-20-30.0	30 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-21	02/08/2020	ACMW21-5	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-21	02/08/2020	ACMW21-15	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-22	04/04/2019	AC-MW-22-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-22	04/04/2019	AC-MW-22-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-22	04/04/2019	AC-MW-22-30.0	30 ft	< 0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-23	05/17/2019	AC-MW-23-5.0	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-23	05/17/2019	AC-MW-23-20.0	20 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-23	05/17/2019	AC-MW-23-35.0	35 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-27	05/13/2019	AC-MW-27-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-27	05/13/2019	AC-MW-27-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-27	05/13/2019	AC-MW-27-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-27	05/13/2019	AC-MW-27-25.0	25 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-27	05/13/2019	AC-MW-27-35.0	35 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-28	04/01/2019	AC-MW-28-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-28	04/01/2019	AC-MW-28-15.0	15 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-28	04/01/2019	AC-MW-28-30.0	30 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
AC-MW-29	02/22/2020	ACMW29-5	5 ft	--	**0.19**	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-29	02/22/2020	ACMW29-10	10 ft	--	**1.3**	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-29	02/22/2020	ACMW29-15	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-29	02/22/2020	ACMW29-20	20 ft	--	**0.057**	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-29	02/22/2020	ACMW29-30	30 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-30	02/09/2020	ACMW30-5	5 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
AC-MW-30	02/09/2020	ACMW30-15	15 ft	--	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--
South Block																										
DP-4	09/05/2017	DP-4-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-4	09/05/2017	DP-4-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-5	09/05/2017	DP-5-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-5	09/05/2017	DP-5-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-6	09/05/2017	DP-6-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-7	09/05/2017	DP-7-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-7	09/05/2017	DP-7-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-8	09/05/2017	DP-8-5.0	5 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-8	09/05/2017	DP-8-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-9	09/05/2017	DP-9-3.0	3 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U
DP-9	09/05/2017	DP-9-10.0	10 ft	< 0.1 U	< 0.025 U	< 0.02 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.5 U

Notes:
VOC - volatile organic compound
ft - feet below ground surface
mg/kg - milligrams per kilogram
"-- "- Not analyzed
MTCA = Model Toxics Control Act
U - Analyte not detected at or above the listed Reporting Limit.
Bold value indicates analyte detected at the listed concentration.
Blue shading indicates analyte detected at a concentration greater than the corresponding MTCA cleanup level.

Table 3. Summary of Remedial Investigation Soil Results: 1,4-Dioxane and VOCs
Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group		Other VOCs														Other VOCs														Other VOCs							
			Analyte	1,2-Dibromoethane (EDB)	1,2-Dichlorobenzene	1,2-Dichloropropane	1,3,5-Trimethylbenzene	1,3-Dichlorobenzene	1,3-Dichloropropane	1,4-Dichlorobenzene	2,2-Dichloropropane	2-Butanone	2-Chlorotoluene	2-Hexanone	4-Chlorotoluene	4-Methyl-2-pentanone	Acetone	Bromobenzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Tetrachloride	Chlorobenzene	Chloroform	Chloromethane	cis-1,2-Dichloroethene (DCE)	cis-1,3-Dichloropropene	Dibromochloromethane	Dibromomethane	Dichlorodifluoromethane	Isopropylbenzene	m,p-Xylenes	Methyl tert-butyl ether (MTBE)	n-Hexane	n-Propylbenzene	o-Xylene	p-Isopropyltoluene	sec-Butylbenzene	Styrene	tert-Butylbenzene
			Concentration Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			MTCA Method A or B Cleanup Level	0.005	7200	27	800			190		48000	1600	400		6400	72000	640	16	130	110	14	1600	32		160		12	800	16000	8000	16000	0.1	4800	8000	16000		8000	16000	8000
Exploration Identification	Sample Date	Sample Identification	Sample Depth																																					
East Block																																								
DP-1	09/02/2017	DP-1-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-1	09/05/2017	DP-1-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-2	09/05/2017	DP-2-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-2	09/05/2017	DP-2-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-3	09/05/2017	DP-3-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-3	09/05/2017	DP-3-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-17	09/06/2017	DP-17-3.0	3 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-17	09/06/2017	DP-17-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-18	09/06/2017	DP-18-3.0	3 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-18	09/06/2017	DP-18-7.0	7 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-19	09/06/2017	DP-19-2.0	2 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-20	09/06/2017	DP-20-3.0	3 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-21	09/06/2017	DP-21-2.0	2 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-22	09/06/2017	DP-22-3.0	3 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-1	11/08/2017	AC-SB-1-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-1	11/08/2017	AC-SB-1-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-1	11/08/2017	AC-SB-1-20.0	20 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-2	11/09/2017	AC-SB-2-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 UJ	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-2	11/09/2017	AC-SB-2-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 UJ	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-2	11/09/2017	AC-SB-2-20.0	20 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 UJ	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-3	11/07/2017	AC-SB-3-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-3	11/07/2017	AC-SB-3-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-3	11/07/2017	AC-SB-3-35.0	35 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-8	03/27/2019	AC-SB-8-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-8	03/27/2019	AC-SB-8-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-9	03/27/2019	AC-SB-9-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-9	03/27/2019	AC-SB-9-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-9	03/27/2019	AC-SB-9-20.0	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-10	03/26/2019	AC-SB-10-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-10	03/26/2019	AC-SB-10-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-10	03/26/2019	AC-SB-10-20.0	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-10	03/26/2019	AC-SB-10-30.0	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-13	03/29/2019	AC-SB-13-7.5	7.5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	**0.07**	< 0.1 U	< 0.05 U	< 0.25 U	**0.14**	< 0.05 U	**0.16**	**0.24**	< 0.05 U	< 0.05 U
AC-SB-13	03/29/2019	AC-SB-13-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-13	03/29/2019	AC-SB-13-30.0	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-14	03/25/2019	AC-SB-14-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-14	03/25/2019	AC-SB-14-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-15	03/25/2019	AC-SB-15-20.0	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-16	04/01/2019	AC-SB-16-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-17	04/01/2019	AC-SB-17-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-17	04/01/2019	AC-SB-17-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-18	03/25/2019	AC-SB-18-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-19	03/26/2019	AC-SB-19-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-19	03/26/2019	AC-SB-19-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW4	08/29/2017	AC-MW4-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW4	08/29/2017	AC-MW4-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW5	11/08/2017	AC-MW-5-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW5	11/08/2017	AC-MW-5-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW5	11/08/2017	AC-MW-5-35.0	35 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW6	11/09/2017	AC-MW-6-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 UJ	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW6	11/09/2017	AC-MW-6-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 UJ	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW6	11/10/2017	AC-MW-6-30.0	30 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW7	11/10/2017	AC-MW-7-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW7	11/10/2017	AC-MW-7-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW7	11/10/2017	AC-MW-7-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-8	03/27/2019	AC-MW-8-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-8	03/27/2019	AC-MW-8-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	**0.14**	< 0.05 U	< 0.05 U
AC-MW-8	03/27/2019	AC-MW-8-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-11	03/28/2019	AC-MW-11-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-12	03/28/2019	AC-MW-12-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-13	04/02/2019	AC-MW-13-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-13	04/02/2019	AC-MW-13-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-13	04/02/2019	AC-MW-13-35.0	35 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-14	03/26/2019	AC-MW-14-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-14	03/26/2019	AC-MW-14-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-14	03/26/2019	AC-MW-14-20.0	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
West Block																																								
DP-10	09/05/2017	DP-10-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-11	09/05/2017	DP-11-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-11	09/05/2017	DP-11-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-12	09/05/2017	DP-12-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-12	09/05/2017	DP-12-7.5	7.5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-13	09/05/2017	DP-13-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-13	09/05/2017	DP-13-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-14	09/06/2017	DP-14-3.0	3 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-14	09/06/2017	DP-14-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-15	09/06/2017	DP-15-3.0	3 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-15	09/06/2017	DP-15-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-16	09/06/2017	DP-16-3.0	3 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-16	09/06/2017	DP-16-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-DSB1	02/03/2020	AC-DSB1-5	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-10	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-15	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-20	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-30	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-44	44 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-50	50 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-60	60 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-70	70 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-80	80 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-90	90 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB1	02/03/2020	AC-DSB1-100	100 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-5	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-10	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-15	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-20	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-30	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-40	40 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-50	50 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-60	60 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-70	70 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-80	80 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-90	90 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-DSB2	02/05/2020	ACDSB2-100	100 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-4	11/06/2017	AC-SB-4-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-4	11/06/2017	AC-SB-4-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	**0.079**	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	**0.065**	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-4	11/06/2017	AC-SB-4-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-4	11/06/2017	AC-SB-4-30.0	30 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-5	11/07/2017	AC-SB-5-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-5	11/07/2017	AC-SB-5-20.0	20 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-5	11/07/2017	AC-SB-5-30.0	30 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-5	11/07/2017	AC-SB-5-35.0	35 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-6	11/03/2017	AC-SB-6-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-SB-6	11/03/2017	AC-SB-6-25.0	25 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U

Table 3. Summary of Remedial Investigation Soil Results: 1,4-Dioxane and VOCs
Project No. 170304, Grand Street Commons Site, Seattle, Washington

Exploration Identification	Sample Date	Sample Identification	Sample Depth	1,2-Dibromoethane (EDB)	1,2-Dichlorobenzene	1,2-Dichloropropane	1,3,5-Trimethylbenzene	1,3-Dichlorobenzene	1,3-Dichloropropane	1,4-Dichlorobenzene	2,2-Dichloropropane	2-Butanone	2-Chlorotoluene	2-Hexanone	4-Chlorotoluene	4-Methyl-2-pentanone	Acetone	Bromobenzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Tetrachloride	Chlorobenzene	Chloroform	Chloromethane	cis-1,2-Dichloroethene (DCE)	cis-1,3-Dichloropropene	Dibromochloromethane	Dibromomethane	Dichlorodifluoromethane	Isopropylbenzene	m,p-Xylenes	Methyl tert-butyl ether (MTBE)	n-Hexane	n-Propylbenzene	o-Xylene	p-Isopropyltoluene	sec-Butylbenzene	Styrene	tert-Butylbenzene
			Analyte Group		Other VOCs														Other VOCs														Other VOCs							
			Concentration Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			MTCA Method A or B Cleanup Level	0.005	7200	27	800			190		48000	1600	400		6400	72000	640	16	130	110	14	1600	32		160		12	800	16000	8000	16000	0.1	4800	8000	16000		8000	16000	8000
AC-SB-20	03/29/2019	AC-SB-20-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-22	02/23/2020	ACSB22-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-22	02/23/2020	ACSB22-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-22	02/23/2020	ACSB22-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-22	02/23/2020	ACSB22-20.0	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-22	02/23/2020	ACSB22-25.0	25 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-22	02/23/2020	ACSB22-30.0	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-20.0	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-25.0	25 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-30.0	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-5	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-10	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-15	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-20	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-25	25 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-30	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-26	05/12/2021	AC-SB-26-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-27	05/12/2021	AC-SB-27-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-28	05/14/2021	AC-SB-28-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-28	05/14/2021	AC-SB-28-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-28	05/14/2021	AC-SB28-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-28	05/14/2021	AC-SB-28-20.0	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-28	05/14/2021	AC-SB-28-25.0	25 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-28	05/14/2021	AC-SB-28-30.0	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-29	05/11/2021	AC-SB-29-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-29	05/11/2021	AC-SB-29-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-29	05/11/2021	AC-SB-29-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-29	05/11/2021	AC-SB-29-20.0	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-29	05/11/2021	AC-SB-29-25.0	25 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-29	05/11/2021	AC-SB-29-30.0	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-30	05/11/2021	AC-SB-30-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-30	05/11/2021	AC-SB-30-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-30	05/11/2021	AC-SB-30-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-30	05/11/2021	AC-SB-30-20.0	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-30	05/11/2021	AC-SB-30-25.0	25 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-30	05/11/2021	AC-SB-30-30.0	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-31	05/11/2021	AC-SB-31-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-31	05/11/2021	AC-SB-31-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-31	05/11/2021	AC-SB-31-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-31	05/11/2021	AC-SB-31-20.0	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-31	05/11/2021	AC-SB-31-25.0	25 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-31	05/11/2021	AC-SB-31-30.0	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-32	05/12/2021	AC-SB-32-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-5	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-10	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-15	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-20	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-30	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-40	40 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-50	50 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-60	60 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-70	70 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-78	78 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-1	02/15/2020	ACDMW1-90	90 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-5	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-10	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-15	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-20	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-30	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-40	40 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-50	50 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-60	60 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-70	70 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-80	80 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACDMW-2	02/04/2020	ACDMW2-90	90 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW1	08/28/2017	AC-MW1-3.0	3 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW1	08/28/2017	AC-MW1-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW2	08/28/2017	AC-MW2-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW2	08/28/2017	AC-MW2-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW3	08/29/2017	AC-MW3-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW3	08/29/2017	AC-MW3-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW9	11/03/2017	AC-MW-9-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW9	11/03/2017	AC-MW-9-20.0	20 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW10	11/06/2017	AC-MW-10-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW10	11/06/2017	AC-MW-10-20.0	20 ft	< 0.05 U	< 0.05 U	< 0.05 U	**0.14**	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW10	11/06/2017	AC-MW-10-35.0	35 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-16	05/14/2019	AC-MW-16-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-16	05/14/2019	AC-MW-16-20.0	20 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-16	05/14/2019	AC-MW-16-25.0	25 ft	< 0.05 U	< 0.05 U	< 0.05 U	**22**	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	**2**	**3**	< 0.05 U	**18**	**8.1**	**0.14**	**0.93**	**0.96**	< 0.05 U	**0.094**
AC-MW-16	05/14/2019	AC-MW-16-30.0	30 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-16	05/14/2019	AC-MW-16-35.0	35 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-17	04/03/2019	AC-MW-17-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-18	04/02/2019	AC-MW-18-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-18	04/02/2019	AC-MW-18-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-18	04/02/2019	AC-MW-18-25.0	25 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-18	04/02/2019	AC-MW-18-30.0	30 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-19	04/03/2019	AC-MW-19-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-19	04/03/2019	AC-MW-19-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-19	04/03/2019	AC-MW-19-20.0	20 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-20	05/13/2019	AC-MW-20-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-20	05/13/2019	AC-MW-20-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-20	05/13/2019	AC-MW-20-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-20	05/13/2019	AC-MW-20-30.0	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-21	02/08/2020	ACMW21-5	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-21	02/08/2020	ACMW21-15	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-22	04/04/2019	AC-MW-22-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-22	04/04/2019	AC-MW-22-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-22	04/04/2019	AC-MW-22-30.0	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-23	05/17/2019	AC-MW-23-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-23	05/17/2019	AC-MW-23-20.0	20 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-23	05/17/2019	AC-MW-23-35.0	35 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-27	05/13/2019	AC-MW-27-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-27	05/13/2019	AC-MW-27-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-27	05/13/2019	AC-MW-27-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-27	05/13/2019	AC-MW-27-25.0	25 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-27	05/13/2019	AC-MW-27-35.0	35 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-28	04/01/2019	AC-MW-28-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-28	04/01/2019	AC-MW-28-15.0	15 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-28	04/01/2019	AC-MW-28-30.0	30 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
AC-MW-29	02/22/2020	ACMW29-5	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-29	02/22/2020	ACMW29-10	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-29	02/22/2020	ACMW29-15	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-29	02/22/2020	ACMW29-20	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-29	02/22/2020	ACMW29-30	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-30	02/09/2020	ACMW30-5	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-30	02/09/2020	ACMW30-15	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.05 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
South Block																																								
DP-4	09/05/2017	DP-4-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-4	09/05/2017	DP-4-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-5	09/05/2017	DP-5-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-5	09/05/2017	DP-5-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-6	09/05/2017	DP-6-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-7	09/05/2017	DP-7-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-7	09/05/2017	DP-7-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-8	09/05/2017	DP-8-5.0	5 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-8	09/05/2017	DP-8-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-9	09/05/2017	DP-9-3.0	3 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U
DP-9	09/05/2017	DP-9-10.0	10 ft	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.5 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.5 U	< 0.05 U	< 0.1 U	< 0.05 U	< 0.25 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U	< 0.05 U

Notes:
VOC - volatile organic compound
ft - feet below ground surface
mg/kg - milligrams per kilogram
"-- "- Not analyzed
MTCA = Model Toxics Control Act
U - Analyte not detected at or above the listed Reporting Limit.
Bold value indicates analyte detected at the listed concentration.
Blue shading indicates analyte detected at a concentration greater than the corresponding MTCA cleanup level.

Table 4. Summary of Remedial Investigation Soil Results: Metals, PAHs, and PCBs

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	Metals								PAHs					
			Analyte	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene
			Concentration Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			MTCA Method A or B Cleanup Level	20	16000	2		250	2	400	400	4800	NE	24000	NE	0.1	NE
Exploration Identification	Sample Date	Sample Identification	Sample Depth														
East Block																	
DP-1	09/02/2017	DP-1-5.0	5 ft	**5.84**	**78.8**	< 1 U	**18.4**	**20.5**	< 1 U	< 5 UJ	< 1 UJ	--	--	--	--	--	--
DP-1	09/05/2017	DP-1-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-2	09/05/2017	DP-2-5.0	5 ft	**2.69**	**68.6**	< 1 U	**18.5**	**7.08**	< 1 U	< 5 UJ	< 1 UJ	--	--	--	--	--	--
DP-17	09/06/2017	DP-17-3.0	3 ft	--	--	--	--	--	--	--	--	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	**0.013**	**0.017**
DP-19	09/06/2017	DP-19-2.0	2 ft	--	--	--	--	--	--	--	--	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U
DP-20	09/06/2017	DP-20-3.0	3 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-13	03/29/2019	AC-SB-13-7.5	7.5 ft	**2.22**	--	< 1 U	**21.1**	**2.28**	< 1 U	--	--	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U
AC-SB-17	04/01/2019	AC-SB-17-5.0	5 ft	**4.36**	--	< 1 U	**52.8**	**5.99**	< 1 U	--	--	--	--	--	--	--	--
AC-MW4	08/29/2017	AC-MW4-5.0	5 ft	**2.36**	**44.9**	< 1 U	**9.71**	**2.4**	< 1 U	< 1 U	< 1 U	--	--	--	--	--	--
AC-MW-8	03/27/2019	AC-MW-8-10.0	10 ft	**7.65**	--	< 1 U	**28.3**	**2.59**	< 1 U	--	--	**1.1**	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U
AC-MW-15	05/14/2019	AC-MW-15-5.0	5 ft	**1.23**	--	< 1 U	**11.4**	**4.54**	< 1 U	--	--	--	--	--	--	--	--
West Block																	
AC-MW3	08/29/2017	AC-MW3-5.0	5 ft	**2.21**	**38**	< 1 U	**22.2**	**1.89**	< 1 U	< 1 U	< 1 U	--	--	--	--	--	--
AC-MW-16	05/14/2019	AC-MW-16-20.0	20 ft	**1.63**	--	< 1 U	**14.4**	**2.97**	< 1 U	--	--	--	--	--	--	--	--
AC-MW-16	05/14/2019	AC-MW-16-25.0	25 ft	**1.07**	--	< 1 U	**13.8**	**5.85**	< 1 U	--	--	--	--	--	--	--	--
AC-MW-16	05/14/2019	AC-MW-16-30.0	30 ft	**1.71**	--	< 1 U	**17.1**	**1.64**	< 1 U	--	--	--	--	--	--	--	--
AC-MW-18	04/02/2019	AC-MW-18-15.0	15 ft	**1.23**	--	< 1 U	**15.3**	**1.13**	< 1 UJ	--	--	--	--	--	--	--	--
AC-MW-19	04/03/2019	AC-MW-19-5.0	5 ft	**2.09**	--	< 1 U	**19.4**	**11.3**	< 1 U	--	--	--	--	--	--	--	--
AC-MW-20	05/13/2019	AC-MW-20-5.0	5 ft	**1.78**	--	< 1 U	**17.5**	**2.14**	< 1 U	--	--	--	--	--	--	--	--
AC-MW-22	04/04/2019	AC-MW-22-5.0	5 ft	**1.79**	--	< 1 U	**18.9**	**2.83**	< 1 U	--	--	--	--	--	--	--	--
AC-SB-20	03/29/2019	AC-SB-20-5.0	5 ft	**6.31**	--	< 1 U	**54.9**	**5.88**	< 1 U	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-5.0	5 ft	**3.03**	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-15.0	15 ft	**1.77**	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-5	5 ft	**2.85**	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-15	15 ft	**1.64**	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-10	09/05/2017	DP-10-5.0	5 ft	**1.95**	**30**	< 1 U	**16.1**	**1.46**	< 1 U	< 5 UJ	< 1 UJ	--	--	--	--	--	--
DP-11	09/05/2017	DP-11-5.0	5 ft	**7.5**	**104**	< 1 U	**25.9**	**43.5**	< 1 U	< 5 UJ	< 1 UJ	--	--	--	--	--	--
South Block																	
DP-7*	09/05/2017	DP-7-5.0	5 ft	**7.17**	**165**	**16.9**	**36.4**	**310**	< 1 U	< 5 UJ	< 1 UJ	--	--	--	--	--	--
DP-7	09/05/2017	DP-7-10.0	10 ft	--	--	< 1 U	--	< 5 U	--	--	--	--	--	--	--	--	--
DP-23	04/05/2019	DP-23-2.5	2.5 ft	**9.97**	**123**	**1.14**	**24 J**	**258**	< 1 U	< 1 U	< 1 U	--	--	--	--	--	--
DP-23	04/05/2019	DP-23-5.0	5 ft	**6.41**	**139**	< 1 U	**41.4 J**	**6.53**	< 1 U	< 1 U	< 1 U	--	--	--	--	--	--
DP-23	04/05/2019	DP-23-10.0	10 ft	**4.73 J**	**115**	< 1 U	**30.5 J**	**5.75**	< 1 U	< 1 UJ	< 1 UJ	--	--	--	--	--	--
DP-24	04/05/2019	DP-24-2.5	2.5 ft	**8.61**	**200**	**1.3**	**21.7 J**	**249**	< 1 U	< 1 U	< 1 U	--	--	--	--	--	--
DP-24	04/05/2019	DP-24-5.0	5 ft	**2.98**	**66**	< 1 U	**22.5 J**	**21.2**	< 1 U	< 1 U	< 1 U	--	--	--	--	--	--
DP-24	04/05/2019	DP-24-10.0	10 ft	**3.28**	**68.8**	< 1 U	**29.8 J**	< 5 U	< 1 U	< 1 U	< 1 U	--	--	--	--	--	--
DP-25	04/05/2019	DP-25-2.5	2.5 ft	**8.45**	**72.6**	< 1 U	**23.2**	**52.7**	< 1 U	< 1 U	< 1 U	--	--	--	--	--	--
DP-25	04/05/2019	DP-25-5.0	5 ft	**2.65 J**	**136**	< 1 U	**21.8 J**	**5.01**	< 1 U	< 1 UJ	< 1 UJ	--	--	--	--	--	--
DP-25	04/05/2019	DP-25-10.0	10 ft	**9.41 J**	**257**	< 1 U	**50.8 J**	**9.26**	< 1 U	< 1 UJ	< 1 UJ	--	--	--	--	--	--
DP-26	07/03/2019	DP-26-2.5	2.5 ft	--	--	--	--	**217**	--	--	--	--	--	--	--	--	--
DP-26	07/03/2019	DP-26-5.0	5 ft	--	--	--	--	**6.6**	--	--	--	--	--	--	--	--	--
DP-27	07/03/2019	DP-27-2.5	2.5 ft	--	--	--	--	**24.7**	--	--	--	--	--	--	--	--	--
DP-27	07/03/2019	DP-27-5.0	5 ft	--	--	--	--	**6.86**	--	--	--	--	--	--	--	--	--
DP-28	07/03/2019	DP-28-2.5	2.5 ft	--	--	--	--	**15.3**	--	--	--	--	--	--	--	--	--
DP-28	07/03/2019	DP-28-5.0	5 ft	--	--	--	--	**61.1**	--	--	--	--	--	--	--	--	--
DP-29	07/03/2019	DP-29-2.5	2.5 ft	--	--	--	--	**61.2**	--	--	--	--	--	--	--	--	--
DP-29	07/03/2019	DP-29-5.0	5 ft	--	--	--	--	**14.7**	--	--	--	--	--	--	--	--	--
AC-SB-21	05/16/2019	AC-SB-21-5.0	5 ft	**2.18**	--	< 1 U	**18.3**	**3.09**	< 1 U	--	--	--	--	--	--	--	--
AC-MW2	08/28/2017	AC-MW2-5.0	5 ft	--	--	--	--	--	--	--	--	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U
AC-MW2	08/28/2017	AC-MW2-10.0	10 ft	--	--	--	--	--	--	--	--	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U
AC-MW-24	05/16/2019	AC-MW-24-5.0	5 ft	**4.7**	--	< 1 U	**27.7**	**39**	< 1 U	--	--	--	--	--	--	--	--

Notes:

ft - feet below ground surface

mg/kg - milligrams per kilogram

"--" - Not Analyzed

U - Analyte not detected at or above Reporting Limit (RL) listed.

UJ - Analyte not detected and the Reporting Limit (RL) is an estimate

J - Listed value is an estimate.

X - Chromatographic pattern does not match fuel standard used for quantitation

MTCA = Model Toxics Control Act

PAH - polycyclic aromatic hydrocarbon

PCB - polychlorinated biphenyls

***** = Sample was additionally analyzed for Toxicity Characteristic Leachate Procedure (TCLP) lead. The TCLP lead was not detected.

Bold value indicates analyte detected at the listed concentration.

Blue shading indicates analyte detected at a concentration greater than the corresponding MTCA cleanup level.

Table 4. Summary of Remedial Investigation Soil Results: Metals, PAHs, and PCBs

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group							PAHs							PCBs				
			Analyte	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268
			Concentration Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			MTCA Method A or B Cleanup Level	NE	NE	NE	NE	3200	3200	NE	NE	2400	5.6	NE	NE	NE	NE	0.5	0.5	NE	NE
Exploration Identification	Sample Date	Sample Identification	Sample Depth																		
East Block																					
DP-1	09/02/2017	DP-1-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-1	09/05/2017	DP-1-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-2	09/05/2017	DP-2-5.0	5 ft	--	--	--	--	--	--	--	--	--	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U
DP-17	09/06/2017	DP-17-3.0	3 ft	**0.011**	< 0.01 U	**0.015**	< 0.01 U	**0.027**	< 0.01 U	**0.01**	**0.011**	**0.023**	--	--	--	--	--	--	--	--	--
DP-19	09/06/2017	DP-19-2.0	2 ft	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	--	--	--	--	--	--	--	--	--
DP-20	09/06/2017	DP-20-3.0	3 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-13	03/29/2019	AC-SB-13-7.5	7.5 ft	< 0.01 U	< 0.01 U	**0.013**	< 0.01 U	**0.025**	**0.79**	< 0.01 U	**1.3**	**0.11**	< 0.02 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.02 U
AC-SB-17	04/01/2019	AC-SB-17-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW4	08/29/2017	AC-MW4-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-8	03/27/2019	AC-MW-8-10.0	10 ft	< 0.01 U	< 0.01 U	**0.028**	< 0.01 U	**0.042**	**1.4**	< 0.01 U	**2.2**	**0.21**	< 0.02 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.02 U	< 0.02 U
AC-MW-15	05/14/2019	AC-MW-15-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
West Block																					
AC-MW3	08/29/2017	AC-MW3-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-16	05/14/2019	AC-MW-16-20.0	20 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-16	05/14/2019	AC-MW-16-25.0	25 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-16	05/14/2019	AC-MW-16-30.0	30 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-18	04/02/2019	AC-MW-18-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-19	04/03/2019	AC-MW-19-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-20	05/13/2019	AC-MW-20-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW-22	04/04/2019	AC-MW-22-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-20	03/29/2019	AC-SB-20-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-23	02/23/2020	ACSB23-15.0	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-5	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-24	02/22/2020	ACSB24-15	15 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-10	09/05/2017	DP-10-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-11	09/05/2017	DP-11-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
South Block																					
DP-7*	09/05/2017	DP-7-5.0	5 ft	--	--	--	--	--	--	--	--	--	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U
DP-7	09/05/2017	DP-7-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-23	04/05/2019	DP-23-2.5	2.5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-23	04/05/2019	DP-23-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-23	04/05/2019	DP-23-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-24	04/05/2019	DP-24-2.5	2.5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-24	04/05/2019	DP-24-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-24	04/05/2019	DP-24-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-25	04/05/2019	DP-25-2.5	2.5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-25	04/05/2019	DP-25-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-25	04/05/2019	DP-25-10.0	10 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-26	07/03/2019	DP-26-2.5	2.5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-26	07/03/2019	DP-26-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-27	07/03/2019	DP-27-2.5	2.5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-27	07/03/2019	DP-27-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-28	07/03/2019	DP-28-2.5	2.5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-28	07/03/2019	DP-28-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-29	07/03/2019	DP-29-2.5	2.5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DP-29	07/03/2019	DP-29-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-SB-21	05/16/2019	AC-SB-21-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AC-MW2	08/28/2017	AC-MW2-5.0	5 ft	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	--	--	--	--	--	--	--	--	--
AC-MW2	08/28/2017	AC-MW2-10.0	10 ft	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	--	--	--	--	--	--	--	--	--
AC-MW-24	05/16/2019	AC-MW-24-5.0	5 ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

ft - feet below ground surface

mg/kg - milligrams per kilogram

"--" - Not Analyzed

U - Analyte not detected at or above Reporting Limit (RL) listed.

UJ - Analyte not detected and the Reporting Limit (RL) is an estimate

J - Listed value is an estimate.

X - Chromatographic pattern does not match fuel standard used for quantitation

MTCA = Model Toxics Control Act

PAH - polycyclic aromatic hydrocarbon

PCB - polychlorinated biphenyls

***** = Sample was additionally analyzed for Toxicity Characteristic Leachate Procedure (TCLP) lead. The TCLP lead was not detected.

Bold value indicates analyte detected at the listed concentration.

Blue shading indicates analyte detected at a concentration greater than the corresponding MTCA cleanup level.

Table 5. Summary of Monitoring Wells Construction and Groundwater Elevations

Project No. 170304, Grand Street Commons Site, Seattle, Washington

Monitoring Well Location	Monitoring Well Identification	Total Well Depth	Depth to Top of Screen	Depth to Bottom of Screen	Top of Well Monument Elevation	Top of Well Casing Elevation	November 2017 Depth-to-Groundwater	November 2017 Groundwater Elevation	November 2019 Depth-to-Groundwater	November 2019 Groundwater Elevation	March 2020 Depth-to-Groundwater	March 2020 Groundwater Elevation
		Feet bgs	Feet bgs	Feet bgs	Feet	Feet	Feet btoc	Feet	Feet btoc	Feet	Feet btoc	Feet
Shallow Groundwater Monitoring Wells (Screened Above Silt Aquitard)												
East Block	AC-SB-13	30	15	30	77.69	77.38	Not Installed	--	17.74	59.64	16.14	61.24
	AC-MW-4	35	20	35	77.78	77.29	24.29	53.00	23.56	53.73	22.37	54.92
	AC-MW-5	35	20	35	77.78	77.43	18.6	58.83	17.76	59.67	17.22	60.21
	AC-MW-6	30	20	30	77.90	77.39	21.61	55.78	17.84	59.55	12.89	64.50
	AC-MW-7	30	20	30	77.93	77.44	23.55	53.89	21.89	55.55	18.75	58.69
	AC-MW-8	35	20	35	77.92	77.55	Not Installed	--	23.56	53.99	22.29	55.26
	AC-MW-11	35	20	35	77.89	77.50	Not Installed	--	9.79	67.71	8.79	68.71
	AC-MW-12	35	20	35	77.90	77.52	Not Installed	--	20.21	57.31	17.55	59.97
	AC-MW-13	35	15	35	77.63	77.29	Not Installed	--	20.54	56.75	18.68	58.61
	AC-MW-14	35	20	35	77.85	77.45	Not Installed	--	23.4	54.05	22.19	55.26
	AC-MW-15	35	15	35	77.38	76.95	Not Installed	--	23.22	53.73	20	56.95
	URS-MW-12	30.5	20	30	74.41	73.98	9.42	64.56	9.85	64.13	Not accessible	--
	URS-MW-16	30	20	30	72.14	71.73	10.51	61.22	13.92	57.81	13.19	58.54
West Block	AC-MW-1	30	15	30	74.30	73.87	21.01	52.86	20.45	53.42	19.62	54.25
	AC-MW-3	30	15	30	69.01	68.48	14.97	53.51	14.2	54.28	11.34	57.14
	AC-MW-9	35	15	35	76.76	76.21	22.4	53.81	21.5	54.71	20.46	55.75
	AC-MW-10	35	15	35	73.40	72.63	19.18	53.45	18.81	53.82	17.55	55.08
	AC-MW-16	35	15	35	72.66	72.24	Not Installed	--	17.74	54.50	15.61	56.63
	AC-MW-17	35	15	35	74.40	74.01	Not Installed	--	20.38	53.63	19.34	54.67
	AC-MW-18	35	15	35	73.19	72.70	Not Installed	--	18.59	54.11	17.06	55.64
	AC-MW-19	35	15	35	72.37	71.83	Not Installed	--	17.06	54.77	14.7	57.13
	AC-MW-20	35	15	35	72.63	72.11	Not Installed	--	16.65	55.46	13.65	58.46
	AC-MW-21	32	22	32	68.8	68.41	Not Installed	--	Not Installed	--	13.83	54.58
	AC-MW-22	40	15	40	73.62	73.16	Not Installed	--	19.79	53.37	17.84	55.32
	AC-MW-23	35	15	35	73.88	73.48	Not Installed	--	20.21	53.27	15.63	57.85
	AC-MW-27	30	10	30	70.46	69.77	Not Installed	--	23.4	46.37	11.4	58.37
	AC-MW-28	35	10	30	70.09	69.66	Not Installed	--	23.22	46.44	11.27	58.39
	AC-MW-29	30	10	30	70.5	70.00	Not Installed	--	Not Installed	--	15.06	54.94
	AC-MW-30	36	16	36	69.3	68.98	Not Installed	--	Not Installed	--	14.02	54.96
	URS-MW-2	20	6	21	69.23	68.89	12.48	56.41	13.78	55.11	11.13	57.76
	URS-MW-3	30	20	30	71.75	71.48	15.11	56.37	14.75	56.73	12.3	59.18
	URS-MW-10	28	18	28	72.46	72.08	Not Installed	--	16.49	55.59	13.38	58.70
	URS-MW-13	30	20	30	74.46	74.05	20.74	53.31	20.12	53.93	18.85	55.20
	URS-MW-21S	30	14.5	29.5	71.47	71.02	Not Installed	--	15.85	55.17	14.66	56.36
	URS-MW-21D	40	35	40	71.28	70.90	Not Installed	--	15.96	54.94	15.13	55.77
	URS-MW-22	35	25	35	71.51	71.10	Not Installed	--	12.64	58.46	10.89	60.21
	URS-MW-27S	20	15	20	69.69	69.17	14.01	55.16	12.75	56.42	11.20	57.97
	URS-MW-27I	36	31	36	69.81	69.35	Not Installed	--	13.11	56.24	11.1	58.25
	URS-MW-28S	23	18	23	70.06	69.66	Not Installed	--	14.75	54.91	11.61	58.05
	URS-MW-28I	38	33	38	70.22	69.79	15.19	54.60	14.75	55.04	11.93	57.86
	PC-MW-17	30	20	30	69.82	69.49	Not Installed	--	14.81	54.68	13.56	55.93
	PC-MW-30S	24	19	24	69.78	69.51	15.11	54.40	14.85	54.66	14.79	54.72
	PC-MW-30I	45	40	45	69.75	69.46	Not Installed	--	14.92	54.54	14.98	54.48
	PC-MW-31S	19	15	20	70.10	69.78	Not Installed	--	14.25	55.53	12.42	57.36
	PC-MW-31I	40	35	40	70.14	69.76	Not Installed	--	14.66	55.10	13.26	56.50
	PC-MW-33S	21	15	20	70.09	69.68	Not Installed	--	15.64	54.04	14.25	55.43
	PC-MW-33I	46	40	45	70.04	69.61	Not Installed	--	15.58	54.03	14.43	55.18
	PC-MW-34S	21	15	20	70.95	70.56	Not Installed	--	16.26	54.30	15.02	55.54
	PC-MW-34I	40	34	39	70.97	70.58	Not Installed	--	16.28	54.30	15.05	55.53
	PC-MW-35S	35	30	35	73.53	73.09	Not Installed	--	19.04	54.05	17.7	55.39
	PC-MW-35I	50	45	50	73.76	73.27	Not Installed	--	19.25	54.02	17.52	55.75
	PC-SCC1	37.5	27.5	37.5	70.6	70.39	Not Installed	--	15.81	54.58	15.81	54.58
	PC-SCC3	29.5	24.5	29.5	70.6	70.24	Not Installed	--	Not accessible	--	14.68	55.56
South Block	AC-MW-2	25	10	25	69.70	69.32	15.87	53.45	16	53.32	14.9	54.42
	AC-MW-24	38	18	38	76.88	76.31	Not Installed	--	20.54	55.77	22.12	54.19
Deep Groundwater Monitoring Wells (Screened Below Silt Aquitard)												
West Block	AC-DMW-1	90	70	90	70.6	70.32	Not Installed	--	Not Installed	--	15.98	54.34
	AC-DMW-2	90	70	90	70.9	70.52	Not Installed	--	Not Installed	--	16.66	53.86
	URS-MW-28D	59	54	59	69.83	69.35	15.81	43.19	15.81	53.54	15.33	54.02
	PC-MW-30D	68	65	70	69.69	69.32	16.19	53.81	16.19	53.13	15.38	53.94
	PC-MW-31D	67	66	71	70.19	69.80	16.66	54.34	16.66	53.14	16.5	53.30
	PC-MW-33D	98	95	100	69.96	69.57	16.15	83.85	16.15	53.42	15.66	53.91
	PC-MW-34D	100	95	100	71.42	71.00	16.92	83.08	16.92	54.08	16.38	54.62
	PC-MW-35D	95	85	95	73.74	73.35	19.45	75.55	19.45	53.90	18.97	54.38

Notes:

bgs - below existing ground surface

btoc - below top of well casing

"--" - no data

* These wells were installed during the RI Stage III Explorations in February 2020.

All wells were surveyed relative to the North American Vertical Datum (NAVD 88) by PACE Engineers subcontracted to Aspect Consulting, except URS-MW-12 which was inaccessible during the PACE surveys in 2019 and 2020 as it is buried under concrete rubble (approximately 5 feet thick). This well was surveyed in 2017 by Aspect when it was accessible.

Table 6. Summary of Remedial Investigation Groundwater Sampling Data

Project No. 170304, Grand Street Commons Site, Seattle, Washington

Monitoring Well Location	Monitoring Well Identification	Date	Temperature	Specific Conductivity	Dissolved Oxygen	pH	Oxidation Reduction Potential	Turbidity
			Celsius	Microsiemens/ centimeter	Milligrams/ Liter		Millivolts	Nephelometric Turbidity Units
Shallow Groundwater Monitoring Wells (Screened Above Silt Aquitard)								
East Block	AC-SB-13	5/15/2019	13.4	647	0.63	6.38	132	11.6
	AC-MW-4	11/15/2017	13.1	515	2.43	6.49	81.8	6.3
		5/16/2019	13.8	504.4	1.04	6.27	97.6	4.27
	AC-MW-5	11/15/2017	12.7	533.4	2.27	6.62	64.4	--
		5/16/2019	13.7	587	0.77	6.69	46.9	2.62
	AC-MW-6	11/15/2017	13.3	381.8	5.25	7.11	102.6	--
		5/16/2019	13.6	354.6	7.32	6.81	127.3	39.1
	AC-MW-7	11/15/2017	13.4	441	5.66	6.74	106.7	8.84
		5/16/2019	13.6	448	5.53	6.73	116.2	5.99
	AC-MW-8	5/15/2019	13.6	672	1.91	7.03	75.1	4.81
	AC-MW-11	5/16/2019	13.4	723	1.43	6.64	139.7	7.76
	AC-MW-12	5/16/2019	13.5	716	1.64	6.66	123.2	4.84
	AC-MW-13	5/15/2019	13.9	964	0.29	6.58	-2.5	4.49
	AC-MW-14	5/15/2019	13.8	723	0.67	6.55	59.2	10.3
	AC-MW-15	5/20/2019	14.2	618.4	4.97	6.55	149.9	10
	URS-MW-12*	--	--	--	--	--	--	--
	URS-MW-16	5/17/2019	14.2	540.6	0.29	6.67	81.5	5.4
West Block	AC-MW-1	5/22/2019	14.1	408.6	3.34	6.35	72	4.64
	AC-MW-3	5/20/2019	13.0	637.5	2	6.92	130.2	7.32
	AC-MW-9	11/15/2017	13.2	318.2	0.22	6.86	99.9	--
		5/22/2019	15	365.2	0.95	6.39	110.9	6.23
	AC-MW-10	11/15/2017	14.3	692	3.65	7.28	115.8	--
		5/21/2019	14	689	0.21	6.87	-50.9	8.25
	AC-MW-16	5/21/2019	14.3	843	0.16	7.54	25.8	33.8
	AC-MW-17	5/22/2019	14.1	622.3	0.73	7.03	119.4	25.7
	AC-MW-18	5/20/2019	13.7	709	0.29	7.19	101.2	5.6
	AC-MW-19	5/20/2019	13.7	476	0.45	6.67	110	29.3
	AC-MW-20	5/20/2019	12.8	612.6	4.9	6.73	303.1	24.8
	AC-MW-21	3/3/2020	13.7	817	0.14	7.06	97	8.48
	AC-MW-22	5/22/2019	47.6	623	0.21	6.62	110.2	13.3
	AC-MW-23	5/22/2019	15.7	516	5.43	6.75	142.8	3.16
	AC-MW-27	5/20/2019	12.7	591.5	5.39	6.38	273	63.2
	AC-MW-28	5/20/2019	13.7	439.9	6.27	6.82	105.1	7.16
	AC-MW-29	3/3/2020	29.2	803	0.67	6.87	55.4	28.1
	AC-MW-30	3/3/2020	13.5	451.5	2.47	6.64	58.4	9.86
	URS-MW-2	5/17/2019	13.8	399	0.55	6.09	11.7	11
	URS-MW-3	5/17/2019	13.9	431.8	0.49	6.58	112.3	3.22
	URS-MW-10	5/17/2019	13.4	744	6.86	6.2	77.8	15.4
	URS-MW-13	5/21/2019	14.2	259.2	4.27	6.47	38.6	2.38
	URS-MW-21S	5/22/2019	21.2	599	2.48	6.22	137.3	1.49
	URS-MW-21D	5/22/2019	21.7	670	0.87	6.46	154.1	6.88
	URS-MW-22	5/22/2019	19.3	746	0.35	6.9	66.2	5.24
	URS-MW-27S	5/20/2019	12.1	281.7	5.9	6.09	143.6	70.3
	URS-MW-27I	5/20/2019	12.7	287	5.48	6.14	220.2	8.45
	URS-MW-28S	5/20/2019	13.8	273.6	7.4	6.75	79.3	46
	URS-MW-28I	5/20/2019	14.2	409.1	2.35	6.53	72.9	9.46
	PC-MW-17	6/21/2019	33	386.1	0.34	6.63	-16.6	33.1
	PC-MW-30S	5/22/2019	15.2	1187	0.45	6.53	43	4.45
	PC-MW-30I	5/22/2019	15.0	1019	0.74	6.65	124.3	2.66
	PC-MW-31S	6/20/2019	16.3	498.1	6.63	6.03	57.1	13.2
	PC-MW-31I	6/20/2019	16.9	378.9	3.45	6.44	104.1	10.6
	PC-MW-33S	6/20/2019	32.8	673	3.31	7.09	-52.8	9.07
	PC-MW-33I	6/20/2019	54.1	838	0.2	6.7	-130	3.17
	PC-MW-34S	6/21/2019	52.4	631	0.6	7.04	-40	5.2
	PC-MW-34I	6/21/2019	54.7	611	0.61	6.95	-83.9	5.92
	PC-MW-35S	6/21/2019	47.5	801	0.71	6.82	-116.4	4.39
	PC-MW-35I	6/22/2019	47.8	719	0.53	6.87	-99.2	5.56
	PC-SCC1	6/18/2019	43.28	415	0.47	5.85	-17.2	--
		3/3/2020	34.3	369.7	0.54	6.3	3.7	3.63
	PC-SCC3	6/18/2019	12.61	661	2.09	5.63	-22.5	--
		3/3/2020	43.5	691	0.08	7.41	-25.4	18.1
South Block	AC-MW-2	9/1/2017	14.1	566	0.28	6.03	102.8	10.8
		8/27/2019	15.7	555.5	0.27	5.94	136.9	3.42
	AC-MW-24	5/21/2019	13.5	1654	2.98	6.62	111.4	55.2
Deep Groundwater Monitoring Wells (Screened Below Silt Aquitard)								
West Block	AC-DMW-1	3/3/2020	41.1	587	0.57	7.39	-92.2	25.6
	AC-DMW-2	3/3/2020	17.9	632	0.25	7.27	2.2	12.6
	URS-MW-28D	5/20/2019	14.5	327.9	1.78	6.69	98.4	7.66
	PC-MW-30D	5/22/2019	16	1031	0.18	7.15	-154.5	6.74
	PC-MW-31D	6/20/2019	16.1	451.6	4.36	8.2	46.1	8
	PC-MW-33D	6/20/2019	53.4	724	0.12	7.22	-205.9	7.23
	PC-MW-34D	6/21/2019	62.5	712	0.1	7.44	-191.9	9.72
	PC-MW-35D	6/21/2019	50.9	556	0.41	7.1	-112.6	10.3

Notes:

bgs - below existing ground surface

btoc - below top of well casing

"--" - No data

* The battery of the measuring instrument failed. Hence no data is available.

All wells were surveyed relative to the North American Vertical Datum (NAVD88) by PACE Engineers subcontracted to Aspect Consulting except URS-MW-12 which was inaccessible during the PACE surveys in 2019 and 2020 as it is buried under concrete rubble (approximately 5 feet thick). This well was surveyed in 2017 by Aspect when it was accessible.

Table 7. Summary of Select Historical Grab Groundwater Results

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group		Chlorinated VOCs						
			Analyte	1,4-Dioxane	Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene (DCE)	trans-1,2-Dichloroethene	Vinyl Chloride	Chloroethane	Methylene Chloride
			Concentration Unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
			MTCA Method A or B Cleanup Level	0.44	5	5	16	160	0.2		5
Exploration Identification	Sample Identification	Sample Date	Sample Depth								
West Block - Discrete Grab Groundwater Samples from Soil Borings											
PC-PH-SB-1	SB1-25.0 RG	09/11/2012	25 ft	--	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 1.0 U
	SB1-35.0 RG	09/11/2012	35 ft	--	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 1.0 U
	SB1-45.0 RG	09/11/2012	45 ft	--	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 1.0 U
	SB1-55.0 RG	09/11/2012	55 ft	--	--	--	--	--	--	--	--
	SB1-65.0 RG	09/11/2012	65 ft	--	--	--	--	--	--	--	--
	SB1-75.0 RG	09/12/2012	75 ft	--	--	--	--	--	--	--	--
PC-PH-SB-13	SB13-100-110RG	01/08/2013	100 - 110 ft	--	--	--	--	--	--	--	--
	SB13-70-80RG	01/08/2013	70 - 80 ft	--	--	--	--	--	--	--	--
	SB13-80-90RG	01/08/2013	80 - 90 ft	--	--	--	--	--	--	--	--

Notes:

VOCs - Volatile Organic Compounds

"--" - no data

ug/L = micrograms per liter

MTCA - Model Toxics Control Act

Grab = Reconnaissance groundwater sample was reportedly obtained by installing a 2-inch-diameter temporary well constructed of poly vinyl chloride (PVC) casing and screen in the boring. Please see the report titled "Draft for Ecology Review Remedial Investigation-Feasibility Study Report" dated July 25, 2014, that was prepared by others.

U - Analyte not detected at or above Reporting Limit (RL) listed.

Bold indicates chemical detected at the listed concentration.

Table 7. Summary of Select Historical Grab Groundwater Results

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	Chlorinated VOCs					Other VOCs	
			Analyte	1,2-Dichloroethane (EDC)	1,1-Dichloroethane	1,1-Dichloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichlorofluoromethane	1,1,1,2-Tetrachloroethane
			Concentration Unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
			MTCA Method A or B Cleanup Level	5	7.7	400	200	0.77	2400	1.7
Exploration Identification	Sample Identification	Sample Date	Sample Depth							
West Block - Discrete Grab Groundwater Samples from Soil Borings										
PC-PH-SB-1	SB1-25.0 RG	09/11/2012	25 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB1-35.0 RG	09/11/2012	35 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB1-45.0 RG	09/11/2012	45 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB1-55.0 RG	09/11/2012	55 ft	--	--	--	--	--	< 0.20 U	< 0.20 U
	SB1-65.0 RG	09/11/2012	65 ft	--	--	--	--	--	< 0.20 U	< 0.20 U
	SB1-75.0 RG	09/12/2012	75 ft	--	--	--	--	--	< 0.20 U	< 0.20 U
PC-PH-SB-13	SB13-100-110RG	01/08/2013	100 - 110 ft	--	--	--	--	--	**0.56**	< 0.20 U
	SB13-70-80RG	01/08/2013	70 - 80 ft	--	--	--	--	--	< 0.20 U	< 0.20 U
	SB13-80-90RG	01/08/2013	80 - 90 ft	--	--	--	--	--	**1.2**	< 0.20 U

Notes:

VOCs - Volatile Organic Compounds

"--" - no data

ug/L = micrograms per liter

MTCA - Model Toxics Control Act

Grab = Reconnaissance groundwater sample was reportedly obtained by installing a 2-inch-diameter temporary well constructed of poly vinyl chloride (PVC) casing and screen in the boring. Please see the report titled "Draft for Ecology Review Remedial Investigation-Feasibility Study Report" dated July 25, 2014, that was prepared by others.

U - Analyte not detected at or above Reporting Limit (RL) listed.

Bold indicates chemical detected at the listed concentration.

Table 7. Summary of Select Historical Grab Groundwater Results

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	Other VOCs						
			Analyte	trans-1,3-Dichloropropene	1,1,2,2-Tetrachloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,1-Dichloropropene	1,2,3-Trichlorobenzene	1,2,3-Trichloropropane
			Concentration Unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
			MTCA Method A or B Cleanup Level		0.22	7.7	400			0.0015
Exploration Identification	Sample Identification	Sample Date	Sample Depth							
West Block - Discrete Grab Groundwater Samples from Soil Borings										
PC-PH-SB-1	SB1-25.0 RG	09/11/2012	25 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB1-35.0 RG	09/11/2012	35 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB1-45.0 RG	09/11/2012	45 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB1-55.0 RG	09/11/2012	55 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 1.0 U	< 0.20 U	< 0.20 U
	SB1-65.0 RG	09/11/2012	65 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 1.0 U	< 0.20 U	< 0.20 U
	SB1-75.0 RG	09/12/2012	75 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 1.0 U	< 0.20 U	< 0.20 U
PC-PH-SB-13	SB13-100-110RG	01/08/2013	100 - 110 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 1.0 U	< 0.20 U	< 0.20 U
	SB13-70-80RG	01/08/2013	70 - 80 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 1.0 U	< 0.20 U	< 0.20 U
	SB13-80-90RG	01/08/2013	80 - 90 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 1.0 U	< 0.20 U	< 0.20 U

Notes:

VOCs - Volatile Organic Compounds

"--" - no data

ug/L = micrograms per liter

MTCA - Model Toxics Control Act

Grab = Reconnaissance groundwater sample was reportedly obtained by installing a 2-inch-diameter temporary well constructed of poly vinyl chloride (PVC) casing and screen in the boring. Please see the report titled "Draft for Ecology Review Remedial Investigation-Feasibility Study Report" dated July 25, 2014, that was prepared by others.

U - Analyte not detected at or above Reporting Limit (RL) listed.

Bold indicates chemical detected at the listed concentration.

Table 7. Summary of Select Historical Grab Groundwater Results
Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	Other VOCs						
			Analyte	1,2,4-Trichlorobenzene	1,2,4-Trimethylbenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane (EDB)	1,2-Dichlorobenzene	1,2-Dichloropropane	1,3,5-Trimethylbenzene
			Concentration Unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
			MTCA Method A or B Cleanup Level	1.5	80	0.055	0.01	720	1.2	80
Exploration Identification	Sample Identification	Sample Date	Sample Depth							
West Block - Discrete Grab Groundwater Samples from Soil Borings										
PC-PH-SB-1	SB1-25.0 RG	09/11/2012	25 ft	< 0.20 U	--	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	--
	SB1-35.0 RG	09/11/2012	35 ft	< 0.20 U	--	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	--
	SB1-45.0 RG	09/11/2012	45 ft	< 0.20 U	--	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	--
	SB1-55.0 RG	09/11/2012	55 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB1-65.0 RG	09/11/2012	65 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB1-75.0 RG	09/12/2012	75 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
PC-PH-SB-13	SB13-100-110RG	01/08/2013	100 - 110 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB13-70-80RG	01/08/2013	70 - 80 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB13-80-90RG	01/08/2013	80 - 90 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U

Notes:

VOCs - Volatile Organic Compounds

"--" - no data

ug/L = micrograms per liter

MTCA - Model Toxics Control Act

Grab = Reconnaissance groundwater sample was reportedly obtained by installing a 2-inch-diameter temporary well constructed of poly vinyl chloride (PVC) casing and screen in the boring. Please see the report titled "Draft for Ecology Review Remedial Investigation-Feasibility Study Report" dated July 25, 2014, that was prepared by others.

U - Analyte not detected at or above Reporting Limit (RL) listed.

Bold indicates chemical detected at the listed concentration.

Table 7. Summary of Select Historical Grab Groundwater Results

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	Other VOCs							
			Analyte	1,3-Dichlorobenzene	1,3-Dichloropropane	1,4-Dichlorobenzene	2,2-Dichloropropane	2-Butanone	2-Chloroethyl Vinyl Ether	2-Chlorotoluene	2-Hexanone
			Concentration Unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
			MTCA Method A or B Cleanup Level			8.1		4800		160	40
Exploration Identification	Sample Identification	Sample Date	Sample Depth								
West Block - Discrete Grab Groundwater Samples from Soil Borings											
PC-PH-SB-1	SB1-25.0 RG	09/11/2012	25 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	--
	SB1-35.0 RG	09/11/2012	35 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	--
	SB1-45.0 RG	09/11/2012	45 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	--
	SB1-55.0 RG	09/11/2012	55 ft	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	--
	SB1-65.0 RG	09/11/2012	65 ft	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	--
	SB1-75.0 RG	09/12/2012	75 ft	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	--
PC-PH-SB-13	SB13-100-110RG	01/08/2013	100 - 110 ft	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	--
	SB13-70-80RG	01/08/2013	70 - 80 ft	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	--
	SB13-80-90RG	01/08/2013	80 - 90 ft	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	--

Notes:

VOCs - Volatile Organic Compounds

"--" - no data

ug/L = micrograms per liter

MTCA - Model Toxics Control Act

Grab = Reconnaissance groundwater sample was reportedly obtained by installing a 2-inch-diameter temporary well constructed of poly vinyl chloride (PVC) casing and screen in the boring. Please see the report titled "Draft for Ecology Review Remedial Investigation-Feasibility Study Report" dated July 25, 2014, that was prepared by others.

U - Analyte not detected at or above Reporting Limit (RL) listed.

Bold indicates chemical detected at the listed concentration.

Table 7. Summary of Select Historical Grab Groundwater Results

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	Other VOCs							
			Analyte	4-Chlorotoluene	4-Methyl-2-pentanone	Acetone	Bromobenzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane
			Concentration Unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
			MTCA Method A or B Cleanup Level		640	7200	64		0.71	5.5	11
Exploration Identification	Sample Identification	Sample Date	Sample Depth								
West Block - Discrete Grab Groundwater Samples from Soil Borings											
PC-PH-SB-1	SB1-25.0 RG	09/11/2012	25 ft	< 0.20 U	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U
	SB1-35.0 RG	09/11/2012	35 ft	< 0.20 U	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U
	SB1-45.0 RG	09/11/2012	45 ft	< 0.20 U	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U
	SB1-55.0 RG	09/11/2012	55 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	--
	SB1-65.0 RG	09/11/2012	65 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	--
	SB1-75.0 RG	09/12/2012	75 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	--
PC-PH-SB-13	SB13-100-110RG	01/08/2013	100 - 110 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	--
	SB13-70-80RG	01/08/2013	70 - 80 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	--
	SB13-80-90RG	01/08/2013	80 - 90 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	--	< 1.0 U	< 0.20 U	--

Notes:

VOCs - Volatile Organic Compounds

"--" - no data

ug/L = micrograms per liter

MTCA - Model Toxics Control Act

Grab = Reconnaissance groundwater sample was reportedly obtained by installing a 2-inch-diameter temporary well constructed of poly vinyl chloride (PVC) casing and screen in the boring. Please see the report titled "Draft for Ecology Review Remedial Investigation-Feasibility Study Report" dated July 25, 2014, that was prepared by others.

U - Analyte not detected at or above Reporting Limit (RL) listed.

Bold indicates chemical detected at the listed concentration.

Table 7. Summary of Select Historical Grab Groundwater Results

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	Other VOCs							
			Analyte	Carbon Tetrachloride	Chlorobenzene	Chloroform	Chloromethane	cis-1,3-Dichloropropene	Dibromochloromethane	Dibromomethane	Dichlorodifluoro methane
			Concentration Unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
			MTCA Method A or B Cleanup Level	0.63	160	1.4			0.52	80	1600
Exploration Identification	Sample Identification	Sample Date	Sample Depth								
West Block - Discrete Grab Groundwater Samples from Soil Borings											
PC-PH-SB-1	SB1-25.0 RG	09/11/2012	25 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB1-35.0 RG	09/11/2012	35 ft	< 0.20 U	< 0.20 U	**0.42**	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB1-45.0 RG	09/11/2012	45 ft	< 0.20 U	< 0.20 U	**0.63**	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB1-55.0 RG	09/11/2012	55 ft	< 0.20 U	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U
	SB1-65.0 RG	09/11/2012	65 ft	< 0.20 U	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U
	SB1-75.0 RG	09/12/2012	75 ft	< 0.20 U	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U
PC-PH-SB-13	SB13-100-110RG	01/08/2013	100 - 110 ft	< 0.20 U	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U
	SB13-70-80RG	01/08/2013	70 - 80 ft	< 0.20 U	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U
	SB13-80-90RG	01/08/2013	80 - 90 ft	< 0.20 U	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U

Notes:

VOCs - Volatile Organic Compounds

"--" - no data

ug/L = micrograms per liter

MTCA - Model Toxics Control Act

Grab = Reconnaissance groundwater sample was reportedly obtained by installing a 2-inch-diameter temporary well constructed of poly vinyl chloride (PVC) casing and screen in the boring. Please see the report titled "Draft for Ecology Review Remedial Investigation-Feasibility Study Report" dated July 25, 2014, that was prepared by others.

U - Analyte not detected at or above Reporting Limit (RL) listed.

Bold indicates chemical detected at the listed concentration.

Table 7. Summary of Select Historical Grab Groundwater Results

Project No. 170304, Grand Street Commons Site, Seattle, Washington

			Analyte Group	Other VOCs							
			Analyte	Isopropylbenzene	m,p-Xylenes	Methyl tert-butyl ether (MTBE)	Methyliodide	n-Hexane	n-Propylbenzene	o-Xylene	p-Isopropyltoluene
			Concentration Unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
			MTCA Method A or B Cleanup Level	800	1600	20		480	800	1600	
Exploration Identification	Sample Identification	Sample Date	Sample Depth								
West Block - Discrete Grab Groundwater Samples from Soil Borings											
PC-PH-SB-1	SB1-25.0 RG	09/11/2012	25 ft	--	--	--	< 1.0 U	--	--	--	--
	SB1-35.0 RG	09/11/2012	35 ft	--	--	--	< 1.0 U	--	--	--	--
	SB1-45.0 RG	09/11/2012	45 ft	--	--	--	< 1.0 U	--	--	--	--
	SB1-55.0 RG	09/11/2012	55 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB1-65.0 RG	09/11/2012	65 ft	< 0.20 U	< 0.20 U	**0.27**	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB1-75.0 RG	09/12/2012	75 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
PC-PH-SB-13	SB13-100-110RG	01/08/2013	100 - 110 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB13-70-80RG	01/08/2013	70 - 80 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	SB13-80-90RG	01/08/2013	80 - 90 ft	< 0.20 U	< 0.20 U	< 0.20 U	< 1.0 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U

Notes:

VOCs - Volatile Organic Compounds

"--" - no data

ug/L = micrograms per liter

MTCA - Model Toxics Control Act

Grab = Reconnaissance groundwater sample was reportedly obtained by installing a 2-inch-diameter temporary well constructed of poly vinyl chloride (PVC) casing and screen in the boring. Please see the report titled "Draft for Ecology Review Remedial Investigation-Feasibility Study Report" dated July 25, 2014, that was prepared by others.

U - Analyte not detected at or above Reporting Limit (RL) listed.

Bold indicates chemical detected at the listed concentration.

Table 8. Summary of RI Shallow Groundwater Results: TPH and BTEX

Project No. 170304, Grand Street Commons Site, Seattle, Washington

				Analyte Group	**Total Petroleum Hydrocarbons**			**BTEX**			
				Analyte	**Gasoline Range Organics**	**Diesel Range Organics**	**Motor Oil Range Organics**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**
				Concentration Unit	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
				MTCA Method A or B Cleanup Level	**800***	**500**	**500**	**5**	**1000**	**700**	**1000**
Well Identification	**Sample Identification**	**Sample Date**	**Well Screen Depth Interval**	**Installed By**							
East Block											
AC-SB-13	AC-SB-13-051519	05/15/2019	15 - 30 ft	Aspect Consulting during the 2017-200 RI	< 100 U	**780 X**	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW4	AC-MW4-42980	09/02/2017	20 - 35 ft		< 100 U	**100 X**	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
	AC-MW-4-111517	11/15/2017	20 - 35 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
	AC-MW-4-051619	05/16/2019	20 - 35 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW5	AC-MW-5-111517	11/15/2017	20 - 35 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
	AC-MW-5-011218	01/12/2018	20 - 35 ft		--	< 50 U	< 250 U	--	--	--	--
	AC-MW-5-051619	05/16/2019	20 - 35 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW6	AC-MW-6-111517	11/15/2017	20 - 30 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
	AC-MW-6-051619	05/16/2019	20 - 30 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW7	AC-MW-7-111517	11/15/2017	20 - 30 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
	AC-MW-7-051619	05/16/2019	20 - 30 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW-8	AC-MW-8-051519	05/15/2019	20 - 35 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW-11	AC-MW-11-051619	05/16/2019	20 - 35 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW-12	AC-MW-12-051619	05/16/2019	20 - 35 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW-13	AC-MW-13-051519	05/15/2019	15 - 35 ft		< 100 U	**110 X**	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW-14	AC-MW-14-051519	05/15/2019	20 - 35 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW-15	AC-MW-15-052019	05/20/2019	15 - 35 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
URS-MW-12	URS-MW-12-42980	09/02/2017	20 - 30 ft	others prior to 2017	< 100 U	**910**	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
URS-MW-16	URS-MW-16-42979	09/01/2017	20 - 30 ft		< 100 U	**220 X**	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
	URS-MW-16-051719	05/17/2019	20 - 30 ft		< 100 U	**240 X**	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
West Block											
AC-MW1	AC-MW1-42979	09/01/2017	15 - 30 ft	Aspect Consulting during the 2017-200 RI	< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
	AC-MW-1-052219	05/22/2019	15 - 30 ft		< 100 U	**120 X**	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW3	AC-MW3-42979	09/01/2017	15 - 30 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
	AC-MW-3-052019	05/20/2019	15 - 30 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW9	AC-MW-9-111517	11/15/2017	15 - 35 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
	AC-MW-9-052219	05/22/2019	15 - 35 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW10	AC-MW-10-111517	11/15/2017	15 - 35 ft		**32000**	**2800 X**	< 250 U	**460**	**370**	**190**	**4200**
	AC-MW-10-052119	05/21/2019	15 - 35 ft		**5000**	**990 X**	< 250 U	**78**	**29**	**170**	**340**
AC-MW-16	AC-MW-16-052119	05/21/2019	15 - 35 ft		**9300**	**3200 X**	< 250 U	< 0.35 U	< 1 U	**4.2**	**80**
AC-MW-17	AC-MW-17-052219	05/22/2019	15 - 35 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW-18	AC-MW-18-052019	05/20/2019	15 - 35 ft		**13000**	**1900 X**	< 250 U	**160**	**46**	**430**	**1710**
AC-MW-19	AC-MW-19-052019	05/20/2019	15 - 35 ft		< 100 U	**140 X**	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW-20	AC-MW-20-052019	05/20/2019	15 - 35 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW-22	AC-MW-22-052219	05/22/2019	15 - 40 ft		--	--	--	**0.81**	< 1 U	< 1 U	< 2 U
AC-MW-23	AC MW23 052219	05/22/2019	15 - 35 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW-27	AC-MW-27-052019	05/20/2019	10 - 30 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
AC-MW-28	AC-MW-28-052019	05/20/2019	10 - 30 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
PC-MW-30I	PC-MW-30I-052219	05/22/2019	40 - 45 ft	others prior to 2017	--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
PC-MW-30S	PC-MW-30S-42980	09/02/2017	19 - 24 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
	PC-MW-30S-052219	05/22/2019	19 - 24 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
URS-MW-2	URS-MW-2-42979	09/01/2017	6 - 21 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
	URS-MW-2-051719	05/17/2019	6 - 21 ft		< 100 U	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
URS-MW-3	URS-MW-3-42979	09/01/2017	20 - 30 ft		< 100 U	**240 X**	**320 X**	< 0.35 U	< 1 U	< 1 U	< 2 U
	URS-MW-3-051719	05/17/2019	20 - 30 ft		< 100 U	**240 X**	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
URS-MW-10	URS-MW-10-051719	05/17/2019	18 - 28 ft		< 100 U	**53 X**	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
URS-MW-13	URS-MW-13-42979	09/01/2017	20 - 30 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
	URS-MW-13-052119	05/21/2019	20 - 30 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
URS-MW-21S	URS MW21S 052219	05/22/2019	14.5 - 29.5 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
URS-MW-21D	URS-MW-21D-052219	05/22/2019	35 - 40 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
URS-MW-22	URS-MW-22-052219	05/22/2019	25 - 35 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
URS-MW-27S	URS-MW-27S-42979	09/01/2017	15 - 20 ft		< 100 U	< 50 U	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
	URS-MW-27S-052019	05/20/2019	15 - 20 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
URS-MW-27I	URS-MW-27I-052019	05/20/2019	31 - 36 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
URS-MW-28S	URS-MW-28S-052019	05/20/2019	18 - 23 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
URS-MW-28I	URS-MW-28I-42979	09/01/2017	33 - 38 ft		< 100 U	**78 X**	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U
	URS-MW-28I-052019	05/20/2019	33 - 38 ft		--	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
South Block											
AC-MW2	AC-MW2-42979	09/01/2017	10 - 25 ft	Aspect Consulting during the 2017-200 RI	< 100 U	**220 X**	**310 X**	< 0.35 U	< 1 U	< 1 U	< 2 U
	AC-MW-2-051719	05/17/2019	10 - 25 ft		< 100 U	--	--	< 0.35 U	< 1 U	< 1 U	< 2 U
	AC-MW-2-082719	08/27/2019	10 - 25 ft		--	**220 X**	< 250 U	--	--	--	--
AC-MW-24	AC-MW-24-052119	05/21/2019	18 - 38 ft		< 100 U	**65 X**	< 250 U	< 0.35 U	< 1 U	< 1 U	< 2 U

Notes:

ft - feet below ground surface

ug/L - micrograms per liter

"--" = Not analyzed

* Gasoline MTCA cleanup level when benzene is present.

MTCA - Model Toxics Control Act

X - Resulting chromatographic pattern does not match the standard quantitation for diesel fuel likely due to presence of polar organics.

U - Analyte not detected at or above Reporting Limit (RL) listed.

Bold indicates chemical detected at the listed concentration.

Shading indicates analyte detected at a concentration greater than the corresponding MTCA cleanup level.

Table 9. Summary of RI Shallow Groundwater Results: 1,4-Dioxane and VOCs

Project No. 170304, Grand Street Commons Site, Seattle, Washington

				Analyte Group		Chlorinated VOCs								
				Analyte	1,4-Dioxane	Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene (DCE)	trans-1,2-Dichloroethene	Vinyl Chloride	Methylene Chloride	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene
				Concentration Unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
				MTCA Method A or B Cleanup Level	0.44	5	5	16	160	0.2	5		7.7	400
Well Identification	Sample Identification	Sample Date	Well Screen Depth Interval	Well Installed By										
East Block														
AC-SB-13	AC-SB-13-051519	05/15/2019	15 - 30 ft	Aspect Consulting during the 2017-2020 RI	< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW4	AC-MW4-42980	09/02/2017	20 - 35 ft		**4**	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	**9.6**	**31**
	AC-MW-4-111517	11/15/2017	20 - 35 ft		**0.48**	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	**6.5**	**17**
	AC-MW-4-051619	05/16/2019	20 - 35 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	**6.2**	**21**
AC-MW5	AC-MW-5-111517	11/15/2017	20 - 35 ft		< 0.4 U	< 1 U	**2.3**	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	**1**	< 1 U
	AC-MW-5-051619	05/16/2019	20 - 35 ft		< 0.4 U	< 1 U	**1.9**	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW6	AC-MW-6-111517	11/15/2017	20 - 30 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	**2**
	AC-MW-6-051619	05/16/2019	20 - 30 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	**2.2**
AC-MW7	AC-MW-7-111517	11/15/2017	20 - 30 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
	AC-MW-7-051619	05/16/2019	20 - 30 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW-8	AC-MW-8-051519	05/15/2019	20 - 35 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	**3.9**	**9.2**
AC-MW-11	AC-MW-11-051619	05/16/2019	20 - 35 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW-12	AC-MW-12-051619	05/16/2019	20 - 35 ft		**3.3**	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	**13**
AC-MW-13	AC-MW-13-051519	05/15/2019	15 - 35 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW-14	AC-MW-14-051519	05/15/2019	20 - 35 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	**1.6**	**2.5**
AC-MW-15	AC-MW-15-052019	05/20/2019	15 - 35 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
URS-MW-12	URS-MW-12-42980	09/02/2017	20 - 30 ft	Others prior to 2017	< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
URS-MW-16	URS-MW-16-42979	09/01/2017	20 - 30 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
	URS-MW-16-051719	05/17/2019	20 - 30 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
West Block														
AC-MW1	AC-MW1-42979	09/01/2017	15 - 30 ft	Aspect Consulting during the 2017-2020 RI	< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
	AC-MW-1-052219	05/22/2019	15 - 30 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW3	AC-MW3-42979	09/01/2017	15 - 30 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
	AC-MW-3-052019	05/20/2019	15 - 30 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW9	AC-MW-9-111517	11/15/2017	15 - 35 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
	AC-MW-9-052219	05/22/2019	15 - 35 ft		--	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW10	AC-MW-10-111517	11/15/2017	15 - 35 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
	AC-MW-10-052119	05/21/2019	15 - 35 ft		< 0.4 U	< 10 U	< 10 U	< 10 U	< 10 U	< 2 U	< 50 U	< 10 U	< 10 U	< 10 U
AC-MW-16	AC-MW-16-052119	05/21/2019	15 - 35 ft		--	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW-17	AC-MW-17-052219	05/22/2019	15 - 35 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW-18	AC-MW-18-052019	05/20/2019	15 - 35 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW-19	AC-MW-19-052019	05/20/2019	15 - 35 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW-20	AC-MW-20-052019	05/20/2019	15 - 35 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW-21	ACMW21-20200303	03/03/2020	22 - 32 ft		--	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 UJ	< 1 U	< 1 U
AC-MW-22	AC-MW-22-052219	05/22/2019	15 - 40 ft		< 0.4 U	**12**	**4**	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW-23	AC MW23 052219	05/22/2019	15 - 35 ft		--	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW-27	AC-MW-27-052019	05/20/2019	10 - 30 ft		< 0.4 U	**8**	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW-28	AC-MW-28-052019	05/20/2019	10 - 30 ft		< 0.4 U	**1.4**	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW-29	ACMW29-20200303	03/03/2020	10 - 30 ft		--	**190**	**14**	**2.3**	< 1 U	< 0.2 U	< 5 U	< 1 UJ	< 1 U	< 1 U
AC-MW-30	ACMW30-20200304	03/03/2020	16 - 36 ft		--	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 UJ	< 1 U	< 1 U
PC-MW-17	PC-MW-17-062119	06/21/2019	20 - 30 ft	Others prior to 2017	--	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
PC-MW-30S	PC-MW-30S-42980	09/02/2017	19 - 24 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
	PC-MW-30S-052219	05/22/2019	19 - 24 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
PC-MW-30I	PC-MW-30I-052219	05/22/2019	40 - 45 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
PC-MW-31S	PC-MW-31S-062019	06/20/2019	15 - 20 ft		--	**13**	**1.7**	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
PC-MW-31I	PC-MW-31I-062019	06/20/2019	35 - 40 ft		--	**10**	**3.9**	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
PC-MW-33S	PC-MW-33S-062019	06/20/2019	15 - 20 ft		--	**1.3**	**12**	**4.1**	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
PC-MW-33I	PC-MW-33I-062019	06/20/2019	40 - 45 ft		--	**3.7**	**9.5**	**9**	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
PC-MW-34S	PC-MW-34S-062119	06/21/2019	15 - 20 ft		--	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
PC-MW-34I	PC-MW-34I-062119	06/21/2019	34 - 39 ft		--	**3.5**	**9.8**	**13**	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
PC-MW-35S	PC-MW-35S-062119	06/21/2019	30 - 35 ft		--	**1.6**	**3.6**	**1.7**	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
PC-MW-35I	PC-MW-35I-062119	06/21/2019	45 - 50 ft		--	**7.9**	**6.8**	**1.8**	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
PC-SCC1	PCSCC1-20200303	03/03/2020	27.5 - 37.5 ft	Others prior to 2017	--	**45**	**1**	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 UJ	< 1 U	< 1 U
PC-SCC3	PCSCC3-20200303	03/03/2020	24.5 - 29.5 ft		--	**2.7**	**9**	**2.5**	< 1 U	**0.21**	< 5 U	< 1 UJ	< 1 U	**1.1**
URS-MW-2	URS-MW-2-42979	09/01/2017	6 - 21 ft		< 0.4 U	**2.2**	< 1 U	**1.5**	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
	URS-MW-2-051719	05/17/2019	6 - 21 ft		< 0.4 U	**2.3**	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
URS-MW-3	URS-MW-3-42979	09/01/2017	20 - 30 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
	URS-MW-3-051719	05/17/2019	20 - 30 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
URS-MW-10	URS-MW-10-051719	05/17/2019	18 - 28 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
URS-MW-13	URS-MW-13-42979	09/01/2017	20 - 30 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
URS-MW-13	URS-MW-13-052119	05/21/2019	20 - 30 ft		--	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
URS-MW-21S	URS MW21S 052219	05/22/2019	14.5 - 29.5 ft		--	**2.1**	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
URS-MW-21D	URS-MW-21D-052219	05/22/2019	35 - 40 ft		--	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
URS-MW-22	URS-MW-22-052219	05/22/2019	25 - 35 ft		--	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
URS-MW-27S	URS-MW-27S-42979	09/01/2017	15 - 20 ft		< 0.4 U	**11**	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
	URS-MW-27S-052019	05/20/2019	15 - 20 ft		< 0.4 U	**11**	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
URS-MW-27I	URS-MW-27I-052019	05/20/2019	31 - 36 ft		< 0.4 U	**25**	**2.1**	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
URS-MW-28S	URS-MW-28S-052019	05/20/2019	18 - 23 ft		< 0.4 U	< 1 U	**2.1**	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
URS-MW-28I	URS-MW-28I-42979	09/01/2017	33 - 38 ft		**0.69**	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
	URS-MW-28I-052019	05/20/2019	33 - 38 ft		**0.93**	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
South Block														
AC-MW-2	AC-MW2-42979	09/01/2017	10 - 25 ft	Aspect Consulting during the 2017-2020 RI	< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
	AC-MW-2-051719	05/17/2019	10 - 25 ft		< 0.4 U	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U
AC-MW-24	AC-MW-24-052119	05/21/2019	18 - 38 ft		--	< 1 U	< 1 U	< 1 U	< 1 U	< 0.2 U	< 5 U	< 1 U	< 1 U	< 1 U

Notes:
ft - feet below ground surface
ug/L - micrograms per liter
"--" - Not analyzed
MTCA - Model Toxics Control Act
U - Analyte not detected at or above Reporting Limit (RL) listed.
Bold indicates chemical detected at the listed concentration.
Shading indicates analyte detected at a concentration greater than the corresponding MTCA cleanup level.

Table 9. Summary of RI Shallow Groundwater Results: 1,4-Dioxane and VOCs

Project No. 170304, Grand Street Commons Site, Seattle, Washington

	Chlorinated VOCs	Other VOCs									
1,1,1-Trichloroethane	1,1,2-Trichloroethane	trans-1,3-Dichloropropene	Trichlorofluoromethane	1,1,1,2-Tetrachloroethane	1,1,2,2-Tetrachloroethane	1,1-Dichloropropene	1,2,3-Trichlorobenzene	1,2,3-Trichloropropane	1,2,4-Trichlorobenzene	1,2,4-Trimethylbenzene
ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
200	0.77		2400	1.7	0.22			0.0015	1.5	80
1.5	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
18	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
12	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
11	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
2.1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1.8	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
3.5	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
2.9	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
2.2	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
9.9	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	1000
< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	360
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	920
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	770
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	--	--	--	--	--	--	--	--	--	--
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	1.5

Table 9. Summary of RI Shallow Groundwater Results: 1,4-Dioxane and VOCs
Project No. 170304, Grand Street Commons Site, Seattle, Washington

Other VOCs									
1,2-Dibromo-3-chloropropane	1,2-Dibromoethane (EDB)	1,2-Dichlorobenzene	1,2-Dichloroethane (EDC)	1,2-Dichloropropane	1,3,5-Trimethylbenzene	1,3-Dichlorobenzene	1,3-Dichloropropane	1,4-Dichlorobenzene	2,2-Dichloropropane
ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
0.055	0.01	720	5	1.2	80			8.1	
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	**300**	< 1 U	< 1 U	< 1 U	< 1 U
< 100 U	< 10 U	< 10 U	< 10 U	< 10 U	**85**	< 10 U	< 10 U	< 10 U	< 10 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	**390**	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	**230**	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
--	--	--	< 1 U	--	--	--	--	--	--
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
--	--	--	< 1 U	--	--	--	--	--	--
--	--	--	< 1 U	--	--	--	--	--	--
--	--	--	< 1 U	--	--	--	--	--	--
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
--	--	--	< 1 U	--	--	--	--	--	--
--	--	--	< 1 U	--	--	--	--	--	--
--	--	--	< 1 U	--	--	--	--	--	--
--	--	--	< 1 U	--	--	--	--	--	--
--	--	--	< 1 U	--	--	--	--	--	--
--	--	--	< 1 U	--	--	--	--	--	--
--	--	--	< 1 U	--	--	--	--	--	--
--	--	--	< 1 U	--	--	--	--	--	--
--	--	--	< 1 U	--	--	--	--	--	--
--	--	--	< 1 U	--	--	--	--	--	--
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U

Table 9. Summary of RI Shallow Groundwater Results: 1,4-Dioxane and VOCs

Project No. 170304, Grand Street Commons Site, Seattle, Washington

Other VOCs													
2-Butanone	2-Chlorotoluene	2-Hexanone	4-Chlorotoluene	4-Methyl-2-pentanone	Acetone	Bromobenzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Tetrachloride	Chlorobenzene	Chloroform	Chloromethane
ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
4800	**160**	**40**		**640**	**7200**	**64**	**0.71**	**5.5**	**11**	**0.63**	**160**	**1.4**	
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	**18 J**	< 1 U	< 1 U	< 1 U	< 1 UJ	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	**21 J**	< 1 U	< 1 U	< 1 U	< 1 UJ	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	**18 J**	< 1 U	< 1 U	< 1 U	< 1 UJ	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 10 U	< 1 U	< 1 U	< 1 U	< 1 UJ	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	--	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	--	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	--	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	**14 J**	< 1 U	< 1 U	< 1 UJ	< 1 U	< 1 U	< 1 U	**1.8**	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
24	< 1 U	**16**	< 1 U	< 10 U	**34 J**	< 1 U	< 1 U	< 1 U	< 1 UJ	< 1 U	< 1 U	< 1 U	< 10 U
< 100 U	< 10 U	< 100 U	< 10 U	< 100 U	< 500 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 100 U
46	< 1 U	< 10 U	< 1 U	< 10 U	**63**	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
39	< 1 U	< 10 U	< 1 U	< 10 U	**81**	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
--	--	--	--	--	--	--	--	--	--	--	--	--	--
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	--	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	--	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	--	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 10 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 10 U
< 10 U	< 1 U	< 10 U	< 1 U	< 10 U	< 50 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	**1.4**	< 10 U

Table 9. Summary of RI Shallow Groundwater Results: 1,4-Dioxane and VOCs

Project No. 170304, Grand Street Commons Site, Seattle, Washington

Other VOCs										Other VOCs		

cis-1,3-Dichloropropene	Dibromochloromethane	Dibromomethane	Dichlorodifluoromethane	Isopropylbenzene	Methyl tert-butyl ether (MTBE)	n-Hexane	n-Propylbenzene	o-Xylene	p-Isopropyltoluene	sec-Butylbenzene	Styrene	tert-Butylbenzene
ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	0.52	80	1600	800	20	480	800	1600		800	1600	800
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	**23**	< 1 U	**150**	**25**	**1300**	**5.5**	**4.4**	< 1 U	**1.4**
< 10 U	< 10 U	< 10 U	< 10 U	**16**	< 10 U	**42**	**31**	**100**	< 10 U	< 10 U	< 10 U	< 10 U
< 1 U	< 1 U	< 1 U	< 1 U	**29**	< 1 U	**70**	**60**	**6**	**9**	**8**	< 1 U	**1.1**
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	**38**	< 1 U	**48**	**75**	**310**	**4.6**	**4.8**	< 1 U	**2**
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
--	--	--	--	--	--	--	--	--	--	--	--	--
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U

Table 10. Summary of RI Shallow Groundwater Results: Metals

Project No.170304, Grand Street Commons Site, Seattle, Washington

				Analyte Group	Metals							
				Analyte	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
				Concentration Unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
				MTCA Method A or B Cleanup Level	5	3200	5	50	15	2	80	80
Well Location	**Sample Identification**	**Sample Date**	**Well Screen Depth Interval**	**Installed By**								
East Block												
AC-SB-13	AC-SB-13-051519	05/15/2019	15 - 30 ft	Aspect Consulting during the 2017-2020 RI	< 1 U	**48.7**	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
AC-MW4	AC-MW4-42980	09/02/2017	20 - 35 ft		**1.27**	**46.5**	< 1 U	< 1 U	< 1 U	< 1 U	**1.15**	< 1 U
AC-MW4	AC-MW-4-051619	05/16/2019	20 - 35 ft		< 1 U	**22.3**	< 1 U	**1.33**	< 1 U	< 1 U	< 1 U	< 1 U
AC-MW7	AC-MW-7-051619	05/16/2019	20 - 30 ft		**1.66**	**13.1**	< 1 U	**5.61**	< 1 U	< 1 U	< 1 U	< 1 U
AC-MW-8	AC-MW-8-051519	05/15/2019	20 - 35 ft		**2.27**	**2.68**	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
AC-MW-15	AC-MW-15-052019	05/20/2019	15 - 35 ft		< 1 U	--	< 1 U	< 1 U	< 1 U	< 1 U	--	--
URS-MW-16	URS-MW-16-051719	05/17/2019	20 - 30 ft	others prior to 2017	**1.72**	--	< 1 U	< 1 U	< 1 U	< 1 U	--	--
West Block												
AC-MW1	AC-MW1-42979	09/01/2017	15 - 30 ft	Aspect Consulting during the 2017-2020 RI	< 1 U	**18**	< 1 U	**1.42**	< 1 U	< 1 U	< 1 U	< 1 U
AC-MW1	AC-MW-1-052219	05/22/2019	15 - 30 ft		**1.19**	--	< 1 U	**1.95**	< 1 U	< 1 U	--	--
AC-MW3	AC-MW3-42979	09/01/2017	15 - 30 ft		**2.21**	**42.2**	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
AC-MW9	AC-MW-9-111517	11/15/2017	15 - 35 ft		**1.81**	**21.6**	< 1 U	**3.5**	< 1 U	< 1 UJ	< 1 U	< 1 U
AC-MW9	AC-MW-9-052219	05/22/2019	15 - 35 ft		**1.14**	--	< 1 U	**1.92**	< 1 U	< 1 U	--	--
AC-MW10	AC-MW-10-111517	11/15/2017	15 - 35 ft		**5.52**	**50.4**	< 1 U	**1.02**	**5.81**	< 1 UJ	< 1 U	< 1 U
AC-MW10	AC-MW-10-052119	05/21/2019	15 - 35 ft		**10.5**	--	< 1 U	< 1 U	< 1 U	< 1 U	--	--
AC-MW-16	AC-MW-16-052119	05/21/2019	15 - 35 ft		**4.93**	--	< 1 U	**2.11**	**9.29**	< 1 U	--	--
AC-MW-17	AC-MW-17-052219	05/22/2019	15 - 35 ft		**2.27**	--	< 1 U	**1.24**	< 1 U	< 1 U	--	--
AC-MW-18	AC-MW-18-052019	05/20/2019	15 - 35 ft		**5.55**	--	< 1 U	< 1 U	**1.8**	< 1 U	--	--
AC-MW-19	AC-MW-19-052019	05/20/2019	15 - 35 ft		**1.22**	--	< 1 U	**1.94**	< 1 U	< 1 U	--	--
AC-MW-20	AC-MW-20-052019	05/20/2019	15 - 35 ft		**1.42**	--	< 1 U	**1.23**	< 1 U	< 1 U	--	--
AC-MW-22	AC-MW-22-052219	05/22/2019	15 - 40 ft		**10.7**	--	< 1 U	< 1 U	< 1 U	< 1 U	--	--
AC-MW-23	AC MW23 052219	05/22/2019	15 - 35 ft		**1.66**	--	< 1 U	< 1 U	< 1 U	< 1 U	--	--
AC-MW-27	AC-MW-27-052019	05/20/2019	10 - 30 ft		**1.1**	--	--	--	--	--	--	--
AC-MW-28	AC-MW-28-052019	05/20/2019	10 - 30 ft		**1.36**	--	--	--	--	--	--	--
AC-MW-29	ACMW29-20200303	03/03/2020	10 - 30 ft		**4.41**	--	--	--	--	--	--	--
AC-MW-30	ACMW30-20200304	03/03/2020	16 - 36 ft		**1.76**	--	--	--	--	--	--	--
PC-MW-17	PC-MW-17-062119	06/21/2019	20 - 30 ft	others prior to 2017	**10.3**	--	< 1 U	**1.87**	**2.85**	< 1 U	--	--
PC-MW-31S	PC-MW-31S-062019	06/20/2019	15 - 20 ft		**1.46**	--	--	--	--	--	--	--
PC-MW-31I	PC-MW-31I-062019	06/20/2019	35 - 40 ft		**2.07**	--	--	--	--	--	--	--
PC-MW-33S	PC-MW-33S-062019	06/20/2019	15 - 20 ft		**19.9**	--	--	--	--	--	--	--
PC-MW-33I	PC-MW-33I-062019	06/20/2019	40 - 45 ft		**31.4**	--	--	--	--	--	--	--
PC-MW-34S	PC-MW-34S-062119	06/21/2019	15 - 20 ft		**42.2**	--	< 1 U	< 1 U	< 1 U	< 1 U	--	--
PC-MW-34I	PC-MW-34I-062119	06/21/2019	34 - 39 ft		**15.1**	--	< 1 U	< 1 U	< 1 U	< 1 U	--	--
PC-MW-35S	PC-MW-35S-062119	06/21/2019	30 - 35 ft		**21.1**	--	< 1 U	< 1 U	< 1 U	< 1 U	--	--
PC-MW-35I	PC-MW-35I-062119	06/21/2019	45 - 50 ft		**36.5**	--	< 1 U	< 1 U	< 1 U	< 1 U	--	--
PC-SCC1	PCSCC1-20200303	03/03/2020	27.5 - 37.5 ft		**1.51**	--	--	--	--	--	--	--
PC-SCC3	PCSCC3-20200303	03/03/2020	24.5 - 29.5 ft		**4.55**	--	--	--	--	--	--	--
URS-MW-3	URS-MW-3-051719	05/17/2019	20 - 30 ft		**1.22**	--	< 1 U	< 1 U	< 1 U	< 1 U	--	--
URS-MW-10	URS-MW-10-051719	05/17/2019	18 - 28 ft		< 1 U	--	< 1 U	**2.68**	< 1 U	< 1 U	--	--
URS-MW-13	URS-MW-13-052119	05/21/2019	20 - 30 ft		< 1 U	--	< 1 U	**3.3**	< 1 U	< 1 U	--	--
URS-MW-21S	URS MW21S 052219	05/22/2019	14.5 - 29.5 ft		< 1 U	--	< 1 U	**1.22**	< 1 U	< 1 U	--	--
URS-MW-21D	URS-MW-21D-052219	05/22/2019	35 - 40 ft		**1.14**	--	< 1 U	< 1 U	< 1 U	< 1 U	--	--
URS-MW-22	URS-MW-22-052219	05/22/2019	25 - 35 ft		**1.65**	--	< 1 U	**1.69**	< 1 U	< 1 U	--	--
URS-MW-27S	URS-MW-27S-052019	05/20/2019	15 - 20 ft		**1.44**	--	--	--	--	--	--	--
URS-MW-27I	URS-MW-27I-052019	05/20/2019	31 - 36 ft		< 1 U	--	--	--	--	--	--	--
South Block												
AC-MW2	AC-MW2-42979	09/01/2017	10 - 25 ft	Aspect Consulting during the 2017-2020 RI	**1.19**	**29**	< 1 U	< 1 U	< 1 U	< 1 U	**2.95**	< 1 U
AC-MW2	AC-MW-2-051719	05/17/2019	10 - 25 ft		**2.65**	--	< 1 U	< 1 U	< 1 U	< 1 U	--	--
AC-MW-24	AC-MW-24-052119	05/21/2019	18 - 38 ft		**2.41**	--	< 1 U	**2.29**	< 1 U	< 1 U	--	--

Notes:

ft - feet below ground surface

ug/L - micrograms per liter

"--" = Not analyzed

MTCA - Model Toxics Control Act

U - Analyte not detected at or above Reporting Limit (RL) listed.

Bold indicates chemical detected at the listed concentration.

Shading indicates analyte detected at a concentration greater than the corresponding MTCA cleanup level.

FIGURES

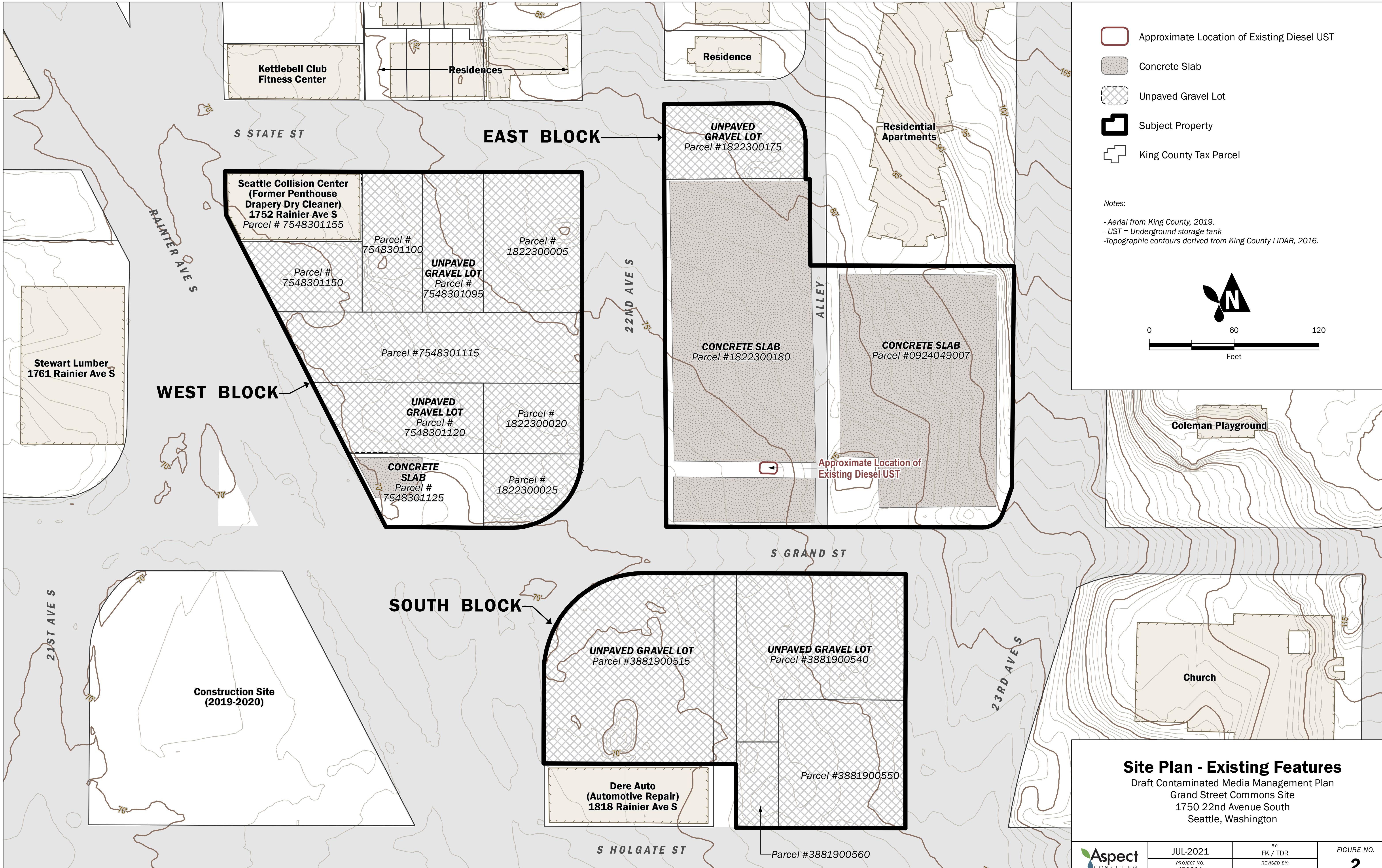
Site Location Map

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

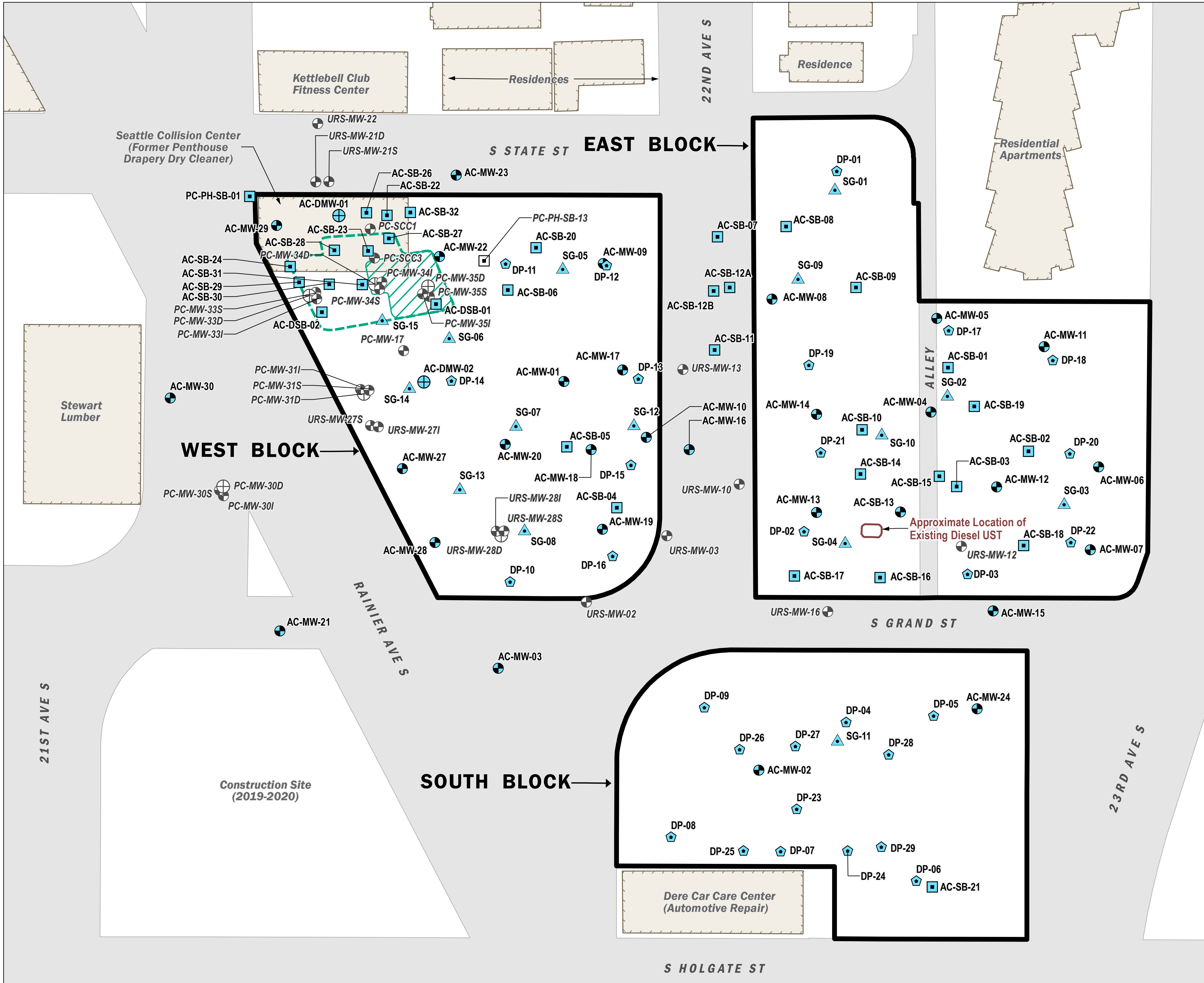
Aspect CONSULTING	JUL-2021	BY: FK / TDR	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: ---	1

GIS Path: T:\projects_8\MBHA_Belshaw_170304\Delivered\Contaminated Media Management Plan\01 Site Location Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 2021-07-08 || User: trulien || Print Date: 2021-07-08

Basemap Layer Credits || Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



Approximate Location of Existing Diesel UST
Concrete Slab
Unpaved Gravel Lot
Subject Property
King County Tax Parcel
Notes:
- Aerial from King County, 2019.
- UST = Underground storage tank
-Topographic contours derived from King County LiDAR, 2016.
0
60
120
Feet
Kettlebell Club Fitness Center
Residences
Residence
Residential Apartments
S STATE ST
EAST BLOCK
UNPAVED GRAVEL LOT
Parcel #1822300175
RAINIER AVE S
Seattle Collision Center (Former Penthouse Drapery Dry Cleaner) 1752 Rainier Ave S
Parcel # 7548301155
Parcel # 7548301100
Parcel # 7548301150
UNPAVED GRAVEL LOT
Parcel # 7548301095
Parcel # 1822300005
22ND AVE S
ALLEY
CONCRETE SLAB
Parcel #1822300180
CONCRETE SLAB
Parcel #0924049007
Parcel #7548301115
Stewart Lumber 1761 Rainier Ave S
WEST BLOCK
UNPAVED GRAVEL LOT
Parcel # 7548301120
Parcel # 1822300020
Coleman Playground
CONCRETE SLAB
Parcel # 7548301125
Parcel # 1822300025
Approximate Location of Existing Diesel UST
S GRAND ST
SOUTH BLOCK
21ST AVE S
UNPAVED GRAVEL LOT
Parcel #3881900515
UNPAVED GRAVEL LOT
Parcel #3881900540
23RD AVE S
Church
Construction Site (2019-2020)
Parcel #3881900550
Dere Auto (Automotive Repair) 1818 Rainier Ave S
S HOLGATE ST
Parcel #3881900560
Site Plan - Existing Features
Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington
Aspect CONSULTING
JUL-2021
PROJECT NO. 170304
BY: FK / TDR
REVISED BY: - - -
FIGURE NO. 2



Deep Monitoring Well (Aspect)

Shallow Monitoring Well (Aspect)

Soil Boring (Aspect)

Direct-Push Soil Boring (Aspect)

Soil Gas Sample (Aspect)

Deep Monitoring Well (Others)

Shallow Monitoring Well (Others)

Soil Boring (Other)

Soil Boring with Discrete Grab Groundwater Sample (Others)

Approximate Extent of Heating Influence (Pacific, 2018)[1]

Approximate Extent of Deep Heating Influence (Pacific, 2018)[1]

Approximate Location of Existing Diesel UST

Existing Building Footprint

Subject Property

Notes:
1. Sourced from Pacific Crest Cleanup Action Progress Report (Figure 4).
2. Site features are approximate.

- UST = Underground storage tank

N

0 60 120

Feet

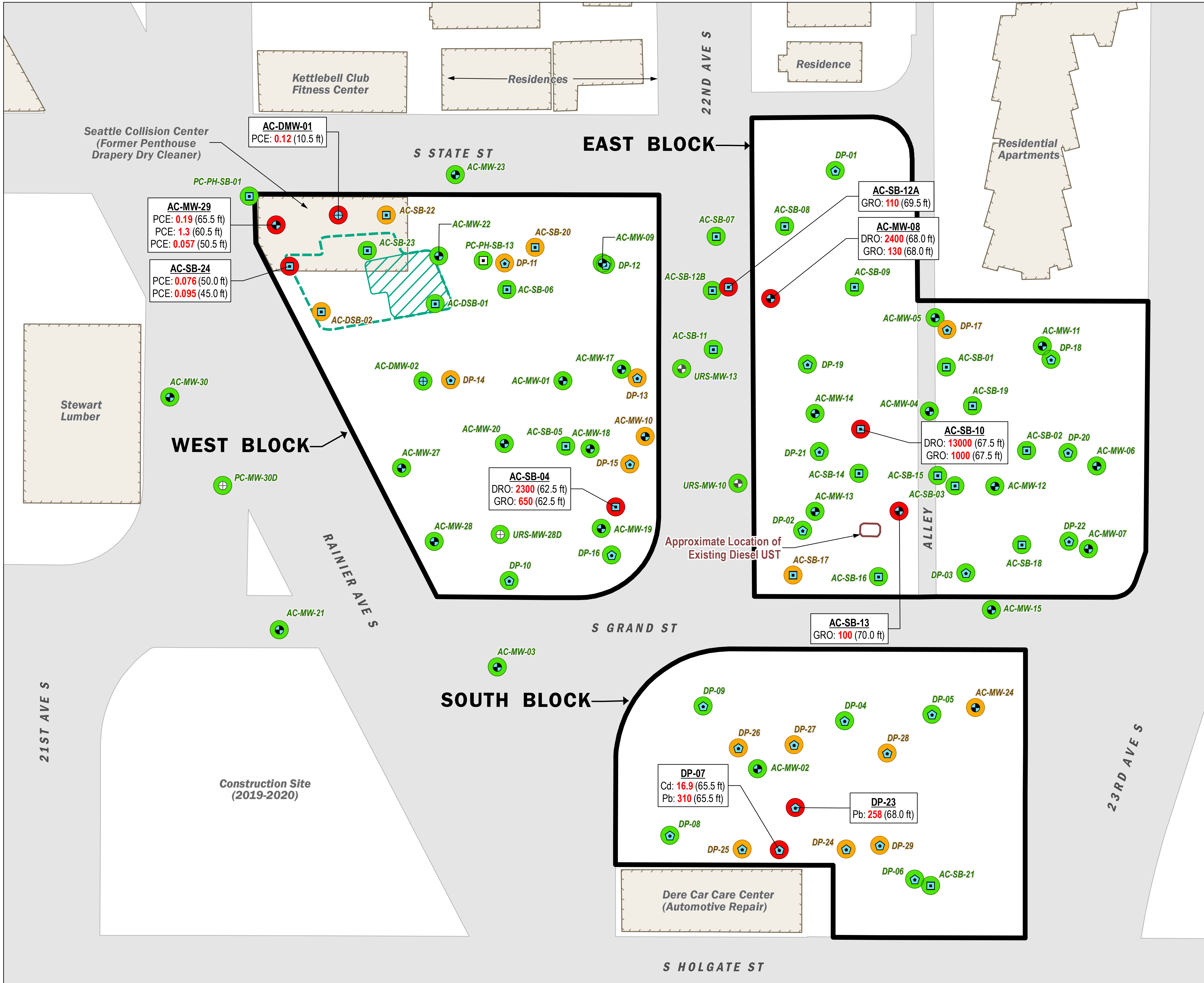
Remedial Investigation Explorations and Cross-Section Line Overview

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

DRAFT

Aspect CONSULTING

JUL-2021	BY: FK / TDR	FIGURE NO. 3
PROJECT NO. 170304	REVISED BY: - - -	



- Analytes detected at concentrations greater than MTCA Method A cleanup levels.
- Analytes detected at concentrations less than MTCA Method A cleanup levels.
- Analytes not detected.
- Deep Monitoring Well (Aspect)
- Shallow Monitoring Well (Aspect)
- Soil Boring (Aspect)
- Direct-Push Soil Boring (Aspect)
- Deep Monitoring Well (Others)
- Shallow Monitoring Well (Others)
- Soil Boring (Other)
- Approximate Extent of Heating Influence (Pacific, 2018)[1]
- Approximate Extent of Deep Heating Influence (Pacific, 2018)[1]
- Approximate Location of Existing Diesel UST
- Existing Building Footprint
- Subject Property

Exploration Name
AC-SB-12A
GRO: 110 (7.5 ft)
Sample Elevation (NAVD88)
Analyte Concentration in Milligrams per Kilogram

Notes: 1. Sourced from Pacific Crest Cleanup Action Progress Report (Figure 4).
2. Site features are approximate.

- GRO = Gasoline Range Organics
- DRO = Diesel Range Organics
- PCE = Tetrachloroethene
- Pb = Lead
- Cd = Cadmium
- MTCA = Model Toxics Control Act
- UST = Underground storage tank

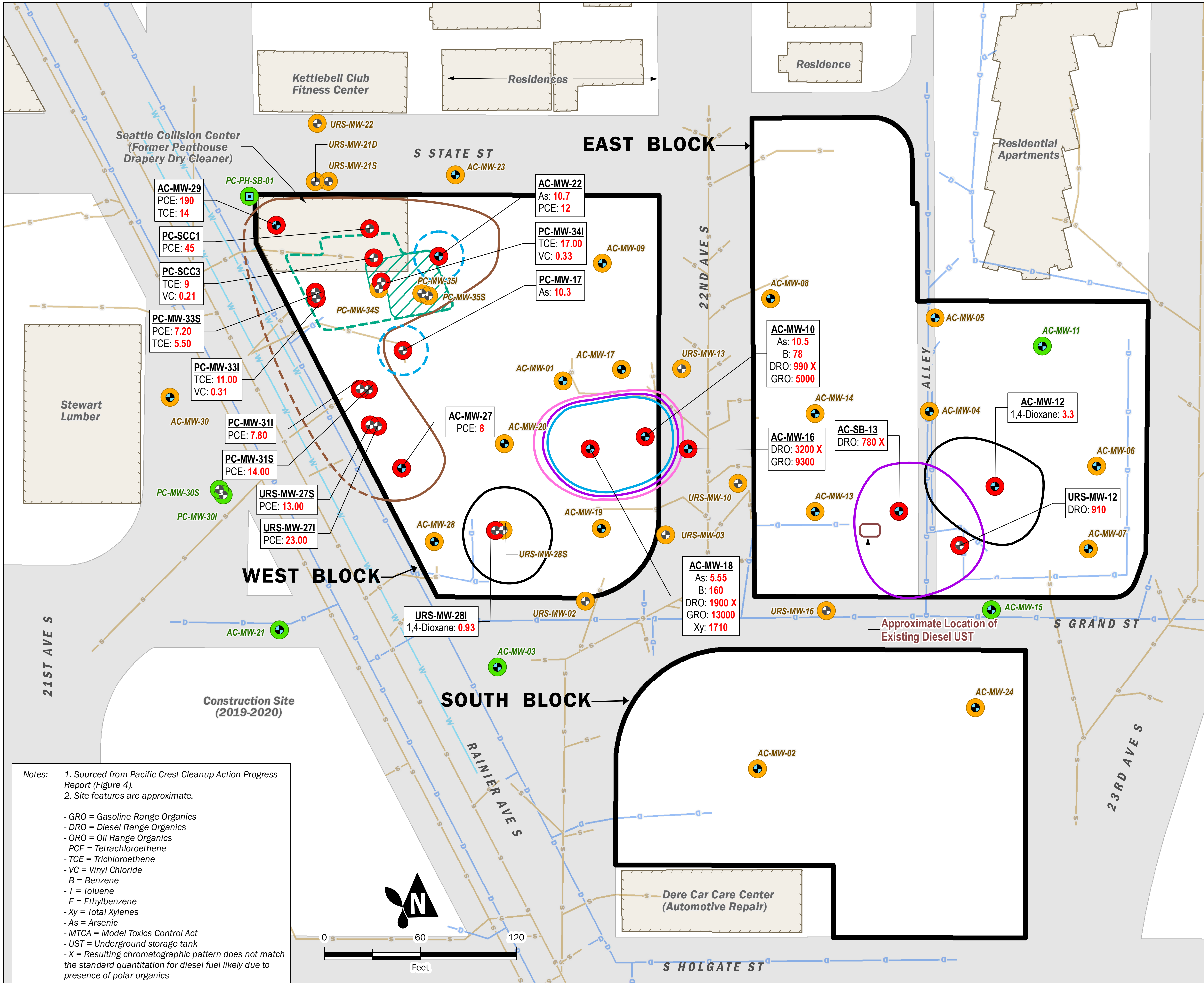
N

0 60 120
Feet

Summary of MTCA Exceedances in Soil

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect Consulting	JUL-2021	BY: FK / TDR	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: - - -	4



Analytes detected at concentrations greater than MTCA Method A cleanup levels.

Analytes detected at concentrations less than MTCA Method A cleanup levels.

Analytes not detected.

Shallow Monitoring Well (Aspect)

Shallow Monitoring Well (Others)

Sanitary Sewer Line

Storm Drain Line

Water Line

Approximate Extent of Heating Influence (Pacific, 2018)[1]

Approximate Extent of Deep Heating Influence (Pacific, 2018)[1]

Approximate Location of Existing Diesel UST

Existing Building Footprint

Subject Property

Groundwater Exceedances

(dashed where inferred)

Approximate Extent of 1,4-Dioxane Exceedances

Approximate Extent of Arsenic Exceedances

Approximate Extent of Diesel Exceedances

Approximate Extent of Gasoline Exceedances

Approximate Extent of PCE Exceedances

Exploration Name

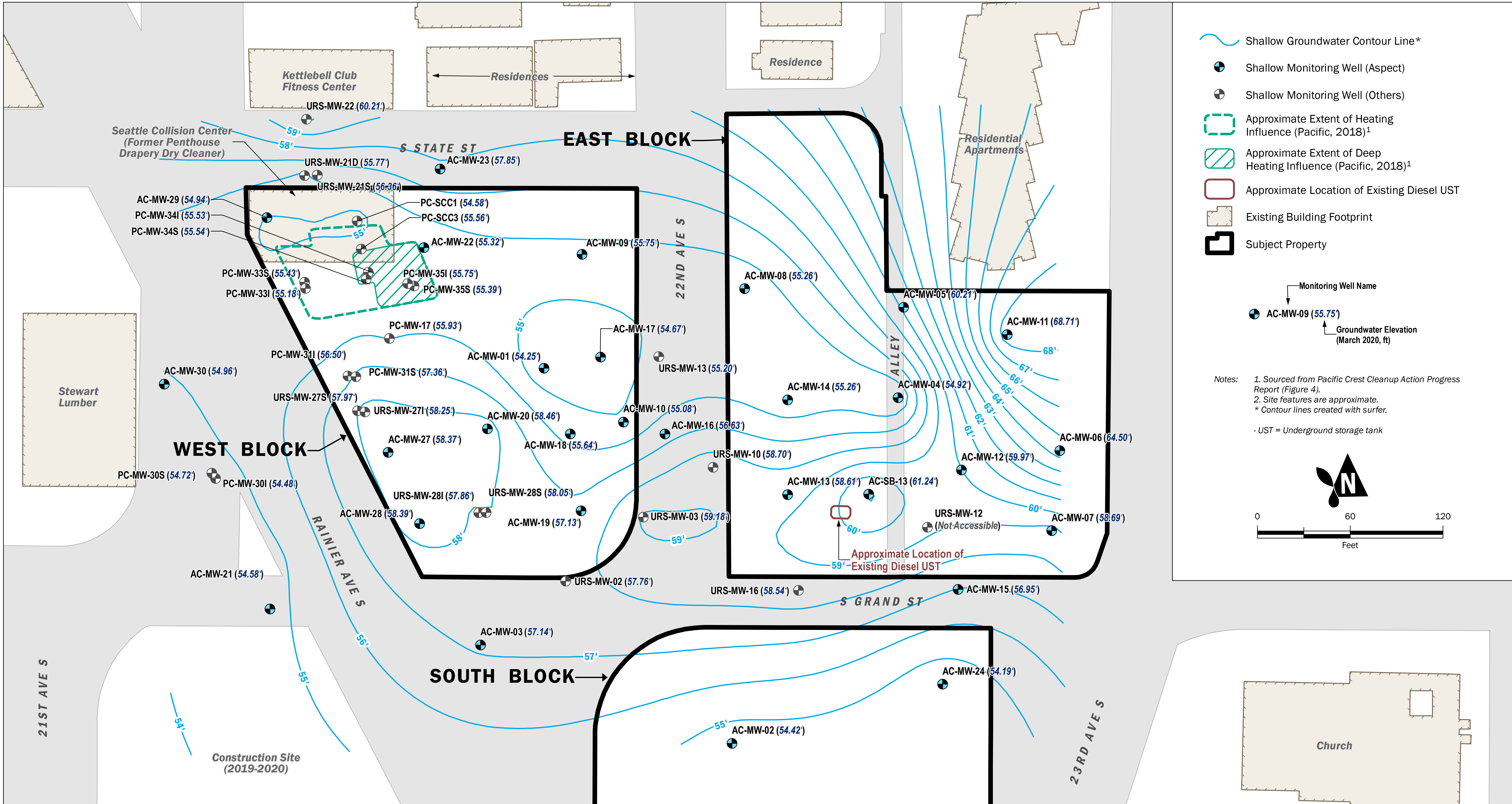
AC-MW-12A
Diox: 3.3

Analyte Concentration in Micrograms per Liter

Summary of MTCA Exceedances in Shallow Groundwater

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	JUL-2021	BY: FK / TDR	FIGURE NO. 5
	PROJECT NO. 170304	REVISED BY: - - -	



Shallow Groundwater Elevations - March 2020

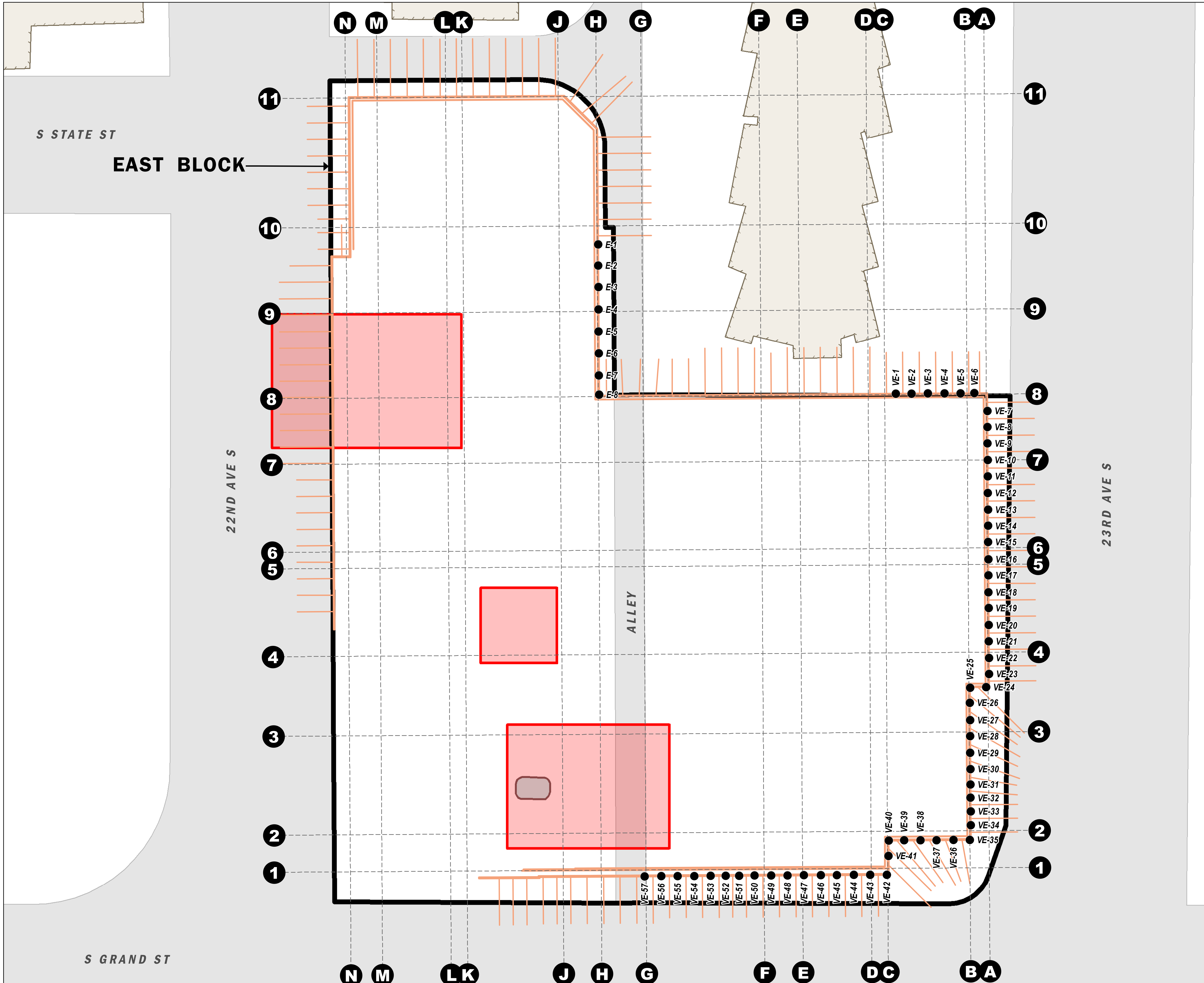
Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect Consulting

JUL-2021
PROJECT NO. 170304
BY: FK / TDR
REVISED BY: - - -
FIGURE NO. 6

Groundwater Monitoring Wells Status Map

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington



Shoring Plan

- Soldier Pile or Vertical Element Location
- Construction Grid
- Soil Nail
- Shoring Wall

Other

- Approximate Location of Existing Diesel UST
- Existing Building Footprint
- Subject Property

Contamination in Soil

- Approximate extent of petroleum contaminated soil. Excavated soil should be disposed at a permitted offsite waste disposal facility.

Notes: *1. Site features are approximate.*

- UST = Underground storage tank

0 35 70
Feet

East Block - Shoring Spoils Handling Plan

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	JUL-2021	BY: FK / TDR	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: - - -	8a

Analytes detected at concentrations greater than MTCA Method A cleanup levels.

Analytes detected at concentrations less than MTCA Method A cleanup levels.

Analytes not detected.

Shallow Monitoring Well (Aspect)

Soil Boring (Aspect)

Direct-Push Soil Boring (Aspect)

Construction Grid

Approximate Location of Existing Diesel UST

Existing Building Footprint

Subject Property

Contamination in Soil

Impacted soil excavated from the Site should be disposed at a permitted offsite waste disposal facility.

Exploration Name

DP-17
TCE: 0.029 (75.0 ft)

Sample Elevation (NAVD88)

Analyte Concentration in Milligrams per Kilogram

Notes: *1. Site features are approximate.*

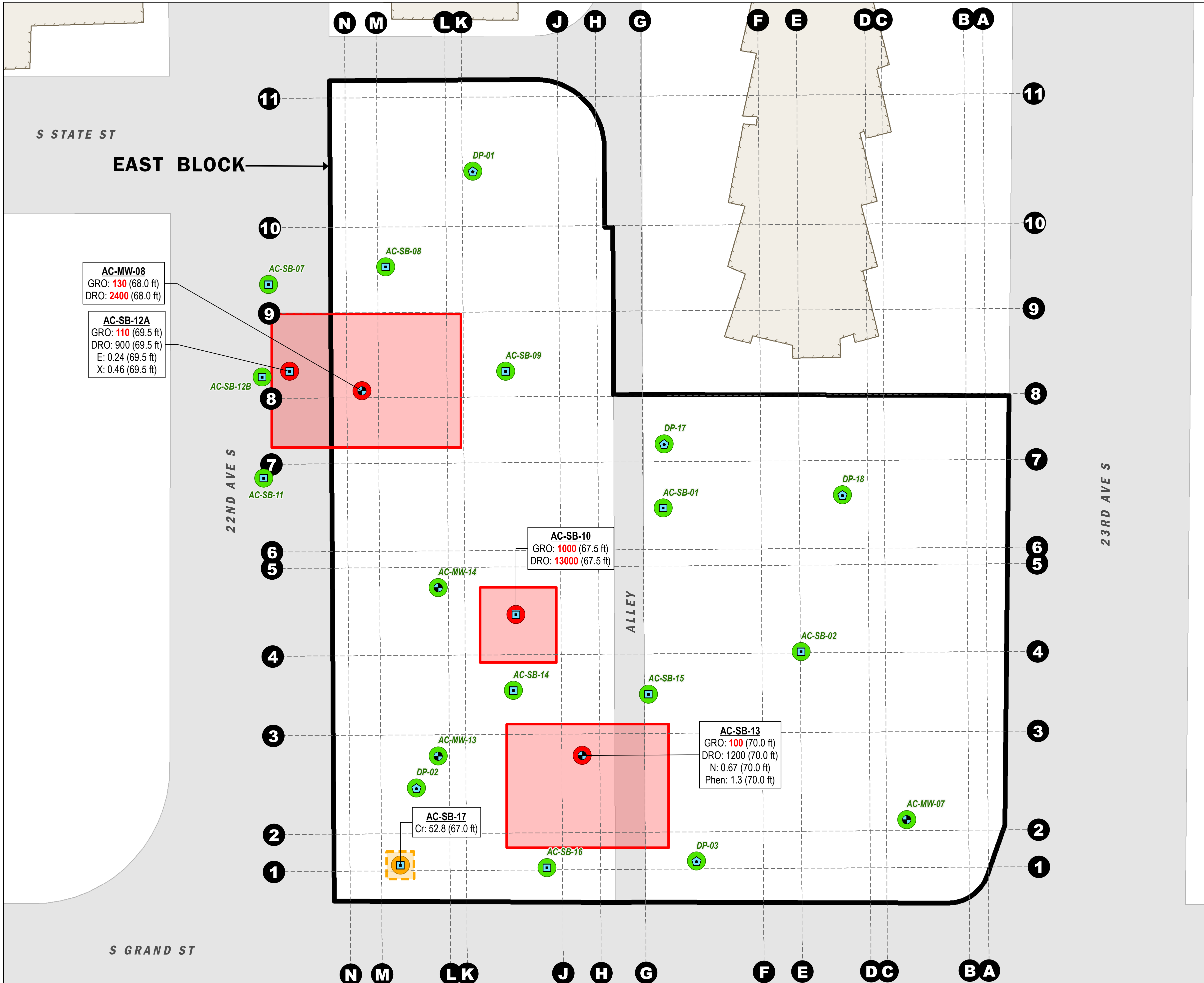
- ORO = Oil Range Organics
- TCE = Trichloroethene
- MTCA = Model Toxics Control Act
- UST = Underground storage tank

0 35 70
Feet

EAST BLOCK SOIL CONDITIONS ELEVATION 77 TO 72 FEET

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING | JUL-2021 | BY: FK / TDR | FIGURE NO. 8b
PROJECT NO. 170304 | REVISED BY: - - -



Analytes detected at concentrations greater than MTCA Method A cleanup levels.

Analytes detected at concentrations less than MTCA Method A cleanup levels.

Analytes not detected.

Shallow Monitoring Well (Aspect)

Soil Boring (Aspect)

Direct-Push Soil Boring (Aspect)

Construction Grid

Existing Building Footprint

Subject Property

Contamination in Soil

Approximate extent of petroleum contaminated soil. Excavated soil should be disposed at a permitted offsite waste disposal facility.

Impacted soil excavated from the Site should be disposed at a permitted offsite waste disposal facility.

Exploration Name

AC-MW-08
GRO: 130 (68.0 ft)
DRO: 2400 (68.0 ft)

Sample Elevation (NAVD88)

Analyte Concentration in Milligrams per Kilogram

Notes: 1. Site features are approximate.

- GRO = Gasoline Range Organics
- DRO = Diesel Range Organics
- E = Ethylbenzene
- X = Total Xylenes
- Cr = Chromium
- Phen = Phenanthrene
- N = Naphthalene
- MTCA = Model Toxics Control Act

N

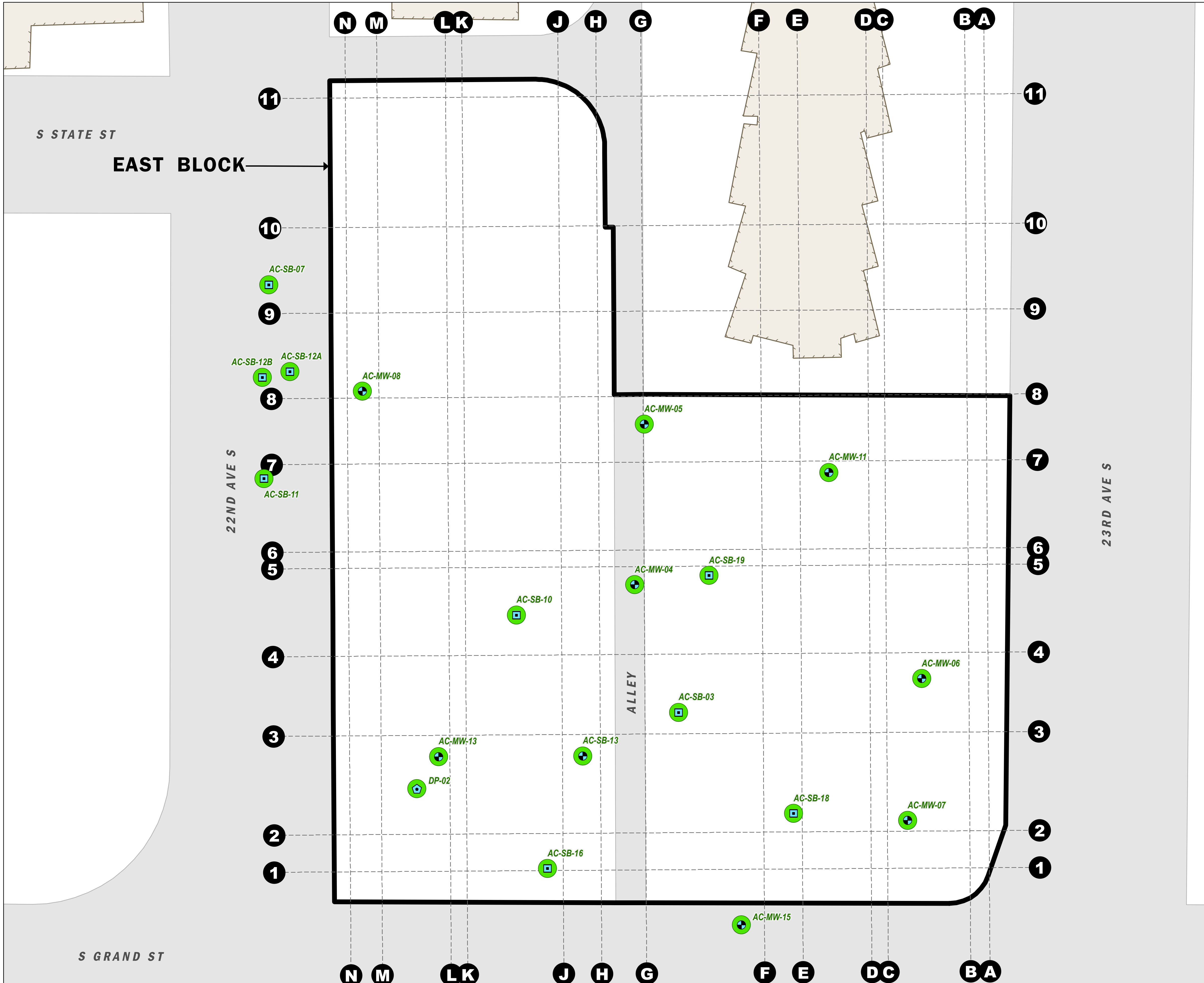
0 35 70

Feet

EAST BLOCK SOIL CONDITIONS ELEVATION 72 TO 67 FEET

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	JUL-2021	BY: FK / TDR	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: - - -	8c



Analytes detected at concentrations greater than MTCA Method A cleanup levels.

Analytes detected at concentrations less than MTCA Method A cleanup levels.

Analytes not detected.

Shallow Monitoring Well (Aspect)

Soil Boring (Aspect)

Direct-Push Soil Boring (Aspect)

Construction Grid

Existing Building Footprint

Subject Property

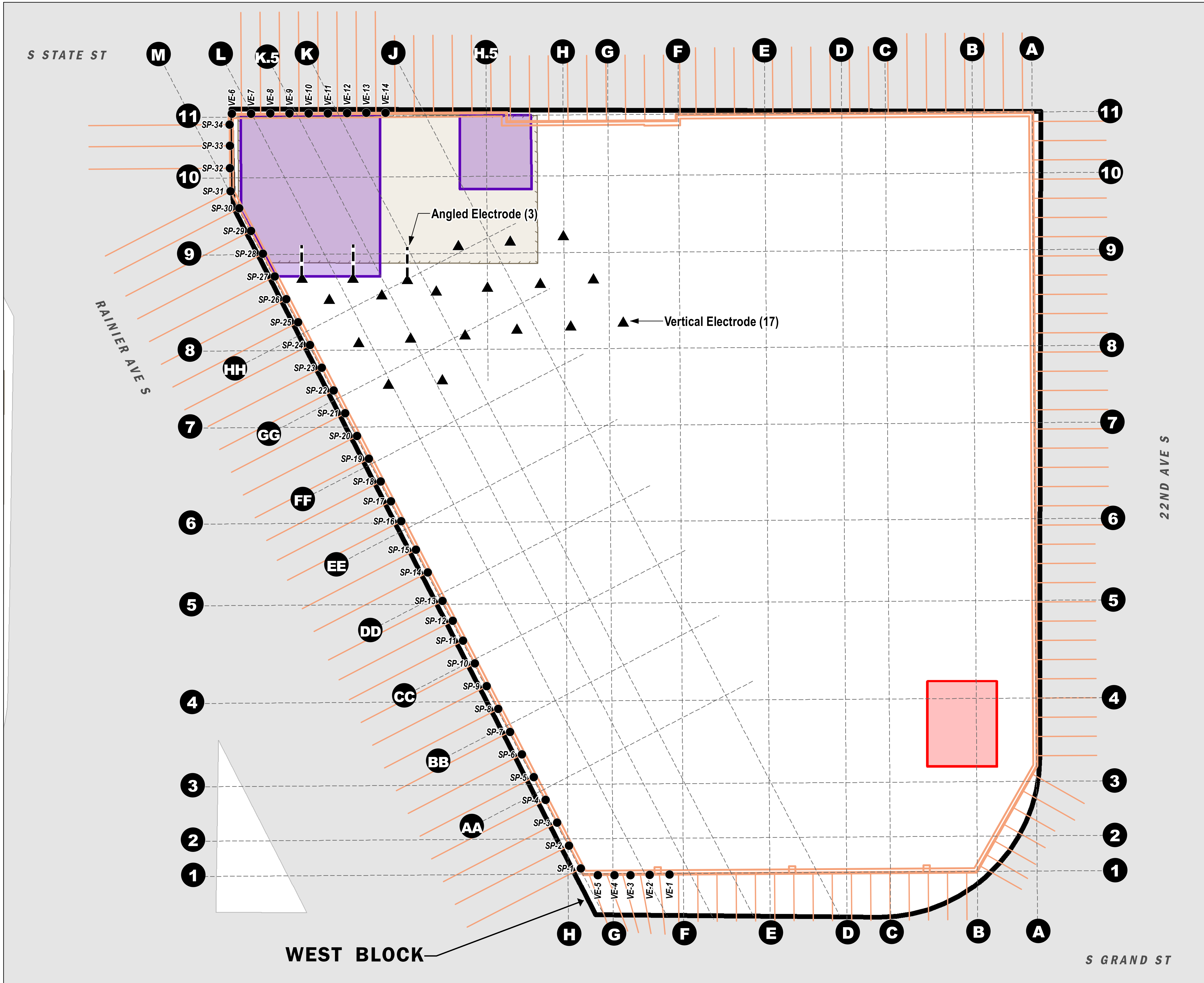
Notes: 1. Site features are approximate.

- MTCA = Model Toxics Control Act
- UST = Underground storage tank

EAST BLOCK SOIL CONDITIONS ELEVATION 67 TO 62 FEET

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING | JUL-2021 | BY: FK / TDR | FIGURE NO. 8d
PROJECT NO. 170304 | REVISED BY: - - -



Shoring Plan

- Soldier Pile or Vertical Element Location
- Construction Grid
- Soil Nail
- Shoring Wall

Other

- Approximate Existing ERH Angled Electrode Location
- Approximate Existing ERH Vertical Electrode Location
- Existing Building Footprint
- Subject Property

Contamination in Soil

- Approximate extent of PCE contaminated/impacted soil. Excavated soil should be disposed offsite as Contained-In Determination soil at a Subtitle D landfill.
- Approximate extent of petroleum contaminated soil. Excavated soil should be disposed at a permitted offsite waste disposal facility.

Notes: *1. Site features are approximate.*

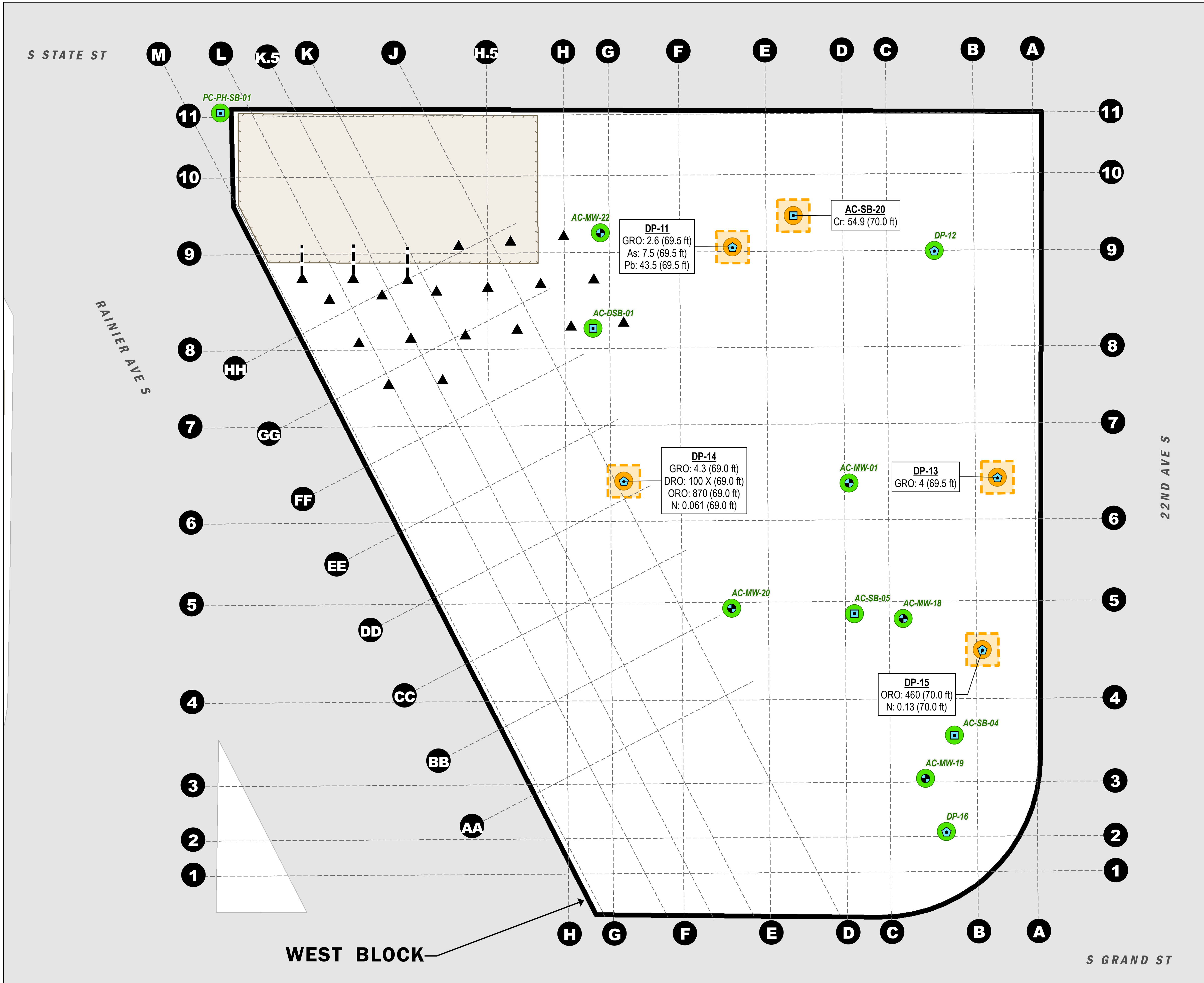
- PCE = Tetrachloroethene
- ERH = Electrical resistance heating

0 30 60
Feet

West Block - Shoring Spoils Handling Plan

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	JUL-2021	BY: FK / TDR	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: - - -	9a



- Analytes detected at concentrations greater than MTCA Method A cleanup levels.
- Analytes detected at concentrations less than MTCA Method A cleanup levels.
- Analytes not detected.
- Shallow Monitoring Well (Aspect)
- Soil Boring (Aspect)
- Direct-Push Soil Boring (Aspect)
- Construction Grid
- Approximate Existing ERH Angled Electrode Location
- Approximate Existing ERH Vertical Electrode Location
- Existing Building Footprint
- Subject Property

Contamination in Soil

- Impacted soil excavated from the Site should be disposed at a permitted offsite waste disposal facility.

Exploration Name
AC-SB-22
PCE: 0.044 (56.0 ft)
Sample Elevation (NAVD88)
Analyte Concentration in Milligrams per Kilogram

Notes: *1. Site features are approximate.*

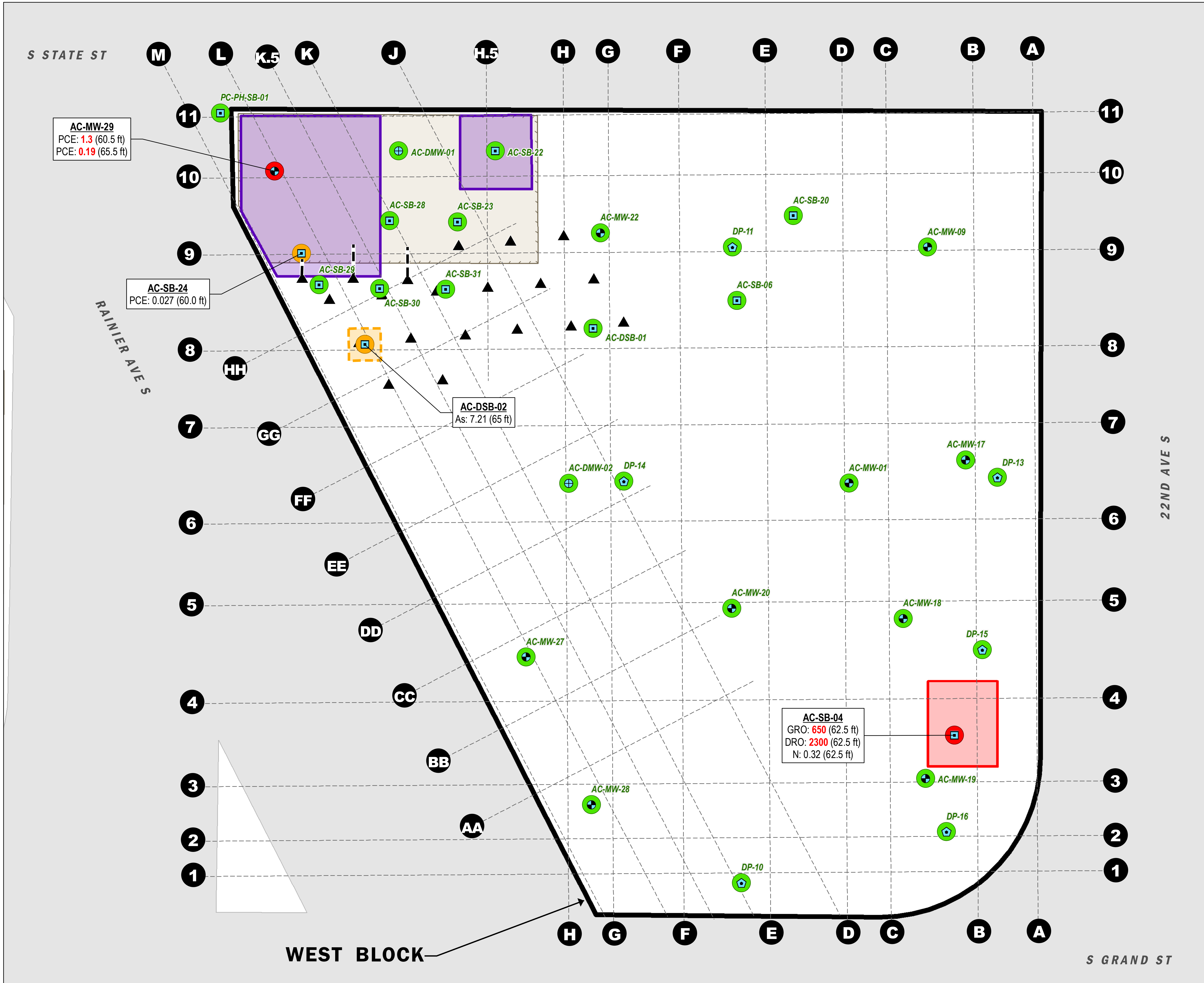
- GRO = Gasoline Range Organics
- DRO = Diesel Range Organics
- ORO = Oil Range Organics
- Pb = Lead
- As = Arsenic
- Cr = Chromium
- N = Naphthalene
- MTCA = Model Toxics Control Act
- ERH = Electrical resistance heating

0 30 60
Feet

WEST BLOCK SOIL CONDITIONS ELEVATION 77 TO 67 FEET

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING | JUL-2021 | BY: FK / TDR | FIGURE NO. 9b
PROJECT NO. 170304 | REVISED BY: ---



Analytes detected at concentrations greater than MTCA Method A cleanup levels.

Analytes detected at concentrations less than MTCA Method A cleanup levels.

Analytes not detected.

Deep Monitoring Well (Aspect)

Shallow Monitoring Well (Aspect)

Soil Boring (Aspect)

Direct-Push Soil Boring (Aspect)

Construction Grid

Approximate Existing ERH Angled Electrode Location

Approximate Existing ERH Vertical Electrode Location

Existing Building Footprint

Subject Property

Contamination in Soil

Approximate extent of PCE contaminated/impacted soil. Excavated soil should be disposed offsite as Contained-In Determination soil at a Subtitle D landfill.

Approximate extent of petroleum contaminated soil. Excavated soil should be disposed at a permitted offsite waste disposal facility.

Impacted soil excavated from the Site should be disposed at a permitted offsite waste disposal facility.

Exploration Name

AC-MW-29
PCE: 1.3 (60.5 ft)
PCE: 0.19 (65.5 ft)

Sample Elevation (NAVD88)

Analyte Concentration in Milligrams per Kilogram

Notes: *1. Site features are approximate.*

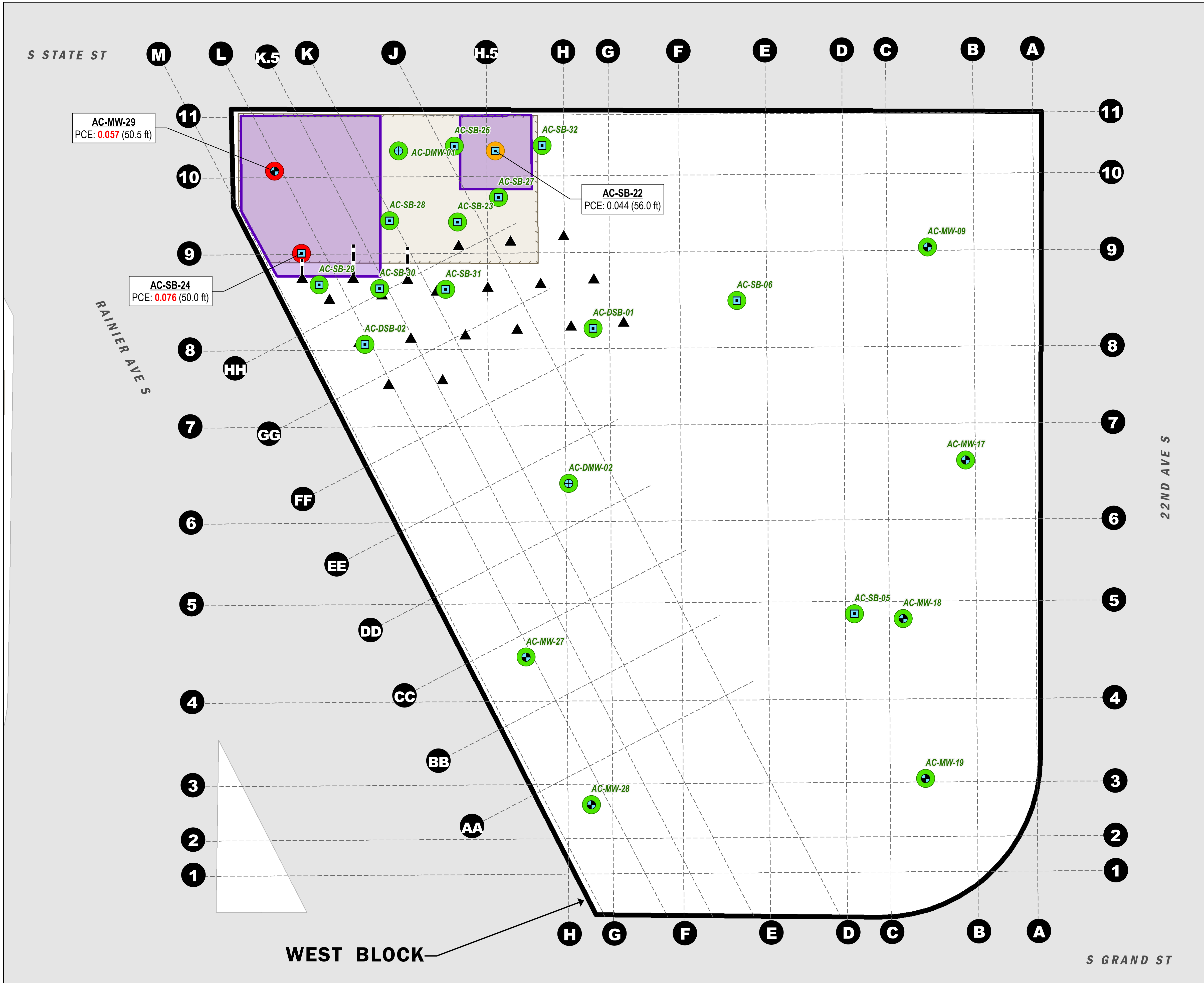
- GRO = Gasoline Range Organics
- DRO = Diesel Range Organics
- PCE = Tetrachloroethene
- As = Arsenic
- N = Naphthalene
- MTCA = Model Toxics Control Act
- ERH = Electrical resistance heating

0 30 60
Feet

WEST BLOCK SOIL CONDITIONS ELEVATION 67 TO 57 FEET

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	JUL-2021	BY: FK / TDR	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: - - -	9c



Analytes detected at concentrations greater than MTCA Method A cleanup levels.

Analytes detected at concentrations less than MTCA Method A cleanup levels.

Analytes not detected.

Deep Monitoring Well (Aspect)

Shallow Monitoring Well (Aspect)

Soil Boring (Aspect)

Construction Grid

Approximate Existing ERH Angled Electrode Location

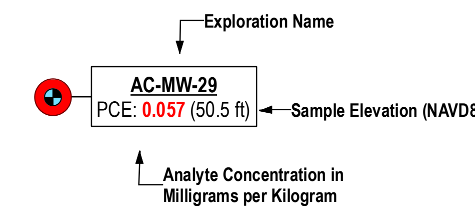
Approximate Existing ERH Vertical Electrode Location

Existing Building Footprint

Subject Property

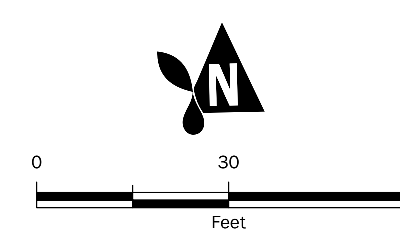
Contamination in Soil

Approximate extent of PCE contaminated/impacted soil. Excavated soil should be disposed offsite as Contained-In Determination soil at a Subtitle D landfill.



Notes: *1. Site features are approximate.*

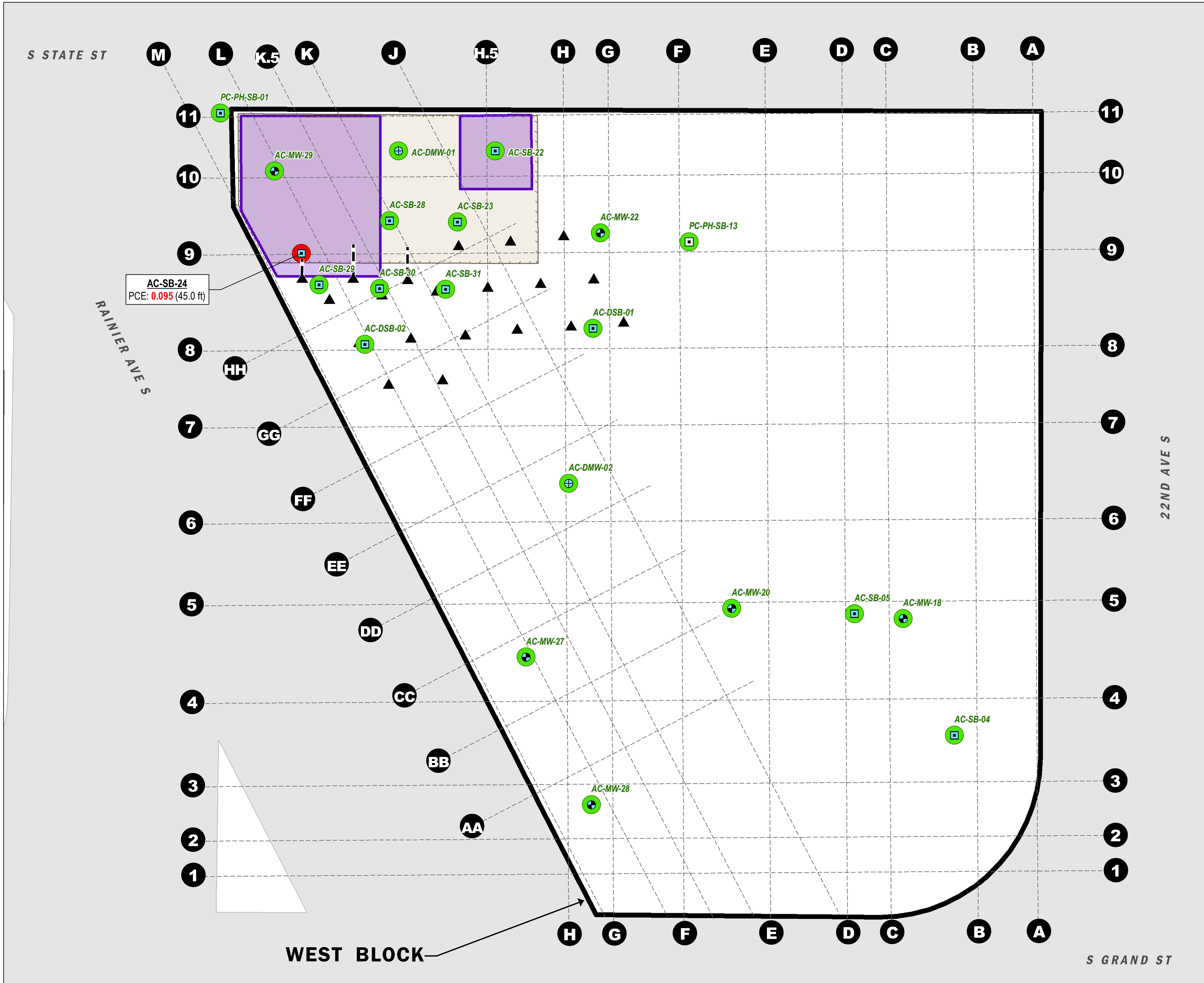
- GRO = Gasoline Range Organics
- DRO = Diesel Range Organics
- PCE = Tetrachloroethene
- E = Ethylbenzene
- X = Total Xylenes
- N = Naphthalene
- MTCA = Model Toxics Control Act
- ERH = Electrical resistance heating



WEST BLOCK SOIL CONDITIONS ELEVATION 57 TO 47 FEET

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	JUL-2021	BY: FK / TDR	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: - - -	9d



Analytes detected at concentrations greater than MTCA Method A cleanup levels.

Analytes detected at concentrations less than MTCA Method A cleanup levels.

Analytes not detected.

Deep Monitoring Well (Aspect)

Shallow Monitoring Well (Aspect)

Soil Boring (Aspect)

Soil Boring (Other)

Construction Grid

Approximate Existing ERH Angled Electrode Location

Approximate Existing ERH Vertical Electrode Location

Existing Building Footprint

Subject Property

Contamination in Soil

Approximate extent of PCE contaminated/impacted soil. Excavated soil should be disposed offsite as Contained-In Determination soil at a Subtitle D landfill.

Exploration Name

AC-SB-24
PCE: 0.095 (45.0 ft)

Sample Elevation (NAVD88)

Analyte Concentration in Milligrams per Kilogram

Notes: *1. Site features are approximate.*

- GRO = Gasoline Range Organics
- PCE = Tetrachloroethene
- MTCA = Model Toxics Control Act
- ERH = Electrical resistance heating

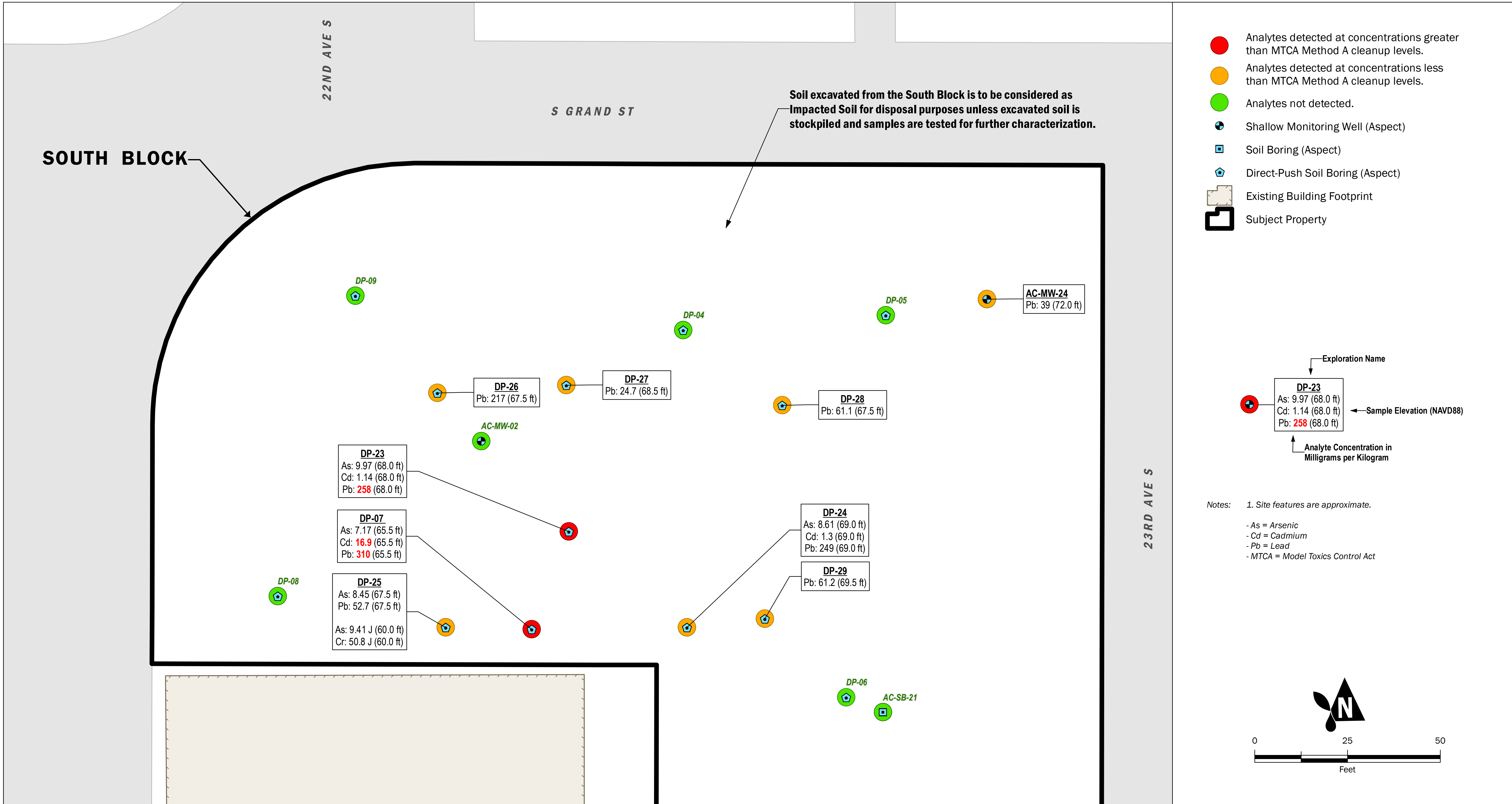
0 30 60
Feet

WEST BLOCK SOIL CONDITIONS ELEVATION 47 TO 37 FEET

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING

JUL-2021	BY: FK / TDR	FIGURE NO.
PROJECT NO. 170304	REVISED BY: ---	9e



SOUTH BLOCK SOIL CONDITIONS ELEVATION 72 TO 62 FEET

Draft Contaminated Media Management Plan
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	JUL-2021	BY: FK / TDR	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: SBM	10

APPENDIX A

June 25, 2021 Contained-In

Determination Approval

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • PO Box 330316 • Shoreline, Washington 98133-9716 • (206) 594-0000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

June 25, 2021

Brendan Lawrence
Grand Street Commons, LLC
401 N 36th Street, Suite 104
Seattle, WA 98103

Re: Contained-In Determination for F002 Contaminated Soils from the Grand Street Commons Site at 1750 22nd Avenue S, Seattle, Washington
Facility Site ID # 97763114; Cleanup Site ID # 3018; RCRA/EPA Site ID # WAD103351581

Reference: 1. Electronic mail and attachment from Fasih Khan (Aspect Consulting, LLC) to Paul Bianco (Ecology), dated April 22, 2021
2. Electronic mail and attachment from Paul Bianco (Ecology) to Fasih Khan (Aspect Consulting, LLC), dated May 3, 2021
3. Electronic mail and attachment from Fasih Khan (Aspect Consulting, LLC) to Paul Bianco (Ecology), dated June 22, 2021

Dear Brendan Lawrence and Conor J. Hansen:

The Washington State Department of Ecology (Ecology) received a contained-in determination request for specific F002 listed waste Tetrachloroethylene (PCE) contaminated soils to be excavated during construction activities at the Grand Street Commons Site at 1750 22nd Avenue S, Seattle, Washington.

Analytical data were submitted to Ecology to determine if these soils contaminated with F002 listed dangerous waste constituents may be exempt from management as dangerous wastes per the "Contained-In Policy"[1]. Ecology understands that these contaminated soils do not designate under federal characteristics (WAC 173-303-090) or State-only criteria (WAC 173-303-100).

Based on the information received and reviewed, Ecology has determined that the **4,686 tons** of PCE contaminated soils to be excavated (**attached Figures 4, 6, and 7**) during construction activities are contaminated with F002 listed dangerous waste constituents (PCE) at concentrations that do not warrant management as dangerous wastes. Ecology will not require disposal of these **4,686 tons** of PCE contaminated soils as F002 listed dangerous wastes at a

[1] Washington State Department of Ecology Contained-in Policy, dated February 19, 1993

RCRA permitted dangerous waste treatment, storage and disposal (TSD) facility, provided that all of the following conditions are implemented. This contained-in determination applies only to the contaminated soils, and does not pertain to contaminated water or any mixture of contaminated soils and fluid.

The owner or environmental consultant, Aspect Consulting, LLC shall:

- Ensure that no standing water is present within the containers or trucks holding the contaminated soils. All water must be removed to the maximum extent possible from each container or truck and managed as F002 dangerous wastes or as otherwise allowed under Chapter 173-303 WAC. Adding bentonite or similar materials to absorb standing F002 listed waste contaminated water in the containers is not allowed. Mixtures of bentonite or similar materials and the listed waste contaminated water must be managed as F002 listed dangerous wastes;

- Directly deliver the soils to a solid waste landfill or transfer station permitted under Chapter 173-351 WAC and/or Chapter 173-350 WAC inside Washington State. If taken directly to the solid waste landfill, no off-loading of the contaminated soils is allowed between the cleanup site and the permitted solid waste landfill; If taken to the transfer station, the intermodal containers from the cleanup site will be loaded on to rail cars, removal of the contaminated soils from the intermodal container at the transfer station is not allowed;

- If you plan to deliver the contaminated soils to a landfill outside Washington State, you must FIRST submit to Ecology written approval for the contaminated soil disposal from the State hazardous waste program and the out of state landfill, **before** the soils are delivered to the out of state landfill.

- If you load the contaminated soils directly onto the truck bed or the contaminated soils are transported in roll-off bins, the truck or the roll-off bins must be lined with plastic and properly covered to prevent leaks, spills, or dispersion due to wind.

- Dispose of the contaminated soils at the permitted solid waste landfill by January 31, 2022. This contained-in determination letter is no longer valid after January 31, 2022 and the contaminated soils shall be managed as dangerous wastes after this date;

- Provide an itemized table of all PCE contaminated soils disposed of under this letter on a monthly basis beginning on August 31, 2021 and ending on January 31, 2022. The table shall include at a minimum the following: date each contaminated soil shipment left the Site; date contaminated soil shipment received by the Ecology approved solid waste landfill; weight of each shipment of contaminated soil; total of all contaminated soil shipments to the Ecology approved solid waste landfill; an approximate percentage of total contained-in soils removed from the site; name and location of the solid waste landfill. This table shall be submitted no later than the last day of each month to Ecology.

- Provide copies of all signed solid waste landfill receipts or a certificate of disposal issued by the receiving landfill for these contaminated soils to Ecology, attention of Paul Bianco, by February 28, 2022. This is an important verification step for you and your consultant to follow in order for this Ecology decision to be valid;

- Do not consolidate these contaminated soils with other soils that do not pertain to this contained-in determination;

- Notify Ecology before disposal of the contaminated soil if the amount exceeds the approved amount in this letter. Ecology needs to make sure that the additional soil qualifies for this contained-in determination;

- Ensure that the transporter is properly trained to handle hazardous waste so that the transporter manages the contained-in determination soils during transport in a manner that is protective of human health and the environment;

- Take measures to prevent unauthorized contact with these contaminated soils at all times;

- Provide instructions to the landfill operator that these soils are **not** to be used for daily, intermediate, or final cover;

- Provide copies of all soil analytical data to the landfill operator, upon request; and

- Do not send these contaminated soils to any incinerator, thermal desorption unit or recycling facility unless that facility is a RCRA Subtitle C permitted dangerous waste TSD facility.

Ecology issued this determination based on the information provided and reviewed to date. This Ecology determination will be rescinded if Ecology finds that the information submitted by the property owner or its environmental consultant is materially false, misleading, otherwise does not accurately represent the site conditions, or if the Ecology requirements listed above are not followed.

This written decision only applies to the **4,686 tons** of specified PCE contaminated soils to be generated during excavation activities described in your request (reference 3). It does not apply to any other media. Any data used for this contained-in determination is intended for use in determining the proper disposal of the above stated PCE contaminated soil according to the Washington State Dangerous Waste Regulations (Chapter 173-303 WAC) and Ecology Contained-in Policy. This letter is not an Ecology approval for dangerous waste designation or disposal of contaminated soils that may be generated from other areas of this property.

This letter is not a No Further Action (NFA) letter and not written approval for any cleanup action plan you may have submitted. Instead, this letter only addresses the procedures for disposal of the contaminated soils according to the Washington State Dangerous Waste Regulations (Chapter 173-303 WAC). Regulatory decisions regarding the cleanup action, applicable soil and groundwater cleanup levels and any other cleanup issues must comply with the requirements under Ecology Model Toxics Control Act (Chapter 173-340 WAC). Local agencies may have the authority to impose additional requirements on this waste stream.

If you fail to comply with the terms of this letter, Ecology may issue an administrative order and/or penalty as provided by the Revised Code of Washington, Sections 70A.300.090 and/or .120 (Hazardous Waste Management Act).

If you have any questions concerning this letter, please contact me at (425) 324-1850 or cboe461@ecy.wa.gov.

Sincerely,

Christa Colouzis, PE
Corrective Action Unit Supervisor
Hazardous Waste and Toxics Reduction Program

Sent by Certified Mail: 9171 9690 0935 0214 2483 49

Enclosures: Figures 4, 6, and 7

ecc: Dave Cook, Aspect Consulting, LLC
Fasih Khan, Aspect Consulting, LLC
Greg Caron, Ecology
Mindy Collins, Ecology
Mark Havighorst, Ecology
Chuck Hoffman, Ecology
Sandra Matthews, Ecology
Donna Musa, Ecology
Karen Wood, Ecology

- Chlorinated solvents detected at concentrations greater than MTCA Method A cleanup levels.
- Chlorinated solvents detected at concentrations less than MTCA Method A cleanup levels.
- Chlorinated solvents not detected.
- Existing Building Footprint
- Subject Property
- Approximate Extent of PCE - Soil Excavation
- Approximate Extent of Shoring
- Cross Section
- Soil boring with discrete grab groundwater sample (others, 2012)

Exploration Name
Sample Depth in feet (ft) bgs.
AC-SB-24 (PCE: 0.095 (25 ft))
Analyte Concentration in Milligrams per Kilogram (mg/kg)

Notes: 1. Site features are approximate.

- PCE = Tetrachloroethene
- MTCA = Model Toxics Control Act
- ND = Not Detected above the laboratory reporting limit of 0.25 mg/kg
- bgs = Below Ground Surface

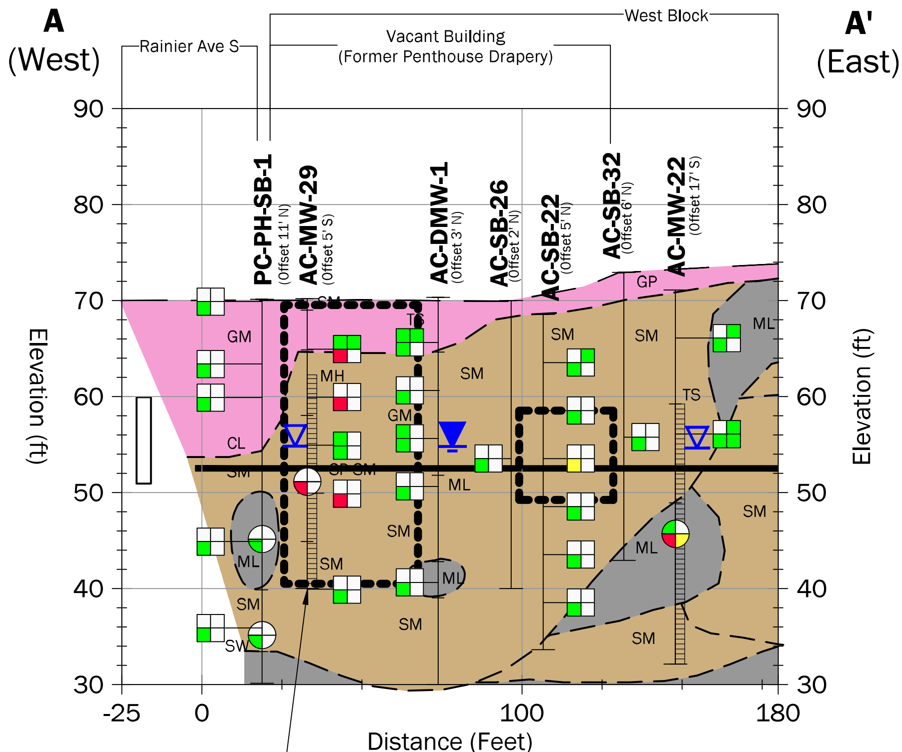
0 40 80
Feet

Chlorinated Solvents in Soil (Depth: 0 - 40 ft. bgs)

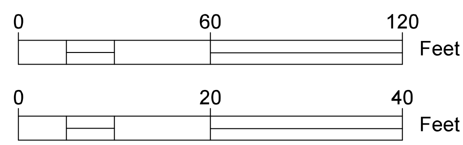
Contained-In Determination Application For Excavation of PCE Soil During Cleanup
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	JUN-2021	BY: FK / TDR	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: SBM	4

GIS Path: T:\projects_8\MBHA_Belshaw_170304\Delivered\Contained-In Determination Applications 2021\Excavation of PCE Soil During Cleanup\04 Chlorinated solvents in Soil.mxd || Coordinate System: 30 ft" property="sr" srProperty="name"/> || Date Saved: 6/2/2021 || User: smortensen || Print Date: 6/2/2021



Water samples shown are discrete "grab"groundwater samples obtained directly from the borehole (See Table 4)



Horizontal Scale: 1" = 60'
Vertical Scale: 1" = 20'
Vertical Exaggeration 3x

LEGEND

- Depth to Shallow Groundwater
- Depth to Regional Groundwater
- Estimated Soil Lithology Change
- Concrete or Asphalt or Gravel
- Silty Clay
- Silt
- Silty Sand
- Sanitary Sewer Utility Corridor
- Storm Drain Corridor
- Approximate extent of PCE - soil excavation
- Approximate elevation of future building slab

AC-MW-29
(Offset 5'S)
Boring ID and Offset
Groundwater Sample Location
Soil Symbol
SM
Soil Sample Location
Screened Interval

Analytical Results

- Chemical detected at a concentration greater than the MTCA Method A cleanup level.
- Chemical detected at a concentration less than the MTCA Method A cleanup level.
- Chemical not detected.
- Chemical not analyzed.

Water Sample Legend

1,4 Dioxane
Tetrachloroethylene (PCE)
Diesel or Oil-Range Hydrocarbons
Gasoline-Range Hydrocarbons and/or Benzene, Toluene, Ethylbenzene and Xylenes

Soil Sample Legend

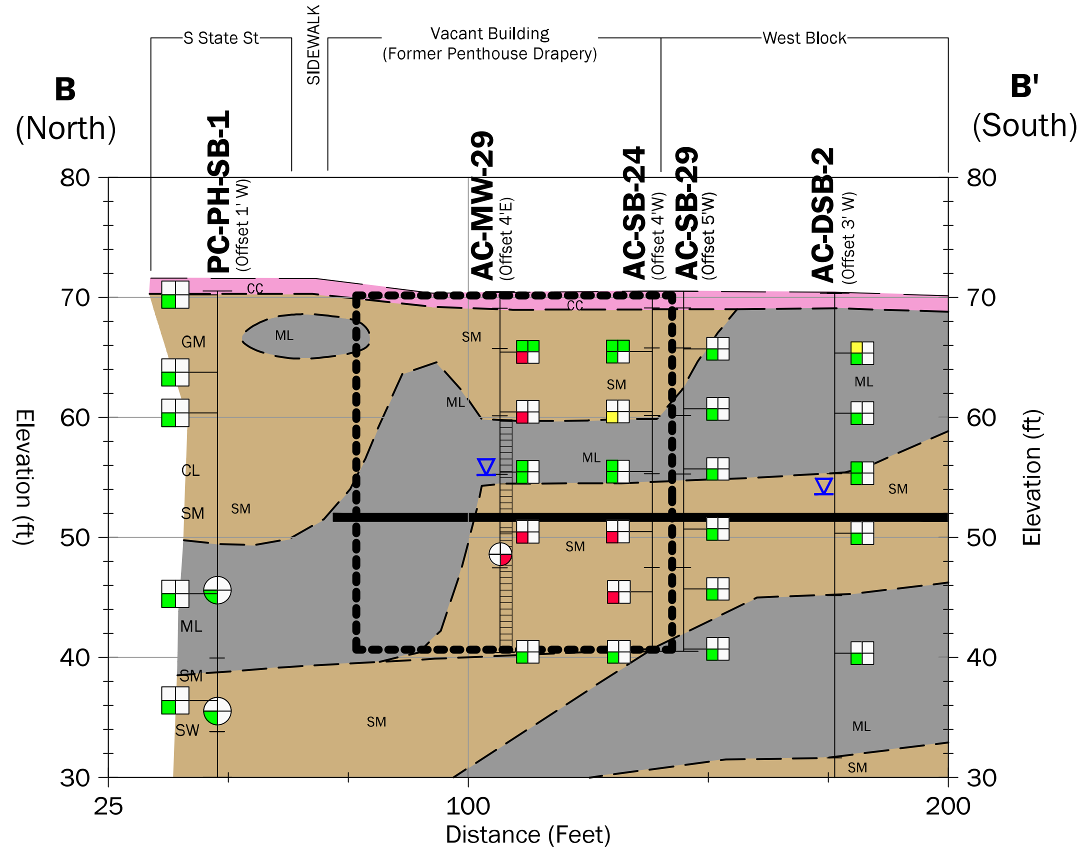
Metals
Tetrachloroethylene (PCE)
Diesel or Oil-Range Hydrocarbons
Gasoline-Range Hydrocarbons and/or Benzene, Toluene, Ethylbenzene and Xylenes

Note:
See boring logs in Appendix A for details regarding the soil lithology units CC, AS, CL, SM, SP, GM, GP, and ML

Cross Section A-A'

Contained-In Determination Application
for PCE - Soil Excavation
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	Jun-2021	BY: FK/CMV	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: -	6



LEGEND

Depth to Shallow Groundwater

Depth to Regional Groundwater

Estimated Soil Lithology Change

Concrete or Asphalt or Gravel

Silty Clay

Silt

Silty Sand

Sanitary Sewer Utility Corridor

Storm Drain Corridor

Approximate extent of PCE - soil excavation

Approximate elevation of future building slab

AC-MW-29 (Offset 4'E) — Boring ID and Offset

Groundwater Sample Location

Soil Symbol SM — Soil Sample Location

Screened Interval

0 40 80 Feet

0 16 32 Feet

Horizontal Scale: 1" = 40'
Vertical Scale: 1" = 16'
Vertical Exaggeration 2.5x

Analytical Results

Chemical detected at a concentration greater than the MTCA Method A cleanup level.

Chemical detected at a concentration less than the MTCA Method A cleanup level.

Chemical not detected.

Chemical not analyzed.

Water Sample Legend

1,4 Dioxane

Diesel or Oil-Range Hydrocarbons

Tetrachloroethylene (PCE)

Gasoline-Range Hydrocarbons and/or Benzene, Toluene, Ethylbenzene and Xylenes

Soil Sample Legend

Metals

Diesel or Oil-Range Hydrocarbons

Tetrachloroethylene (PCE)

Gasoline-Range Hydrocarbons and/or Benzene, Toluene, Ethylbenzene and Xylenes

Note:
See boring logs in Appendix A for details regarding the soil lithology units CC, AS, CL, SM, SP, GM, GP, and ML

Cross Section B-B'

Contained-In Determination Application
for PCE - Soil Excavation
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	Jun-2021	BY: FK/CMV	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: -	7

CAD Path: C:\Users\cvanslyke\AppData\Local\Temp\AcPublish_10256\170304-CID.dwg Fig 6 BB || Date Saved: Jun 02, 2021 12:25pm || User: cvanslyke

APPENDIX B

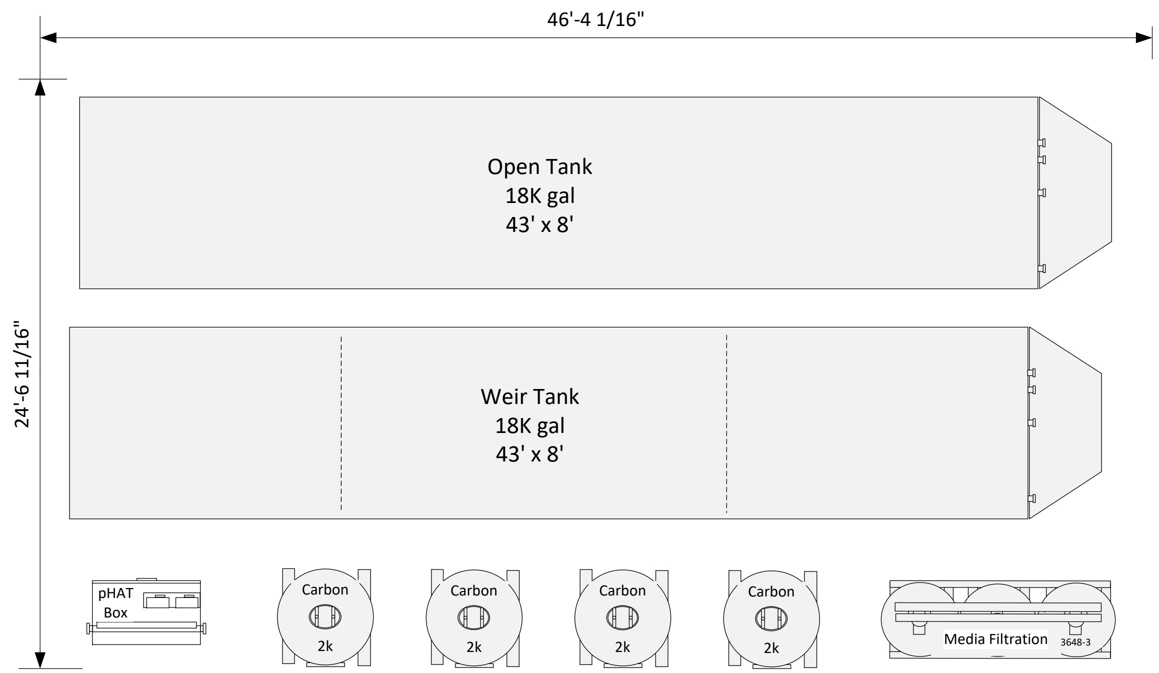
Schematic of Construction

Stormwater Treatment System

WG Clark – Grand Street East/West Individual System Layout

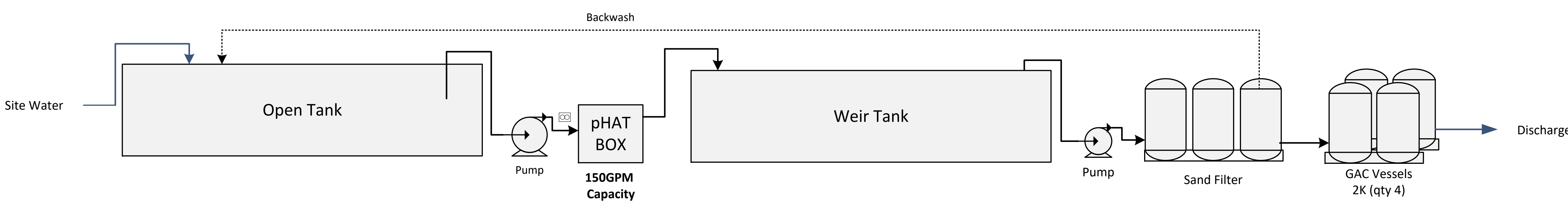
WATERTECTONICS

REVISIONS			
REV	DESCRIPTION	DATE	INITIALS
1	Equipment Layout/PFD	6/22/2021	LD
2			
3			
4			



Notes:
- Layout is for a single system. One system would be needed for each block.
- Layout shown is conceptual only and can be reconfigured to fit site constraints (i.e., linear)
- System requires 480V 3-phase 60A service provided at WT fused disconnect
- Client to provide water to the system
- Client to provide level gravel/paved pad for all treatment equipment
- All intersystem plumbing by WT
- Client to provide discharge piping if greater than 50' from laydown area (WT can provide based on T&M if requested)
- Client to provide equipment offloading and placement

Equipment Weights:
- pHAT Box unloaded by fork pockets or sling, approximately 250 lbs.
- Sand filter Skid (10'L x 4'W x 7'H) Approximately 3,000lbs empty, 15,000lbs fully loaded. Offloading by fork pockets or 4pt pick harness (sling around skid base)
- Carbon vessels (4'D x 7'H EA) Approximately 2,000lbs empty, 4,000lbs w/ carbon, 7500lbs operational
- Tanks placed by delivery truck. Tanks (45'L x 8.5'W x 9.5'H), 30,000lbs empty, approximately 150,400lbs full



Treatment Narrative – Batch System

Water from the site is pumped to the detention tank(s) for gross particle settling before being sent through the pHAT box to the settling tank. Post dosing in the pHAT box the treated water is sent to the settling tank where the coagulated particles flocculate and separate from the water column. Post settling, the clarified water is passed through the sand media filter after which turbidity and pH are measured via grab sample every 15 minutes. If turbidity and pH are within set parameters, the treated effluent will be discharged. Any water not meeting the discharge parameters will be recycled back to the detention tank. Four (qty. 4) 2000 Lb. granular activated carbon (GAC) vessels placed post turbidity/pH readings for removal of TPH/VOC contamination is present. Placement after the recirculation line protects against clogging the GAC filters should an upset occur.

DRAWN LD	PG SIZE 11x17	DWG NO	PROJECT NAME Grand Street	REV 0
ISSUED 6/21/2021	SCALE		SHEET 1 OF 1	

APPENDIX C

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND USE GUIDELINES

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on this report or the product of our services without the express written consent of Aspect Consulting, LLC (Aspect). This limitation is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual conditions or limitations and guidelines governing their use of the report. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and recognized standards of professionals in the same locality and involving similar conditions.

Services for Specific Purposes, Persons and Projects

Aspect has performed the services in general accordance with the scope and limitations of our Agreement. This report has been prepared for the exclusive use of the Client and their authorized third parties, approved in writing by Aspect. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

This report is not, and should not, be construed as a warranty or guarantee regarding the presence or absence of hazardous substances or petroleum products that may affect the subject property. The report is not intended to make any representation concerning title or ownership to the subject property. If real property records were reviewed, they were reviewed for the sole purpose of determining the subject property's historical uses. All findings, conclusions, and recommendations stated in this report are based on the data and information provided to Aspect, current use of the subject property, and observations and conditions that existed on the date and time of the report.

Aspect structures its services to meet the specific needs of our clients. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and subject property. This report should not be applied for any purpose or project except the purpose described in the Agreement.

This Report Is Project-Specific

Aspect considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

If changes are made to the project or subject property after the date of this report, Aspect should be retained to assess the impact of the changes with respect to the conclusions contained in the report.

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

Environmental Regulations Are Not Static

Some hazardous substances or petroleum products may be present near the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or petroleum products or do not otherwise present potential liability. Changes may occur in the standards for appropriate inquiry or regulatory definitions of hazardous substance and petroleum products; therefore, this report has a limited useful life.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time (for example, Phase I ESA reports are applicable for 180 days), by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope failure or groundwater fluctuations. If more than six months have passed since issuance of our report, or if any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

APPENDIX C

Ecology Contained-In Determination Letter (June 25, 2021)

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • PO Box 330316 • Shoreline, Washington 98133-9716 • (206) 594-0000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

June 25, 2021

Brendan Lawrence
Grand Street Commons, LLC
401 N 36th Street, Suite 104
Seattle, WA 98103

**Re: Contained-In Determination for F002 Contaminated Soils from the Grand Street Commons Site at 1750 22nd Avenue S, Seattle, Washington
Facility Site ID # 97763114; Cleanup Site ID # 3018; RCRA/EPA Site ID # WAD103351581**

Reference: 1. Electronic mail and attachment from Fasih Khan (Aspect Consulting, LLC) to Paul Bianco (Ecology), dated April 22, 2021
2. Electronic mail and attachment from Paul Bianco (Ecology) to Fasih Khan (Aspect Consulting, LLC), dated May 3, 2021
3. Electronic mail and attachment from Fasih Khan (Aspect Consulting, LLC) to Paul Bianco (Ecology), dated June 22, 2021

Dear Brendan Lawrence and Conor J. Hansen:

The Washington State Department of Ecology (Ecology) received a contained-in determination request for specific F002 listed waste Tetrachloroethylene (PCE) contaminated soils to be excavated during construction activities at the Grand Street Commons Site at 1750 22nd Avenue S, Seattle, Washington.

Analytical data were submitted to Ecology to determine if these soils contaminated with F002 listed dangerous waste constituents may be exempt from management as dangerous wastes per the "Contained-In Policy"[1]. Ecology understands that these contaminated soils do not designate under federal characteristics (WAC 173-303-090) or State-only criteria (WAC 173-303-100).

Based on the information received and reviewed, Ecology has determined that the **4,686 tons** of PCE contaminated soils to be excavated (**attached Figures 4, 6, and 7**) during construction activities are contaminated with F002 listed dangerous waste constituents (PCE) at concentrations that do not warrant management as dangerous wastes. Ecology will not require disposal of these **4,686 tons** of PCE contaminated soils as F002 listed dangerous wastes at a

[1] Washington State Department of Ecology Contained-in Policy, dated February 19, 1993

RCRA permitted dangerous waste treatment, storage and disposal (TSD) facility, provided that all of the following conditions are implemented. This contained-in determination applies only to the contaminated soils, and does not pertain to contaminated water or any mixture of contaminated soils and fluid.

The owner or environmental consultant, Aspect Consulting, LLC shall:

- Ensure that no standing water is present within the containers or trucks holding the contaminated soils. All water must be removed to the maximum extent possible from each container or truck and managed as F002 dangerous wastes or as otherwise allowed under Chapter 173-303 WAC. Adding bentonite or similar materials to absorb standing F002 listed waste contaminated water in the containers is not allowed. Mixtures of bentonite or similar materials and the listed waste contaminated water must be managed as F002 listed dangerous wastes;

- Directly deliver the soils to a solid waste landfill or transfer station permitted under Chapter 173-351 WAC and/or Chapter 173-350 WAC inside Washington State. If taken directly to the solid waste landfill, no off-loading of the contaminated soils is allowed between the cleanup site and the permitted solid waste landfill; If taken to the transfer station, the intermodal containers from the cleanup site will be loaded on to rail cars, removal of the contaminated soils from the intermodal container at the transfer station is not allowed;

- If you plan to deliver the contaminated soils to a landfill outside Washington State, you must FIRST submit to Ecology written approval for the contaminated soil disposal from the State hazardous waste program and the out of state landfill, **before** the soils are delivered to the out of state landfill.

- If you load the contaminated soils directly onto the truck bed or the contaminated soils are transported in roll-off bins, the truck or the roll-off bins must be lined with plastic and properly covered to prevent leaks, spills, or dispersion due to wind.

- Dispose of the contaminated soils at the permitted solid waste landfill by January 31, 2022. This contained-in determination letter is no longer valid after January 31, 2022 and the contaminated soils shall be managed as dangerous wastes after this date;

- Provide an itemized table of all PCE contaminated soils disposed of under this letter on a monthly basis beginning on August 31, 2021 and ending on January 31, 2022. The table shall include at a minimum the following: date each contaminated soil shipment left the Site; date contaminated soil shipment received by the Ecology approved solid waste landfill; weight of each shipment of contaminated soil; total of all contaminated soil shipments to the Ecology approved solid waste landfill; an approximate percentage of total contained-in soils removed from the site; name and location of the solid waste landfill. This table shall be submitted no later than the last day of each month to Ecology.

- Provide copies of all signed solid waste landfill receipts or a certificate of disposal issued by the receiving landfill for these contaminated soils to Ecology, attention of Paul Bianco, by February 28, 2022. This is an important verification step for you and your consultant to follow in order for this Ecology decision to be valid;

- Do not consolidate these contaminated soils with other soils that do not pertain to this contained-in determination;

- Notify Ecology before disposal of the contaminated soil if the amount exceeds the approved amount in this letter. Ecology needs to make sure that the additional soil qualifies for this contained-in determination;

- Ensure that the transporter is properly trained to handle hazardous waste so that the transporter manages the contained-in determination soils during transport in a manner that is protective of human health and the environment;

- Take measures to prevent unauthorized contact with these contaminated soils at all times;

- Provide instructions to the landfill operator that these soils are **not** to be used for daily, intermediate, or final cover;

- Provide copies of all soil analytical data to the landfill operator, upon request; and

- Do not send these contaminated soils to any incinerator, thermal desorption unit or recycling facility unless that facility is a RCRA Subtitle C permitted dangerous waste TSD facility.

Ecology issued this determination based on the information provided and reviewed to date. This Ecology determination will be rescinded if Ecology finds that the information submitted by the property owner or its environmental consultant is materially false, misleading, otherwise does not accurately represent the site conditions, or if the Ecology requirements listed above are not followed.

This written decision only applies to the **4,686 tons** of specified PCE contaminated soils to be generated during excavation activities described in your request (reference 3). It does not apply to any other media. Any data used for this contained-in determination is intended for use in determining the proper disposal of the above stated PCE contaminated soil according to the Washington State Dangerous Waste Regulations (Chapter 173-303 WAC) and Ecology Contained-in Policy. This letter is not an Ecology approval for dangerous waste designation or disposal of contaminated soils that may be generated from other areas of this property.

This letter is not a No Further Action (NFA) letter and not written approval for any cleanup action plan you may have submitted. Instead, this letter only addresses the procedures for disposal of the contaminated soils according to the Washington State Dangerous Waste Regulations (Chapter 173-303 WAC). Regulatory decisions regarding the cleanup action, applicable soil and groundwater cleanup levels and any other cleanup issues must comply with the requirements under Ecology Model Toxics Control Act (Chapter 173-340 WAC). Local agencies may have the authority to impose additional requirements on this waste stream.

If you fail to comply with the terms of this letter, Ecology may issue an administrative order and/or penalty as provided by the Revised Code of Washington, Sections 70A.300.090 and/or .120 (Hazardous Waste Management Act).

If you have any questions concerning this letter, please contact me at (425) 324-1850 or cboe461@ecy.wa.gov.

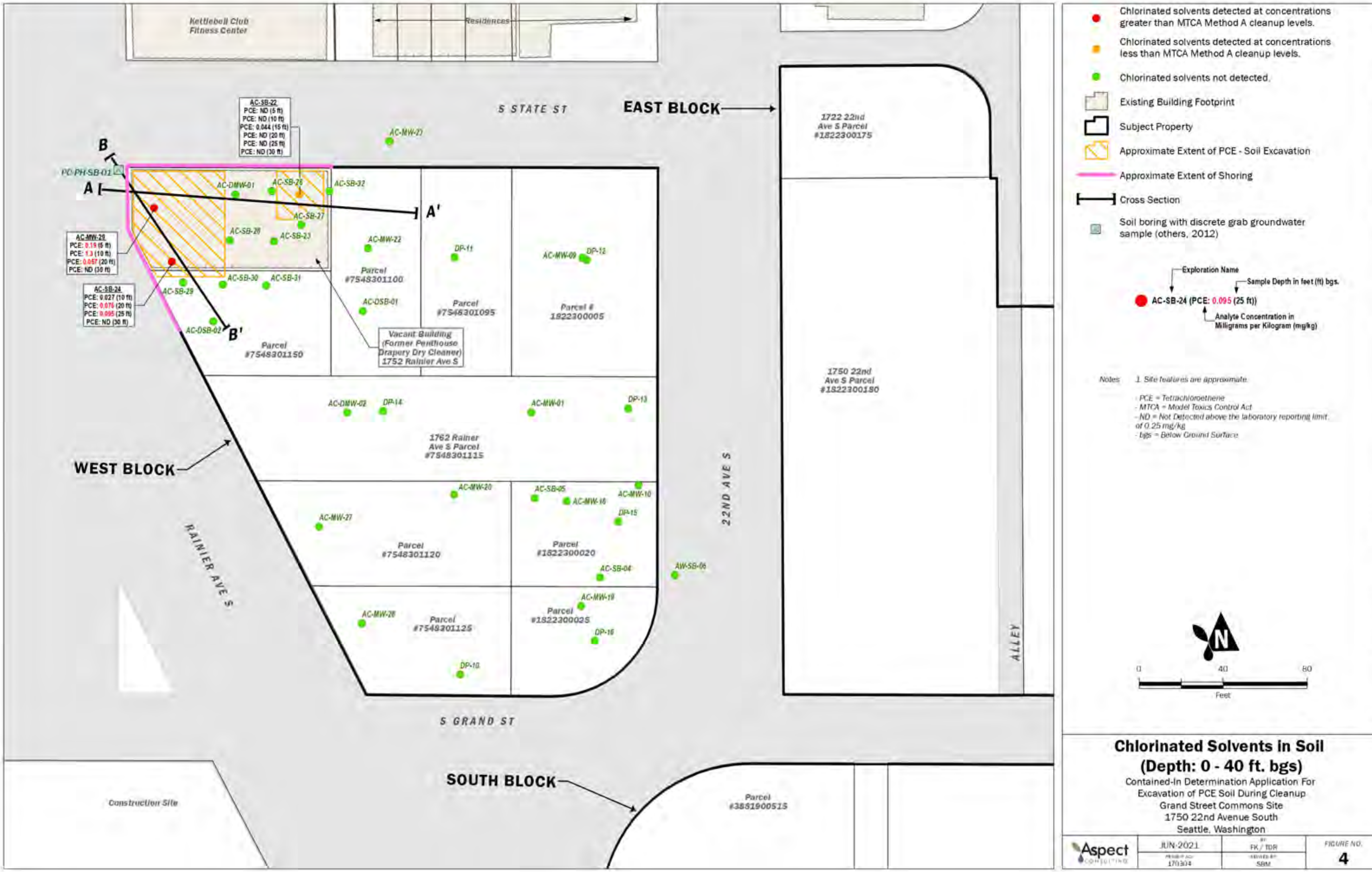
Sincerely,

Christa Colouzis, PE
Corrective Action Unit Supervisor
Hazardous Waste and Toxics Reduction Program

Sent by Certified Mail: 9171 9690 0935 0214 2483 49

Enclosures: Figures 4, 6, and 7

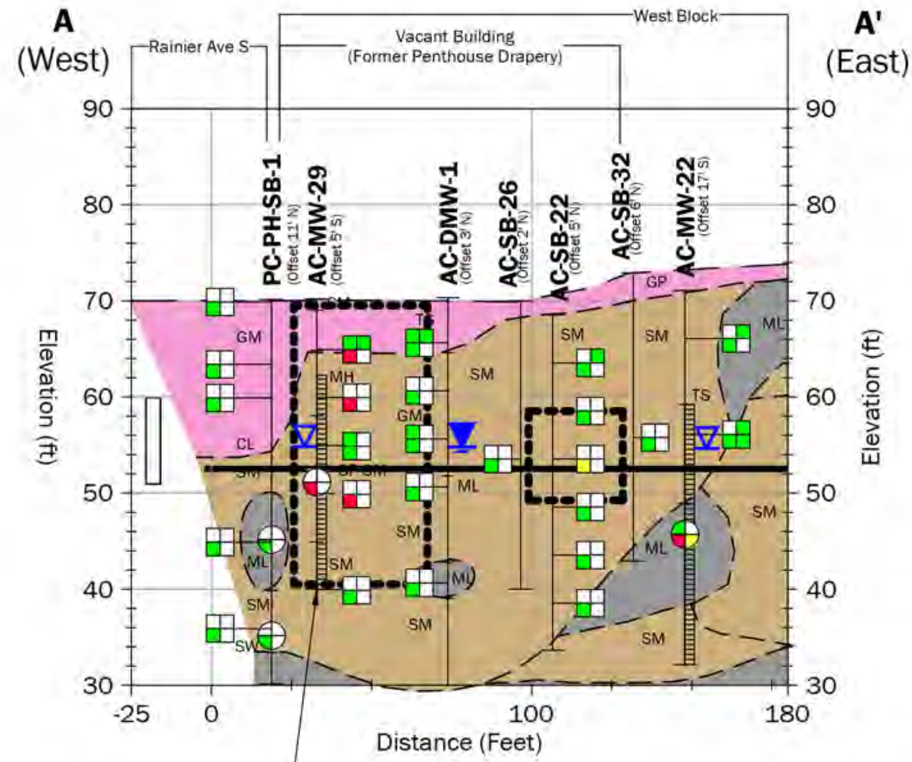
ecc: Dave Cook, Aspect Consulting, LLC
Fasih Khan, Aspect Consulting, LLC
Greg Caron, Ecology
Mindy Collins, Ecology
Mark Havighorst, Ecology
Chuck Hoffman, Ecology
Sandra Matthews, Ecology
Donna Musa, Ecology
Karen Wood, Ecology



Chlorinated Solvents in Soil (Depth: 0 - 40 ft. bgs)

Contained-In Determination Application For Excavation of PCE Soil During Cleanup
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect Consulting	JUN-2021	FK / TDR	FIGURE NO.
	170304	SBM	4



Water samples shown are discrete "grab"groundwater samples obtained directly from the borehole (See Table 4)

0 60 120 Feet

0 20 40 Feet

Horizontal Scale: 1" = 60'
Vertical Scale: 1" = 20'
Vertical Exaggeration 3x

LEGEND

- Depth to Shallow Groundwater
- Depth to Regional Groundwater
- Estimated Soil Lithology Change
- Concrete or Asphalt or Gravel
- Silty Clay
- Silt
- Silty Sand
- Sanitary Sewer Utility Corridor
- Storm Drain Corridor
- Approximate extent of PCE - soil excavation
- Approximate elevation of future building slab

AC-MW-29 (Offset 5' S) — Boring ID and Offset
Groundwater Sample Location
Soil Symbol SM
Soil Sample Location
Screened Interval

Analytical Results

- Chemical detected at a concentration greater than the MTCA Method A cleanup level.
- Chemical detected at a concentration less than the MTCA Method A cleanup level.
- Chemical not detected.
- Chemical not analyzed.

Water Sample Legend

1,4 Dioxane — Diesel or Oil-Range Hydrocarbons
Tetrachloroethylene (PCE) — Gasoline-Range Hydrocarbons and/or Benzene, Toluene, Ethylbenzene and Xylenes

Soil Sample Legend

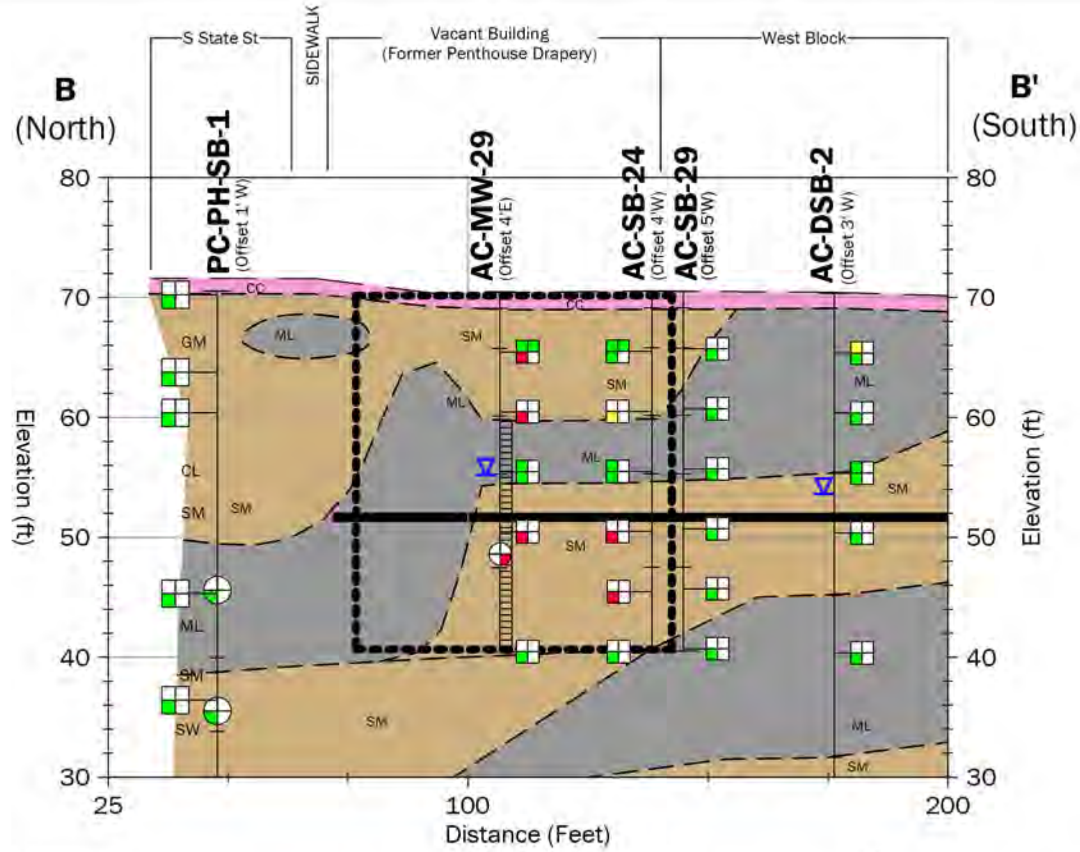
Metals — Diesel or Oil-Range Hydrocarbons
Tetrachloroethylene (PCE) — Gasoline-Range Hydrocarbons and/or Benzene, Toluene, Ethylbenzene and Xylenes

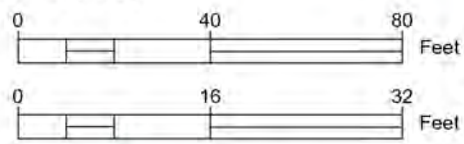
Note:
See boring logs in Appendix A for details regarding the soil lithology units CC, AS, CL, SM, SP, GM, GP, and ML

Cross Section A-A'

Contained-In Determination Application
for PCE - Soil Excavation
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect Consulting	Jun-2021	BY: FK/CMV	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: -	6





Horizontal Scale: 1" = 40'
Vertical Scale: 1" = 16'
Vertical Exaggeration 2.5x

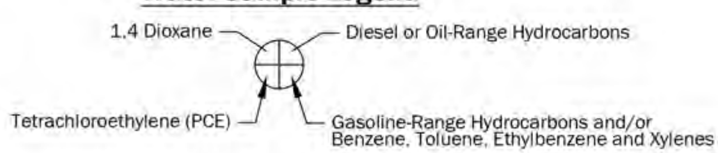
LEGEND

- Depth to Shallow Groundwater
- Depth to Regional Groundwater
- Estimated Soil Lithology Change
- Concrete or Asphalt or Gravel
- Silty Clay
- Silt
- Silty Sand
- Sanitary Sewer Utility Corridor
- Storm Drain Corridor
- Approximate extent of PCE - soil excavation
- Approximate elevation of future building slab

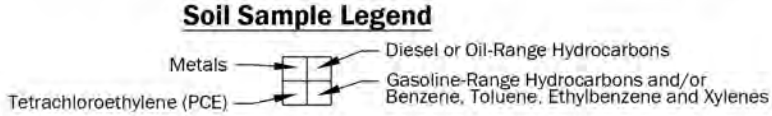
Analytical Results

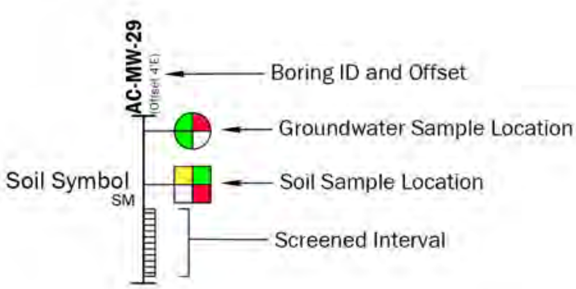
- Chemical detected at a concentration greater than the MTCA Method A cleanup level.
- Chemical detected at a concentration less than the MTCA Method A cleanup level.
- Chemical not detected.
- Chemical not analyzed.

Water Sample Legend



Soil Sample Legend





Note:
See boring logs in Appendix A for details regarding the soil lithology units CC, AS, CL, SM, SP, GM, GP, and ML

Cross Section B-B'

Contained-In Determination Application for PCE - Soil Excavation
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	Jun-2021	BY: FK/CMV	FIGURE NO. 7
	PROJECT NO. 170304	REVISED BY: -	

CAD Path: C:\Users\cvanslyke\AppData\Local\Temp\AcPublish_10256\170304-CID.dwg Fig 6 BB || Date Saved: Jun 02, 2021 12:25pm || User: cvanslyke

APPENDIX D

SEPA Determination

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000
711 for Washington Relay Service • Persons with a speech disability can call (877) 833-6341

STATE ENVIRONMENTAL POLICY ACT
DETERMINATION OF NONSIGNIFICANCE

Date of Issuance: February 19, 2021

Lead agency: Department of Ecology, Toxics Cleanup Program, and Northwest Regional Office

Agency Contact: Sandra Matthews, sandra.matthews@ecy.wa.gov, (425) 649-7206

Description of proposal:

The Subject Property is composed of 17 tax parcels totaling approximately 3.3 acres located on three city blocks in a mixed-use commercial and residential area of the Judkins Park neighborhood of Seattle, Washington. The Subject Property is mostly vacant except for one commercial building in the northwest corner of the West Block that is occupied by an automobile body repair business. The three-city-block redevelopment will consist of a mix of affordable and market rate housing with some retail space and underground parking. The redevelopment project will result in 360 affordable housing units near the planned Judkins Park Light Link Rail Station.

The proposed cleanup action consists of in situ treatment of shallow groundwater, excavation and off-Site disposal of petroleum hydrocarbon- and PCE-contaminated soil, and monitored natural attenuation of shallow groundwater at the Site.

Location of proposal: Grand Street Commons Site- 1750 22nd Avenue South, Seattle, WA 98144

Applicant/Proponent:

Brendan Lawrence
brendan@lakeunionpartners.com
(206) 290-1097
401 North 36 Street, Suite 104
Seattle, WA 98103

Ecology has determined that this proposal will not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). We have reviewed the attached Environmental Checklist, the Remedial

Investigation/Feasibility Study, and the Draft Cleanup Action Plan for the Site. These are available at: Grand Street Commons documents csid=3018

This determination is based on the following findings and conclusions:

The project proponent is removing the soil source material causing the groundwater contamination and disposing of it off site. This is the most protective and permanent cleanup alternative for the Site. By completing source removal, the development of the properties will not inhibit future cleanup activities that may be required.

The comment period for this DNS corresponds with the comment period for the Remedial Investigation/Feasibility Study Report, and the Draft Cleanup Action Plan, which will end on March 30, 2021.

Responsible official:

Robert Warren
Northwest Regional Office Section Manger
Toxics Cleanup Program
Department of Ecology
3190 160th Ave SE
Bellevue, WA 98008-5452
425-649-7054

Signature __ Date February 19, 2021

This SEPA decision may be appealed in conjunction with an appeal on the underlying agency action. In this case, the permit, rule amendment, plan, order or other may be appealed by the applicable citation and summary of timeline.

STATE ENVIRONMENTAL POLICY ACT (SEPA) ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals:

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. Background [HELP]

1. Name of proposed project, if applicable:

   Grand Street Commons Site at 1750 22nd Avenue South, Seattle, Washington

   Prospective Purchaser Consent Decrees (PPCD) Nos. 18-2-14708-5 SEA and 18-2-14714-0

Dept. of Ecology Facility Site ID #97763114
Dept. of Ecology Cleanup Site ID #3018
Seattle Department of Construction & Inspections (SDCI) #3035309-LU, 3035344-LU, and 3035498-LU

2. Name of applicant:
   Grand Street Commons, LLC

3. Address and phone number of applicant and contact person:
   c/o Aspect Consulting, LLC
   Dave Cook, LG, CPG
   Principal Geologist
   Office: 206.838.5837

4. Date checklist prepared:
   January 28, 2021

5. Agency requesting checklist:
   Washington State Department of Ecology (Ecology)

6. Proposed timing or schedule (including phasing, if applicable):
   - **January 2021** – Complete Ecology review of the Draft Remedial Investigation/Feasibility Study (RI/FS) Report and a Draft Cleanup Action Plan (CAP) documents. Prepare and submit a State Environmental Policy Act (SEPA) Checklist for the proposed cleanup to Ecology for review.
   - **February 2021** – Revise the RI/FS and CAP documents per Ecology's comments (if needed) and begin Ecology's public participation process to set up the RI/FS, CAP, and SEPA documents for a 30-day public comment period. Prepare and submit an Engineering Design Report (EDR) to Ecology.
   - **March 2021 –** Complete the 30-day public comment period for the RI/FS, CAP, and SEPA documents. Perform permitting for implementing the injections associated with the *in situ* treatment of shallow groundwater.
   - **April 2021** – Finalize the RI/FS and CAP documents following Ecology review of the public comments. Coordinate logistics for implementing the injections associated with the *in situ* treatment of shallow groundwater.
   - **May 2021** – Complete the injections associated with the *in situ* treatment of shallow groundwater on the East and West Blocks. Prepare and submit a Contained-In Determination (CID) Waiver application to Ecology for the PCE-contaminated soil that will be excavated during cleanup.
   - **June 2021** – Perform performance monitoring for the shallow groundwater treatment on the East and West Blocks. Decommission the groundwater monitoring wells within the construction footprint.
   - **July through December 2021** – Complete the remedial excavations on the East and West Blocks. Remove the metals-contaminated soil, as needed, on the South Block.

- **2022 –** Place the protective cap on top of the residual-contaminated soil. Formalize the Groundwater Compliance Monitoring Plan (GCMP). Begin Monitored Natural Attenuation (MNA) using the groundwater monitoring wells present outside the construction footprint.
- **2023** – Enact necessary institutional controls and install replacement wells at the East, West, and/or South Blocks following completion of construction activities and continue MNA at the Site.
- **2028 –** First 5-year Ecology Review. If conditions at this time are not protective of human health and the environment, evaluate the MNA timeframe and the need for any contingency action.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

Not at this time.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

This Site comprises of the Subject Property (17 tax parcels totaling approximately 3.3 acres located on three city blocks in a mixed-use commercial/residential area of the Judkins Park neighborhood of Seattle, Washington) and adjacent rights-of-ways (22nd Avenue South and likely Rainier Avenue South).

The Site has a long history of environmental investigation and interim cleanup actions. Dozens of environmental reports have been prepared by multiple parties over the last three decades. The most comprehensive Site history, environmental condition, and state of soil and groundwater contamination associated with the Site is available in Aspect's 2021 Draft RI/FS report and 2021 Draft CAP (references listed below). A complete list of references for all the environmental investigations completed at the Site is included in the Draft RI/FS report.

- Aspect Consulting, LLC (Aspect), February 4, 2021, Draft Remedial Investigation and Feasibility Study – Grand Street Commons Property, 1750 22nd Avenue S, Seattle, Washington, PPCD Nos. 18-2-14708-5 SEA and 18-2-147414-0, Facility ID#97763114, Cleanup Site ID#3018.
- Aspect Consulting, LLC (Aspect), February 5, 2021, Draft Cleanup Action Plan – Grand Street Commons Property, 1750 22nd Avenue S, Seattle, Washington, PPCD Nos. 18-2-14708-5 SEA and 18-2-147414-0, Facility ID#97763114, Cleanup Site ID#3018.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

The City of Seattle is currently reviewing shoring and building permits related to the redevelopment of the Site. There are three separate sets of shoring and building permits that have been submitted (one for each of the city blocks to be developed).

Separate SEPA permit applications have also been submitted to the City of Seattle for the developments on the three city blocks. A Construction Stormwater General Permit will be obtained from Ecology prior to beginning construction for incidental dewatering at the Site.

10. List any government approvals or permits that will be needed for your proposal, if known.

City of Seattle - Master Use Permit, Demolition permit, dewatering, shoring and excavation permit, building permit, mechanical permits, electrical permits, elevator permits, occupancy permits, Comprehensive Drainage Control Plan Approvals.
Seattle Department of Transportation - Street Use permits (temporary) and Street improvements
Washington State Department of Ecology Contained-In Soil Determination Waiver
Washington State Department of Ecology Construction Stormwater General Permit

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The Subject Property is composed of 17 tax parcels totaling approximately 3.3 acres located on three city blocks in a mixed-use commercial and residential area of the Judkins Park neighborhood of Seattle, Washington (Figure 1). The Subject Property is mostly vacant except for one commercial building that is occupied by Seattle Collision Center (SCC), an automobile body repair business (Figure 2).

The three-city-block redevelopment will consist of a mix of three, large, affordable, and market-rate housing buildings with some retail space and underground parking. The redevelopment project will result in 360 affordable housing units near the planned Judkins Park Light Link Rail Station.

Grand Street Commons, LLC (GSC) acquired the Subject Property from Centioli Improvement LLC in June 2018. GSC is a joint entity comprised of Lake Union Partners (LUP) and its project partners Hal Real Estate, a private investment company, and Mt. Baker Housing Association (MBHA), a nonprofit affordable housing organization.

Following Subject Property acquisition, GSC and MBHA signed Prospective Purchaser Consent Decrees (PPCD Nos. 18-2-14708-5 SEA and 18-2-14714-0, executed in September 2018) with Ecology for assessment and cleanup of the GSC Site (Site) for redevelopment. The Site includes the Subject Property and adjacent rights-of-way (22nd Avenue South and likely Rainier Avenue South). Following execution of both PPCDs, the City of Seattle (City) designated the Subject Property parcels pursuant to Resolution 31836 as a Redevelopment Opportunity Zone (ROZ) in September 2018.

The proposed cleanup action that will be performed pursuant to the PPCDs under Ecology's oversight consists of *in situ* treatment of shallow groundwater, excavation and off-Site disposal of petroleum hydrocarbon- and PCE-contaminated soil, and MNA of shallow groundwater at the Site. Please refer to the Draft RI/FS and Draft CAP for details.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

Although this is a large redevelopment with multiple historical addresses, the address representative of the Site in Ecology's database is 1750 22nd Avenue South in Seattle, Washington. The Site is shown relative to surrounding physical features on the attached Figure 1. The Site is bounded to the north by South State Street; to the east by 23rd Avenue South; to the south by South Holgate Street; and to the west by Rainier Avenue South. The Site parcels, the Subject Property layout (17 parcels located across East, West, and South Blocks), and the general vicinity are shown on the attached Figure 2.

B. *Environmental Elements* [HELP]

1. *Earth* [help]

a. General description of the site: (bolded and underlined)

The East Block is relatively flat, and the West and South Blocks moderately slope from northeast to the southwest.

Flat, rolling, hilly, steep slopes, mountainous, other **moderate slopes**

b. What is the steepest slope on the site (approximate percent slope)?

Approximately 8 percent at the east boundary of the East Block along 23rd Avenue South.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

The Site is underlain generally by three soil types as follows:

FILL. Loose silty sand (SM) and gravel (GP or GM). Fill thickness ranges from approximately 2.5 feet (West Block) to approximately 10 feet (East and South Block).

GLACIAL RECESSIONAL SOILS. Medium stiff, moist, low-plasticity clay (CL). Pockets of glacial recessional soils were observed beneath the fill to approximate depths ranging from 13.5 feet below ground surface (South Blocks) to 15 feet below ground surface (East and West Blocks).

GLACIALLY CONSOLIDATED SOILS. Dense to very dense, slightly moist, silty sand (SM) with gravel and hard, slightly moist, sandy low-plasticity silt (ML) with interbedded lenses of sand (SP). Glacially consolidated soil was observed beneath the glacially recessional soil at each Block.

Please refer to the Draft RI/FS report for details.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

No

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Prior to construction excavation, five remedial excavations will be completed for the purposes of removing contaminated soil. Approximate extents and volumes of contaminated soil are shown on the attached Figure 3.

- Approximately 4,580 tons of petroleum-contaminated soil will be excavated from Area 1 (estimated 1,200 square feet with a maximum depth of 15 feet) at the East Block.

- Approximately 1,020 tons of petroleum-contaminated soil will be excavated from Area 2 (estimated 900 square feet with a maximum depth of 15 feet) at the East Block.
- Approximately 5,940 tons of petroleum-contaminated soil will be excavated from Area 3 (estimated 4,800 square feet with a maximum depth of 15 feet) at the East Block.
- Approximately 11,313 tons of PCE-contaminated soil will be excavated from Area 4 (estimated 4,550 square feet with a maximum depth of 30 feet) at the West Block.
- Approximately 850 tons of petroleum-contaminated soil will be excavated from Area 5 (estimated 900 square feet with a maximum depth of 15 feet) at the West Block.

Backfill will consist of imported structural fill consisting of Mineral Aggregate Type 2 or Type 2G, following City of Seattle Standard Specification 9-03.10(1).

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

No. Any accumulated stormwater runoff and/or groundwater accumulating in the excavations will be treated on the Site in accordance with all local, state, and federal regulations prior to discharge to Duwamish Waterway through the municipal storm drain system.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Greater than 95 percent will be covered with asphalt and buildings. A limited number of raised planter beds will be present at the Subject Property.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

None.

2. Air [help]

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

No emissions are expected after remediation and redevelopment are completed.

During construction, the following is anticipated. For the petroleum hydrocarbon- and tetrachloroethene (PCE)-impacted areas to be excavated, limited volatilization of petroleum hydrocarbons from soil and/or groundwater is expected as the remedial excavation is completed. No significant odors are expected to originate from the excavation, but air quality will be monitored during active excavation to ensure air quality is protective of human health. If air monitoring indicates a potential impact to worker health, active ventilation of the exposed remedial excavation will be implemented.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Continuous air quality monitoring will be performed when workers are present in the remedial excavations.

3. Water [help]

a. Surface Water: [help]

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

No.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

No.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

None.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

During construction, dewatering will be performed to facilitate the remedial excavations. Based on preliminary hydrogeologic testing, up to 575,000 gallons may be removed from the East and West Blocks during excavation. All dewatered groundwater will be treated prior to discharge to the Duwamish Waterway through the municipal storm drain system.

b. Ground Water: [help]

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

No. Post-construction, institutional controls will prohibit groundwater use at the Site. Drinking water will be supplied by City of Seattle.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the

number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

None – post-construction, the redevelopments will discharge to the municipal sanitary sewer.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

During construction, stormwater will be retained on the Site and treated, prior to discharge to the Duwamish Waterway through the municipal storm drain system. After redevelopment, Stormwater runoff will be mitigated by green roof, stormwater planters, and discharge directly to the municipal storm drain system.

2) Could waste materials enter ground or surface waters? If so, generally describe.

No. The purpose of the remedial excavation is to remove contaminated soil in order to improve groundwater quality. There are no surface water bodies near the Site.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

No.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

During construction, best management practices will be implemented to eliminate/minimize runoff from the Site.

4. Plants [help]

a. Check the types of vegetation found on the site:

__ _deciduous tree: alder, maple, aspen, **other**
____evergreen tree: fir, cedar, pine, other
__X_shrubs
__X_grass – very limited amount
____pasture
____crop or grain
____ Orchards, vineyards or other permanent crops.
____ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
____water plants: water lily, eelgrass, milfoil, other
____other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

A limited amount of grass and shrubs will be removed during remedial excavation.

c. List threatened and endangered species known to be on or near the site.

None.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

The project will meet a green factor of 3.00 (based on the SEPA checklists submitted for the three buildings to be constructed at the Site). Small, raised planter beds will be present at the three redevelopments. On- and off-Site landscaping is planned in accordance with the City of Seattle Commercial zone Green Factor standards.

e. List all noxious weeds and invasive species known to be on or near the site.

None.

5. Animals [help]

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

The Site is located within the City of Seattle limits. Any birds (such as pigeons, sparrows, crows, and seagulls) or other animals (such as rodents, squirrels, rabbits) in the City are likely to be found on or near the site.

Examples include:

Birds: hawk, heron, eagle, songbirds, other
Mammals: deer, bear, elk, beaver, other
Fish: bass, salmon, trout, herring, shellfish, other ________

b. List any threatened and endangered species known to be on or near the site.

None.

c. Is the site part of a migration route? If so, explain.

Yes. The entire Puget Sound Area is within the Pacific Flyway, which is a major north-south flyway for migratory birds in America, extending from Alaska to Patagonia. Every year, migratory birds travel some or all of this distance both in spring and in fall, following food sources, heading to breeding grounds, or traveling to overwintering sites.

d. Proposed measures to preserve or enhance wildlife, if any:

None.

e. List any invasive animal species known to be on or near the site.

Invasive species known to be located in King County and which could be present within the project area include European starling, house sparrow, and eastern gray squirrel.

6. Energy and Natural Resources [help]

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electric and/or natural gas will be present at the redevelopment buildings.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

Based on information included in the SEPA checklists for the buildings, the project is designed to meet or exceed the requirements of the 2015 Seattle Energy Code. Measures to reduce or control energy impacts are planned through optimization of the building envelope and ventilation strategies.

7. Environmental Health [help]

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal?
If so, describe.

During the remedial excavation, workers could be exposed to chlorinated solvent- and/or petroleum hydrocarbon-contaminated soil, groundwater, and air (through volatilization). Excavation contractors will be certified with OSHA 40-hour HAZWOPER. Air quality will be monitored during active excavation of the contaminated media, and active ventilation of the excavations will be implemented if air monitoring indicates a potential exposure risk to worker health. Post-redevelopment, any remaining soil contamination will be capped, groundwater contamination will be monitored for natural attenuation.

1) Describe any known or possible contamination at the site from present or past uses.

- **Former bakery-equipment manufacturing operations on the East and West Blocks**. Belshaw Brothers, Inc. (Belshaw), a commercial bakery- and restaurant-equipment manufacturing company, used several underground storage tanks (USTs) for storing gasoline/diesel fuel and it utilized other hazardous chemicals (such as 1,1,1-TCA; petroleum-based cutting oils; aromatic alcohol; propylene glycol; chlorinated alkane polymer; methyl ethyl ketone; toluene; xylene; ethylbenzene; ethanol; methanol; petroleum naphthalene; and mineral spirits) for their manufacturing operations that were performed from approximately the 1920s through 2004. Today, the East and West Blocks are vacant lots, except for a one-story building in the northwest portion of the West Block. The Seattle Collision Center (SCC), an automobile body repair business currently occupies this building (Figure 2).

- **Former dry-cleaning operations on the West Block**. Penthouse Drapery Cleaners & Manufacturers, Inc. (Penthouse), a commercial drycleaner, operated within the building present on the northwest portion of the West Block from approximately 1980 through the mid-1990s (Figure 3). Tetrachloroethene (PCE) was used by the drycleaner for routine dry-cleaning operations. PCE-contaminated soil and shallow groundwater have been confirmed in the northwest potion and west half of the West Block. SCC currently occupies this building in the northwest portion of the West Block (Figure 2).

- **Undocumented fill on the South Block.** The west half of the South Block was used as a parking lot by Belshaw when it operated at the Site from the 1920s through 2004 (Figure 2). Cadmium- and lead-contaminated soil was confirmed in the southwest portion of the South Block and is likely associated with undocumented fill that may have been deposited during Belshaw's operations to improve the parking lot portion of the South Block. Also, three single-family residences formerly existed on the east half of the South Block (Figure 2). No soil contamination was identified in the east half.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

Petroleum-hydrocarbon and chlorinated solvent-contaminated soil and groundwater on the East and West Blocks, and metals-contaminated soil on the South Block.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

Petroleum will be used to fuel heavy equipment during both excavation and redevelopment construction of the Subject Property.

4) Describe special emergency services that might be required.

None.

5) Proposed measures to reduce or control environmental health hazards, if any:

Air monitoring during active excavation while workers are present.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Rainier Avenue South is a major thoroughfare and handles a large volume of traffic.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indi-
cate what hours noise would come from the site.

Construction-related noise would occur as a result of on-Site construction activities associated with the proposed project. Construction noise would be limited by the City of Seattle's noise ordinances, which for the Site are:

- 7:00 a.m. to 7:00 p.m. on weekdays
- 9:00 a.m. to 7:00 p.m. on weekends and legal holidays

Impact construction work is limited to:

- 8:00 a.m. to 5:00 p.m. on weekdays
- 9:00 a.m. to 5:00 p.m. on weekends and legal holidays

Variances will be acquired if construction is to take place outside of these hours.

3) Proposed measures to reduce or control noise impacts, if any:

The project will comply with provisions of the City's Noise Control Code (SMC 25.08), limiting construction hours, as directed. If alternate hours of construction are necessary, the applicant will seek approval from SDCI, but alternate hours are not anticipated at this time.

8. Land and Shoreline Use [help]

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

East and South Blocks – Vacant

West Block – Mostly vacant except for a single-story building in the northwest corner that is occupied by SCC, an automotive body repair business.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

None.

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

No.

c. Describe any structures on the site.

West Block – A single-story building in the northwest corner that is occupied by SCC, an automotive body repair business.

d. Will any structures be demolished? If so, what?

The single-story building in the northwest corner of the West Block.

e. What is the current zoning classification of the site?

NC3-75' for commercial/mixed use

f. What is the current comprehensive plan designation of the site?

Hub Urban Village

g. If applicable, what is the current shoreline master program designation of the site?

Not applicable.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

A small portion of the West and South Blocks (western side of each) has been classified as a critical area (ECA5 - Liquefaction Prone Area) by the City.

i. Approximately how many people would reside or work in the completed project?

Approximately 1,010 residents will live and 65 people will work at the completed project.

j. Approximately how many people would the completed project displace?

None.

k. Proposed measures to avoid or reduce displacement impacts, if any:

Not Applicable.

L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Project meets the requirements of a Redevelopment Opportunity Zone through the creation of affordable housing units.

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

None.

9. Housing [help]

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

360 affordable housing units and 416 residential units.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

None.

c. Proposed measures to reduce or control housing impacts, if any:

None.

10. Aesthetics [help]

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

East Block – 7 stories, West Block – 8 stories, and South Block – 7 stories.

The principal exterior building materials proposed are: Masonry (brick), and Fiber cement cladding (panel and lap siding).

b. What views in the immediate vicinity would be altered or obstructed?

East and West Blocks – Views from the adjacent apartment buildings to the north (located across South State Street) will be altered for those unit windows facing south. The new view will be of the new building and exterior courtyard.

South Block – Views from the commercial office building to the south (located across South Holgate Street) will be altered for those units facing north. The view will be primarily of the new residential building with a commercial use at the ground floor.

d. Proposed measures to reduce or control aesthetic impacts, if any:

None. New buildings will be of higher quality than the current view of vacant lots.

11. Light and Glare [help]

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

During the construction process, area lighting of the job site (to meet safety requirements) might be required and could be noticeable proximate to the project site. In general, however, light and glare from the proposed project are not anticipated to adversely affect adjacent land uses.

The finished project will include some glazing on the facades, which could produce glare, but the levels would be typical for a residential building and are not expected to create safety hazards.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

c. What existing off-site sources of light or glare may affect your proposal?

None known.

d. Proposed measures to reduce or control light and glare impacts, if any:

None warranted.

12. Recreation [help]

a. What designated and informal recreational opportunities are in the immediate vicinity?

There are several public recreational spaces within 5 to 10 minutes walking distance in the vicinity of the Site, including the Seattle Children's Playgarden, Colman Playground, Jimi Hendrix Park, and Sam Smith Park. The Amy Yee tennis center is nearby as well.

b. Would the proposed project displace any existing recreational uses? If so, describe.

No.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

None.

13. Historic and cultural preservation [help]

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe.

The existing SCC building on the West Block is over 45 years old. An Appendix A report has been compiled and submitted to the City of Seattle Department of Neighborhoods for historical relevance review. A copy of this report is attached to this checklist.

There are several other buildings near the Site that are also over 45 years old, but none of them are currently listed on local or national historic registers. There are buildings near the Site that are also over 45 years old, but none of them are currently listed on local or national historic registers.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

No.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

Potential impacts to cultural and historical resources were evaluated by consulting the City of Seattle database of historical properties. Review of historical property uses were completed during Phase I Environmental Site Assessments. Also, an Appendix A report for the existing building was submitted to the City of Seattle Department of Neighborhood as part of the MUP application for review. City's decision is pending.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

None.

14. Transportation [help]

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

Primary travel routes to and from the Site include I-5, I-90, Rainier Avenue South, 23rd Avenue South, 22nd Avenue South, and South Grand Street.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

Yes, there are several bus lines that stop within 1/8th of a mile of the project Site. In addition, the east link light rail station at I-90 and Rainier Avenue South is located within 1/2 mile of the project site.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

East Block – 264 new parking stalls (at grade)

West Block – 264 new parking stalls (underground parking)

South Block – 32 parking stalls (at grade)

No parking stalls are eliminated by the project.

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

Yes, the project will require street improvements on all surrounding right-of-ways. New drive lanes, curbs, street trees, parking, and sidewalks will be installed. A 9.5-foot setback will be provided at the north property line and a 1-foot setback on the east property line as required by zoning and street improvement requirements. A 4.04-foot dedication will be provided along the south property line at South Holgate Street.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No.

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

East Block – The proposed project is estimated to generate 456 weekday daily trips with peak volumes occurring during the AM peak period (7-9 AM) and PM peak period (4-6 PM).

West Block – The proposed project is estimated to generate 1,093 weekday daily trips with peak volumes occurring during the AM peak period (7-9 AM) and PM peak period (4-6 PM).

South Block – The proposed project is estimated to generate 257 weekday daily trips with peak volumes occurring during the AM peak period (7-9 AM) and PM peak period (4-6 PM).

Trip generation estimates are based on the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, and were originally presented in the SEPA checklists submitted to the City of Seattle for the three buildings to be constructed at the Site.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

No.

h. Proposed measures to reduce or control transportation impacts, if any:

None warranted. The area is zoned to provide minimum parking and to rely primarily on existing bike, ride share, bus, and rail transportation systems.

15. Public Services [help]

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

Yes. It is anticipated the proposed project would generate an incremental need for increased public services due to the proposed on-Site residential population. The proposed retail spaces are neighborhood-oriented and are not expected to generate additional public service demands by drawing customers from other portions of the city.

b. Proposed measures to reduce or control direct impacts on public services, if any.

None warranted.

16. Utilities [help]

a. Circle utilities currently available at the site: (bolded and underlined)
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system,
other ___________

e. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

Water: new domestic water connection and fire service (Seattle Public Utility [SPU])

Sewer and Stormwater - new side connections to sewer and stormwater systems (SPU)

Natural Gas: New gas service (Puget Sound Energy)

Telecommunications: various providers

Electrical: new electrical feed (Seattle City Light)

Refuse / Recycle service: Waste Management

C. Signature [HELP]

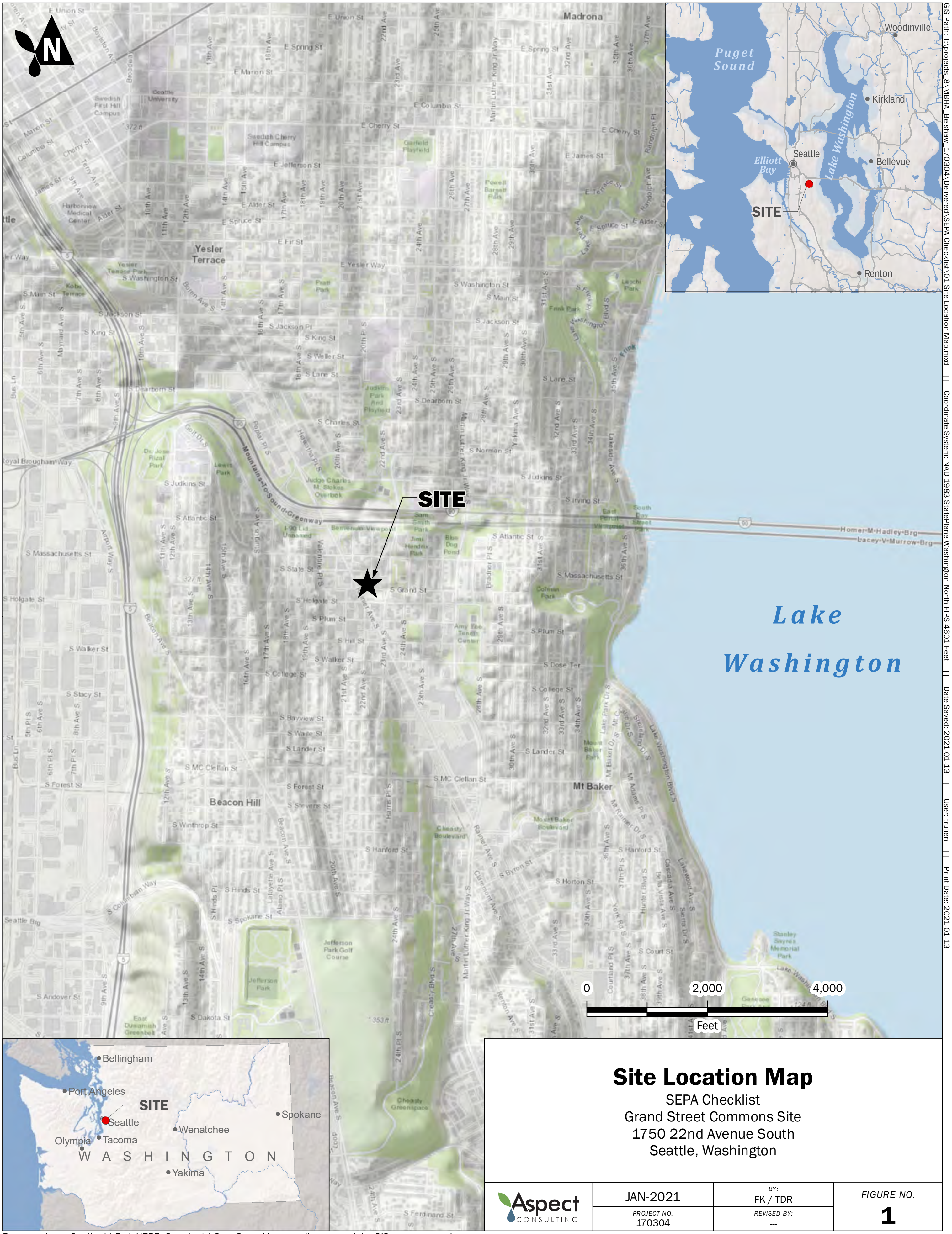
The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: D. Cook

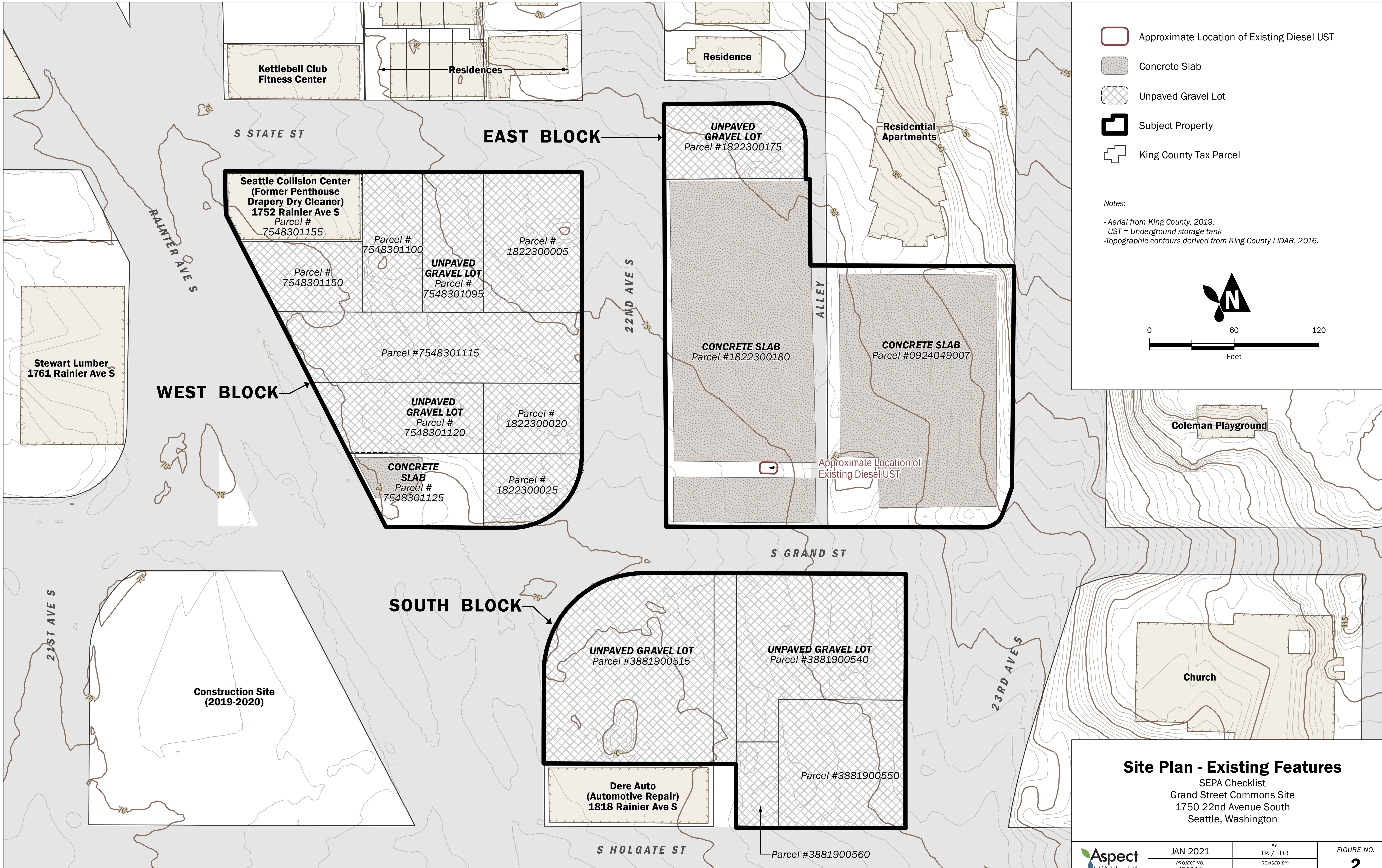
Name of signee: Dave Cook, LG, CPG

Position and Agency/Organization: Aspect Consulting, LLC

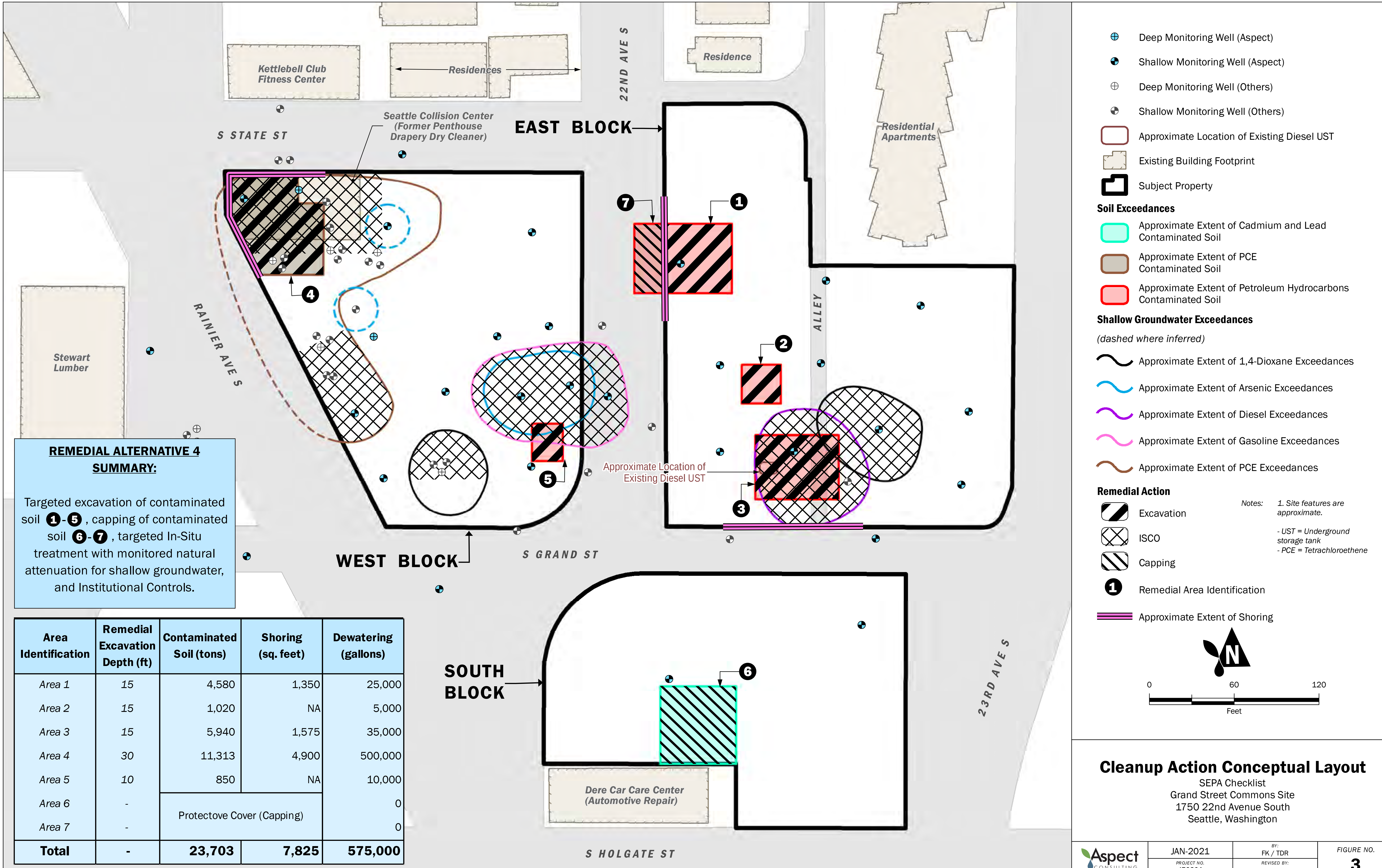
Date Submitted: 1/28/2021



Basemap Layer Credits || Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



Approximate Location of Existing Diesel UST
Concrete Slab
Unpaved Gravel Lot
Subject Property
King County Tax Parcel
Notes:
- Aerial from King County, 2019.
- UST = Underground storage tank
-Topographic contours derived from King County LiDAR, 2016.
N
0
60
120
Feet
Kettlebell Club Fitness Center
Residences
Residence
Residential Apartments
S STATE ST
EAST BLOCK
UNPAVED GRAVEL LOT
Parcel #1822300175
RAINIER AVE S
Seattle Collision Center (Former Penthouse Drapery Dry Cleaner) 1752 Rainier Ave S
Parcel # 7548301155
Parcel # 7548301100
Parcel # 1822300005
Parcel # 7548301150
UNPAVED GRAVEL LOT
Parcel # 7548301095
22ND AVE S
ALLEY
CONCRETE SLAB
Parcel #1822300180
CONCRETE SLAB
Parcel #0924049007
Parcel #7548301115
Stewart Lumber 1761 Rainier Ave S
WEST BLOCK
UNPAVED GRAVEL LOT
Parcel # 7548301120
Parcel # 1822300020
Coleman Playground
CONCRETE SLAB
Parcel # 7548301125
Parcel # 1822300025
Approximate Location of Existing Diesel UST
S GRAND ST
SOUTH BLOCK
21ST AVE S
UNPAVED GRAVEL LOT
Parcel #3881900515
UNPAVED GRAVEL LOT
Parcel #3881900540
23RD AVE S
Construction Site (2019-2020)
Church
Parcel #3881900550
Dere Auto (Automotive Repair) 1818 Rainier Ave S
S HOLGATE ST
Parcel #3881900560
Site Plan - Existing Features
SEPA Checklist
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington
Aspect CONSULTING
JAN-2021
PROJECT NO.
170304
BY:
FK / TDR
REVISED BY:
- - -
FIGURE NO.
2



REMEDIAL ALTERNATIVE 4 SUMMARY:

Targeted excavation of contaminated soil 1-5, capping of contaminated soil 6-7, targeted In-Situ treatment with monitored natural attenuation for shallow groundwater, and Institutional Controls.

Area Identification	Remedial Excavation Depth (ft)	Contaminated Soil (tons)	Shoring (sq. feet)	Dewatering (gallons)
Area 1	*15*	4,580	1,350	25,000
Area 2	*15*	1,020	NA	5,000
Area 3	*15*	5,940	1,575	35,000
Area 4	*30*	11,313	4,900	500,000
Area 5	*10*	850	NA	10,000
Area 6	-	Protectove Cover (Capping)		0
Area 7	-			0
Total	**-**	**23,703**	**7,825**	**575,000**

Cleanup Action Conceptual Layout

SEPA Checklist
Grand Street Commons Site
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING | JAN-2021 | PROJECT NO. 170304 | BY: FK / TDR | REVISED BY: - - - | FIGURE NO. 3

APPENDIX A

SCC building Appendix A Report – pursuant to GSC- West block# 3035316

RUNBERG
ARCHITECTURE
GROUP

SCC building Appendix A Report – pursuant to GSC- West block# 3035316

1752 RAINIER AVE S 98144

Aerial shows the subject site and immediate neighborhood. The subject building is outlined in red. (Google Earth)

One Yesler Way, Suite 200 | Seattle, WA 98104 | 206.956.1970 Main | 206.956.1971 Fax | www.runberg.com

SCC building Appendix A Report – pursuant to GSC- West block # 3035316

Historical Context for the Rainier Valley:

The proposed project site is in the North Rainier Valley of Seattle, Washington. Rainier Valley was originally home to native "Lake People" who lived primarily along the banks of Lake Washington and was opened up to development by Rainier Valley Electric Railway, which was constructed in 1891 by J.K.Edmiston.

The Rainier Valley is a neighborhood focused on the transportation corridor of Rainier Avenue. The valley includes a commercial strip along Rainier Avenue and a variety of multifamily and single-family housing in adjacent areas.

Prior to 1900, the growth of the Rainier Valley was relatively slow, with some settlement near Columbia City and scattered farms and a few lumber operations. In the early 1900s, the population was largely of Chinese, Italian, Irish and Filipino decent. The valley was continued to be used as a thoroughfare to connect the city along the Sound to Lake Washington and developments further south.

During the years from 1900 to 1907, the Rainier Valley was transformed into a thriving community. Much of the residential construction was concentrated in two areas: the "Garlic Gulch" Italian neighborhood centered on Rainier Avenue South between Massachusetts and Atlantic streets and the residential area north of Columbia City, north to include the community of York.

The Dearborn regrade in 1909 moved more than a million cubic yards of dirt. The rail line moved people and goods through the valley, encouraging the development of businesses. The W.G. Savage Lumber Company constructed the first lumber yard at 1761 Rainier Avenue South in about 1920. Stewart Lumber and Hardware Company took over this yard in 1927, which welcomed spur lines through their shops to maximize transport. Other industrial uses abound as well, including the Belshaw Bakery, which resided on the East Block of Grand Street Commons, on a block just east of the subject of this report.

After the streetcar closed and I-90 interrupted the neighborhood in the 1950s, the local community dispersed and was slowly replaced by peoples displaced from the Central District north of Rainier Valley. The lots adjacent to Rainier Ave S remained largely industrial in nature, and many transitioned to serving automobiles. As new mass transit is introduced to the neighborhood and Seattle's population continues to press for new residential neighborhoods, the Rainier Valley is now rapidly transforming from a service and warehouse neighborhood to a true mixed-use, mixed-income community.

Sources:

https://www.seattle.gov/Documents/Departments/Neighborhoods/HistoricPreservation/HistoricResourcesSurvey/context-north-rainier.pdf

1752 RAINIER AVE S (Parcel #754830-1155)

Property Description

Date of construction: original building constructed in 1947
Architect: Unknown.
APN: 754830-1155
Historic Owner: Colin & Barbara Tsuchikawa, purchase date unknown
Lu Vi Han through Han Hong, purchase date 1990
Present Owner: Sullivan Todd M+ Karen, purchase date 12/18/1998

The building in question was built alongside the rail line on Rainier Ave S. in the late 1940s. The single story industrial / warehouse style building has cycled through various uses throughout the years, transitioning from a furniture warehouse, to a drapery cleaner and manufacturer, to an auto body repair shop as it remains today.

Physical Description: Single story,14' tall. The construction type is ordinary masonry featuring concrete block with concrete foundation, and no basement. The parcel lot area is 4815 SF, building is totaling 4790 SF. The exterior of the building is comprised 8''concrete block wall. The car service entrance is located along the north façade, facing state street.

Alterations: A mansard roof element was added the west façade in a 1968 remodel. In a subsequent remodel, the primary building frontage along Rainier Ave S was modified to remove the original storefront windows and replace them with smaller operable windows with a high sill height along Rainier, and the mansard roof was removed.

Additional Historical data:
The building was built in 1947 and originally served as a furniture shop. A photo from April 30, 1947 shows the name "Puget Sound Auction" at the NW corner storefront, and the words, "Furniture New – Used" facing Rainier Ave S.

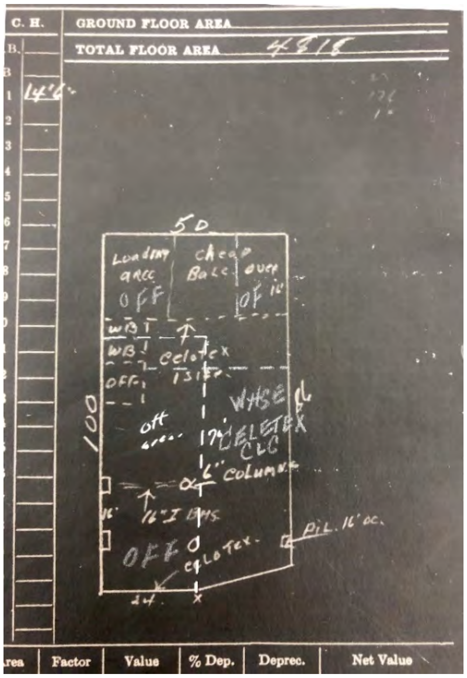
At the time of the 1968 remodel the property was occupied by Penthouse Drapery, a drapery cleaning and manufacturing company.

In a property record from September 21, 1971, the building use was listed as a "Pool Supply Store" and the Owner was listed as L.J. Runge and "Atlas Equipment."

Since 1999 the building has been operated by an auto body repair shop called "Seattle Collision Center."

Summary:
Due to alterations over the years and a lack of historical significance, the buildings does not meet the landmark design criteria.

Historic Photos and Drawings:



Existing building footprint (Puget Sound Archive, 1947)

S State Street & Rainier Ave S, Intersection view (Puget Sound Archives)

West façade from Rainier Ave S, after remodel in 1968 (Puget Sound Archives)

Current Photos:

West facade of building, facing Rainier Ave S.

Northwest corner of building, storefront and entrance.

Northeast corner of building,car entrance facing State street.

East façade of building, facing the parking lot.

SW corner of the building, south façade facing the vacant lot (future Grand Street Common west building).

Close up image of north façade of the building looking east along state street. Note the building is built right against the existing property line with no windows at eye level.

[END]

APPENDIX E

Inadvertent Discovery Plan

INADVERTENT DISCOVERY PLAN

PLAN AND PROCEDURES FOR THE DISCOVERY OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS

To request ADA accommodation, including materials in a format for the visually impaired, call Ecology at 360-407-6000 or visit https://ecology.wa.gov/accessibility. People with impaired hearing may call Washington Relay Service at 711. People with a speech disability may call TTY at 877-833-6341.

Site Name(s): Grand Street Commons   Location: 1750 22nd Avenue South

Project Lead/Organization: Grand Street Commons LLC   County: King

If this Inadvertent Discovery Plan (IDP) is for multiple (batched) projects, ensure the location information covers all project areas.

1. INTRODUCTION

The IDP outlines procedures to perform in the event of a discovery of archaeological materials or human remains, in accordance with applicable state and federal laws. An IDP is required, as part of Agency Terms and Conditions for all grants and loans, for any project that creates disturbance above or below the ground. An IDP is not a substitute for a formal cultural resource review (Executive 05-05 or Section 106).

Once completed, **the IDP shall always be kept at the project site** during all project activities. All staff, contractors, and volunteers shall be familiar with its contents and know where to find it.

2. CULTURAL RESOURCE DISCOVERIES

A cultural resource discovery could be prehistoric or historic. Examples include (see images for further examples):

- An accumulation of shell, burned rocks, or other food related materials.
- Bones, intact or in small pieces.
- An area of charcoal or very dark stained soil with artifacts.
- Stone tools or waste flakes (for example, an arrowhead or stone chips).
- Modified or stripped trees, often cedar or aspen, or other modified natural features, such as rock drawings.
- Agricultural or logging materials that appear older than 50 years. These could include equipment, fencing, canals, spillways, chutes, derelict sawmills, tools, and many other items.
- Clusters of tin cans or bottles, or other debris that appear older than 50 years.
- Old munitions casings. ***Always assume these are live and never touch or move***.
- Buried railroad tracks, decking, foundations, or other industrial materials.
- Remnants of homesteading. These could include bricks, nails, household items,

toys, food containers, and other items associated with homes or farming sites.

The above list does not cover every possible cultural resource. When in doubt, assume the material is a cultural resource.

3. ON-SITE RESPONSIBILITIES

If any employee, contractor, or subcontractor believes that they have uncovered cultural resources or human remains at any point in the project, take the following steps to ***Stop-Protect-Notify***. **If you suspect that the discovery includes human remains, also follow Sections 5 and 6.**

STEP A: Stop Work.

All work must stop immediately in the vicinity of the discovery.

STEP B: Protect the Discovery.

Leave the discovery and the surrounding area untouched and create a clear, identifiable, and wide boundary (30 feet or larger) with temporary fencing, flagging, stakes, or other clear markings. Provide protection and ensure integrity of the discovery until cleared by the Department of Archaeological and Historical Preservation (DAHP) or a licensed, professional archaeologist.

Do not permit vehicles, equipment, or unauthorized personnel to traverse the discovery site. Do not allow work to resume within the boundary until the requirements of this IDP are met.

STEP C: Notify Project Archaeologist (if applicable).

If the project has an archaeologist, notify that person. If there is a monitoring plan in place, the archaeologist will follow the outlined procedure.

STEP D: Notify Project and Washington Department of Ecology (Ecology) contacts.

Project Lead Contacts

Primary Contact
Name: Fasih Khan
Cell: 206-713-2136
Email: fkhan@aspectconsulting.com

Alternate Contact
Name: Brendan Lawrence
Office: 206-290-1097
Email: brendan@lakeunionpartners.com

Ecology Contacts (completed by Ecology Project Manager)

Ecology Project Manager
Name: Sandra Matthews
Program: TCP/NWRO
Cell: 425-223-1999
Email: sandra.matthews@ecy.wa.gov

Alternate or Cultural Resource Contact
Name: Lucy McInerney
Program: TCP/NWRO
Cell: 425- 410-1400
Email: lucy.mcinerney@ecy.wa.gov

STEP E: Ecology will notify DAHP.

Once notified, the Ecology Cultural Resource Contact or the Ecology Project Manager will contact DAHP to report and confirm the discovery. To avoid delay, the Project Lead/Organization will contact DAHP if they are not able to reach Ecology.

DAHP will provide the steps to assist with identification. DAHP, Ecology, and Tribal representatives may coordinate a site visit following any necessary safety protocols. DAHP may also inform the Project Lead/Organization and Ecology of additional steps to further protect the site.

Do not continue work until DAHP has issued an approval for work to proceed in the area of, or near, the discovery.

DAHP Contacts:

Name: Rob Whitlam, PhD
Title: State Archaeologist
Cell: 360-890-2615
Email: Rob.Whitlam@dahp.wa.gov
Main Office: 360-586-3065

Human Remains/Bones:

Name: Guy Tasa, PhD
Title: State Anthropologist
Cell: 360-790-1633 (24/7)
Email: Guy.Tasa@dahp.wa.gov

4. TRIBAL CONTACTS

In the event cultural resources are discovered, the following tribes will be contacted. See Section 10 for Additional Resources.

Tribe: Muckleshoot Indian Tribe
Name: Laura Murphy
Title: Archaeologist Cultural Resources
Phone: 253-876-3272
Email: laura.murphy@muckleshoot.nsn.us

Tribe: Snoqualmie Indian Tribe
Name: Adam Osbekoff
Title: Archaeology & Historic Preservation
Phone: 425-292-0249
Email: adam@snoqualmietribe.us

Tribe: Samish Indian Nation
Name: Jackie Ferry
Title: THPO
Phone: 360-652-7362 ext 126
Email: jferry@samishtribe.nsn.us

Tribe: Stillaguamish Tribe of Indians
Name: Kerry Lyste
Title: THPO, Cultural Resources
Phone: 360-293-6404 ext. 126
Email: klyste@stillaguamish.com

Tribe: Suquamish Tribe
Name: Dennis Lewarch
Title: THPO
Phone: 360-394-8529
Email: dlewarch@Suquamish.nsn.us

Tribe: Tulalip Tribes
Name: Richard Young
Title: Cultural Resources
Phone: 360-716-2652
Email: ryoung@tulaliptribes-nsn.gov

Please provide contact information for additional tribes within your project area, if needed, in Section 11.

5. FURTHER CONTACTS (if applicable)

If the discovery is confirmed by DAHP as a cultural or archaeological resource, or as human remains, and there is a partnering federal or state agency, Ecology or the Project Lead/Organization will ensure the partnering agency is immediately notified.

Federal Agency:

Agency:

Name:

Title:

Phone:

Email:

State Agency:

Agency:

Name:

Title:

Phone:

Email:

6. SPECIAL PROCEDURES FOR THE DISCOVERY OF HUMAN SKELETAL REMAINS

Any human skeletal remains, regardless of antiquity or ethnic origin, will at all times be treated with dignity and respect. Follow the steps under ***Stop-Protect-Notify.*** For specific instructions on how to handle a human remains discovery, see: *RCW 68.50.645: Skeletal human remains—Duty to notify—Ground disturbing activities—Coroner determination—Definitions*.

Suggestion: If you are unsure whether the discovery is human bone or not, contact Guy Tasa with DAHP, for identification and next steps. Do not pick up the discovery.

Guy Tasa, PhD State Physical Anthropologist

Guy.Tasa@dahp.wa.gov

(360) 790-1633 (Cell/Office)

For discoveries that are confirmed or suspected human remains, follow these steps:

1. Notify law enforcement and the Medical Examiner/Coroner using the contacts below. **Do not call 911** unless it is the only number available to you.

   Enter contact information below (required):

- Local Medical Examiner or Coroner name and phone: Richard Harruff, MD, PhD, Chief Medical Examiner,206-731-3232, ext. 4
    - Local Law Enforcement main name and phone: Seattle police, 206-625-5011
    - Local Non-Emergency phone number (911 if without a non-emergency number): 206-625-5011

2. The Medical Examiner/Coroner (with assistance of law enforcement personnel) will determine if the remains are human or if the discovery site constitutes a crime scene and will notify DAHP.
3. **DO NOT speak with the media, allow photography or disturbance of the remains, or release any information about the discovery on social media.**
4. If the remains are determined to be non-forensic, cover the remains with a tarp or other materials (not soil or rocks) for temporary protection and to shield them from being photographed by others or disturbed.

Further activities:

- Per RCW 27.44.055, RCW 68.50, and RCW 68.60, DAHP will have jurisdiction over non-forensic human remains. Ecology staff will participate in consultation. The Project Lead/Organization may also participate in consultation.Documentation of human skeletal remains and funerary objects will be agreed upon through the consultation process described in RCW 27.44.055, RCW 68.50, and RCW 68.60.
- When consultation and documentation activities are complete, work in the discovery area may resume as described in Section 8.

If the project occurs on federal lands (such as a national forest or park or a military reservation) the provisions of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) apply and the responsible federal agency will follow its provisions. Note that state highways that cross federal lands are on an easement and are not owned by the state.

If the project occurs on non-federal lands, the Project Lead/Organization will comply with applicable state and federal laws, and the above protocol.

7. DOCUMENTATION OF ARCHAEOLOGICAL MATERIALS

Archaeological resources discovered during construction are protected by state law RCW 27.56 and assumed eligible for inclusion in the National Register of Historic Places under Criterion D until a formal Determination of Eligibility is made.

The Project Lead/Organization must ensure that proper documentation and field assessments are made of all discovered cultural resources in cooperation with all parties: the federal agencies (if any), DAHP, Ecology, affected tribes, and the archaeologist.

An archaeologist will record all prehistoric and historic cultural material discovered during project construction on a standard DAHP archaeological site or isolate inventory form. They will photograph site overviews, features, and artifacts and prepare stratigraphic profiles and soil/sediment descriptions for minimal subsurface exposures. They will document discovery locations on scaled site plans and site location maps.

Cultural features, horizons, and artifacts detected in buried sediments may require the archaeologist to conduct further evaluation using hand-dug test units. They will excavate units in a controlled fashion to expose features, collect samples from undisturbed contexts, or to interpret complex stratigraphy. They may also use a test unit or trench excavation to determine if an intact occupation surface is present. They will only use test units when necessary to gather information on the nature, extent, and integrity of subsurface cultural deposits to evaluate the site’s significance. They will conduct excavations using standard archaeological techniques to precisely document the location of cultural deposits, artifacts, and features.

The archaeologist will record spatial information, depth of excavation levels, natural and cultural stratigraphy, presence or absence of cultural material, and depth to sterile soil, regolith, or bedrock for each unit on a standard form. They will complete test excavation unit level forms, which will include plan maps for each excavation level and artifact counts and material types, number, and vertical provenience (depth below surface and stratum association where applicable) for all recovered artifacts. They will draw a stratigraphic profile for at least one wall of each test excavation unit.

The archaeologist will screen sediments excavated for purposes of cultural resources investigation through 1/8-inch mesh, unless soil conditions warrant 1/4-inch mesh.

The archaeologist will analyze, catalogue, and temporarily curate all prehistoric and historic artifacts collected from the surface and from probes and excavation units. The ultimate disposition of cultural materials will be determined in consultation with the federal agencies (if any), DAHP, Ecology, and the affected tribe(s).

Within 90 days of concluding fieldwork, the archaeologist will provide a technical report describing any and all monitoring and resultant archaeological excavations to the Project Lead/Organization, who will forward the report to Ecology, the federal agencies (if any), DAHP, and the affected tribe(s) for review and comment.

If assessment activities expose human remains (burials, isolated teeth, or bones), the archaeologist and Project Lead/Organization will follow the process described in **Section 6**.

8. PROCEEDING WITH WORK

The Project Lead/Organization shall work with the archaeologist, DAHP, and affected tribe(s) to determine the appropriate discovery boundary and where work can continue.

Work may continue at the discovery location only after the process outlined in this plan is followed and the Project Lead/Organization, DAHP, any affected tribe(s), Ecology, and the federal agencies (if any) determine that compliance with state and federal laws is complete.

9. ORGANIZATION RESPONSIBILITY

The Project Lead/Organization is responsible for ensuring:

- This IDP has complete and accurate information.
- This IDP is immediately available to all field staff at the site and available by request to any party.
- This IDP is implemented to address any discovery at the site.
- That all field staff, contractors, and volunteers are instructed on how to implement this IDP.

10. ADDITIONAL RESOURCES

Informative Video

Ecology recommends that all project staff, contractors, and volunteers view this informative video explaining the value of IDP protocol and what to do in the event of a discovery. The target audience is anyone working on the project who could unexpectedly find cultural resources or human remains while excavating or digging. The video is also posted on DAHP's inadvertent discovery language website.

Ecology's IDP Video (https://www.youtube.com/watch?v=ioX-4cXfbDY)

Informational Resources

DAHP (https://dahp.wa.gov)

Washington State Archeology (DAHP 2003)
(https://dahp.wa.gov/sites/default/files/Field%20Guide%20to%20WA%20Arch_0.pdf)

Association of Washington Archaeologists (https://www.archaeologyinwashington.com)

Potentially Interested Tribes

Tribal Contacts: Interactive Map of Tribes by Area
(https://dahp.wa.gov/archaeology/tribal-consultation-information)

Tribal Contacts - WSDOT Tribal Contact Website
(https://wsdot.wa.gov/tribal/TribalContacts.htm)

11. ADDITIONAL INFORMATION

Please add any additional contact information or other information needed within this IDP.

Implement the IDP if you see…

Chipped stone artifacts.

Examples are:

- Glass-like material.
- Angular material.
- “Unusual” material or shape for the area.
- Regularity of flaking.
- Variability of size.

Stone artifacts from Oregon.

Stone artifacts from Washington.

Biface-knife, scraper, or pre-form found in NE Washington. Thought to be a well knapped object of great antiquity. Courtesy of Methow Salmon Rec. Foundation.

Implement the IDP if you see…

Ground stone artifacts.

Examples are:

- Unusual or unnatural shapes or unusual stone.
- Striations or scratching.
- Etching, perforations, or pecking.
- Regularity in modifications.
- Variability of size, function, or complexity.

Above: Fishing Weight - credit CRITFC Treaty Fishing Rights website.

Artifacts from unknown locations (left and right images).

Implement the IDP if you see…

Bone or shell artifacts, tools, or beads.

Examples are:

- Smooth or carved materials.
- Unusual shape.
- Pointed as if used as a tool.
- Wedge shaped like a “shoehorn”.
- Variability of size.
- Beads from shell (dentalium) or tusk.

Upper Left:*Bone Awls from Oregon.*

Upper Center: *Bone Wedge from California.*

Upper Right: *Plateau dentalium choker and bracelet, from Nez Perce National Historical Park, 19th century, made using Antalis pretiosa shells Credit: Nez Perce - Nez Perce National Historical Park, NEPE 8762, Public Domain.*

Above: *Tooth Pendants. Right: Bone Pendants. Both from Oregon and Washington.*

Implement the IDP if you see…

Culturally modified trees, fiber, or wood artifacts.

Examples are:

- Trees with bark stripped or peeled, carvings, axe cuts, de-limbing, wood removal, and other human modifications.
- Fiber or wood artifacts in a wet environment.
- Variability of size, function, and complexity.

Left and Below: *Culturally modified tree and an old carving on an aspen (Courtesy of DAHP). These are examples of above ground cultural resources.*

Right, Top to Bottom: *Artifacts from Mud Bay, Olympia: Toy war club, two strand cedar rope, wet basketry*.

Implement the IDP if you see…

Strange, different, or interesting looking dirt, rocks, or shells.

Human activities leave traces in the ground that may or may not have artifacts associated with them. Examples are:

- "Unusual" accumulations of rock (especially fire-cracked rock).
- "Unusual" shaped accumulations of rock (such as a shape similar to a fire ring).
- Charcoal or charcoal-stained soils, burnt-looking soils, or soil that has a "layer cake" appearance.
- Accumulations of shell, bones, or artifacts. Shells may be crushed.
- Look for the "unusual" or out of place (for example, rock piles in areas with otherwise few rocks).

Shell Midden pocket in modern fill discovered in sewer trench.

Underground oven. Courtesy of DAHP.

Shell midden with fire cracked rock.

Hearth excavated near Hamilton, WA.

Implement the IDP if you see…

Historic period artifacts (historic archaeology considered older than 50 years).

Examples are:

- Agricultural or logging equipment. May include equipment, fencing, canals, spillways, chutes, derelict sawmills, tools, etc.
- Domestic items including square or wire nails, amethyst colored glass, or painted stoneware.

Left: Top to Bottom: *Willow pattern serving bowl and slip joint pocket knife discovered during Seattle Smith Cove shantytown (45-KI-1200) excavation.*

Right: *Collections of historic artifacts discovered during excavations in eastern Washington cities.*

Implement the IDP if you see…

Historic period artifacts (historic archaeology considered older than 50 years).

Examples are:

- Railway tokens, coins, and buttons.
- Spectacles, toys, clothing, and personal items.
- Items helping to understand a culture or identity.
- Food containers and dishware.

Main Image: *Dishes, bottles, work boot found at the North Shore Japanese bath house (ofuro) site, Courtesy Bob Muckle, Archaeologist, Capilano University, B.C. This is an example of an above ground resource.*

Right, from Top to Bottom: *Coins, token, spectacles and Montgomery Ward pitchfork toy discovered during Seattle Smith Cove shantytown (45-KI-1200) excavation.*

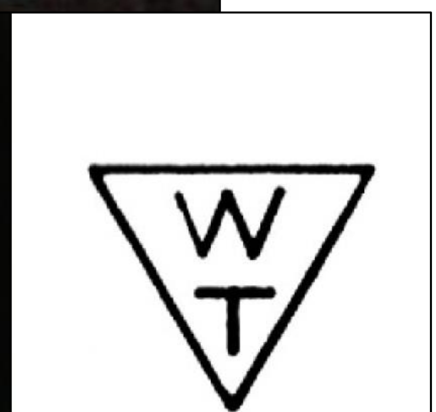
Implement the IDP if you see…

- Old munition casings – if you see ammunition of any type – ***always assume they are live and never touch or move!***
- Tin cans or glass bottles with an older manufacturer's technique – maker's mark, distinct colors such as turquoise, or an older method of opening the container.

Far Left: *.303 British cartridge found by a WCC planting crew on Skagit River.* ***Don't ever touch something like this!***

Left: *Maker's mark on bottom of old bottle.*

Right: *Old beer can found in Oregon. ACME was owned by Olympia Brewery. Courtesy of Heather Simmons.*



Logo employed by Whithall Tatum & Co. between 1924 to 1938 (Lockhart et al. 2016).

Can opening dates, courtesy of W.M. Schroeder.

Implement the IDP if you see…

Historic foundations or buried structures.

Examples are:

- Foundations.
- Railroad and trolley tracks.
- Remnants of structures.

Counter Clockwise, Left to Right: *Historic structure 45KI924, in WSDOT right of way for SR99 tunnel. Remnants of Smith Cove shantytown (45-KI-1200) discovered during Ecology CSO excavation, City of Spokane historic trolley tracks (above ground historic resources) uncovered during stormwater project, intact foundation of historic home that survived the Great Ellensburg Fire of July 4, 1889, uncovered beneath parking lot in Ellensburg.*

*B***Implement the IDP if you see…**

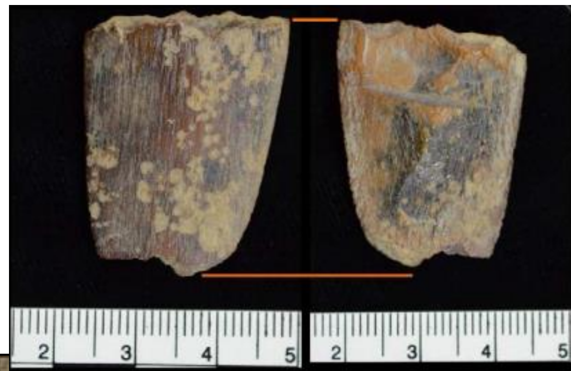
Potential human remains.

Examples are:

- Grave headstones that appear to be older than 50 years.
- Bones or bone tools--intact or in small pieces. It can be difficult to differentiate animal from human so they must be identified by an expert.
- These are all examples of animal bones and are not human.

Center: *Bone wedge tool, courtesy of Smith Cove Shantytown excavation (45KI1200).*

Other images (Top Right, Bottom Left, and Bottom) Center: Courtesy of DAHP.



Directly Above: *This is a real discovery at an Ecology sewer project site.*

What would you do if you found these items at a site? Who would be the first person you would call?

Hint: *Read the plan!*

APPENDIX F

In Situ Injection Phase II Field Logs

WEEKLY PROJECT SUMMARY

PROJECT NAME/NUMBER: ASPECT, SEATTLE, WA / KLOZUR / 306211060

Day	Date	On-site Time	Off-site Time	Wells Completed	% Solution Sodium Hydroxide (Gallons)	% Solution Klozur (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)
Monday	5/24/2021	2:45 PM	4:30 PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tuesday	5/25/2021	7:00 AM	5:30 PM	1.0	50.00	220.40	810.0	1,000.0	100.0	1,100.0
Wednesday	5/26/2021	7:00 AM	6:15 PM	1.0	75.000	330.6	1,215.0	1,500.0	150.0	1,650.0
Thursday	5/27/2021	7:00 AM	6:30 PM	2.0	100.00	440.80	1,620.0	2,000.0	200.0	2,200.0
Friday	5/28/2021	7:00 AM	2:30 PM	1.0	37.50	165.30	607.5	750.0	75.0	825.0
Tuesday	6/1/2021	10:00 AM	5:30 PM	1.0	36.0	165.3	607.5	750.0	75.0	825.0
Wednesday	6/2/2021	7:00 AM	5:30 PM	1.0	75.0	330.6	1,215.0	1,500.0	150.0	1,650.0
Thursday	6/3/2021	7:00 AM	6:15 PM	2.0	100.0	440.8	1,620.0	2,000.0	200.0	2,200.0
Friday	6/4/2021	7:00 AM	1:30 PM	1.0	0.0	55.1	90.0	100.0	25.0	125.0
Monday	6/7/2021	10:45 AM	5:45 PM	1.0	25.0	110.0	425.0	450.0	50.0	500.0
Tuesday	6/8/2021	6:45 AM	7:15 PM	3.0	100.0	440.8	1,700.0	1,800.0	175.0	1,975.0
Wednesday	6/9/2021	6:45 AM	6:15 PM	2.0	125.0	551.0	2,125.0	2,250.0	250.0	2,500.0
Thursday	6/10/2021	6:45 AM	6:30 PM	3.0	125.0	551.0	2,125.0	2,250.0	250.0	2,500.0
Friday	6/11/2021	6:00 AM	5:15 PM	1.0	87.5	385.7	1,487.5	1,575.0	175.0	1,750.0
Monday	6/14/2021	9:45 AM	5:45 PM	2.0	75.0	330.6	1,215.0	1,500.0	150.0	1,650.0
Tuesday	6/15/2021	7:00 AM	1:00 PM	1.0	37.5	165.3	607.5	750.0	75.0	825.0
			Totals	23	1,048.50	4,683.30	17,470.00	20,175.00	2,100.00	22,275.00

Notes:
PSI - pounds per square inch

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: ASPECT - SEATTLE, WA / 306211060

LEAD OPERATOR: C. Flaherty
SCOPE OF WORK: Complete multiple injection boring's

INJECTION APPROACH: Custom built injection platform, hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	Sodium Hydroxide (Gallons)	Klozur (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
KSP-1	4/28/2021	2:28 PM	4/28/2021	2:51 PM	20.0 to 22.5	320	310	6.3	7.00	31.80	142.5	150.0	0.0	150.0		
	4/28/2021	4:03 PM	4/28/2021	4:23 PM	20.0 to 22.5	310	390	7.4	7.00	31.80	142.5	150.0	25.0	175.0		
	4/29/2021	8:44 AM	4/29/2021	9:24 AM	22.5 to 25.0	320	380	7.4	14.00	63.60	285.0	300.0	25.0	325.0		
	4/29/2021	10:10 AM	4/29/2021	10:44 AM	25.0 to 27.5	320	380	8.6	14.00	63.60	285.0	300.0	25.0	325.0		
	4/29/2021	11:43 AM	4/29/2021	12:17 PM	27.5 to 30.0	320	425	8.8	14.00	63.60	285.0	300.0	25.0	325.0		
	4/29/2021	1:06 PM	4/29/2021	1:45 PM	30.0 to 32.5	320	200	7.6	14.00	63.60	285.0	300.0	25.0	325.0	X	13:15 up welling. Slowed flow to re install locking cap on monitoring well near KSP-2
	4/29/2021	2:37 PM	4/29/2021	3:42 PM	32.5 to 35.0	140	140	4.6	30.50	76.10	253.5	300.0	25.0	325.0		
								TOTALS	100.50	394.10	1,678.5	1,800.0	150.0	1,950		
KSP-2	4/27/2021	2:22 PM	4/27/2021	2:41 PM	20.0 to 22.5	200	165	16.6	14.00	63.60	285.0	300.0	25.0	325.0		
	4/27/2021	3:11 PM	4/27/2021	3:28 PM	22.5 to 25.0	170	160	19.1	14.00	63.60	285.0	300.0	25.0	325.0		
	4/28/2021	8:05 AM	4/28/2021	8:50 AM	25.0 to 27.5	580	430	7.1	14.00	63.60	285.0	300.0	25.0	325.0	X	8:15 minor surfacing from annulus, Slowed flow to minimize surfaced solution
	4/28/2021	9:51 AM	4/28/2021	10:48 AM	27.5 to 30.0	600	160	5.2	14.00	63.60	285.0	300.0	25.0	325.0	X	Upwelling at monitoring well 4' away. Slowed flow and tightened cap down.
	4/28/2021	11:37 AM	4/28/2021	12:15 PM	30.0 to 32.5	180	300	7.7	14.00	63.60	285.0	300.0	25.0	325.0		
	4/28/2021	12:27 PM	4/28/2021	1:10 PM	32.5 to 35.0	280	140	6.9	14.00	63.60	285.0	300.0	25.0	325.0		
								TOTALS	84.00	381.60	1,710.0	1,800.0	150.0	1,950		
KSP-3	4/28/2021	3:18 PM	4/28/2021	3:52 PM	20.0 to 22.5	240	320	4.4	7.00	31.80	142.5	150.0	0.0	150.0	X	Minor surfacing from annulus. Slowed flow
	4/28/2021	4:03 PM	4/28/2021	4:23 PM	20.0 to 22.5	310	390	7.4	7.00	31.80	142.5	150.0	25.0	175.0		
	4/29/2021	8:44 AM	4/29/2021	9:24 AM	22.5 to 25.0	320	380	7.4	14.00	63.60	285.0	300.0	25.0	325.0		
	4/29/2021	10:10 AM	4/29/2021	10:44 AM	25.0 to 27.5	320	380	8.6	14.00	63.60	285.0	300.0	25.0	325.0		
	4/29/2021	11:43 AM	4/29/2021	12:17 PM	27.5 to 30.0	320	425	8.8	14.00	63.60	285.0	300.0	25.0	325.0	X	Observed surfacing at end of interval 14' and 35' from KSP-3 and under injection truck
	4/29/2021	1:06 PM	4/29/2021	1:45 PM	30.0 to 32.5	320	200	7.6	14.00	63.60	285.0	300.0	25.0	325.0	X	13:15 up welling. Slowed flow to re install locking cap on monitoring well near KSP-2
	4/29/2021	2:37 PM	4/29/2021	3:42 PM	32.5 to 35.0	140	140	4.6	30.50	76.10	253.5	300.0	25.0	325.0		
								TOTALS	100.50	394.10	1,678.5	1,800.0	150.0	1,950		
KSP-12	5/25/2021	11:30 AM	5/25/2021	12:17 PM	25.0 to 27.5	250	200	5.3	12.5	55.1	202.5	225.0	25.0	250.0		
	5/25/2021	12:33 PM	5/25/2021	1:41 PM	27.5 to 30.0	350	370	3.7	12.5	55.1	202.5	225.0	25.0	250.0		
	5/25/2021	1:47 PM	5/25/2021	2:42 PM	30.0 to 32.5	340	200	4.5	12.5	55.1	202.5	225.0	25.0	250.0		
	5/25/2021	2:53 PM	5/25/2021	3:41 PM	32.5 to 35.0	250	40	5.2	12.5	55.1	202.5	225.0	25.0	250.0		
								TOTALS	50.0	220.4	810.0	900.0	100.0	1,000		
KSP-8	5/26/2021	9:33 AM	5/26/2021	10:50 AM	25.0 to 27.5	875	20	3.2	12.5	55.1	202.5	225.0	25.0	250.0		
	5/26/2021	11:00 AM	5/26/2021	11:52 AM	27.5 to 30.0	400	120	4.8	12.5	55.1	202.5	225.0	25.0	250.0	X	Minor surfacing from annulus. Sealed with bentonite and slowed flow.
	5/26/2021	12:07 PM	5/26/2021	1:20 PM	30.0 to 32.5	600	60	3.4	12.5	55.1	202.5	225.0	25.0	250.0	X	Minor surfacing 20' from point. Slowed flow. Apprx. 10 gal. loss.
	5/26/2021	1:37 PM	5/26/2021	2:41 PM	32.5 to 35.0	200	60	3.9	12.5	55.1	202.5	225.0	25.0	250.0		
								TOTALS	50.0	220.4	810.0	900.0	100.0	1,000		
KSP-5	5/26/2021	4:07 PM	5/26/2021	5:03 PM	25.0 to 27.5	300	170	4.5	12.5	55.1	202.5	225.0	25.0	250.0		
	5/26/2021	5:10 PM	5/26/2021	6:00 PM	27.5 to 30.0	350	50	5.0	12.5	55.1	202.5	225.0	25.0	250.0		
	5/27/2021	8:01 AM	5/27/2021	9:22 AM	30.0 to 32.5	575	600	3.1	12.5	55.1	202.5	225.0	25.0	250.0		
	5/27/2021	9:31 AM	5/27/2021	10:35 AM	32.5 to 35.0	400	380	3.9	12.5	55.1	202.5	225.0	25.0	250.0		
								TOTALS	50.0	220.4	810.0	900.0	100.0	1,000		
KSP-7	5/27/2021	11:15 AM	5/27/2021	12:06 PM	25.0 to 27.5	500	200	4.9	12.5	55.1	202.5	225.0	25.0	250.0		
	5/27/2021	12:50 PM	5/27/2021	1:43 PM	27.5 to 30.0	200	80	4.2	12.5	55.1	202.5	225.0	25.0	250.0		
	5/27/2021	1:53 PM	5/27/2021	2:45 PM	30.0 to 32.5	350	60	4.8	12.5	55.1	202.5	225.0	25.0	250.0		
	5/27/2021	3:08 PM	5/27/2021	3:59 PM	32.5 to 35.0	150	150	4.9	12.5	55.1	202.5	225.0	25.0	250.0		
								TOTALS	50.0	220.4	810.0	900.0	100.0	1,000		
KSP-13	5/27/2021	4:06 PM	5/27/2021	4:56 PM	25.0 to 27.5	375	110	5.0	12.5	55.1	202.5	225.0	25.0	250.0		
	5/27/2021	5:09 PM	5/27/2021	6:10 PM	27.5 to 30.0	400	400	4.1	12.5	55.1	202.5	225.0	25.0	250.0		
	5/28/2021	8:18 AM	5/28/2021	9:18 AM	30.0 to 32.5	600	580	4.2	12.5	55.1	202.5	225.0	25.0	250.0		
	5/28/2021	9:39 AM	5/28/2021	10:00 AM	32.5 to 35.0	300	200	3.6	0.0	27.6	45.0	50.0	25.0	75.0	X	Had surfacing out of hole, pulled out and offset 2'
	5/28/2021	10:50 AM	5/28/2021	11:53 AM	32.5 to 35.0	650	400	3.2	12.5	27.6	157.5	175.0	25.0	200.0		Injected remaining volume in offset hole
								TOTALS	50.0	220.4	810.0	900.0	125.0	1,025		
KSP-4	5/28/2021	12:42 PM	5/28/2021	1:57 PM	25.0 to 27.5	600	500	3.3	12.5	55.1	202.5	225.0	25.0	250.0		
	6/1/2021	12:44 PM	6/1/2021	1:40 PM	27.5 to 30.0	300	85	4.5	12.5	55.1	202.5	225.0	25.0	250.0	X	Minor surfacing 20' away. Observed at end of interval.
	6/1/2021	1:54 PM	6/1/2021	2:33 PM	30.0 to 32.5	250	80	4.5	5.5	55.1	135.0	150.0	25.0	175.0	X	Major surfacing from several locations 20' from point. Push to next interval.
	6/1/2021	2:54 PM	6/1/2021	3:55 PM	32.5 to 35.0	700	0	2.9	5.5	55.1	135.0	150.0	25.0	175.0	X	Surfacing (same locations) 20' away, slowed flow, no change. Shut off and push to 37.5. As Per client.
	6/1/2021	4:04 PM	6/1/2021	4:41 PM	35.0 to 37.5	100	30	2.7	7.0	0.0	68.0	75.0	25.0	100.0	X	Surfacing (same locations) 20' away. Was able to manage surfacing by slowing flow.
								TOTALS	36.0	220.4	675.0	825.0	125.0	850		
KSP-11	6/2/2021	9:54 AM	6/2/2021	10:57 AM	25.0 to 27.5	700	150	4.0	12.5	55.1	202.5	225.0	25.0	250.0		
	6/2/2021	11:39 AM	6/2/2021	1:42 PM	30.0 to 32.5	215	75	4.1	25.0	110.2	405.0	450.0	50.0	500.0		Tried to inject @30' surfacing out of annulus, Pushed down to 3rd interval to inject two volumes AS PER CLIENT.
	6/2/2021	1:54 PM	6/2/2021	2:57 PM	32.5 to 35.0	20	0	4.0	12.5	55.1	202.5	225.0	25.0	250.0		
								TOTALS	50.0	220.4	810.0	900.0	100.0	1,000		
KSP-9	6/2/2021	3:10 PM	6/2/2021	4:11 PM	25.0 to 27.5	250	80	4.1	12.5	55.1	202.5	225.0	25.0	250.0	X	Minor surfacing out of annulus, slowed flow.
	6/2/2021	4:20 PM	6/2/2021	5:15 PM	27.5 to 30.0	160	75	4.5	12.5	55.1	202.5	225.0	25.0	250.0		
	6/3/2021	8:03 AM	6/3/2021	9:00 AM	30.0 to 32.5	200	20	4.4	12.5	55.1	202.5	225.0	25.0	250.0		
	6/3/2021	9:14 AM	6/3/2021	10:11 AM	32.5 to 35.0	150	50	4.4	12.5	55.1	202.5	225.0	25.0	250.0		
								TOTALS	50.0	220.4	810.0	900.0	100.0	1,000		
KSP-10	6/3/2021	10:20 AM	6/3/2021	11:14 AM	25.0 to 27.5	150	40	4.6	12.5	55.1	202.5	225.0	25.0	250.0		
	6/3/2021	11:25 AM	6/3/2021	12:36 PM	27.5 to 30.0	250	80	3.2	12.5	55.1	202.5	225.0	25.0	250.0	X	Surfacing (annulus), applied bentonite seal and slowed flow.
	6/3/2021	12:48 PM	6/3/2021	1:54 PM	30.0 to 32.5	150	150	3.4	12.5	55.1	202.5	225.0	25.0	250.0		
	6/3/2021	2:02 PM	6/3/2021	3:05 PM	32.5 to 35.0	100	100	3.6	12.5	55.1	202.5	225.0	25.0	250.0		
								TOTALS	50.0	220.4	810.0	900.0	100.0	1,000		

INJECTION FIELD LOG

PROJECT NUMBER/NAME: ASPECT - SEATTLE, WA / 306211060

LEAD OPERATOR: C. Flaherty
SCOPE OF WORK: Complete multiple injection boring's

INJECTION APPROACH: Custom built injection platform, hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	Sodium Hydroxide (Gallons)	Klozur (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
KSP-6	6/3/2021	3:12 PM	6/3/2021	4:11 PM	25.0 to 27.5	200	60	4.2	12.5	55.1	202.5	225.0	25.0	250.0		
	6/3/2021	4:20 PM	6/3/2021	5:12 PM	27.5 to 30.0	120	70	4.8	12.5	55.1	202.5	225.0	25.0	250.0	X	Surfacing out of mutiple locations ranging from 20'-60' from point, (apprx 5 gal. loss)
	6/4/2021	8:15 AM	6/4/2021	8:36 AM	30.0 to 32.5	60	50	2.4	0.0	27.6	45.0	50.0	0.0	50.0	X	Surfacing - multiple locations 20' from point, Stopped injection, pushed to next interval.
	6/4/2021	8:53 AM	6/4/2021	9:05 AM	32.5 to 35.0	50	20	2.1	0.0	13.8	22.5	25.0	0.0	25.0	X	Surfacing - multiple locations 20' from point, Stopped injection, pushed to next interval as per client.
	6/4/2021	9:25 AM	6/4/2021	9:52 AM	35.0 to 37.5	250	200	0.9	0.0	13.8	22.5	25.0	25.0	50.0	X	Surfacing - multiple locations 20' from point. Cancelled remaining volume due to surfacing.
								TOTALS	**25.0**	**165.3**	**495.0**	**550.0**	**75.0**	**625**		
KSP-14	6/7/2021	1:18 PM	6/7/2021	1:33 PM	35.0 to 37.5	250	180	15.8	12.5	55.1	212.5	225.0	25.0	250.0	X	Minor surfacing 15' from point during H20 flush.
	6/7/2021	1:47 PM	6/7/2021	1:52 PM	37.5 to 40.0	325	100	5.9	1.8	8.0	30.7	32.5	0.0	32.5	X	Surfacing from same location 2 min into injection. Slowed flow, no change. Shut off flow
	6/7/2021	2:12 PM	6/7/2021	2:36 PM	40.0 to 42.5	100	125	7.9	10.7	47.1	181.8	192.5	25.0	217.5	X	Minor surfacing at 14:32, Slowed flow slightly. Major surfacing during line flush. Lost 25' of 1.5" rod and 1 pressure activated tool (rod threads sheared)
								TOTALS	**25.0**	**110.2**	**425.0**	**450.0**	**50.0**	**500**		
KSP-16	6/7/2021	4:21 PM	6/7/2021	4:21 PM	33.0 to 35.5	750	750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	X	Attempted first interval on 6-7-21. Hard drilling at 27'. Continued to first inteveral. Performed a water test. Unable to inject due to high pressure. Pulled rod up 1" for second attempt. Immediate surfacing. Shut down.
	6/8/2021	8:35 AM	6/8/2021	9:15 AM	33.0 to 35.5	500	325	5.6	12.5	55.1	212.5	225.0	25.0	250.0		Stepped over 3' from original boring for 2nd attempt.
	6/8/2021	9:34 AM	6/8/2021	10:13 AM	35.5 to 38.0	500	425	5.8	12.5	55.1	212.5	225.0	25.0	250.0		
	6/8/2021	11:56 AM	6/8/2021	12:19 PM	35.5 to 38.0	275	275	5.3	6.9	30.6	118.0	125.0	25.0	150.0		Remaining volume from KSP-15.
								TOTALS	**31.9**	**140.8**	**543.0**	**575.0**	**75.0**	**650**		
KSP-15	6/8/2021	10:53 AM	6/8/2021	11:01 AM	33.0 to 35.5	500	25	4.7	2.0	9.2	35.5	37.5	0.0	37.5	X	Surfacing 10' from point. Slowed flow but unable to control surfacing. Stopped injection and advanced to next interval.
	6/8/2021	11:10 AM	6/8/2021	11:37 AM	35.5 to 38.0	100	85	6.8	10.4	45.9	177.0	187.5	0.0	187.5		
	6/8/2021	11:37 AM	6/8/2021	11:50 AM	35.5 to 38.0	100	100	7.7	5.6	24.5	94.5	100.0	0.0	100.0	X	Surfacing under drill rig 7' away from point. Slowed flow but unable to stop surfacing. Surplus volume will be injected at KSP-16 (35.5'-38')
								TOTALS	**18.0**	**79.6**	**307.0**	**325.0**	**0.0**	**325**		
KSP-17	6/8/2021	3:47 PM	6/8/2021	4:10 PM	20.0 to 22.5	275	125	10.9	12.5	55.1	212.5	225.0	25.0	250.0		
	6/8/2021	4:17 PM	6/8/2021	4:47 PM	22.5 to 25.0	300	290	7.5	12.5	55.1	212.5	225.0	25.0	250.0		
	6/8/2021	4:57 PM	6/8/2021	5:29 PM	25.0 to 27.5	450	650	7.0	12.5	55.1	212.5	225.0	25.0	250.0		16:59 - Pressure increase to 675 PSI. 17:14 Pressure decrease to 625 PSI
	6/8/2021	5:35 PM	6/8/2021	5:59 PM	27.5 to 30.0	600	630	9.4	12.5	55.1	212.5	225.0	25.0	250.0		
								TOTALS	**50.0**	**220.4**	**850.0**	**900.0**	**100.0**	**1,000**		
KSP-19	6/9/2021	8:29 AM	6/9/2021	8:52 AM	20.0 to 22.5	400	200	10.5	12.5	55.1	212.5	225.0	25.0	250.0		8:30 pressure decrease to 200 PSI (Flow increase)
	6/9/2021	9:04 AM	6/9/2021	9:38 AM	22.5 to 25.0	275	200	7.4	12.5	55.1	212.5	225.0	25.0	250.0		
	6/9/2021	10:03 AM	6/9/2021	10:35 AM	25.0 to 27.5	200	150	6.9	12.5	55.1	212.5	225.0	25.0	250.0		
	6/9/2021	11:05 AM	6/9/2021	11:31 AM	27.5 to 30.0	625	175	8.7	12.5	55.1	212.5	225.0	25.0	250.0		11:10 pressure decrease to 200 PSI (Flow increase)
								TOTALS	**50.0**	**220.4**	**850.0**	**900.0**	**100.0**	**1,000**		
KSP-26	6/9/2021	11:41 AM	6/9/2021	12:11 PM	17.5 to 20.0	550	200	8.3	12.5	55.1	212.5	225.0	25.0	250.0		11:58 Pressure decrease to 225 PSI (Flow increase)
	6/9/2021	12:25 PM	6/9/2021	12:52 PM	20.0 to 22.5	300	190	8.3	12.5	55.1	212.5	225.0	25.0	250.0		12:27 Pressure decrease to 225 PSI (Flow increase)
	6/9/2021	1:44 PM	6/9/2021	2:27 PM	22.5 to 25.0	100	100	5.2	12.5	55.1	212.5	225.0	25.0	250.0	X	first attempt at 13:00, immediate surfacing from annulus (apprx 2 gls). Stopped flow and sealed off upper foot with bentonite and replaced top drill rod (drilling conditions resulted in rod damage)
	6/9/2021	2:40 PM	6/9/2021	3:14 PM	25.0 to 27.5	100	100	6.6	12.5	55.1	212.5	225.0	25.0	250.0		
								TOTALS	**50.0**	**220.4**	**850.0**	**900.0**	**100.0**	**1,000**		
KSP-18	6/9/2021	3:37 PM	6/9/2021	4:19 PM	20.0 to 22.5	400	600	6.0	12.5	55.1	212.5	225.0	25.0	250.0		
	6/9/2021	4:27 PM	6/9/2021	4:59 PM	22.5 to 25.0	630	645	7.8	12.5	55.1	212.5	225.0	25.0	250.0		
	6/10/2021	8:22 AM	6/10/2021	9:02 AM	25.0 to 27.5	500	325	5.6	12.5	55.1	212.5	225.0	25.0	250.0		
	6/10/2021	9:10 AM	6/10/2021	9:43 AM	27.5 to 30.0	100	125	6.8	12.5	55.1	212.5	225.0	25.0	250.0		
								TOTALS	**50.0**	**220.4**	**850.0**	**900.0**	**100.0**	**1,000**		
KSP-24	6/10/2021	9:56 AM	6/10/2021	10:31 AM	15.0 to 17.5	50	45	7.1	12.5	55.1	212.5	225.0	25.0	250.0		
	6/10/2021	10:39 AM	6/10/2021	11:08 AM	17.5 to 20.0	75	45	7.8	12.5	55.1	212.5	225.0	25.0	250.0		
	6/10/2021	11:45 AM	6/10/2021	12:17 PM	20.0 to 22.5	50	55	7.0	12.5	55.1	212.5	225.0	25.0	250.0	X	Immediate surfacing from annulus 11:17. Stopped flow. Isolated leak to a damaged drill rod. Replaced rod and continued
	6/10/2021	12:30 PM	6/10/2021	1:10 PM	22.5 to 25.0	600	560	5.6	12.5	55.1	212.5	225.0	25.0	250.0		
								TOTALS	**50.0**	**220.4**	**850.0**	**900.0**	**100.0**	**1,000**		
KSP-23	6/10/2021	1:30 PM	6/10/2021	2:10 PM	17.5 to 20.0	200	225	6.1	12.5	55.1	212.5	225.0	25.0	250.0	X	Instant surfacing from annulus. Stopped flow, tightened rods , and sealed annulus. Surfacing stopped.
	6/10/2021	2:51 PM	6/10/2021	3:28 PM	20.0 to 22.5	400	375	6.0	12.5	55.1	212.5	225.0	25.0	250.0		Upwelling URS-MW-12 shortly after start up. Stopped flow and installed well packer.
	6/10/2021	3:38 PM	6/10/2021	4:11 PM	22.5 to 25.0	425	340	6.7	12.5	55.1	212.5	225.0	25.0	250.0	X	Minor surfacing from annulus during start. Stopped injection, fixed leaky connection and tightened rods.
	6/10/2021	4:27 PM	6/10/2021	4:53 PM	25.0 to 27.5	375	275	8.7	12.5	55.1	212.5	225.0	25.0	250.0		
								TOTALS	**50.0**	**220.4**	**850.0**	**900.0**	**100.0**	**1,000**		
KSP-20	6/11/2021	8:13 AM	6/11/2021	8:41 AM	16.0 to 18.5	175	185	8.8	12.5	55.1	212.5	225.0	25.0	250.0		
	6/11/2021	8:47 AM	6/11/2021	9:16 AM	18.5 to 21.0	190	205	8.5	12.5	55.1	212.5	225.0	25.0	250.0		
	6/11/2021	9:23 AM	6/11/2021	9:50 AM	21.0 to 23.5	210	200	8.3	12.5	55.1	212.5	225.0	25.0	250.0		
	6/11/2021	9:58 AM	6/11/2021	10:17 AM	23.5 to 26.0	180	175	11.8	12.5	55.1	212.5	225.0	25.0	250.0		
								TOTALS	**50.0**	**220.4**	**850.0**	**900.0**	**100.0**	**1,000**		
KSP-25	6/11/2021	11:23 AM	6/11/2021	11:45 AM	15.0 to 17.5	125	130	11.1	12.5	55.1	212.5	225.0	25.0	250.0		Immediate surfacing from annulus. Stopped injection. Pulled rods, sealed upper 10' of borehole and advanced 2.25" rods with a pressure tool. Surfacing stopped, continued injection
	6/11/2021	12:01 PM	6/11/2021	12:37 PM	17.5 to 20.0	75	80	6.2	12.5	55.1	212.5	225.0	25.0	250.0		
	6/11/2021	12:58 PM	6/11/2021	1:30 PM	20.0 to 22.5	75	75	7.0	12.5	55.1	212.5	225.0	25.0	250.0		Medium hard drilling.
	6/14/2021	12:05 PM	6/14/2021	12:55 PM	22.5 to 25.0	200	60	5.0	12.5	55.1	202.5	225.0	25.0	250.0		6/11 -Medium hard drilling. Surfacing from annulus with very little flow (700 PSI). 3 attempts made but unable to inject. Plan to Step out 4' and attempt last interval again with 1.5" rod.
								TOTALS	**50.0**	**220.4**	**840.0**	**900.0**	**100.0**	**1,000**		
KSP-21	6/14/2021	1:11 PM	6/14/2021	1:41 PM	16.5 to 19.0	200	40	8.3	12.5	55.1	202.5	225.0	25.0	250.0		
	6/14/2021	1:56 PM	6/14/2021	2:30 PM	19.0 to 21.5	150	100	7.4	12.5	55.1	202.5	225.0	25.0	250.0		
	6/14/2021	2:37 PM	6/14/2021	3:20 PM	21.5 to 24.0	200	20	5.8	12.5	55.1	202.5	225.0	25.0	250.0	X	Surfacing annulus, Slowed flow.
	6/14/2021	3:25 PM	6/14/2021	4:40 PM	24.0 to 26.5	150	150	3.3	12.5	55.1	202.5	225.0	25.0	250.0		
								TOTALS	**50.0**	**220.4**	**810.0**	**900.0**	**100.0**	**1,000**		
KSP-22	6/14/2021	4:51 PM	6/14/2021	5:30 PM	20.0 to 22.5	600	60	6.4	12.5	55.1	202.5	225.0	25.0	250.0		
	6/15/2021	7:30 AM	6/15/2021	7:57 AM	22.5 to 25.0	700	140	9.3	12.5	55.1	202.5	225.0	25.0	250.0		
	6/15/2021	8:10 AM	6/15/2021	9:07 AM	25.0 to 27.5	260	75	4.4	12.5	55.1	202.5	225.0	25.0	250.0	X	Surfacing annulus, Slowed flow.
	6/15/2021	9:46 AM	6/15/2021	10:30 AM	27.5 to 30.0	250	100	5.7	12.5	55.1	202.5	225.0	25.0	250.0		
								TOTALS	**50.0**	**220.4**	**810.0**	**900.0**	**100.0**	**1,000**		

CASCADE
DRILLING | TECHNICAL SERVICES

WEEKLY PROJECT SUMMARY

PROJECT NAME/NUMBER: ASPECT, SEATTLE, WA / EHCL / 306-21-1060

Day	Date	On-site Time	Off-site Time	Wells Completed	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)
Monday	---	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tuesday	---	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wednesday	---	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Thursday	6/17/2021	9:00 AM	6:15 PM	1.0	18.0	95.5	1,112.5	1,125.0	125.0	1,250.0
Friday	6/18/2021	7:00 AM	4:00 PM	3.0	18.0	95.5	1,112.5	1,125.0	125.0	1,250.0
Monday	6/21/2021	9:00 AM	5:30 PM	1.0	14.4	76.4	890.0	900.0	100.0	1,000.0
Tuesday	6/22/2021	7:00 AM	6:30 PM	1.0	18.0	95.5	1,112.5	1,125.0	125.0	1,250.0
Wednesday	6/23/2021	7:00 AM	6:00 PM	1.0	21.6	114.6	1,335.0	1,350.0	150.0	1,500.0
Thursday	6/24/2021	7:00 AM	6:30 PM	2.0	25.2	133.7	1,557.5	1,575.0	175.0	1,750.0
Friday	6/25/2021	7:00 AM	2:30 PM	1.0	7.20	38.2	445.0	450.0	50.0	500.0
Monday	10/11/2021	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tuesday	10/12/2021	7:00 AM	5:45 PM	1.0	22.5	144.0	1,335.0	1,350.0	150.0	1,500.0
Wednesday	10/13/2020	7:00 AM	5:45 PM	2.0	22.5	144.0	1,335.0	1,350.0	150.0	1,500.0
Thursday	10/14/2021	7:00 AM	5:00 PM	1.0	15.0	96.0	890.0	900.0	100.0	1,000.0
Friday	10/15/2021	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tuesday	10/19/2021	8:00 AM	5:45 PM	1.0	15.0	96.0	890.0	900.0	100.0	1,000.0
Wednesday	10/20/2021	7:00 AM	5:15 PM	0.0	5.4	34.7	321.6	325.0	25.0	350.0
Thursday	10/21/2021	7:00 AM	2:30 PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Friday	10/22/2021	7:00 AM	4:00 PM	1.0	24.5	157.3	1,458.4	1,475.0	125.0	1,600.0
			Totals	16	227.30	1,321.40	13,795.00	13,950.00	1,500.00	15,450.00

Notes:
PSI - pounds per square inch

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
											EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					
EHCL-4	6/17/2021	12:58 PM	6/17/2021	1:37 PM	30.0	to	32.5	250	175	6.3	3.6	19.1	222.5	225.0	25.0	250.0		
	6/17/2021	1:48 PM	6/17/2021	2:30 PM	32.5	to	35.0	575	125	6.0	3.6	19.1	222.5	225.0	25.0	250.0		13:57 - pressure decrease to 125 PSIs with increased flow, slowed pump. 14:26 - Upwelling AC-MW-32 (stc 5') Installed well packer.
	6/21/2021	2:10 PM	6/21/2021	2:56 PM	30.0	to	32.5	200	150	4.9	3.6	19.1	222.5	225.0	25.0	250.0	X	First attempt unable to inject due to high pressure. Replaced tool. Minor surfacing 30' away toward end of interval. Slowed flowed slightly.
	6/21/2021	2:58 PM	6/21/2021	4:12 PM	32.5	to	35.0	675	660	3.0	3.6	19.1	222.5	225.0	25.0	250.0		
										TOTALS	**14.4**	**76.4**	**890.0**	**900.0**	**100.0**	**1,000**		
EHCL-5	6/22/2021	8:30 AM	6/22/2021	9:18 AM	30.0	to	32.5	50	50	5.2	3.6	19.1	222.5	225.0	25.0	250.0		8:45 - Upwelling URS-MW- 27S. Installed well packer.
	6/22/2021	9:30 AM	6/22/2021	9:31 AM	32.5	to	35.0	200	50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	X	Instant surfacing 1.5' from URS-MW-27I, slowed flow no change. Shutdown and advance to next interval.
	6/22/2021	9:43 AM	6/22/2021	9:44 AM	35.0	to	37.5	100	50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	X	Instant surfacing 1.5' from URS-MW-27I, slowed flow no change. Shutdown and advance to next interval.
	6/22/2021	9:55 AM	6/22/2021	9:56 AM	37.5	to	40.0	425	425	0.0	0.0	0.0	0.0	0.0	0.0	0.0	X	Instant surfacing 1.5' from URS-MW-27I. Pull/ seal borehole.
	6/23/2021	8:29 AM	6/23/2021	9:02 AM	32.5	to	35.0	260	190	7.6	3.6	19.1	222.5	225.0	25.0	250.0		Stepped out 6' SE from original boring centered between well cluster. 8:35 - Pressure decrease to 190 PSI. 8:50 - upwelling at URS-MW-27i, installed well packer.
	6/23/2021	9:32 AM	6/23/2021	9:38 AM	35.0	to	37.5	280	50	4.2	0.4	2.1	24.7	25.0	0.0	25.0	X	9:34 - Pressure decrease to 225 PSI. 9:37 surfacing near URS-MW-27i (same locations as yesterday), slowed flow but unable to stop surfacing. Shut down, advance to next interval.
	6/23/2021	9:47 AM	6/23/2021	9:50 AM	37.5	to	40.0	575	50	4.2	0.2	1.0	12.3	12.5	0.0	12.5	X	9:49 - Surfacing near URS-MW-27i (same locations as yesterday), slowed flow but unable to stop surfacing. Shut down. Advance to 40'-42.5'.
	6/23/2021	10:09 AM	6/23/2021	10:12 AM	40.0	to	42.5	475	75	4.2	0.2	1.0	12.3	12.5	0.0	12.5	X	10:11 - Surfacing near URS-MW-27i (same locations as yesterday), slowed flow but unable to stop surfacing. Shut down.
	6/23/2021	11:20 AM	6/23/2021	11:53 AM	35.0	to	37.5	175	200	6.8	3.2	17.0	197.8	200.0	25.0	225.0		Stepped out 6' SW from original injection boring (center of well cluster).
	6/23/2021	12:05 PM	6/23/2021	1:06 PM	37.5	to	40.0	650	230	3.7	3.2	17.0	197.8	200.0	25.0	225.0		12:20 - slowed flow to decrease pressure from 650 to 200 PSI. Extremely mild ground saturation observed in several locations within 4' of injection boring. Continued injection.
										TOTALS	**14.4**	**76.3**	**889.9**	**900.0**	**100.0**	**1,000**		
EHCL-6	6/22/2021	10:30 AM	6/22/2021	11:30 AM	30.0	to	32.5	150	100	4.1	3.6	19.1	222.5	225.0	25.0	250.0		
	6/22/2021	11:43 AM	6/22/2021	11:44 AM	32.5	to	35.0	100	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	X	Surfacing 1' away and surfacing from annulus. Stopped, advanced to next interval
	6/22/2021	11:50 AM	6/22/2021	12:30 PM	35.0	to	37.5	0	0	3.1	2.0	10.6	123.6	125.0	0.0	125.0	X	12:27 Surfacing 22' away around URS-MW-27i. Attempted to increase flow to create new pathways. No change, Stopped injection.
	6/22/2021	1:45 PM	6/22/2021	1:52 PM	37.5	to	40.0	0	0	3.6	0.4	2.1	24.7	25.0	0.0	25.0	X	Surfacing near URS-MW-27i, Shutdown.
	6/22/2021	2:18 PM	6/22/2021	2:52 PM	32.5	to	35.0	125	90	7.2	3.6	19.1	222.5	225.0	25.0	250.0		Stepped out 3' from original boring. 2:28 - upwelling PT-MW-31i, installed well packer.
	6/22/2021	3:00 PM	6/22/2021	3:56 PM	35.0	to	37.5	700	660	4.4	3.6	19.1	222.5	225.0	25.0	250.0		
	6/22/2021	4:03 PM	6/22/2021	4:26 PM	37.5	to	40.0	675	650	4.3	1.2	6.4	74.1	75.0	25.0	100.0		
										TOTALS	**14.4**	**76.4**	**889.9**	**900.0**	**100.0**	**1,000**		
EHCL-7	6/17/2021	2:54 PM	6/17/2021	3:27 PM	30.0	to	32.5	250	225	7.5	3.6	19.1	222.5	225.0	25.0	250.0		Upwelling PC-MW-31S at 14:58. Sealed well with mechanical packer.
	6/17/2021	3:40 PM	6/17/2021	4:13 PM	32.5	to	35.0	125	125	7.5	3.6	19.1	222.5	225.0	25.0	250.0		
	6/17/2021	4:21 PM	6/17/2021	4:54 PM	35.0	to	37.5	140	125	6.8	3.6	19.1	222.5	225.0	25.0	250.0		
	6/18/2021	8:30 AM	6/18/2021	9:04 AM	40.0	to	42.5	150	140	6.6	3.6	19.1	222.5	225.0	25.0	250.0	X	First attempt at 8:16, surfacing from annulus. Stopped injection and advanced to 40'-42.5'. Encountered surfacing from annulus for a second time. Temporarily increased flow/GPM and surfacing subsided.
										TOTALS	**14.4**	**76.4**	**890.0**	**900.0**	**100.0**	**1,000**		
EHCL-8	6/18/2021	9:42 AM	6/18/2021	10:58 AM	35.0	to	37.5	675	650	3.3	3.6	19.1	222.5	225.0	25.0	250.0		
	6/18/2021	11:12 AM	6/18/2021	11:56 AM	37.5	to	40.0	350	250	5.6	3.6	19.1	222.5	225.0	25.0	250.0		1300 Upwelling at PC-MW-31S, Installed mechanical well packer.
										TOTALS	**7.2**	**38.2**	**445.0**	**450.0**	**50.0**	**500**		
EHCL-9	6/21/2021	11:31 AM	6/21/2021	12:18 PM	0.0	to	0.0	200	160	5.3	3.6	19.1	222.5	225.0	25.0	250.0		upwelling at PC-MW-31I, installed packer
	6/21/2021	12:25 PM	6/21/2021	1:11 PM	0.0	to	0.0	200	150	5.4	3.6	19.1	222.5	225.0	25.0	250.0		
										TOTALS	**7.2**	**38.2**	**445.0**	**450.0**	**50.0**	**500**		
EHCL-10	6/18/2021	12:30 PM	6/18/2021	1:13 PM	40.0	to	42.5	350	250	5.7	3.6	19.1	222.5	225.0	25.0	250.0		1300 upwelling PC-MW-31S, Install well packer. 13:19 PSI decrease to 175
	6/18/2021	1:17 PM	6/18/2021	2:04 PM	42.5	to	45.0	250	150	5.3	3.6	19.1	222.5	225.0	25.0	250.0		13:28 Minor annulus surfacing on EHCL-8. Sealed off upper 5' of borehole with 2.25" rod. 13:34 pressure decrease to 150, slowed flow to hit target GPM.
										TOTALS	**7.2**	**38.2**	**445.0**	**450.0**	**50.0**	**500.0**		

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)		% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
ECHL-11	10/22/2021	8:27 AM	10/22/2021	9:17 AM	30.0	to	32.5	550	250	4.5	3.8	24.0	222.5		225.0	25.0	250.0		High pressure at beginning of interval, @0836 it dropped, @0902 turned flow up as per client.
	10/22/2021	9:25 AM	10/22/2021	9:58 AM	32.5	to	35.0	300	270	6.8	3.8	24.0	222.5		225.0	25.0	250.0		
	10/22/2021	10:22 AM	10/22/2021	10:53 AM	35.0	to	37.5	150	200	7.3	3.8	24.0	222.5		225.0	25.0	250.0		
	10/22/2021	11:07 AM	10/22/2021	1:22 PM	37.5	to	40.0	150	150	5.9	13.3	85.3	790.9		800.0	50.0	850.0		Inject remaining volume from EHCL-12 into interval as per client. Additional 575 gallons.
										TOTALS	**24.5**	**157.3**	**1,458.4**		**1,475.0**	**125.0**	**1,600.0**		
ECHL-12	10/20/2021	12:14 PM	10/20/2021	1:05 PM	30.0	to	32.5	200	110	4.9	3.8	24.0	222.5		225.0	25.0	250.0		
	10/20/2021	1:15 PM	10/20/2021	1:36 PM	32.5	to	35.0	150	110	4.8	1.7	10.7	99.1		100.0	0.0	100.0	X	@1320 had minor surfacing 3' radius, about 3 gallons total, shut off @1336 due to major surfacing. Moved 5' NE to try again, immediate surfacing.
										TOTALS	**5.4**	**34.7**	**321.6**		**325.0**	**25.0**	**350**		
EHCL-13	10/19/2021	12:55 PM	10/19/2021	1:45 PM	30.0	to	32.5	200	190	5.0	3.8	24.0	222.5		225.0	25.0	250.0	X	Tried water test on first hole, surfacing out of annulus, moved over and drilled second location
	10/19/2021	1:52 PM	10/19/2021	2:42 PM	32.5	to	35.0	200	150	5.0	3.8	24.0	222.5		225.0	25.0	250.0		
	10/19/2021	2:55 PM	10/19/2021	3:52 PM	35.0	to	37.5	350	350	3.9	3.8	24.0	222.5		225.0	25.0	250.0	X	Pulled up 6" to relieve pressure and increase flow.
	10/19/2021	4:12 PM	10/19/2021	5:13 PM	37.5	to	40.0	500	500	3.7	3.8	24.0	222.5		225.0	25.0	250.0	X	Minor surfacing out of annulus
										TOTALS	**15.0**	**96.0**	**890.0**	**#**	**900.0**	**100.0**	**1,000.0**		
EHCL-14	10/12/2021	9:27 AM	10/12/2021	10:17 AM	30.0	to	32.5	150	150	5.0	3.8	24.0	222.5		225.0	25.0	250.0	X	10:00 upwelling out of URS-MW-21S, 10:15 Upwelling from URS-MW-21D
	10/12/2021	10:28 AM	10/12/2021	11:55 AM	32.5	to	35.0	350	400	2.9	3.8	24.0	222.5		225.0	25.0	250.0		
	10/12/2021	12:10 PM	10/12/2021	1:02 PM	35.0	to	37.5	150	140	4.3	3.8	24.0	222.5		225.0	25.0	250.0		
	10/12/2021	1:11 PM	10/12/2021	1:57 PM	37.5	to	40.0	150	140	4.9	3.8	24.0	222.5		225.0	25.0	250.0		
										TOTALS	**15.0**	**96.0**	**890.0**		**900.0**	**100.0**	**1,000**		
EHCL-15	10/13/2021	12:06 PM	10/13/2021	12:56 PM	30.0	to	32.5	100	95	5.0	3.8	24.0	222.5		225.0	25.0	250.0	X	12:20 Upwelling URS-MW-21S and 21D. 12:50 Observed slight annulus surfacing, sealed with bentonite.
	10/13/2021	1:11 PM	10/13/2021	2:05 PM	32.5	to	35.0	300	400	4.6	3.8	24.0	222.5		225.0	25.0	250.0		
	10/13/2021	2:13 PM	10/13/2021	3:03 PM	35.0	to	37.5	150	175	4.5	3.8	24.0	222.5		225.0	25.0	250.0		
	10/13/2021	3:16 PM	10/13/2021	4:27 PM	37.5	to	40.0	200	150	3.2	3.8	24.0	222.5		225.0	25.0	250.0		Pulled tooling up .5 feet into permeable zone. Pressure drop/ flow increase.
										TOTALS	**15.0**	**96.0**	**890.0**		**900.0**	**100.0**	**1,000**		
EHCL-16	10/14/2021	9:05 AM	10/14/2021	9:55 AM	30.0	to	32.5	140	140	5.0	3.8	24.0	222.5		225.0	25.0	250.0		
	10/14/2021	10:09 AM	10/14/2021	10:59 AM	32.5	to	35.0	100	100	5.0	3.8	24.0	222.5		225.0	25.0	250.0		
	10/14/2021	11:20 AM	10/14/2021	12:11 PM	35.0	to	37.5	130	140	4.4	3.8	24.0	222.5		225.0	25.0	250.0		
	10/14/2021	12:19 PM	10/14/2021	1:15 PM	37.5	to	40.0	350	300	4.0	3.8	24.0	222.5		225.0	25.0	250.0		
										TOTALS	**15.0**	**96.0**	**890.0**		**900.0**	**100.0**	**1,000**		
EHCL-17	10/12/2021	3:34 PM	10/12/2021	4:25 PM	30.0	to	32.5	600	275	4.9	3.8	24.0	222.5		225.0	25.0	250.0		
	10/12/2021	4:35 PM	10/12/2021	5:25 PM	32.5	to	35.0	250	200	5.0	3.8	24.0	222.5		225.0	25.0	250.0		
	10/13/2021	8:15 AM	10/13/2021	9:08 AM	35.0	to	37.5	250	175	4.2	3.8	24.0	222.5		225.0	25.0	250.0		
	10/13/2021	9:41 AM	10/13/2021	10:31 AM	37.5	to	40.0	250	150	4.5	3.8	24.0	222.5		225.0	25.0	250.0		
										TOTALS	**15.0**	**96.0**	**890.0**	**#**	**900.0**	**100.0**	**1,000.0**		
EHCL-18	6/24/2021	4:29 PM	6/24/2021	5:03 PM	30.0	to	32.5	180	110	7.4	3.6	19.1	222.5		225.0	25.0	250.0		First boring location unable to inject due to high pressure. Stepped out 3' W for second attempt. 4:40 - 110 PSI. Pressure gradually decreased to 100 PSI toward second half of interval
	6/24/2021	5:05 PM	6/24/2021	5:39 PM	32.5	to	35.0	225	125	7.2	3.6	19.1	222.5		225.0	25.0	250.0		Pressure slowly decreased to 125 PSI within first 15 minutes of injection. Pressure stabilized at 125 PSI for remainder of interval.
	6/25/2021	9:15 AM	6/25/2021	9:50 AM	35.0	to	37.5	150	100	7.1	3.6	19.1	222.5		225.0	25.0	250.0	X	Unable to inject due to high pressure and annulus surfacing. Advanced to 40' no change. Stepped out 4' N from original location for third attempt. High pressure/ no flow, pulled rods up 6" and starting seeing flow. Observed minor surfacing at 9:45 12' North of injection point. Slowed flow slightly.
	6/25/2021	10:03 AM	6/25/2021	11:23 AM	37.5	to	40.0	675	675	3.1	3.6	19.1	222.5		225.0	25.0	250.0		
										TOTALS	**14.4**	**76.4**	**890.0**		**900.0**	**100.0**	**1,000**		

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
EHCL-19	6/23/2021	2:04 PM	6/23/2021	2:39 PM	30.0	to	32.5	200	175	7.0	3.6	19.1	222.5	225.0	25.0	250.0		
	6/23/2021	3:05 PM	6/23/2021	3:41 PM	32.5	to	35.0	380	250	6.9	3.6	19.1	222.5	225.0	25.0	250.0		3:09 - Gradual pressure decrease to 310 PSI observed. 3:13 pressure reading 290 PSI. 3:17 pressure reading 275 PSI. 3:21 - 255 PSI. 3:25 - 250 PSI. Pressure stabalized at 250 PSI
	6/23/2021	3:50 PM	6/23/2021	4:44 PM	35.0	to	37.5	400	400	4.2	3.6	19.1	222.5	225.0	25.0	250.0		3:58 - Gradual pressure decrease to 375 PSI. 4:08 - 385 PSI. 4:12 - 390 PSI. 4:17 - 395 PSI. 4:25 - 400 PSI. Pressure stabilized at 400 PSI
	6/24/2021	8:32 AM	6/24/2021	9:55 AM	37.5	to	40.0	650	660	2.7	3.6	19.1	222.5	225.0	25.0	250.0		High pressure / low flow. Unable to inject at lower pressure. Due to hard drilling conditions 1 pressure activated tool and 15' of 1.5" rod was lost.
										TOTALS	**14.4**	**76.4**	**890.0**	**900.0**	**100.0**	**1,000**		
EHCL-20	6/24/2021	10:57 AM	6/24/2021	11:32 AM	30.0	to	32.5	140	90	7.1	3.6	19.1	222.5	225.0	25.0	250.0		10:58 - 100 PSI. 11:09 - 90 PSI.
	6/24/2021	11:45 AM	6/24/2021	12:27 PM	32.5	to	35.0	250	160	5.9	3.6	19.1	222.5	225.0	25.0	250.0		12:00 - pressure gradually dropped from 250 to 160 PSI, Slowed flow to compensate for increased flow.
	6/24/2021	12:55 PM	6/24/2021	1:37 PM	35.0	to	37.5	225	150	6.0	3.6	19.1	222.5	225.0	25.0	250.0		12:58 - 185 PSI. 1:12 - 165 PSI. 1:30 - 145 PSI. 1:37 - 140 PSI
	6/24/2021	2:00 PM	6/24/2021	2:44 PM	37.5	to	40.0	450	400	5.6	3.6	19.1	222.5	225.0	25.0	250.0		2:10 - 400 PSI. Pressure fluctuating between 375 -425 PSI.
										TOTALS	**14.4**	**76.4**	**890.0**	**900.0**	**100.0**	**1,000**		

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

											% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
					0.0	to	0.0	0	0		0.0	0.0	0.0	0.0	0.0	0.0		
					0.0	to	0.0	0	0		0.0	0.0	0.0	0.0	0.0	0.0		
					0.0	to	0.0	0	0		0.0	0.0	0.0	0.0	0.0	0.0		
					0.0	to	0.0	0	0		0.0	0.0	0.0	0.0	0.0	0.0		
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
					0.0	to	0.0	0	0		0.0	0.0	0.0	0.0	0.0	0.0		
					0.0	to	0.0	0	0		0.0	0.0	0.0	0.0	0.0	0.0		
					0.0	to	0.0	0	0		0.0	0.0	0.0	0.0	0.0	0.0		
					0.0	to	0.0	0	0		0.0	0.0	0.0	0.0	0.0	0.0		
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
					0.0	to	0.0	0	0		0.0	0.0	0.0	0.0	0.0	0.0		
					0.0	to	0.0	0	0		0.0	0.0	0.0	0.0	0.0	0.0		
					0.0	to	0.0	0	0		0.0	0.0	0.0	0.0	0.0	0.0		
					0.0	to	0.0	0	0		0.0	0.0	0.0	0.0	0.0	0.0		
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
1					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
2					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
3					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
4					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
5					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
6					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
7					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

											% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
8					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
9					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
10					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
11					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
12					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
13					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
14					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
15					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
16					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
17					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
18					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
19					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
20					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
21					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
22					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
23					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
24					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
25					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
26					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
27					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
28					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

											% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
29					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
30					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
31					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
32					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
33					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
34					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
35					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
36					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
37					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
38					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
39					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
40					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
42					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
43					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
44					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
45					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
46					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
47					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
48					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
49					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
50					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

											% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
51					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
53					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
54					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
55					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
57					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
58					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
59					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
60					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
61					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
62					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
63					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
64					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
65					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
66					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
67					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
68					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
69					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
70					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
71					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
72					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
73					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
											EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					
74					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
75					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
76					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
78					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
79					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
80					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
81					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
82					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
83					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
84					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
85					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
86					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
87					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
88					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
89					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
90					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
91					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
92					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
93					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
94					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
95					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

											% Solution							
Well ID	**Start Date**	**Start Time**	**End Date**	**End Time**	**Injection Interval**			**Initial Pressure (PSI)**	**Sustained Pressure (PSI)**	**Average Flow Rate (GPM)**	**EHCL (Pounds)**	**ELS (Pounds)**	**Water (Gallons)**	**% Solution Injected (Gallons)**	**Flush Water Injected (Gallons)**	**Total Injected (Gallons)**	**Day Lighting**	**Field Notes**
96					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
97					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
98					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
99					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
100					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
101					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
102					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
103					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
104					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
105					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
106					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

											% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
107					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
108					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
109					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
110					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
111					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
112					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
113					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
114					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
115					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
116					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

											% Solution							
Well ID	**Start Date**	**Start Time**	**End Date**	**End Time**	**Injection Interval**			**Initial Pressure (PSI)**	**Sustained Pressure (PSI)**	**Average Flow Rate (GPM)**	**EHCL (Pounds)**	**ELS (Pounds)**	**Water (Gallons)**	**% Solution Injected (Gallons)**	**Flush Water Injected (Gallons)**	**Total Injected (Gallons)**	**Day Lighting**	**Field Notes**
117					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
118					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
119					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
120					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
121					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
122					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
123					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
125					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
126					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
127					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
128					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
129					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
130					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
131					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
132					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
133					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
134					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
135					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
136					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
137					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
138					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
139					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
140					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
141					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
142					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
143					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
144					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
145					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
146					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
147					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
148					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
149					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
150					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
151					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
152					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
153					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
154					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
155					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
156					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
157					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
158					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
159					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

											% Solution						
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
160					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
161					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
162					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
163					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
164					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
165					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
166					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
167					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
168					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
169					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
170					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
171					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
172					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
173					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
174					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
175					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
176					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
177					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
178					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
179					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
180					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
											EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					
181					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
182					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
183					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
184					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
185					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
186					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
187					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
188					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
189					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
190					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
191					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
											EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
192					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
193					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
194					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
195					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
196					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
197					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
198					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
199					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
200					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
201					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

										% Solution								
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
202					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
203					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
204					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
205					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
206					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
207					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
208					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
209					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
210					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
211					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	0.0	0.0	0.0	0.0	0.0	0		
212					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
213					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
214					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
215					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
216					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
217					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
218					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
219					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
220					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
221					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		
222					#REF! to #REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
								TOTALS	0.0	0.0	0.0	0.0	0.0	0		

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

											% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval			Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
223					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
224					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
225					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
226					#REF!	to	#REF!				0.0	0.0	0.0			0.0		1. Pressure spikes/drops. 2. Surfacing - location (at well away from injection point), interval, est gallons and recovery. 3. Lost damaged tooling. 4. Drilling issues (i.e. refusal, difficult drilling/lithology) 5. Down-time (reason/cause - i.e. visitors, weather)
										TOTALS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**		
										PAGE TOTALS	**234.8**	**1369.3**	**14239.8**	**14400.0**	**1550.0**	**15950.0**		

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King

SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

									% Solution							
Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution			% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes
									EHCL (Pounds)	ELS (Pounds)	Water (Gallons)					

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	ELS (Pounds)	Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

CASCADE
DRILLING | TECHNICAL SERVICES

INJECTION FIELD LOG

PROJECT NUMBER/NAME: *Aspect - Seattle, WA / 306-21-1060*

LEAD OPERATOR: K. King
SCOPE OF WORK: Complete temporary injection boring's at varying depths.

INJECTION APPROACH: Custom built injection platform, sheer pump, and hydracel pump with 2' pressure activated tool

Well ID	Start Date	Start Time	End Date	End Time	Injection Interval	Initial Pressure (PSI)	Sustained Pressure (PSI)	Average Flow Rate (GPM)	% Solution EHCL (Pounds)	% Solution ELS (Pounds)	% Solution Water (Gallons)	% Solution Injected (Gallons)	Flush Water Injected (Gallons)	Total Injected (Gallons)	Day Lighting	Field Notes

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/1/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-31	6/1/21	0955	~~KSP-4~~ *	19.51	* Before injection
AC-MW-18		0957	*	17.53	
AC-MW-10		0959	*	18.02	
AC-MW-16		1001	*	17.18	
AC-MW-17		1003	*	20.01	monument filled to casing w/water
AC-MW-31		1345	KSP-4	19.47	27.5-30'
AC-MW-18			KSP-4	17.33	
AC-MW-10			KSP-4	18.01	
AC-MW-16			KSP-4	17.19	
AC-MW-17			KSP-4	20.00	
AC-MW-31		1450	KSP-4	19.46	30 - 32.5'
AC-MW-18			KSP-4	17.18	
AC-MW-10			KSP-4	18.01	
AC-MW-16			KSP-4	17.18	
AC-MW-17			KSP-4	19.99	
AC-MW-31		1555	KSP-4	19.45	32.5' - 35'
AC-MW-18			KSP-4	17.07	
AC-MW-10			KSP-4	18.01	
AC-MW-16			KSP-4	17.18	
AC-MW-17			KSP-4	19.99	
AC-MW-31		1700	KSP-4	19.45	35 - 37.5'
AC-MW-18			KSP-4	16.96	
AC-MW-10			KSP-4	18.01	
AC-MW-16			KSP-4	17.18	
AC-MW-17			KSP-4	19.99	

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/2/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-31	6/2/21	0700	Before injection	19.46	
AC-MW-18				17.25	
AC-MW-10				18.09	
AC-MW-16				17.22	
AC-MW-17				20.04	
AC-MW-31		1105	KSP-11	~~14.68~~ 19.41	after 25-27.5' lift
AC-MW-18				17.26 ~~17.26~~ RC ~~19.41~~	
AC-MW-10				~~17.26~~ 14.68	
AC-MW-16				17.12	
AC-MW-17				20.01	
AC-MW-31		1135	KSP-11	19.41	after 27.5-30' lift
AC-MW-18				17.31	
AC-MW-10				14.31	
AC-MW-16				17.12	
AC-MW-17				RC ~~17.~~ 20.01	
AC-MW-31		1355	KSP-11	19.41	after 30-32.5' lift
AC-MW-18				~~17.12~~ RC 17.31	
AC-MW-10				14.93	
AC-MW-16				17.12	
AC-MW-17				20.01	
AC-MW 31		1505	KSP-11	19.41	after 32.5-35 ft
AC-MW-18				17.31	
AC-MW-10				15.31	
AC-MW-16				17.12	
AC-MW-17				20.01	
AC-MW-31		1615	KSP-9	19.31	after 25-27.5
AC-MW-18				15.08	
AC-MW-10				15.64	
AC-MW-16				17.12	
AC-MW-17				20.01	

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/2/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-31	6/2/21	1720	KSP-9	19.28	after 27.5-30' lift
AC-MW-18				14.48	
AC-MW-10				15.87	
AC-MW-16				17.12	
AC-MW-17				20.01	

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/3/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-31	6/3/21	0700		19.41	Before injections
AC-MW-18				16.81	
AC-MW-10				17.13	
AC-MW-16				17.12	
AC-MW-17				20.04	
AC-MW-31		0912		19.32	After KSP-11 30-32.5
AC-MW-18		~~91~~	KSP-#9	15.37	
AC-MW-10				17.16	
AC-MW-16				17.12	
AC-MW-17				20.04	
AC-MW-31		1015	KSP-#9	19.29	After 32.5-35 lift
AC-MW-18				12.56	
AC-MW-10				17.16	
AC-MW-16				17.12	
AC-MW-17				20.04	
AC-MW-31		1120	KSP-10	19.29	After 25-27.5 lift
AC-MW-18				13.65	
AC-MW-10				17.19	
AC-MW-16				17.12	
AC-MW-17				20.04	
AC-MW-31		1238	KSP-10	19.31	After 27.5-30 lift
AC-MW-18				14.40	
AC-MW-10				17.21	
AC-MW-16				17.12	
AC-MW-17				20.04	
AC-MW-31		1358	KSP-10	19.33	After 30-32.5 lift
AC-MW-18				~~17~~ RC 14.92	
AC-MW-10				17.21	
AC-MW-16				17.12	
AC-MW-17				20.04	

Aspect Consulting

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/3/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-31	6/3/21	1508	KSP-10	19.33	After 32.5-35' lift
AC-MW-18				15.20	
AC-MW-10				17.14	
AC-MW-16				17.12	
AC-MW-17				20.04	
AC-MW-31		1615	KSP-6	19.33	After 25-27.5 lift
AC-MW-18				15.50	
AC-MW-10				17.14	
AC-MW-16				17.12	
AC-MW-17				20.04	
AC-MW-31		1725	KSP-6	19.33	After 27.5-30 ft lift
AC-MW-18				15.78	
AC-MW-10				17.14	
AC-MW-16				17.12	
AC-MW-17				20.04	
AC-MW-19				14.61	
URS-MW-03				~~0~~ RC unknown, cap covered	surfacing, monument filled
URS-MW-03		1755	KSP-6	13.48	surfacing appears to be from monument

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/4/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-31	6/4/21	0725	(KSP-6) Before injections	19.41	
AC-MW-18				16.74	
AC-MW-10				17.43	
AC-MW-16				17.13	
AC-MW-17				20.04	
URS-MW-03				13.66	
AC-MW-19				16.51	
URS-MW-10				15.99	
URS-MW-28				14.20	
URS-MW-28S				14.24	
URS-MW-28D				15.33	
AC-MW-20				16.11	
AC-MW-01				20.22	
~~AC-MW-13~~					RC
AC-MW-28				13.72	
AC-MW-31		0840	KSP-6	19.41	SW facing S of MW-16 after 50 gal on lift 30-32.5
AC-MW-18				16.77	
AC-MW-10				17.43	
AC-MW-16				17.13	
AC-MW-17				20.08	
URS-MW-03				13.66	
AC-MW-19				16.51	
URS-MW-10				15.99	
URS-MW-28				14.20	
URS-MW-28S				14.24	
URS-MW-28D				15.33	
AC-MW-20				16.11	
AC-MW-01				20.22	
AC-MW ~~13~~ -28				13.72	

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/4/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-31	6/4/21	0945	KSP-6	19.41	after lift 35-37.5 surfacing after 25gal at cracks S of MW-10
AC-MW-18				16.77	
AC-MW-10				17.43	
AC-MW-16				~~16.51~~ RC 17.13	
AC-MW-17				20.06	
URS-MW-03				13.66	
AC-MW-19				16.51	
URS-MW-10				15.99	
URS-MW-28				14.20	
URS-MW-28S				14.24	
URS-MW-28D				15.33	
AC-MW-20				16.11	
AC-MW-01				20.22	
AC-MW-28				13.72	
~~URS-MW-28~~			~~KSP-14~~		~~After lift 25-27.5~~
~~URS-MW-28S~~					
~~URS-MW-28D~~					
~~ACMW28~~					
~~AC-MW-20~~					
~~AC-MW-19~~					
~~AC-MW-18~~					
~~AC-MW-31~~					
~~URS-MW-03~~					
~~AC-MW-16~~					
~~AC-MW-10~~					

incomplete

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/7/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
URS-MW-28S	6/7/21	1130	Before injections	14.32	
URS-MW-28D				15.57	
URS-MW-28I				14.28	
AC-MW-28				13.82	
AC-MW-20				16.20	
AC-MW-19				16.58	
URS-MW-03				13.72	
AC-MW-18				16.94	
URS-MW-02				13.39	
URS-MW-28S		1338	KSP-14	13.84	after 35-37.5'
URS-MW-28D				15.24	
URS-MW-28I				13.37	
AC-MW-28				13.73	
AC-MW-20				16.16	
AC-MW-19				16.56	
AC-MW-18				17.01	
URS-MW-03				13.72	
URS-MW-02				13.40	
URS-MW-28S		1358	KSP-14	13.88	after 37.5'-40'
URS-MW-28D				15.26	
URS-MW-28I				13.40	
AC-MW-28				13.75	
AC-MW-20				16.16	
AC-MW-19				16.56	
AC-MW-18				17.01	
AC-MW-03				13.72	
AC-MW-02				13.40	

32.5 gal KSP injected, surfacing observed

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAe
Date: 6/7/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
URS-MW-28S	6/7/21	1440	KSP 14	13.55	after 40-42.5', remainder of water injected. surfacing @ cc end during 25gal flush
URS-MW-28D				15.32	
URS-MW-28I				13.33	
AC-MW-28				13.75	
AC-MW-20				16.16	
AC-MW-19				16.56	
AC-MW-18				17.01	
URS-MW-03				13.72	
URS-MW-02				13.40	
URS-MW-28S		1650	KSP-16	13.61	surfacing @ point immediately
URS-MW-28D				15.36	
URS-MW-28I				13.33	
AC-MW-28				13.75	
AC-MW-20				16.16	
AC-MW-19				16.56	
AC-MW-18				17.01	
URS-MW-03				13.72	
URS-MW-02				13.40	

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/8/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
URS-MW-28S	6/8/21	0700	KSP-16 (1st attempt)	13.90	Before injections start for day
URS-MW-28D				15..47	
URS-MW-28I				13.88	
AC-MW-28				RS ~~13.78~~	
AC-MW-20				13.76	
AC-MW-19				16.16	
AC-MW-18				16.56	
URS-MW-03				17.04 13.72	
URS-MW-02				13.41	
URS-MW-28S		0925	KSP-16	10.31	Offset by 3', after interval 33-35.5'
URS-MW-28D				15.31	
URS-MW-28I				13.31	
AC-MW-28				13.79	
AC-MW-20				16.10	
AC-MW-19				16.44	
AC-MW-18				17.04	
URS-MW-03				13.72	
URS-MW-02				13.41	
URS-MW-28S		1015	KSP-16	5.22	after 35.5'-38' interval
URS-MW-28D				15.08	
URS-MW-28I				12.35	
AC-MW-28				13.77	
AC-MW-20				16.16	
AC-MW-19				16.41	
AC-MW-18				17.04	
URS-MW-03				13.72	
URS-MW-02				13.41	

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/8/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
URS-MW-28S	6/8/21	1100	KSP-15	11.42	after 33-35.5'
URS-MW-28D			~~KSP~~	15.20	
URS-MW-28I				12.76	
AC-MW-28				13.76	
AC-MW-20				16.16	
AC-MW-19				16.38	
AC-MW-18				17.05	
URS-MW-03				13.72	
URS-MW-02				13.41	
URS-MW-28S		1153	KSP-15	12.14	Post 35.5-38'
URS-MW-28D				15.20	
URS-MW-28I				12.71	
AC-MW-28				13.74	
AC-MW-20				16.16	
AC-MW-19				16.38	
AC-MW-18				17.05	
URS-MW-03				13.72	
URS-MW-02				13.41	
URS-MW-28S		1218	KSP-16	3.55	Post some volume from KSP-15 35.5-38 interval
URS-MW-28D				14.86	
URS-MW-28I				11.56	
AC-MW 28				13.74	
URS-MW-28S		1225	KSP-15	capped	Post full volume @ 35.5-38'
URS-MW-28D				14.91	
URS-MW-28I				12.03	
AC-MW-28				13.72	
AC-MW-20				16.16	
AC-MW-19				16.38	
AC-MW-18				17.05	
URS-MW-03				13.79	
URS-MW-02				13.41	

Aspect Consulting

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/8/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-04	6/8	1350	Before EB inject	23.21	
AC-MW-06				16.69	
AC-MW-07				21.12	
AC-MW-12				18.20	
AC-MW-13				20.26	
AC-MW-14				23.14	
AC-SB-13				18.38	
URS-MW-12				11.53	
AC-MW-15				22.96	
AC-MW-16				13.60	
AC-MW-04		1610	KSP-17	23.21	after 20-22.5'
AC-MW-06				16.69	
AC-MW-07				21.12	
AC-MW-12				18.32	
AC-MW13				20.26	
AC-MW14				23.14	
AC-MW-15				22.96	
AC-MW16				13.60	
AC-SB-13				18.32	
URS-MW-12				11.42	
AC-MW-04		1655	KSP-17	23.21	after 22.5-25'
AC-MW-06				16.69	
AC-MW-07				21.12	
AC-MW-12				18.32	
AC-MW-13				20.24	
AC-MW-14				23.14	
AC-MW15				22.96	
AC-MW16				13.60	
AC-SB-13				18.30	
URS-MW-12				11.40	

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC

Date: 6/8/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-04	6/8/21	1735	KSP-17	23.21	after 25-27.5'
AC-MW-06				16.71	
AC-MW-07				21.18	
AC-MW-12				18.32	
AC-MW-13				20.21	
AC-MW-14				23.13	
AC-MW-15				22.96	
AC-MW-16				13.60	
AC-SB-13				18.08	
URS-MW-12				11.40	
AC-MW-04		1805	KSP-17	23.21	after 27.5-30'
AC-MW-06				16.71	
AC-MW-07				21.18	
AC-MW-12				18.32	
AC-MW-13				20.21	
AC-MW-14				23.13	
AC-MW-15				22.96	
AC-MW-16				13.60	
AC-SB-13				17.47	
URS-MW-12				11.40	

Field Staff: RAC
Date: 6/9/21

Water Level Monitoring Log

Grand Street Commons 170304

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-15	6/9/21	1212	KSP-26	23.01	after 17-19.5'
AC-MW-16				13.63	
AC-MW-12				18.36	
AC-SB-13				17.73	
URS-MW-12				8.45	
AC-MW-15		1255	KSP-26	23.01	after 19.5'-22'
AC-MW-16				13.63	
AC-MW-12				18.36	
AC-SB-13				17.70	
URS-MW-12				9.09	
AC-MW-15		1430	KSP-26	23.01	after 22-24.5
AC-MW-16				13.63	
AC-MW-12				18.35	
AC-SB-13				17.65	
URS-MW-12				9.82	
AC-MW-15		1515	KSP-26	23.01	after 24.5-27'
AC-MW-16				13.63	
AC-MW-12				18.35	
AC-SB-13				17.63	
URS-MW-12				10.13	
AC-MW-12		1625	KSP-18	18.33	after 20-22.5'
AC-SB-13				17.62	
URS-MW-12				RC ~~18.33~~ 10.29	
AC-MW-04				RC ~~10.29~~ 23.24	
AC-MW-13				20.10	
AC-MW-12			KSP-18	18.31	after 22.5-25'
AC-SB-13				17.60	
URS-MW-12				10.33	
AC-MW-04				23.23	
AC-MW-13				20.06	

23.25'
before KSP18,
20.13'
(@ 1520

Aspect Consulting

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/8/2021

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-04	6/9/21	0700	Before injections	23.25	6/8 KSP-17 injection complete
AC-MW-06				16.69	
AC-MW-07				21.21	
AC-MW-12				18.37	
AC-MW-13				20.13	
AC-MW-14				~~20.13~~ 23.19	
AC-MW-15				23.01	
AC-MW-16				13.63	
AC-SB-13				17.79	
URS-MW-12				11.31	
AC-MW-04		0855	KSP-19	23.27	after 20-22.5'
AC-MW-06				~~2~~ 16.69	
AC-MW-07				21.22	
AC-MW-12				18.41	
AC-MW-13				20.13	
AC-MW-14				23.19	
AC-MW-15				23.01	
AC-MW-16				13.63	
AC-SB-13				17.78	
URS-MW-12				9.65	
AC-MW-12			KSP-19	18.38	after 22.5'-25'
AC-SB-13				17.73	
URS-MW-12				9.12	
AC-MW-12			KSP-19	18.38	after 25-27.5
AC-SB-13				17.76	
URS-MW-12				9.42	
AC-MW-12		1135	KSP-19	18.36	after 27.5-30
AC-SB-13				17.76	
URS-MW-12				8.61	

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 9/10/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-12	6/10/21	0900	KSP18	18.35	after ~~255~~ 25-27.5' interval
AC-SB-13				17.34	
URS-MW-12				10.29	
AC-MW-04				23.23	
AC-MW-13				20.04	
AC-MW-12		0952	KSP18	18.32	after 27.5-30' interval
AC-SB-13				17.32	
URS-MW-12				10.30	
AC-MW-04				23.23	
AC-MW-13				20.03	
AC-MW-15				23.02	
AC-MW-16				13.63	
AC-MW-12		1035	KSP-24	18.32	after 15-17.5' interval
AC-SB-13				17.28	
URS-MW-12				10.28	
AC-MW-13				20.03	
AC-MW-15				23.02	
AC-MW-16				13.63	
AC-MW-12		1110	KSP-24	18.32	after 17.5-20'
AC-SB-13				17.28	
URS-MW-12				10.28	
AC-MW-13				20.03	
AC-MW-15				23.02	
AC-MW-16				13.61	
AC-MW-12		1220	KSP-24	18.32	after 20-22.5'
AC-SB-13				17.13	
URS-MW-12				10.12	
AC-MW-13				20.01	
AC-MW-15				23.02	
AC-MW-16				13.94	

Water Level Monitoring Log
Grand Street Commons 170304

Field Staff: RAC
Date: 6/10/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-12	6/10/21	~~1415~~	KSP-24	18.36	after 4th interval
AC-SB-13				17.06	
URS-MW-12				10.01	
AC-MW-13				20.00	
AC-MW-15				23.02	
AC-MW-16				14.01	
AC-MW-12		1415	KSP-23	18.36	after first interval
AC-SB-13				16.80	
URS-MW-12				7.78	
AC-MW-13				20.00	
AC-MW-15				23.02	
AC-MW-16				14.01	
AC-MW-12		1530	KSP-23	18.36	after second interval
AC-SB-13				16.71	
URS-MW-12				capped	
AC-MW-13				19.96	
AC-MW-15				23.00	
AC-MW-16				13.94	
AC-MW-12		1615	KSP-23	18.36	after third interval
AC-SB-13				16.68	
URS-MW-12				capped	
AC-MW-13				19.94	
AC-MW-15				13.86	
AC-MW-16				23.01	
AC-MW-12		1655	KSP-23	18.20	after fourth interval
AC-SB-13				16.66	
URS-MW-12				capped	
AC-MW-13				19.93	
AC-MW-15				13.89	
AC-MW-16				23.01	

Aspect Consulting

Water Level Monitoring Log
Grand Street Commons 170304

Field Staff: RAC
Date: 6/14/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-SB-13	6/14/21	1010	KSP-25	16.47	Before injections
URS-MW-12				7.89	
AC-MW-13				19.53	
AC-MW-12				17.50	
AC-SB-13		1300	KSP-25	16.41	after 4th interval
URS-MW-12				7.69	
AC-MW-13				19.53	
AC-MW-12				17.50	
AC-SB-13		1350	KSP-21	15.95	after first interval
URS-MW-12				7.63	
AC-MW-13				19.52	
AC-MW-12				17.48	
AC-SB-13		1430	KSP-21	15.21	after second interval
URS-MW-12				7.68	
AC-MW-13				19.52	
AC-MW-12				17.39	
AC-SB-13		1524	KSP-21	13.52	after third interval
URS-MW-12				7.71	
AC-MW-13				19.51	
AC-MW-12				17.34	
AC-SB-13		1645	KSP-21	12.96	after fourth interval
URS-MW-12				7.59	
AC-MW-13				19.51	
AC-MW-12				17.33	
AC-SB-13		1740	KSP-22	12.62	after first interval
URS-MW-12 ~~AC-MW~~				7.01	
AC-MW-13				19.51	
AC-MW-12				17.32	

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/15/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-SB-13	6/15/21	0700	KSP-22	15.64	
URS-MW-12				7.61	
AC-MW-13				19.52	
AC-MW-12				17.49	Beginning of day
AC-SB-13		0800	KSP-22	14.94	after 2nd interval
URS-MW-12				capped	
AC-MW-13				19.51	
AC-MW-12				17.56	
AC-SB-13		0914	KSP-22	14.86	after 3rd interval
URS-MW-12				capped	
AC-MW-13				19.51	
AC-MW-12				17.57	
AC-SB-13		1050	KSP-22	14.70	after 4th interval
URS-MW-12				capped	
AC-MW-13				19.50	
AC-MW-12				17.62	

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/17/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
~~AE~~ RC URS-MW-27I	6/17	1030	Before Injection	12.77	
AC-MW-32				14.38	
AC-MW-27				13.29	
PC-MW-31I				14.81	
PC-MW-31S				13.94	
PC-MW-31D				16.72	
AC-DMW-02				17.51	
URS-MW-27I		1340	EHCL-4	12.57	interval 1 (after)
AC-MW-32				12.59	
AC-MW-27				13.04	
PC-MW-31I				14.26	
PC-MW-31S				13.91	
PC-MW-31D				16.72	
AC-DMW-02				17.51	
URS-MW-27I		~~1340~~ 1435 RAC	EHCL-4	11.96	Interval 2 (after)
AC-MW-32				capped	
AC-MW-27				12.69	
PC-MW-31I				13.99.	
PC-MW-31S				13.84	
PC-MW-31D				16.72	
AC-DMW-02				17.51	
URS-MW-27I		~~1435~~ RC 1530	EHCL-7	12.34	After Interval 1
AC-MW-32				7.55	
AC-MW-27				12.88	
PC-MW-31I				13.20	
PC-MW-31S				capped	
PC-MW-31D				16.74	
AC-DMW-02				17.51	

Aspect Consulting

EHCL-7 waterlevels, cont.

6/17/21
RAC

well ID	after interval 2 @1620	after interval 3 @1710
URS-MW-27I	12.41	12.43
AC-MW-32	9.41	11.82
AC-MW-27	12.94	12.98
PC-MW-31I	11.45	9.72
PC-MW-31S	capped	capped
PC-MW-31D	16.74	16.74
AC-DMW-02	17.51	17.51

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: DRB
Date: 6/18/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-32	6/18/21	0650	Baseline	14.01	
PC-MW-31I				2.37	
URS-MW-27I				12.52	
AC-MW-27				13.11	
AC-MW-32		0905	EHCL-7-37.5-40	13.95	
PC-MW-31I				Capped	
URS-MW-27I				12.52	
AC-MW-27				13.11	
AC-MW-32		1100	CHCL-8-35-37.5	13.90	
PC-MW-31I				5.70	
URS-MW-27I				12.47	
AC-MW-27				13.11	
PC-MW-33I				15.19	
AC-MW-32		1200	EHCL-8-37.5-40	13.85	
PC-MW-31I				~~12.47~~ 10.50	
URS-MW-27I				12.47	
PC-MW-33I				15.19	
AC-MW-27				13.11	
AC-MW-32		1315	EHCL-10-40-42.5	13.75	
PC-MW-31I				Surfaced	
URS-MW-27I				12.50	
PC-MW-33I				15.19	
AC-MW-27				13.11	
AC-MW-32		1405	EHCL-10-42.5-45	13.25	
PC-MW-31I				Surfaced	
URS-MW-27I				12.32	
PC-MW-33I				14.99	
AC-MW-27				13.11	

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/21/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
PC-MW-31I	6/21	1000	Before Injections	14.11	
PC-MW-31S				13.00	
PC-MW-31D				16.62	
AC-MW-32				14.14	
AC-MW-27				18.18	
URS-MW-27I				12.57	
AC-DMW-02				17.42	
PC-MW-31I		1220	EHCL-9	capped@2'bgs	@ first interval (after)
PC-MW-31S				4.51	
PC-MW-31D				16.64	
AC-MW-32				13.24	
AC-MW-27				13.12	
URS-MW-27I				11.98	
AC-DMW-02				17.40	
PC-MW-31I		1313	EHCL-9	capped@2'bgs	@second interval (after)
PC-MW-31S				capped @3'bgs	
PC-MW-31D				16.62	
AC-MW-32				13.27	
AC-MW-27				13.10	
URS-MW-27I				10.91	
AC-DMW-02				17.39	
PC-MW-31I		1447	EHCL-4	9.50	after 35-37.5'
PC-MW-31S				6.54	
PC-MW-31D				16.58	
AC-MW-32				6.31	
AC-MW-27				12.31	
URS-MW-27I				5.57	
AC-DMW-02				17.38	

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/21/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
PC-MW-31I	6/21	1608	EHCL-4	12.69	after 37.5-40'
PC-MW-31S				9.42	
PC-MW-31D				16.58	
AC-MW-32				11.58	
AC-MW-27				12.61	
URS-MW-27I				10.66	
AC-DMW-02				17.36	
~~PC-MW-31I~~					
~~PC-MW-31S~~					
~~PC-MW-31D~~					
~~AC-MW-32~~					
~~AC-MW-27~~					
~~URS-MW-27I~~					
~~AC-DMW-02~~					

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/22

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
PC-MW-31I	6/22	1245	EHCL-~~5~~6	~~capped~~ 12.74	after 35-37.5, w/25gal injected before surfacing
PC-MW-31S				9.54	
PC-MW-31D				16.62	
AC-MW-32				13.53	
AC-MW-27				12.66	
URS-MW-27I				capped	
URS-MW-27S				capped ~~[illegible]~~	
PC-MW-31I		1355	EHCL-6	13.42	after 37.5-40' interval, partially injected
PC-MW-31S				9.41	
PC-MW-31D				16.62	
AC-MW-32				13.60	
AC-MW-27				12.69	
URS-MW-27I				capped	
URS-MW-27S				capped	
PC-MW-31I		1455	EHCL-6	capped	after 32.5-35', offset
PC-MW-31S				8.69	
PC-MW-31D				16.60	
AC-MW-32				1.79	
AC-MW-27				12.71	
URS-MW-27I				capped	
URS-MW-27S				10.03	
PC-MW-31I		1558	EHCL-6	capped	after 35-37.5', offset
PC-MW-31S				7.34	
PC-MW-31D				16.60	
AC-MW-32				6.43	
AC-MW-27				12.72	
URS-MW-27I				capped	
URS-MW-27S				10.48	

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/22/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
PC-MW-31I	6/22	1630	EHCL-6	capped	after 37.5-40' offset, 75gal
PC-MW-31S				7.61	
PC-MW-31D				16.58	
RC ~~PC-MW-31~~ AC-MW-32				5.98	
AC-MW-27				12.	
URS-MW-27I				capped	
URS-MW-27D				~~TZ~~RC 10.52	

Aspect Consulting

Water Level Monitoring Log

Grand Street Commons 170304

Field Staff: RAC
Date: 6/25/21

Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
AC-MW-22	6/25/21	0700	Before injecting	18.27	
		0812	EHCL-18	18.28	after 35-37.5 (surfacing @point, not full volume)
		0955	EHCL-18	17.62	second attempt, ~~offset~~
		1130	EHCL-18	17.95	after 37.5-40'

Water Level Monitoring Log

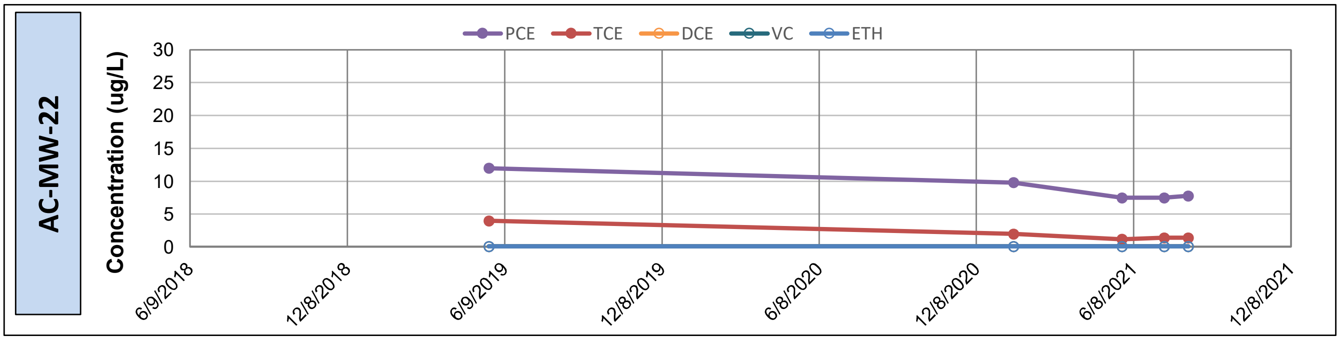
Grand Street Commons 170304

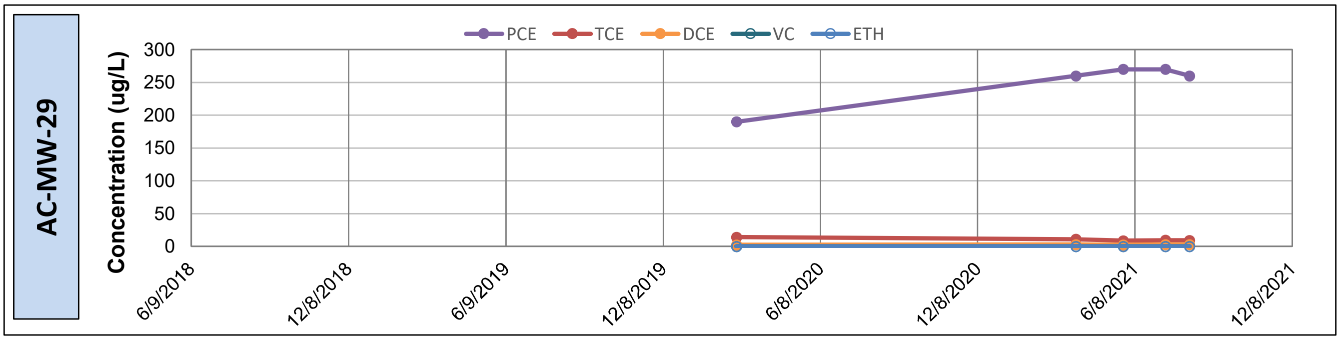
Field Staff: DRB
Date: 6/23 - 6/24

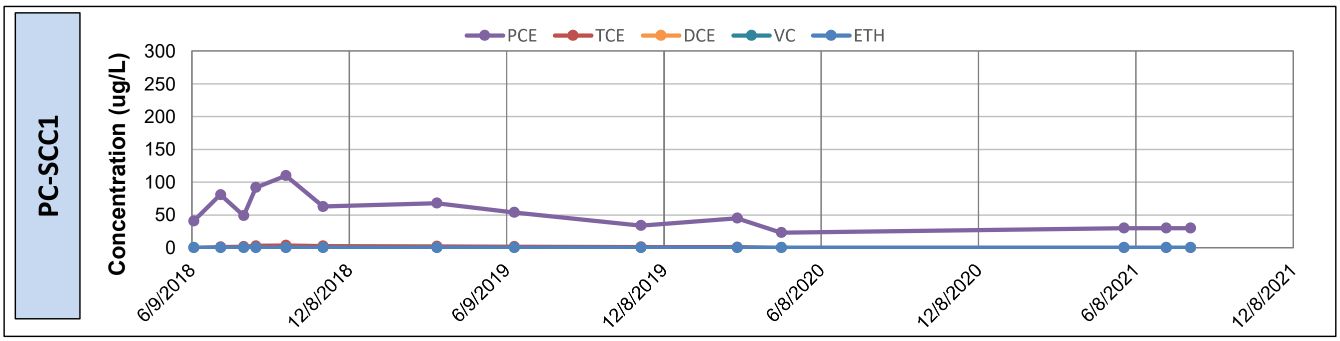
Injection Well	Date	Time	Injection Location	Water Level (ft bTOC)	Comment
URS-MW-271	6/23/21	0710	Baseline	10.70	
AC-MW-27				12.88	
AC-MW-32				13.80	
PC-MW-311				12.10	
URS-MW-271		0905	EHCL532.5-35	—	Surfacing in Well
AC-MW-27				9.87	
AC-MW-32				12.44	
PC-MW-311				12.13	
URS-MW-271		1155	EHCL535-37.5	—	Surfacing in well
AC-MW-27				11.74	
AC-MW-32				12.40	
PC-MW-311				11.64	
URS-MW-271		1310	EHCL537.5-40	—	Surfacing in well
AC-MW-27				11.90	
AC-MW-32				11.74	
PC-MW-311				12.45	
AC-MW-22		1330	Baseline	18.92	
AC-MW-22		1440	EHCL-19-30-32.5	18.40	
AC-MW-22		1545	EHCL-19-32.5-35	18.40	
AC-MW-22	6/24/21	0730	Baseline	18.64	
AC-MW-22		1000	EHCL 19-37.5-40	18.60	
AC-MW-22		1135	EHCL-20-30-32.5	17.40	
AC-MW-22		1230	EHCL-20-32.5-35	16.51	
AC-MW-22		1340	EHCL-20-35-37.5	15.66	
AC-MW-22		1445	EHCL-20-37.5-40	16.58	
AC-MW-22		1705	EHCL-18-30-32.5	16.81	
AC-MW-22		1740	EHCL-18-32.5-35	16.95	

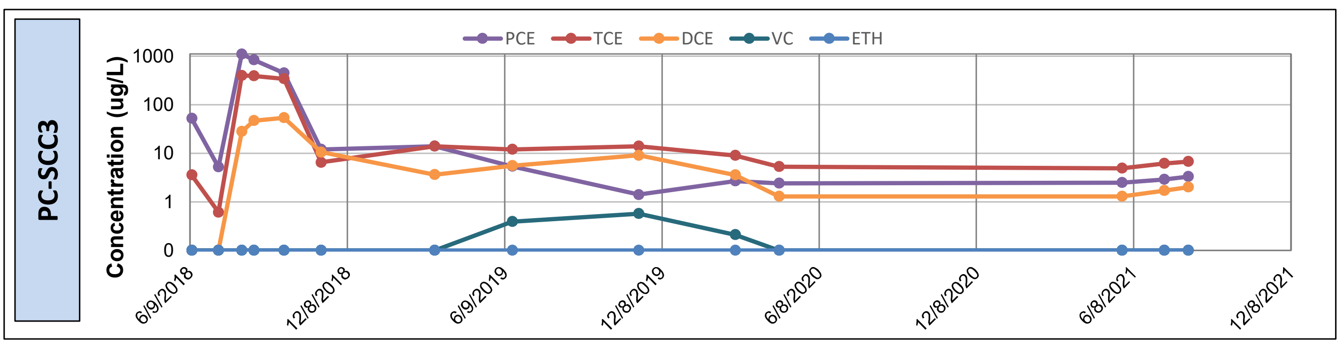
APPENDIX G

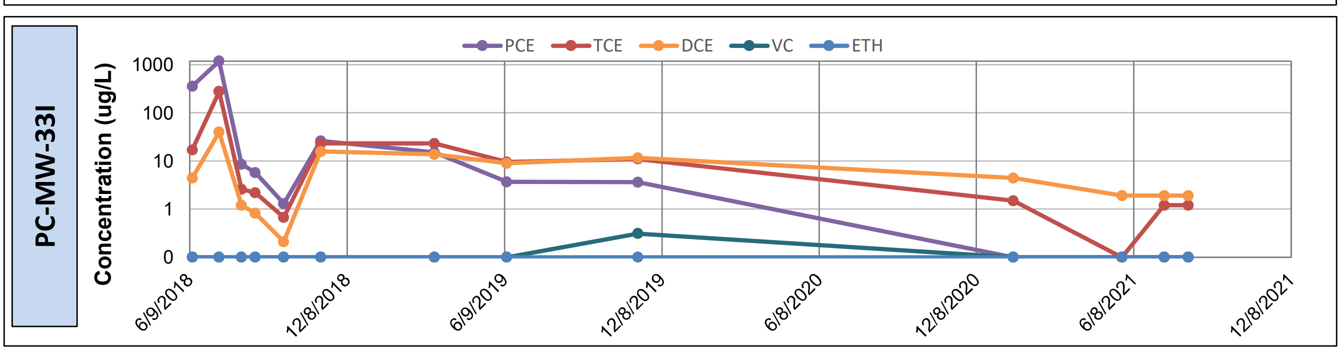
Groundwater Time Series Data









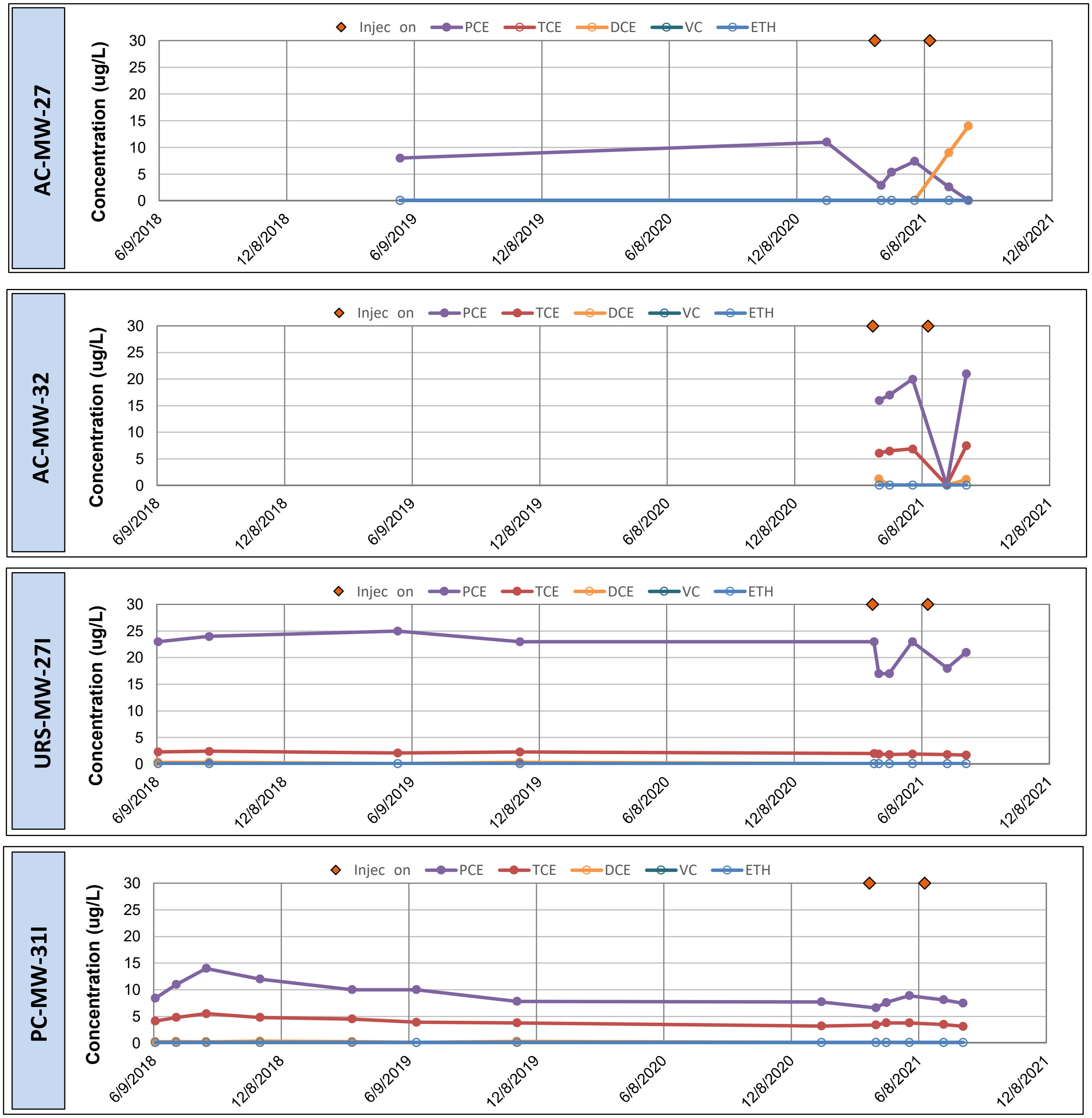


Notes:
- *PCE = Tetrachloroethene*
- *TCE = Trichloroethene*
- *DCE = Trans-1,2-dichloroethene + Cis-1,2-dichloroethene + 1,1-dichloroethene*
- *VC = Vinyl Chloride*
- *ETH = Ethane + Ethene*
- *Non detect values displayed as 0.1 μg/L*

West Block PCE

Engineering Design Report
Grand Street Commons
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	SEP-2021	BY: RAC	FIGURE NO.
	PROJECT NO. 170304	REV BY: MCC	**I-1**



Notes:
- PCE = Tetrachloroethene
- TCE = Trichloroethene
- DCE = Trans-1,2-dichloroethene + Cis-1,2-dichloroethene + 1,1-dichloroethene
- VC = Vinyl Chloride
- ETH = Ethane + Ethene
- Non detect values displayed as 0.1 µg/L

West Block PCE

Engineering Design Report
Grand Street Commons
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING

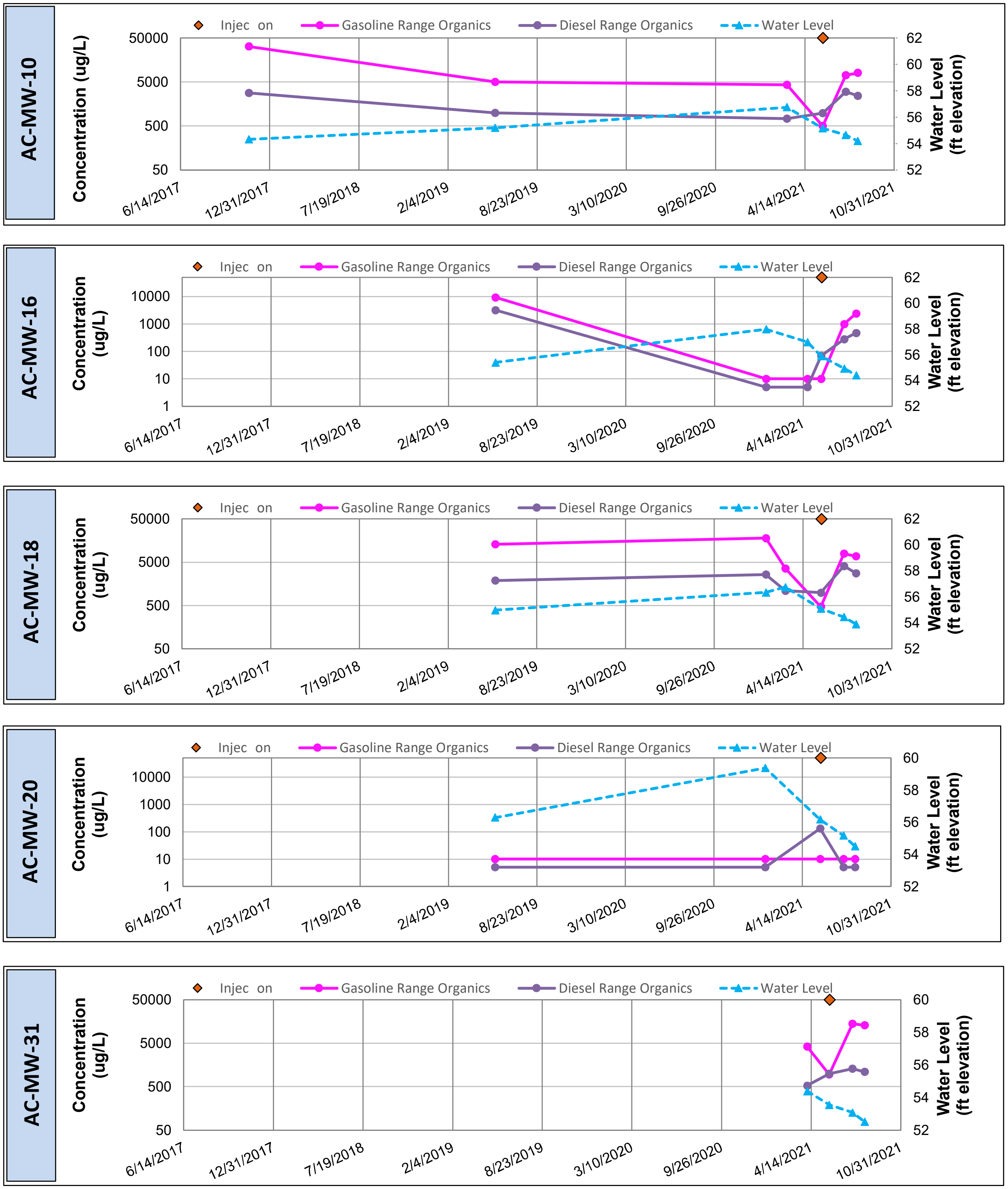
SEP-2021

BY: RAC

PROJECT NO. 170304

REV BY: MCC

FIGURE NO. I-2



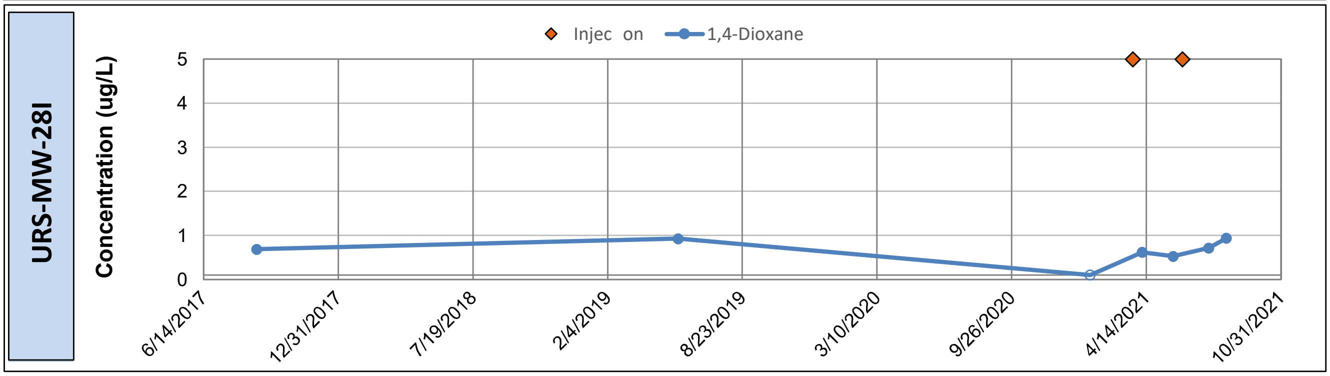
Notes:
- TPH = Total Petroleum Hydrocarbons
- Non detect values for gasoline range organics displayed as 10 µg/L
- Non detect values for diesel range organics displayed as 5 µg/L

West Block TPH

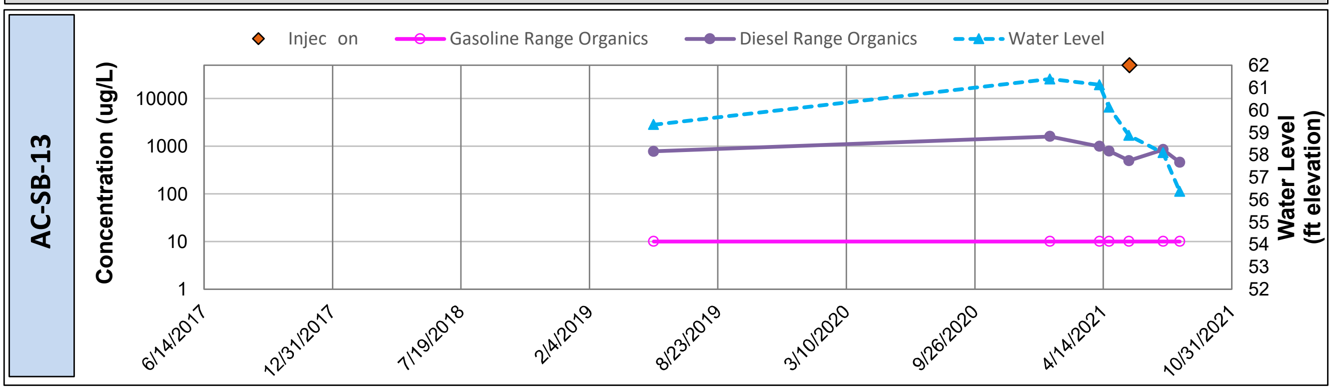
Engineering Design Report
Grand Street Commons
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	SEP-2021	BY: RAC	FIGURE NO.
	PROJECT NO. 170304	REV BY: MCC	**I-3**

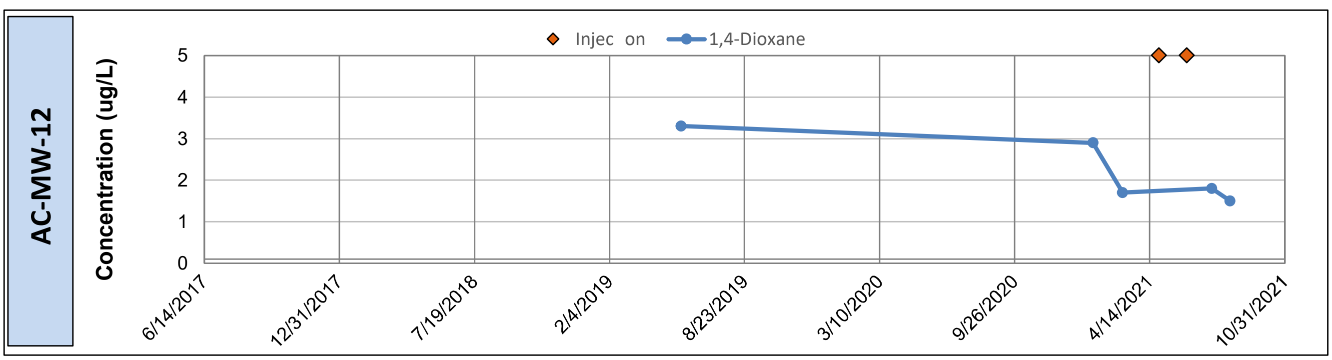
West Block 1,4-dioxane



East Block TPH



East Block 1,4-dioxane



Notes:
- TPH = Total Petroleum Hydrocarbons
- Non detect values for gasoline range organics displayed as 10 µg/L
- Non detect values for diesel range organics displayed as 5 µg/L
- Non detect values for 1,4-dioxane displayed as 0.1 µg/L

1,4-dioxane and East Block TPH

Engineering Design Report
Grand Street Commons
1750 22nd Avenue South
Seattle, Washington

Aspect CONSULTING	SEP-2021	BY: RAC	FIGURE NO.
	PROJECT NO. 170304	REV BY: MCC	**I-4**

APPENDIX H

Laboratory Reports

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

July 23, 2021

Marc Chalfant, Project Manager
Aspect Consulting, LLC
350 Madison Ave. N.
Bainbridge Island, WA 98110-1810

Dear Mr Chalfant:

Included are the results from the testing of material submitted on July 15, 2021 from the Grand Street Commons 170304, F&BI 107250 project. There are 27 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0723R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on July 15, 2021 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Grand Street Commons 170304, F&BI 107250 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
107250 -01	AC-MW-29-071421
107250 -02	PC-SCC1-071421
107250 -03	PC-SCC3-071421
107250 -04	AC-MW-22-071421
107250 -05	PC-MW-33I-071421
107250 -06	PC-MW-31I-071421
107250 -07	AC-MW-32-071421
107250 -08	AC-MW-27-071421
107250 -09	URS-MW-27I-1-071521
107250 -10	URS-MW-27I-2-071521

The samples were sent to Fremont Analytical for sulfate, chloride, and TOC analyses. The report will be forwarded upon receipt.

The 8260D laboratory control sample and laboratory control sample duplicate failed the relative percent difference for methylene chloride. The analyte was not detected therefore the data were acceptable.

All other quality control requirements were acceptable.

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-29-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-01
Date Analyzed:	07/19/21	Data File:	107250-01.054
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	98.5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-SCC1-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-02
Date Analyzed:	07/19/21	Data File:	107250-02.055
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	70.2

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-SCC3-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-03
Date Analyzed:	07/19/21	Data File:	107250-03.056
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	108

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-22-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-04
Date Analyzed:	07/19/21	Data File:	107250-04.057
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	97.1

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-MW-33I-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-05 x10
Date Analyzed:	07/19/21	Data File:	107250-05 x10.096
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	9,910

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-MW-31I-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-06
Date Analyzed:	07/19/21	Data File:	107250-06.097
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	52.5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-32-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-07 x10
Date Analyzed:	07/19/21	Data File:	107250-07 x10.104
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	607

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-27-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-08 x10
Date Analyzed:	07/19/21	Data File:	107250-08 x10.105
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	8,930

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	URS-MW-27I-1-071521	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-09 x10
Date Analyzed:	07/19/21	Data File:	107250-09 x10.106
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	4,450

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	URS-MW-27I-2-071521	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-10 x10
Date Analyzed:	07/19/21	Data File:	107250-10 x10.107
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	4,280

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	I1-438 mb
Date Analyzed:	07/16/21	Data File:	I1-438 mb.087
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	<50

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-29-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-01
Date Analyzed:	07/16/21	Data File:	071621.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	2.9
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	9.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-29-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-01 1/10
Date Analyzed:	07/16/21	Data File:	071630.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	102	88	112

Compounds:	Concentration ug/L (ppb)
Tetrachloroethene	270

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-SCC1-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-02
Date Analyzed:	07/16/21	Data File:	071620.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	30

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-SCC3-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-03
Date Analyzed:	07/16/21	Data File:	071611.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	102	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	1.7
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	6.2
Tetrachloroethene	2.9

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-22-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-04
Date Analyzed:	07/16/21	Data File:	071612.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	86	113
Toluene-d8	99	88	114
4-Bromofluorobenzene	101	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.4
Tetrachloroethene	7.5

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-MW-33I-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-05
Date Analyzed:	07/16/21	Data File:	071610.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	103	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	1.9
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.2
Tetrachloroethene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-MW-31I-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-06
Date Analyzed:	07/16/21	Data File:	071616.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	99	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	3.5
Tetrachloroethene	8.1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-32-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-07
Date Analyzed:	07/16/21	Data File:	071617.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	102	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-27-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-08
Date Analyzed:	07/16/21	Data File:	071615.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	9.0
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	2.6

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	URS-MW-27I-1-071521	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-09
Date Analyzed:	07/16/21	Data File:	071618.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	86	113
Toluene-d8	96	88	114
4-Bromofluorobenzene	96	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.8
Tetrachloroethene	18

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	URS-MW-27I-2-071521	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-10
Date Analyzed:	07/16/21	Data File:	071619.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	96	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.8
Tetrachloroethene	17

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	01-1584 mb
Date Analyzed:	07/16/21	Data File:	071608.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	101	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

Date of Report: 07/23/21
Date Received: 07/15/21
Project: Grand Street Commons 170304, F&BI 107250

QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR DISSOLVED METALS USING EPA METHOD 6020B

Laboratory Code: 107250-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Iron	ug/L (ppb)	100	103	102	101	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Iron	ug/L (ppb)	100	101	80-120

Date of Report: 07/23/21
Date Received: 07/15/21
Project: Grand Street Commons 170304, F&BI 107250

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260D

Laboratory Code: 107250-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Vinyl chloride	ug/L (ppb)	10	<0.2	102	36-166
Chloroethane	ug/L (ppb)	10	<1	111	46-160
1,1-Dichloroethene	ug/L (ppb)	10	<1	95	58-142
Methylene chloride	ug/L (ppb)	10	<5	107	50-145
trans-1,2-Dichloroethene	ug/L (ppb)	10	<1	106	61-136
1,1-Dichloroethane	ug/L (ppb)	10	<1	102	63-135
cis-1,2-Dichloroethene	ug/L (ppb)	10	1.7	107	63-134
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	<1	104	48-149
1,1,1-Trichloroethane	ug/L (ppb)	10	<1	114	60-146
Trichloroethene	ug/L (ppb)	10	6.2	102 b	66-135
Tetrachloroethene	ug/L (ppb)	10	2.9	99 b	10-226

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	10	121	105	50-154	14
Chloroethane	ug/L (ppb)	10	128	110	58-146	15
1,1-Dichloroethene	ug/L (ppb)	10	117	100	67-136	16
Methylene chloride	ug/L (ppb)	10	119	96	19-178	21 vo
trans-1,2-Dichloroethene	ug/L (ppb)	10	118	105	68-128	12
1,1-Dichloroethane	ug/L (ppb)	10	119	104	74-135	13
cis-1,2-Dichloroethene	ug/L (ppb)	10	122	105	74-136	15
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	121	104	66-129	15
1,1,1-Trichloroethane	ug/L (ppb)	10	131	115	74-142	13
Trichloroethene	ug/L (ppb)	10	117	100	67-133	16
Tetrachloroethene	ug/L (ppb)	10	110	96	76-121	14

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

107250

SAMPLE CHAIN OF CUSTODY 07-15-21

VW4/ AI4

Page # 1 of 1

Report To Marc Chalfant

Company Aspect Consulting

Address 710 2nd Ave Ste 550

City, State, ZIP Seattle, WA 98104

Phone 206-331-4606 Email mchalfant@aspectconsulting.com

SAMPLERS (signature)	
Dylan Bransum Rachel C	
PROJECT NAME	PO #
Grand Street Commons	170304
REMARKS	INVOICE TO
Project specific RLs? - Yes / No	AP

TURNAROUND TIME
- ☒ Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	CVOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	sulfate EPA 300	dissolved iron EPA 6020 *	TOC SM 5310	Chloride EPA 300	RSK-175 methane ethane ethene	Notes
AC-MW-29-071421	01 A-I	7/14/21	0800	W	9					X			X	X	X	X	X	field filtered =*
PC-SCC1-071421	02	↓	0900	↓	↓					↓			↓	↓	↓	↓	↓	
PC-SCC3-071421	03		1005															
AC-MW-22-071421	04		1105															
PC-MW-33I-071421	05		1205															
PC-MW-31I-071421	06		1255															
AC-MW-32-071421	07		1340															
AC-MW-27-071421	08	↓	1455															
URS-MW-27I-071521	09	7/15/21	1000															
URS-MW-27I-2-071521	10 ↓	↓	1010	↓	↓					↓			↓	↓	↓	↓	↓	

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Dylan Bransum	Dylan Branscum	Aspect	7/14/21	1530
Received by: Rachel C	Rachel Cornwell	Aspect	~~7/15/21~~ 7/14/21	1530
Relinquished by: Rachel C	Rachel Cornwell	Aspect	7/15/21	1824
Received by:	JOE MOHAMMED	FBI	7/15/21	1824

Samples received at 2 °C

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 107250
Work Order Number: 2107260

July 28, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 10 sample(s) on 7/16/2021 for the analyses presented in the following report.

Dissolved Gases by RSK-175
Ion Chromatography by EPA Method 300.0
Total Organic Carbon by SM 5310C

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Date: *07/28/2021*

CLIENT:	Friedman & Bruya	
Project:	107250	
Work Order:	2107260	

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2107260-001	AC-MW-29071421	07/14/2021 8:00 AM	07/16/2021 2:48 PM
2107260-002	PC-SCC1-071421	07/14/2021 9:00 AM	07/16/2021 2:48 PM
2107260-003	PC-SCC3-071421	07/14/2021 10:05 AM	07/16/2021 2:48 PM
2107260-004	AC-MW-22-071421	07/14/2021 11:05 AM	07/16/2021 2:48 PM
2107260-005	PC-MW-33I-071421	07/14/2021 12:05 PM	07/16/2021 2:48 PM
2107260-006	PC-MW-31I-071421	07/14/2021 12:55 PM	07/16/2021 2:48 PM
2107260-007	AC-MW-32-071421	07/14/2021 1:40 PM	07/16/2021 2:48 PM
2107260-008	AC-MW-27-071421	07/14/2021 2:55 PM	07/16/2021 2:48 PM
2107260-009	URS-MW-27I-1-071521	07/15/2021 10:00 AM	07/16/2021 2:48 PM
2107260-010	URS-MW-27I-2-071521	07/15/2021 10:10 AM	07/16/2021 2:48 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Fremont Analytical

Case Narrative

WO#: **2107260**

Date: **7/28/2021**

CLIENT: Friedman & Bruya

Project: 107250

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Fremont Analytical

Work Order: **2107260**
Date Reported: **7/28/2021**

CLIENT: Friedman & Bruya
Project: 107250

Lab ID: 2107260-001 **Collection Date:** 7/14/2021 8:00:00 AM
Client Sample ID: **AC-MW-29071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	ND	0.00675		mg/L	1	7/26/2021 4:38:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:38:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:38:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	15.6	1.00	D	mg/L	10	7/19/2021 3:53:00 PM
Sulfate	47.8	6.00	D	mg/L	10	7/19/2021 3:53:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	2.60	0.500		mg/L	1	7/26/2021 3:23:00 PM

Lab ID: 2107260-002 **Collection Date:** 7/14/2021 9:00:00 AM
Client Sample ID: **PC-SCC1-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	ND	0.00675		mg/L	1	7/26/2021 4:43:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:43:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:43:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	29.5	1.00	D	mg/L	10	7/19/2021 4:16:00 PM
Sulfate	15.9	6.00	D	mg/L	10	7/19/2021 4:16:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	0.820	0.500		mg/L	1	7/26/2021 4:49:00 PM

Analytical Report

Fremont Analytical

Work Order: **2107260**
Date Reported: **7/28/2021**

CLIENT: Friedman & Bruya
Project: 107250

Lab ID: 2107260-003 **Collection Date:** 7/14/2021 10:05:00 AM
Client Sample ID: **PC-SCC3-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	0.00770	0.00675		mg/L	1	7/26/2021 4:45:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:45:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:45:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	15.4	1.00	D	mg/L	10	7/19/2021 5:25:00 PM
Sulfate	122	6.00	D	mg/L	10	7/19/2021 5:25:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	9.98	0.500		mg/L	1	7/26/2021 5:10:00 PM

Lab ID: 2107260-004 **Collection Date:** 7/14/2021 11:05:00 AM
Client Sample ID: **AC-MW-22-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	0.00952	0.00675		mg/L	1	7/26/2021 4:47:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:47:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:47:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	11.0	1.00	D	mg/L	10	7/19/2021 5:49:00 PM
Sulfate	22.7	6.00	D	mg/L	10	7/19/2021 5:49:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	1.17	0.500		mg/L	1	7/26/2021 6:32:00 PM

Fremont Analytical

Analytical Report

Work Order: **2107260**
Date Reported: **7/28/2021**

CLIENT: Friedman & Bruya
Project: 107250

Lab ID: 2107260-005 **Collection Date:** 7/14/2021 12:05:00 PM
Client Sample ID: **PC-MW-33I-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68860		Analyst: MS
Methane	1.39	0.0675	D	mg/L	10	7/27/2021 2:31:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:50:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:50:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	26.9	1.00	D	mg/L	10	7/19/2021 6:12:00 PM
Sulfate	2.24	0.600		mg/L	1	7/20/2021 10:16:00 AM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	11.2	0.500		mg/L	1	7/26/2021 6:51:00 PM

Lab ID: 2107260-006 **Collection Date:** 7/14/2021 12:55:00 PM
Client Sample ID: **PC-MW-31I-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	ND	0.00675		mg/L	1	7/26/2021 4:52:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:52:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:52:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	6.93	1.00	D	mg/L	10	7/19/2021 6:35:00 PM
Sulfate	22.4	6.00	D	mg/L	10	7/19/2021 6:35:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	1.09	0.500		mg/L	1	7/26/2021 7:12:00 PM

Fremont Analytical

Analytical Report

Work Order: **2107260**
Date Reported: **7/28/2021**

CLIENT: Friedman & Bruya
Project: 107250

Lab ID: 2107260-007 **Collection Date:** 7/14/2021 1:40:00 PM
Client Sample ID: **AC-MW-32-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	ND	0.00675		mg/L	1	7/26/2021 4:56:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:56:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:56:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	7.56	1.00	D	mg/L	10	7/19/2021 6:58:00 PM
Sulfate	30.2	6.00	D	mg/L	10	7/19/2021 6:58:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	2.30	0.500		mg/L	1	7/26/2021 7:33:00 PM

Lab ID: 2107260-008 **Collection Date:** 7/14/2021 2:55:00 PM
Client Sample ID: **AC-MW-27-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	0.921	0.0675	D	mg/L	10	7/26/2021 5:25:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:59:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:59:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	15.6	1.00	D	mg/L	10	7/19/2021 7:21:00 PM
Sulfate	1.84	0.600		mg/L	1	7/20/2021 10:39:00 AM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	13.6	0.500		mg/L	1	7/26/2021 7:56:00 PM

Fremont Analytical

Analytical Report

Work Order: **2107260**
Date Reported: **7/28/2021**

CLIENT: Friedman & Bruya
Project: 107250

Lab ID: 2107260-009 **Collection Date:** 7/15/2021 10:00:00 AM
Client Sample ID: **URS-MW-27I-1-071521** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	ND	0.00675		mg/L	1	7/26/2021 5:03:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 5:03:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 5:03:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	16.4	1.00	D	mg/L	10	7/19/2021 7:44:00 PM
Sulfate	15.5	6.00	D	mg/L	10	7/19/2021 7:44:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	52.9	1.00	D	mg/L	2	7/27/2021 5:39:00 PM

NOTES:
20mL to 40mL

Lab ID: 2107260-010 **Collection Date:** 7/15/2021 10:10:00 AM
Client Sample ID: **URS-MW-27I-2-071521** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	ND	0.00675		mg/L	1	7/26/2021 5:05:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 5:05:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 5:05:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	16.4	1.00	D	mg/L	10	7/19/2021 8:07:00 PM
Sulfate	13.9	6.00	D	mg/L	10	7/19/2021 8:07:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	53.7	1.00	D	mg/L	2	7/27/2021 6:02:00 PM

Date: *7/28/2021*

Work Order: 2107260
CLIENT: Friedman & Bruya
Project: 107250

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **LCS-33046**	SampType: **LCS**			Units: **mg/L**		Prep Date: **7/19/2021**		RunNo: **68687**			
Client ID: **LCSW**	Batch ID: **33046**					Analysis Date: **7/19/2021**		SeqNo: **1388651**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	0.698	0.100	0.7500	0	93.1	90	110				
Sulfate	3.52	0.600	3.750	0	94.0	90	110				

Sample ID: **MB-33046**	SampType: **MBLK**			Units: **mg/L**		Prep Date: **7/19/2021**		RunNo: **68687**			
Client ID: **MBLKW**	Batch ID: **33046**					Analysis Date: **7/19/2021**		SeqNo: **1388653**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.100									
Sulfate	ND	0.600									

Sample ID: **2107250-001BDUP**	SampType: **DUP**			Units: **mg/L**		Prep Date: **7/19/2021**		RunNo: **68687**			
Client ID: **BATCH**	Batch ID: **33046**					Analysis Date: **7/19/2021**		SeqNo: **1388655**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	151	10.0						149.1	1.13	20	D
Sulfate	ND	60.0						0		20	D

Sample ID: **2107250-001BMS**	SampType: **MS**			Units: **mg/L**		Prep Date: **7/19/2021**		RunNo: **68687**			
Client ID: **BATCH**	Batch ID: **33046**					Analysis Date: **7/19/2021**		SeqNo: **1388656**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	230	10.0	75.00	149.1	108	80	120				D
Sulfate	375	60.0	375.0	34.90	90.7	80	120				D

Fremont Analytical

Date: *7/28/2021*

Work Order: 2107260
CLIENT: Friedman & Bruya
Project: 107250

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2107250-001BMSD** SampType: **MSD** Units: **mg/L** Prep Date: **7/19/2021** RunNo: **68687**
Client ID: **BATCH** Batch ID: **33046** Analysis Date: **7/19/2021** SeqNo: **1388657**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	229	10.0	75.00	149.1	107	80	120	230.4	0.522	20	D
Sulfate	378	60.0	375.0	34.90	91.6	80	120	375.0	0.929	20	D

Sample ID: **2107263-001BDUP** SampType: **DUP** Units: **mg/L** Prep Date: **7/19/2021** RunNo: **68687**
Client ID: **BATCH** Batch ID: **33046** Analysis Date: **7/19/2021** SeqNo: **1388673**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	5.08	0.100						5.074	0.0197	20	E
Sulfate	4.16	0.600						4.161	0.0962	20	

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Sample ID: **2107263-001BMS** SampType: **MS** Units: **mg/L** Prep Date: **7/19/2021** RunNo: **68687**
Client ID: **BATCH** Batch ID: **33046** Analysis Date: **7/19/2021** SeqNo: **1388674**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	5.88	0.100	0.7500	5.074	107	80	120				E
Sulfate	8.11	0.600	3.750	4.161	105	80	120				

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Fremont Analytical

Date: *7/28/2021*

Work Order: 2107260
CLIENT: Friedman & Bruya
Project: 107250

QC SUMMARY REPORT

Total Organic Carbon by SM 5310C

Sample ID: **MB-R68864**	SampType: **MBLK**			Units: **mg/L**		Prep Date: **7/26/2021**			RunNo: **68864**		
Client ID: **MBLKW**	Batch ID: **R68864**					Analysis Date: **7/26/2021**			SeqNo: **1393160**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	ND	0.500									

Sample ID: **LCS-R68864**	SampType: **LCS**			Units: **mg/L**		Prep Date: **7/26/2021**			RunNo: **68864**		
Client ID: **LCSW**	Batch ID: **R68864**					Analysis Date: **7/26/2021**			SeqNo: **1393161**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	4.88	0.500	5.000	0	97.7	90.6	113				

Sample ID: **2107260-001CDUP**	SampType: **DUP**			Units: **mg/L**		Prep Date: **7/26/2021**			RunNo: **68864**		
Client ID: **AC-MW-29071421**	Batch ID: **R68864**					Analysis Date: **7/26/2021**			SeqNo: **1393163**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	2.56	0.500						2.599	1.39	20	

Sample ID: **2107260-001CMS**	SampType: **MS**			Units: **mg/L**		Prep Date: **7/26/2021**			RunNo: **68864**		
Client ID: **AC-MW-29071421**	Batch ID: **R68864**					Analysis Date: **7/26/2021**			SeqNo: **1393164**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	7.44	0.500	5.000	2.599	96.8	69.1	124				

Sample ID: **2107260-001CMSD**	SampType: **MSD**			Units: **mg/L**		Prep Date: **7/26/2021**			RunNo: **68864**		
Client ID: **AC-MW-29071421**	Batch ID: **R68864**					Analysis Date: **7/26/2021**			SeqNo: **1393165**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	7.26	0.500	5.000	2.599	93.2	69.1	124	7.439	2.45	30	

Fremont Analytical

Date: *7/28/2021*

Work Order: 2107260
CLIENT: Friedman & Bruya
Project: 107250

QC SUMMARY REPORT

Dissolved Gases by RSK-175

Sample ID: **LCS-R68834** SampType: **LCS** Units: **mg/L** Prep Date: **7/26/2021** RunNo: **68834**
Client ID: **LCSW** Batch ID: **R68834** Analysis Date: **7/26/2021** SeqNo: **1392356**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	909	0.00675	1,000	0	90.9	66.7	141				
Ethene	921	0.0146	1,000	0	92.1	68.6	139				
Ethane	925	0.0151	1,000	0	92.5	69.3	136				

Sample ID: **MB-R68834** SampType: **MBLK** Units: **mg/L** Prep Date: **7/26/2021** RunNo: **68834**
Client ID: **MBLKW** Batch ID: **R68834** Analysis Date: **7/26/2021** SeqNo: **1392357**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00675									
Ethene	ND	0.0146									
Ethane	ND	0.0151									

Sample ID: **2107260-001AREP** SampType: **REP** Units: **mg/L** Prep Date: **7/26/2021** RunNo: **68834**
Client ID: **AC-MW-29071421** Batch ID: **R68834** Analysis Date: **7/26/2021** SeqNo: **1392338**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00675						0		30	
Ethene	ND	0.0146						0		30	
Ethane	ND	0.0151						0		30	

Sample Log-In Check List

Client Name:	FB	Work Order Number:	2107260
Logged by:	Gabrielle Coeuille	Date Received:	7/16/2021 2:48:00 PM

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >2°C to 6°C *	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☑	NA ☐
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample 1	0.9

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2107260

Page # 1 of 1

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER	Fremont
PROJECT NAME/NO. 107250	PO # B-325
REMARKS Please Email Results	

TURNAROUND TIME
- X Standard TAT
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Dispose after 30 days
- ☐ Return samples
- ☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Sulfate EPA 300	TOC SM 5310	Chloride EPA 300	RSK-175 methane, ethane, ethene							Notes
AC-MW-29071421		7/14/21	0800	W	5	X	X	X	X							
PC-SCC1-071421			0900													
PC-SCC3-071421			1005													
AC-MW-22-071421			1105													
PC-MW-33I-071421			1205													
PC-MW-31I-071421			1255													
AC-MW-32-071421			1340													
AC-MW-27-071421			1455													
VRS-MW-27I-1-071521		7/15/21	1000													
VRS-MW-27I-2-071521			1010													

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: [signature]	Ann Webber-Bruya	Friedman & Bruya	7/16/21	1447
Received by: [signature]	Justine Mantz	FAI	7/16/21	1448
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

July 26, 2021

Marc Chalfant, Project Manager
Aspect Consulting, LLC
350 Madison Ave. N.
Bainbridge Island, WA 98110-1810

Dear Mr Chalfant:

Included are the results from the testing of material submitted on July 16, 2021 from the Grand St Commons 170304, F&BI 107272 project. There are 21 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0726R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on July 16, 2021 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Grand St Commons 170304, F&BI 107272 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
107272 -01	AC-MW-31-071521
107272 -02	AC-MW-18-071521
107272 -03	AC-MW-10-071521
107272 -04	AC-MW-16-071521
107272 -05	AC-MW-20-071621
107272 -06	URS-MW-28I-1-071621
107272 -07	URS-MW-28I-2-071621
107272 -08	AC-MW-12-071621
107272 -09	AC-SB-13-1-071621
107272 -10	AC-SB-13-2-071621

Samples AC-MW-31-071521, AC-MW-18-071521, AC-MW-10-071521, AC-MW-16-071521, AC-MW-20-071621, URS-MW-28I-1-071621, AC-MW-12-071621, and AC-SB-13-1-071621 were sent to Fremont Analytical for sulfate analysis. The report will be forwarded upon receipt.

All quality control requirements were acceptable.

Date of Report: 07/26/21
Date Received: 07/16/21
Project: Grand St Commons 170304, F&BI 107272
Date Extracted: 07/21/21
Date Analyzed: 07/21/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx
Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 52-124)
AC-MW-31-071521 107272-01 1/40	760	1,100	400	1,700	14,000	76
AC-MW-18-071521 107272-02 1/5	120	64	220	940	7,900	83
AC-MW-10-071521 107272-03 1/5	46	44	140	790	7,100	84
AC-MW-16-071521 107272-04	<1	4.6	1.4	7.2	1,000	79
AC-MW-20-071621 107272-05	<1	<1	<1	<3	<100	79
AC-SB-13-1-071621 107272-09	<1	<1	<1	<3	<100	77
AC-SB-13-2-071621 107272-10	<1	<1	<1	<3	<100	77
Method Blank 01-1650 MB	<1	<1	<1	<3	<100	77

Date of Report: 07/26/21
Date Received: 07/16/21
Project: Grand St Commons 170304, F&BI 107272
Date Extracted: 07/19/21
Date Analyzed: 07/19/21 and 07/21/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
AC-MW-31-071521 107272-01	1,300 x	<250	88
AC-MW-18-071521 107272-02	4,100 x	410 x	103
AC-MW-10-071521 107272-03	3,000 x	<250	96
AC-MW-16-071521 107272-04	280 x	<250	112
AC-MW-20-071621 107272-05	<50	<250	95
AC-SB-13-1-071621 107272-09	850 x	<250	93
AC-SB-13-2-071621 107272-10	830 x	<250	93
Method Blank 01-1675 MB	<50	<250	92

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-31-071521	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-01
Date Analyzed:	07/23/21	Data File:	107272-01.070
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	1,050

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-18-071521	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-02 x10
Date Analyzed:	07/23/21	Data File:	107272-02 x10.047
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	937

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-10-071521	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-03 x2
Date Analyzed:	07/23/21	Data File:	107272-03 x2.071
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	350

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-16-071521	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-04
Date Analyzed:	07/23/21	Data File:	107272-04.072
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	125

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-20-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-05
Date Analyzed:	07/23/21	Data File:	107272-05.073
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	144

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	URS-MW-28I-1-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-06
Date Analyzed:	07/23/21	Data File:	107272-06.074
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	68.4

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-12-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-08 x2
Date Analyzed:	07/23/21	Data File:	107272-08 x2.075
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	196

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-SB-13-1-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-09 x2
Date Analyzed:	07/23/21	Data File:	107272-09 x2.076
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	340

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	I1-444 mb
Date Analyzed:	07/21/21	Data File:	I1-444 mb.094
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	<50

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	URS-MW-28I-1-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-06
Date Analyzed:	07/21/21	Data File:	072109.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	98	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	0.72

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	URS-MW-28I-2-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-07
Date Analyzed:	07/21/21	Data File:	072110.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	0.76

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	AC-MW-12-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-08
Date Analyzed:	07/21/21	Data File:	072111.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	1.8

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	01-1598 mb
Date Analyzed:	07/21/21	Data File:	072108.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	<0.4

Date of Report: 07/26/21
Date Received: 07/16/21
Project: Grand St Commons 170304, F&BI 107272

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES, AND TPH AS GASOLINE USING EPA METHOD 8021B AND NWTPH-Gx

Laboratory Code: 107303-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	92	65-118
Toluene	ug/L (ppb)	50	98	72-122
Ethylbenzene	ug/L (ppb)	50	96	73-126
Xylenes	ug/L (ppb)	150	93	74-118
Gasoline	ug/L (ppb)	1,000	94	69-134

Date of Report: 07/26/21
Date Received: 07/16/21
Project: Grand St Commons 170304, F&BI 107272

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	96	96	63-142	0

Date of Report: 07/26/21
Date Received: 07/16/21
Project: Grand St Commons 170304, F&BI 107272

QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR DISSOLVED METALS USING EPA METHOD 6020B

Laboratory Code: 107272-02 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Iron	ug/L (ppb)	100	937	102	107	75-125	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Iron	ug/L (ppb)	100	95	80-120

Date of Report: 07/26/21
Date Received: 07/16/21
Project: Grand St Commons 170304, F&BI 107272

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260D SIM

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
1,4-Dioxane	ug/L (ppb)	2	98	94	70-130	4

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

107272

SAMPLE CHAIN OF CUSTODY

ME 7/16/21

VW3 AI4 E03

Page # 1 of 1

Report To Marc Chalfant

Company Aspect Consulting

Address 710 2nd Ave Ste 550

City, State, ZIP Seattle, WA 98104

Phone 206-331-4606 Email mchalfant@aspectconsulting.com

SAMPLERS (signature) Rachel C

PROJECT NAME	PO #
Grand St Commons	170304

REMARKS	INVOICE TO
Project specific RLs? - Yes / No	AP

TURNAROUND TIME
- X Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	sulfate EPA 300.0	Iron (dissolved) EPA 6020 *	1,4-dioxane 8260 SIM		Notes (AA = ascorbic acid (added in field))
AC-MW-31-071521	01 A→F	7/15/21	1204	W	6	X	X	X					X	X			1mL AA added/VOA 1mL AA added/Am * Field Filtered
AC-MW-18-071521	02		1310			X	X	X					X	X			1.7mL AA added/VOA 20mL AA added to Amb
AC-MW-10-071521	03		1615			X	X	X					X	X			1mL AA/VOA 1mL AA/Amber
AC-MW-16-071521	04		1725			X	X	X					X	X			
AC-MW-20-071621	05	7/16/21	1220			X	X	X					X	X			
URS-MW-28I-1-071621	06 A→E		1340		5								X	X	X		1mL AA/VOA
URS-MW-28I-2-071621	07 A→C		1340		3										X		
AC-MW-12-071621	08 A→E		1605		5								X	X	X		
AC-SB-13-1-071621	09 A→F		1720		6	X	X	X					X	X			1mL AA/VOA 1mL AA/Amber
AC-SB-13-2-071621	10 A→D		1730		4	X	X	X									

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Rachel C	Rachel Cornwell	Aspect	7/16/21	1841
Received by: [signature]	JOE MOHAMMED	F&BI	7/16/21	1841
Relinquished by:				
Received by:		Samples received at 2 °C		

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 107272
Work Order Number: 2107289

July 26, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 8 sample(s) on 7/19/2021 for the analyses presented in the following report.

Ion Chromatography by EPA Method 300.0

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

CLIENT:	Friedman & Bruya
Project:	107272
Work Order:	2107289

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2107289-001	AC-MW-31-071521	07/15/2021 12:04 PM	07/19/2021 2:28 PM
2107289-002	AC-MW-18-071521	07/15/2021 1:10 PM	07/19/2021 2:28 PM
2107289-003	AC-MW-10-071521	07/15/2021 4:15 PM	07/19/2021 2:28 PM
2107289-004	AC-MW-16-071521	07/15/2021 5:25 PM	07/19/2021 2:28 PM
2107289-005	AC-MW-20-071621	07/16/2021 12:20 PM	07/19/2021 2:28 PM
2107289-006	URS-MW-28I-1-071621	07/16/2021 1:40 PM	07/19/2021 2:28 PM
2107289-007	AC-MW-12-071621	07/16/2021 4:05 PM	07/19/2021 2:28 PM
2107289-008	AC-SB-13-1-071621	07/16/2021 5:20 PM	07/19/2021 2:28 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Fremont Analytical

Case Narrative

WO#: **2107289**

Date: **7/26/2021**

CLIENT: Friedman & Bruya

Project: 107272

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Fremont Analytical

Analytical Report

Work Order: **2107289**
Date Reported: **7/26/2021**

CLIENT: Friedman & Bruya
Project: 107272

Lab ID: 2107289-001 **Collection Date:** 7/15/2021 12:04:00 PM
Client Sample ID: **AC-MW-31-071521** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	12.1	6.00	D	mg/L	10	7/22/2021 4:06:00 PM

Lab ID: 2107289-002 **Collection Date:** 7/15/2021 1:10:00 PM
Client Sample ID: **AC-MW-18-071521** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	1,490	120	D	mg/L	200	7/23/2021 6:51:00 PM

Lab ID: 2107289-003 **Collection Date:** 7/15/2021 4:15:00 PM
Client Sample ID: **AC-MW-10-071521** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	492	60.0	D	mg/L	100	7/23/2021 7:14:00 PM

Lab ID: 2107289-004 **Collection Date:** 7/15/2021 5:25:00 PM
Client Sample ID: **AC-MW-16-071521** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	13.9	6.00	D	mg/L	10	7/22/2021 7:11:00 PM

Analytical Report

Work Order: **2107289**
Date Reported: **7/26/2021**

CLIENT: Friedman & Bruya
Project: 107272

Lab ID: 2107289-005 | **Collection Date:** 7/16/2021 12:20:00 PM
Client Sample ID: **AC-MW-20-071621** | **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	31.9	6.00	D	mg/L	10	7/22/2021 7:34:00 PM

Lab ID: 2107289-006 | **Collection Date:** 7/16/2021 1:40:00 PM
Client Sample ID: **URS-MW-28I-1-071621** | **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	39.1	6.00	D	mg/L	10	7/22/2021 7:57:00 PM

Lab ID: 2107289-007 | **Collection Date:** 7/16/2021 4:05:00 PM
Client Sample ID: **AC-MW-12-071621** | **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	1,620	120	D	mg/L	200	7/23/2021 7:37:00 PM

Lab ID: 2107289-008 | **Collection Date:** 7/16/2021 5:20:00 PM
Client Sample ID: **AC-SB-13-1-071621** | **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	392	60.0	D	mg/L	100	7/23/2021 8:00:00 PM

Fremont Analytical

Date: *7/26/2021*

Work Order: 2107289
CLIENT: Friedman & Bruya
Project: 107272

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-33096** SampType: **MBLK** Units: **mg/L** Prep Date: **7/22/2021** RunNo: **68791**
Client ID: **MBLKW** Batch ID: **33096** Analysis Date: **7/22/2021** SeqNo: **1391118**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	0.600									

Sample ID: **LCS-33096** SampType: **LCS** Units: **mg/L** Prep Date: **7/22/2021** RunNo: **68791**
Client ID: **LCSW** Batch ID: **33096** Analysis Date: **7/22/2021** SeqNo: **1391119**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	3.72	0.600	3.750	0	99.3	90	110				

Sample ID: **2107333-002BDUP** SampType: **DUP** Units: **mg/L** Prep Date: **7/22/2021** RunNo: **68791**
Client ID: **BATCH** Batch ID: **33096** Analysis Date: **7/22/2021** SeqNo: **1391124**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	256	120						155.6	48.9	20	D

Sample ID: **2107333-002BMS** SampType: **MS** Units: **mg/L** Prep Date: **7/22/2021** RunNo: **68791**
Client ID: **BATCH** Batch ID: **33096** Analysis Date: **7/22/2021** SeqNo: **1391125**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	929	120	750.0	155.6	103	80	120				D

Sample ID: **2107289-001ADUP** SampType: **DUP** Units: **mg/L** Prep Date: **7/22/2021** RunNo: **68791**
Client ID: **AC-MW-31-071521** Batch ID: **33096** Analysis Date: **7/22/2021** SeqNo: **1391129**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	12.3	6.00						12.12	1.80	20	D

Fremont Analytical

Date: *7/26/2021*

Work Order: 2107289
CLIENT: Friedman & Bruya
Project: 107272

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2107289-001AMS** SampType: **MS** Units: **mg/L** Prep Date: **7/22/2021** RunNo: **68791**
Client ID: **AC-MW-31-071521** Batch ID: **33096** Analysis Date: **7/22/2021** SeqNo: **1391130**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	47.4	6.00	37.50	12.12	94.1	80	120				D

Sample ID: **2107289-001AMSD** SampType: **MSD** Units: **mg/L** Prep Date: **7/22/2021** RunNo: **68791**
Client ID: **AC-MW-31-071521** Batch ID: **33096** Analysis Date: **7/22/2021** SeqNo: **1391131**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	47.4	6.00	37.50	12.12	94.0	80	120	47.42	0.105	20	D

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**2107289**
Logged by:	**Gabrielle Coeuille**	Date Received:	**7/19/2021 2:28:00 PM**

Chain of Custody

#	Question	Yes	No	Not Present / NA
1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

#	Question	Yes	No	NA
3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >2°C to 6°C *	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

#	Question	Yes	No	NA
18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample 1	0.4

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

2107284

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTER Fremont

PROJECT NAME/NO.	PO #
107272	B-335

REMARKS

Please Email Results

Page # 1 of 1

TURNAROUND TIME
- [x] Standard (2 Weeks)
- [ ] RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
- [ ] Dispose after 30 days
- [ ] Return samples
- [ ] Will call with instructions

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Nitrate	Sulfate	Alkalinity	TOC-9060M				Notes
AC-MW-31-071521		7/15/21	1204	W	1					X						
AC-MW-18-071521			1310							X						
AC-MW-10-071521			1615							X						
AC-MW-16-071521			1725							X						
AC-MW-20-071621		7/16/21	1220							X						
URS-MW-28I-1-071621			1340							X						
AC-MW-12-071621			1605							X						
AC-SB-13-1-071621			1720							X						

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Ann Webber-Bruya	Friedman and Bruya	7/19/21	1425
Received by:	Justine Martz	FAI	7/19/21	14:28
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

August 19, 2021

Marc Chalfant, Project Manager
Aspect Consulting, LLC
350 Madison Ave. N.
Bainbridge Island, WA 98110-1810

Dear Mr Chalfant:

Included are the results from the testing of material submitted on August 11, 2021 from the Grand Street Commons 170304, F&BI 108180 project. There are 27 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0819R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on August 11, 2021 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Grand Street Commons 170304, F&BI 108180 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
108180 -01	AC-MW-27-081021
108180 -02	AC-MW-32-1-081021
108180 -03	AC-MW-32-2-081021
108180 -04	URS-MW-27I-081021
108180 -05	PC-MW-31I-081021
108180 -06	PC-MW-33I-081021
108180 -07	AC-MW-22-081021
108180 -08	PC-SCC1-081021
108180 -09	AC-MW-29-081021
108180 -10	PC-SCC3-081021

The samples were sent to Fremont Analytical for sulfate, chloride, and TOC analyses. The report will be forwarded upon receipt.

All quality control requirements were acceptable.

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-27-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-01 x50
Date Analyzed:	08/16/21	Data File:	108180-01 x50.043
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	AP

Analyte:	Concentration ug/L (ppb)
Iron	11,600

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-32-1-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-02
Date Analyzed:	08/12/21	Data File:	108180-02.134
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	3,190

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-32-2-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-03
Date Analyzed:	08/12/21	Data File:	108180-03.135
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	3,210

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	URS-MW-27I-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-04
Date Analyzed:	08/12/21	Data File:	108180-04.136
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	4,340

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-MW-31I-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-05
Date Analyzed:	08/12/21	Data File:	108180-05.143
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	70.7

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-MW-33I-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-06 x50
Date Analyzed:	08/16/21	Data File:	108180-06 x50.044
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	AP

Analyte:	Concentration ug/L (ppb)
Iron	14,300

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-22-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-07
Date Analyzed:	08/12/21	Data File:	108180-07.145
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	107

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-SCC1-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-08
Date Analyzed:	08/12/21	Data File:	108180-08.146
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	64.8

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-29-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-09
Date Analyzed:	08/12/21	Data File:	108180-09.147
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	114

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-SCC3-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-10
Date Analyzed:	08/12/21	Data File:	108180-10.155
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	121

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	I1-491 mb
Date Analyzed:	08/12/21	Data File:	I1-491 mb.072
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	<50

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-27-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-01
Date Analyzed:	08/12/21	Data File:	081216.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	14
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-32-1-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-02
Date Analyzed:	08/12/21	Data File:	081227.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	1.0
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	7.5
Tetrachloroethene	21

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-32-2-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-03
Date Analyzed:	08/12/21	Data File:	081228.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	1.1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	7.2
Tetrachloroethene	21

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	URS-MW-27I-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-04
Date Analyzed:	08/12/21	Data File:	081226.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	101	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.7
Tetrachloroethene	21

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-MW-31I-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-05
Date Analyzed:	08/12/21	Data File:	081218.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	3.1
Tetrachloroethene	7.5

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-MW-33I-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-06
Date Analyzed:	08/12/21	Data File:	081215.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	1.9
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.2
Tetrachloroethene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-22-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-07
Date Analyzed:	08/12/21	Data File:	081219.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.4
Tetrachloroethene	7.8

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-SCC1-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-08
Date Analyzed:	08/12/21	Data File:	081229.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	101	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	30

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-29-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-09
Date Analyzed:	08/12/21	Data File:	081220.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	2.8
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	9.3

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-29-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-09 1/10
Date Analyzed:	08/12/21 20:47	Data File:	081236.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Tetrachloroethene	260

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-SCC3-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-10
Date Analyzed:	08/12/21	Data File:	081217.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	2.0
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	6.8
Tetrachloroethene	3.3

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	01-1836 mb
Date Analyzed:	08/12/21	Data File:	081205.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	WE

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	78	126
Toluene-d8	97	87	115
4-Bromofluorobenzene	102	92	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

Date of Report: 08/19/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108180

QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR DISSOLVED METALS USING EPA METHOD 6020B

Laboratory Code: 108180-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Iron	ug/L (ppb)	100	10,800	0 b	0 b	75-125	0 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Iron	ug/L (ppb)	100	100	80-120

Date of Report: 08/19/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108180

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260D

Laboratory Code: 108180-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Vinyl chloride	ug/L (ppb)	10	<0.2	103	36-166
Chloroethane	ug/L (ppb)	10	<1	118	46-160
1,1-Dichloroethene	ug/L (ppb)	10	<1	105	58-142
Methylene chloride	ug/L (ppb)	10	<5	119	50-145
trans-1,2-Dichloroethene	ug/L (ppb)	10	<1	103	61-136
1,1-Dichloroethane	ug/L (ppb)	10	<1	99	63-135
cis-1,2-Dichloroethene	ug/L (ppb)	10	14	113 b	63-134
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	<1	101	48-149
1,1,1-Trichloroethane	ug/L (ppb)	10	<1	104	60-146
Trichloroethene	ug/L (ppb)	10	<1	100	66-135
Tetrachloroethene	ug/L (ppb)	10	<1	99	10-226

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	10	101	98	50-154	3
Chloroethane	ug/L (ppb)	10	114	113	58-146	1
1,1-Dichloroethene	ug/L (ppb)	10	100	101	67-136	1
Methylene chloride	ug/L (ppb)	10	97	116	19-178	18
trans-1,2-Dichloroethene	ug/L (ppb)	10	102	102	68-128	0
1,1-Dichloroethane	ug/L (ppb)	10	100	99	74-135	1
cis-1,2-Dichloroethene	ug/L (ppb)	10	105	107	74-136	2
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	100	101	66-129	1
1,1,1-Trichloroethane	ug/L (ppb)	10	104	102	74-142	2
Trichloroethene	ug/L (ppb)	10	99	97	67-133	2
Tetrachloroethene	ug/L (ppb)	10	100	102	76-121	2

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

108180

SAMPLE CHAIN OF CUSTODY

ME 8/11/21

AI5 VW3

Page # 1 of 1

Report To: Marc Chalfant

Company: Aspect consulting

Address: 710 2nd Ave Ste 550

City, State, ZIP: Seattle, WA 98104

Phone: 206-331-4606 Email: mchalfant@aspectconsulting.com

SAMPLERS (signature): Rachel C

PROJECT NAME: Grand Street Commons

PO #: 170304

REMARKS

INVOICE TO: AP

Project specific RLs? - Yes / No

TURNAROUND TIME
- [X] Standard turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [ ] Archive samples
- [ ] Other
- Default: Dispose after 30 days

ANALYSES REQUESTED

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	cVOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Sulfate EPA 300	Dissolved Iron EPA 6020 *	TOC SM 5310	Chloride EPA 300	RSK-175 methane ethane ethene	Notes
AC-MW-27-081021	01 A-I	8/10/21	0820	W	9					X			X	X	X	X	X	* Field Filtered
AC-MW-32-1-081021	02		1130															
AC-MW-32-2-081021	03		1120															
URS-MW-27I-081021	04		1025															
PC-MW-31I-081021	05		1235															
PC-MW-33I-081021	06		1335															
AC-MW-22-081021	07		1440															
PC-SCC1-081021	08		1555															
AC-MW-29-081021	09		1720															
PC-SCC3-081021	10		1825															

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Rachel C	Rachel Cornwell	Aspect	8/11/21	1824
Received by:	[signature]	JOE MOHAMMED	FBI	8/11/21	1824
Relinquished by:					
Received by:		Samples received at 2 °C			

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 108180
Work Order Number: 2108172

August 19, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 10 sample(s) on 8/12/2021 for the analyses presented in the following report.

Dissolved Gases by RSK-175
Ion Chromatography by EPA Method 300.0
Total Organic Carbon by SM 5310C

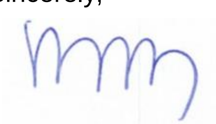
This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,



Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Date: *08/19/2021*

CLIENT: Friedman & Bruya
Project: 108180
Work Order: 2108172

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2108172-001	AC-MW-27-081021	08/10/2021 8:20 AM	08/12/2021 1:30 PM
2108172-002	AC-MW-32-1-081021	08/10/2021 11:30 AM	08/12/2021 1:30 PM
2108172-003	AC-MW-32-2-081021	08/10/2021 11:20 AM	08/12/2021 1:30 PM
2108172-004	URS-MW-27I-081021	08/10/2021 10:25 AM	08/12/2021 1:30 PM
2108172-005	PC-MW-31I-081021	08/10/2021 12:35 PM	08/12/2021 1:30 PM
2108172-006	PC-MW-33I-081021	08/10/2021 1:35 PM	08/12/2021 1:30 PM
2108172-007	AC-MW-22-081021	08/10/2021 2:40 PM	08/12/2021 1:30 PM
2108172-008	PC-SCCI-081021	08/10/2021 3:55 PM	08/12/2021 1:30 PM
2108172-009	AC-MW-29-081021	08/10/2021 5:20 PM	08/12/2021 1:30 PM
2108172-010	PC-SCC3-081021	08/10/2021 6:25 PM	08/12/2021 1:30 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2108172**

Date: **8/19/2021**

CLIENT: Friedman & Bruya
Project: 108180

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Project: 108180
Lab ID: 2108172-001
Client Sample ID: AC-MW-27-081021

Collection Date: 8/10/2021 8:20:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	2.50	0.0675	D	mg/L	10	8/18/2021 11:46:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 10:58:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 10:58:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	17.1	1.00	D	mg/L	10	8/18/2021 12:39:00 PM
Sulfate	1.86	0.600		mg/L	1	8/18/2021 2:57:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	6.98	0.500		mg/L	1	8/18/2021 6:27:00 PM

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Project: 108180
Lab ID: 2108172-002
Client Sample ID: **AC-MW-32-1-081021**

Collection Date: 8/10/2021 11:30:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	0.0109	0.00675		mg/L	1	8/18/2021 11:00:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:00:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:00:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	15.3	1.00	D	mg/L	10	8/17/2021 4:24:00 PM
Sulfate	5.38	0.600		mg/L	1	8/18/2021 1:02:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	11.4	0.500		mg/L	1	8/18/2021 7:56:00 PM

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Collection Date: 8/10/2021 11:20:00 AM
Project: 108180
Lab ID: 2108172-003
Matrix: Water
Client Sample ID: AC-MW-32-2-081021

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	ND	0.00675		mg/L	1	8/18/2021 11:02:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:02:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:02:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	15.3	1.00	D	mg/L	10	8/17/2021 4:47:00 PM
Sulfate	4.85	0.600		mg/L	1	8/18/2021 1:25:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	10.6	0.500		mg/L	1	8/18/2021 8:19:00 PM

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Collection Date: 8/10/2021 10:25:00 AM
Project: 108180
Lab ID: 2108172-004
Matrix: Water
Client Sample ID: URS-MW-27I-081021

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	0.0961	0.00675		mg/L	1	8/18/2021 11:05:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:05:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:05:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	17.5	1.00	D	mg/L	10	8/17/2021 7:05:00 PM
Sulfate	1.23	0.600		mg/L	1	8/18/2021 1:48:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	20.1	0.500		mg/L	1	8/18/2021 9:35:00 PM

Original

Fremont Analytical

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Project: 108180
Lab ID: 2108172-005
Client Sample ID: PC-MW-31I-081021

Collection Date: 8/10/2021 12:35:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	ND	0.00675		mg/L	1	8/18/2021 11:07:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:07:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:07:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	6.79	1.00	D	mg/L	10	8/17/2021 7:28:00 PM
Sulfate	21.8	6.00	D	mg/L	10	8/17/2021 7:28:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	0.950	0.500		mg/L	1	8/18/2021 10:07:00 PM

Fremont Analytical

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Project: 108180
Lab ID: 2108172-006
Client Sample ID: PC-MW-33I-081021

Collection Date: 8/10/2021 1:35:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	1.55	0.0675	D	mg/L	10	8/18/2021 11:49:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:10:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:10:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	27.5	1.00	D	mg/L	10	8/17/2021 7:52:00 PM
Sulfate	7.00	1.20	D	mg/L	2	8/18/2021 2:11:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	9.69	0.500		mg/L	1	8/18/2021 10:27:00 PM

Original

Fremont Analytical

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Collection Date: 8/10/2021 2:40:00 PM
Project: 108180
Lab ID: 2108172-007
Matrix: Water
Client Sample ID: AC-MW-22-081021

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	0.0118	0.00675		mg/L	1	8/18/2021 11:15:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:15:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:15:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	10.9	1.00	D	mg/L	10	8/17/2021 8:15:00 PM
Sulfate	20.0	6.00	D	mg/L	10	8/17/2021 8:15:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	1.22	0.500		mg/L	1	8/18/2021 10:48:00 PM

Fremont Analytical

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Project: 108180
Lab ID: 2108172-008
Client Sample ID: PC-SCCI-081021

Collection Date: 8/10/2021 3:55:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	ND	0.00675		mg/L	1	8/18/2021 11:17:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:17:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:17:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	29.5	2.00	D	mg/L	20	8/18/2021 2:34:00 PM
Sulfate	18.4	6.00	D	mg/L	10	8/17/2021 8:38:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	0.808	0.500		mg/L	1	8/18/2021 11:19:00 PM

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Project: 108180
Lab ID: 2108172-009
Client Sample ID: **AC-MW-29-081021**

Collection Date: 8/10/2021 5:20:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	ND	0.00675		mg/L	1	8/18/2021 11:19:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:19:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:19:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	16.1	1.00	D	mg/L	10	8/17/2021 9:01:00 PM
Sulfate	50.4	6.00	D	mg/L	10	8/17/2021 9:01:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	2.48	0.500		mg/L	1	8/18/2021 11:37:00 PM

Original

Fremont Analytical

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Project: 108180
Lab ID: 2108172-010
Client Sample ID: PC-SCC3-081021

Collection Date: 8/10/2021 6:25:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	0.00940	0.00675		mg/L	1	8/18/2021 11:23:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:23:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:23:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	16.0	1.00	D	mg/L	10	8/17/2021 9:24:00 PM
Sulfate	123	6.00	D	mg/L	10	8/17/2021 9:24:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	9.83	0.500		mg/L	1	8/18/2021 11:59:00 PM

Date: *8/19/2021*

Work Order: 2108172
CLIENT: Friedman & Bruya
Project: 108180

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-33389** SampType: **MBLK** Units: **mg/L** Prep Date: **8/17/2021** RunNo: **69355**
Client ID: **MBLKW** Batch ID: **33389** Analysis Date: **8/17/2021** SeqNo: **1405422**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.100									
Sulfate	ND	0.600									

Sample ID: **2108172-003ADUP** SampType: **DUP** Units: **mg/L** Prep Date: **8/17/2021** RunNo: **69355**
Client ID: **AC-MW-32-2-081021** Batch ID: **33389** Analysis Date: **8/17/2021** SeqNo: **1405427**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	15.5	1.00						15.33	1.36	20	D
Sulfate	6.18	6.00						6.130	0.812	20	D

Sample ID: **2108172-003AMS** SampType: **MS** Units: **mg/L** Prep Date: **8/17/2021** RunNo: **69355**
Client ID: **AC-MW-32-2-081021** Batch ID: **33389** Analysis Date: **8/17/2021** SeqNo: **1405428**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	23.4	1.00	7.500	15.33	107	80	120				D
Sulfate	40.5	6.00	37.50	6.130	91.7	80	120				D

Sample ID: **2108172-003AMSD** SampType: **MSD** Units: **mg/L** Prep Date: **8/17/2021** RunNo: **69355**
Client ID: **AC-MW-32-2-081021** Batch ID: **33389** Analysis Date: **8/17/2021** SeqNo: **1405429**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	23.6	1.00	7.500	15.33	111	80	120	23.39	1.06	20	D
Sulfate	41.6	6.00	37.50	6.130	94.5	80	120	40.52	2.56	20	D

Fremont Analytical

Date: *8/19/2021*

Work Order: 2108172
CLIENT: Friedman & Bruya
Project: 108180

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **LCSRR-33389** SampType: **LCS** Units: **mg/L** Prep Date: **8/18/2021** RunNo: **69355**
Client ID: **LCSW** Batch ID: **33389** Analysis Date: **8/18/2021** SeqNo: **1405443**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	0.695	0.100	0.7500	0	92.7	90	110				
Sulfate	3.55	0.600	3.750	0	94.7	90	110				

Fremont Analytical

Date: *8/19/2021*

Work Order: 2108172
CLIENT: Friedman & Bruya
Project: 108180

QC SUMMARY REPORT

Total Organic Carbon by SM 5310C

Sample ID: **MB-R69344** SampType: **MBLK** Units: **mg/L** Prep Date: **8/18/2021** RunNo: **69344**
Client ID: **MBLKW** Batch ID: **R69344** Analysis Date: **8/18/2021** SeqNo: **1405198**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	ND	0.500									

Sample ID: **LCS-R69344** SampType: **LCS** Units: **mg/L** Prep Date: **8/18/2021** RunNo: **69344**
Client ID: **LCSW** Batch ID: **R69344** Analysis Date: **8/18/2021** SeqNo: **1405199**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	4.73	0.500	5.000	0	94.6	93.1	106				

Sample ID: **2108172-001BDUP** SampType: **DUP** Units: **mg/L** Prep Date: **8/18/2021** RunNo: **69344**
Client ID: **AC-MW-27-081021** Batch ID: **R69344** Analysis Date: **8/18/2021** SeqNo: **1405201**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	7.05	0.500						6.976	1.03	20	

Sample ID: **2108172-001BMS** SampType: **MS** Units: **mg/L** Prep Date: **8/18/2021** RunNo: **69344**
Client ID: **AC-MW-27-081021** Batch ID: **R69344** Analysis Date: **8/18/2021** SeqNo: **1405202**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	11.6	0.500	5.000	6.976	91.5	69.1	124				

Sample ID: **2108172-001BMSD** SampType: **MSD** Units: **mg/L** Prep Date: **8/18/2021** RunNo: **69344**
Client ID: **AC-MW-27-081021** Batch ID: **R69344** Analysis Date: **8/18/2021** SeqNo: **1405203**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	11.5	0.500	5.000	6.976	91.4	69.1	124	11.55	0.0433	30	

Fremont Analytical

Date: *8/19/2021*

Work Order: 2108172
CLIENT: Friedman & Bruya
Project: 108180

QC SUMMARY REPORT

Dissolved Gases by RSK-175

Sample ID: **LCS-R69334**	SampType: **LCS**			Units: **mg/L**		Prep Date: **8/18/2021**			RunNo: **69334**		
Client ID: **LCSW**	Batch ID: **R69334**					Analysis Date: **8/18/2021**			SeqNo: **1404960**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	965	0.00675	1,000	0	96.5	66.7	141				
Ethene	973	0.0146	1,000	0	97.3	68.6	139				
Ethane	985	0.0151	1,000	0	98.5	69.3	136				

Sample ID: **MB-R69334**	SampType: **MBLK**			Units: **mg/L**		Prep Date: **8/18/2021**			RunNo: **69334**		
Client ID: **MBLKW**	Batch ID: **R69334**					Analysis Date: **8/18/2021**			SeqNo: **1404961**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00675									
Ethene	ND	0.0146									
Ethane	ND	0.0151									

Sample ID: **2108192-002DREP**	SampType: **REP**			Units: **mg/L**		Prep Date: **8/18/2021**			RunNo: **69334**		
Client ID: **BATCH**	Batch ID: **R69334**					Analysis Date: **8/18/2021**			SeqNo: **1404955**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	9.86	0.00675						8.225	18.1	30	E
Ethene	ND	0.0146						0		30	
Ethane	ND	0.0151						0		30	

NOTES:
E - Estimated value. The amount exceeds the calibrated range of the instrument.

Fremont Analytical

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**2108172**
Logged by:	**Clare Griggs**	Date Received:	**8/12/2021 1:30:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >2°C to 6°C *	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☑	NA ☐
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: ______ Date: ______

By Whom: ______ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: ______

Client Instructions: ______

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample	1.1

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

2108172

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Page # 1 of 1

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER	Fremont
PROJECT NAME/NO. 108180	PO # B-368
REMARKS	Aspect EDD

TURNAROUND TIME
- [x] Standard TAT
- [ ] RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
- [ ] Dispose after 30 days
- [ ] Return samples
- [ ] Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Sulfate	TOC	Chloride	RSK-175 Methane, Ethane, Ethene				Notes
AC-MW-27-081021		8/10/21	0820	water	5				X	X	X	X				
AC-MW-32-1-081021			1130						X	X	X	X				
AC-MW-32-2-081021			1120						X	X	X	X				
URS-MW-27I-081021			1025						X	X	X	X				
PC-MW-31I-081021			1235						X	X	X	X				
PC-MW-33I-081021			1335						X	X	X	X				
AC-MW-22-081021			1440						X	X	X	X				
PC-SCCI-081021			1555						X	X	X	X				
AC-MW-29-081021			1720						X	X	X	X				
PC-SCC3-081021			1825						X	X	X	X				

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: [signature]	Michael Erdahl	Friedman & Bruya	8/12/21	0838
Received by: [signature]	Justine Mantz	FAI	8/12/21	13:30
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

August 20, 2021

Marc Chalfant, Project Manager
Aspect Consulting, LLC
350 Madison Ave. N.
Bainbridge Island, WA 98110-1810

Dear Mr Chalfant:

Included are the results from the testing of material submitted on August 11, 2021 from the Grand Street Commons 170304, F&BI 108179 project. There are 21 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0820R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on August 11, 2021 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Grand Street Commons 170304, F&BI 108179 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
108179 -01	AC-MW-31-081121
108179 -02	AC-MW-10-081121
108179 -03	AC-MW-18-081121
108179 -04	AC-MW-20-081121
108179 -05	URS-MW-28I-1-081121
108179 -06	URS-MW-28I-2-081121
108179 -07	AC-MW-16-1-081121
108179 -08	AC-MW-16-2-081121
108179 -09	AC-MW-12-081121
108179 -10	AC-SB-13-081121

Samples AC-MW-31-081121, AC-MW-10-081121, AC-MW-18-081121, AC-MW-20-081121, URS-MW-28I-1-081121, AC-MW-16-1-081121, AC-MW-12-081121, and AC-SB-13-081121 were sent to Fremont Analytical for sulfate analysis. The report is enclosed.

All quality control requirements were acceptable.

Date of Report: 08/20/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108179
Date Extracted: 08/16/21
Date Analyzed: 08/16/21 and 08/18/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES AND TPH AS GASOLINE USING METHODS 8021B AND NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 52-124)
AC-MW-31-081121 108179-01 1/20	1,000	560	490	1,500	13,000	83
AC-MW-10-081121 108179-02 1/20	34	33	170	890	8,000	81
AC-MW-18-081121 108179-03 1/20	74	33	240	810	6,900	81
AC-MW-20-081121 108179-04	<1	<1	<1	<3	<100	85
AC-MW-16-1-081121 108179-07	<1	5.9	4.9	19	2,400	94
AC-MW-16-2-081121 108179-08	<1	5.3	6.0	18	2,300	94
AC-SB-13-081121 108179-10	<1	<1	<1	<3	<100	82
Method Blank 01-1778 MB	<1	<1	<1	<3	<100	81

Date of Report: 08/20/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108179
Date Extracted: 08/12/21
Date Analyzed: 08/12/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
AC-MW-31-081121 108179-01	1,100 x	340 x	91
AC-MW-10-081121 108179-02	2,400 x	290 x	83
AC-MW-18-081121 108179-03	2,800 x	420 x	88
AC-MW-20-081121 108179-04	<50	<250	89
AC-MW-16-1-081121 108179-07	450 x	<250	89
AC-MW-16-2-081121 108179-08	470 x	<250	94
AC-SB-13-081121 108179-10	460 x	<250	96
Method Blank 01-1835 MB2	<50	<250	83

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-31-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-01
Date Analyzed:	08/12/21	Data File:	108179-01.156
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	1,180

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-10-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-02
Date Analyzed:	08/12/21	Data File:	108179-02.157
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	328

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-18-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-03
Date Analyzed:	08/12/21	Data File:	108179-03.158
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	917

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-20-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-04
Date Analyzed:	08/12/21	Data File:	108179-04.159
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	127

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	URS-MW-28I-1-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-05
Date Analyzed:	08/12/21	Data File:	108179-05.167
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	73.2

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-16-1-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-07
Date Analyzed:	08/12/21	Data File:	108179-07.168
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	1,470

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-12-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-09
Date Analyzed:	08/12/21	Data File:	108179-09.169
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	255

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-SB-13-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-10
Date Analyzed:	08/12/21	Data File:	108179-10.170
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	308

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	I1-491 mb
Date Analyzed:	08/12/21	Data File:	I1-491 mb.072
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	<50

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	URS-MW-28I-1-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/13/21	Lab ID:	108179-05
Date Analyzed:	08/13/21	Data File:	081319.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	0.66

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	URS-MW-28I-2-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/13/21	Lab ID:	108179-06
Date Analyzed:	08/13/21	Data File:	081320.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	0.94

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	AC-MW-12-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/13/21	Lab ID:	108179-09
Date Analyzed:	08/14/21	Data File:	081321.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	102	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	1.5

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	170304, F&BI 108179
Date Extracted:	08/13/21	Lab ID:	01-1843 mb
Date Analyzed:	08/13/21	Data File:	081318.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	<0.4

Date of Report: 08/20/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108179

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES, AND TPH AS GASOLINE USING METHOD 8021B AND NWTPH-Gx

Laboratory Code: 108182-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	97	65-118
Toluene	ug/L (ppb)	50	99	72-122
Ethylbenzene	ug/L (ppb)	50	103	73-126
Xylenes	ug/L (ppb)	150	96	74-118
Gasoline	ug/L (ppb)	1,000	83	69-134

Date of Report: 08/20/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108179

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	92	92	63-142	0

Date of Report: 08/20/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108179

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR DISSOLVED METALS USING EPA METHOD 6020B**

Laboratory Code: 108180-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Iron	ug/L (ppb)	100	10,800	0 b	0 b	75-125	0 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Iron	ug/L (ppb)	100	100	80-120

Date of Report: 08/20/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108179

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260D SIM

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
1,4-Dioxane	ug/L (ppb)	2	97	81	70-130	18

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

108179

SAMPLE CHAIN OF CUSTODY

ME 8/11/21 VW3 AI5 E03

Page # 1 of 1

Report To Marc Chalfant

Company Aspect Consulting

Address 710 2nd Ave Ste 550

City, State, ZIP Seattle, WA 98104

Phone 206-331-4606 Email mchalfant@aspectconsulting.com

SAMPLERS (signature) Rachel	
PROJECT NAME Grand Street Commons	PO # 170304
REMARKS Project specific RLs? - Yes / No	INVOICE TO AP

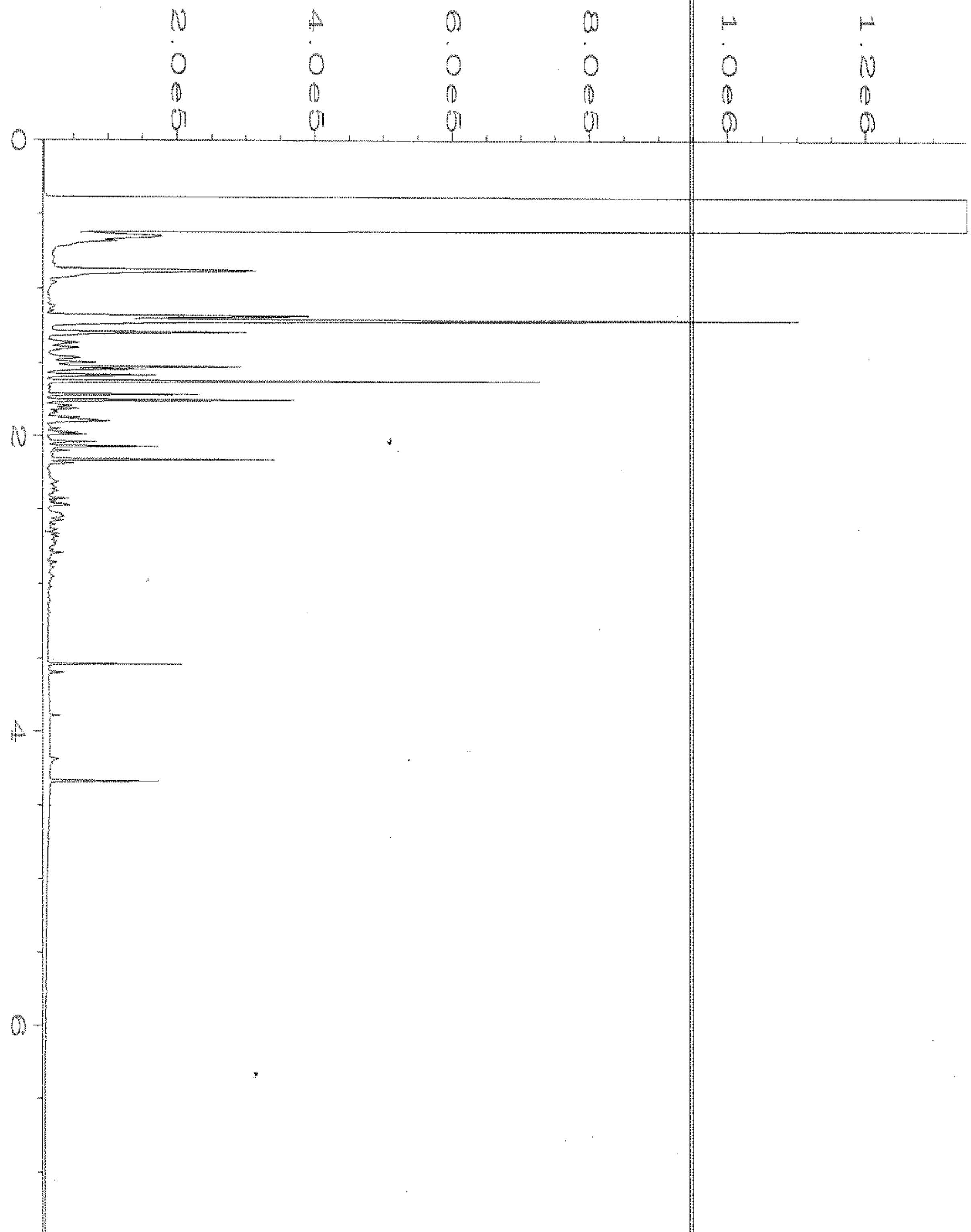
TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:
SAMPLE DISPOSAL
☐ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	sulfate EPA 300	Iron (dissolved) EPA 6020 *	1-4dioxane 8260SIM		Notes
AC-MW-31-081121	01 A-F	8/11/21	0810	W	6	X	X	X					X	X			*Field Filtered
AC-MW-10-081121	02		0950			X	X	X					X	X			
AC-MW-18-081121	03		1125			X	X	X					X	X			
AC-MW-20-081121	04		1255			X	X	X					X	X			
URS-MW-28I-1-081121	05 A-E		1345		5								X	X	X		
URS-MW-28I-2-081121	06 A-C		1355		3										X		
AC-MW-16-1-081121	07 A-F		1445		6	X	X	X					X	X			
AC-MW-16-2-081121	08 A-D		1450		4	X	X	X									
AC-MW-12-081121	09 A-E		1635		5								X	X	X		
AC-SB-13-081121	10 A-F		1715		6	X	X	X					X	X			

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

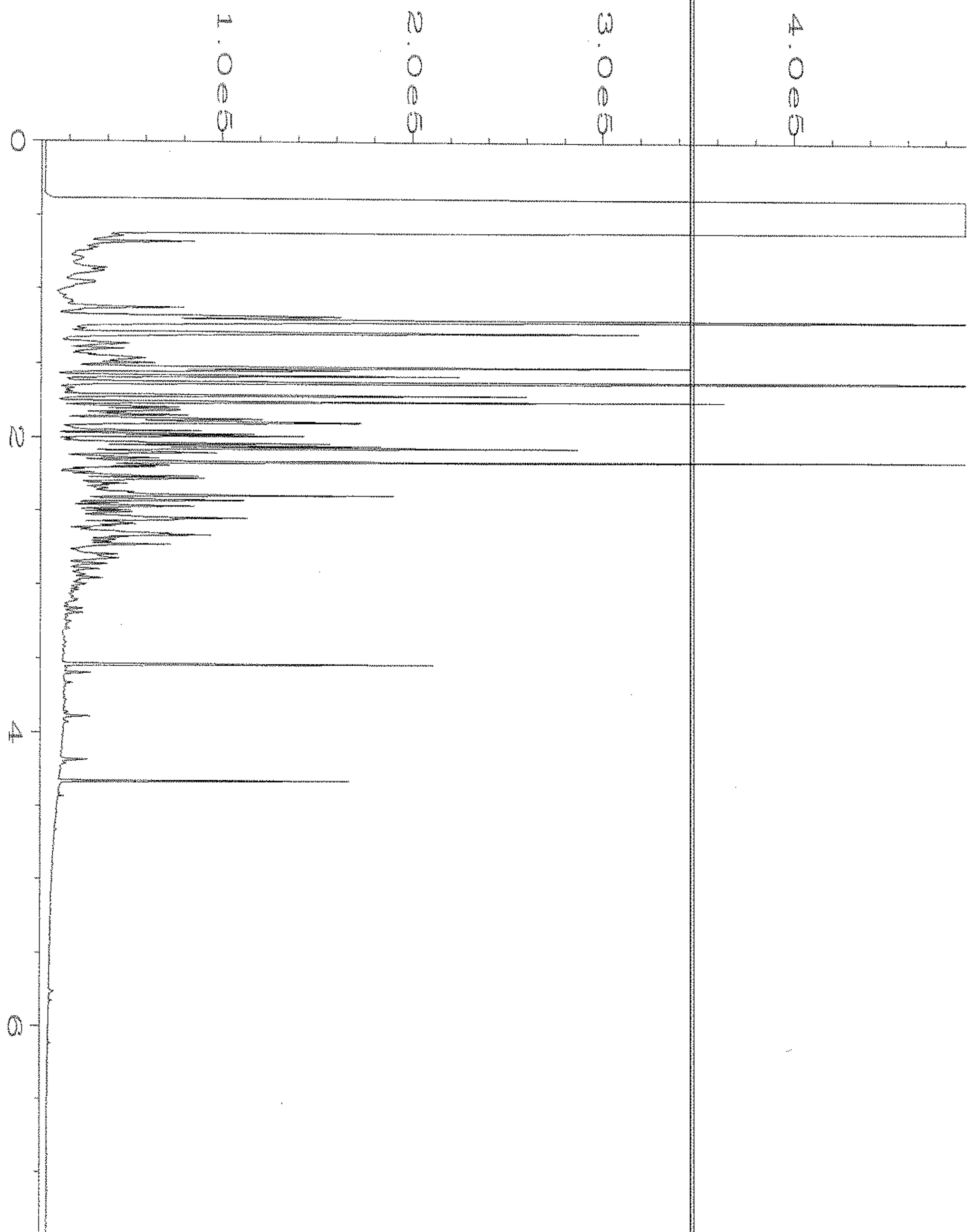
SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Rachel	Rachel Cornwell	Aspect	8/11/21	1824
Received by:	JOE MOHAMMED	FBI	8/11/21	1824
Relinquished by:				
Received by:				

Samples received at 2 °C



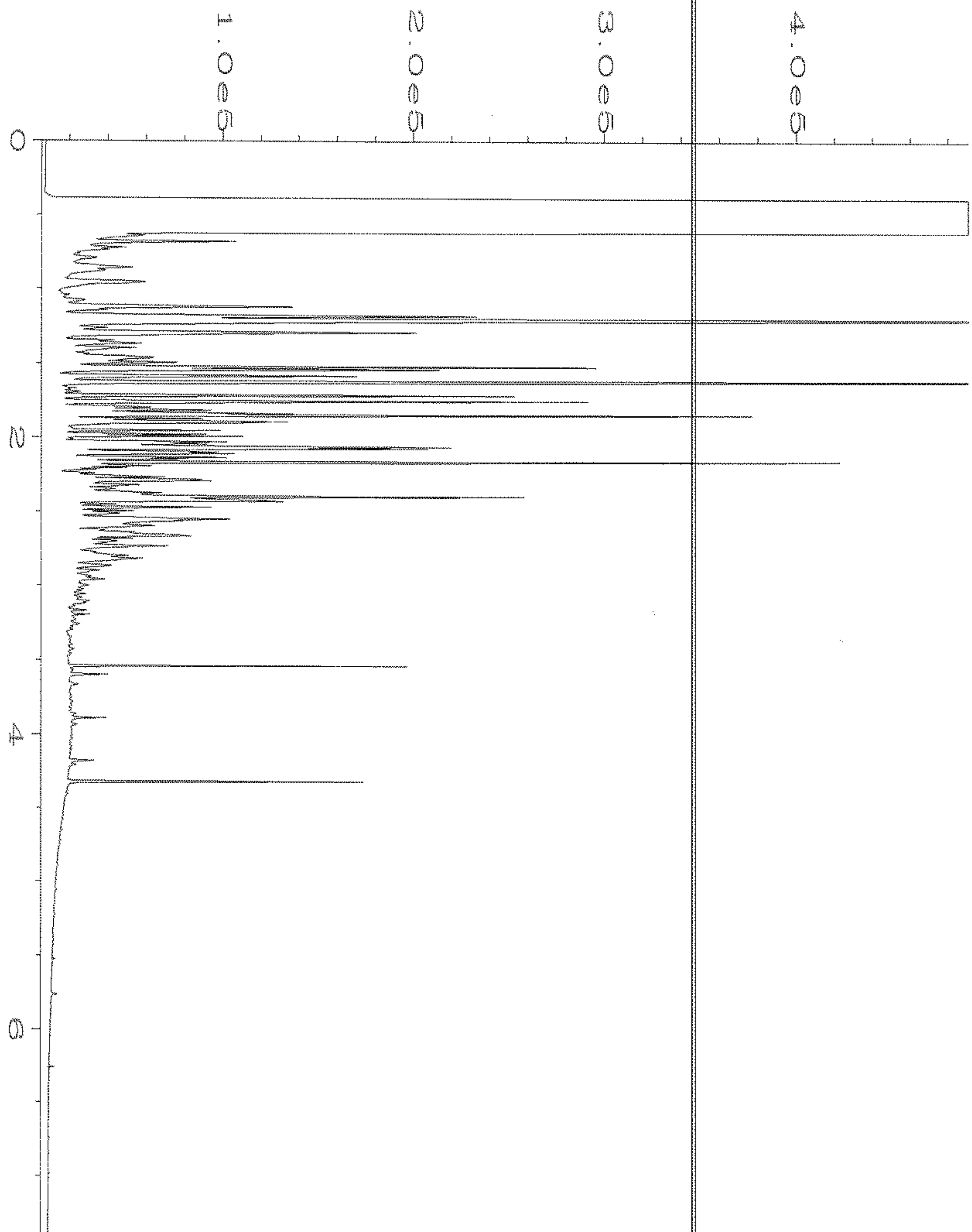
Data File Name : C:\HPCHEM\1\DATA\08-12-21\018F0701.D
Operator : TL
Instrument : GC1
Sample Name : 108179-01
Run Time Bar Code:
Acquired on : 12 Aug 21 03:13 PM
Report Created on: 13 Aug 21 08:40 AM

Page Number : 1
Vial Number : 18
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

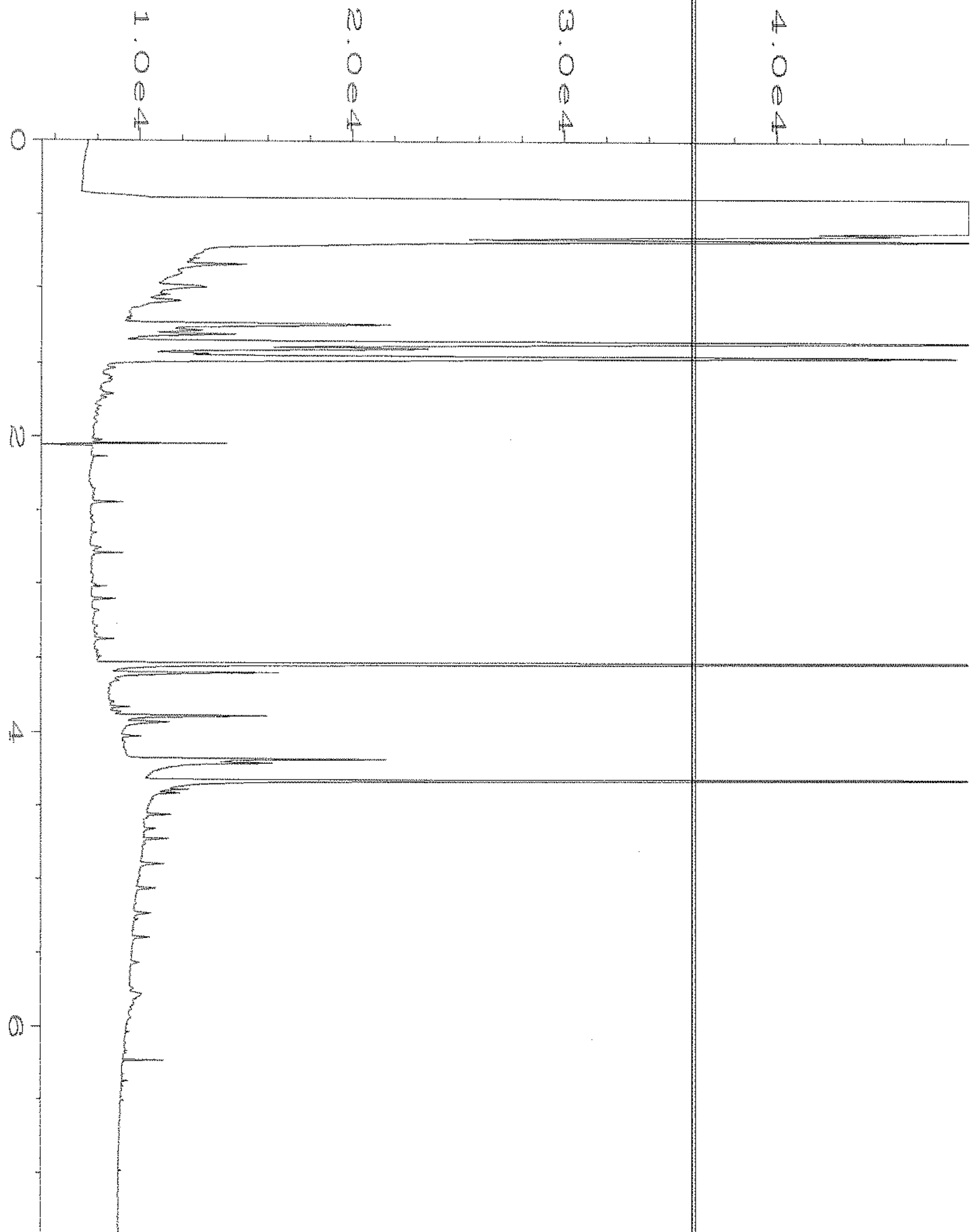


Data File Name : C:\HPCHEM\1\DATA\08-12-21\019F0701.D
Operator : TL
Instrument : GC1
Sample Name : 108179-02
Run Time Bar Code:
Acquired on : 12 Aug 21 03:23 PM
Report Created on: 13 Aug 21 08:40 AM

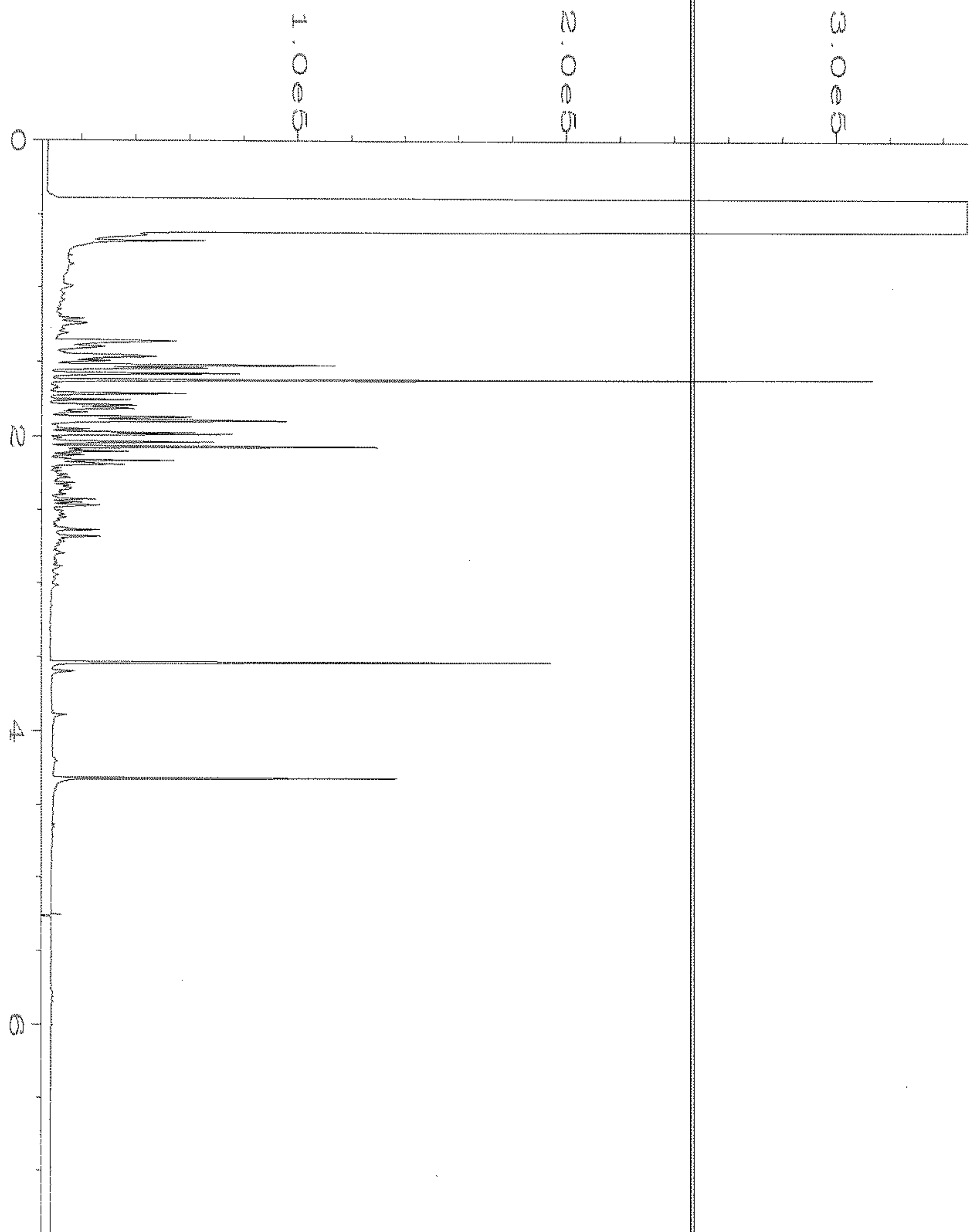
Page Number : 1
Vial Number : 19
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



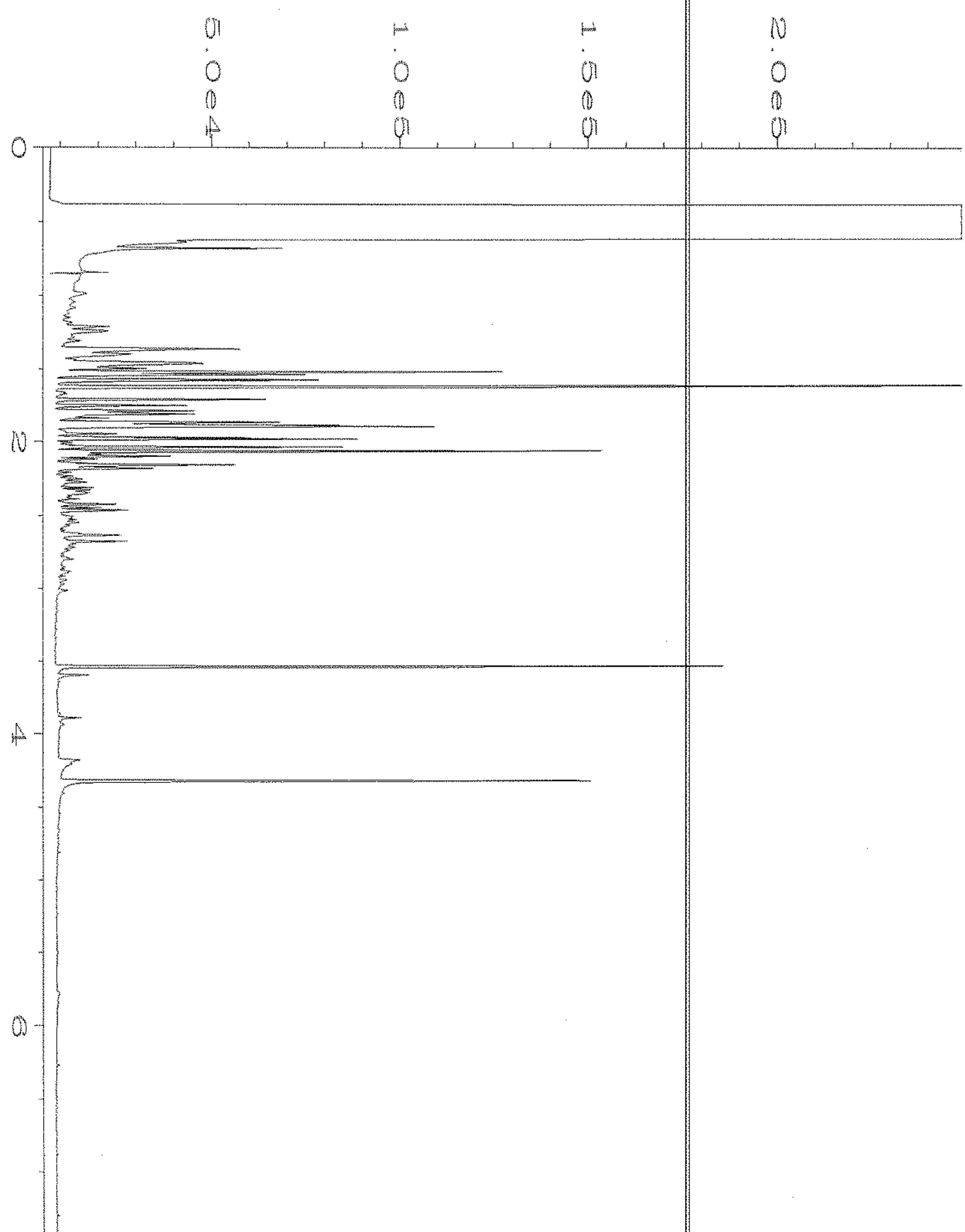
Data File Name	:	C:\HPCHEM\1\DATA\08-12-21\020F0701.D			
Operator	:	TL	Page Number	:	1
Instrument	:	GC1	Vial Number	:	20
Sample Name	:	108179-03	Injection Number	:	1
Run Time Bar Code:			Sequence Line	:	7
Acquired on	:	12 Aug 21 03:34 PM	Instrument Method:		DX.MTH
Report Created on:		13 Aug 21 08:40 AM	Analysis Method	:	DEFAULT.MTH




```
Data File Name    : C:\HPCHEM\1\DATA\08-12-21\021F0701.D
Operator          : TL                            Page Number       : 1
Instrument        : GC1                           Vial Number       : 21
Sample Name       : 108179-04                     Injection Number  : 1
Run Time Bar Code:                                Sequence Line     : 7
Acquired on       : 12 Aug 21   03:46 PM          Instrument Method: DX.MTH
Report Created on: 13 Aug 21   08:40 AM           Analysis Method   : DEFAULT.MTH
```

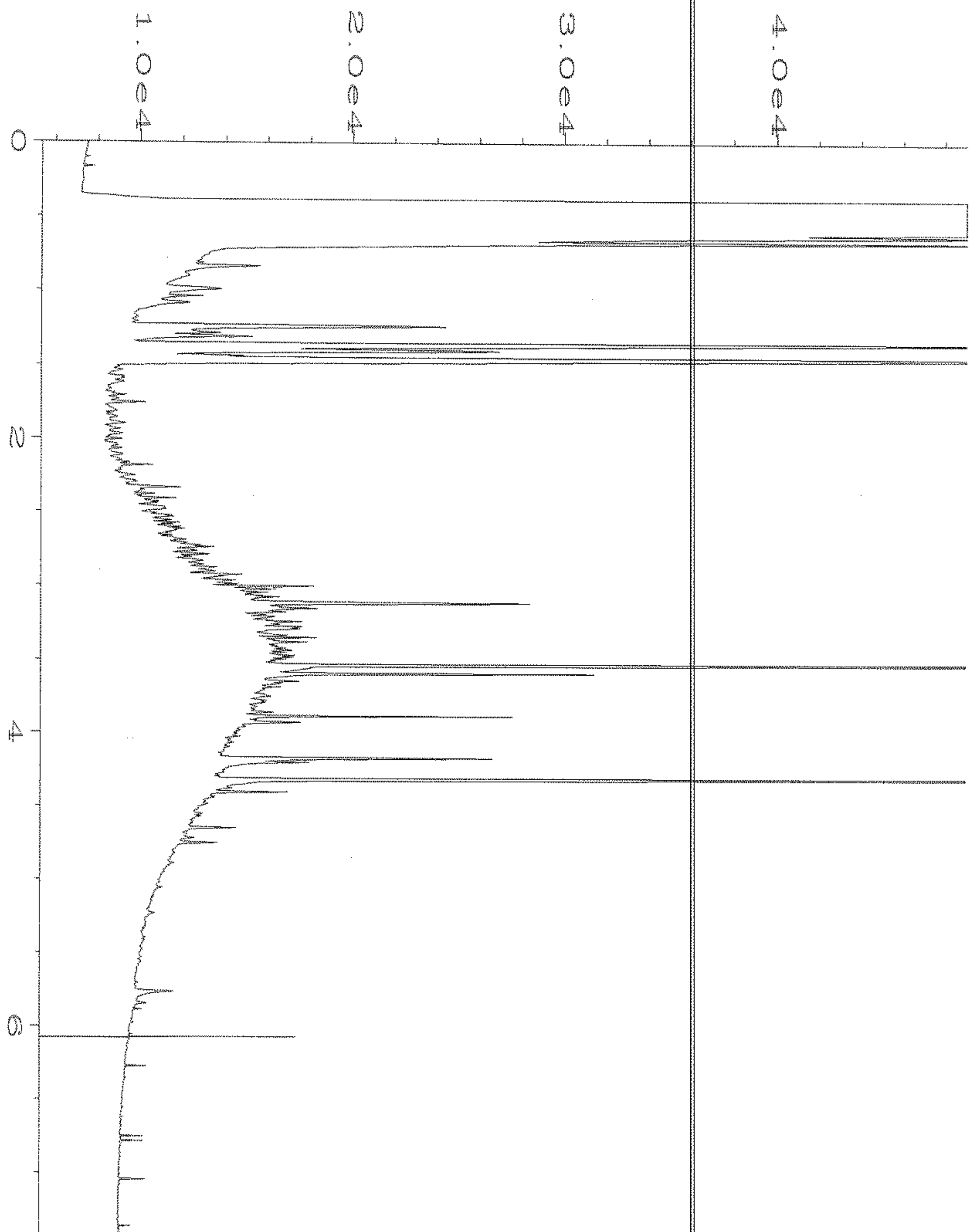


Data File Name	: C:\HPCHEM\1\DATA\08-12-21\022F0701.D		
Operator	: TL	Page Number	: 1
Instrument	: GC1	Vial Number	: 22
Sample Name	: 108179-07	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
Acquired on	: 12 Aug 21 03:58 PM	Instrument Method:	DX.MTH
Report Created on:	13 Aug 21 08:40 AM	Analysis Method	: DEFAULT.MTH

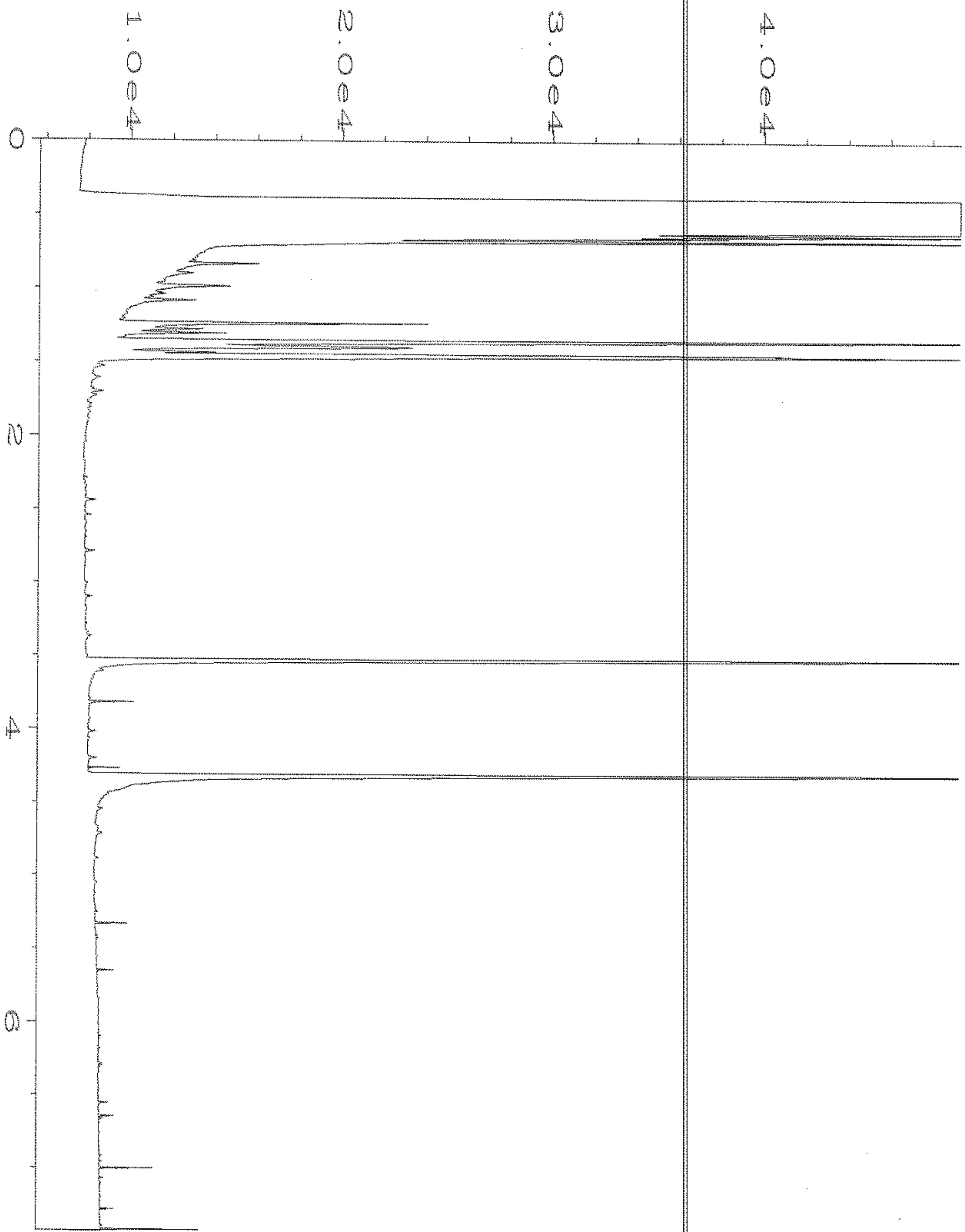


Data File Name : C:\HPCHEM\1\DATA\08-12-21\023F0701.D
Operator : TL
Instrument : GC1
Sample Name : 108179-08
Run Time Bar Code:
Acquired on : 12 Aug 21 04:10 PM
Report Created on: 13 Aug 21 08:41 AM

Page Number : 1
Vial Number : 23
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

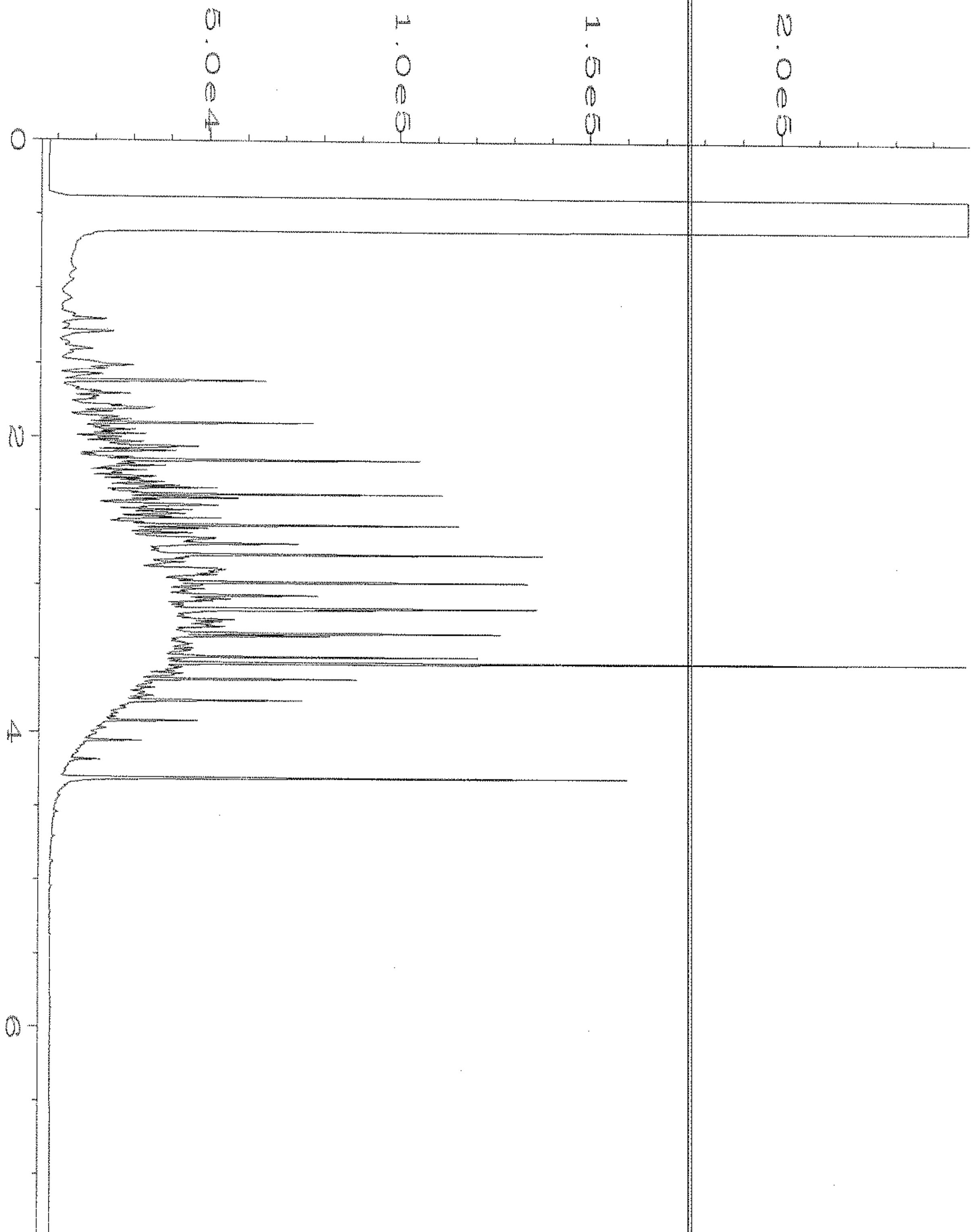


Data File Name	: C:\HPCHEM\1\DATA\08-12-21\024F0701.D		
Operator	: TL	Page Number	: 1
Instrument	: GC1	Vial Number	: 24
Sample Name	: 108179-10	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
Acquired on	: 12 Aug 21 04:22 PM	Instrument Method	: DX.MTH
Report Created on:	13 Aug 21 08:41 AM	Analysis Method	: DEFAULT.MTH



Data File Name : C:\HPCHEM\1\DATA\08-12-21\013F0301.D
Operator : TL
Instrument : GC1
Sample Name : 01-1875 mb2
Run Time Bar Code: 3 JL08·13
Acquired on : 12 Aug 21 01:13 PM
Report Created on: 13 Aug 21 08:41 AM

Page Number : 1
Vial Number : 13
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



Data File Name : C:\HPCHEM\1\DATA\08-12-21\003F0201.D
Operator : TL
Instrument : GC1
Sample Name : 500 Dx 63-79C
Run Time Bar Code:
Acquired on : 12 Aug 21 05:52 AM
Report Created on: 13 Aug 21 08:41 AM

Page Number : 1
Vial Number : 3
Injection Number : 1
Sequence Line : 2
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 108179
Work Order Number: 2108171

August 19, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 8 sample(s) on 8/12/2021 for the analyses presented in the following report.

Ion Chromatography by EPA Method 300.0

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

CLIENT: Friedman & Bruya
Project: 108179
Work Order: 2108171

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2108171-001	AC-MW-31-081121	08/11/2021 8:10 AM	08/12/2021 1:30 PM
2108171-002	AC-MW-10-081121	08/11/2021 9:50 AM	08/12/2021 1:30 PM
2108171-003	AC-MW-18-081121	08/11/2021 11:25 AM	08/12/2021 1:30 PM
2108171-004	AC-MW-20-081121	08/11/2021 12:55 PM	08/12/2021 1:30 PM
2108171-005	URS-MW-28I-1-081121	08/11/2021 1:45 PM	08/12/2021 1:30 PM
2108171-006	AC-MW-16-1-081121	08/11/2021 2:45 PM	08/12/2021 1:30 PM
2108171-007	AC-MW-12-081121	08/11/2021 4:35 PM	08/12/2021 1:30 PM
2108171-008	AC-SB-13-081121	08/11/2021 5:15 PM	08/12/2021 1:30 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2108171**

Date: **8/19/2021**

CLIENT: Friedman & Bruya
Project: 108179

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **2108171**
Date Reported: **8/19/2021**

CLIENT: Friedman & Bruya
Project: 108179

Lab ID: 2108171-001 **Collection Date:** 8/11/2021 8:10:00 AM
Client Sample ID: **AC-MW-31-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33366		Analyst: SS
Sulfate	30.3	6.00	D	mg/L	10	8/16/2021 1:12:00 PM

Lab ID: 2108171-002 **Collection Date:** 8/11/2021 9:50:00 AM
Client Sample ID: **AC-MW-10-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33366		Analyst: SS
Sulfate	622	60.0	D	mg/L	100	8/17/2021 9:50:00 AM

Lab ID: 2108171-003 **Collection Date:** 8/11/2021 11:25:00 AM
Client Sample ID: **AC-MW-18-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33366		Analyst: SS
Sulfate	1,340	120	D	mg/L	200	8/17/2021 10:13:00 AM

Lab ID: 2108171-004 **Collection Date:** 8/11/2021 12:55:00 PM
Client Sample ID: **AC-MW-20-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33366		Analyst: SS
Sulfate	30.2	6.00	D	mg/L	10	8/16/2021 4:16:00 PM

Analytical Report

Fremont Analytical

Work Order: **2108171**
Date Reported: **8/19/2021**

CLIENT: Friedman & Bruya
Project: 108179

Lab ID: 2108171-005 **Collection Date:** 8/11/2021 1:45:00 PM
Client Sample ID: **URS-MW-28I-1-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0			Batch ID: 33366		Analyst: SS	
Sulfate	55.8	6.00	D	mg/L	10	8/16/2021 4:39:00 PM

Lab ID: 2108171-006 **Collection Date:** 8/11/2021 2:45:00 PM
Client Sample ID: **AC-MW-16-1-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0			Batch ID: 33366		Analyst: SS	
Sulfate	10.8	6.00	D	mg/L	10	8/16/2021 5:03:00 PM

Lab ID: 2108171-007 **Collection Date:** 8/11/2021 4:35:00 PM
Client Sample ID: **AC-MW-12-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0			Batch ID: 33366		Analyst: SS	
Sulfate	836	60.0	D	mg/L	100	8/17/2021 10:37:00 AM

Lab ID: 2108171-008 **Collection Date:** 8/11/2021 5:15:00 PM
Client Sample ID: **AC-SB-13-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0			Batch ID: 33366		Analyst: SS	
Sulfate	306	30.0	D	mg/L	50	8/17/2021 11:00:00 AM

Date: *8/19/2021*

Work Order: 2108171
CLIENT: Friedman & Bruya
Project: 108179

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-33366** SampType: **MBLK** Units: **mg/L** Prep Date: **8/16/2021** RunNo: **69352**
Client ID: **MBLKW** Batch ID: **33366** Analysis Date: **8/16/2021** SeqNo: **1405390**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	0.600									

Sample ID: **LCS-33366** SampType: **LCS** Units: **mg/L** Prep Date: **8/16/2021** RunNo: **69352**
Client ID: **LCSW** Batch ID: **33366** Analysis Date: **8/16/2021** SeqNo: **1405391**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	3.55	0.600	3.750	0	94.7	90	110				

Sample ID: **2108171-001ADUP** SampType: **DUP** Units: **mg/L** Prep Date: **8/16/2021** RunNo: **69352**
Client ID: **AC-MW-31-081121** Batch ID: **33366** Analysis Date: **8/16/2021** SeqNo: **1405393**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	30.0	6.00						30.32	0.961	20	D

Sample ID: **2108171-001AMS** SampType: **MS** Units: **mg/L** Prep Date: **8/16/2021** RunNo: **69352**
Client ID: **AC-MW-31-081121** Batch ID: **33366** Analysis Date: **8/16/2021** SeqNo: **1405394**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	67.3	6.00	37.50	30.32	98.7	80	120				D

Sample ID: **2108171-001AMSD** SampType: **MSD** Units: **mg/L** Prep Date: **8/16/2021** RunNo: **69352**
Client ID: **AC-MW-31-081121** Batch ID: **33366** Analysis Date: **8/16/2021** SeqNo: **1405395**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	67.8	6.00	37.50	30.32	99.9	80	120	67.33	0.696	20	D

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**2108171**
Logged by:	**Clare Griggs**	Date Received:	**8/12/2021 1:30:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >2°C to 6°C *	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample	1.1

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2108171

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont	
PROJECT NAME/NO. 108179	PO # B-368
REMARKS Aspect EDD	

TURNAROUND TIME
- ☒ Standard TAT
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Dispose after 30 days
- ☐ Return samples
- ☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Sulfate							Notes
AC-MW-31-081121		8/11/21	0816	Water					X							
AC-MW-10-081121			0950						X							
AC-MW-18-081121			1125						X							
AC-MW-20-081121			1255						X							
URS-MW-26I-1-081121			1345						X							
AC-MW-16-1-081121			1445						X							
AC-MW-12-081121			1635						X							
AC-SB-13-081121			1715						X							

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: [signature]	Michael Erdahl	Friedman & Bruya	8/12/21	0838
Received by: [signature]	Justine Martz	FAI	8/12/21	13:30
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

July 23, 2021

Marc Chalfant, Project Manager
Aspect Consulting, LLC
350 Madison Ave. N.
Bainbridge Island, WA 98110-1810

Dear Mr Chalfant:

Included are the results from the testing of material submitted on July 15, 2021 from the Grand Street Commons 170304, F&BI 107250 project. There are 27 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0723R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on July 15, 2021 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Grand Street Commons 170304, F&BI 107250 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
107250 -01	AC-MW-29-071421
107250 -02	PC-SCC1-071421
107250 -03	PC-SCC3-071421
107250 -04	AC-MW-22-071421
107250 -05	PC-MW-33I-071421
107250 -06	PC-MW-31I-071421
107250 -07	AC-MW-32-071421
107250 -08	AC-MW-27-071421
107250 -09	URS-MW-27I-1-071521
107250 -10	URS-MW-27I-2-071521

The samples were sent to Fremont Analytical for sulfate, chloride, and TOC analyses. The report will be forwarded upon receipt.

The 8260D laboratory control sample and laboratory control sample duplicate failed the relative percent difference for methylene chloride. The analyte was not detected therefore the data were acceptable.

All other quality control requirements were acceptable.

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-29-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-01
Date Analyzed:	07/19/21	Data File:	107250-01.054
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	98.5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-SCC1-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-02
Date Analyzed:	07/19/21	Data File:	107250-02.055
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	70.2

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-SCC3-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-03
Date Analyzed:	07/19/21	Data File:	107250-03.056
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	108

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-22-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-04
Date Analyzed:	07/19/21	Data File:	107250-04.057
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	97.1

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-MW-33I-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-05 x10
Date Analyzed:	07/19/21	Data File:	107250-05 x10.096
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	9,910

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-MW-31I-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-06
Date Analyzed:	07/19/21	Data File:	107250-06.097
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	52.5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-32-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-07 x10
Date Analyzed:	07/19/21	Data File:	107250-07 x10.104
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	607

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-27-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-08 x10
Date Analyzed:	07/19/21	Data File:	107250-08 x10.105
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	8,930

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	URS-MW-27I-1-071521	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-09 x10
Date Analyzed:	07/19/21	Data File:	107250-09 x10.106
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	4,450

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	URS-MW-27I-2-071521	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-10 x10
Date Analyzed:	07/19/21	Data File:	107250-10 x10.107
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	4,280

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	I1-438 mb
Date Analyzed:	07/16/21	Data File:	I1-438 mb.087
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	<50

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-29-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-01
Date Analyzed:	07/16/21	Data File:	071621.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	2.9
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	9.5

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-29-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-01 1/10
Date Analyzed:	07/16/21	Data File:	071630.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	102	88	112

Compounds:	Concentration ug/L (ppb)
Tetrachloroethene	270

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-SCC1-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-02
Date Analyzed:	07/16/21	Data File:	071620.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	30

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-SCC3-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-03
Date Analyzed:	07/16/21	Data File:	071611.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	102	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	1.7
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	6.2
Tetrachloroethene	2.9

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-22-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-04
Date Analyzed:	07/16/21	Data File:	071612.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	86	113
Toluene-d8	99	88	114
4-Bromofluorobenzene	101	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.4
Tetrachloroethene	7.5

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-MW-33I-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-05
Date Analyzed:	07/16/21	Data File:	071610.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	103	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	1.9
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.2
Tetrachloroethene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-MW-31I-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-06
Date Analyzed:	07/16/21	Data File:	071616.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	99	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	3.5
Tetrachloroethene	8.1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-32-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-07
Date Analyzed:	07/16/21	Data File:	071617.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	102	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-27-071421	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-08
Date Analyzed:	07/16/21	Data File:	071615.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	9.0
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	2.6

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	URS-MW-27I-1-071521	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-09
Date Analyzed:	07/16/21	Data File:	071618.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	86	113
Toluene-d8	96	88	114
4-Bromofluorobenzene	96	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.8
Tetrachloroethene	18

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	URS-MW-27I-2-071521	Client:	Aspect Consulting, LLC
Date Received:	07/15/21	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	107250-10
Date Analyzed:	07/16/21	Data File:	071619.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	96	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.8
Tetrachloroethene	17

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Grand Street Commons 170304
Date Extracted:	07/16/21	Lab ID:	01-1584 mb
Date Analyzed:	07/16/21	Data File:	071608.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	101	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

Date of Report: 07/23/21
Date Received: 07/15/21
Project: Grand Street Commons 170304, F&BI 107250

QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR DISSOLVED METALS USING EPA METHOD 6020B

Laboratory Code: 107250-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Iron	ug/L (ppb)	100	103	102	101	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Iron	ug/L (ppb)	100	101	80-120

Date of Report: 07/23/21
Date Received: 07/15/21
Project: Grand Street Commons 170304, F&BI 107250

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260D

Laboratory Code: 107250-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Vinyl chloride	ug/L (ppb)	10	<0.2	102	36-166
Chloroethane	ug/L (ppb)	10	<1	111	46-160
1,1-Dichloroethene	ug/L (ppb)	10	<1	95	58-142
Methylene chloride	ug/L (ppb)	10	<5	107	50-145
trans-1,2-Dichloroethene	ug/L (ppb)	10	<1	106	61-136
1,1-Dichloroethane	ug/L (ppb)	10	<1	102	63-135
cis-1,2-Dichloroethene	ug/L (ppb)	10	1.7	107	63-134
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	<1	104	48-149
1,1,1-Trichloroethane	ug/L (ppb)	10	<1	114	60-146
Trichloroethene	ug/L (ppb)	10	6.2	102 b	66-135
Tetrachloroethene	ug/L (ppb)	10	2.9	99 b	10-226

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	10	121	105	50-154	14
Chloroethane	ug/L (ppb)	10	128	110	58-146	15
1,1-Dichloroethene	ug/L (ppb)	10	117	100	67-136	16
Methylene chloride	ug/L (ppb)	10	119	96	19-178	21 vo
trans-1,2-Dichloroethene	ug/L (ppb)	10	118	105	68-128	12
1,1-Dichloroethane	ug/L (ppb)	10	119	104	74-135	13
cis-1,2-Dichloroethene	ug/L (ppb)	10	122	105	74-136	15
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	121	104	66-129	15
1,1,1-Trichloroethane	ug/L (ppb)	10	131	115	74-142	13
Trichloroethene	ug/L (ppb)	10	117	100	67-133	16
Tetrachloroethene	ug/L (ppb)	10	110	96	76-121	14

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

107250

SAMPLE CHAIN OF CUSTODY 07-15-21

VW4/ AI4

Page # 1 of 1

Report To Marc Chalfant

Company Aspect Consulting

Address 710 2nd Ave Ste 550

City, State, ZIP Seattle, WA 98104

Phone 206-331-4606 Email mchalfant@aspectconsulting.com

SAMPLERS (signature) Dylan Bransc... Rachel C...

PROJECT NAME	PO #
Grand Street Commons	170304
REMARKS	INVOICE TO
Project specific RLs? - Yes / No	AP

TURNAROUND TIME
- ☒ Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	CVOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Sulfate EPA 300	dissolved iron EPA 6020 *	TOC SM 5310	Chloride EPA 300	RSK-175 methane ethane ethene	Notes
AC-MW-29-071421	01 A-I	7/14/21	0800	W	9					X			X	X	X	X	X	Field filtered = *
PC-SCC1-071421	02	↓	0900	↓	↓					↓			↓	↓	↓	↓	↓	
PC-SCC3-071421	03		1005															
AC-MW-22-071421	04		1105															
PC-MW-33I-071421	05		1205															
PC-MW-31I-071421	06		1255															
AC-MW-32-071421	07		1340															
AC-MW-27-071421	08	↓	1455															
URS-MW-27I-071521	09	7/15/21	1000															
URS-MW-27I-2-071521	10 ↓	↓	1010	↓	↓					↓			↓	↓	↓	↓	↓	

Friedman & Bruya, Inc.

3012 16th Avenue West

Seattle, WA 98119-2029

Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Dylan Bransc...	Dylan Branscum	Aspect	7/14/21	1530
Received by: Rachel C...	Rachel Cornwell	Aspect	7/~~15~~14/21	1530
Relinquished by: Rachel C...	Rachel Cornwell	Aspect	7/15/21	1824
Received by:	JOE MOHAMMED	F&BI	7/15/21	1824

Samples received at 2 °C

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 107250
Work Order Number: 2107260

July 28, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 10 sample(s) on 7/16/2021 for the analyses presented in the following report.

Dissolved Gases by RSK-175
Ion Chromatography by EPA Method 300.0
Total Organic Carbon by SM 5310C

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Fremont Analytical

Date: *07/28/2021*

CLIENT: Friedman & Bruya
Project: 107250
Work Order: 2107260

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2107260-001	AC-MW-29071421	07/14/2021 8:00 AM	07/16/2021 2:48 PM
2107260-002	PC-SCC1-071421	07/14/2021 9:00 AM	07/16/2021 2:48 PM
2107260-003	PC-SCC3-071421	07/14/2021 10:05 AM	07/16/2021 2:48 PM
2107260-004	AC-MW-22-071421	07/14/2021 11:05 AM	07/16/2021 2:48 PM
2107260-005	PC-MW-33I-071421	07/14/2021 12:05 PM	07/16/2021 2:48 PM
2107260-006	PC-MW-31I-071421	07/14/2021 12:55 PM	07/16/2021 2:48 PM
2107260-007	AC-MW-32-071421	07/14/2021 1:40 PM	07/16/2021 2:48 PM
2107260-008	AC-MW-27-071421	07/14/2021 2:55 PM	07/16/2021 2:48 PM
2107260-009	URS-MW-27I-1-071521	07/15/2021 10:00 AM	07/16/2021 2:48 PM
2107260-010	URS-MW-27I-2-071521	07/15/2021 10:10 AM	07/16/2021 2:48 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2107260**

Date: **7/28/2021**

CLIENT: Friedman & Bruya

Project: 107250

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Fremont Analytical

Work Order: **2107260**
Date Reported: **7/28/2021**

CLIENT: Friedman & Bruya
Project: 107250

Lab ID: 2107260-001 **Collection Date:** 7/14/2021 8:00:00 AM
Client Sample ID: **AC-MW-29071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	ND	0.00675		mg/L	1	7/26/2021 4:38:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:38:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:38:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	15.6	1.00	D	mg/L	10	7/19/2021 3:53:00 PM
Sulfate	47.8	6.00	D	mg/L	10	7/19/2021 3:53:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	2.60	0.500		mg/L	1	7/26/2021 3:23:00 PM

Lab ID: 2107260-002 **Collection Date:** 7/14/2021 9:00:00 AM
Client Sample ID: **PC-SCC1-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	ND	0.00675		mg/L	1	7/26/2021 4:43:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:43:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:43:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	29.5	1.00	D	mg/L	10	7/19/2021 4:16:00 PM
Sulfate	15.9	6.00	D	mg/L	10	7/19/2021 4:16:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	0.820	0.500		mg/L	1	7/26/2021 4:49:00 PM

CLIENT: Friedman & Bruya
Project: 107250

Lab ID: 2107260-003 **Collection Date:** 7/14/2021 10:05:00 AM
Client Sample ID: **PC-SCC3-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	0.00770	0.00675		mg/L	1	7/26/2021 4:45:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:45:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:45:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	15.4	1.00	D	mg/L	10	7/19/2021 5:25:00 PM
Sulfate	122	6.00	D	mg/L	10	7/19/2021 5:25:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	9.98	0.500		mg/L	1	7/26/2021 5:10:00 PM

Lab ID: 2107260-004 **Collection Date:** 7/14/2021 11:05:00 AM
Client Sample ID: **AC-MW-22-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	0.00952	0.00675		mg/L	1	7/26/2021 4:47:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:47:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:47:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	11.0	1.00	D	mg/L	10	7/19/2021 5:49:00 PM
Sulfate	22.7	6.00	D	mg/L	10	7/19/2021 5:49:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	1.17	0.500		mg/L	1	7/26/2021 6:32:00 PM

Analytical Report

Work Order: **2107260**
Date Reported: **7/28/2021**

CLIENT: Friedman & Bruya
Project: 107250

Lab ID: 2107260-005 **Collection Date:** 7/14/2021 12:05:00 PM
Client Sample ID: **PC-MW-33I-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68860		Analyst: MS
Methane	1.39	0.0675	D	mg/L	10	7/27/2021 2:31:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:50:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:50:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	26.9	1.00	D	mg/L	10	7/19/2021 6:12:00 PM
Sulfate	2.24	0.600		mg/L	1	7/20/2021 10:16:00 AM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	11.2	0.500		mg/L	1	7/26/2021 6:51:00 PM

Lab ID: 2107260-006 **Collection Date:** 7/14/2021 12:55:00 PM
Client Sample ID: **PC-MW-31I-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	ND	0.00675		mg/L	1	7/26/2021 4:52:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:52:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:52:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	6.93	1.00	D	mg/L	10	7/19/2021 6:35:00 PM
Sulfate	22.4	6.00	D	mg/L	10	7/19/2021 6:35:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	1.09	0.500		mg/L	1	7/26/2021 7:12:00 PM

Analytical Report

Work Order: **2107260**
Date Reported: **7/28/2021**

CLIENT: Friedman & Bruya
Project: 107250

Lab ID: 2107260-007 **Collection Date:** 7/14/2021 1:40:00 PM
Client Sample ID: **AC-MW-32-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	ND	0.00675		mg/L	1	7/26/2021 4:56:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:56:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:56:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	7.56	1.00	D	mg/L	10	7/19/2021 6:58:00 PM
Sulfate	30.2	6.00	D	mg/L	10	7/19/2021 6:58:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	2.30	0.500		mg/L	1	7/26/2021 7:33:00 PM

Lab ID: 2107260-008 **Collection Date:** 7/14/2021 2:55:00 PM
Client Sample ID: **AC-MW-27-071421** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	0.921	0.0675	D	mg/L	10	7/26/2021 5:25:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 4:59:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 4:59:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	15.6	1.00	D	mg/L	10	7/19/2021 7:21:00 PM
Sulfate	1.84	0.600		mg/L	1	7/20/2021 10:39:00 AM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	13.6	0.500		mg/L	1	7/26/2021 7:56:00 PM

Fremont Analytical

Analytical Report

Work Order: **2107260**
Date Reported: **7/28/2021**

CLIENT: Friedman & Bruya
Project: 107250

Lab ID: 2107260-009 **Collection Date:** 7/15/2021 10:00:00 AM
Client Sample ID: **URS-MW-27I-1-071521** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	ND	0.00675		mg/L	1	7/26/2021 5:03:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 5:03:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 5:03:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	16.4	1.00	D	mg/L	10	7/19/2021 7:44:00 PM
Sulfate	15.5	6.00	D	mg/L	10	7/19/2021 7:44:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	52.9	1.00	D	mg/L	2	7/27/2021 5:39:00 PM

NOTES:
20mL to 40mL

Lab ID: 2107260-010 **Collection Date:** 7/15/2021 10:10:00 AM
Client Sample ID: **URS-MW-27I-2-071521** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R68834		Analyst: MS
Methane	ND	0.00675		mg/L	1	7/26/2021 5:05:00 PM
Ethene	ND	0.0146		mg/L	1	7/26/2021 5:05:00 PM
Ethane	ND	0.0151		mg/L	1	7/26/2021 5:05:00 PM
Ion Chromatography by EPA Method 300.0				Batch ID: 33046		Analyst: SS
Chloride	16.4	1.00	D	mg/L	10	7/19/2021 8:07:00 PM
Sulfate	13.9	6.00	D	mg/L	10	7/19/2021 8:07:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R68864		Analyst: SS
Total Organic Carbon	53.7	1.00	D	mg/L	2	7/27/2021 6:02:00 PM

Date: *7/28/2021*

Work Order: 2107260
CLIENT: Friedman & Bruya
Project: 107250

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **LCS-33046** SampType: **LCS** Units: **mg/L** Prep Date: **7/19/2021** RunNo: **68687**
Client ID: **LCSW** Batch ID: **33046** Analysis Date: **7/19/2021** SeqNo: **1388651**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	0.698	0.100	0.7500	0	93.1	90	110				
Sulfate	3.52	0.600	3.750	0	94.0	90	110				

Sample ID: **MB-33046** SampType: **MBLK** Units: **mg/L** Prep Date: **7/19/2021** RunNo: **68687**
Client ID: **MBLKW** Batch ID: **33046** Analysis Date: **7/19/2021** SeqNo: **1388653**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.100									
Sulfate	ND	0.600									

Sample ID: **2107250-001BDUP** SampType: **DUP** Units: **mg/L** Prep Date: **7/19/2021** RunNo: **68687**
Client ID: **BATCH** Batch ID: **33046** Analysis Date: **7/19/2021** SeqNo: **1388655**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	151	10.0						149.1	1.13	20	D
Sulfate	ND	60.0						0		20	D

Sample ID: **2107250-001BMS** SampType: **MS** Units: **mg/L** Prep Date: **7/19/2021** RunNo: **68687**
Client ID: **BATCH** Batch ID: **33046** Analysis Date: **7/19/2021** SeqNo: **1388656**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	230	10.0	75.00	149.1	108	80	120				D
Sulfate	375	60.0	375.0	34.90	90.7	80	120				D

Work Order: 2107260
CLIENT: Friedman & Bruya
Project: 107250

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2107250-001BMSD** SampType: **MSD** Units: **mg/L** Prep Date: **7/19/2021** RunNo: **68687**
Client ID: **BATCH** Batch ID: **33046** Analysis Date: **7/19/2021** SeqNo: **1388657**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	229	10.0	75.00	149.1	107	80	120	230.4	0.522	20	D
Sulfate	378	60.0	375.0	34.90	91.6	80	120	375.0	0.929	20	D

Sample ID: **2107263-001BDUP** SampType: **DUP** Units: **mg/L** Prep Date: **7/19/2021** RunNo: **68687**
Client ID: **BATCH** Batch ID: **33046** Analysis Date: **7/19/2021** SeqNo: **1388673**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	5.08	0.100						5.074	0.0197	20	E
Sulfate	4.16	0.600						4.161	0.0962	20	

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Sample ID: **2107263-001BMS** SampType: **MS** Units: **mg/L** Prep Date: **7/19/2021** RunNo: **68687**
Client ID: **BATCH** Batch ID: **33046** Analysis Date: **7/19/2021** SeqNo: **1388674**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	5.88	0.100	0.7500	5.074	107	80	120				E
Sulfate	8.11	0.600	3.750	4.161	105	80	120				

NOTES:
E - Estimated value. The amount exceeds the linear working range of the instrument.

Date: *7/28/2021*

Work Order: 2107260
CLIENT: Friedman & Bruya
Project: 107250

QC SUMMARY REPORT

Total Organic Carbon by SM 5310C

Sample ID: **MB-R68864**	SampType: **MBLK**			Units: **mg/L**		Prep Date: **7/26/2021**			RunNo: **68864**		
Client ID: **MBLKW**	Batch ID: **R68864**					Analysis Date: **7/26/2021**			SeqNo: **1393160**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	ND	0.500									

Sample ID: **LCS-R68864**	SampType: **LCS**			Units: **mg/L**		Prep Date: **7/26/2021**			RunNo: **68864**		
Client ID: **LCSW**	Batch ID: **R68864**					Analysis Date: **7/26/2021**			SeqNo: **1393161**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	4.88	0.500	5.000	0	97.7	90.6	113				

Sample ID: **2107260-001CDUP**	SampType: **DUP**			Units: **mg/L**		Prep Date: **7/26/2021**			RunNo: **68864**		
Client ID: **AC-MW-29071421**	Batch ID: **R68864**					Analysis Date: **7/26/2021**			SeqNo: **1393163**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	2.56	0.500						2.599	1.39	20	

Sample ID: **2107260-001CMS**	SampType: **MS**			Units: **mg/L**		Prep Date: **7/26/2021**			RunNo: **68864**		
Client ID: **AC-MW-29071421**	Batch ID: **R68864**					Analysis Date: **7/26/2021**			SeqNo: **1393164**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	7.44	0.500	5.000	2.599	96.8	69.1	124				

Sample ID: **2107260-001CMSD**	SampType: **MSD**			Units: **mg/L**		Prep Date: **7/26/2021**			RunNo: **68864**		
Client ID: **AC-MW-29071421**	Batch ID: **R68864**					Analysis Date: **7/26/2021**			SeqNo: **1393165**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	7.26	0.500	5.000	2.599	93.2	69.1	124	7.439	2.45	30	

Work Order: 2107260
CLIENT: Friedman & Bruya
Project: 107250

QC SUMMARY REPORT

Dissolved Gases by RSK-175

Sample ID: **LCS-R68834** SampType: **LCS** Units: **mg/L** Prep Date: **7/26/2021** RunNo: **68834**
Client ID: **LCSW** Batch ID: **R68834** Analysis Date: **7/26/2021** SeqNo: **1392356**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	909	0.00675	1,000	0	90.9	66.7	141				
Ethene	921	0.0146	1,000	0	92.1	68.6	139				
Ethane	925	0.0151	1,000	0	92.5	69.3	136				

Sample ID: **MB-R68834** SampType: **MBLK** Units: **mg/L** Prep Date: **7/26/2021** RunNo: **68834**
Client ID: **MBLKW** Batch ID: **R68834** Analysis Date: **7/26/2021** SeqNo: **1392357**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00675									
Ethene	ND	0.0146									
Ethane	ND	0.0151									

Sample ID: **2107260-001AREP** SampType: **REP** Units: **mg/L** Prep Date: **7/26/2021** RunNo: **68834**
Client ID: **AC-MW-29071421** Batch ID: **R68834** Analysis Date: **7/26/2021** SeqNo: **1392338**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00675						0		30	
Ethene	ND	0.0146						0		30	
Ethane	ND	0.0151						0		30	

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**2107260**
Logged by:	**Gabrielle Coeuille**	Date Received:	**7/16/2021 2:48:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >2°C to 6°C *	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☑	NA ☐
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified:		Date:	
By Whom:		Via:	☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:			
Client Instructions:			

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample 1	0.9

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Original

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2107260

Page # 1 of 1

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER	Fremont
PROJECT NAME/NO. 107250	PO # B-325
REMARKS Please Email Results	

TURNAROUND TIME

- X Standard TAT
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL

- ☐ Dispose after 30 days
- ☐ Return samples
- ☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Sulfate EPA 300	TOC SM 5310	Chloride EPA 300	RSK-175 methane, ethane, ethene							Notes
AC-MW-29-071421		7/14/21	0800	W	5	X	X	X	X							
PC-SCC1-071421			0900													
PC-SCC3-071421			1005													
AC-MW-22-071421			1105													
PC-MW-33I-071421			1205													
PC-MW-31I-071421			1255													
AC-MW-32-071421			1340													
AC-MW-27-071421			1455													
VRS-MW-27I-1-071521		7/15/21	1000													
VRS-MW-27I-2-071521			1010													

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: [signature]	Ann Webber-Bruya	Friedman & Bruya	7/16/21	1447
Received by: [signature]	Justine Mantz	FAI	7/16/21	1448
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

July 26, 2021

Marc Chalfant, Project Manager
Aspect Consulting, LLC
350 Madison Ave. N.
Bainbridge Island, WA 98110-1810

Dear Mr Chalfant:

Included are the results from the testing of material submitted on July 16, 2021 from the Grand St Commons 170304, F&BI 107272 project. There are 21 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0726R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on July 16, 2021 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Grand St Commons 170304, F&BI 107272 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
107272 -01	AC-MW-31-071521
107272 -02	AC-MW-18-071521
107272 -03	AC-MW-10-071521
107272 -04	AC-MW-16-071521
107272 -05	AC-MW-20-071621
107272 -06	URS-MW-28I-1-071621
107272 -07	URS-MW-28I-2-071621
107272 -08	AC-MW-12-071621
107272 -09	AC-SB-13-1-071621
107272 -10	AC-SB-13-2-071621

Samples AC-MW-31-071521, AC-MW-18-071521, AC-MW-10-071521, AC-MW-16-071521, AC-MW-20-071621, URS-MW-28I-1-071621, AC-MW-12-071621, and AC-SB-13-1-071621 were sent to Fremont Analytical for sulfate analysis. The report will be forwarded upon receipt.

All quality control requirements were acceptable.

Date of Report: 07/26/21
Date Received: 07/16/21
Project: Grand St Commons 170304, F&BI 107272
Date Extracted: 07/21/21
Date Analyzed: 07/21/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx
Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 52-124)
AC-MW-31-071521 107272-01 1/40	760	1,100	400	1,700	14,000	76
AC-MW-18-071521 107272-02 1/5	120	64	220	940	7,900	83
AC-MW-10-071521 107272-03 1/5	46	44	140	790	7,100	84
AC-MW-16-071521 107272-04	<1	4.6	1.4	7.2	1,000	79
AC-MW-20-071621 107272-05	<1	<1	<1	<3	<100	79
AC-SB-13-1-071621 107272-09	<1	<1	<1	<3	<100	77
AC-SB-13-2-071621 107272-10	<1	<1	<1	<3	<100	77
Method Blank 01-1650 MB	<1	<1	<1	<3	<100	77

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 07/26/21
Date Received: 07/16/21
Project: Grand St Commons 170304, F&BI 107272
Date Extracted: 07/19/21
Date Analyzed: 07/19/21 and 07/21/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
AC-MW-31-071521 107272-01	1,300 x	<250	88
AC-MW-18-071521 107272-02	4,100 x	410 x	103
AC-MW-10-071521 107272-03	3,000 x	<250	96
AC-MW-16-071521 107272-04	280 x	<250	112
AC-MW-20-071621 107272-05	<50	<250	95
AC-SB-13-1-071621 107272-09	850 x	<250	93
AC-SB-13-2-071621 107272-10	830 x	<250	93
Method Blank 01-1675 MB	<50	<250	92

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-31-071521	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-01
Date Analyzed:	07/23/21	Data File:	107272-01.070
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	1,050

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-18-071521	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-02 x10
Date Analyzed:	07/23/21	Data File:	107272-02 x10.047
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	937

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-10-071521	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-03 x2
Date Analyzed:	07/23/21	Data File:	107272-03 x2.071
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	350

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-16-071521	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-04
Date Analyzed:	07/23/21	Data File:	107272-04.072
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	125

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-20-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-05
Date Analyzed:	07/23/21	Data File:	107272-05.073
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	144

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	URS-MW-28I-1-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-06
Date Analyzed:	07/23/21	Data File:	107272-06.074
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	68.4

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-12-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-08 x2
Date Analyzed:	07/23/21	Data File:	107272-08 x2.075
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	196

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-SB-13-1-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-09 x2
Date Analyzed:	07/23/21	Data File:	107272-09 x2.076
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	340

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	I1-444 mb
Date Analyzed:	07/21/21	Data File:	I1-444 mb.094
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	<50

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	URS-MW-28I-1-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-06
Date Analyzed:	07/21/21	Data File:	072109.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	98	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	0.72

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	URS-MW-28I-2-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-07
Date Analyzed:	07/21/21	Data File:	072110.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	0.76

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	AC-MW-12-071621	Client:	Aspect Consulting, LLC
Date Received:	07/16/21	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	107272-08
Date Analyzed:	07/21/21	Data File:	072111.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	1.8

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Grand St Commons 170304
Date Extracted:	07/21/21	Lab ID:	01-1598 mb
Date Analyzed:	07/21/21	Data File:	072108.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	<0.4

Date of Report: 07/26/21
Date Received: 07/16/21
Project: Grand St Commons 170304, F&BI 107272

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES, AND TPH AS GASOLINE USING EPA METHOD 8021B AND NWTPH-Gx

Laboratory Code: 107303-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	92	65-118
Toluene	ug/L (ppb)	50	98	72-122
Ethylbenzene	ug/L (ppb)	50	96	73-126
Xylenes	ug/L (ppb)	150	93	74-118
Gasoline	ug/L (ppb)	1,000	94	69-134

Date of Report: 07/26/21
Date Received: 07/16/21
Project: Grand St Commons 170304, F&BI 107272

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	96	96	63-142	0

Date of Report: 07/26/21
Date Received: 07/16/21
Project: Grand St Commons 170304, F&BI 107272

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR DISSOLVED METALS USING EPA METHOD 6020B**

Laboratory Code: 107272-02 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Iron	ug/L (ppb)	100	937	102	107	75-125	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Iron	ug/L (ppb)	100	95	80-120

Date of Report: 07/26/21
Date Received: 07/16/21
Project: Grand St Commons 170304, F&BI 107272

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260D SIM

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
1,4-Dioxane	ug/L (ppb)	2	98	94	70-130	4

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

107272

SAMPLE CHAIN OF CUSTODY

ME 7/16/21

VW3 AI4 E03

Page # 1 of 1

Report To Marc Chalfant

Company Aspect Consulting

Address 710 2nd Ave Ste 550

City, State, ZIP Seattle, WA 98104

Phone 206-331-4606 Email mchalfant@aspectconsulting.com

SAMPLERS (signature) Rachel C	
PROJECT NAME Grand St Commons	PO # 170304
REMARKS	INVOICE TO AP
Project specific RLs? - Yes / No	

TURNAROUND TIME
- X Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	sulfate EPA 300.0	Iron (dissolved) EPA 6020 *	1,4-dioxane 8260 SIM		Notes: AA = ascorbic acid (additive in field); 1mL AA added/VOA; 1mL AA added/Amb
AC-MW-31-071521	01 A→F	7/15/21	1204	W	6	X	X	X					X	X			* Field Filtered
AC-MW-18-071521	02		1310			X	X	X					X	X			1.7mL AA added/VOA 20mL AA added to amb
AC-MW-10-071521	03		1615			X	X	X					X	X			1mL AA/VOA 1mL AA/Amber
AC-MW-16-071521	04		1725			X	X	X					X	X			
AC-MW-20-071621	05	7/16/21	1220			X	X	X					X	X			
URS-MW-28I-1-071621	06 A→E		1340		5								X	X	X		1mL AA/VOA
URS-MW-28I-2-071621	07 A→C		1340		3										X		
AC-MW-12-071621	08 A→E		1605		5								X	X	X		
AC-SB-13-1-071621	09 A→F		1720		6	X	X	X					X	X			1mL AA/VOA 1mL AA/Amber
AC-SB-13-2-071621	10 A→D		1730		4	X	X	X									

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Rachel C	Rachel Cornwell	Aspect	7/16/21	1841
Received by:	JOE MOHAMMED	F&BI	7/16/21	1841
Relinquished by:				
Received by:		Samples received at 2 °C		

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 107272
Work Order Number: 2107289

July 26, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 8 sample(s) on 7/19/2021 for the analyses presented in the following report.

Ion Chromatography by EPA Method 300.0

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Date: *07/26/2021*

CLIENT:	Friedman & Bruya
Project:	107272
Work Order:	2107289

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2107289-001	AC-MW-31-071521	07/15/2021 12:04 PM	07/19/2021 2:28 PM
2107289-002	AC-MW-18-071521	07/15/2021 1:10 PM	07/19/2021 2:28 PM
2107289-003	AC-MW-10-071521	07/15/2021 4:15 PM	07/19/2021 2:28 PM
2107289-004	AC-MW-16-071521	07/15/2021 5:25 PM	07/19/2021 2:28 PM
2107289-005	AC-MW-20-071621	07/16/2021 12:20 PM	07/19/2021 2:28 PM
2107289-006	URS-MW-28I-1-071621	07/16/2021 1:40 PM	07/19/2021 2:28 PM
2107289-007	AC-MW-12-071621	07/16/2021 4:05 PM	07/19/2021 2:28 PM
2107289-008	AC-SB-13-1-071621	07/16/2021 5:20 PM	07/19/2021 2:28 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2107289**

Date: **7/26/2021**

CLIENT: Friedman & Bruya

Project: 107272

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **2107289**
Date Reported: **7/26/2021**

CLIENT: Friedman & Bruya
Project: 107272

Lab ID: 2107289-001 **Collection Date:** 7/15/2021 12:04:00 PM
Client Sample ID: **AC-MW-31-071521** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	12.1	6.00	D	mg/L	10	7/22/2021 4:06:00 PM

Lab ID: 2107289-002 **Collection Date:** 7/15/2021 1:10:00 PM
Client Sample ID: **AC-MW-18-071521** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	1,490	120	D	mg/L	200	7/23/2021 6:51:00 PM

Lab ID: 2107289-003 **Collection Date:** 7/15/2021 4:15:00 PM
Client Sample ID: **AC-MW-10-071521** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	492	60.0	D	mg/L	100	7/23/2021 7:14:00 PM

Lab ID: 2107289-004 **Collection Date:** 7/15/2021 5:25:00 PM
Client Sample ID: **AC-MW-16-071521** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	13.9	6.00	D	mg/L	10	7/22/2021 7:11:00 PM

Analytical Report

Work Order: **2107289**
Date Reported: **7/26/2021**

CLIENT: Friedman & Bruya
Project: 107272

Lab ID: 2107289-005 **Collection Date:** 7/16/2021 12:20:00 PM
Client Sample ID: **AC-MW-20-071621** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	31.9	6.00	D	mg/L	10	7/22/2021 7:34:00 PM

Lab ID: 2107289-006 **Collection Date:** 7/16/2021 1:40:00 PM
Client Sample ID: **URS-MW-28I-1-071621** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	39.1	6.00	D	mg/L	10	7/22/2021 7:57:00 PM

Lab ID: 2107289-007 **Collection Date:** 7/16/2021 4:05:00 PM
Client Sample ID: **AC-MW-12-071621** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	1,620	120	D	mg/L	200	7/23/2021 7:37:00 PM

Lab ID: 2107289-008 **Collection Date:** 7/16/2021 5:20:00 PM
Client Sample ID: **AC-SB-13-1-071621** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33096		Analyst: SS
Sulfate	392	60.0	D	mg/L	100	7/23/2021 8:00:00 PM

Fremont Analytical

Date: *7/26/2021*

Work Order: 2107289
CLIENT: Friedman & Bruya
Project: 107272

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-33096**	SampType: **MBLK**			Units: **mg/L**		Prep Date: **7/22/2021**			RunNo: **68791**		
Client ID: **MBLKW**	Batch ID: **33096**					Analysis Date: **7/22/2021**			SeqNo: **1391118**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	0.600									

Sample ID: **LCS-33096**	SampType: **LCS**			Units: **mg/L**		Prep Date: **7/22/2021**			RunNo: **68791**		
Client ID: **LCSW**	Batch ID: **33096**					Analysis Date: **7/22/2021**			SeqNo: **1391119**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	3.72	0.600	3.750	0	99.3	90	110				

Sample ID: **2107333-002BDUP**	SampType: **DUP**			Units: **mg/L**		Prep Date: **7/22/2021**			RunNo: **68791**		
Client ID: **BATCH**	Batch ID: **33096**					Analysis Date: **7/22/2021**			SeqNo: **1391124**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	256	120						155.6	48.9	20	D

Sample ID: **2107333-002BMS**	SampType: **MS**			Units: **mg/L**		Prep Date: **7/22/2021**			RunNo: **68791**		
Client ID: **BATCH**	Batch ID: **33096**					Analysis Date: **7/22/2021**			SeqNo: **1391125**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	929	120	750.0	155.6	103	80	120				D

Sample ID: **2107289-001ADUP**	SampType: **DUP**			Units: **mg/L**		Prep Date: **7/22/2021**			RunNo: **68791**		
Client ID: **AC-MW-31-071521**	Batch ID: **33096**					Analysis Date: **7/22/2021**			SeqNo: **1391129**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	12.3	6.00						12.12	1.80	20	D

Date: *7/26/2021*

Work Order: 2107289
CLIENT: Friedman & Bruya
Project: 107272

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2107289-001AMS** SampType: **MS** Units: **mg/L** Prep Date: **7/22/2021** RunNo: **68791**
Client ID: **AC-MW-31-071521** Batch ID: **33096** Analysis Date: **7/22/2021** SeqNo: **1391130**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	47.4	6.00	37.50	12.12	94.1	80	120				D

Sample ID: **2107289-001AMSD** SampType: **MSD** Units: **mg/L** Prep Date: **7/22/2021** RunNo: **68791**
Client ID: **AC-MW-31-071521** Batch ID: **33096** Analysis Date: **7/22/2021** SeqNo: **1391131**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	47.4	6.00	37.50	12.12	94.0	80	120	47.42	0.105	20	D

Fremont Analytical

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**2107289**
Logged by:	**Gabrielle Coeuille**	Date Received:	**7/19/2021 2:28:00 PM**

Chain of Custody

	Question	Yes	No	NA / Not Present
1.	Is Chain of Custody complete?	Yes ✔	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

	Question	Yes	No	NA / Not Present
3.	Coolers are present?	Yes ✔	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ✔	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Present ✔
6.	Was an attempt made to cool the samples?	Yes ✔	No ☐	NA ☐
7.	Were all items received at a temperature of >2°C to 6°C *	Yes ✔	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ✔	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ✔	No ☐	
10.	Are samples properly preserved?	Yes ✔	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ✔	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ✔
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ✔	No ☐	
14.	Does paperwork match bottle labels?	Yes ✔	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ✔	No ☐	
16.	Is it clear what analyses were requested?	Yes ✔	No ☐	
17.	Were all holding times able to be met?	Yes ✔	No ☐	

Special Handling (if applicable)

	Question	Yes	No	NA
18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ✔

Person Notified: ______ Date: ______

By Whom: ______ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: ______

Client Instructions: ______

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample 1	0.4

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

2107284

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTER Fremont

PROJECT NAME/NO.	PO #
107272	B-335

REMARKS

Please Email Results

Page # 1 of 1

TURNAROUND TIME
- ☒ Standard (2 Weeks)
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Dispose after 30 days
- ☐ Return samples
- ☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Nitrate	Sulfate	Alkalinity	TOC-9060M				Notes
AC-MW-31-071521		7/15/21	1204	W	1					X						
AC-MW-18-071521			1310							X						
AC-MW-10-071521			1615							X						
AC-MW-16-071521			1725							X						
AC-MW-20-071621		7/16/21	1220							X						
URS-MW-28I-1-071621			1340							X						
AC-MW-12-071621			1605							X						
AC-SB-13-1-071621			1720							X						

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: [signature]	Ann Webber-Bruya	Friedman and Bruya	7/19/21	1425
Received by: [signature]	Justine Martz	FAI	7/19/21	14:28
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

August 19, 2021

Marc Chalfant, Project Manager
Aspect Consulting, LLC
350 Madison Ave. N.
Bainbridge Island, WA 98110-1810

Dear Mr Chalfant:

Included are the results from the testing of material submitted on August 11, 2021 from the Grand Street Commons 170304, F&BI 108180 project. There are 27 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0819R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on August 11, 2021 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Grand Street Commons 170304, F&BI 108180 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
108180 -01	AC-MW-27-081021
108180 -02	AC-MW-32-1-081021
108180 -03	AC-MW-32-2-081021
108180 -04	URS-MW-27I-081021
108180 -05	PC-MW-31I-081021
108180 -06	PC-MW-33I-081021
108180 -07	AC-MW-22-081021
108180 -08	PC-SCC1-081021
108180 -09	AC-MW-29-081021
108180 -10	PC-SCC3-081021

The samples were sent to Fremont Analytical for sulfate, chloride, and TOC analyses. The report will be forwarded upon receipt.

All quality control requirements were acceptable.

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-27-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-01 x50
Date Analyzed:	08/16/21	Data File:	108180-01 x50.043
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	AP

Analyte:	Concentration ug/L (ppb)
Iron	11,600

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-32-1-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-02
Date Analyzed:	08/12/21	Data File:	108180-02.134
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	3,190

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-32-2-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-03
Date Analyzed:	08/12/21	Data File:	108180-03.135
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	3,210

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	URS-MW-27I-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-04
Date Analyzed:	08/12/21	Data File:	108180-04.136
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	4,340

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-MW-31I-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-05
Date Analyzed:	08/12/21	Data File:	108180-05.143
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	70.7

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-MW-33I-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-06 x50
Date Analyzed:	08/16/21	Data File:	108180-06 x50.044
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	AP

Analyte:	Concentration ug/L (ppb)
Iron	14,300

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-22-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-07
Date Analyzed:	08/12/21	Data File:	108180-07.145
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	107

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-SCC1-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-08
Date Analyzed:	08/12/21	Data File:	108180-08.146
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	64.8

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-29-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-09
Date Analyzed:	08/12/21	Data File:	108180-09.147
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	114

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	PC-SCC3-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-10
Date Analyzed:	08/12/21	Data File:	108180-10.155
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	121

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	I1-491 mb
Date Analyzed:	08/12/21	Data File:	I1-491 mb.072
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	<50

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-27-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-01
Date Analyzed:	08/12/21	Data File:	081216.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	14
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-32-1-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-02
Date Analyzed:	08/12/21	Data File:	081227.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	1.0
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	7.5
Tetrachloroethene	21

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-32-2-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-03
Date Analyzed:	08/12/21	Data File:	081228.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	1.1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	7.2
Tetrachloroethene	21

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	URS-MW-27I-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-04
Date Analyzed:	08/12/21	Data File:	081226.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	101	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.7
Tetrachloroethene	21

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-MW-31I-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-05
Date Analyzed:	08/12/21	Data File:	081218.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	3.1
Tetrachloroethene	7.5

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-MW-33I-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-06
Date Analyzed:	08/12/21	Data File:	081215.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	1.9
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.2
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-22-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-07
Date Analyzed:	08/12/21	Data File:	081219.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.4
Tetrachloroethene	7.8

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-SCC1-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-08
Date Analyzed:	08/12/21	Data File:	081229.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	101	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	30

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-29-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-09
Date Analyzed:	08/12/21	Data File:	081220.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	2.8
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	9.3

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	AC-MW-29-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-09 1/10
Date Analyzed:	08/12/21 20:47	Data File:	081236.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Tetrachloroethene	260

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	PC-SCC3-081021	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	108180-10
Date Analyzed:	08/12/21	Data File:	081217.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	2.0
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	6.8
Tetrachloroethene	3.3

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Grand Street Commons 170304, F&BI 108180
Date Extracted:	08/12/21	Lab ID:	01-1836 mb
Date Analyzed:	08/12/21	Data File:	081205.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	WE

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	78	126
Toluene-d8	97	87	115
4-Bromofluorobenzene	102	92	112

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

Date of Report: 08/19/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108180

QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR DISSOLVED METALS USING EPA METHOD 6020B

Laboratory Code: 108180-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Iron	ug/L (ppb)	100	10,800	0 b	0 b	75-125	0 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Iron	ug/L (ppb)	100	100	80-120

Date of Report: 08/19/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108180

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260D

Laboratory Code: 108180-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Vinyl chloride	ug/L (ppb)	10	<0.2	103	36-166
Chloroethane	ug/L (ppb)	10	<1	118	46-160
1,1-Dichloroethene	ug/L (ppb)	10	<1	105	58-142
Methylene chloride	ug/L (ppb)	10	<5	119	50-145
trans-1,2-Dichloroethene	ug/L (ppb)	10	<1	103	61-136
1,1-Dichloroethane	ug/L (ppb)	10	<1	99	63-135
cis-1,2-Dichloroethene	ug/L (ppb)	10	14	113 b	63-134
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	<1	101	48-149
1,1,1-Trichloroethane	ug/L (ppb)	10	<1	104	60-146
Trichloroethene	ug/L (ppb)	10	<1	100	66-135
Tetrachloroethene	ug/L (ppb)	10	<1	99	10-226

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	10	101	98	50-154	3
Chloroethane	ug/L (ppb)	10	114	113	58-146	1
1,1-Dichloroethene	ug/L (ppb)	10	100	101	67-136	1
Methylene chloride	ug/L (ppb)	10	97	116	19-178	18
trans-1,2-Dichloroethene	ug/L (ppb)	10	102	102	68-128	0
1,1-Dichloroethane	ug/L (ppb)	10	100	99	74-135	1
cis-1,2-Dichloroethene	ug/L (ppb)	10	105	107	74-136	2
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	100	101	66-129	1
1,1,1-Trichloroethane	ug/L (ppb)	10	104	102	74-142	2
Trichloroethene	ug/L (ppb)	10	99	97	67-133	2
Tetrachloroethene	ug/L (ppb)	10	100	102	76-121	2

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

108180

SAMPLE CHAIN OF CUSTODY

ME 8/11/21

AI5 VW3

Page # 1 of 1

Report To Marc Chalfant

Company Aspect consulting

Address 710 2nd Ave Ste 550

City, State, ZIP Seattle, WA 98104

Phone 206-331-4606 Email mchalfant@aspectconsulting.com

SAMPLERS (signature) Rachel C	
PROJECT NAME Grand Street Commons	PO # 170304
REMARKS Project specific RLs? - Yes / No	INVOICE TO AP

TURNAROUND TIME
X Standard turnaround
☐ RUSH
Rush charges authorized by:
SAMPLE DISPOSAL
☐ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	CVOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Sulfate EPA 300	Dissolved Iron EPA 6020 *	TOC SM 5310	Chloride EPA 300	RSK-175 methane ethane ethene	Notes
AC-MW-27-081021	01 A-I	8/10/21	0820	W	9					X			X	X	X	X	X	* Field Filtered
AC-MW-32-1-081021	02		1130															
AC-MW-32-2-081021	03		1120															
URS-MW-27I-081021	04		1025															
PC-MW-31I-081021	05		1235															
PC-MW-33I-081021	06		1335															
AC-MW-22-081021	07		1440															
PC-SCC1-081021	08		1555															
AC-MW-29-081021	09		1720															
PC-SCC3-081021	10		1825															

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Rachel C	Rachel Cornwell	Aspect	8/11/21	1824
Received by: [signature]	JOE MOHAMMED	FBI	8/11/21	1824
Relinquished by:				
Received by:	Samples received at 2 °C			

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 108180
Work Order Number: 2108172

August 19, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 10 sample(s) on 8/12/2021 for the analyses presented in the following report.

Dissolved Gases by RSK-175
Ion Chromatography by EPA Method 300.0
Total Organic Carbon by SM 5310C

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Date: *08/19/2021*

CLIENT:	Friedman & Bruya
Project:	108180
Work Order:	2108172

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2108172-001	AC-MW-27-081021	08/10/2021 8:20 AM	08/12/2021 1:30 PM
2108172-002	AC-MW-32-1-081021	08/10/2021 11:30 AM	08/12/2021 1:30 PM
2108172-003	AC-MW-32-2-081021	08/10/2021 11:20 AM	08/12/2021 1:30 PM
2108172-004	URS-MW-27I-081021	08/10/2021 10:25 AM	08/12/2021 1:30 PM
2108172-005	PC-MW-31I-081021	08/10/2021 12:35 PM	08/12/2021 1:30 PM
2108172-006	PC-MW-33I-081021	08/10/2021 1:35 PM	08/12/2021 1:30 PM
2108172-007	AC-MW-22-081021	08/10/2021 2:40 PM	08/12/2021 1:30 PM
2108172-008	PC-SCCI-081021	08/10/2021 3:55 PM	08/12/2021 1:30 PM
2108172-009	AC-MW-29-081021	08/10/2021 5:20 PM	08/12/2021 1:30 PM
2108172-010	PC-SCC3-081021	08/10/2021 6:25 PM	08/12/2021 1:30 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Original

CLIENT: Friedman & Bruya

Project: 108180

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Collection Date: 8/10/2021 8:20:00 AM
Project: 108180
Lab ID: 2108172-001
Matrix: Water
Client Sample ID: AC-MW-27-081021

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	2.50	0.0675	D	mg/L	10	8/18/2021 11:46:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 10:58:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 10:58:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	17.1	1.00	D	mg/L	10	8/18/2021 12:39:00 PM
Sulfate	1.86	0.600		mg/L	1	8/18/2021 2:57:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	6.98	0.500		mg/L	1	8/18/2021 6:27:00 PM

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Collection Date: 8/10/2021 11:30:00 AM
Project: 108180
Lab ID: 2108172-002
Matrix: Water
Client Sample ID: AC-MW-32-1-081021

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	0.0109	0.00675		mg/L	1	8/18/2021 11:00:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:00:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:00:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	15.3	1.00	D	mg/L	10	8/17/2021 4:24:00 PM
Sulfate	5.38	0.600		mg/L	1	8/18/2021 1:02:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	11.4	0.500		mg/L	1	8/18/2021 7:56:00 PM

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Project: 108180
Lab ID: 2108172-003
Client Sample ID: **AC-MW-32-2-081021**

Collection Date: 8/10/2021 11:20:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	ND	0.00675		mg/L	1	8/18/2021 11:02:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:02:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:02:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	15.3	1.00	D	mg/L	10	8/17/2021 4:47:00 PM
Sulfate	4.85	0.600		mg/L	1	8/18/2021 1:25:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	10.6	0.500		mg/L	1	8/18/2021 8:19:00 PM

Fremont Analytical

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Project: 108180
Lab ID: 2108172-004
Client Sample ID: URS-MW-27I-081021

Collection Date: 8/10/2021 10:25:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	0.0961	0.00675		mg/L	1	8/18/2021 11:05:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:05:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:05:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	17.5	1.00	D	mg/L	10	8/17/2021 7:05:00 PM
Sulfate	1.23	0.600		mg/L	1	8/18/2021 1:48:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	20.1	0.500		mg/L	1	8/18/2021 9:35:00 PM

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Project: 108180
Lab ID: 2108172-005
Client Sample ID: **PC-MW-31I-081021**

Collection Date: 8/10/2021 12:35:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	ND	0.00675		mg/L	1	8/18/2021 11:07:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:07:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:07:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	6.79	1.00	D	mg/L	10	8/17/2021 7:28:00 PM
Sulfate	21.8	6.00	D	mg/L	10	8/17/2021 7:28:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	0.950	0.500		mg/L	1	8/18/2021 10:07:00 PM

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Project: 108180
Lab ID: 2108172-006
Client Sample ID: **PC-MW-33I-081021**

Collection Date: 8/10/2021 1:35:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	1.55	0.0675	D	mg/L	10	8/18/2021 11:49:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:10:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:10:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	27.5	1.00	D	mg/L	10	8/17/2021 7:52:00 PM
Sulfate	7.00	1.20	D	mg/L	2	8/18/2021 2:11:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	9.69	0.500		mg/L	1	8/18/2021 10:27:00 PM

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Collection Date: 8/10/2021 2:40:00 PM
Project: 108180
Lab ID: 2108172-007
Matrix: Water
Client Sample ID: AC-MW-22-081021

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	0.0118	0.00675		mg/L	1	8/18/2021 11:15:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:15:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:15:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	10.9	1.00	D	mg/L	10	8/17/2021 8:15:00 PM
Sulfate	20.0	6.00	D	mg/L	10	8/17/2021 8:15:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	1.22	0.500		mg/L	1	8/18/2021 10:48:00 PM

Fremont Analytical

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Collection Date: 8/10/2021 3:55:00 PM
Project: 108180
Lab ID: 2108172-008
Matrix: Water
Client Sample ID: PC-SCCI-081021

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	ND	0.00675		mg/L	1	8/18/2021 11:17:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:17:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:17:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	29.5	2.00	D	mg/L	20	8/18/2021 2:34:00 PM
Sulfate	18.4	6.00	D	mg/L	10	8/17/2021 8:38:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	0.808	0.500		mg/L	1	8/18/2021 11:19:00 PM

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Project: 108180
Lab ID: 2108172-009
Client Sample ID: **AC-MW-29-081021**

Collection Date: 8/10/2021 5:20:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	ND	0.00675		mg/L	1	8/18/2021 11:19:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:19:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:19:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	16.1	1.00	D	mg/L	10	8/17/2021 9:01:00 PM
Sulfate	50.4	6.00	D	mg/L	10	8/17/2021 9:01:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	2.48	0.500		mg/L	1	8/18/2021 11:37:00 PM

Fremont Analytical

Analytical Report

Work Order: **2108172**
Date Reported: **8/19/2021**

Client: Friedman & Bruya
Collection Date: 8/10/2021 6:25:00 PM
Project: 108180
Lab ID: 2108172-010
Matrix: Water
Client Sample ID: PC-SCC3-081021

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Gases by RSK-175				Batch ID: R69334		Analyst: SLA
Methane	0.00940	0.00675		mg/L	1	8/18/2021 11:23:00 AM
Ethene	ND	0.0146		mg/L	1	8/18/2021 11:23:00 AM
Ethane	ND	0.0151		mg/L	1	8/18/2021 11:23:00 AM
Ion Chromatography by EPA Method 300.0				Batch ID: 33389		Analyst: SS
Chloride	16.0	1.00	D	mg/L	10	8/17/2021 9:24:00 PM
Sulfate	123	6.00	D	mg/L	10	8/17/2021 9:24:00 PM
Total Organic Carbon by SM 5310C				Batch ID: R69344		Analyst: SS
Total Organic Carbon	9.83	0.500		mg/L	1	8/18/2021 11:59:00 PM

Fremont Analytical

Date: *8/19/2021*

Work Order: 2108172
CLIENT: Friedman & Bruya
Project: 108180

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-33389**	SampType: **MBLK**				Units: **mg/L**		Prep Date: **8/17/2021**		RunNo: **69355**		
Client ID: **MBLKW**	Batch ID: **33389**						Analysis Date: **8/17/2021**		SeqNo: **1405422**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.100									
Sulfate	ND	0.600									

Sample ID: **2108172-003ADUP**	SampType: **DUP**				Units: **mg/L**		Prep Date: **8/17/2021**		RunNo: **69355**		
Client ID: **AC-MW-32-2-081021**	Batch ID: **33389**						Analysis Date: **8/17/2021**		SeqNo: **1405427**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	15.5	1.00						15.33	1.36	20	D
Sulfate	6.18	6.00						6.130	0.812	20	D

Sample ID: **2108172-003AMS**	SampType: **MS**				Units: **mg/L**		Prep Date: **8/17/2021**		RunNo: **69355**		
Client ID: **AC-MW-32-2-081021**	Batch ID: **33389**						Analysis Date: **8/17/2021**		SeqNo: **1405428**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	23.4	1.00	7.500	15.33	107	80	120				D
Sulfate	40.5	6.00	37.50	6.130	91.7	80	120				D

Sample ID: **2108172-003AMSD**	SampType: **MSD**				Units: **mg/L**		Prep Date: **8/17/2021**		RunNo: **69355**		
Client ID: **AC-MW-32-2-081021**	Batch ID: **33389**						Analysis Date: **8/17/2021**		SeqNo: **1405429**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	23.6	1.00	7.500	15.33	111	80	120	23.39	1.06	20	D
Sulfate	41.6	6.00	37.50	6.130	94.5	80	120	40.52	2.56	20	D

Fremont Analytical

Date: *8/19/2021*

Work Order: 2108172
CLIENT: Friedman & Bruya
Project: 108180

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **LCSRR-33389** SampType: **LCS** Units: **mg/L** Prep Date: **8/18/2021** RunNo: **69355**
Client ID: **LCSW** Batch ID: **33389** Analysis Date: **8/18/2021** SeqNo: **1405443**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	0.695	0.100	0.7500	0	92.7	90	110				
Sulfate	3.55	0.600	3.750	0	94.7	90	110				

Fremont Analytical

Date: *8/19/2021*

Work Order: 2108172
CLIENT: Friedman & Bruya
Project: 108180

QC SUMMARY REPORT

Total Organic Carbon by SM 5310C

Sample ID: **MB-R69344** | SampType: **MBLK** | Units: **mg/L** | Prep Date: **8/18/2021** | RunNo: **69344**
Client ID: **MBLKW** | Batch ID: **R69344** | Analysis Date: **8/18/2021** | SeqNo: **1405198**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	ND	0.500									

Sample ID: **LCS-R69344** | SampType: **LCS** | Units: **mg/L** | Prep Date: **8/18/2021** | RunNo: **69344**
Client ID: **LCSW** | Batch ID: **R69344** | Analysis Date: **8/18/2021** | SeqNo: **1405199**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	4.73	0.500	5.000	0	94.6	93.1	106				

Sample ID: **2108172-001BDUP** | SampType: **DUP** | Units: **mg/L** | Prep Date: **8/18/2021** | RunNo: **69344**
Client ID: **AC-MW-27-081021** | Batch ID: **R69344** | Analysis Date: **8/18/2021** | SeqNo: **1405201**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	7.05	0.500						6.976	1.03	20	

Sample ID: **2108172-001BMS** | SampType: **MS** | Units: **mg/L** | Prep Date: **8/18/2021** | RunNo: **69344**
Client ID: **AC-MW-27-081021** | Batch ID: **R69344** | Analysis Date: **8/18/2021** | SeqNo: **1405202**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	11.6	0.500	5.000	6.976	91.5	69.1	124				

Sample ID: **2108172-001BMSD** | SampType: **MSD** | Units: **mg/L** | Prep Date: **8/18/2021** | RunNo: **69344**
Client ID: **AC-MW-27-081021** | Batch ID: **R69344** | Analysis Date: **8/18/2021** | SeqNo: **1405203**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	11.5	0.500	5.000	6.976	91.4	69.1	124	11.55	0.0433	30	

Date: *8/19/2021*

Work Order: 2108172
CLIENT: Friedman & Bruya
Project: 108180

QC SUMMARY REPORT

Dissolved Gases by RSK-175

Sample ID: **LCS-R69334** | SampType: **LCS** | Units: **mg/L** | Prep Date: **8/18/2021** | RunNo: **69334**
Client ID: **LCSW** | Batch ID: **R69334** | Analysis Date: **8/18/2021** | SeqNo: **1404960**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	965	0.00675	1,000	0	96.5	66.7	141				
Ethene	973	0.0146	1,000	0	97.3	68.6	139				
Ethane	985	0.0151	1,000	0	98.5	69.3	136				

Sample ID: **MB-R69334** | SampType: **MBLK** | Units: **mg/L** | Prep Date: **8/18/2021** | RunNo: **69334**
Client ID: **MBLKW** | Batch ID: **R69334** | Analysis Date: **8/18/2021** | SeqNo: **1404961**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00675									
Ethene	ND	0.0146									
Ethane	ND	0.0151									

Sample ID: **2108192-002DREP** | SampType: **REP** | Units: **mg/L** | Prep Date: **8/18/2021** | RunNo: **69334**
Client ID: **BATCH** | Batch ID: **R69334** | Analysis Date: **8/18/2021** | SeqNo: **1404955**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	9.86	0.00675						8.225	18.1	30	E
Ethene	ND	0.0146						0		30	
Ethane	ND	0.0151						0		30	

NOTES:
E - Estimated value. The amount exceeds the calibrated range of the instrument.

Fremont Analytical

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**2108172**
Logged by:	**Clare Griggs**	Date Received:	**8/12/2021 1:30:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >2°C to 6°C *	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☑	NA ☐
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified:		Date:	
By Whom:		Via:	☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:			
Client Instructions:			

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample	1.1

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Original

2108172

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont

PROJECT NAME/NO.	PO #
108180	B-368

REMARKS

Aspect EDD

Page # 1 of 1

TURNAROUND TIME
- ☒ Standard TAT
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Dispose after 30 days
- ☐ Return samples
- ☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Sulfate	TOC	Chloride	RSK-175 Methane, Ethane, Ethene			Notes
AC-MW-27-081021		8/10/21	0820	water	5				x	x	x	x			
AC-MW-32-1-081021			1130						x	x	x	x			
AC-MW-32-2-081021			1120						x	x	x	x			
URS-MW-27I-081021			1025						x	x	x	x			
PC-MW-31I-081021			1235						x	x	x	x			
PC-MW-33I-081021			1335						x	x	x	x			
AC-MW-22-081021			1440						x	x	x	x			
PC-SCCI-081021			1555						x	x	x	x			
AC-MW-29-081021			1720						x	x	x	x			
PC-SCC3-081021			1825						x	x	x	x			

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: [signature]	Michael Erdahl	Friedman & Bruya	8/12/21	0838
Received by: [signature]	Justine Mantz	FAI	8/12/21	13:30
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

August 20, 2021

Marc Chalfant, Project Manager
Aspect Consulting, LLC
350 Madison Ave. N.
Bainbridge Island, WA 98110-1810

Dear Mr Chalfant:

Included are the results from the testing of material submitted on August 11, 2021 from the Grand Street Commons 170304, F&BI 108179 project. There are 21 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0820R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on August 11, 2021 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Grand Street Commons 170304, F&BI 108179 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
108179 -01	AC-MW-31-081121
108179 -02	AC-MW-10-081121
108179 -03	AC-MW-18-081121
108179 -04	AC-MW-20-081121
108179 -05	URS-MW-28I-1-081121
108179 -06	URS-MW-28I-2-081121
108179 -07	AC-MW-16-1-081121
108179 -08	AC-MW-16-2-081121
108179 -09	AC-MW-12-081121
108179 -10	AC-SB-13-081121

Samples AC-MW-31-081121, AC-MW-10-081121, AC-MW-18-081121, AC-MW-20-081121, URS-MW-28I-1-081121, AC-MW-16-1-081121, AC-MW-12-081121, and AC-SB-13-081121 were sent to Fremont Analytical for sulfate analysis. The report is enclosed.

All quality control requirements were acceptable.

Date of Report: 08/20/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108179
Date Extracted: 08/16/21
Date Analyzed: 08/16/21 and 08/18/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES AND TPH AS GASOLINE USING METHODS 8021B AND NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 52-124)
AC-MW-31-081121 108179-01 1/20	1,000	560	490	1,500	13,000	83
AC-MW-10-081121 108179-02 1/20	34	33	170	890	8,000	81
AC-MW-18-081121 108179-03 1/20	74	33	240	810	6,900	81
AC-MW-20-081121 108179-04	<1	<1	<1	<3	<100	85
AC-MW-16-1-081121 108179-07	<1	5.9	4.9	19	2,400	94
AC-MW-16-2-081121 108179-08	<1	5.3	6.0	18	2,300	94
AC-SB-13-081121 108179-10	<1	<1	<1	<3	<100	82
Method Blank 01-1778 MB	<1	<1	<1	<3	<100	81

Date of Report: 08/20/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108179
Date Extracted: 08/12/21
Date Analyzed: 08/12/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
AC-MW-31-081121 108179-01	1,100 x	340 x	91
AC-MW-10-081121 108179-02	2,400 x	290 x	83
AC-MW-18-081121 108179-03	2,800 x	420 x	88
AC-MW-20-081121 108179-04	<50	<250	89
AC-MW-16-1-081121 108179-07	450 x	<250	89
AC-MW-16-2-081121 108179-08	470 x	<250	94
AC-SB-13-081121 108179-10	460 x	<250	96
Method Blank 01-1835 MB2	<50	<250	83

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-31-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-01
Date Analyzed:	08/12/21	Data File:	108179-01.156
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	1,180

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-10-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-02
Date Analyzed:	08/12/21	Data File:	108179-02.157
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	328

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-18-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-03
Date Analyzed:	08/12/21	Data File:	108179-03.158
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	917

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-20-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-04
Date Analyzed:	08/12/21	Data File:	108179-04.159
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	127

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	URS-MW-28I-1-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-05
Date Analyzed:	08/12/21	Data File:	108179-05.167
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	73.2

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-16-1-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-07
Date Analyzed:	08/12/21	Data File:	108179-07.168
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	1,470

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-MW-12-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-09
Date Analyzed:	08/12/21	Data File:	108179-09.169
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	255

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	AC-SB-13-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	108179-10
Date Analyzed:	08/12/21	Data File:	108179-10.170
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	308

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	170304, F&BI 108179
Date Extracted:	08/12/21	Lab ID:	I1-491 mb
Date Analyzed:	08/12/21	Data File:	I1-491 mb.072
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	<50

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	URS-MW-28I-1-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/13/21	Lab ID:	108179-05
Date Analyzed:	08/13/21	Data File:	081319.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	0.66

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	URS-MW-28I-2-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/13/21	Lab ID:	108179-06
Date Analyzed:	08/13/21	Data File:	081320.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	0.94

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	AC-MW-12-081121	Client:	Aspect Consulting, LLC
Date Received:	08/11/21	Project:	170304, F&BI 108179
Date Extracted:	08/13/21	Lab ID:	108179-09
Date Analyzed:	08/14/21	Data File:	081321.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	102	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	1.5

Analysis For Volatile Compounds By EPA Method 8260D SIM

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	170304, F&BI 108179
Date Extracted:	08/13/21	Lab ID:	01-1843 mb
Date Analyzed:	08/13/21	Data File:	081318.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration ug/L (ppb)
1,4-Dioxane	<0.4

Date of Report: 08/20/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108179

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES, AND TPH AS GASOLINE USING METHOD 8021B AND NWTPH-Gx

Laboratory Code: 108182-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	97	65-118
Toluene	ug/L (ppb)	50	99	72-122
Ethylbenzene	ug/L (ppb)	50	103	73-126
Xylenes	ug/L (ppb)	150	96	74-118
Gasoline	ug/L (ppb)	1,000	83	69-134

Date of Report: 08/20/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108179

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	92	92	63-142	0

Date of Report: 08/20/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108179

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR DISSOLVED METALS USING EPA METHOD 6020B**

Laboratory Code: 108180-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Iron	ug/L (ppb)	100	10,800	0 b	0 b	75-125	0 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Iron	ug/L (ppb)	100	100	80-120

Date of Report: 08/20/21
Date Received: 08/11/21
Project: Grand Street Commons 170304, F&BI 108179

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260D SIM

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
1,4-Dioxane	ug/L (ppb)	2	97	81	70-130	18

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

108179

ME 8/11/21 VW3 AI5 E03

SAMPLE CHAIN OF CUSTODY

Page # 1 of 1

Report To Marc Chalfant

Company Aspect Consulting

Address 710 2nd Ave Ste 550

City, State, ZIP Seattle, WA 98104

Phone 206-331-4646 Email mchalfant@aspectconsulting.com

SAMPLERS (*signature*) Rachel

PROJECT NAME	PO #
Grand Street Commons	170304
REMARKS	INVOICE TO
Project specific RLs? - Yes / No	AP

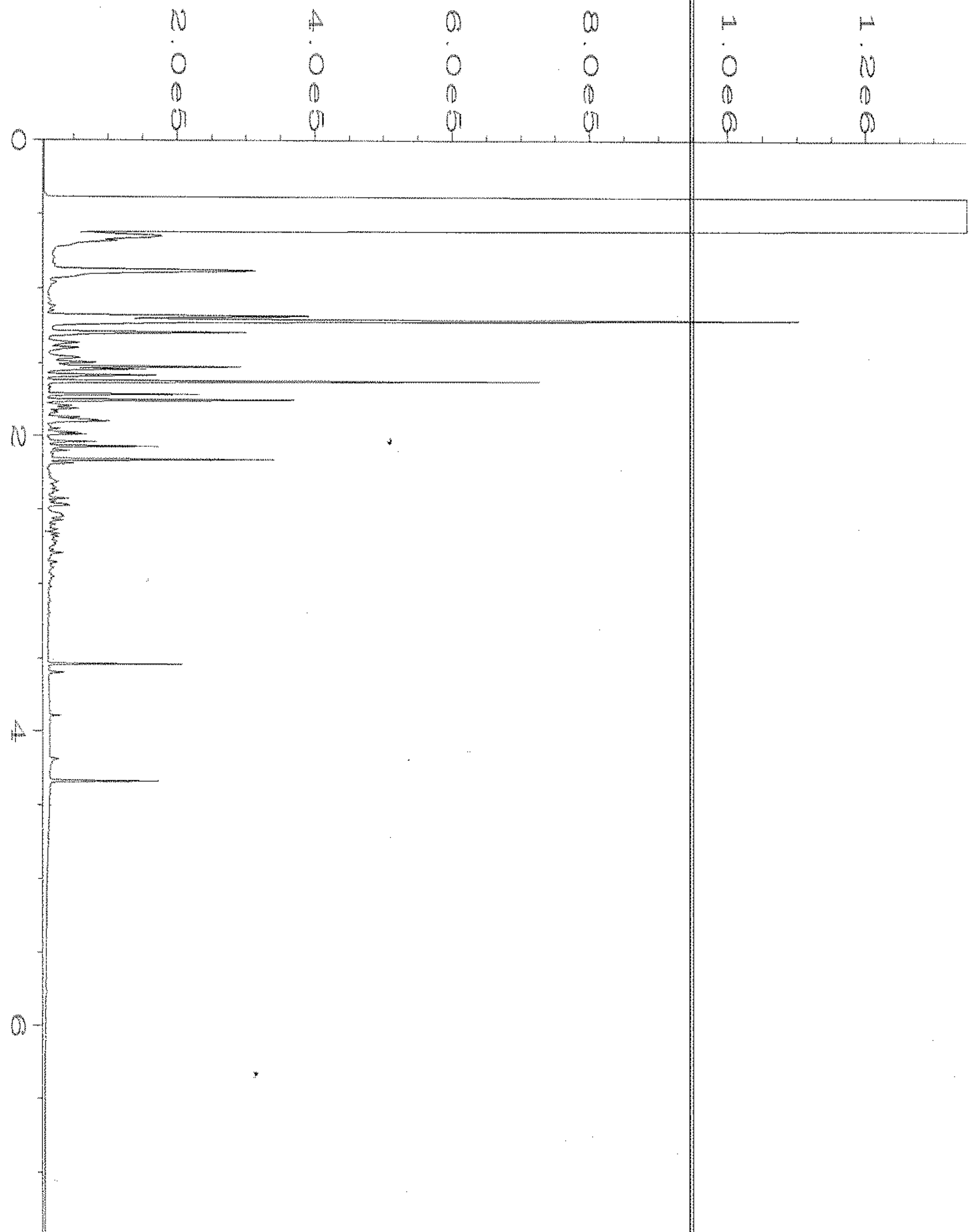
TURNAROUND TIME
- ☒ Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	sulfate EPA 300	Iron (dissolved) EPA 6020 *	1-4 dioxane 8260 SIM		Notes
AC-MW-31-081121	01 A-F	8/11/21	0810	w	6	X	X	X					X	X			*Field Filtered
AC-MW-10-081121	02		0950			X	X	X					X	X			
AC-MW-18-081121	03		1125			X	X	X					X	X			
AC-MW-20-081121	04		1255			X	X	X					X	X			
URS-MW-28I-1-081121	05 A-E		1345		5								X	X	X		
URS-MW-28I-2-081121	06 A-C		1355		3										X		
AC-MW-16-1-081121	07 A-F		1445		6	X	X	X					X	X			
AC-MW-16-2-081121	08 A-D		1450		4	X	X	X									
AC-MW-12-081121	09 A-E		1635		5								X	X	X		
AC-SB-13-081121	10 A-F		1715		6	X	X	X					X	X			

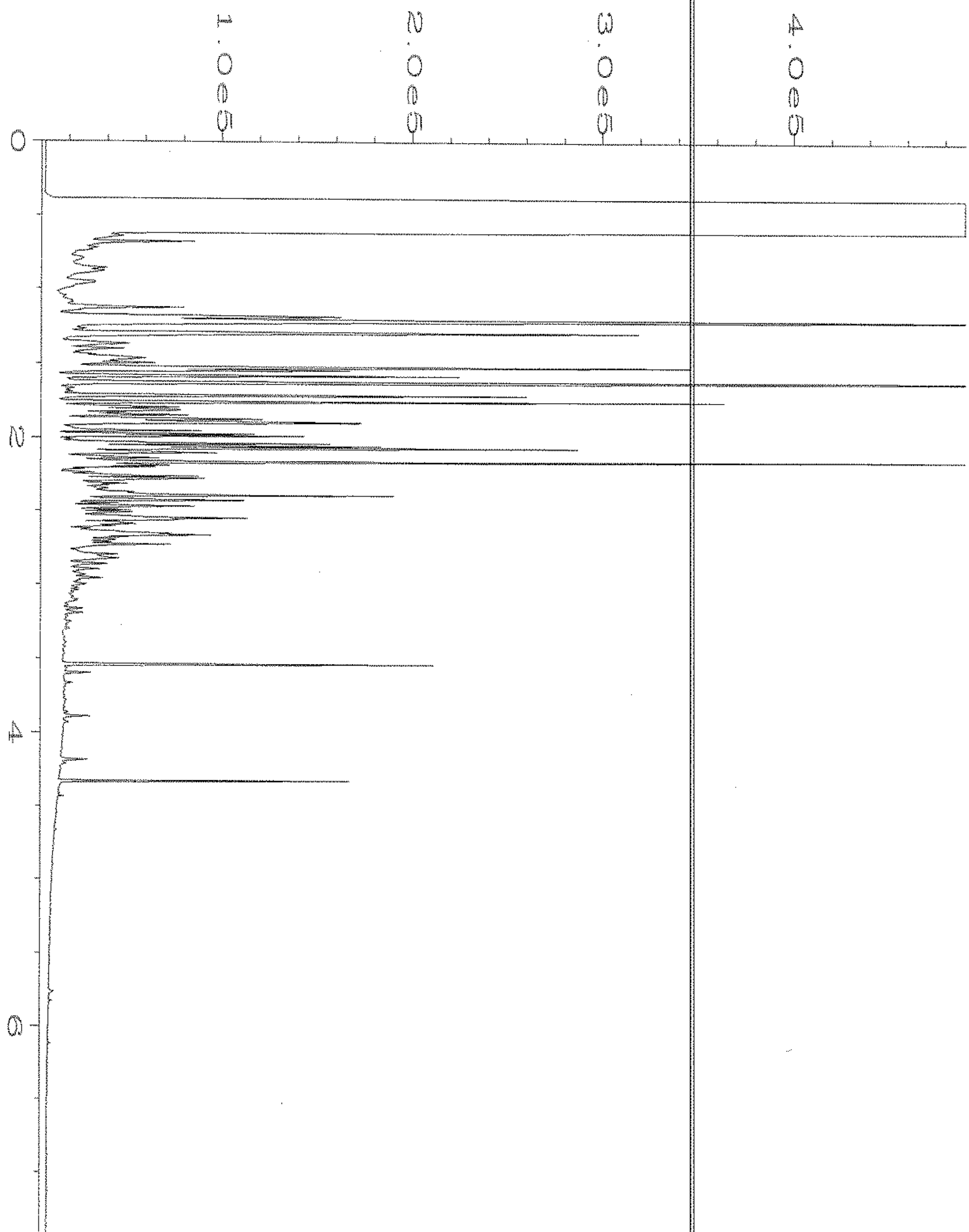
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Rachel	Rachel Cornwell	Aspect	8/11/21	1824
Received by:	JOE MOHAMMED	FBI	8/11/21	1824
Relinquished by:				
Received by:	Samples received at 2 °C			



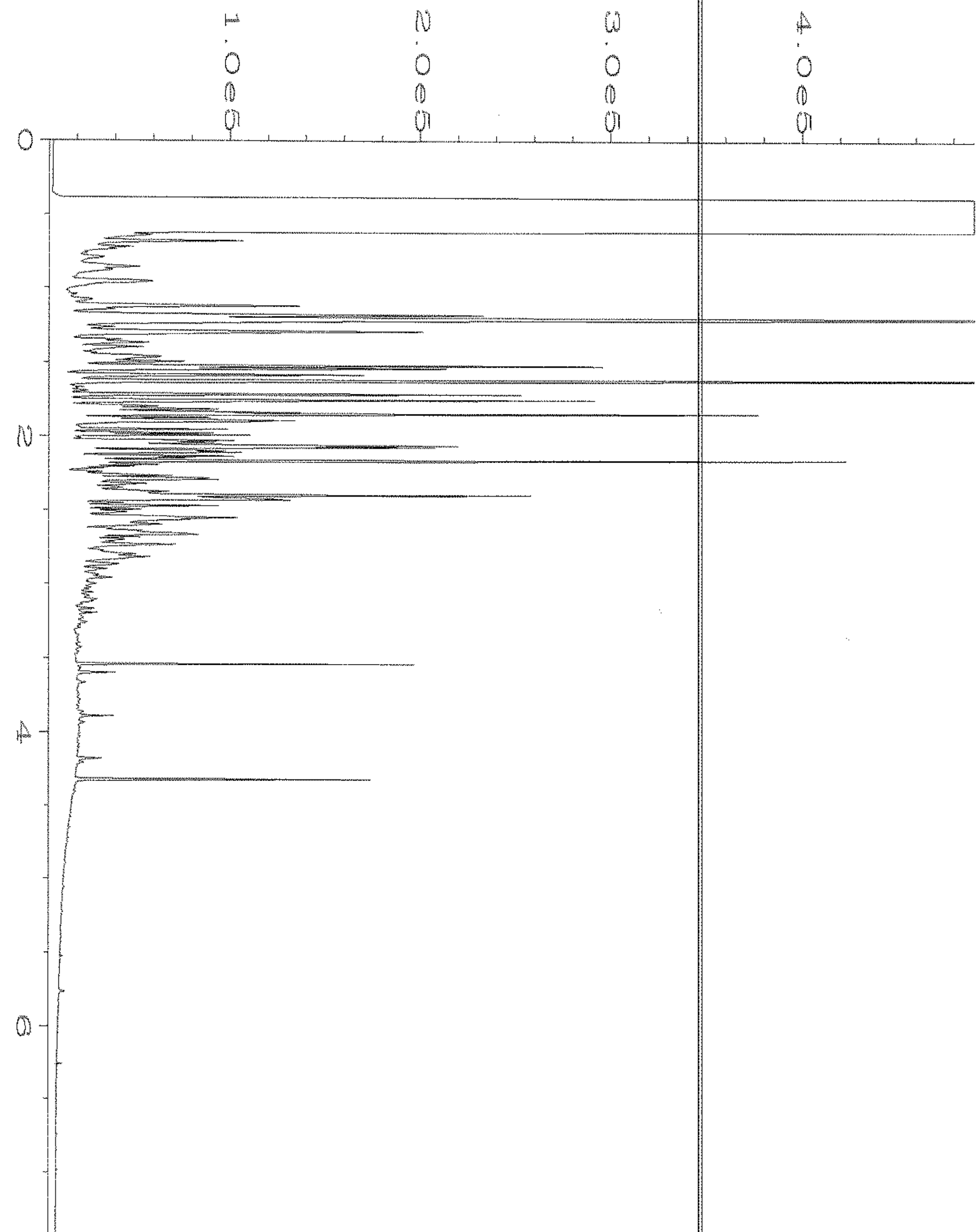
Data File Name : C:\HPCHEM\1\DATA\08-12-21\018F0701.D
Operator : TL
Instrument : GC1
Sample Name : 108179-01
Run Time Bar Code:
Acquired on : 12 Aug 21 03:13 PM
Report Created on: 13 Aug 21 08:40 AM

Page Number : 1
Vial Number : 18
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



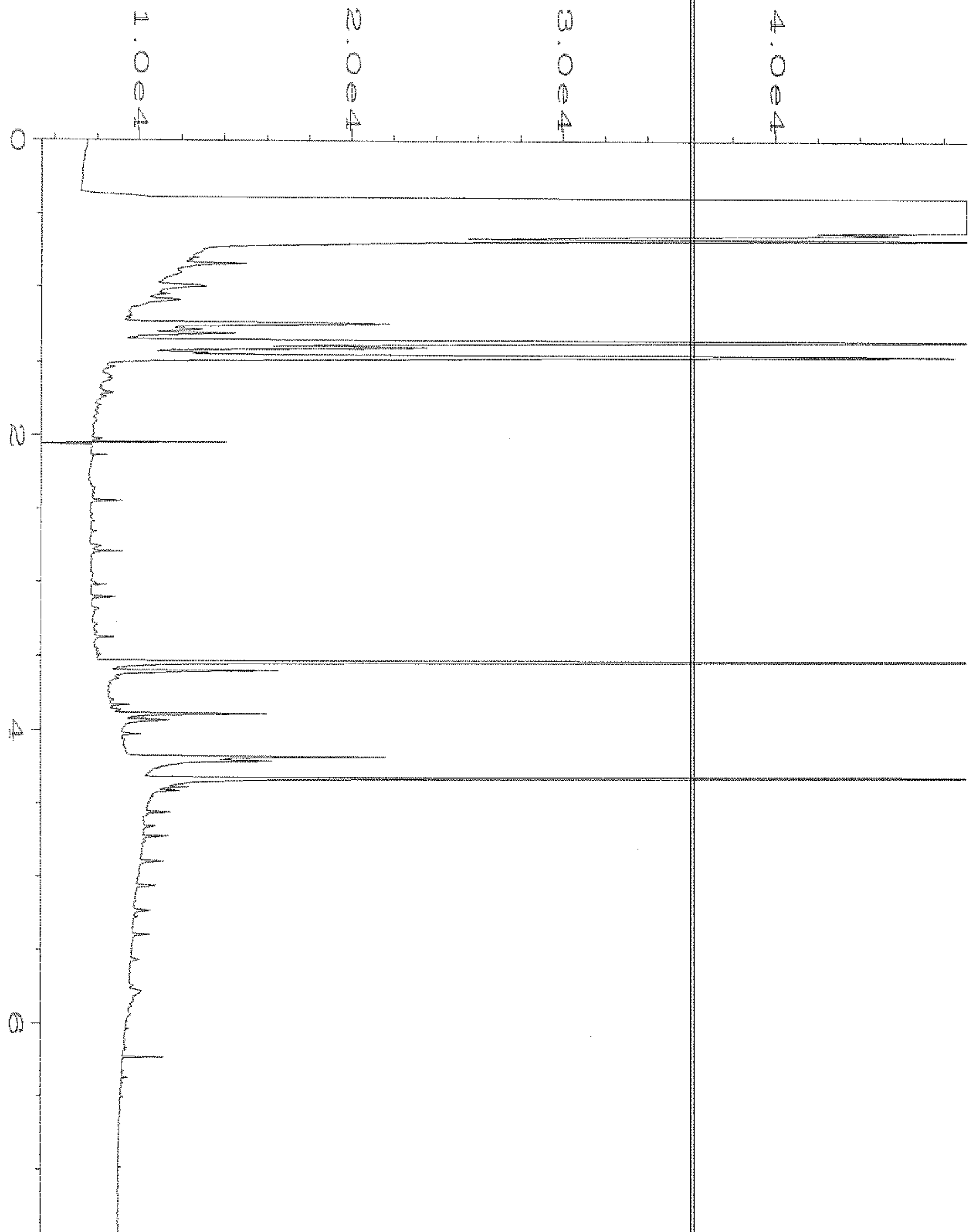
Data File Name : C:\HPCHEM\1\DATA\08-12-21\019F0701.D
Operator : TL
Instrument : GC1
Sample Name : 108179-02
Run Time Bar Code:
Acquired on : 12 Aug 21 03:23 PM
Report Created on: 13 Aug 21 08:40 AM

Page Number : 1
Vial Number : 19
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



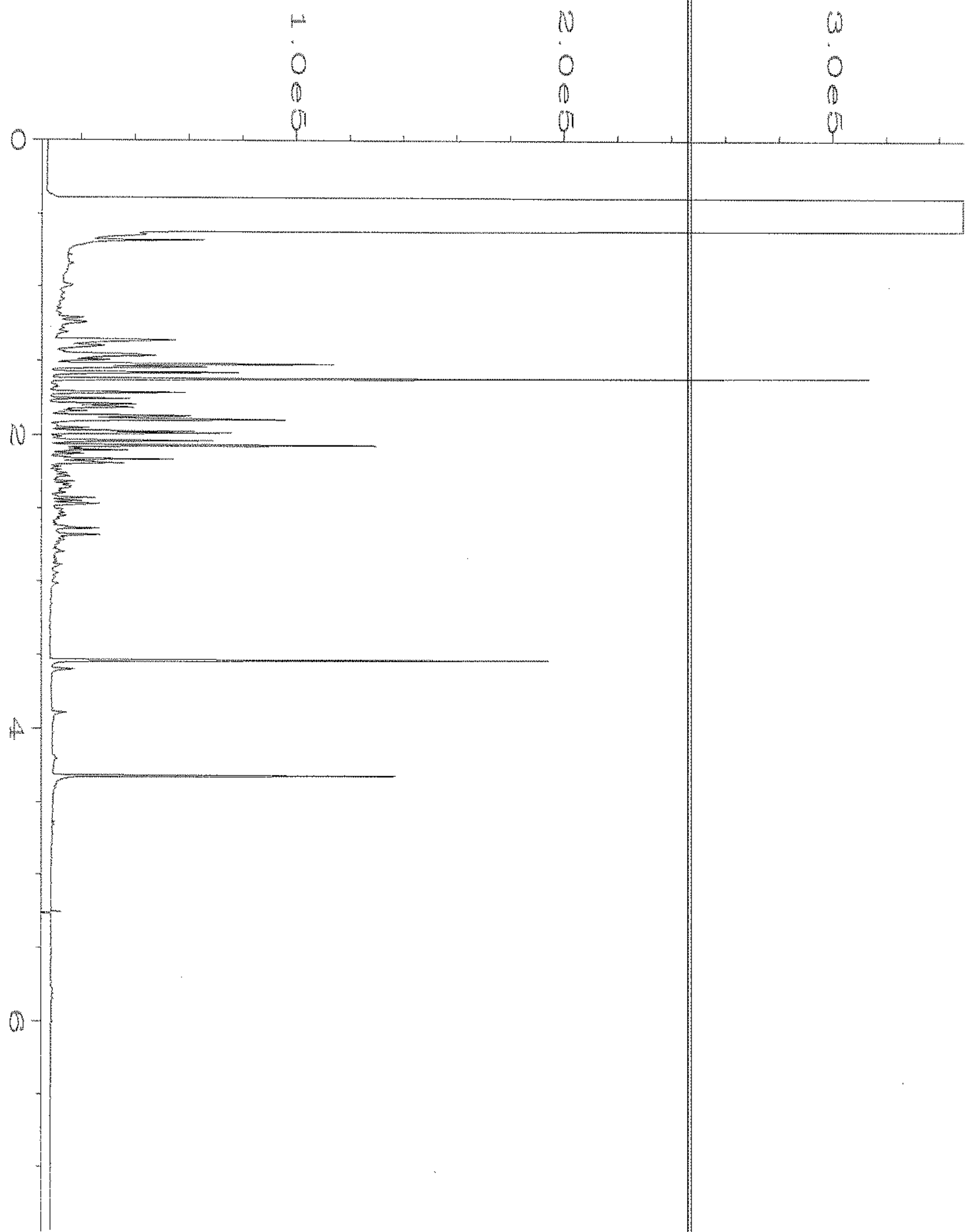
Data File Name : C:\HPCHEM\1\DATA\08-12-21\020F0701.D
Operator : TL
Instrument : GC1
Sample Name : 108179-03
Run Time Bar Code:
Acquired on : 12 Aug 21 03:34 PM
Report Created on: 13 Aug 21 08:40 AM

Page Number : 1
Vial Number : 20
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



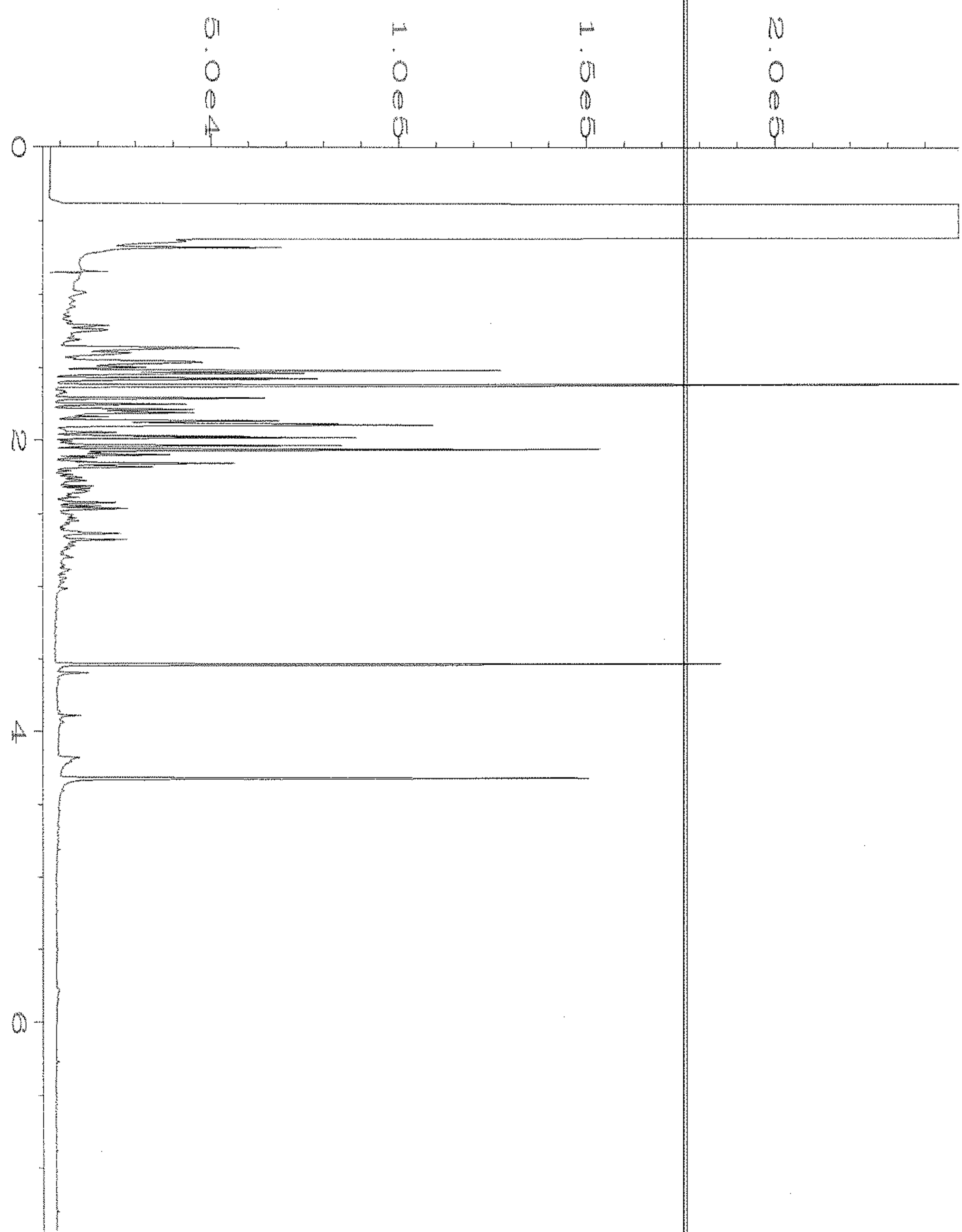
Data File Name : C:\HPCHEM\1\DATA\08-12-21\021F0701.D
Operator : TL
Instrument : GC1
Sample Name : 108179-04
Run Time Bar Code:
Acquired on : 12 Aug 21 03:46 PM
Report Created on: 13 Aug 21 08:40 AM

Page Number : 1
Vial Number : 21
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



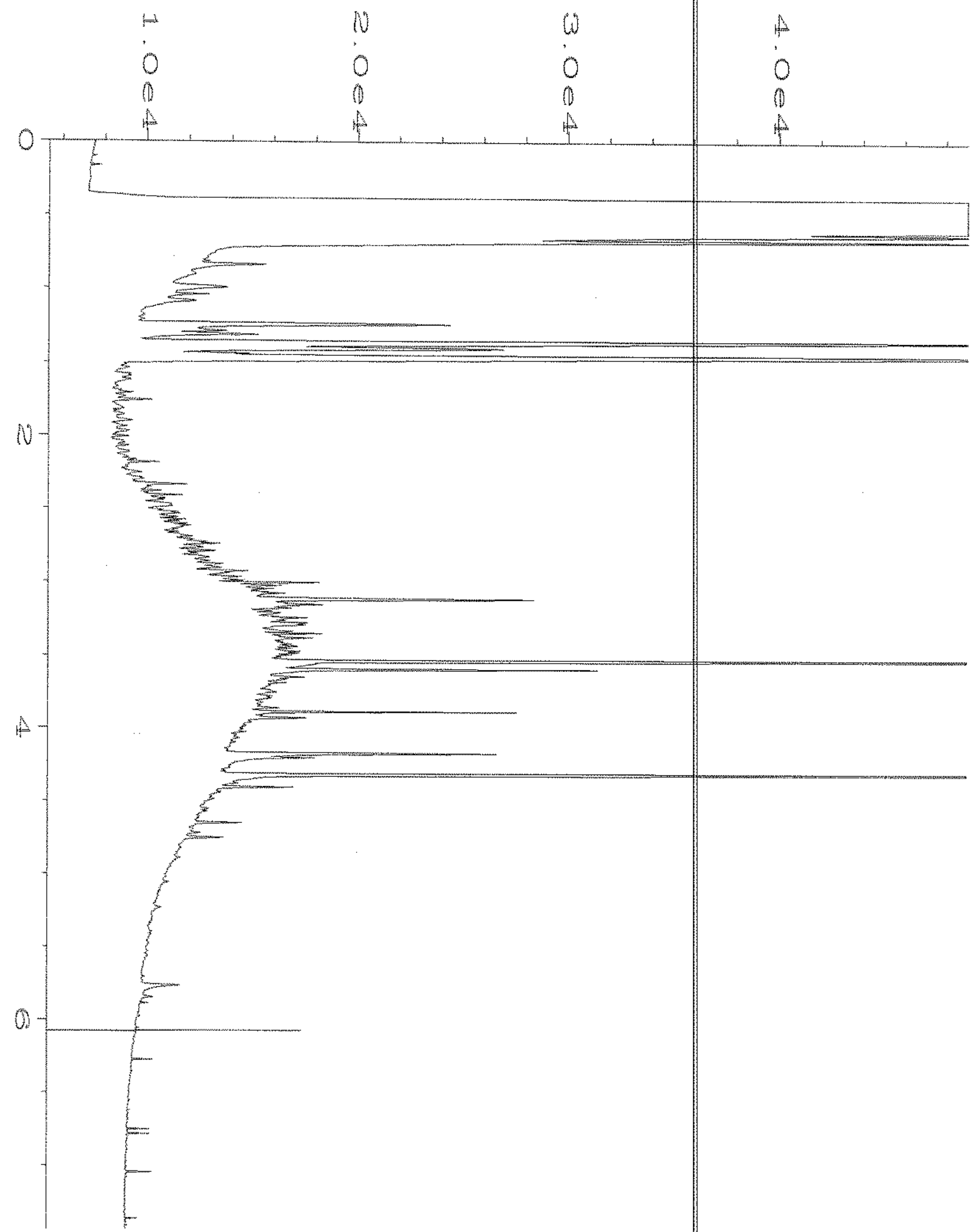
Data File Name : C:\HPCHEM\1\DATA\08-12-21\022F0701.D
Operator : TL
Instrument : GC1
Sample Name : 108179-07
Run Time Bar Code:
Acquired on : 12 Aug 21 03:58 PM
Report Created on: 13 Aug 21 08:40 AM

Page Number : 1
Vial Number : 22
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



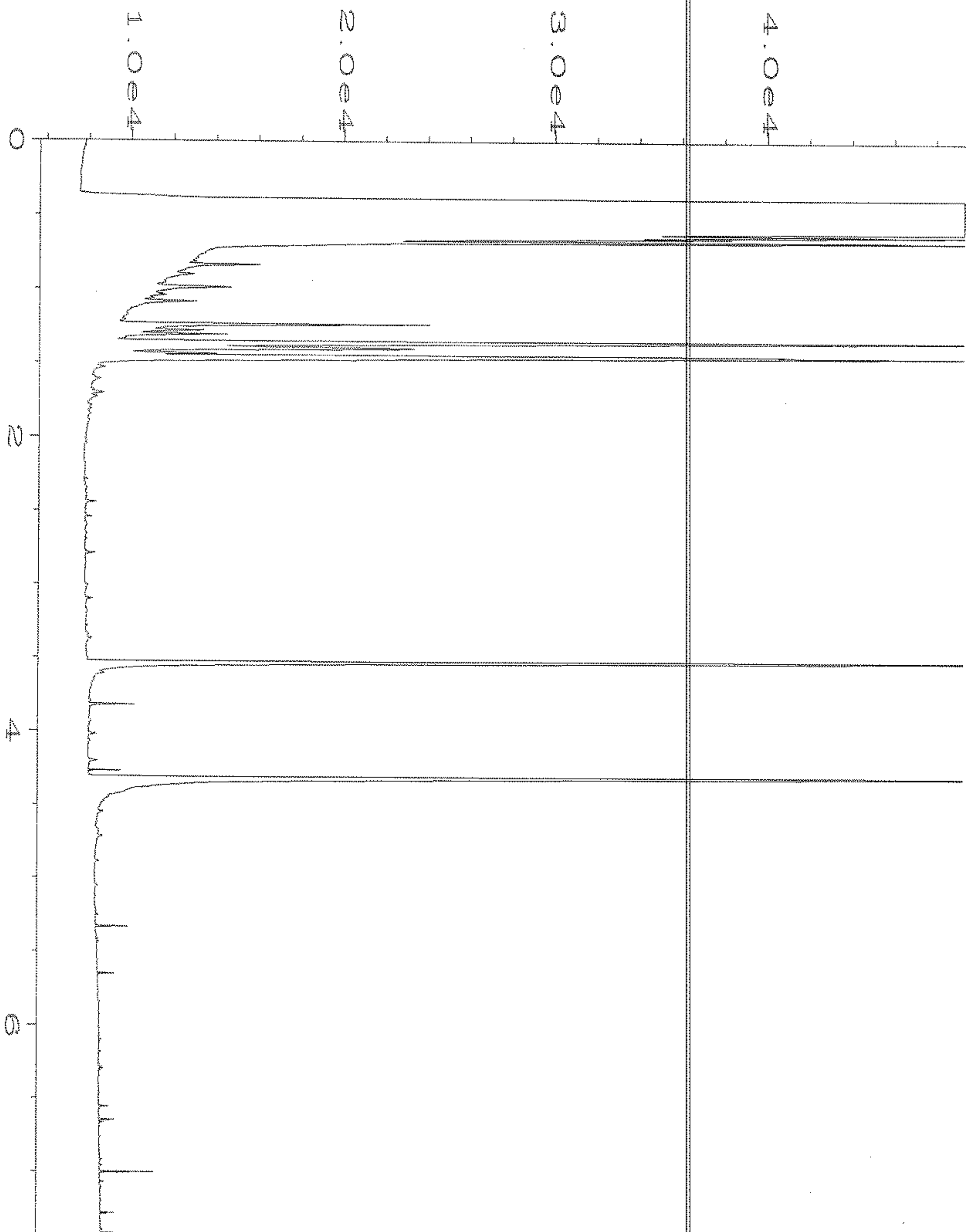
Data File Name : C:\HPCHEM\1\DATA\08-12-21\023F0701.D
Operator : TL
Instrument : GC1
Sample Name : 108179-08
Run Time Bar Code:
Acquired on : 12 Aug 21 04:10 PM
Report Created on: 13 Aug 21 08:41 AM

Page Number : 1
Vial Number : 23
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



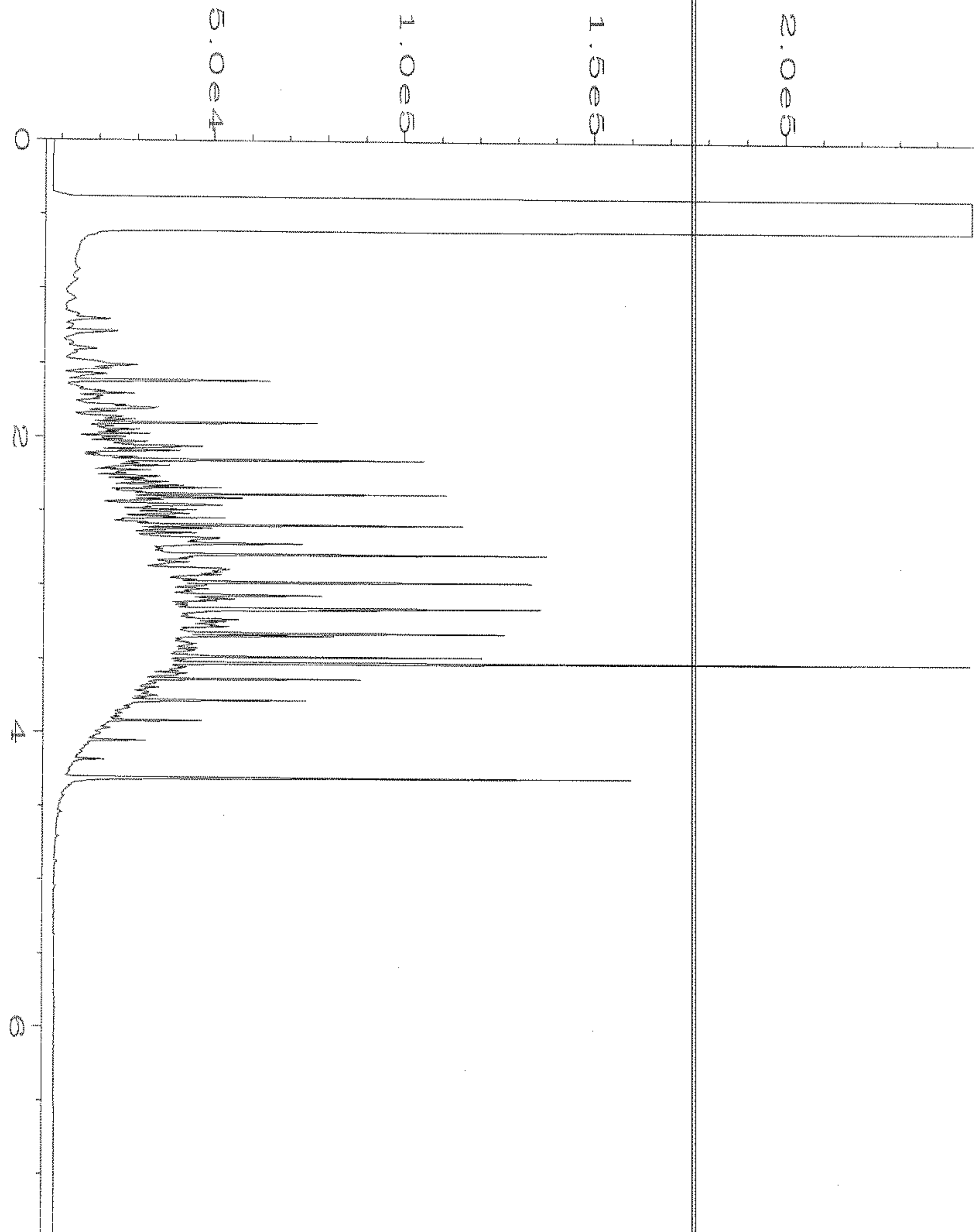
Data File Name : C:\HPCHEM\1\DATA\08-12-21\024F0701.D
Operator : TL
Instrument : GC1
Sample Name : 108179-10
Run Time Bar Code:
Acquired on : 12 Aug 21 04:22 PM
Report Created on: 13 Aug 21 08:41 AM

Page Number : 1
Vial Number : 24
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



Data File Name : C:\HPCHEM\1\DATA\08-12-21\013F0301.D
Operator : TL
Instrument : GC1
Sample Name : 01-18~~7~~5 mb2
Run Time Bar Code:
3 TL08·13
Acquired on : 12 Aug 21 01:13 PM
Report Created on: 13 Aug 21 08:41 AM

Page Number : 1
Vial Number : 13
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



Data File Name : C:\HPCHEM\1\DATA\08-12-21\003F0201.D
Operator : TL
Instrument : GC1
Sample Name : 500 Dx 63-79C
Run Time Bar Code:
Acquired on : 12 Aug 21 05:52 AM
Report Created on: 13 Aug 21 08:41 AM

Page Number : 1
Vial Number : 3
Injection Number : 1
Sequence Line : 2
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 108179
Work Order Number: 2108171

August 19, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 8 sample(s) on 8/12/2021 for the analyses presented in the following report.

Ion Chromatography by EPA Method 300.0

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Fremont Analytical

Date: *08/19/2021*

CLIENT: Friedman & Bruya
Project: 108179
Work Order: 2108171

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2108171-001	AC-MW-31-081121	08/11/2021 8:10 AM	08/12/2021 1:30 PM
2108171-002	AC-MW-10-081121	08/11/2021 9:50 AM	08/12/2021 1:30 PM
2108171-003	AC-MW-18-081121	08/11/2021 11:25 AM	08/12/2021 1:30 PM
2108171-004	AC-MW-20-081121	08/11/2021 12:55 PM	08/12/2021 1:30 PM
2108171-005	URS-MW-28I-1-081121	08/11/2021 1:45 PM	08/12/2021 1:30 PM
2108171-006	AC-MW-16-1-081121	08/11/2021 2:45 PM	08/12/2021 1:30 PM
2108171-007	AC-MW-12-081121	08/11/2021 4:35 PM	08/12/2021 1:30 PM
2108171-008	AC-SB-13-081121	08/11/2021 5:15 PM	08/12/2021 1:30 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

CLIENT: Friedman & Bruya
Project: 108179

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Fremont Analytical

Analytical Report

Work Order: **2108171**
Date Reported: **8/19/2021**

CLIENT: Friedman & Bruya
Project: 108179

Lab ID: 2108171-001 **Collection Date:** 8/11/2021 8:10:00 AM
Client Sample ID: **AC-MW-31-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33366		Analyst: SS
Sulfate	30.3	6.00	D	mg/L	10	8/16/2021 1:12:00 PM

Lab ID: 2108171-002 **Collection Date:** 8/11/2021 9:50:00 AM
Client Sample ID: **AC-MW-10-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33366		Analyst: SS
Sulfate	622	60.0	D	mg/L	100	8/17/2021 9:50:00 AM

Lab ID: 2108171-003 **Collection Date:** 8/11/2021 11:25:00 AM
Client Sample ID: **AC-MW-18-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33366		Analyst: SS
Sulfate	1,340	120	D	mg/L	200	8/17/2021 10:13:00 AM

Lab ID: 2108171-004 **Collection Date:** 8/11/2021 12:55:00 PM
Client Sample ID: **AC-MW-20-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33366		Analyst: SS
Sulfate	30.2	6.00	D	mg/L	10	8/16/2021 4:16:00 PM

Analytical Report

Work Order: **2108171**
Date Reported: **8/19/2021**

CLIENT: Friedman & Bruya
Project: 108179

Lab ID: 2108171-005 **Collection Date:** 8/11/2021 1:45:00 PM
Client Sample ID: **URS-MW-28I-1-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33366		Analyst: SS
Sulfate	55.8	6.00	D	mg/L	10	8/16/2021 4:39:00 PM

Lab ID: 2108171-006 **Collection Date:** 8/11/2021 2:45:00 PM
Client Sample ID: **AC-MW-16-1-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33366		Analyst: SS
Sulfate	10.8	6.00	D	mg/L	10	8/16/2021 5:03:00 PM

Lab ID: 2108171-007 **Collection Date:** 8/11/2021 4:35:00 PM
Client Sample ID: **AC-MW-12-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33366		Analyst: SS
Sulfate	836	60.0	D	mg/L	100	8/17/2021 10:37:00 AM

Lab ID: 2108171-008 **Collection Date:** 8/11/2021 5:15:00 PM
Client Sample ID: **AC-SB-13-081121** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33366		Analyst: SS
Sulfate	306	30.0	D	mg/L	50	8/17/2021 11:00:00 AM

Fremont Analytical

Date: *8/19/2021*

Work Order: 2108171
CLIENT: Friedman & Bruya
Project: 108179

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-33366** SampType: **MBLK** Units: **mg/L** Prep Date: **8/16/2021** RunNo: **69352**
Client ID: **MBLKW** Batch ID: **33366** Analysis Date: **8/16/2021** SeqNo: **1405390**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	0.600									

Sample ID: **LCS-33366** SampType: **LCS** Units: **mg/L** Prep Date: **8/16/2021** RunNo: **69352**
Client ID: **LCSW** Batch ID: **33366** Analysis Date: **8/16/2021** SeqNo: **1405391**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	3.55	0.600	3.750	0	94.7	90	110				

Sample ID: **2108171-001ADUP** SampType: **DUP** Units: **mg/L** Prep Date: **8/16/2021** RunNo: **69352**
Client ID: **AC-MW-31-081121** Batch ID: **33366** Analysis Date: **8/16/2021** SeqNo: **1405393**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	30.0	6.00						30.32	0.961	20	D

Sample ID: **2108171-001AMS** SampType: **MS** Units: **mg/L** Prep Date: **8/16/2021** RunNo: **69352**
Client ID: **AC-MW-31-081121** Batch ID: **33366** Analysis Date: **8/16/2021** SeqNo: **1405394**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	67.3	6.00	37.50	30.32	98.7	80	120				D

Sample ID: **2108171-001AMSD** SampType: **MSD** Units: **mg/L** Prep Date: **8/16/2021** RunNo: **69352**
Client ID: **AC-MW-31-081121** Batch ID: **33366** Analysis Date: **8/16/2021** SeqNo: **1405395**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	67.8	6.00	37.50	30.32	99.9	80	120	67.33	0.696	20	D

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**2108171**
Logged by:	**Clare Griggs**	Date Received:	**8/12/2021 1:30:00 PM**

Chain of Custody

#	Question	Yes	No	Other
1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

#	Question	Yes	No	Other
3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >2°C to 6°C *	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

#	Question	Yes	No	Other
18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample	1.1

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2108171

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont

PROJECT NAME/NO. 108179 | PO # B-368

REMARKS

Aspect EDD

Page # 1 of 1

TURNAROUND TIME
- ☒ Standard TAT
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Dispose after 30 days
- ☐ Return samples
- ☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Sulfate							Notes
AC-MW-31-081121		8/11/21	0816	Water					X							
AC-MW-10-081121			0950						X							
AC-MW-18-081121			1125						X							
AC-MW-20-081121			1255						X							
URS-MW-26I-1-081121			1345						X							
AC-MW-16-1-081121			1445						X							
AC-MW-12-081121			1635						X							
AC-SB-13-081121			1715						X							

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: [signature]	Michael Erdahl	Friedman & Bruya	8/12/21	0838
Received by: Justine Mantz	Justine Mantz	FAI	8/12/21	13:30
Relinquished by:				
Received by:				

APPENDIX I

Shoring and Grading Plan Sets

Shoring and Grading Plan Sets
GSC East 95% CD

GRAND STREET COMMONS - EAST BUILDING

1750 22ND AVE S
SEATTLE, WASHINGTON

TEMPORARY SHORING DESIGN DRAWINGS

SHEET INDEX

SHEET	TITLE
SH1.0	GENERAL INFORMATION
SH2.0	SITE PLAN
SH2.1	SHORING PLAN
SH3.0	WEST, NORTH 1 AND EAST 1 WALL ELEVATIONS
SH3.1	NORTH 2, EAST 2 AND SOUTH WALL ELEVATIONS
SH4.0	CROSS SECTIONS
SH5.0	DETAILS
SH6.0	SPECIFICATIONS (1 OF 2)
SH6.1	SPECIFICATIONS (2 OF 2)

GENERAL NOTES

GENERAL

THE CONTRACTOR AND SUBCONTRACTORS ARE RESPONSIBLE FOR THE CONSTRUCTION PROCESS AND THE SAFETY OF THE WORKERS. THIS INCLUDES BUT IS NOT LIMITED TO, THE CONSTRUCTION SEQUENCE, TEMPORARY HANDRAILS, EXCAVATION ACCESS, AND BARRIERS. IT ALSO INCLUDES LIFTING OF MATERIALS AND CONSTRUCTION EQUIPMENT INTO AND OUT OF THE EXCAVATION, TEMPORARY BRACING OF SINGLE-SIDED FORMWORK, TEMPORARY SHORING OF EXCAVATIONS, AND STABILITY OF ALL TEMPORARY CUT SLOPES.

THE CONTRACTOR SHALL PROVIDE PROTECTION OF PEDESTRIANS AND VEHICULAR TRAFFIC WHEN CONSTRUCTION ACTIVITIES REQUIRE SUCH.

PRECONSTRUCTION MEETINGS

PRIOR TO THE START OF EXCAVATION THE GENERAL CONTRACTOR IS RESPONSIBLE FOR THE ARRANGEMENT OF TWO SEPARATE PRE- CONSTRUCTION MEETINGS ONE BETWEEN OWNER'S REPRESENTATIVES AND SEATTLE SDCI AND THE OTHER BETWEEN OWNER'S REPRESENTATIVES AND SDOT. CALL (206) 684-8950 TO ARRANGE A MEETING WITH SEATTLE SDCI. CALL (206) 684-5281 TO ARRANGE A MEETING WITH SDOT.

BUILDING CODES, DESIGN MANUALS, AND SPECIFICATIONS

2015 INTERNATIONAL BUILDING CODE (IBC)

DESIGN LIVE LOADS

TRAFFIC SURCHARGE = 250 PSF VERTICAL (70 PSF HORIZONTAL FOR VERTICAL ELEMENTS) .
CONSTRUCTION SURCHARGE = 500 PSF VERTICAL APPLIED TO WEST AND SOUTH SHORING WALLS.
CONSTRUCTION SURCHARGES SHALL NOT BE APPLIED UNTIL THE SHORING WALLS ARE FULLY CONSTRUCTED.

BUILDING LOADS

THE ADJACENT APARTMENT BUILDING LOCATED 1711 23RD AVE S WAS MODELED AS A UNIFORM 750 PSF VERTICAL SURCHARGE FOR 4 STORIES OF BUILDING.

SUBSURFACE DESIGN

ALL SUBSURFACE SOIL AND WATER PARAMETERS USED IN THE DESIGN WERE BASED ON THE SUBSURFACE CHARACTERIZATION PRESENTED IN THE REPORT TITLED, "GEOTECHNICAL ENGINEERING REPORT, GRAND STREET COMMONS EAST, SEATTLE, WASHINGTON" PREPARED BY ASPECT CONSULTING. , DATED OCTOBER 12, 2020.

THE FOLLOWING SOIL PROPERTIES WERE USED IN THE DESIGN OF THE SOIL NAILED SHORING WALLS:

SOIL UNIT	MOIST UNIT WEIGHT (PCF)	FRICTION (DEG)	COHESION (PSF)	ULTIMATE NAIL PULLOUT RESISTANCE (K/FT)
FILL	115	30	0	3
GLACIAL RECESSIONAL DEPOSITS	115	32	100	4
GLACIALLY CONSOLIDATED SOILS	130	40	100	7

EXISTING UNDERGROUND OBSTRUCTIONS AND UTILITIES

THE CONTRACTOR MUST FIELD VERIFY ALL EXISTING DIMENSIONS AND SITE CONDITIONS.THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING ACTUAL LOCATIONS OF ALL EXISTING UTILITIES SHOWN ON THE PLANS AND THOSE UTILITIES OR UNDERGROUND OBSTRUCTIONS NOT SHOWN ON THE PLANS. THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL ABANDONED UTILITIES, OR OTHER UNDERGROUND OBSTRUCTIONS THAT INTERFERE WITH THE NEW CONSTRUCTION. LOCATION AND/OR ABANDONMENT MUST BE COMPLETED PRIOR TO VERTICAL ELEMENT INSTALLATION AND EXCAVATION.

SEWER INSPECTION

ALL SEWER AND STORM LINES IN THE R.O.W. WITHIN 10 FEET (OR WITHIN 20 FEET IF SUCH LINES ARE 30 FEET OR MORE OFF OF SITE PROPERTY LINE) OF ANY PROPOSED SHORING ELEMENT SHALL BE VIDEOTAPED OF PRE-PROJECT CONDITION AND A COPY SENT TO SPU AT SPU_DWW_PIPE_REHAB@SEATTLE.GOV PRIOR TO THE PRECONSTRUCTION MEETING. SIMILAR VIDEOTAPE OF POST-PROJECT CONDITION IS ALSO REQUIRED AND SENT TO SPU AT SAME EMAIL ADDRESS.

GENERAL NOTES (CONT.)

JOB SITE SAFETY

INSOFAR AS JOB SITE SAFETY IS CONCERNED, TERRACON IS RESPONSIBLE FOR THE HEALTH AND SAFETY OF ITS EMPLOYEES AND SUBCONTRACTORS. NOTHING HEREIN SHALL BE CONSTRUED TO RELIEVE CLIENT OR ANY OTHER CONSULTANTS OR CONTRACTORS FROM THEIR RESPONSIBILITIES FOR MAINTAINING A SAFE JOB SITE. TERRACON SHALL NOT ADVISE ON, ISSUE DIRECTIONS REGARDING, OR ASSUME CONTROL OVER SAFETY CONDITIONS AND PROGRAMS FOR OTHERS AT THE JOB SITE. NEITHER THE PROFESSIONAL ACTIVITIES OF TERRACON, NOR THE PRESENCE OF TERRACON OR ITS EMPLOYEES AND SUBCONTRACTORS, SHALL BE CONSTRUED TO IMPLY THAT TERRACON CONTROLS THE OPERATIONS OF OTHERS OR HAS ANY RESPONSIBILITY FOR JOB SITE SAFETY.

STRUCTURAL STEEL

STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING STANDARDS UNLESS OTHERWISE SHOWN ON THE DRAWINGS OR APPROVED OTHERWISE BY THE ENGINEER.

WIDE FLANGE (W) SHAPES:	ASTM A992
PLATES:	ASTM A572 GRADE 50

MINIMUM WELD SIZE 1/4" CONTINUOUS FILLET. MINIMUM WELD LENGTH 4 INCHES. ALL WELDING TO BE PERFORMED BY WELDERS CERTIFIED PER AWS STANDARD SPECIFICATIONS. USE E70XX ELECTRODES.

SHORING IN THE RIGHT OF WAY (ROW):

ALL SHORING ELEMENTS IN THE ROW SHALL BE REMOVED TO A DEPTH OF AT LEAST 4 FEET BELOW FINISHED GRADE IN THE ROW ONCE THEY ARE NO LONGER NEEDED FOR CONSTRUCTION.

SHOTCRETE

ALL SHOTCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4500 PSI, AND A MINIMUM 3-DAY COMPRESSIVE STRENGTH OF 2000 PSI. SEE THE SPECIFICATIONS FOR SPECIFIC REQUIREMENTS. TYPE I PORTLAND CEMENT CONFORMING TO ASTM C150 / AASHTO M85 SHALL BE USED FOR SHOTCRETE. SUBMIT MIX DESIGNS IN ACCORDANCE WITH THE SPECIFICATIONS. ALL TEMPORARY SHOTCRETE SHALL BE SCREED FINISH

SOIL NAIL GROUT

ALL SOIL NAIL GROUT SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,000 PSI. SEE THE SPECIFICATIONS FOR SPECIFIC REQUIREMENTS.

NAIL BAR STEEL

ALL NAIL BARS SHALL CONFORM TO ASTM A615 / AASHTO M31, GRADE 75 OR GRADE 100 OR ASTM A722-07 / AASHTO M275 GRADE 150 AS INDICATED ON THE PLANS.

REINFORCING STEEL

ALL REINFORCING STEEL SHALL CONFORM TO ASTM A615 / AASHTO M31, GRADE 60 FOR DEFORMED BARS, AND ASTM A185 / AASHTO M55 FOR WELDED WIRE FABRIC (WWF).

SUBMIT REINFORCING STEEL SHOP DRAWINGS TO ENGINEER IN ACCORDANCE WITH THE SPECIFICATIONS.

ALL REINFORCING STEEL DETAILS IN ACCORDANCE WITH ACI 315 MANUAL OF STANDARD PRACTICE

ALL DEFORMED REINFORCING BAR LAPS SHALL BE CLASS B, IN ACCORDANCE WITH ACI 318-11 OR AS SUMMARIZED IN THE FOLLOWING TABLE:

BAR SIZE	BAR DIA. (IN)	CLASS B LAP SPLICE LENGTH (DIA)	CLASS B LAP SPLICE LENGTH (IN)
#4	0.500	40 Ø	20

WWF LAPS SHALL BE 12 INCHES.

SEE THE PLANS FOR SPECIFIC STRUCTURAL DETAILS. SUBMIT ALL SHOP DRAWINGS IN ACCORDANCE WITH THE SPECIFICATIONS.

WELDING

MINIMUM WELD SIZE 1/4" CONTINUOUS FILLET. MINIMUM WELD LENGTH 4 INCHES. ALL WELDING TO BE PERFORMED BY WELDERS CERTIFIED PER AWS STANDARD SPECIFICATIONS. USE E70XX ELECTRODES.

SHORING LAYOUT

THE SHORING WALL AS DESIGNED IS TIGHT AGAINST THE BACK OF THE BUILDING BASEMENT WALLS. LAYOUT OF SHORING ELEMENTS PERPENDICULAR TO THE BUILDING WALL SHALL BE BASED ON THE ARCHITECTURAL PLANS TAKING INTO ACCOUNT ANY ADDITIONAL OFFSET REQUIRED TO ALLOW FOR THE BASEMENT WALL DRAINAGE LAYER AND WATERPROOFING BETWEEN THE SHORING WALL AND PERMANENT BASEMENT WALL.

CONTAMINATED SOIL REMOVAL

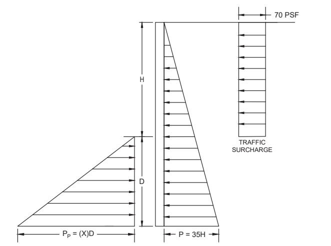
CONTAMINATED SOIL AND GROUNDWATER WILL BE SCREENED, HANDLED, AND MANAGED IN ACCORDANCE WITH THE MEASURES OUTLINED IN A CONTAMINATED MEDIA MANAGEMENT PLAN (CMMP). THE CMMP WILL BE PREPARED BY ASPECT PRIOR TO CONSTRUCTION.

SPECIAL INSPECTION AND TESTING

IN ACCORDANCE WITH THE 2015 IBC, SPECIAL INSPECTION SHALL BE PROVIDED FOR THE FOLLOWING TYPES OF CONSTRUCTION:

- VERTICAL ELEMENT INSTALLATION
- SOIL NAIL INSTALLATION AND TESTING
- SOIL NAIL GROUT UNCONFINED COMPRESSIVE STRENGTH
- SHOTCRETE UNCONFINED COMPRESSIVE STRENGTH

LATERAL EARTH PRESSURE DIAGRAM - VERTICAL ELEMENTS/SOLDIER PILES



NOTES

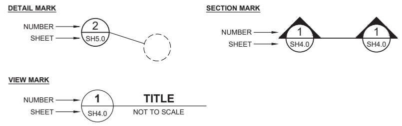
D & H ARE MEASURED IN FEET
ALL PRESSURES ARE IN POUNDS PER SQUARE FOOT (PSF)
D = EMBEDMENT DEPTH
H = EXCAVATION HEIGHT

ACTIVE EARTH PRESSURE:
35H TRIANGULAR

PASSIVE EARTH PRESSURE (X):
ALLOWABLE = 400D (GLACIALLY CONSOLIDATED)
ALLOWABLE = 250D (FILL AND GLACIAL RECESSIONAL DEPOSITS)
PASSIVE PRESSURE ACTS OVER 2 PILE DIAMETERS

SURCHARGES:
TRAFFIC = 70 PSF

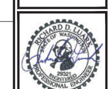
GRAPHIC LEGEND



REV.	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

GENERAL INFORMATION
GRAND STREET COMMONS - EAST BUILDING
1750 22ND AVE S
SEATTLE WASHINGTON

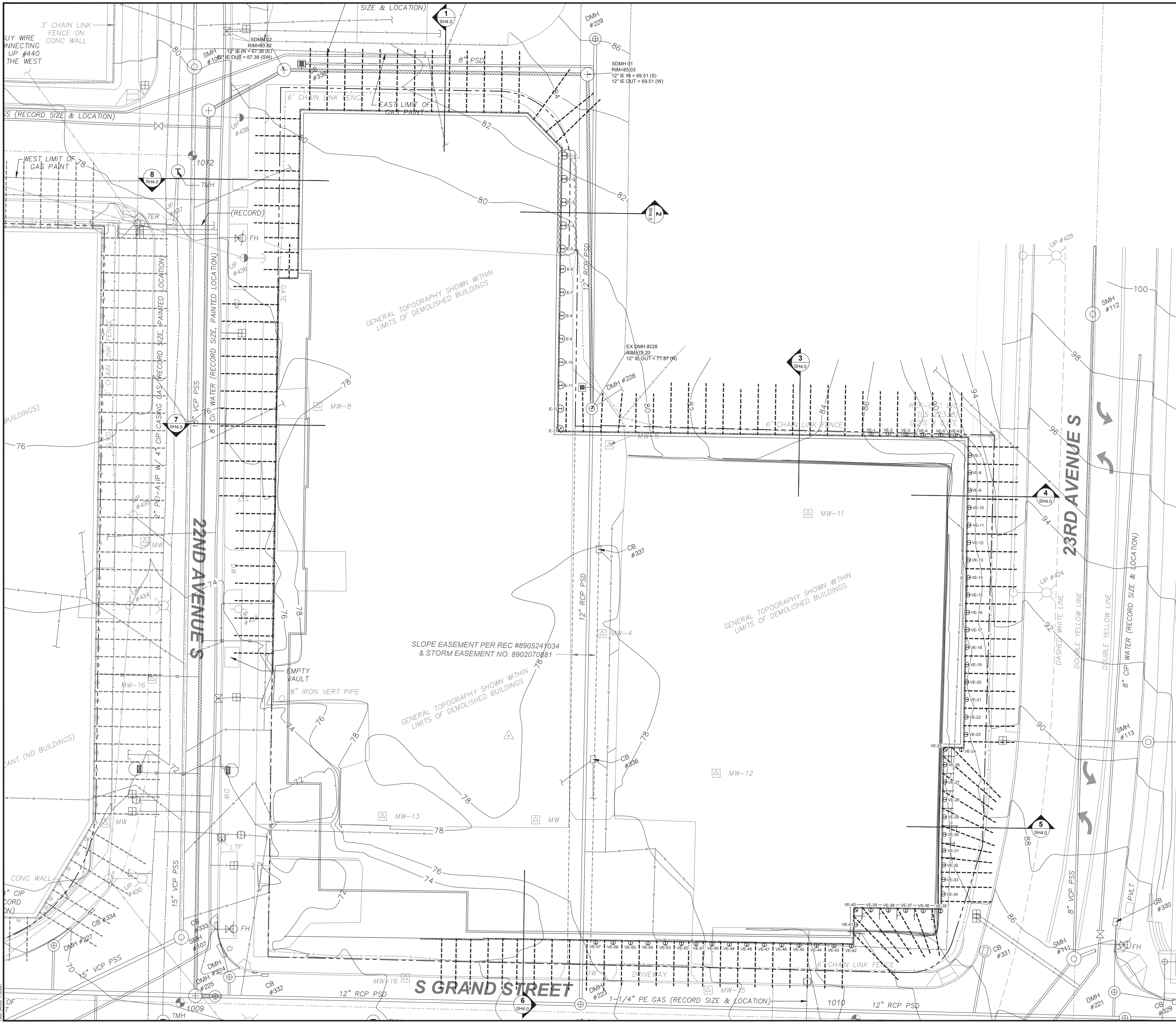
Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549



SH1.0

DESIGNED BY:	TB
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	1 OF 9

LAST SAVED: 7/16/2021



NOTES

1) UTILITIES ON BASE MAP ARE SHADED BACK FOR ILLUSTRATION PURPOSES.
2) WHERE SHORING ELEMENTS ARE WITHIN 5 FEET OF EXISTING ELECTRICAL, WATER, SEWER, GAS, COMMUNICATION, OR FIBEROPTIC LINES THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AS BUILTS. IF AS BUILTS ARE NOT AVAILABLE POTHOLING IS REQUIRED.

SHORING LEGEND

- EXTENT OF SOIL NAILS
- PROPERTY LINE
- VERTICAL ELEMENTS

REV	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

SITE PLAN

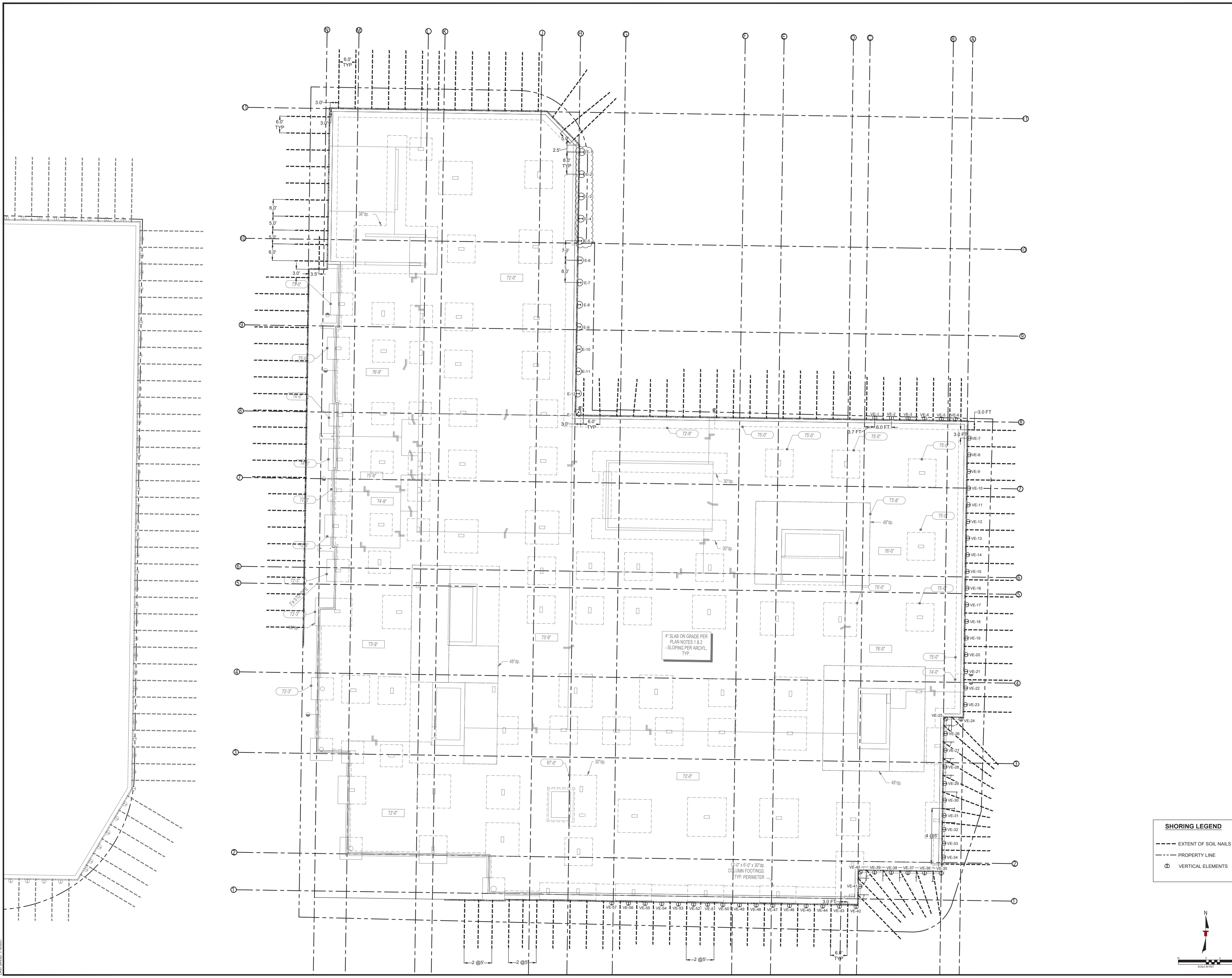
GRAND STREET COMMONS - EAST BUILDING
1750 22ND AVE S

SEATTLE WASHINGTON

Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

SH2.0

DESIGNED BY:	TB
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	2 OF 9



REV	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

SHORING PLAN

GRAND STREET COMMONS - EAST BUILDING

1750 22ND AVE S

SEATTLE WASHINGTON

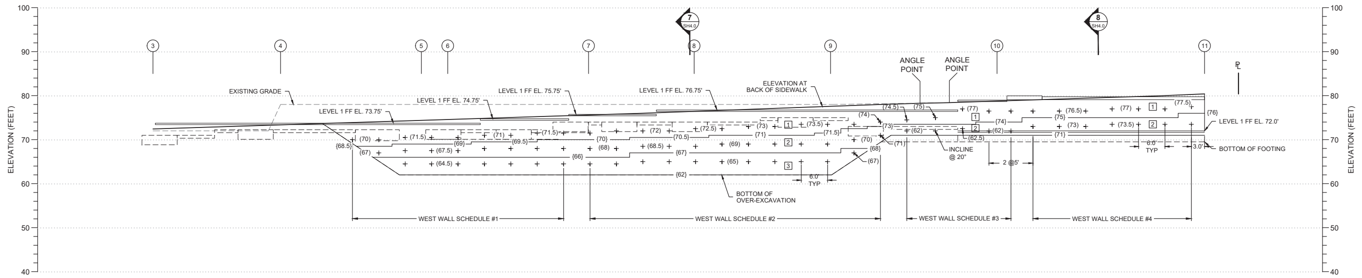
Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

RICHARD D. LUARK STATE OF WASHINGTON 29321 REGISTERED PROFESSIONAL ENGINEER

SH2.1

DESIGNED BY:	TB
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	4 OF 9

LAST SAVED: 7/16/2021



WEST WALL SOIL NAIL SCHEDULE #1						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	14	#8	75	6 FT O.C.	20	2
2	14	#8	75	6 FT O.C.	15	2
3	12	#8	75	6 FT O.C.	15	2

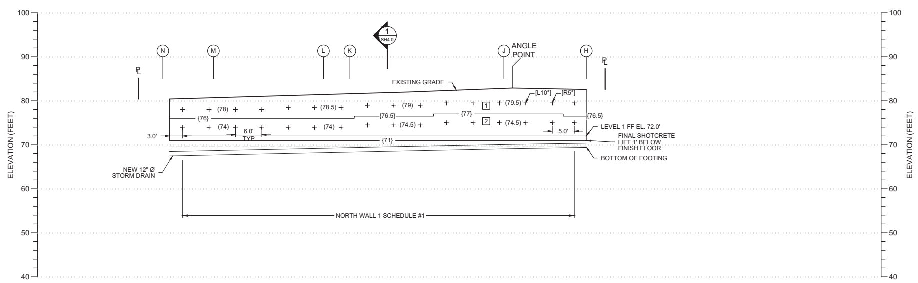
1 SH3.0 WEST WALL ELEVATION

0 10 20
SCALE IN FEET

WEST WALL SOIL NAIL SCHEDULE #2						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	20	#8	75	6 FT O.C.	20	1.5
2	20	#8	75	6 FT O.C.	15	2
3	12	#8	75	6 FT O.C.	15	2

WEST WALL SOIL NAIL SCHEDULE #3						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	12	#8	75	6 FT O.C.	10	2
2	12	#8	75	6 FT O.C.	10	2

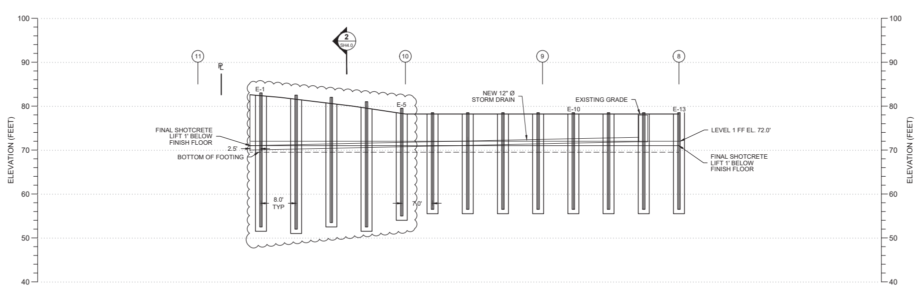
WEST WALL SOIL NAIL SCHEDULE #4						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	16	#8	75	6 FT O.C.	20	2
2	12	#8	75	6 FT O.C.	15	2



2 SH3.0 NORTH 1 WALL ELEVATION

0 10 20
SCALE IN FEET

NORTH WALL 1 SOIL NAIL SCHEDULE #1						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	22	#8	75	6 FT O.C.	15	2
2	12	#8	75	6 FT O.C.	10	2



3 SH3.0 EAST 1 WALL ELEVATION

0 10 20
SCALE IN FEET

EAST WALL 1 SOIL NAIL SCHEDULE #1						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	20	#8	75	6 FT O.C.	10	2
2	12	#8	75	6 FT O.C.	23	2

PILE	SECTION	SHAFT DIAM. IN	STEEL LENGTH FT	ELEV. AT TOP FT	ELEV. AT BOTTOM FT
E-1	W18X76	30	30.5	83.0	52.5
E-2	W18X76	30	30.5	82.5	52.0
E-3	W18X50	30	28.5	82.0	53.5
E-4	W18X50	30	28.5	81.0	52.5
E-5	W14X38	30	24.5	79.5	55.0
E-6 TO E-13	W14X30	30	22	78.5	56.5

LEGEND

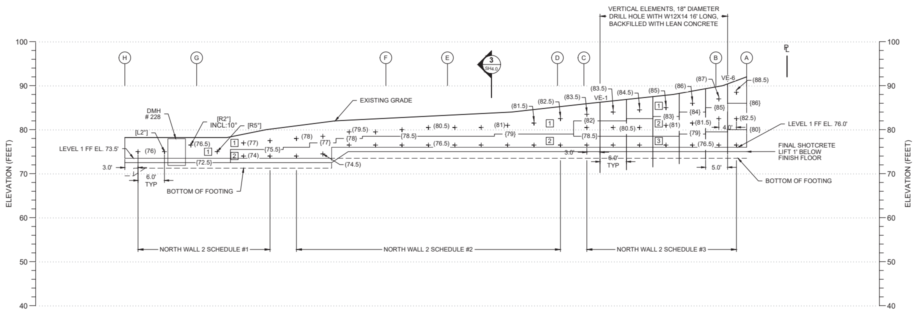
- GRIDLINE
1 - SOIL NAIL ROW
\+ - SOIL NAIL
| - VERTICAL ELEMENT
(146) - SOIL NAIL OR TIEBACK ELEVATION
{132} - SHOTCRETE JOINT ELEVATION
L - DRILLED NAIL LENGTH (FEET)
BAR - NAIL BAR SIZE
GRADE - NAIL BAR STEEL GRADE (Fy)
α - NAIL DECLINATION (DEGREES) UNLESS SHOWN OTHERWISE ON PLANS
[15°] - SPLAY ANGLE OF SOIL NAIL
A_D - ALLOWABLE DESIGN NAIL PULLOUT RESISTANCE (K/FT)

WEST, NORTH 1 AND EAST 1 WALL ELEVATIONS
GRAND STREET COMMONS - EAST BUILDING
1750 22ND AVE S
SEATTLE WASHINGTON

Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

RICHARD D. LUARK STATE OF WASHINGTON 29321 REGISTERED PROFESSIONAL ENGINEER

SH3.0	
DESIGNED BY:	TB
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	4 OF 9



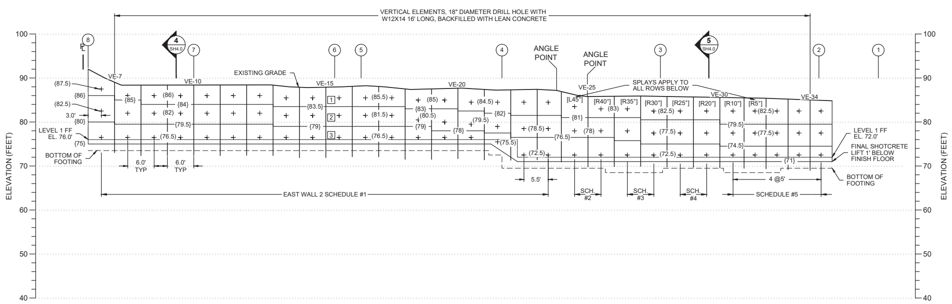
1 SH3.1 **NORTH 2 WALL ELEVATION**

SCALE IN FEET

NORTH WALL 2 SOIL NAIL SCHEDULE #1						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	14	#8	75	6 FT O.C.	15	1.5
2	12	#8	75	6 FT O.C.	15	2

NORTH WALL 2 SOIL NAIL SCHEDULE #2						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	18	#8	75	6 FT O.C.	15	1.5
2	12	#8	75	6 FT O.C.	15	2

NORTH WALL 2 SOIL NAIL SCHEDULE #3						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	16	#8	75	6 FT O.C.	15	2
2	14	#8	75	6 FT O.C.	15	2
3	12	#8	75	6 FT O.C.	15	3.5



2 SH3.1 **EAST 2 WALL ELEVATION**

SCALE IN FEET

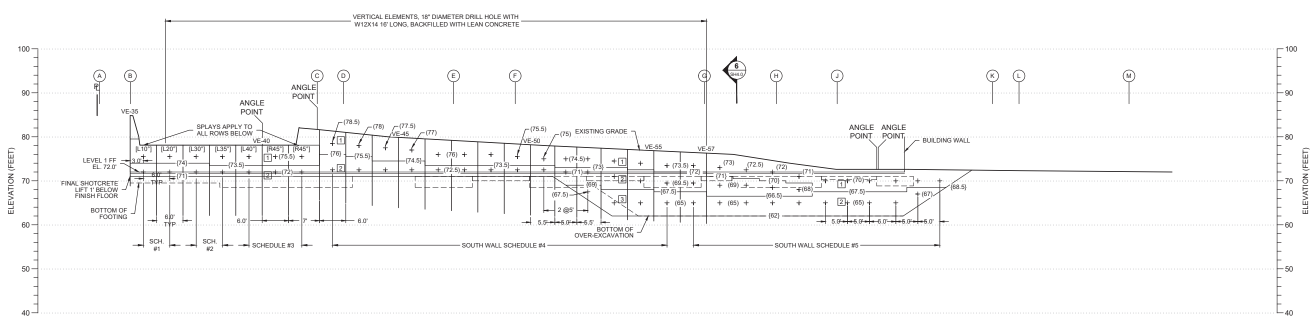
EAST WALL 2 SOIL NAIL SCHEDULE #1						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	18	#8	75	6 FT O.C.	15	1.5
2	16	#8	75	6 FT O.C.	15	2
3	12	#8	75	6 FT O.C.	15	3.5

EAST WALL 2 SOIL NAIL SCHEDULE #2						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	25	#9	75	6 FT O.C.	15	1.5
2	23	#9	75	6 FT O.C.	15	2
3	17	#9	75	6 FT O.C.	15	3.5

EAST WALL 2 SOIL NAIL SCHEDULE #3						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	22	#9	75	6 FT O.C.	15	1.5
2	20	#9	75	6 FT O.C.	15	2
3	15	#8	75	6 FT O.C.	15	3.5

EAST WALL 2 SOIL NAIL SCHEDULE #4						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	20	#8	75	6 FT O.C.	15	1.5
2	18	#8	75	6 FT O.C.	15	2
3	14	#8	75	6 FT O.C.	15	3.5

EAST WALL 2 SOIL NAIL SCHEDULE #5						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	18	#8	75	6 FT O.C.	15	1.5
2	16	#8	75	6 FT O.C.	15	2
3	12	#8	75	6 FT O.C.	15	3.5



3 SH3.1 **SOUTH WALL ELEVATION**

SCALE IN FEET

SOUTH WALL SOIL NAIL SCHEDULE #1						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	17	#8	75	6 FT O.C.	15	1.5
2	13	#8	75	6 FT O.C.	15	2

*10°-20° SPLAY ACCOUNTED FOR IN SCHEDULE

SOUTH WALL SOIL NAIL SCHEDULE #2						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	20	#9	75	6 FT O.C.	15	1.5
2	15	#8	75	6 FT O.C.	15	2

*30°-35° SPLAY ACCOUNTED FOR IN SCHEDULE

SOUTH WALL SOIL NAIL SCHEDULE #3						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	23	#9	75	6 FT O.C.	15	1.5
2	17	#9	75	6 FT O.C.	15	2

*40°-45° SPLAY ACCOUNTED FOR IN SCHEDULE

SOUTH WALL SOIL NAIL SCHEDULE #4						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	16	#8	75	6 FT O.C.	15	1.5
2	14	#8	75	6 FT O.C.	15	2
3	12	#8	75	6 FT O.C.	15	3.5

SOUTH WALL SOIL NAIL SCHEDULE #5						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	18	#8	75	6 FT O.C.	15	2
2	16	#8	75	6 FT O.C.	15	2
3	12	#8	75	6 FT O.C.	15	2

LEGEND

1	- GRIDLINE
1	- SOIL NAIL ROW
+	- SOIL NAIL
|	- VERTICAL ELEMENT
(146)	- SOIL NAIL OR TIEBACK ELEVATION
{132}	- SHOTCRETE JOINT ELEVATION
L	- DRILLED NAIL LENGTH (FEET)
BAR	- NAIL BAR SIZE
GRADE	- NAIL BAR STEEL GRADE (Fy)
α	- NAIL DECLINATION (DEGREES) UNLESS SHOWN OTHERWISE ON PLANS
[15°]	- SPLAY ANGLE OF SOIL NAIL
A_D	- ALLOWABLE DESIGN NAIL PULLOUT RESISTANCE (K/FT)

REV.	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

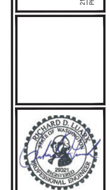
NORTH 2, EAST 2 AND SOUTH WALL ELEVATIONS

GRAND STREET COMMONS - EAST BUILDING

1750 22ND AVE S

SEATTLE WASHINGTON

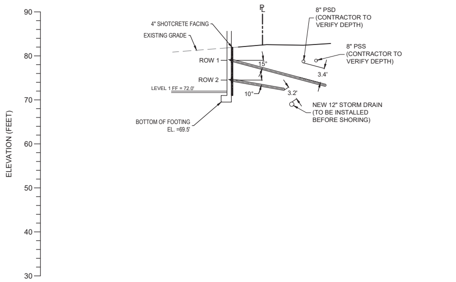
Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549



SH3.1

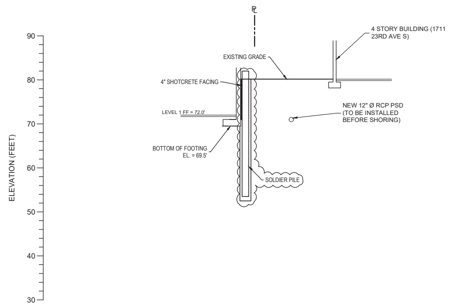
DESIGNED BY:	TB
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	5 OF 9

LAST SAVED: 7/16/2021



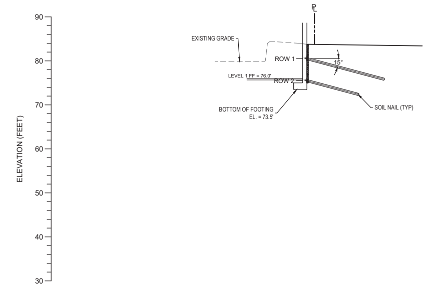
1 SH4.0 **NORTH 1 WALL CROSS SECTION**

0 10 20 SCALE IN FEET



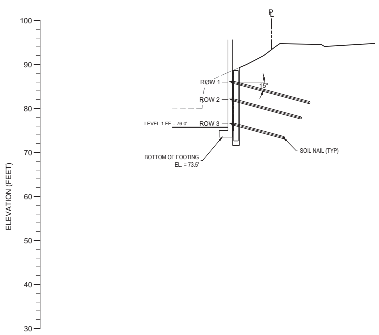
2 SH4.0 **EAST 1 WALL CROSS SECTION**

0 10 20 SCALE IN FEET



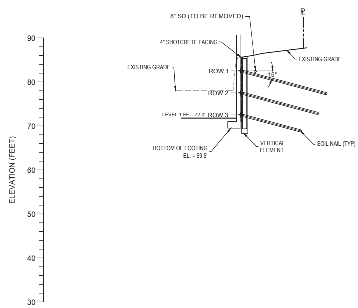
3 SH4.0 **NORTH 2 WALL CROSS SECTION**

0 10 20 SCALE IN FEET



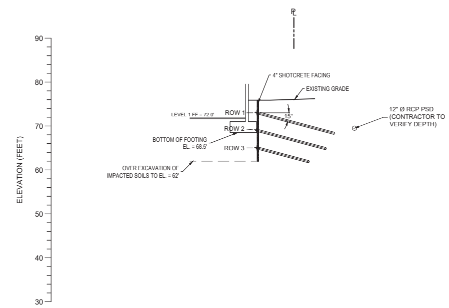
4 SH4.0 **EAST 2 WALL CROSS SECTION**

0 10 20 SCALE IN FEET



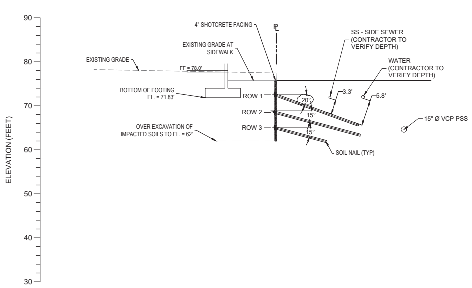
5 SH4.0 **EAST 2 WALL CROSS SECTION**

0 10 20 SCALE IN FEET



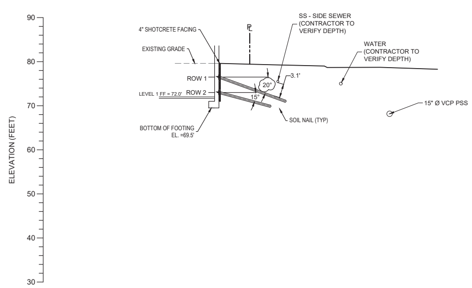
6 SH4.0 **SOUTH WALL CROSS SECTION**

0 10 20 SCALE IN FEET



7 SH4.0 **WEST WALL CROSS SECTION**

0 10 20 SCALE IN FEET



8 SH4.0 **WEST WALL CROSS SECTION**

0 10 20 SCALE IN FEET

LAST SAVED: 7/16/2021

REV.	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

CROSS SECTIONS

GRAND STREET COMMONS - EAST BUILDING

1750 22ND AVE S

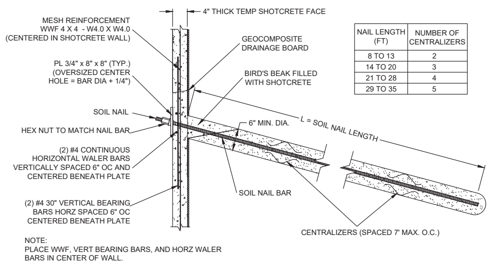
SEATTLE WASHINGTON

Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

RICHARD D. LUARK STATE OF WASHINGTON 29321 REGISTERED PROFESSIONAL ENGINEER

SH4.0

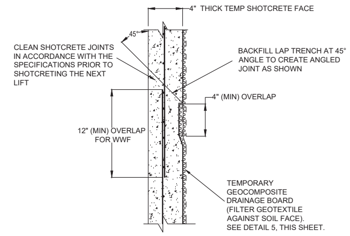
DESIGNED BY:	TB
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	6 OF 9



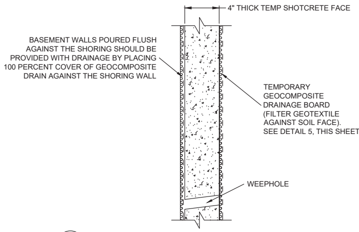
NAIL LENGTH (FT)	NUMBER OF CENTRALIZERS
8 TO 13	2
14 TO 20	3
21 TO 28	4
29 TO 35	5

NOTE:
PLACE WWF, VERT BEARING BARS, AND HORZ WALER BARS IN CENTER OF WALL.

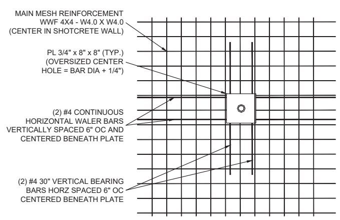
1 SH5.0 TEMPORARY SHOTCRETE FACING AND TEMPORARY NAIL DETAIL - PROFILE VIEW
NOT TO SCALE



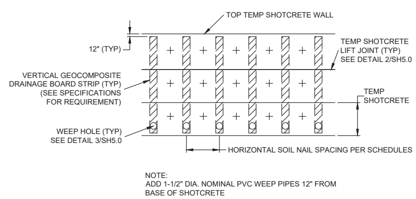
2 SH5.0 TEMPORARY SHOTCRETE JOINT DETAIL
NOT TO SCALE



3 SH5.0 TEMPORARY DRAINAGE DETAIL
NOT TO SCALE

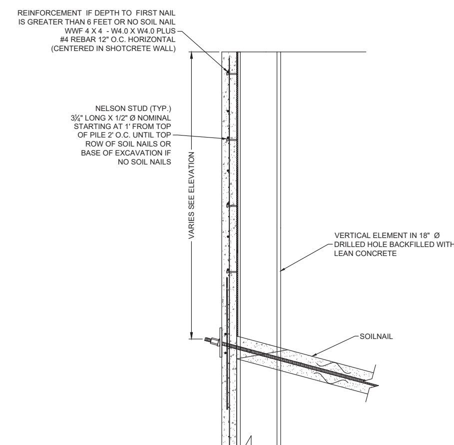


4 SH5.0 TEMPORARY SHOTCRETE FACING AND TEMPORARY NAIL DETAIL (ELEVATION VIEW)
NOT TO SCALE

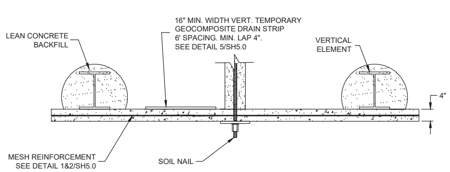


NOTE:
ADD 1-1/2" DIA. NOMINAL PVC WEEP PIPES 12" FROM BASE OF SHOTCRETE

5 SH5.0 TEMPORARY WALL DRAINAGE DETAIL, SOIL NAIL WALL
NOT TO SCALE



6 SH5.0 VERTICAL ELEMENT DETAIL - CROSS SECTION
NOT TO SCALE



7 SH5.0 VERTICAL ELEMENT DETAIL - PLAN VIEW
NOT TO SCALE

REV.	DATE	BY	DESCRIPTION
0	10-2-20	RDL	PERMIT SUBMITTAL
1	4-6-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

DETAILS (1 OF 2)
GRAND STREET COMMONS - EAST BUILDING
1750 22ND AVE S
SEATTLE WASHINGTON

Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

SH5.0

DESIGNED BY:	TB
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.:	81205043
SHEET NO.:	7 OF 9

LAST SAVED: 7/16/2021

SECTION 02330 - VERTICAL ELEMENTS

1.0 GENERAL

A. THE WORK SHALL CONSIST OF DRILLING SHAFTS AND INSTALLING THE VERTICAL ELEMENTS AS SPECIFIED HEREIN AND SHOWN ON THE PLANS. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED FOR COMPLETING THE WORK.

B. A PRE-CONSTRUCTION MEETING SHALL BE HELD PRIOR TO THE START OF THE WORK AND SHALL BE ATTENDED BY THE OWNER'S REPRESENTATIVES, THE ENGINEER, THE PRIME CONTRACTOR, THE EXCAVATION CONTRACTOR, AND THE DRILLED SOLDIER PILE SPECIALTY CONTRACTOR. THE PRE-CONSTRUCTION MEETING SHALL BE CONDUCTED TO CLARIFY THE CONSTRUCTION REQUIREMENTS FOR THE WORK, TO COORDINATE THE CONSTRUCTION ACTIVITIES, AND TO IDENTIFY CONTRACTUAL RELATIONSHIPS AND RESPONSIBILITIES.

C. UTILITIES SHOWN ON THE PLANS ARE FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATING AND VERIFYING THE LOCATION OF ALL UTILITIES SHOWN ON THE PLANS PRIOR TO STARTING THE WORK. THE CONTRACTOR SHALL MAINTAIN UNINTERRUPTED SERVICE FOR THOSE UTILITIES DESIGNATED TO REMAIN IN SERVICE THROUGHOUT THE WORK.

1.1 QUALITY ASSURANCE

A. THE CONTRACTOR SHALL SUBMIT A REFERENCE LIST INDICATING THE SUCCESSFUL COMPLETION OF AT LEAST FIVE DRILLED VERTICAL ELEMENT PROJECTS OF A SIMILAR NATURE AND COMPLETED DURING THE LAST 3 YEARS. A BRIEF DESCRIPTION OF EACH PROJECT WITH THE OWNER'S NAME AND CURRENT PHONE NUMBER SHALL BE INCLUDED.

B. THE CONTRACTOR'S SUPERINTENDENT SHALL HAVE A MINIMUM OF 3 YEARS OF EXPERIENCE SUPERVISING DRILLED VERTICAL ELEMENT PILE CONSTRUCTION AND THE DRILL OPERATORS AND ON-SITE SUPERVISORS SHALL HAVE A MINIMUM OF 1 YEAR OF EXPERIENCE INSTALLING DRILLED VERTICAL ELEMENTS. PRIOR TO STARTING THE WORK, THE CONTRACTOR SHALL SUBMIT A LIST IDENTIFYING THE SUPERINTENDENT, DRILL RIG OPERATORS, AND ON-SITE SUPERVISORS ASSIGNED TO THE PROJECT. THE LIST SHALL CONTAIN A SUMMARY OF EACH INDIVIDUAL'S EXPERIENCE AND SHALL BE SUFFICIENTLY COMPLETE FOR THE ENGINEER TO EVALUATE THE INDIVIDUAL'S QUALIFICATIONS.

C. THE ENGINEER MAY SUSPEND THE WORK IF THE CONTRACTOR SUBSTITUTES NON-APPROVED PERSONNEL FOR APPROVED PERSONNEL. THE CONTRACTOR SHALL BE FULLY LIABLE FOR ADDITIONAL COSTS RESULTING FROM THE SUSPENSION OF WORK AND NO ADJUSTMENTS IN THE CONTRACT TIME RESULTING FROM THE WORK SUSPENSION SHALL BE ALLOWED.

1.2 CONSTRUCTION SITE SURVEY

A. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO ANY CONSTRUCTION ACTIVITY FOR THE PURPOSE OF OBSERVING AND DOCUMENTING THE PRE-CONSTRUCTION CONDITION OF ALL STRUCTURES, SIDEWALKS, ROADWAYS, AND ALL OTHER FACILITIES ADJACENT TO THE PROJECT SITE. DURING CONSTRUCTION, THE CONTRACTOR SHALL OBSERVE THE CONDITIONS ABOVE THE SHORING WALL ON A DAILY BASIS FOR SIGNS OF ANY GROUND OR STRUCTURE MOVEMENTS. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IF ANY SIGN OF MOVEMENT SUCH AS NEW CRACKS IN STRUCTURES, INCREASED SIZE OF OLD CRACKS OR SEPARATION OF JOINTS IN STRUCTURES, FOUNDATIONS, STREETS OR PAVED AND UNPAVED SURFACES ARE OBSERVED; AND PROVIDE THE ENGINEER WRITTEN DOCUMENTATION OF THE OBSERVED CONDITIONS WITHIN 24 HOURS.

1.3 CONSTRUCTION TOLERANCES

A. SHAFTS FOR VERTICAL ELEMENTS SHALL BE CONSTRUCTED SO THAT THE CENTER AT THE TOP OF THE SHAFT IS WITHIN 3 INCHES OF THE PLAN LOCATION. SHAFTS SHALL BE PLUMB, TO WITHIN 1.0% OF THE LENGTH BASED ON THE TOTAL LENGTH OF THE SHAFT. THE ELEVATION AT THE TOP OF SHAFT SHALL BE +/-3 INCHES FROM THE PLAN LOCATION. DURING CONSTRUCTION FOR THE SHAFTS, THE CONTRACTOR SHALL MAKE FREQUENT CHECKS ON THE PLUMBNESS, ALIGNMENT, AND DIMENSIONS OF THE SHAFTS. ANY DEVIATION EXCEEDING THE ALLOWABLE TOLERANCES SHALL BE CORRECTED IMMEDIATELY.

B. STEEL PILES SHALL BE PLACED SO THAT THE CENTER LINE OF THE PILE IS WITHIN 1 INCH OF THE PLAN LOCATION. THE STEEL PILE SHALL BE PLUMB TO WITHIN 0.5% OF THE EXPOSED PILE LENGTH. THE TOP ELEVATION OF THE VERTICAL ELEMENT PILE SHALL BE WITHIN 1 INCH OF THE PLAN ELEVATION.

1.4 SUBMITTALS

A. THE FOLLOWING SUBMITTALS AND VERTICAL ELEMENTS SHALL BE PROVIDED BY THE CONTRACTOR FOR THE ENGINEER'S REVIEW AND APPROVAL. THE CONTRACTOR WILL NOT BE ALLOWED TO BEGIN WALL CONSTRUCTION UNTIL ALL SUBMITTAL REQUIREMENTS ARE SATISFIED AND FOUND ACCEPTABLE TO THE ENGINEER. CHANGES OR DEVIATIONS FROM THE APPROVED SUBMITTALS MUST BE RE-SUBMITTED FOR APPROVAL. NO ADJUSTMENTS IN CONTRACT TIME WILL BE ALLOWED DUE TO INCOMPLETE SUBMITTALS. AT LEAST 15 DAYS PRIOR TO INITIATING THE WORK, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER:

1. WORKING DRAWINGS INDICATING STEEL PILE FABRICATION DETAILS AND MATERIALS.
2. CONCRETE MIX DESIGNS AND PLACEMENT PROCEDURES.
3. SHAFT INSTALLATION PLAN, PROVIDING AT LEAST THE FOLLOWING INFORMATION:

A. LIST AND DESCRIPTION OF PROPOSED EQUIPMENT TO BE USED, INCLUDING BUT NOT LIMITED TO, CRANES, DRILLS, AUGERS, BAILING BUCKETS, FINAL CLEANING EQUIPMENT, TREMIES, PUMPS, ETC.
B. THE CONSTRUCTION SEQUENCE AND THE ORDER OF SHAFT CONSTRUCTION.
C. DETAILS OF SHAFT EXCAVATION METHODS INCLUDING METHODS TO CLEAN THE SHAFT EXCAVATION.
D. DETAILS OF THE SHAFTS AND CASING.
E. DETAILS OF VERTICAL ELEMENT PLACEMENT METHODS INCLUDING INTERNAL SUPPORT BRACING AND CENTRALIZATION METHODS.
F. DETAILS OF CONCRETE PLACEMENT METHODS INCLUDING EQUIPMENT AND PROCEDURES FOR CONCRETING THROUGH A CONDUIT OR TREMIE.
G. THE METHOD TO BE USED TO PREVENT CAVING (TEMPORARY CASING, SLURRY, OR OTHER METHODS).

1.5 MATERIALS

1.5.1 STRUCTURAL STEEL
A. ALL STRUCTURAL STEEL SHALL CONFORM TO THE REQUIREMENTS OF ASTM A992, UNLESS SHOWN OTHERWISE ON THE PLANS.

1.5.2 WELD ELECTRODES AND HEADED STUDS
A. WELD ELECTRODES SHALL BE E70XX AND SHALL CONFORM TO AWS D1.1-88.

B. HEADED STUDS SHALL CONFORM TO ASTM A307.

1.5.3 LEAN CONCRETE

1.5.3.1 GENERAL
A. WHERE INDICATED ON THE PLANS, THE CONTRACTOR SHALL FURNISH PLANT, LABOR, AND MATERIALS AND PERFORM ALL OPERATIONS NECESSARY TO FURNISH, PLACE, AND INSTALL LEAN CONCRETE FOR DRILLED SOLDIER PILE SHAFTS.

1.5.3.2 MIX REQUIREMENTS
A. LEAN CONCRETE FOR DRILLED SHAFTS SHALL BE PROPORTIONED TO MEET THE FOLLOWING REQUIREMENTS:

1. CEMENTITIOUS MATERIAL CONTENT SHALL BE NOT LESS THAN 141 POUNDS PER CUBIC YARD.
2. CEMENTITIOUS MATERIAL MAY BE PORTLAND CEMENT, BLENDED HYDRAULIC CEMENT, OR A COMBINATION OF PORTLAND CEMENT AND FLY ASH AS FOLLOWS:

A. PORTLAND CEMENT SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M85/ASTM C150.
B. BLENDED HYDRAULIC CEMENT SHALL CONFORM TO THE REQUIREMENTS OF ASTM C595 TYPE 1P(MS).
C. FLY ASH SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M295.

3. SLUMP, INCLUDING WATER-REDUCING ADMIXTURES, SHALL BE NO LESS THAN 4 INCHES AND NO GREATER THAN 8 INCHES.

B. ADMIXTURES SHALL CONFORM TO THE REQUIREMENTS OF ASTM C494, SHALL BE USED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, AND SHALL BE APPROVED BY THE ENGINEER.

C. AGGREGATES SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M6/ASTM C33 FOR FINE AGGREGATES AND AASHTO M80, CLASS B FOR COARSE AGGREGATES.

1.6 CONSTRUCTION REQUIREMENTS

1.6.1 SHAFT EXCAVATION
A. SHAFTS SHALL BE EXCAVATED TO THE REQUIRED DEPTH AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. THE EXCAVATION SHALL BE COMPLETED IN A CONTINUOUS OPERATION USING EQUIPMENT CAPABLE OF EXCAVATING THROUGH THE TYPE OF MATERIAL EXPECTED TO BE ENCOUNTERED

B. SHAFT EXCAVATIONS SHALL BE BACKFILLED WITHIN 4 HOURS OF BEGINNING OF EXCAVATION, UNLESS APPROVED OTHERWISE BY THE ENGINEER. IF THE SHAFT EXCAVATION IS STOPPED WITH THE APPROVAL OF THE ENGINEER, THE SHAFT SHALL BE SECURED BY INSTALLATION OF A SAFETY COVER. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THE SAFETY OF THE SHAFT AND SURROUNDING SOIL AND THE STABILITY OF THE SIDE WALLS. A TEMPORARY CASING SHOULD BE USED IF NECESSARY TO ENSURE SUCH SAFETY AND STABILITY.

C. WHERE CAVING CONDITIONS ARE ENCOUNTERED, FURTHER EXCAVATION WILL NOT BE ALLOWED UNTIL THE CONTRACTOR SELECTS A METHOD TO PREVENT GROUND MOVEMENT. THE CONTRACTOR MAY ELECT TO PLACE A TEMPORARY CASING OR USE OTHER METHODS APPROVED BY THE ENGINEER.

D. THE CONTRACTOR SHALL USE APPROPRIATE MEANS (SUCH AS A CLEANOUT BUCKET), TO CLEAN THE BOTTOM OF THE EXCAVATION SUCH THAT NO MORE THAN 1 INCH OF LOOSE OR DISTURBED MATERIAL IS PRESENT.

E. THE EXCAVATED SHAFT SHALL BE INSPECTED AND APPROVED BY THE ENGINEER PRIOR TO PROCEEDING WITH CONSTRUCTION.

F. WHEN UNEXPECTED OBSTRUCTIONS, WHICH REQUIRE SPECIALIZED EQUIPMENT AND/OR LABOR ARE ENCOUNTERED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER PROMPTLY AND THE OBSTRUCTIONS SHALL BE REMOVED AND THE EXCAVATION CONTINUED IN A MANNER APPROVED BY THE ENGINEER.

G. TEMPORARY CASINGS FOR THE SHAFTS SHALL BE REMOVED BEFORE CONCRETE SETUP. A MINIMUM 5 FOOT HEAD OF CONCRETE MUST BE MAINTAINED TO BALANCE THE SOIL AND WATER PRESSURE AT THE BOTTOM OF THE CASING DURING REMOVAL. THE CASING SHALL BE SMOOTH AND WELL OILED WITH FORM OIL.

1.6.2 INSTALLATION OF VERTICAL ELEMENTS
A. THE STEEL SOLDIER PILES SHALL BE LOWERED INTO THE DRILLED SHAFTS AND SECURED IN POSITION.

1.6.3 PLACEMENT OF SHAFT CONCRETE
A. SHAFT CONCRETE SHALL BE PLACED AS SHOWN ON THE PLANS AND SHALL COMMENCE WITHIN 2 HOURS AFTER COMPLETION OF THE EXCAVATION. SHAFT CONCRETE SHALL BE PLACED IN ONE CONTINUOUS OPERATION TO THE TOP OF THE SHAFT.

B. IF WATER IS NOT PRESENT, THE CONCRETE SHALL BE DEPOSITED BY A METHOD WHICH PREVENTS AGGREGATE SEGREGATION. THE CONTRACTOR'S METHOD FOR DEPOSITING CONCRETE SHALL HAVE APPROVAL OF THE ENGINEER PRIOR TO CONCRETE PLACEMENT.

C. IF WATER IS PRESENT, THE CONCRETE SHALL BE DEPOSITED BY TREMIE PLACEMENT METHODS.

SECTION 02340 - SOIL NAILS AND WALL DRAINAGE

PART 1 - GENERAL

1.01 DESCRIPTION
A. THE WORK SHALL CONSIST OF CONSTRUCTING SOIL NAILS AND WALL DRAINAGE AS SPECIFIED HEREIN AND SHOWN ON THE PLANS. THE WORK SHALL ALSO INCLUDE EXCAVATING IN ACCORDANCE WITH THE STAGED LIFTS SHOWN ON THE PLANS; DRILLING SOIL NAIL HOLES TO THE SPECIFIED MINIMUM LENGTH AND ORIENTATION INDICATED ON THE PLANS; PROVIDING, PLACING, AND GROUTING THE NAILS IN THE DRILLED HOLES; PLACING DRAINAGE ELEMENTS; AND PERFORMING ALL SOIL NAIL PULLOUT TESTING. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED FOR COMPLETING THE WORK.

B. A PRE-CONSTRUCTION MEETING SHALL BE HELD PRIOR TO THE START OF THE WORK AND SHALL BE ATTENDED BY THE OWNER'S REPRESENTATIVE, THE ENGINEER, THE PRIME CONTRACTOR, THE EXCAVATION CONTRACTOR, THE SOIL NAIL SPECIALTY SUBCONTRACTOR, AND SEATTLE DEPARTMENT OF TRANSPORTATION (SDOT) AND THE SEATTLE DEPARTMENT OF CONSTRUCTION AND INSPECTION (SDCI). THE PRE-CONSTRUCTION MEETING SHALL BE CONDUCTED TO CLARIFY THE CONSTRUCTION REQUIREMENTS FOR THE WORK, TO COORDINATE THE CONSTRUCTION ACTIVITIES, AND TO IDENTIFY CONTRACTUAL RELATIONSHIPS AND RESPONSIBILITIES.

C. THE OWNER'S REPRESENTATIVE / SOIL NAILING INSPECTOR THAT IS PROVIDING THE SPECIAL INSPECTION AND CONSTRUCTION MONITORING SHALL BE A QUALIFIED GEOTECHNICAL ENGINEER OR HIS REPRESENTATIVE WITH EXPERIENCE MONITORING SOIL NAIL WALL CONSTRUCTION.

D. UTILITIES REFERENCED ON THE PLANS ARE FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATING AND VERIFYING THE LOCATION OF ALL UTILITIES, BOTH THOSE SHOWN ON THE PLANS AND THOSE NOT SHOWN, PRIOR TO STARTING THE WORK. THE CONTRACTOR SHALL MAINTAIN UNINTERRUPTED SERVICE FOR THOSE UTILITIES DESIGNATED TO REMAIN IN SERVICE THROUGHOUT THE WORK.

1.02 QUALITY ASSURANCE

A. THE CONTRACTOR SHALL SUBMIT A REFERENCE LIST INDICATING THE SUCCESSFUL COMPLETION OF AT LEAST FIVE SOIL NAIL OR GROUND ANCHOR RETAINING WALL PROJECTS COMPLETED DURING THE LAST 3 YEARS. A BRIEF DESCRIPTION OF EACH PROJECT WITH THE OWNER'S NAME AND CURRENT PHONE NUMBER SHALL BE INCLUDED

B. THE CONTRACTOR'S SUPERINTENDENT SHALL HAVE A MINIMUM OF 3 YEARS EXPERIENCE SUPERVISING SOIL NAILING AND/OR GROUND ANCHOR WORK, AND THE DRILL OPERATORS AND ON-SITE SUPERVISORS SHALL HAVE A MINIMUM OF 1 YEAR EXPERIENCE INSTALLING SOIL NAILS OR GROUND ANCHORS. PRIOR TO STARTING THE WORK, THE CONTRACTOR SHALL SUBMIT A LIST IDENTIFYING THE SUPERINTENDENT, DRILL RIG OPERATORS, AND ON-SITE SUPERVISORS ASSIGNED TO THE PROJECT. THE LIST SHALL CONTAIN A SUMMARY OF EACH INDIVIDUAL'S EXPERIENCE AND SHALL BE SUFFICIENTLY COMPLETE FOR THE ENGINEER TO EVALUATE THE INDIVIDUAL'S QUALIFICATIONS. WORK SHALL NOT BE STARTED UNTIL WRITTEN APPROVAL OF THE CONTRACTOR'S QUALIFICATIONS IS GIVEN.

C. THE OWNER'S REPRESENTATIVE MAY SUSPEND THE WORK IF THE CONTRACTOR SUBSTITUTES NON-APPROVED PERSONNEL FOR APPROVED PERSONNEL. THE CONTRACTOR SHALL BE FULLY LIABLE FOR ADDITIONAL COSTS RESULTING FROM THE SUSPENSION OF WORK, AND NO ADJUSTMENTS IN THE CONTRACT TIME RESULTING FROM THE WORK SUSPENSION SHALL BE ALLOWED.

1.03 CONSTRUCTION SITE SURVEY
A. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO ANY CONSTRUCTION ACTIVITIES FOR THE PURPOSE OF OBSERVING AND DOCUMENTING THE PRE-CONSTRUCTION CONDITION OF ALL STRUCTURES, INFRASTRUCTURE, SIDEWALKS, ROADWAYS, AND ALL OTHER FACILITIES ADJACENT TO THE SITE. DURING CONSTRUCTION, THE CONTRACTOR SHALL OBSERVE THE CONDITIONS ABOVE THE SOIL NAIL WALL ON A DAILY BASIS FOR SIGNS OF GROUND OR BUILDING MOVEMENTS. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER'S REPRESENTATIVE AND ENGINEER IF SIGNS OF MOVEMENTS SUCH AS NEW CRACKS, INCREASED SIZE OF OLD CRACKS OR SEPARATION OF JOINTS IN STRUCTURES, FOUNDATIONS, STREETS OR PAVED AND UNPAVED SURFACES ARE OBSERVED. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WRITTEN DOCUMENTATION OF THE OBSERVED CONDITIONS WITHIN 24 HOURS.

1.04 SUBMITTALS
A. THE FOLLOWING SUBMITTALS SHALL BE PROVIDED BY THE CONTRACTOR FOR THE ENGINEER'S REVIEW AND APPROVAL. THE CONTRACTOR WILL NOT BE ALLOWED TO BEGIN WALL CONSTRUCTION UNTIL ALL SUBMITTAL REQUIREMENTS ARE SATISFIED AND FOUND ACCEPTABLE TO THE ENGINEER. CHANGES OR DEVIATIONS FROM THE APPROVED SUBMITTALS MUST BE RE-SUBMITTED FOR APPROVAL. NO ADJUSTMENTS IN CONTRACT TIME WILL BE ALLOWED DUE TO INCOMPLETE SUBMITTALS. AT LEAST 15 DAYS PRIOR TO INITIATING THE WORK, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER:

1. A DETAILED CONSTRUCTION SEQUENCE AND PLANNED START OF WORK DATE.
2. METHODS OF EXCAVATING TO THE STAGED LIFTS INDICATED ON THE PLANS, PROVISION OF TEMPORARY STABILITY, AND EXCAVATION EQUIPMENT TYPES.
3. DRILLING METHODS AND EQUIPMENT INCLUDING PROPOSED DRILLHOLE DIAMETER TO ACHIEVE THE SPECIFIED PULLOUT RESISTANCE AND ANY VARIATION OF THESE ALONG THE ALIGNMENT.
4. NAIL GROUT MIX DESIGN INCLUDING: BRAND AND TYPE OF PORTLAND CEMENT; SOURCE, GRADATION, AND QUALITY OF ALL AGGREGATES; PROPORTIONS OF MIX BY WEIGHT AND WATER-CEMENT RATIO; MANUFACTURER AND BRAND NAME OF ALL ADMIXTURES; AND COMPRESSIVE STRENGTH TEST RESULTS (PER ASTM C109 / AASHTO T106) VERIFYING THE SPECIFIED MINIMUM 3 AND 28 DAY GROUT STRENGTHS.
5. NAIL GROUT PLACEMENT PROCEDURES AND EQUIPMENT.
6. SOIL NAIL TESTING METHODS AND EQUIPMENT INCLUDING: DETAILS OF THE JACKING FRAME AND APPURTENANT BRACING; DETAILS SHOWING METHODS OF ISOLATING TEST NAILS DURING SHOTCRETE APPLICATION (I.E., METHODS TO PREVENT BONDING OF THE SOIL NAIL BAR AND THE SHOTCRETE DURING TESTING); DETAILS SHOWING METHODS OF GROUTING THE UNBONDED LENGTH OF TEST NAILS AFTER COMPLETION OF TESTING; AND EQUIPMENT LIST.
7. IDENTIFICATION NUMBERS AND CERTIFIED CALIBRATION RECORDS FOR EACH TEST JACK AND PRESSURE GAUGE PAIR TO BE USED. CALIBRATION RECORDS SHALL INCLUDE THE DATE TESTED, DEVICE IDENTIFICATION NUMBER, AND THE CALIBRATION TEST RESULTS AND SHALL BE CERTIFIED FOR AN ACCURACY OF AT LEAST 2 PERCENT OF THE APPLIED CERTIFICATION LOADS BY A QUALIFIED INDEPENDENT TESTING LABORATORY WITHIN 90 DAYS PRIOR TO SUBMITTAL.
8. CERTIFIED MILL TEST RESULTS FOR NAIL BARS FROM EACH HEAT SPECIFYING THE ULTIMATE STRENGTH, YIELD STRENGTH, ELONGATION AND COMPOSITION.
9. MANUFACTURER CERTIFICATIONS FOR THE SOIL NAIL CENTRALIZERS AND SOIL NAIL BAR COUPLERS
10. A DETAILED CONSTRUCTION DRAINAGE CONTROL PLAN ADDRESSING ALL ELEMENTS NECESSARY TO DIVERT, CONTROL, AND DISPOSE OF SURFACE WATER.

PART 2 - MATERIALS

2.01 GENERAL DESCRIPTION
A. MATERIALS FOR CONSTRUCTION OF SOIL NAIL WALLS SHALL BE FURNISHED NEW AND WITHOUT DEFECTS. DEFECTIVE MATERIALS REJECTED BY THE OWNER'S REPRESENTATIVE SHALL BE REMOVED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. MATERIALS SHALL CONSIST OF THE FOLLOWING: THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED FOR COMPLETING THE WORK.

CENTRALIZERS	SCHEDULE 40 PVC OR OTHER MATERIAL NOT DETRIMENTAL TO THE NAIL STEEL (WOOD SHALL NOT BE USED); SECURELY ATTACHED TO THE NAIL BAR; SIZED TO POSITION THE NAIL BAR WITHIN 1 INCH OF THE CENTER OF THE DRILL HOLE; SIZED TO ALLOW TREMIE PIPE INSERTION TO THE BOTTOM OF THE DRILL HOLE; AND, SIZED TO ALLOW GROUT TO FLOW FREELY UP THE DRILL HOLE.
NAIL GROUT	THE GROUT SHALL BE A NEAT OR SAND/ CEMENT MIXTURE WITH A MINIMUM 3-DAY COMPRESSIVE STRENGTH OF 1500 PSI AND A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3000 PSI PER ASTM C109 / AASHTO T106.
CEMENT	ASTM C150 / AASHTO M85, TYPE I. FINE AGGREGATE ASTM C33 / AASHTO M6.
NAIL BARS	ASTM A615 / AASHTO M31, GRADE 60 OR 75 OR ASTM A722 / AASHTO M275, GRADE 150.
BAR COUPLERS	BAR COUPLERS SHALL DEVELOP THE FULL ULTIMATE TENSILE STRENGTH OF THE BAR AS CERTIFIED BY THE MANUFACTURER AND PROVIDE THE NECESSARY CORROSION PROTECTION AS THE REMAINDER OF THE BAR.
BEARING PLATES	ASTM A709 / AASHTO M270, GRADE 36. NUTS & WASHERS AASHTO M291, GRADE B, HEXAGONAL FITTED WITH BEVELED WASHER OR SPHERICAL SEAT TO PROVIDE UNIFORM BEARING.
HEADED-STUDS	ASTM A307 OR APPROVED EQUAL.
WELD ELECTRODES	E70XX AND IN ACCORDANCE WITH AWS D1.1-88.
DRAINAGE GEOTEXTILE	NEEDLE PUNCHED, NON-WOVEN, PUNCTURE RESISTANCE (ASTM D4833) 335 N, GRAB STRENGTH (ASTM D4632) 690 N, FABRIC WEIGHT (ASTM 3776) 0.2 KG/M2, APPARENT OPENING SIZE (AOS) (COE CW-02215) 70.
DRAINAGE AGGREGATE	ASTM C33 NO. 67 WITH NO MORE THAN FIVE PERCENT PASSING THE #200 SIEVE.
GEOCOMPOSITE DRAINAGE BOARD	MIRADRAIN G100N (OR APPROVED EQUIVALENT).
WEEP PIPES	SCHEDULE 40 PVC.

2.02 MATERIALS HANDLING AND STORAGE
A. CEMENT SHALL BE ADEQUATELY STORED TO PREVENT MOISTURE DEGRADATION AND PARTIAL HYDRATION. CEMENT THAT HAS BECOME CAKED OR LUMPY SHALL NOT BE USED.

B. ALL STEEL REINFORCEMENT SHALL BE CAREFULLY HANDLED AND SHALL BE STORED ON SUPPORTS TO KEEP THE STEEL FROM CONTACT WITH THE GROUND. STEEL BARS SHALL BE PICKED UP IN SUCH A WAY AS TO PREVENT OVERSTRESSING. DAMAGE TO THE NAIL STEEL AS A RESULT OF OVERSTRESSING, ABRASION, CUTS, NICKS, WELDS, AND WELD SPLATTER SHALL BE CAUSE FOR REJECTION BY THE OWNER'S REPRESENTATIVE. GROUNDING OF WELDING LEADS TO THE NAIL STEEL SHALL NOT BE ALLOWED. NAIL STEEL SHALL BE PROTECTED FROM AND SUFFICIENTLY FREE OF DIRT, RUST, AND OTHER DELETERIOUS SUBSTANCES PRIOR TO INSTALLATION. HEAVY CORROSION OR PITTING OF NAILS SHALL BE CAUSE FOR REJECTION BY THE OWNER'S REPRESENTATIVE. LIGHT RUST THAT HAS NOT RESULTED IN PITTING IS ACCEPTABLE.

C. DRAINAGE GEOTEXTILE AND GEOCOMPOSITE DRAINS SHALL BE PROVIDED IN ROLLS WRAPPED WITH A PROTECTIVE COVERING AND STORED IN A MANNER THAT PROTECTS THE FABRIC FROM MUD, DIRT, DUST, DEBRIS, AND SHOTCRETE REBOUND. PROTECTIVE WRAPPING SHALL NOT BE REMOVED UNTIL IMMEDIATELY BEFORE THE GEOTEXTILE OR DRAIN STRIP IS INSTALLED. EXTENDED EXPOSURE TO ULTRA-VIOLET LIGHT SHALL BE AVOIDED.

PART 3 - EXECUTION

3.01 GENERAL
A. THE CONSTRUCTION SEQUENCE SHALL BE IN ACCORDANCE WITH THE APPROVED SUBMITTAL, UNLESS APPROVED OTHERWISE BY THE ENGINEER. NO EXCAVATIONS STEEPER OR HIGHER THAN THOSE SPECIFIED HEREIN SHALL BE MADE ABOVE OR BELOW THE SOIL NAIL WALL WITHOUT WRITTEN APPROVAL OF THE ENGINEER.

3.02 EARTHWORK

3.02.01 MASS EXCAVATION
A. FOR DISTANCES AWAY FROM THE WALL FACE GREATER THAN THE CURRENT WALL HEIGHT, MASS EXCAVATION MAY OCCUR AT ANY TIME, BUT WITH SLOPES NO STEEPER THAN 1H:1V, UNLESS APPROVED OTHERWISE BY THE ENGINEER.

B. SUBSEQUENT MASS EXCAVATION BENEATH A PRECEDING SHOTCRETE LIFT, NO CLOSER THAN 5 FEET FROM THE FACE OF SHOTCRETE, MAY OCCUR ANY TIME THE DAY AFTER SHOTCRETING THE PRECEDING LIFT. ALL TEMPORARY SLOPES THAT ARE HIGHER THAN 4 FEET SHALL NOT BE STEEPER THAN 1H:1V UNLESS APPROVED OTHERWISE BY THE ENGINEER.

C. DURING MASS EXCAVATION OF THE DRILL BENCH FOR THE NEXT ROW OF NAILS, THE CONTRACTOR SHALL MAINTAIN A BENCH OF MATERIAL TO SERVE AS BOTH A PLATFORM FOR THE DRILLING EQUIPMENT, AND AS A STABILIZING BERM AGAINST THE FINAL WALL EXCAVATION FACE NEAT-LINE. THE MATERIAL NEAR THE WALL FACE MAY BE EITHER (A) A NATIVE BERM, (B) A SOFT BERM, OR (C) NEAT CUT AS SUBMITTED IN ACCORDANCE WITH SECTION 1.04 OF THE SUBMITTALS. IN ALL THREE CASES, THE DRILL BENCH SHALL BE ESTABLISHED NOT MORE THAN 3 FEET BELOW THE ROW OF NAILS TO BE INSTALLED AND SHALL EXTEND OUT FROM THE WALL FACE A MINIMUM DISTANCE NECESSARY TO PROVIDE A SAFE WORKING BENCH FOR THE DRILL EQUIPMENT AND WORKERS. THE CONTRACTOR IS COMPLETELY RESPONSIBLE FOR THE SAFETY AND STABILITY OF THE TEMPORARY DRILL BENCH AND WALL FACE CUT, UNTIL THE CORRESPONDING SHOTCRETE LIFT WITH CONNECTION HARDWARE IS CONSTRUCTED .

D. SUBSEQUENT MASS EXCAVATION BENEATH A PRECEDING SHOTCRETE LIFT, CLOSER THAN 5 FEET FROM THE FACE OF SHOTCRETE, SHALL NOT OCCUR UNTIL: (1) IT HAS BEEN SHOWN TO THE DESIGN ENGINEER THAT NAIL GROUT AND SHOTCRETE ON THE PRECEDING LIFT HAVE REACHED 50 PERCENT OF THEIR SPECIFIED 28-DAY COMPRESSIVE STRENGTHS; AND (2) INSTALLATION OF CONNECTION HARDWARE AND NAIL TESTING FOR THE PRECEDING LIFT ARE COMPLETE AND ACCEPTABLE TO THE OWNER'S REPRESENTATIVE. MASS EXCAVATION CLOSER THAN 5 FEET TO THE SHOTCRETE FACE MUST BE IN ACCORDANCE WITH THE DRILL BERM REQUIREMENTS DESCRIBED IN SECTION C.

E. EXCAVATING OF THE GROUND BEYOND THE FINAL WALL FACE SHALL NOT BE ALLOWED. INADVERTENT OVEREXCAVATION BEYOND THE FINAL WALL FACE SHALL BE RESTORED BY THE CONTRACTOR USING A METHOD APPROVED BY THE ENGINEER AND AT NO ADDITIONAL COST TO THE OWNER.

3.02.02 WALL FACE EXCAVATION
A. EXCAVATION TO THE FINAL WALL EXCAVATION FACE (NEAT LINE) SHALL BE DONE USING PROCEDURES THAT : (1) PREVENT GROUND LOSS, SWELLING, AIR SLACKING, OR LOOSENING; (2) MINIMIZE DEGRADATION OF SOIL BEARING SUPPORT BELOW THE OVERLYING PORTIONS OF THE SOIL NAIL WALL AND BELOW THE SOIL NAILS CURRENTLY BEING INSTALLED; (3) PREVENT PREMATURE LOSS OF SOIL MOISTURE AT THE FACE; (4) PREVENT GROUND FREEZING; AND (5) REDUCE THE POTENTIAL FOR SHOTCRETE OVERAGES.

B. THE DURATION OF TIME BETWEEN EXCAVATION TO THE FINAL WALL FACE (NEAT LINE) AND APPLICATION OF THE SHOTCRETE SHALL BE REFERRED TO AS THE "CLOSURE TIME". THE CLOSURE TIME FOR ALL WALL FACES SHALL BE LESS THAN ONE WORK SHIFT UNLESS APPROVED OTHERWISE BY THE ENGINEER, AND THAT THE ENGINEER CAN APPROVE A CLOSURE TIME UP TO 24 HOURS FROM EXCAVATION FACE CUT TO APPLICATION OF SHOTCRETE IF THE CONTRACTOR CAN DEMONSTRATE THAT THE DELAY WILL NOT ADVERSELY AFFECT THE EXCAVATION FACE STABILITY.

C. REQUESTS FOR EXTENSION OF THE CLOSURE TIME SHALL BE SUBMITTED FOR IN ACCORDANCE WITH THE SUBMITTALS SECTION OF THE CONTRACT DOCUMENTS. NO APPROVAL FOR EXTENSION OF CLOSURE TIME SHALL BE GRANTED UNTIL THE CONTRACTOR DEMONSTRATES TO THE ENGINEER THAT THE UNSUPPORTED FINAL EXCAVATION FACE WILL BE STABLE OVER THE PROPOSED EXTENSION OF THE CLOSURE TIME (24 HOURS MAXIMUM). EXTENSIONS TO THE FACE CLOSURE TIME SHALL BE PERIODICALLY REVIEWED AND MAY BE REVOKED BY THE ENGINEER AT HIS DISCRETION AND AT NO ADDITIONAL COST TO THE OWNER.

3.02.03 TEMPORARY END OF WALL CONDITIONS
A. WHERE THE CONTRACTOR'S CONSTRUCTION SEQUENCING RESULT IN A DISCONTINUOUS LIFT ALONG ANY NAIL ROW, THE ENDS OF THE LIFT SHALL EXTEND BEYOND THE ENDS OF THE NEXT LOWER LIFT BY AT LEAST 10 FEET. SLOPES/BERMS IMMEDIATELY BENEATH THESE STEPPED LIFTS SHALL BE CONSTRUCTED TO PREVENT SLOUGHING OR FAILURE THAT WOULD RESULT IN LOSS OF THE FACE SUPPORT PROVIDED BY THE SLOPES/BERMS.

3.02.04 PROTRUSIONS AND VOIDS
A. COBBLES, BOULDERS, RUBBLE, OR OTHER OBJECTS THAT ARE ENCOUNTERED AT THE SOIL FACE DURING EXCAVATION AND THAT PROTRUDE FROM THE SOIL FACE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTING THE SHOTCRETE CONSTRUCTION FACING AND/OR THE FINISH STRUCTURAL FACING TO THE SPECIFIED MINIMUM THICKNESS AND TO THE LINE AND GRADE INDICATED IN THE PLANS. REMOVAL OF FACE PROTRUSIONS TO ACCOMPLISH THIS CONSTRUCTION SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF THE PROPOSED METHOD FOR MITIGATION OF FACE PROTRUSIONS AT LEAST 24 HOURS PRIOR TO INITIATION OF THE WORK. SHOULD THE REMOVAL OF FACE PROTRUSIONS RESULT IN VOIDS BEYOND THE FINISH FACE LINE (NEAT LINE), THE CONTRACTOR SHALL DETERMINE THE APPROPRIATE METHOD OF BACKFILLING AND SHALL SUBMIT TO THE ENGINEER SUCH METHOD(S) AT LEAST 24 HOURS PRIOR TO INITIATING THE WORK.

3.03 WALL DRAINAGE

3.03.01 DESCRIPTION
A. THE DRAINAGE NETWORK SHALL CONSIST OF INSTALLING THE PREFABRICATED GEOCOMPOSITE DRAINAGE STRIPS, PVC CONNECTION PIPES AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. ALL ELEMENTS OF THE DRAINAGE NETWORK SHALL BE INSTALLED PRIOR TO SHOTCRETING.

3.03.02 DRAINAGE CONTROL
A. LOCALIZED AREAS OF PERCHED WATER MAY BE ENCOUNTERED. THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE IF GROUNDWATER OCCURS IN THE EXCAVATION OR AT THE EXCAVATION FACE.

B. THE CONTRACTOR SHALL PROVIDE POSITIVE CONTROL AND DISCHARGE OF ALL SURFACE WATER ENCOUNTERED DURING CONSTRUCTION TO THE EXTENT NECESSARY TO PREVENT ADVERSE CONDITIONS AS DETERMINED BY THE OWNER'S REPRESENTATIVE. DAMAGE CAUSED BY THE FAILURE TO CONTROL SURFACE WATER SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE AT NO ADDITIONAL COST TO THE OWNER.

C. EXISTING SUBSURFACE DRAINAGE FEATURES ENCOUNTERED DURING EXCAVATION SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE OWNER'S REPRESENTATIVE. WORK IN THESE AREAS SHALL BE SUSPENDED UNTIL REMEDIAL MEASURES MEETING THE APPROVAL OF THE OWNER'S REPRESENTATIVE ARE IMPLEMENTED BY THE CONTRACTOR. SURFACE WATER RUNOFF FLOW AND FLOWS FROM EXISTING SUBSURFACE DRAINAGE FEATURES SHALL BE CAPTURED INDEPENDENTLY OF THE WALL DRAINAGE NETWORK AND CONVEYED TO AN OUTFALL STRUCTURE OR STORM SEWER AS DETERMINED BY THE OWNER'S REPRESENTATIVE.

D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONDITION AND MAINTENANCE OF ANY PIPE OR CONDUIT USED TO CONTROL SURFACE WATER DURING CONSTRUCTION. UPON SUBSTANTIAL COMPLETION OF THE WORK, SURFACE WATER CONTROL PIPES OR CONDUITS SHALL BE REMOVED FROM THE SITE. ALTERNATIVELY, PIPES OR CONDUITS THAT ARE LEFT IN PLACE WITH THE APPROVAL OF THE OWNER'S REPRESENTATIVE SHALL BE FULLY GROUTED (ABANDONED) OR LEFT IN A MANNER THAT PROTECTS THE STRUCTURE AND ALL ADJACENT FACILITIES FROM MIGRATION OF FINES THROUGH THE PIPE OR CONDUIT AND POTENTIAL GROUND LOSS.

3.03.03 GEOCOMPOSITE DRAIN STRIPS
A. GEOCOMPOSITE DRAIN STRIPS SHALL BE INSTALLED AS SHOWN ON THE PLANS. DRAIN STRIPS AT CONSTRUCTION JOINTS SHALL BE PLACED SUCH THAT THE JOINT IS ALIGNED AS CLOSE AS PRACTICAL ALONG THE MIDDLE OF THE LONGITUDINAL AXIS OF THE DRAIN STRIP.

B. THE GEOCOMPOSITE DRAIN STRIPS SHALL BE AT LEAST 16 INCHES WIDE AND SHALL BE SECURED TO THE EXCAVATION FACE WITH THE GEOTEXTILE SIDE AGAINST THE GROUND BEFORE SHOTCRETING. DRAIN STRIPS SHALL BE MADE CONTINUOUS BY USING THE "SHINGLE" METHOD OF SPLICING WITH A 4 INCH MINIMUM OVERLAP SUCH THAT THE FLOW OF WATER IS NOT IMPEDED.

3.03.04 CONNECTION PIPES AND WEEP HOLES
A. CONNECTION PIPES AND WEEP HOLES SHALL BE CONNECTED TO THE DRAIN STRIPS AS SHOWN ON THE PLANS, UNLESS APPROVED OTHERWISE BY THE ENGINEER. THE JOINT BETWEEN THE DRAIN PIPE AND THE DRAIN STRIP, AND THE DISCHARGE END OF THE CONNECTOR PIPE SHALL BOTH BE SEALED TO PREVENT SHOTCRETE INTRUSION. DAMAGE OF THE GEOCOMPOSITE DRAIN STRIP WHICH, IN THE OPINION OF THE OWNER'S REPRESENTATIVE, MAY CAUSE INTERRUPTION IN FLOW SHALL REQUIRE INSTALLATION OF ADDITIONAL CONNECTION PIPES OR WEEPHOLES ABOVE THE DAMAGED SECTION. CONNECTION PIPES SHALL BE EXTENDED TO THE EDGE OF THE FOOTING DRAIN BUT NOT THROUGH THE DRAINAGE GEOTEXTILE. THE INTEGRITY OF THE DRAINAGE GEOTEXTILE SHALL NOT BE INTERRUPTED.

3.04 NAIL INSTALLATION

3.04.01 GENERAL
A. TWO SUCCESSFUL VERIFICATION TESTS SHALL BE PERFORMED IN EACH SOIL UNIT IDENTIFIED ON THE PLANS PRIOR TO STARTING INSTALLATION OF PRODUCTION NAILS. THE LOCATIONS OF THE VERIFICATION TESTS ARE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE OWNER'S REPRESENTATIVE. ADDITIONAL VERIFICATION TESTS MAY BE REQUIRED IF THE CONTRACTOR MODIFIES THE INSTALLATION METHODS FROM THOSE USED DURING THE INSTALLATION OF THE APPROVED VERIFICATION TEST NAILS AND WILL BE CONDUCTED AT THE CONTRACTOR'S EXPENSE.

B. NAILS SHALL BE INSTALLED PRIOR TO THE APPLICATION OF SHOTCRETE AT THE LOCATIONS AND TO THE LENGTHS INDICATED ON THE PLANS. THE ENGINEER MAY ADD, ELIMINATE, OR RELOCATE NAILS TO ACCOMMODATE ACTUAL FIELD CONDITIONS. MODIFICATIONS TO THE DESIGN RESULTING FROM ACTIONS OF THE CONTRACTOR SHALL BE DETERMINED BY THE ENGINEER.

3.04.02 DRILLING
A. THE CONTRACTOR SHALL SELECT DRILLING EQUIPMENT AND METHODS SUITABLE FOR THE GROUND CONDITIONS DESCRIBED IN THE GEOTECHNICAL REPORT. DRILLHOLE DIAMETER SHALL BE SELECTED TO PROVIDE THE MINIMUM SPECIFIED GROUT COVER OVER THE SOIL NAIL TENDON AND TO DEVELOP THE SPECIFIED LOAD CARRYING CAPACITY. WATER, DRILLING MUDS, OR OTHER FLUIDS USED TO ASSIST IN CUTTING REMOVAL SHALL NOT BE ALLOWED. UNCASED DRILLHOLES SHALL BE OBSERVED FOR CLEANLINESS PRIOR TO INSERTION OF THE SOIL NAIL TENDON. IN CAVING GROUND, THE CONTRACTOR SHALL USE CASED DRILLING METHODS TO SUPPORT THE DRILLHOLES.

B. THE CONTRACTOR SHALL IMMEDIATELY SUSPEND DRILLING OPERATIONS IF GROUND SUBSIDENCE IS OBSERVED, IF THE SOIL NAIL WALL IS ADVERSELY AFFECTED, OR IF ADJACENT STRUCTURES ARE DAMAGED AS A RESULT OF THE DRILLING OPERATION. THE ADVERSE CONDITIONS SHALL BE STABILIZED IMMEDIATELY AND THE ENGINEER SHALL BE NOTIFIED OF SUCH CONDITIONS WITHIN 24 HOURS.

3.04.03 NAIL TENDON INSTALLATION
A. NAIL TENDONS SHALL BE INSERTED INTO THE DRILLHOLE TO THE REQUIRED LENGTH WITHOUT DIFFICULTY AND IN SUCH A MANNER AS TO PREVENT DAMAGE TO THE DRILLHOLE. TENDONS THAT CANNOT BE FULLY INSERTED TO THE DESIGN DEPTH SHALL BE REMOVED FROM THE DRILLHOLE AND THE DRILLHOLE SHALL BE CLEANED SUFFICIENTLY TO ALLOW UNOBSTRUCTED INSTALLATION OF THE TENDON.

B. IF THE NAIL TENDON IS INSTALLED USING CASED OR HOLLOW-STEM AUGER METHODS, CENTRALIZERS ARE NOT REQUIRED PROVIDED THE INSTALLATION METHOD ENSURES THAT THE TENDON WILL REMAIN IN THE CENTRAL PORTION OF THE NAIL GROUT. IN SUCH SITUATIONS, SLUMP SHALL NOT EXCEED 8 INCHES.

3.05 GROUTING

3.05.01 GROUTING EQUIPMENT
A. GROUT EQUIPMENT SHALL PRODUCE A UNIFORMLY MIXED GROUT FREE OF LUMPY AND UNDISPERSED CEMENT. A POSITIVE DISPLACEMENT GROUT PUMP SHALL BE USED. THE PUMP SHALL BE EQUIPPED WITH A PRESSURE GAUGE THAT CAN MEASURE AT LEAST TWICE BUT NO MORE THAN THREE TIMES THE INTENDED GROUT PRESSURE. THE GROUTING EQUIPMENT SHALL BE SIZED TO ENABLE THE ENTIRE NAIL TO BE GROUTED IN ONE CONTINUOUS OPERATION. THE MIXER SHALL BE CAPABLE OF CONTINUOUSLY AGITATING THE GROUT DURING USAGE.

3.05.02 GROUTING METHODS
A. THE DRILLHOLE SHALL BE GROUTED AFTER INSTALLATION OF THE NAIL TENDON. GROUTING PRIOR TO INSERTION OF THE NAIL TENDON CAN BE ALLOWED PROVIDED NEAT CEMENT GROUT IS USED AND THE NAIL BAR IS IMMEDIATELY INSERTED THROUGH THE GROUT TO THE SPECIFIED LENGTH WITHOUT DIFFICULTY. NO PORTION OF THE NAIL HOLE SHALL BE LEFT OPEN FOR MORE THAN 60 MINUTES PRIOR TO GROUTING UNLESS APPROVED OTHERWISE BY THE ENGINEER. THE GROUT SHALL BE INJECTED AT THE LOWEST POINT OF EACH DRILLHOLE THROUGH A GROUT TREMIE PIPE, CASING, HOLLOW-STEM AUGER, OR DRILL RODS WITH THE DRILLHOLE FILLED IN ONE CONTINUOUS OPERATION. COLD JOINTS IN THE GROUT PLACEMENT ARE ALLOWED FOR CONSTRUCTION OF TEST NAILS. THE CONDUIT DELIVERING THE GROUT SHALL BE KEPT BELOW THE SURFACE OF THE GROUT AS THE CONDUIT IS WITHDRAWN. THE GROUTING CONDUIT SHALL BE WITHDRAWN AS THE NAIL HOLE IS FILLED IN A MANNER WHICH PREVENTS THE CREATION OF VOIDS. THE QUANTITY OF GROUT AND THE GROUTING PRESSURES SHALL BE RECORDED FOR EACH SOIL NAIL. GROUT PRESSURES SHALL BE CONTROLLED TO PREVENT EXCESSIVE GROUND HEAVE OR FRACTURING.

B. DURING CASING REMOVAL FOR DRILLHOLES ADVANCED BY EITHER CASED OR AUGER-CAST METHODS, THE GROUT SURFACE WITHIN THE CASING SHALL BE CONTINUALLY MONITORED FOR MAINTENANCE OF "HEAD" SUFFICIENT TO OFFSET THE EXTERNAL GROUNDWATER/SOIL PRESSURE.

3.05.03 GROUT TESTING
A. NAIL GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI IN 3 DAYS AND 3000 PSI IN 28 DAYS. NAIL GROUT SHALL BE TESTED BY THE CONTRACTOR IN ACCORDANCE WITH ASTM C109 / AASHTO T106 AT A FREQUENCY OF NO LESS THAN ONE TEST FOR EVERY 50 CUBIC YARDS OF GROUT PLACED OR ONCE PER WEEK, WHICHEVER COMES FIRST.

3.05.04 TEST NAIL UNBONDED LENGTH
A. TEMPORARY UNBONDED LENGTHS SHALL BE PROVIDED FOR EACH TEST NAIL. THE TEST NAIL BAR SHALL BE ISOLATED FROM THE SHOTCRETE FACING AND THE REACTION FRAME DURING TESTING. ISOLATION OF A TEST NAIL THROUGH THE SHOTCRETE FACING SHALL NOT AFFECT THE LOCATION OF THE REINFORCING STEEL UNDER THE BEARING PLATE. ACCEPTED TEST NAILS MAY BE INCORPORATED IN THE WORK PROVIDED THE TEMPORARY TEST UNBONDED LENGTH IS FULLY GROUTED SUBSEQUENT TO TESTING.

3.06 NAIL TESTING

3.06.01 GENERAL
A. VERIFICATION TESTS SHALL BE PERFORMED AT THE LOCATIONS SELECTED BY THE CONTRACTOR AND APPROVED BY THE OWNER'S REPRESENTATIVE. PROOF TESTS SHALL BE PERFORMED AT LOCATIONS SELECTED BY THE OWNER'S REPRESENTATIVE. ALL TEST DATA SHALL BE RECORDED BY THE OWNER'S REPRESENTATIVE, UNLESS APPROVED OTHERWISE AND SUBMITTED TO THE ENGINEER. PULLOUT TESTING OF NAILS SHALL NOT BE PERFORMED UNTIL THE NAIL GROUT AND SHOTCRETE FACING HAVE ATTAINED AT LEAST 50 PERCENT OF THEIR SPECIFIED 28-DAY COMPRESSIVE STRENGTHS.

B. WHERE TEMPORARY CASING OF THE UNBONDED LENGTH OF TEST NAILS IS PROVIDED, THE CASING SHALL BE INSTALLED TO PREVENT ANY REACTION BETWEEN THE CASING AND THE GROUTED BOND LENGTH OF THE NAIL AND/OR THE STRESSING APPARATUS.

3.06.02 TESTING EQUIPMENT
A. TESTING EQUIPMENT SHALL INCLUDE TWO DIAL GAUGES, A DIAL GAUGE SUPPORT, JACK AND PRESSURE GAUGE, A PUMP, AND A REACTION FRAME.

B. A MINIMUM OF TWO DIAL GAUGES CAPABLE OF MEASURING TO 0.001-INCH SHALL BE AVAILABLE AT THE SITE TO MEASURE THE NAIL MOVEMENT. THE DIAL GAUGES SHALL HAVE A MINIMUM TRAVEL SUFFICIENT TO ALLOW THE TEST TO BE PERFORMED WITHOUT RE-SETTING THE DIAL GAUGE. THE DIAL GAUGES SHALL BE ALIGNED WITHIN 5 DEGREES OF THE AXIS OF THE NAIL AND SHALL BE SUPPORTED INDEPENDENT OF THE JACKING SET-UP AND THE WALL. A HYDRAULIC JACK, PRESSURE GAUGE, AND PUMP SHALL BE USED TO APPLY AND MEASURE THE TEST LOAD. THE CONTRACTOR SHALL PROVIDE CURRENT CALIBRATION CURVES IN ACCORDANCE WITH THE SUBMITTALS SECTION.

C. THE JACK AND PRESSURE GAUGE SHALL BE CALIBRATED BY AN INDEPENDENT TESTING LABORATORY AS A UNIT. THE PRESSURE GAUGE SHALL BE GRADUATED IN 100 PSI INCREMENTS OR LESS AND SHALL HAVE A RANGE NOT EXCEEDING TWICE THE ANTICIPATED MAXIMUM PRESSURE DURING TESTING UNLESS APPROVED OTHERWISE BY THE ENGINEER. THE RAM TRAVEL OF THE JACK SHALL BE SUFFICIENT TO ENABLE THE TEST TO BE PERFORMED WITHOUT RE-SETTING THE JACK. THE JACK SHALL BE CAPABLE OF APPLYING EACH TEST LOAD INCREMENT IN LESS THAN 1 MINUTE.

D. THE JACK SHALL BE INDEPENDENTLY SUPPORTED AND CENTERED OVER THE NAIL SO THAT THE NAIL DOES NOT CARRY THE WEIGHT OF THE JACK. THE STRESSING EQUIPMENT SHALL BE PLACED OVER THE NAIL IN SUCH A MANNER THAT THE JACK, BEARING PLATES, AND STRESSING ANCHORAGE ARE IN ALIGNMENT. THE JACK SHALL BE POSITIONED AT THE BEGINNING OF THE TEST SUCH THAT UNLOADING AND REPOSITIONING OF THE JACK DURING THE TEST WILL NOT BE REQUIRED.

E. THE REACTION FRAME SHALL BE SUFFICIENTLY RIGID AND OF ADEQUATE DIMENSION SUCH THAT EXCESSIVE DEFORMATION OF THE TEST APPARATUS REQUIRING REPOSITIONING OF ANY COMPONENTS DOES NOT OCCUR DURING TESTING. WHERE THE REACTION FRAME BEARS DIRECTLY ON THE SHOTCRETE FACING, THE REACTION FRAME SHALL BE DESIGNED TO PREVENT FRACTURE OF THE SHOTCRETE.

3.06.03 VERIFICATION TESTING OF SACRIFICIAL NAILS
A. TWO VERIFICATION TESTS SHALL BE PERFORMED IN EACH SOIL UNIT PRIOR TO INSTALLATION OF PRODUCTION NAILS IN THAT UNIT TO VERIFY THE CONTRACTOR'S INSTALLATION METHODS, NAIL PULLOUT CAPACITY, AND DESIGN ASSUMPTIONS. THE NAILS USED FOR THE VERIFICATION TESTS SHALL BE SACRIFICIAL AND SHALL NOT BE INCORPORATED AS PRODUCTION NAILS.

B. TEST NAILS SHALL BE CONSTRUCTED USING THE SAME EQUIPMENT, METHODS, AND HOLE DIAMETER AS PLANNED FOR THE PRODUCTION NAILS. CHANGES IN THE DRILLING OR INSTALLATION METHOD MAY REQUIRE ADDITIONAL VERIFICATION TESTING AS DETERMINED BY THE ENGINEER AND SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.

C. THE UNBONDED LENGTH OF THE TEST NAIL SHALL BE AT LEAST 3 FEET UNLESS APPROVED OTHERWISE BY THE ENGINEER. THE BONDED LENGTH OF THE TEST NAIL SHALL BE DETERMINED BY THE ENGINEER BASED ON THE BAR GRADE AND SIZE SUCH THAT THE ALLOWABLE BAR LOAD IS NOT EXCEEDED, BUT SHALL NOT BE LESS THAN 10 FEET. THE ALLOWABLE BAR LOAD DURING TESTING SHALL NOT EXCEED 80 PERCENT OF THE STEEL ULTIMATE STRENGTH FOR GRADE 150 BARS OR 90 PERCENT OF THE YIELD STRENGTH FOR GRADE 60 AND GRADE 75 BARS.

D. THE DESIGN TEST LOAD (DTL) DURING TESTING SHALL BE DETERMINED BY MULTIPLYING THE BOND LENGTH OF THE NAIL TIMES THE DESIGN ADHESION. VERIFICATION TEST NAILS SHALL BE INCREMENTALLY LOADED AND UNLOADED IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

LOAD	HOLD TIME	LOAD	HOLD TIME
AL	1 MINUTE	1.75DTL	UNTIL STABLE
0.25DTL	10 MINUTES	1.50DTL	UNTIL STABLE
0.50DTL	10 MINUTES	1.25DTL	UNTIL STABLE
0.75DTL	10 MINUTES	1.00DTL	UNTIL STABLE
1.00DTL	10 MINUTES	0.75DTL	UNTIL STABLE
1.25DTL	10 MINUTES	0.50DTL	UNTIL STABLE
1.50DTL	60 MINUTES	0.25DTL	UNTIL STABLE
1.75DTL	10 MINUTES	AL	UNTIL STABLE
2.00DTL	10 MINUTES		

E. THE ALIGNMENT LOAD (AL) SHALL BE THE MINIMUM LOAD REQUIRED TO ALIGN THE TESTING APPARATUS AND SHOULD NOT EXCEED 0.05DTL. DIAL GAUGES SHALL BE ZEROED AFTER THE ALIGNMENT LOAD HAS BEEN APPLIED. EACH LOAD INCREMENT SHALL BE HELD FOR AT LEAST 10 MINUTES. THE VERIFICATION TEST NAIL SHALL BE MONITORED FOR CREEP FOR 60 MINUTES AT THE 1.50 DTL LOAD INCREMENT. NAIL MOVEMENTS DURING THE CREEP PORTION OF THE TEST SHALL BE MEASURED AND RECORDED AT 1, 2, 3, 5, 6, 10, 20, 30, 50, AND 60 MINUTES.

3.06.04 PROOF TESTING OF PRODUCTION NAILS
A. PROOF TESTING SHALL BE PERFORMED ON APPROXIMATELY 5 PERCENT OF THE PRODUCTION NAILS IN EACH SHOTCRETE LIFT AS DETERMINED BY THE OWNER'S REPRESENTATIVE.

B. THE UNBONDED LENGTH OF THE TEST NAIL SHALL BE AT LEAST 3 FEET. THE BONDED LENGTH OF THE TEST NAIL SHALL BE DETERMINED BY THE OWNER'S REPRESENTATIVE SUCH THAT THE ALLOWABLE BAR LOAD IS NOT EXCEEDED BUT SHALL NOT BE LESS THAN 10 FEET. THE ALLOWABLE BAR LOAD DURING TESTING SHALL NOT EXCEED 80 PERCENT OF THE STEEL ULTIMATE STRENGTH FOR GRADE 150 BARS OR 90 PERCENT OF THE STEEL YIELD STRENGTH FOR GRADE 60 AND GRADE 75 BARS.

C. PROOF TEST NAILS SHALL BE INCREMENTALLY LOADED IN 0.25DTL INCREMENTS TO A MAXIMUM LOAD OF 1.50DTL IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

AL	1.00DTL
0.25DTL	1.25DTL
0.50DTL	1.50DTL
0.75DTL	

D. THE ALIGNMENT LOAD (AL) SHALL BE THE MINIMUM LOAD REQUIRED TO ALIGN THE TESTING APPARATUS AND SHOULD NOT EXCEED 0.05DTL. DIAL GAUGES SHALL BE ZEROED AFTER THE ALIGNMENT LOAD HAS BEEN APPLIED.

E. ALL INCREMENTS SHALL BE MAINTAINED WITHIN 5 PERCENT OF THE INTENDED LOAD. DEPENDING ON PERFORMANCE, EITHER A 10 MINUTE OR 60 MINUTE CREEP TEST SHALL BE PERFORMED AT 1.50DTL. NAIL MOVEMENT SHALL BE MEASURED AND RECORDED AT 1, 2, 3, 5, 6, AND 10 MINUTES. WHERE THE NAIL MOVEMENT BETWEEN 1 MINUTE AND 10 MINUTES EXCEEDS 0.04 INCHES, THE MAXIMUM TEST LOAD SHALL BE MAINTAINED AN ADDITIONAL 50 MINUTES, AND MOVEMENTS SHALL BE RECORDED AT 20, 30, 50, AND 60 MINUTES.

3.06.05 TEST NAIL ACCEPTANCE CRITERIA
A. A TEST NAIL SHALL BE CONSIDERED ACCEPTABLE WHEN:

1. FOR VERIFICATION TESTS, A CREEP RATE LESS THAN 0.08 INCHES PER LOG CYCLE OF TIME BETWEEN THE 6 AND 60 MINUTE READINGS IS OBSERVED DURING CREEP TESTING, AND THE RATE IS LINEAR OR DECREASING THROUGHOUT THE CREEP TEST LOAD HOLD PERIOD.
2. FOR PROOF TESTS, A CREEP RATE LESS THAN 0.04 INCHES PER LOG CYCLE OF TIME BETWEEN THE 1 AND 10 MINUTE READINGS IS OBSERVED OR A CREEP RATE LESS THAN 0.08 INCHES PER LOG CYCLE OF TIME BETWEEN THE 6 AND 60 MINUTE READINGS, AND THE CREEP RATE IS LINEAR OR DECREASING THROUGHOUT THE CREEP TEST LOAD HOLD PERIOD.
3. THE TOTAL MOVEMENT AT THE MAXIMUM TEST LOAD EXCEEDS 80 PERCENT OF THE THEORETICAL ELASTIC ELONGATION OF THE TEST NAIL UNBONDED LENGTH.
4. PULLOUT FAILURE DOES NOT OCCUR DURING TESTING. PULLOUT FAILURE IS DEFINED AS THE LOAD AT WHICH ATTEMPTS TO INCREASE THE TEST LOAD SIMPLY RESULT IN CONTINUED PULLOUT MOVEMENT OF THE TEST NAIL.

B. AT THE CONTRACTOR'S OPTION, SUCCESSFUL PROOF TEST NAILS MEETING THE ABOVE TEST ACCEPTANCE CRITERIA MAY BE INCORPORATED AS PRODUCTION NAILS, PROVIDED THAT (1) THE UNBONDED TEST LENGTH OF THE NAIL HOLE HAS NOT COLLAPSED DURING TESTING, (2) THE MINIMUM REQUIRED HOLE DIAMETER HAS BEEN MAINTAINED, AND (3) THE TEST NAIL LENGTH AND BAR SIZE ARE EQUAL TO OR GREATER THAN THE SCHEDULED PRODUCTION NAIL LENGTH AND BAR SIZE. TEST NAILS MEETING THESE REQUIREMENTS SHALL BE COMPLETED BY SATISFACTORILY GROUTING THE UNBONDED TEST LENGTH. MAINTAINING THE TEMPORARY UNBONDED TEST LENGTH FOR SUBSEQUENT GROUTING IS THE CONTRACTOR'S RESPONSIBILITY.

3.06.06 INADEQUATE TEST NAIL PERFORMANCE
A. THE ENGINEER SHALL EVALUATE THE RESULTS OF EACH VERIFICATION TEST. INSTALLATION METHODS THAT DO NOT SATISFY THE NAIL TESTING REQUIREMENTS SHALL BE CONSIDERED INADEQUATE. THE CONTRACTOR SHALL PROPOSE ALTERNATIVE METHODS AND INSTALL REPLACEMENT VERIFICATION TEST NAILS. REPLACEMENT TEST NAILS SHALL BE INSTALLED AND TESTED AT NO ADDITIONAL COST TO THE OWNER.

B. THE ENGINEER MAY REQUIRE THAT THE CONTRACTOR REPLACE SOME OR ALL OF THE PRODUCTION NAILS REPRESENTED BY THE INADEQUATE PROOF TEST NAIL. ALTERNATIVELY, THE ENGINEER MAY REQUIRE PROOF TESTING OF ADDITIONALLY INSTALLED PROOF TEST NAILS BE CONDUCTED TO VERIFY THAT ADJACENT PREVIOUSLY INSTALLED PRODUCTION NAILS HAVE SUFFICIENT LOAD CARRYING CAPACITY. COSTS DUE TO ADDITIONAL PROOF TESTS OR INSTALLATION OF ADDITIONAL OR MODIFIED NAILS AS A RESULT OF POOR PROOF TEST NAIL PERFORMANCE SHALL BE AT NO ADDITIONAL COST TO THE OWNER, UNLESS DETERMINED BY THE ENGINEER TO BE DUE TO CAUSES BEYOND THE CONTRACTOR'S CONTROL.

3.07 SOIL NAIL TOLERANCES
A. THE SOIL NAILS SHALL NOT EXTEND BEYOND THE LIMITS SHOWN ON THE PLANS, UNLESS APPROVED OTHERWISE. BARS SHALL BE CENTERED WITHIN 1 INCH OF THE CENTER OF THE DRILLHOLE. INDIVIDUAL NAILS SHALL BE POSITIONED PLUS OR MINUS 12 INCHES FROM THE DESIGN LOCATIONS SHOWN IN THE PLANS. LOCATION TOLERANCES SHALL BE CONSIDERED APPLICABLE TO ONLY ONE NAIL AND NOT CUMULATIVE OVER LARGE WALL AREAS. THE NAIL INCLINATION SHALL BE PLUS OR MINUS 3 DEGREES OF THAT SHOWN IN THE PLANS. NAIL SPLAY ANGLE SHALL BE WITHIN PLUS OR MINUS 3 DEGREES. NAILS THAT ENCOUNTER UNANTICIPATED OBSTRUCTIONS DURING DRILLING SHALL BE RELOCATED BY THE ENGINEER AT THE OWNER'S COST. SOIL NAILS THAT DO NOT SATISFY THE SPECIFIED TOLERANCES DUE TO THE CONTRACTOR'S INSTALLATION METHODS SHALL BE REPLACED TO THE ENGINEER'S SATISFACTION AT NO ADDITIONAL COST TO THE OWNER.

SECTION 02360 - SHOTCRETE FACING

PART 1 - GENERAL

1.01 DESCRIPTION

A. THE WORK DESCRIBED IN THIS SECTION SHALL CONSIST OF FURNISHING ALL MATERIALS AND LABOR REQUIRED FOR PLACING REINFORCED SHOTCRETE FOR THE SOIL NAIL WALL AND SOLDIER PILE WALL WHEN THE PLANS REQUIRE. THE WORK SHALL INCLUDE PLACEMENT OF THICKNESS PINS OR FINISHING WIRES, AND PREPARATORY TRIMMING AND CLEANING OF SOIL/ROCK SURFACES AND SHOTCRETE COLD JOINTS FOR THE SOIL NAIL WALLS SHOWN ON THE PLANS.

B. SHOTCRETE SHALL COMPLY WITH THE REQUIREMENTS OF ACI 506.2-94, "SPECIFICATION FOR SHOTCRETE", EXCEPT AS SPECIFIED OTHERWISE HEREIN.

C. THE OWNER'S REPRESENTATIVE / SHOTCRETE INSPECTOR SHALL BE QUALIFIED TO INSPECT REINFORCEMENT AND SHOTCRETE PLACEMENT.

1.02 QUALITY ASSURANCE

A. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING A QUALITY ASSURANCE PROGRAM. ALL WORKERS, INCLUDING FOREMAN, NOZZLEMEN, FINISHERS AND DELIVERY EQUIPMENT OPERATORS SHALL BE FULLY QUALIFIED TO PERFORM THE WORK. ALL NOZZLEMEN SHALL HAVE AT LEAST ONE YEAR OF CUMULATIVE EXPERIENCE IN THE PAST 3 YEARS IN SIMILAR SHOTCRETE APPLICATION WORK AND SHALL DEMONSTRATE ABILITY TO SATISFACTORILY PLACE THE MATERIAL IN ACCORDANCE WITH THE RECOMMENDATIONS OF ACI 506.3R "GUIDE TO CERTIFICATION TO SHOTCRETE NOZZLEMEN" AND ANY LOCAL CODE REQUIREMENTS.

B. QUALIFICATION OF NOZZLEMEN SHALL BE BASED ON A VISUAL INSPECTION OF THE SHOTCRETE DENSITY AND VOID STRUCTURE AND ON ACHIEVING THE SPECIFIED 3-DAY AND 28- DAY COMPRESSIVE STRENGTH REQUIREMENTS DETERMINED FROM THE AVERAGE TEST RESULTS FROM THREE CORES EXTRACTED FROM EACH PRE CONSTRUCTION AND PRODUCTION TEST PANEL. PRE CONSTRUCTION AND PRODUCTION TEST PANELS, CORE EXTRACTION AND COMPRESSIVE STRENGTH TESTING SHALL BE CONDUCTED IN ACCORDANCE WITH ACI 506.2-94 UNLESS SPECIFIED OTHERWISE HEREIN.

C. THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE NOT LESS THAN 2 DAYS PRIOR TO THE SHOOTING OF A QUALIFICATION PANEL. SHOTCRETE MIX AND EQUIPMENT USED TO MAKE QUALIFICATION TEST PANELS SHALL BE THE SAME AS THOSE TO BE USED FOR THE SOIL NAIL WALL.

D. EACH FINISHER SHALL HAVE AT LEAST ONE YEAR OF CUMULATIVE EXPERIENCE IN THE PAST 3 YEARS IN SIMILAR STRUCTURAL SHOTCRETE APPLICATION WORK.

1.03 SUBMITTALS

A. AT LEAST 15 DAYS PRIOR TO INITIATING THE WORK, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL:

1. WRITTEN DOCUMENTATION LISTING AT LEAST 5 SIMILAR SHOTCRETE WALLS SUCCESSFULLY COMPLETED WITHIN THE PAST 3 YEARS, INCLUDING PHOTOGRAPHS OF THE PROJECT AS WELL AS NAME, ADDRESS, AND PHONE NUMBER OF THE OWNER'S REPRESENTATIVE.
2. WRITTEN DOCUMENTATION OF THE NOZZLEMEN AND FINISHERS QUALIFICATIONS AND PROPOSED METHOD OF SHOTCRETE PLACEMENT.
3. SHOP DRAWINGS ILLUSTRATING REINFORCING LAYOUT AND SCHEDULES.
4. SHOTCRETE MIX DESIGN INCLUDING: BRAND AND TYPE OF PORTLAND CEMENT TO BE USED: SOURCE, GRADATION, AND QUALITY OF AGGREGATES AS SPECIFIED HEREIN; MIX PROPORTIONS BY WEIGHT; PROPOSED ADMIXTURES, AND THEIR MANUFACTURER, DOSAGE, AND TECHNICAL LITERATURE; AND COMPRESSIVE STRENGTH TEST RESULTS FROM THE MANUFACTURES RECORDS NO OLDER THAN 6 MONTHS VERIFYING THE 28-DAY COMPRESSIVE STRENGTH.
5. CERTIFIED MILL TESTS FOR ALL REINFORCING STEEL FROM EACH HEAT SPECIFYING THE MINIMUM ULTIMATE STRENGTH, YIELD STRENGTH, ELONGATION, AND COMPOSITION.
6. CERTIFICATIONS OF COMPLIANCE FOR BEARING PLATES, NUTS, AND CURING COMPOUNDS.
7. SPECIFICATION AND DATA FOR REVIEW ON EQUIPMENT PROPOSED FOR THE PROJECT INCLUDING SHOTCRETING AND COMPRESSED AIR EQUIPMENT, PROPOSED ACCESS ARRANGEMENTS, AND CAPACITIES.
8. METHODS OF CONTROLLING THE LOCATION OF THE FINISH FACE AND DETERMINING SHOTCRETE THICKNESS.

PART 2 - MATERIALS

2.01 GENERAL

A. ALL MATERIALS FOR SHOTCRETE SHALL CONFORM TO THE FOLLOWING REQUIREMENTS.

CEMENT	- ASTM C150 / AASHTO M85, TYPE I.
FINE AGGREGATE	- ASTM C33 / AASHTO M6.
COARSE AGGREGATE	- AASHTO M-80, CLASS B FOR QUALITY.
WATER	- POTABLE, CLEAN, AND FREE FROM SUBSTANCES DELETERIOUS TO CONCRETE AND STEEL, OR THAT WOULD CAUSE STAINING. CHEMICAL ADMIXTURES ACCELERATOR FLUID TYPE, APPLIED AT NOZZLE, MEETING THE REQUIREMENTS HEREIN.
WATER-REDUCER	- ASTM C494 / AASHTO M194, TYPE AND SUPER- A, D, F,G. PLASTICIZER AIR-ENTRAINING ASTM C260 / AASHTO M154. AGENT MINERAL ADMIXTURES:
FLY ASH	- ASTM C618 / AASHTO M295, TYPE F OR G, CEMENT REPLACEMENT UP TO 35 PERCENT BY WEIGHT OF CEMENT. SILICA FUME ASTM C1240, 90 PERCENT MINIMUM SILICON DIOXIDE SOLIDS CONTENT, NOT TO EXCEED 12 PERCENT BY WEIGHT OF CEMENT.
WELDED WIRE FABRIC	- ASTM A185 / AASHTO M55.
REINFORCING BARS	- ASTM A615 / AASHTO M31, GRADE 60, DEFORMED.
CURING COMPOUNDS	- AASHTO M148, TYPE ID OR TYPE 2.
FILM PROTECTION	- AASHTO M171 OR POLYETHYLENE FILM.

2.02 ADMIXTURES

A. SHOTCRETE ADMIXTURES SHALL NOT BE USED UNLESS APPROVED BY THE ENGINEER. ADMIXTURES USED TO ENTRAIN AIR, TO REDUCE WATER-CEMENT RATIO, TO RETARD OR ACCELERATE SETTING TIME, OR TO ACCELERATE THE DEVELOPMENT OF STRENGTH SHALL BE THOROUGHLY MIXED INTO THE SHOTCRETE AT THE RATE SPECIFIED BY THE MANUFACTURER UNLESS SPECIFIED OTHERWISE. ACCELERATING ADDITIVES SHALL BE COMPATIBLE WITH THE CEMENT USED, BE NON-CORROSIVE TO STEEL AND SHALL NOT PROMOTE OTHER DETRIMENTAL EFFECTS SUCH AS CRACKING OR EXCESSIVE SHRINKAGE. THE MAXIMUM ALLOWABLE CHLORIDE ION CONTENT OF ALL INGREDIENTS SHALL NOT EXCEED 0.10 PERCENT WHEN TESTED PER AASHTO T260.

2.03 MATERIALS HANDLING AND STORAGE

A. MATERIALS SHALL BE DELIVERED STORED AND HANDLED TO PREVENT CONTAMINATION, SEGREGATION, CORROSION OR DAMAGE. LIQUID ADMIXTURES SHALL BE STORED TO PREVENT EVAPORATION AND FREEZING.

2.04 SHOTCRETE MIX DESIGN

A. AGGREGATES FOR SHOTCRETE SHALL MEET THE STRENGTH AND DURABILITY REQUIREMENT OF AASHTO M80 AND SHALL MEET THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE SIZE	PERCENT PASSING BY WEIGHT	SIEVE SIZE	PERCENT PASSING BY WEIGHT
1/2 INCH	100	NO. 16	35-55
3/8 INCH	90-100	NO. 30	20-35
NO. 4	70-85	NO. 50	8-20
NO. 8	50-70	NO. 100	2-10

B. CEMENT CONTENT SHALL BE AT LEAST 600 POUNDS PER CUBIC YARD. THE WATER/CEMENT RATIO SHALL NOT BE GREATER THAN 0.45. FOR WET-MIX SHOTCRETE EXPOSED TO FREEZING AND THAWING, THE AIR CONTENT AT THE TRUCK SHALL BE BETWEEN 7 TO 10 PERCENT WHEN TESTED IN ACCORDANCE WITH ASTM C231 / AASHTO T152. THE MIX SHALL BE PROPORTIONED TO BE PUMPABLE WITH THE CONCRETE PUMP FURNISHED FOR THE WORK. ADMIXTURES SHALL BE USED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

B. SHOTCRETE SHALL BE PROPORTIONED TO PRODUCE A MIX CAPABLE OF ATTAINING A COMPRESSIVE STRENGTH OF 2000 PSI IN 3 DAYS AND 4000 PSI IN 28 DAYS. THE AVERAGE COMPRESSIVE STRENGTH OF EACH SET OF THREE CORES EXTRACTED FROM TEST PANELS OR WALL FACE SHALL BE EQUAL TO OR EXCEED 85 PERCENT, WITH NO INDIVIDUAL CORE LESS THAN 75 PERCENT OF THE SPECIFIED COMPRESSIVE STRENGTH IN ACCORDANCE WITH ACI 506.2.

PART 3 - EXECUTION

3.01 SHOTCRETE MIXING AND BATCHING

A. AGGREGATE AND CEMENT MAY BE BATCHED BY WEIGHT OR BY VOLUME IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM C94 / AASHTO M157. MIXING EQUIPMENT SHALL BE CAPABLE OF THOROUGHLY MIXING THE MATERIALS IN SUFFICIENT QUANTITY TO MAINTAIN PLACING CONTINUITY. READY-MIX SHOTCRETE SHALL BE DELIVERED AND PLACED WITHIN 90 MINUTES OF BEING BATCHED UNLESS APPROVED OTHERWISE BY THE ENGINEER.

3.02 SHOTCRETE TEST PANELS

3.02.01 GENERAL
A. PRE CONSTRUCTION AND PRODUCTION SHOTCRETE TEST PANELS ARE REQUIRED (UNLESS WAIVED BY THE ENGINEER). PRE CONSTRUCTION AND PRODUCTION TEST PANELS SHALL NOT BE DISTURBED OR MOVED WITHIN THE FIRST 24 HOURS AFTER SHOOTING. TEST PANELS SHALL BE FIELD CURED UNDER CONDITIONS SIMILAR TO THOSE ANTICIPATED FOR THE WORK. SHOTCRETING AND CORING OF TEST PANELS SHALL BE PERFORMED BY QUALIFIED PERSONNEL IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE

B. UNLESS WAIVED BY THE ENGINEER, THE CONTRACTOR SHALL PROVIDE EQUIPMENT, MATERIALS, AND PERSONNEL AS NECESSARY TO OBTAIN SHOTCRETE CORES FOR TESTING INCLUDING CONSTRUCTION OF TEST PANEL BOXES, FIELD CURING REQUIREMENTS AND CORING. COMPRESSIVE STRENGTH TESTING WILL BE PERFORMED BY THE OWNER. SHOTCRETE WILL BE ACCEPTED BASED ON THE 28-DAY STRENGTH. THE FREQUENCY SPECIFIED FOR TEST PANELS IS APPROXIMATE. A GREATER OR LESSER NUMBER OF PANELS MAY BE MADE AS REQUIRED BY THE ENGINEER.

3.02.02 PRECONSTRUCTION TEST PANELS
A. EACH SHOTCRETE APPLICATION CREW SHALL FURNISH AT LEAST TWO PRECONSTRUCTION TEST PANELS FOR EACH PROPOSED MIXTURE BEING CONSIDERED AND FOR EACH SHOOTING POSITION ENCOUNTERED ON THE JOB. PRECONSTRUCTION TEST PANELS SHALL BE MADE BY EACH APPLICATION CREW USING THE EQUIPMENT, MATERIALS, MIXTURE PROPORTIONS, AND PROCEDURES PROPOSED FOR THE JOB PRIOR TO THE COMMENCEMENT OF WORK.

A. PRECONSTRUCTION TEST PANELS FOR PLAN SHOTCRETE SHALL BE 30 IN. X 30 IN. IN ACCORDANCE WITH ACI 506.2-94, WITH THE FOLLOWING EXCEPTIONS:

1. ONE PRECONSTRUCTION TEST PANEL SHALL BE OF THE MAXIMUM SHOTCRETE THICKNESS SHOWN ON THE PLANS AND SHALL INCLUDE THE MAXIMUM ANTICIPATED REINFORCING CONGESTION. CORES EXTRACTED FROM THE TEST PANEL SHALL DEMONSTRATE ENCAPSULATION OF THE REINFORCEMENT IN ACCORDANCE WITH ACI 506.2 EQUAL TO CORE GRADE 2 OR BETTER.
2. ONE PRECONSTRUCTION TEST PANEL SHALL BE AT LEAST 6 INCHES THICK AND CONSTRUCTED WITHOUT REINFORCEMENT AND USED FOR ABSORPTION AND COMPRESSIVE STRENGTH TESTING
3. THE CORNERS OF PRODUCTION AND PRECONSTRUCTION TEST PANELS SHALL BE CHAMFERED OUTWARD AT 45 DEGREES OVER THE FULL THICKNESS OF THE PANEL.

3.02.03 PRODUCTION TEST PANELS
A. THE CONTRACTOR SHALL FURNISH AT LEAST ONE PRODUCTION TEST PANEL, OR, IN LIEU OF PRODUCTION TEST PANELS, SIX 3-INCH DIAMETER CORES FROM THE SHOTCRETE FACE DURING THE FIRST APPLICATION OF SHOTCRETE AND HENCEFORTH FOR EVERY FIFTH APPLICATION OF SHOTCRETE, OR EVERY 5000 SQ. FT., OR EVERY 50 CU. YDS., WHICHEVER IS LESS. THE PRODUCTION TEST PANELS SHALL BE CONSTRUCTED SIMULTANEOUSLY WITH THE SHOTCRETE FACING INSTALLATION AT TIMES DESIGNATED BY THE OWNER'S REPRESENTATIVE. THE PRODUCTION TEST PANELS SHALL HAVE MINIMUM DIMENSIONS OF 18" X 18" X 6".

3.02.04 CORE TESTING
A. AT LEAST NINE CORE SAMPLES WILL BE CUT FROM EACH PRECONSTRUCTION AND PRODUCTION TEST PANEL FOR COMPRESSIVE STRENGTH. CORES SHALL BE AT LEAST 3-IN. DIAMETER AND SHALL HAVE A MINIMUM LENGTH TO WIDTH RATIO OF ONE. WHEN THE LENGTH OF THE CORE IS LESS THAN TWICE THE DIAMETER, APPLY THE CORRECTION FACTORS GIVEN IN ASTM C42 TO OBTAIN THE COMPRESSIVE STRENGTH OF INDIVIDUAL CORES. THREE CORES SHALL BE TESTED AT 3-DAYS AND THREE CORE SHALL BE TESTED AT 28-DAYS FOR COMPRESSIVE STRENGTH.

3.03 SHOTCRETE ALIGNMENT CONTROL

A. ALIGNMENT WIRES AND/OR THICKNESS CONTROL PINS SHALL BE PROVIDED AS NECESSARY TO ESTABLISH AND MAINTAIN THE MINIMUM SHOTCRETE THICKNESS SHOWN ON THE PLANS. THE MAXIMUM DISTANCE BETWEEN WIRES AND/OR THICKNESS CONTROL PINS ON ANY SURFACE SHALL BE EQUAL TO THE VERTICAL NAIL SPACING. THE CONTRACTOR SHALL ENSURE THAT ALIGNMENT WIRES ARE TIGHT, TRUE TO LINE, AND PLACED TO ALLOW FURTHER TIGHTENING.

3.04 SURFACE PREPARATION

A. PRIOR TO SHOTCRETING THE UNGROUTED ZONE ABOVE THE NAIL GROUT AT THE EXCAVATION CUT FACE (BIRDS BEAK), THE CONTRACTOR SHALL REMOVE ALL LOOSE MATERIALS FROM THE SURFACE OF THE GROUT AND PREPARE THE JOINT IN ACCORDANCE WITH ALL REQUIREMENTS FOR JOINT PREPARATION SPECIFIED HEREIN.

B. THE CONTRACTOR SHALL REMOVE ALL LOOSE MATERIALS AND LOOSE DRIED SHOTCRETE FROM PREVIOUS PLACEMENT OPERATIONS AND FROM ALL RECEIVING SURFACES BY METHODS ACCEPTABLE TO THE OWNER'S REPRESENTATIVE. THE REMOVAL SHALL BE ACCOMPLISHED IN SUCH A MANNER AS NOT TO LOOSEN, CRACK, OR SHATTER THE SURFACES TO RECEIVE THE SHOTCRETE. ANY SURFACE MATERIAL THAT, IN THE OPINION OF THE OWNER'S REPRESENTATIVE, IS SO LOOSENED OR DAMAGED SHALL BE REMOVED TO SUFFICIENT DEPTH TO PROVIDE A BASE THAT IS SUITABLE TO RECEIVE THE SHOTCRETE. MATERIAL THAT LOOSENS AS THE SHOTCRETE IS APPLIED SHALL BE REMOVED. SHOTCRETE SHALL NOT BE PLACED ON FROZEN SURFACES.

3.05 DELIVERY AND APPLICATION

A. A CLEAN, DRY, OIL-FREE SUPPLY OF COMPRESSED AIR SUFFICIENT FOR MAINTAINING ADEQUATE NOZZLE VELOCITY FOR ALL PARTS OF THE WORK AND FOR SIMULTANEOUS OPERATION OF A BLOW PIPE FOR CLEANING AWAY REBOUND SHALL BE MAINTAINED AT ALL TIMES. THE EQUIPMENT SHALL BE CAPABLE OF DELIVERING THE PREMIXED MATERIAL ACCURATELY, UNIFORMLY, AND CONTINUOUSLY THROUGH THE DELIVERY HOSE.

B. THE SHOTCRETE SHALL BE APPLIED FROM THE LOWER PART OF THE WORK AREA UPWARDS TO PREVENT ACCUMULATION OF REBOUND ON UNCOVERED SURFACES. THICKNESS, METHODS OF SUPPORT, AIR PRESSURE, AND RATE OF PLACEMENT OF SHOTCRETE SHALL BE CONTROLLED TO PREVENT SAGGING OR SLOUGHING OF FRESHLY APPLIED SHOTCRETE. WHERE SHOTCRETE IS USED TO COMPLETE THE UNGROUTED ZONE OF THE NAIL DRILL HOLE NEAR THE EXCAVATION CUT FACE, THE NOZZLE SHALL BE POSITIONED INTO THE MOUTH OF THE DRILLHOLE TO COMPLETELY FILL THE VOID. REBOUND SHALL NOT BE WORKED BACK INTO THE PLACEMENT NOR SHALL THE REBOUND BE SALVAGED. REBOUND THAT DOES NOT FALL CLEAR OF THE WORKING AREA SHALL BE REMOVED. THE NOZZLE SHALL BE HELD AT A DISTANCE AND AT AN ANGLE APPROXIMATELY PERPENDICULAR TO THE WORKING FACE SO THAT REBOUND WILL BE MINIMAL AND COMPACTION WILL BE MAXIMIZED. THE NOZZLE SHALL BE ROTATED STEADILY IN A SMALL CIRCULAR PATTERN.

C. SHOTCRETE PLACEMENT SHALL BE BY THE BENCH GUNNING METHOD WHEN THE THICKNESS OF THE SHOTCRETE LAYER IS 6 IN. OR GREATER. THE GUNNING METHOD SHALL CONSIST OF BUILDING UP A THICK LAYER OF SHOTCRETE FROM THE BOTTOM OF THE LIFT AND MAINTAINING THE TOP SURFACE AT APPROXIMATELY A 45-DEGREE SLOPE.

3.06 VISUAL OBSERVATION

A. A CLEARLY DEFINED PATTERN OF CONTINUOUS HORIZONTAL OR VERTICAL RIDGES OR DEPRESSIONS AT THE REINFORCING ELEMENTS AFTER THEY ARE COVERED WILL BE CONSIDERED INDICATION OF INSUFFICIENT COVER OF REINFORCEMENT OR POOR APPLICATION AND PROBABLE VOID. IN THIS CASE, THE WORK SHALL BE IMMEDIATELY SUSPENDED AND THE WORK CAREFULLY INSPECTED BY THE OWNER'S REPRESENTATIVE. THE CONTRACTOR SHALL IMPLEMENT AND COMPLETE CORRECTIVE MEASURES PRIOR TO RESUMING THE SHOTCRETE OPERATIONS.

3.07 DEFECTIVE SHOTCRETE

A. SURFACE DEFECTS SHALL BE REPAIRED AS SOON AS POSSIBLE AFTER INITIAL PLACEMENT OF SHOTCRETE. ALL SHOTCRETE THAT LACKS UNIFORMITY, EXHIBITS SEGREGATION, SAGGING, HONEYCOMBING, OR LAMINATION, OR CONTAINS ANY VOIDS OR SAND POCKETS SHALL BE REMOVED AND REPLACED WITH FRESH SHOTCRETE BY THE CONTRACTOR TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE.

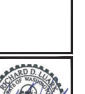
3.08 CONSTRUCTION JOINTS

A. CONSTRUCTION JOINTS SHALL BE WATERTIGHT AND UNIFORMLY TAPERED TOWARD THE EXCAVATION FACE OVER A MINIMUM DISTANCE EQUAL TO THE THICKNESS OF THE SHOTCRETE LAYER. THE SURFACE OF THE JOINTS SHALL BE ROUGH, CLEAN, SOUND AND DAMP. THE HARDENED SURFACE SHALL BE CLEANED OF ALL LAITANCE, FOREIGN SUBSTANCES, WASHED WITH CLEAN WATER, AND WETTED THOROUGHLY PRECEDING PLACEMENT OF FRESH SHOTCRETE.
THE SHOTCRETING PROCEDURE MAY BE CORRECTED BY ADJUSTING THE NOZZLE DISTANCE AND ORIENTATION

REV.	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

SPECIFICATIONS (1 OF 2)
GRAND STREET COMMONS - EAST BUILDING
1750 22ND AVE S
SEATTLE WASHINGTON

Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549



SH6.0

DESIGNED BY:	TB
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	8 OF 9

LAST SAVED: 7/16/2021

PERPENDICULAR TO THE SURFACE, ADJUSTING THE WATER CONTENT OF THE SHOTCRETE MIX, OR OTHER MEANS ACCEPTABLE TO THE OWNER'S REPRESENTATIVE. ALL OVERSPRAY AND REBOUND SHALL BE REMOVED FROM THE SURFACE.

3.09 FINISH

A. SHOTCRETE FINISH SHALL BE EITHER AN UNDISTURBED GUN FINISH AS APPLIED FROM THE NOZZLE, A SCREEDED FINISH, OR A WOOD OR STEEL TROWELED FINISH, UNLESS SHOWN OTHERWISE ON THE PLANS.

3.10 ATTACHMENT OF THE NAIL HEAD CONNECTION HARDWARE

A. FOR TEMPORARY SHOTCRETE FACINGS, THE BEARING PLATE SHALL BE WET-SET WHILE THE SHOTCRETE IS PLASTIC TO ASSURE FULL SHOTCRETE BEARING BEHIND THE PLATE. HOWEVER, THE RETENTION NUT SHALL ONLY BE HAND TIGHTENED SUCH THAT FULL BEARING IS ACHIEVED WITHOUT EXCESSIVELY SQUEEZING FRESH SHOTCRETE OUT FROM UNDER THE PLATE.

B. FOR PERMANENT SHOTCRETE FACINGS, THE HEADED STUD PLATE SHALL BE LOCATED WITHIN THE WALL SUCH THAT THE PROPER SHOTCRETE COVER IS PROVIDED AS SHOWN ON THE PLANS. IN ADDITION, THE PLATE, WASHER, AND NUT SHALL BE PULLED UP FLUSH TOGETHER BY WIRING TO THE REINFORCEMENT OR OTHER MEANS NECESSARY TO ASSURE ADEQUATE CONTACT BETWEEN THESE PARTS.

3.11 CURING

3.11.01 GENERAL

A. TEMPORARY SHOTCRETE SHALL NOT REQUIRE CURING.

B. PERMANENT SHOTCRETE SHALL BE PROTECTED FROM LOSS OF MOISTURE FOR AT LEAST 7 DAYS AFTER PLACEMENT. WHEN SHOTCRETE IS BEING PROTECTED FROM LOW TEMPERATURES, CURING SHALL BE TERMINATED NO SOONER THAN ONE DAY AFTER THE REMOVAL OF LOW TEMPERATURE PROTECTION. CURING OF SHOTCRETE SHALL BE BY METHODS THAT WILL KEEP SHOTCRETE SURFACES ADEQUATELY WET AND PROTECTED DURING THE SPECIFIED PERIOD. CURING SHALL COMMENCE WITHIN ONE HOUR OF SHOTCRETE APPLICATION. WHEN THE AMBIENT TEMPERATURE EXCEEDS 80 DEGREES FAHRENHEIT, THE CONTRACTOR SHALL PLAN THE WORK SUCH THAT CURING CAN COMMENCE IMMEDIATELY AFTER FINISHING. CURING SHALL BE COMPLETED IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS.

3.11.02 WATER CURING

A. THE RATE OF WATER APPLICATION SHALL BE REGULATED TO PROVIDE COMPLETE SURFACE COVERAGE WITH A MINIMUM OF RUNOFF.

3.11.03 MEMBRANE CURING

A. CURING COMPOUNDS SHALL NOT BE USED ON ANY SURFACES AGAINST WHICH ADDITIONAL SHOTCRETE OR OTHER CEMENTITIOUS FINISHING MATERIALS ARE TO BE BONDED UNLESS THE SURFACE IS THOROUGHLY SANDBLASTED IMMEDIATELY PRIOR TO SHOTCRETE PLACEMENT IN A MANNER ACCEPTABLE TO THE OWNER'S REPRESENTATIVE. MEMBRANE CURING COMPOUNDS SHALL BE SPRAY APPLIED AS QUICKLY AS PRACTICAL AFTER INITIAL SHOTCRETE SET AT A COVERAGE OF NOT LESS THAN 40 SQ. FT. PER GALLON.

3.11.04 FILM CURING

A. FILM CURING WITH POLYETHYLENE SHEETING MAY BE USED TO SUPPLEMENT WATER CURING ON SHOTCRETE THAT WILL BE COVERED LATER WITH ADDITIONAL SHOTCRETE OR CONCRETE. THE SHEETING SHALL COMPLETELY COVER ALL SURFACES, AND HAVE EDGES OVERLAPPED FOR PROPER SEALING AND ANCHORAGES.

3.12 WEATHER LIMITATIONS

A. SHOTCRETE SHALL NOT BE PLACED IN COLD WEATHER UNLESS ADEQUATELY PROTECTED WHEN THE AMBIENT TEMPERATURE IS BELOW 40° F AND FALLING AND/OR WHEN THE SHOTCRETE IS LIKELY TO BE SUBJECTED TO FREEZING TEMPERATURES BEFORE REACHING A MINIMUM STRENGTH OF 750 PSI. COLD WEATHER PROTECTION SHALL BE MAINTAINED UNTIL THE STRENGTH OF THE IN-PLACE SHOTCRETE IS GREATER THAN 750 PSI. COLD WEATHER PROTECTION SHALL INCLUDE HEATING UNDER TENTS, BLANKETS OR OTHER MEANS ACCEPTABLE TO THE OWNER'S REPRESENTATIVE. THE TEMPERATURE OF THE SHOTCRETE, WHEN DEPOSITED, SHALL BE NOT LESS THAN 50° F NOR MORE THAN 80° F. THE AIR IN CONTACT WITH SHOTCRETE SURFACES SHALL BE MAINTAINED AT TEMPERATURES ABOVE 32° F FOR A MINIMUM OF 7 DAYS.

B. SHOTCRETE APPLICATION SHALL BE SUSPENDED DURING HIGH WINDS AND HEAVY RAINS WHEN IN THE OPINION OF THE OWNER'S REPRESENTATIVE THE QUALITY OF THE APPLICATION IS NOT ACCEPTABLE. NEWLY PLACED SHOTCRETE EXPOSED TO RAIN THAT WASHES OUT CEMENT OR OTHERWISE MAKES THE SHOTCRETE UNACCEPTABLE TO THE OWNER'S REPRESENTATIVE SHALL BE REMOVED AND REPLACED. THE CONTRACTOR SHALL PROVIDE ADEQUATELY SECURED POLYETHYLENE SHEETING OR EQUIVALENT WHEN ADVERSE EXPOSURE TO WEATHER IS ANTICIPATED.

3.13 TOLERANCES

A. THE TOLERANCES FOR TEMPORARY AND PERMANENT SHOTCRETE FACINGS SHALL BE AS FOLLOWS:

	TEMPORARY SHOTCRETE
VERTICAL LOCATION OF SHOTCRETE JOINT	12"
THICKNESS OF SHOTCRETE	- 0.5"
HORIZONTAL LOCATION OF REINFORCEMENT	1"
REINFORCING LAP LENGTH	- 1"
REINFORCEMENT SPACING	1"

SECTION 02370 - SHORING WALL MONITORING

PART 1 - GENERAL

1.01 DESCRIPTION

A. CONSTRUCTION MONITORING OF THE SOIL NAIL WALL/VERTICAL ELEMENT WALLS SHALL BE THE RESPONSIBILITY OF LICENSED SURVEYOR AND SHALL CONSIST OF CONTROLLED SURVEYING AS DESCRIBED IN THIS SECTION. EXECUTION OF THE SURVEYING SHALL BE PERFORMED BY A LICENSED SURVEYOR UNDER CONTRACT TO THE OWNER. CONTROLLED SURVEYING SHALL BE PERFORMED AT LEAST ONCE A WEEK TO DETERMINE: (A) ELEVATION AND PLAN LOCATION OF MONITORING POINTS; AND (B) VERTICAL AND HORIZONTAL MOVEMENT OF THE MONITORING POINTS. MONITORING SHALL BE COMPLETED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT.

B. MONITORING POINTS SHALL CONSIST OF BOLTS OR RODS EMBEDDED INTO THE OBJECT OF INTEREST, OR CROSS-HAIRS SCRIBED ONTO A PLATE THAT IS ATTACHED TO THE FACE OF THE OBJECT OF INTEREST. SURVEY ACCURACY SHALL BE TO +/- 0.01 FT.

C. MONITORING POINTS SHALL BE ESTABLISHED: (A) AT THE TOP OF THE SOIL NAIL WALLS AND SPACED NO GREATER THAN 20 FEET ON CENTER AROUND THE ENTIRE WALL PERIMETER; (B) ON TOP EVERY THIRD VERTICAL ELEMENT; (C) ON ALL EXISTING STRUCTURES THAT ARE SENSITIVE TO MOVEMENT AND WITHIN 30 FEET OF THE EXCAVATION; AND (D) AT THE CURB LINE AT 25 FOOT INTERVALS.

1.02 MONITORING FREQUENCY AND REPORTING

A. SURVEY AND REPORTING OF MOVEMENT OF MONITORING POINTS SHALL BE PERFORMED A MINIMUM OF TWICE PER WEEK, WITH AT LEAST ONE OF THE READINGS BY A LICENSED LAND SURVEYOR, DURING SHORING INSTALLATION AND EXCAVATION. SURVEY FREQUENCY CAN BE DECREASED AFTER THE SHORING SYSTEM HAS BEEN INSTALLED AND EXCAVATION IS COMPLETE IF THE DATA INDICATES LITTLE OR NO ADDITIONAL MOVEMENT. SURVEYING MUST CONTINUE UNTIL THE PERMANENT STRUCTURE (INCLUDING FLOOR SLABS AS BRACES) IS COMPLETE UP TO FINAL AND STREET GRADES. THE SURVEY FREQUENCY WILL BE DETERMINED BY THE GEOTECHNICAL ENGINEER AFTER REVIEW AND APPROVAL BY SDCI AND SDOT.

B. MONITORING RESULTS SHALL BE PRESENTED WEEKLY TO THE GEOTECHNICAL ENGINEER OF RECORD. THE GEOTECHNICAL ENGINEER SHALL REVIEW THE SURVEY DATA AND PROVIDE AN EVALUATION OF WALL PERFORMANCE ALONG WITH GRAPHICAL REPRESENTATION OF WALL MOVEMENT VERSUS TIME AND SURVEY DATA TO SDCI AND SDOT ON AT LEAST A WEEKLY BASIS. IMMEDIATELY AND DIRECTLY, NOTIFY SDCI AND SDOT IF ANY UNUSUAL OR SIGNIFICANTLY INCREASED MOVEMENT OCCURS.

C. IMMEDIATELY AND DIRECTLY NOTIFY THE GEOTECHNICAL AND STRUCTURAL ENGINEERS, WALL DESIGNER, SDCI, AND SDOT IF 0.5 INCHES OF MOVEMENT OCCURS BETWEEN TWO CONSECUTIVE READINGS AND WHEN TOTAL MOVEMENTS REACH 0.5 INCH. AT THAT AMOUNT OF MOVEMENT, THE ENGINEERS AND DESIGNERS SHALL DETERMINE THE CAUSE OF DISPLACEMENT AND DEVELOP REMEDIAL MEASURES SUFFICIENT TO LIMIT TOTAL WALL MOVEMENTS TO 1 INCH. ALL EARTHWORK AND CONSTRUCTION ACTIVITIES MUST BE DIRECTED TOWARDS IMMEDIATE IMPLEMENTATION OF REMEDIAL MEASURES NECESSARY TO LIMIT TOTAL WALL MOVEMENTS TO WHAT HAS BEEN DEFINED AS ACCEPTABLE BY THE DESIGN TEAM, SDCI, AND SDOT (AS INDICATED ABOVE).

SECTION 02380 - SOIL NAIL WALL CONSTRUCTION OBSERVATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. SOIL NAIL WALL CONSTRUCTION OBSERVATION SHALL BE PERFORMED IN GENERAL ACCORDANCE WITH FHWA GUIDE LINES (SOIL NAILING INSPECTORS MANUAL - SOIL NAIL WALLS, 1994)

B. SOIL NAIL INSPECTOR OR PROJECT MANAGER IN CHARGE OF SOIL NAIL CONSTRUCTION OBSERVATION SHALL BE A REGISTERED PROFESSIONAL ENGINEER AND HAVE A MINIMUM OF 3 YEARS EXPERIENCE IN THE DESIGN OF SOIL NAIL WALLS AND THE CONSTRUCTION OF SOIL NAIL WALLS.

C. THE EXCAVATION FACE SHALL BE LOGGED AND PRESENTED IN GRAPHICAL FORMAT AS PART OF THE SOIL NAIL SPECIAL INSPECTION. GRAPHICAL LOGS OF SHORING WALLS SHALL BE PRESENTED ON A WEEKLY BASIS TO THE SHORING ENGINEER.

D. VARIATIONS FROM THE GEOTECHNICAL REPORT OR THE ASSUMED SOIL CONDITIONS SHALL BE IMMEDIATELY PRESENTED IN WRITING TO THE SHORING DESIGNER AND GEOTECHNICAL ENGINEER OF RECORD PRIOR TO PROCEEDING WITH THE SUBSEQUENT SHORING.

REV.	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

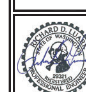
SPECIFICATIONS (2 OF 2)

GRAND STREET COMMONS - EAST BUILDING

1750 22ND AVE S

SEATTLE WASHINGTON

Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549



SH6.1

DESIGNED BY:	TB
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	9 OF 9

LAST SAVED: 7/16/2021

AGGREGATE PIER NOTES

GENERAL

1. AGGREGATE PIER DESIGN IS BASED ON THE FOLLOWING DOCUMENTS:
   A. PERFORMANCE CRITERIA, AND SUBSURFACE INFORMATION PROVIDED IN GEOTECHNICAL ENGINEERING REPORT BY ASPECT CONSULTING, LLC, DATED OCTOBER 12, 2020.
   B. AGGREGATE PIER GROUND IMPROVEMENT DESIGN MEMORANDUM BY ASPECT CONSULTING, LLC, DATED JULY 8, 2021.
   C. FOUNDATION PLAN, SHEET S2.1, BY COUGHLIN PORTER LUNDEEN, DATED APRIL 1, 2021.
2. THESE DRAWINGS ARE BASED ON THE STRUCTURAL DRAWINGS PROVIDED BY COUGHLIN PORTER LUNDEEN. THE AGGREGATE PIER LAYOUT LOCATION PLAN AND FOOTING DETAILS ARE FOR AGGREGATE PIER NUMBER, LOCATION, AND LAYOUT ONLY. FOOTING LOCATIONS, SIZES, AND ORIENTATION SHOWN ON THESE PLANS ARE FOR INFORMATION ONLY. REFER TO STRUCTURAL PLANS FOR SPECIFIC FOUNDATION DIMENSIONS AND LOCATION. THE AGGREGATE PIER DESIGNER SHALL BE NOTIFIED IMMEDIATELY IF INFORMATION ON THESE PLANS CONFLICTS WITH STRUCTURAL OR ARCHITECTURAL DRAWINGS.
3. WORKING GRADES SHALL BE DETERMINED BY GENERAL CONTRACTOR AND AGGREGATE PIER CONTRACTOR AND REVIEWED BY AGGREGATE PIER DESIGNER. WORKING GRADES SHALL NOT BE LOWER THAN THE ADJACENT FOUNDATIONS. WORKING GRADES AND FOUNDATION ELEVATIONS AT AGGREGATE PIER LOCATIONS SHALL BE REPORTED IN WRITING OR MARKED AT THE FOUNDATION LOCATIONS PRIOR TO INSTALLING AGGREGATE PIERS.
4. ALL AGGREGATE PIERS SHALL BE INSTALLED TO PRACTICAL REFUSAL AND MINIMUM SPECIFIED ELEVATION AS DEFINED BELOW. THE CONTRACTOR SHOULD BE PREPARED TO PREDRILL TO REACH THE MINIMUM TIP ELEVATION FOR SOME AGGREGATE PIERS.
5. THE CONTRACTOR SHOULD BE PREPARED FOR ZONES OF PERCHED WATER AND POTENTIALLY CAVING SOILS.
6. AGGREGATE PIERS SHALL BE INSTALLED IN THE FIELD WITHIN 4 INCHES OF LOCATION SHOWN ON THESE PLANS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR UTILITY LOCATIONS AND NOTIFYING THE AGGREGATE PIER DESIGNER OF CONFLICTS BETWEEN AGGREGATE PIER LOCATIONS AND UTILITIES.
8. WHEN OBSTRUCTIONS ARE ENCOUNTERED THAT CANNOT BE REMOVED OR BYPASSED WITH CONVENTIONAL AGGREGATE PIER INSTALLATION EQUIPMENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING OBSTRUCTIONS.
9. AFTER COMPLETION OF AGGREGATE PIER INSTALLATIONS, THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING THE AGGREGATE PIERS AGAINST DISTURBANCE OR DAMAGE.

INSTALLATION CRITERIA

1. AGGREGATE PIERS SHALL BE INSTALLED TO MEET THE FOLLOWING REQUIREMENTS:
   A. HAVE A MINIMUM DIAMETER OF 27 INCHES WITH UNIFORMLY DENSELY COMPACTED AGGREGATE FOR THE FULL LENGTH OF THE PIER.
   B. AGGREGATE USED IN THE PIERS SHALL CONSIST OF CRUSHED QUARRY ROCK MEETING THE REQUIREMENTS FOR AASHTO #57 OR APPROVED EQUAL. RECYCLED CONCRETE AGGREGATE SHALL NOT BE USED.
   C. MEET THE SPECIFIED MINIMUM TIP ELEVATIONS AND INSTALLED TO PRACTICAL REFUSAL USING DISPLACEMENT METHODS. PRACTICAL REFUSAL SHALL BE CONSIDERED LESS THAN 6 INCHES OF MANDREL PENETRATION IN 30 SECONDS OF CONTINUOUS DRIVING. WHERE IT IS NOT POSSIBLE TO ADVANCE THE PIERS TO SPECIFIED MINIMUM TIP ELEVATION BY DISPLACEMENT METHODS, THEN PRE-DRILLING WILL BE REQUIRED, FOLLOWED BY RE-INSERTION OF THE MANDREL UNTIL PRACTICAL REFUSAL. SEE AGGREGATE PIER SCHEDULE FOR MINIMUM TIP ELEVATIONS.
   D. ACHIEVE A STIFFNESS MODULUS OF AT LEAST 200 POUNDS PER CUBIC INCH (PCI) AND CAPACITY OF UP TO 63 KIPS (VARIES BETWEEN 55 AND 63 KIPS DEPENDING ON FOOTING TYPE AND LOCATION) VERIFIED WITH TWO SUCCESSFUL MODULUS TESTS AT LOCATIONS SELECTED BY THE AGGREGATE PIER DESIGNER.

INSPECTION AND QUALITY CONTROL

1. THE AGGREGATE PIER DESIGNER SHALL PROVIDE INSPECTION OF ALL AGGREGATE PIERS TO VERIFY THEY HAVE BEEN INSTALLED IN ACCORDANCE WITH THESE PLANS. ACCEPTANCE OF ALL AGGREGATE PIERS SHALL BE THE RESPONSIBILITY OF THE DESIGNER.
2. THE CONTRACTOR SHALL SUBMIT 25-POUND SAMPLE OF THE PROPOSED AGGREGATE SHALL BE SUBMITTED FOR REVIEW AND APPROVAL BY THE AGGREGATE PIER DESIGNER AT LEAST ONE WEEK PRIOR TO THE START OF AGGREGATE PIER INSTALLATION.
3. THE CONTRACTOR SHALL PERFORM TWO MODULUS TESTS ON AGGREGATE PIERS AT LOCATIONS SELECTED BY THE AGGREGATE PIER DESIGNER TO VERIFY THE CONTRACTOR'S MEANS AND METHODS ACHIEVE THE DESIGN CRITERIA.
4. THE MODULUS TEST LOAD SCHEDULE, EQUIPMENT AND TEST FRAME SETUP SHOULD BE SUBMITTED TO THE AGGREGATE PIER DESIGNER PRIOR TO THE START OF CONSTRUCTION AND SHOULD BE IN GENERAL ACCORDANCE WITH ASTM D1143. THE MODULUS TESTS MAY BE PERFORMED ON PRODUCTION OR SACRIFICIAL AGGREGATE PIERS AT THE DISCRETION OF THE CONTRACTOR.

4.1 AT A MINIMUM, TESTING EQUIPMENT SHALL CONSIST OF:
   A. A BEARING PLATE THE SAME DIAMETER AS THE AGGREGATE PIER.
   B. A DIAL GAUGE CAPABLE OF MEASURING TO 0.001 INCHES SHALL BE USED TO MEASURE THE DISPLACEMENT OF THE BEARING PLATE. THE MOVEMENT-MEASURING DEVICE SHALL HAVE A MINIMUM TRAVEL EQUAL TO THE THEORETICAL COMPRESSION OF THE TOTAL AGGREGATE PIER LENGTH AT THE MAXIMUM TEST LOAD PLUS 1-INCH. THE DIAL GAUGE SHALL BE SUPPORTED INDEPENDENT OF THE JACKING SYSTEM AND RETAINED STRUCTURE AND SHALL BE ALIGNED SO THAT ITS AXIS IS WITHIN 5 DEGREES FROM THE AXIS OF THE AGGREGATE PIER.
   C. A HYDRAULIC JACK AND PUMP SHALL BE USED TO APPLY THE TEST LOAD. THE JACK AND PRESSURE GAUGE SHALL BE CALIBRATED BY AN INDEPENDENT TEST LABORATORY AS A UNIT. THE PRESSURE GAUGE SHALL BE GRADUATED IN 100 PSI INCREMENTS OR LESS. THE PRESSURE GAUGE WILL BE USED TO MEASURE THE APPLIED LOAD. THE RAM TRAVEL OF THE JACK SHALL NOT BE LESS THAN THE THEORETICAL COMPRESSION OF THE TOTAL AGGREGATE PIER LENGTH AT THE MAXIMUM TEST LOAD PLUS 1-INCH. THE REACTION FRAME OR EQUIPMENT SHALL BE CAPABLE OF RESISTING 2 TIMES THE ALLOWABLE DESIGN LOAD OF THE AGGREGATE PIER.

4.2 AT A MINIMUM, THE LOAD TESTING PROCEDURE SHOULD:
   A. THE MODULUS LOAD TESTING SHOULD BE TAKEN TO 150 PERCENT OF THE DESIGN LOAD WITH A MINIMUM OF A 1 HOUR CREEP TEST AT 100 PERCENT OF THE DESIGN LOAD. THE DESIGN LOAD VARIES BETWEEN 55 AND 63 KIPS DEPENDING ON FOOTING TYPE AND LOCATION.
   B. LOADING INCREMENTS SHOULD BE INCREASED AT A MAXIMUM OF 10% OF THE DESIGN LOAD AND HELD FOR A MINIMUM OF 5 MINUTES AT EACH INCREMENT.
   C. UNLOADING SHOULD BE PERFORMED IN INCREMENTS OF 25% OF THE DESIGN LOAD WITH EACH LOAD KEPT CONSTANT FOR A MINIMUM OF 5 MINUTES AT EACH INCREMENT.

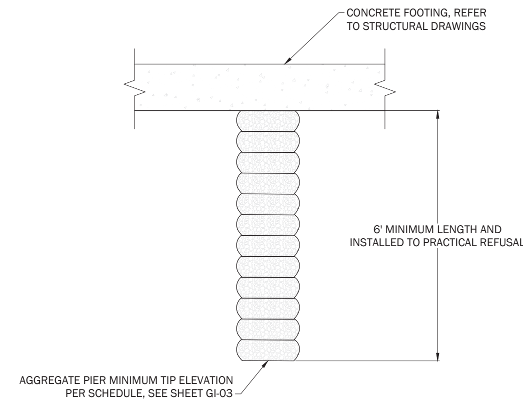
4.3 ACCEPTANCE CRITERIA
   A. ACCEPTANCE OF THE MODULUS TEST WILL BE BASED ON 1) LESS THAN 1-INCH OF TOTAL SETTLEMENT AT 100 PERCENT OF DESIGN LOAD 2) A CALCULATED STIFFNESS MODULUS OF THE AGGREGATE PIER OF 200 PCI OR GREATER (DETERMINED BY PLOTTING DEFLECTION AGAINST STRESS AT EACH INCREMENT) 3) NO NOTABLE FAILURE OCCURRING AT 150% OF THE DESIGN LOAD.

FOOTING CONSTRUCTION OVER AGGREGATE PIERS

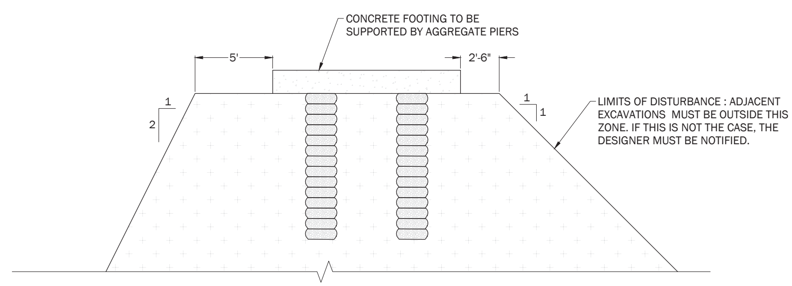
1. THE CONTRACTOR SHALL EXCAVATE FOUNDATIONS A MANNER THAT MINIMIZES THE DISTURBANCE TO THE AGGREGATE PIERS AND SURROUNDING SOIL. ALL EXCAVATIONS FOR FOUNDATIONS SUPPORTED BY AGGREGATE PIERS SHALL BE LIMITED TO 3 INCHES BELOW THE PLANNED BOTTOM OF FOOTING ELEVATION.
2. FOLLOWING FOUNDATION EXCAVATION AND PRIOR TO CONCRETE PLACEMENT, THE TOP OF THE AGGREGATE PIERS AND SURROUNDING SOIL SHALL BE COMPACTED WITH A STANDARD, HAND-OPERATED IMPACT COMPACTOR (I.E. JUMPING JACK COMPACTOR) OVER THE ENTIRE FOUNDATION AREA.
3. FOUNDATION EXCAVATIONS SHALL BE FREE OF STANDING WATER PRIOR TO AND DURING COMPACTION AND PLACEMENT OF CONCRETE.
4. THE GEOTECHNICAL ENGINEER SHALL INSPECT ALL FOUNDATION SUBGRADES PRIOR TO PLACEMENT OF CONCRETE.

VIBRATION MONITORING

1. THE CONTRACTOR OR OWNER SHALL PERFORM VIBRATION MONITORING AT THE ADJACENT APARTMENT BUILDING AT 1701 23RD AVE S BUILDING DURING GROUND IMPROVEMENT CONSTRUCTION ACTIVITIES. VIBRATION MONITORING SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING:
   A. ESTABLISH AUTOMATED VIBRATION MONITORING EQUIPMENT TO CONTINUOUSLY COLLECT VIBRATION DATA AT LOCATIONS APPROVED BY THE GEOTECHNICAL ENGINEER. THE VIBRATION MONITORING EQUIPMENT SHALL BE CAPABLE OF RECORDING VIBRATIONS OF ONE-HUNDREDTH OF AN INCH PER SECOND (0.01 INCH/SECOND) OR LESS.
   B. AT LEAST 1 WEEK PRIOR TO THE START OF GROUND IMPROVEMENT CONSTRUCTION, COLLECT AT LEAST 1 WEEK OF BASELINE VIBRATION READINGS DURING NORMAL WORKING HOURS.
   C. PERFORM VIBRATION MONITORING ON A DAILY BASIS DURING GROUND IMPROVEMENT CONSTRUCTION ACTIVITIES UNTIL GROUND IMPROVEMENT CONSTRUCTION ACTIVITIES ARE COMPLETE AND VIBRATIONS HAVE STABILIZED. SUBMIT VIBRATION MONITORING DATA TO THE GEOTECHNICAL ENGINEER OF RECORD WITHIN 48 HOURS OF PERFORMING THE MONITORING.
   D. UPON DETECTING VIBRATIONS EXCEEDING A PEAK PARTICLE VELOCITY OF 0.5 INCH PER SECOND, THE CONTRACTOR SHALL NOTIFY THE GEOTECHNICAL ENGINEER AND IMPLEMENT CORRECTIVE ACTIONS. UPON DETECTING VIBRATIONS EXCEEDING A PEAK PARTICLE VELOCITY OF 1 INCH PER SECOND, THE CONTRACTOR MUST STOP VIBRATION GENERATING ACTIVITIES AND DEVELOP A MITIGATION PLAN TO BE APPROVED BY THE GEOTECHNICAL ENGINEER BEFORE RESUMING WORK.



AGGREGATE PIER TYPICAL DETAIL 1 / GI-01
SCALE: NTS



ADJACENT EXCAVATION DETAIL 2 / GI-01
SCALE: NTS

STATE OF WASHINGTON
56315
REGISTERED PROFESSIONAL ENGINEER
09/30/2021

REV.	DESCRIPTION	DATE	APPR.
2	95% CD	09/30/2021	ECS
1	BP CORRECTIONS	07/08/2021	ECS

Aspect CONSULTING

DATE: Sep/30/2021
REVISION: -
PROJECT NUMBER: 170304
DESIGNED BY: ECS
DRAWN BY: CMV
REVISED BY: -

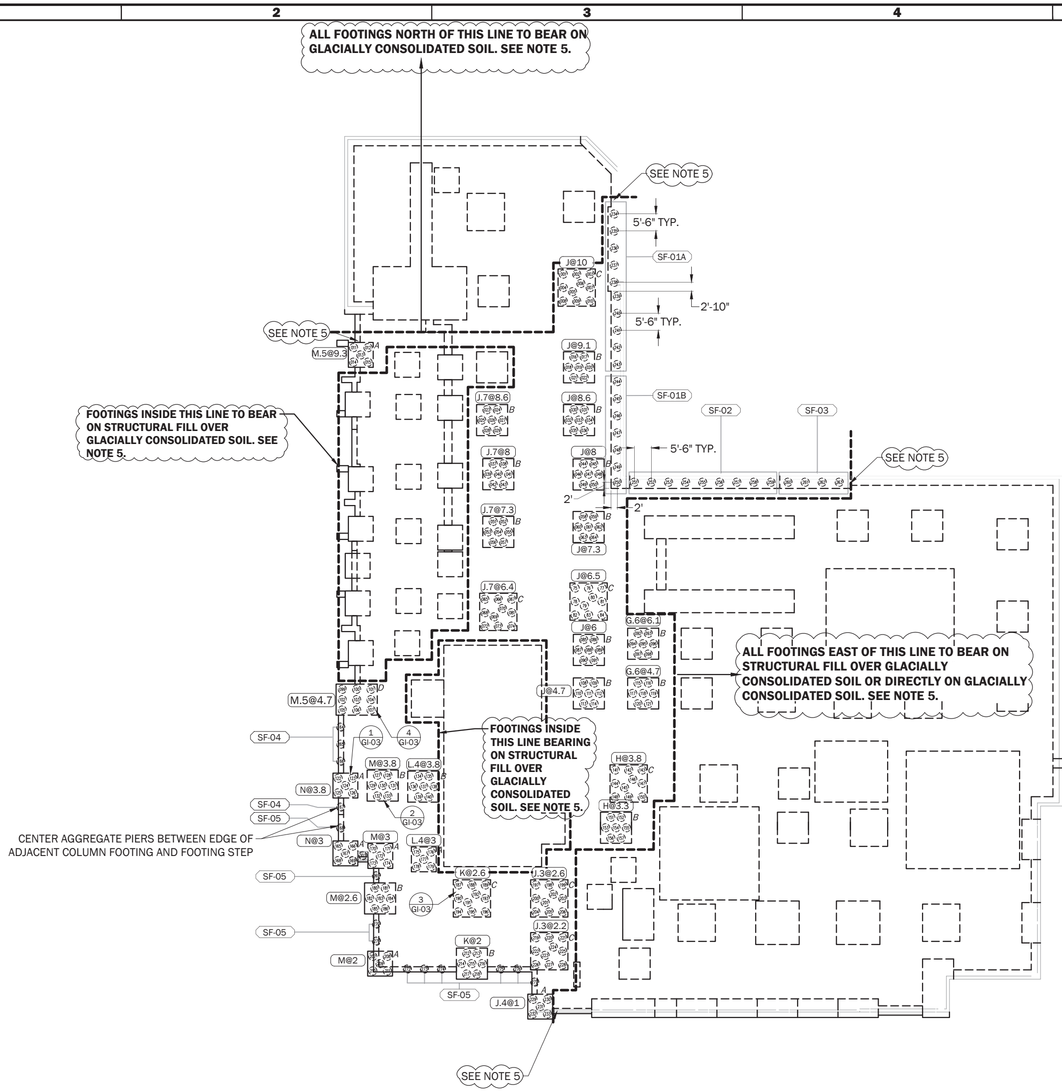
AGGREGATE PIER NOTES AND DETAILS

GROUND IMPROVEMENT PLAN
GRAND STREET COMMONS EAST
SEATTLE, WASHINGTON

EAST SHEET

GI-01

SHEET 1 OF 3



AGGREGATE PIER PLAN
SCALE: 1" = 20'
1 GI-02

0 20 40 Feet

LEGEND

- AGGREGATE PIER: 27-INCH DIAMETER
- STRIP FOOTING PIER LOCATION
- J.7@6.4 FOOTING IDENTIFICATION (COLUMN FOOTING)
- SF-01 FOOTING IDENTIFICATION (STRIP FOOTING)
- *A* PIER CONFIGURATION ID (SEE SHEET GI-03)

AGGREGATE PIER PLAN NOTES:

1. THIS DRAWING IS BASED ON STRUCTURAL DRAWINGS PROVIDED BY COUGHLIN PORTER LUNDEEN.
2. FOOTING OUTLINES ARE FOR INFORMATION ONLY. SEE STRUCTURAL AND/OR ARCHITECTURAL PLANS FOR FOOTING DIMENSIONS AND DETAILS.
3. FOOTING LOCATIONS SHALL BE IN ACCORDANCE WITH STRUCTURAL AND/OR ARCHITECTURAL DRAWINGS, DIMENSIONS, AND DETAILS.
4. AGGREGATE PIERS UNDER WALLS AND COLUMNS SHALL BE CENTERED UNDER FOOTINGS AS SHOWN, DIMENSIONED FROM CONTROL POINTS ESTABLISHED FROM STRUCTURAL AND/OR ARCHITECTURAL PLANS. REFER TO SHEET GI-03 FOR SPECIFIC LAYOUT DETAILS FOR AGGREGATE PIERS BELOW FOOTINGS.
5. WHERE TRANSITION FROM GROUND IMPROVEMENT TO NO GROUND IMPROVEMENT OCCURS BELOW OR ADJACENT TO A FOOTING, THE CONTRACTOR SHALL COMPLETE THE FOUNDATION EXCAVATION AND PLACE ALL NECESSARY STRUCTURAL FILL IN THE AREA WITH NO GROUND IMPROVEMENT PRIOR TO INSTALLING AGGREGATE PIERS IN THE ADJACENT GROUND IMPROVEMENT AREA.

ERIC SCHELLENGER, STATE OF WASHINGTON, 56315, REGISTERED PROFESSIONAL ENGINEER
09/30/2021

REV.	DATE	DESCRIPTION	APPR.
2	09/30/2021	95% CD	ECS
1	07/08/2021	BP CORRECTIONS	ECS

REVISED BY: -
DRAWN BY: CMV
DESIGNED BY: ECS
PROJECT NUMBER: 170304
REVISION: -
DATE: Sep/30/2021

Aspect CONSULTING

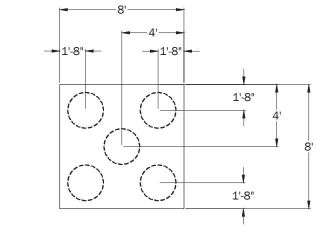
AGGREGATE PIER PLAN

GROUND IMPROVEMENT PLAN
GRAND STREET COMMONS EAST
SEATTLE, WASHINGTON

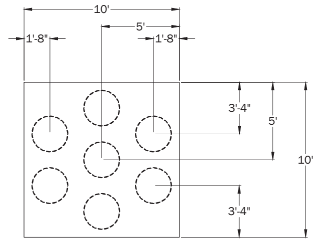
EAST SHEET

GI-02

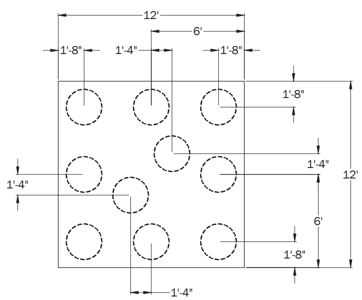
SHEET 2 OF 3



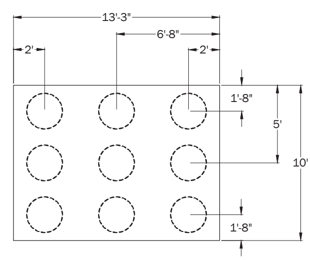
FOOTING "A" TYP. DETAIL (8' X 8')
SCALE: 1" = 4'
1
GI-03



FOOTING "B" TYP. DETAIL (10' X 10')
SCALE: 1" = 4'
2
GI-03



FOOTING "C" TYP. DETAIL (12' X 12')
SCALE: 1" = 4'
3
GI-03



FOOTING "D" DETAIL (13'-3" x10')
SCALE: 1" = 4'
4
GI-03

ALL ELEVATIONS BASED ON NAVD 88.

PIER NO.	FOOTING ID	BOTTOM OF FOOTING ELEVATION (FEET)	AGGREGATE PIER MINIMUM TIP ELEVATION (FEET)
1-10	J@10	68.33	62.33
11-15	M.5@9.3	70.83	64.83
16-22	J@9.1	68.50	62.50
23-29	J.7@8.6	68.50	62.50
30-36	J@8.6	68.50	62.50
37-43	J.7@8	68.50	62.00
44-50	J@8	68.50	62.00
51-57	J.7@7.3	68.50	62.00
58-64	J@7.3	68.50	62.00
65-74	J.7@6.4	68.33	62.33
75-84	J@6.5	68.33	62.33
85-91	J@6	68.50	62.50
92-98	G.6@6.1	68.50	62.00
99-107	M.5@4.7	69.75	63.75
108-114	J@4.7	68.50	62.50
115-121	G.6@4.7	68.50	62.50
122-126	N@3.8	70.08	63.58
127-133	M@3.8	68.50	62.50
134-140	L.4@3.8	67.00	61.00
141-150	H@3.8	68.33	62.33
151-157	H@3.3	68.50	62.50
158-164	NOT USED	N/A	N/A
165-169	N@3	68.83	62.83
170-174	M@3	68.83	62.83
175-179	L.4@3	67.33	61.33
180-186	M@2.6	68.50	62.50
187-196	K@2.6	68.33	62.33
197-206	J.3@2.6	68.33	59.83
207-211	M@2	68.83	62.83
212-218	K@2	68.50	62.50
219-228	J.3@2.2	68.33	62.33
229-233	J.4@1	68.83	62.83
234-243	H@9 to H@10.5 (SF-01)	69.50	63.50
244-250	H@8 to H@9 (SF-01)	69.50	63.00
251-259	F.2@8 to H@8 (SF-02)	71.25	62.75
260-263	E@8 to F.2@8 (SF-03)	73.50	67.50
264-268	M/N Line between 7 and 3.5 (SF-04)	71.58	63.58
269-277	SF-05	70.33	63.33

09/30/2021

REV.	DATE	DESCRIPTION	APPR.
2	09/30/2021	95% CD	ECS
1	07/08/2021	BP CORRECTIONS	ECS

REVISED BY: -
DRAWN BY: CMV
DESIGNED BY: ECS
PROJECT NUMBER: 170304
REVISION: -
DATE: Sep/30/2021

Aspect CONSULTING

AGGREGATE PIER SCHEDULE

GROUND IMPROVEMENT PLAN
GRAND STREET COMMONS EAST
SEATTLE, WASHINGTON

EAST SHEET

GI-03

SHEET 3 OF 3

Shoring and Grading Plan Sets
GSC West 95% CD

GRAND STREET COMMONS - WEST BUILDING

1765 22ND AVE S
SEATTLE, WASHINGTON

TEMPORARY SHORING DESIGN DRAWINGS

SHEET INDEX

SHEET	TITLE
SH1.0	GENERAL INFORMATION
SH2.0	SITE PLAN
SH2.1	SHORING PLAN
SH3.0	NORTH AND EAST WALL ELEVATIONS
SH3.1	SOUTH AND WEST WALL ELEVATIONS
SH4.0	CROSS SECTIONS
SH5.0	DETAILS (1 OF 2)
SH5.1	DETAILS (2 OF 2)
SH6.0	SPECIFICATIONS (1 OF 2)
SH6.1	SPECIFICATIONS (2 OF 2)

GENERAL NOTES

GENERAL

THE CONTRACTOR AND SUBCONTRACTORS ARE RESPONSIBLE FOR THE CONSTRUCTION PROCESS AND THE SAFETY OF THE WORKERS. THIS INCLUDES BUT IS NOT LIMITED TO, THE CONSTRUCTION SEQUENCE, TEMPORARY HANDRAILS, EXCAVATION ACCESS, AND BARRIERS. IT ALSO INCLUDES LIFTING OF MATERIALS AND CONSTRUCTION EQUIPMENT INTO AND OUT OF THE EXCAVATION, TEMPORARY BRACING OF SINGLE-SIDED FORMWORK, TEMPORARY SHORING OF EXCAVATIONS, AND STABILITY OF ALL TEMPORARY CUT SLOPES.

THE CONTRACTOR SHALL PROVIDE PROTECTION OF PEDESTRIANS AND VEHICULAR TRAFFIC WHEN CONSTRUCTION ACTIVITIES REQUIRE SUCH.

PRIOR TO THE START OF EXCAVATION THE GENERAL CONTRACTOR IS RESPONSIBLE FOR THE ARRANGEMENT OF TWO SEPARATE PRE- CONSTRUCTION MEETINGS ONE BETWEEN OWNER'S REPRESENTATIVES AND SEATTLE SDCI AND THE OTHER BETWEEN OWNER'S REPRESENTATIVES AND SDOT. CALL (206) 684-8950 TO ARRANGE A MEETING WITH SEATTLE SDCI. CALL (206) 684-5281 TO ARRANGE A MEETING WITH SDOT.

BUILDING CODES, DESIGN MANUALS, AND SPECIFICATIONS
2015 INTERNATIONAL BUILDING CODE (IBC)
FHWA MANUAL FOR ANCHORED WALLS
SOIL NAIL WALLS REFERENCE MANUAL. U.S. DEPARTMENT OF TRANSPORTATION. FEDERAL HIGHWAY ADMINISTRATION PUBLICATION NO. FHWA-NHI-14-007. FHWA GEC 007. FEBRUARY 2015.

DESIGN LIVE LOADS

TRAFFIC SURCHARGE = 250 PSF VERTICAL (70 PSF HORIZONTAL FOR VERTICAL ELEMENTS).
CONSTRUCTION SURCHARGE = 500 PSF VERTICAL APPLIED TO SOUTH AND EAST SHORING WALL.
CONSTRUCTION SURCHARGES CANNOT BE APPLIED UNTIL THE SOIL NAIL WALL IS FULLY CONSTRUCTED.

SUBSURFACE DESIGN

ALL SUBSURFACE SOIL AND WATER PARAMETERS USED IN THE DESIGN WERE BASED ON THE SUBSURFACE CHARACTERIZATION PRESENTED IN THE REPORT TITLED, "GEOTECHNICAL ENGINEERING REPORT, GRAND STREET COMMONS, WEST, SEATTLE, WASHINGTON" PREPARED BY ASPECT CONSULTING, DATED OCTOBER 12, 2020.

THE FOLLOWING SOIL PROPERTIES WERE USED IN THE DESIGN OF THE SOIL NAILED SHORING WALLS:

SOIL UNIT	MOIST UNIT WEIGHT (PCF)	FRICTION (DEG)	COHESION (PSF)	ULTIMATE NAIL PULLOUT RESISTANCE (K/FT)
FILL	115	30	0	3
GLACIAL RECESSIONAL DEPOSITS	115	32	100	4
GLACIALLY CONSOLIDATED SOILS	130	40	100	7

EXISTING UNDERGROUND OBSTRUCTIONS AND UTILITIES

THE CONTRACTOR MUST FIELD VERIFY ALL EXISTING DIMENSIONS AND SITE CONDITIONS.THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING ACTUAL LOCATIONS OF ALL EXISTING UTILITIES SHOWN ON THE PLANS AND THOSE UTILITIES OR UNDERGROUND OBSTRUCTIONS NOT SHOWN ON THE PLANS. THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL ABANDONED UTILITIES, OR OTHER UNDERGROUND OBSTRUCTIONS THAT INTERFERE WITH THE NEW CONSTRUCTION. LOCATION AND/OR ABANDONMENT MUST BE COMPLETED PRIOR TO VERTICAL ELEMENT INSTALLATION AND EXCAVATION.

SEWER INSPECTION

ALL SEWER AND STORM LINES IN THE R.O.W. WITHIN 10 FEET (OR WITHIN 20 FEET IF SUCH LINES ARE 30 FEET OR MORE OFF OF SITE PROPERTY LINE) OF ANY PROPOSED SHORING ELEMENT SHALL BE VIDEOTAPED OF PRE-PROJECT CONDITION AND A COPY SENT TO SPU AT SPU_DWW_PIPE_REHAB@SEATTLE.GOV PRIOR TO THE PRECONSTRUCTION MEETING. SIMILAR VIDEOTAPE OF POST-PROJECT CONDITION IS ALSO REQUIRED AND SENT TO SPU AT SAME EMAIL ADDRESS.

GENERAL NOTES (CONT.)

JOB SITE SAFETY

INSOFAR AS JOB SITE SAFETY IS CONCERNED, TERRACON IS RESPONSIBLE FOR THE HEALTH AND SAFETY OF ITS EMPLOYEES AND SUBCONTRACTORS. NOTHING HEREIN SHALL BE CONSTRUED TO RELIEVE CLIENT OR ANY OTHER CONSULTANTS OR CONTRACTORS FROM THEIR RESPONSIBILITIES FOR MAINTAINING A SAFE JOB SITE. TERRACON SHALL NOT ADVISE ON, ISSUE DIRECTIONS REGARDING, OR ASSUME CONTROL OVER SAFETY CONDITIONS AND PROGRAMS FOR OTHERS AT THE JOB SITE. NEITHER THE PROFESSIONAL ACTIVITIES OF TERRACON, NOR THE PRESENCE OF TERRACON OR ITS EMPLOYEES AND SUBCONTRACTORS, SHALL BE CONSTRUED TO IMPLY THAT TERRACON CONTROLS THE OPERATIONS OF OTHERS OR HAS ANY RESPONSIBILITY FOR JOB SITE SAFETY.

STRUCTURAL STEEL

STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING STANDARDS UNLESS OTHERWISE SHOWN ON THE DRAWINGS OR APPROVED OTHERWISE BY THE ENGINEER.

WIDE FLANGE (W) SHAPES: ASTM A992
PLATES: ASTM A572 GRADE 50

MINIMUM WELD SIZE 1/4" CONTINUOUS FILLET. MINIMUM WELD LENGTH 4 INCHES. ALL WELDING TO BE PERFORMED BY WELDERS CERTIFIED PER AWS STANDARD SPECIFICATIONS. USE E70XX ELECTRODES.

SHORING IN THE RIGHT OF WAY (ROW):

ALL SHORING ELEMENTS IN THE ROW SHALL BE REMOVED TO A DEPTH OF AT LEAST 4 FEET BELOW FINISHED GRADE IN THE ROW ONCE THEY ARE NO LONGER NEEDED FOR CONSTRUCTION.

SHOTCRETE

ALL SHOTCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4500 PSI, AND A MINIMUM 3-DAY COMPRESSIVE STRENGTH OF 2000 PSI. SEE THE SPECIFICATIONS FOR SPECIFIC REQUIREMENTS. TYPE I PORTLAND CEMENT CONFORMING TO ASTM C150 / AASHTO M85 SHALL BE USED FOR SHOTCRETE. SUBMIT MIX DESIGNS IN ACCORDANCE WITH THE SPECIFICATIONS. ALL TEMPORARY SHOTCRETE SHALL BE SCREED FINISH

SOIL NAIL GROUT

ALL SOIL NAIL GROUT SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,000 PSI. SEE THE SPECIFICATIONS FOR SPECIFIC REQUIREMENTS.

NAIL BAR STEEL

ALL NAIL BARS SHALL CONFORM TO ASTM A615 / AASHTO M31, GRADE 75 OR GRADE 100 OR ASTM A722-07 / AASHTO M275 GRADE 150 AS INDICATED ON THE PLANS.

REINFORCING STEEL

ALL REINFORCING STEEL SHALL CONFORM TO ASTM A615 / AASHTO M31, GRADE 60 FOR DEFORMED BARS, AND ASTM A185 / AASHTO M55 FOR WELDED WIRE FABRIC (WWF).

SUBMIT REINFORCING STEEL SHOP DRAWINGS TO ENGINEER IN ACCORDANCE WITH THE SPECIFICATIONS.

ALL REINFORCING STEEL DETAILS IN ACCORDANCE WITH ACI 315 MANUAL OF STANDARD PRACTICE

ALL DEFORMED REINFORCING BAR LAPS SHALL BE CLASS B, IN ACCORDANCE WITH ACI 318-11 OR AS SUMMARIZED IN THE FOLLOWING TABLE:

BAR SIZE	BAR DIA. (IN)	CLASS B LAP SPLICE LENGTH (DIA)	CLASS B LAP SPLICE LENGTH (IN)
#4	0.500	40 Ø	20

WWF LAPS SHALL BE 12 INCHES.

SEE THE PLANS FOR SPECIFIC STRUCTURAL DETAILS. SUBMIT ALL SHOP DRAWINGS IN ACCORDANCE WITH THE SPECIFICATIONS.

WELDING

MINIMUM WELD SIZE 1/4" CONTINUOUS FILLET. MINIMUM WELD LENGTH 4 INCHES. ALL WELDING TO BE PERFORMED BY WELDERS CERTIFIED PER AWS STANDARD SPECIFICATIONS. USE E70XX ELECTRODES.

TIEBACKS
ALL TIEBACKS SHALL BE DESTRESSED ONCE THE PERMANENT BUILDING IS CONSTRUCTED SUCH THAT IT CAN SUPPORT THE LATERAL EARTH PRESSURES. THE STRUCTURAL ENGINEER FOR THE BUILDING SHALL DETERMINE WHEN THE TIEBACKS CAN BE DESTRESSED.

270 KSI, 0.6 INCH DIAMETER 7 WIRE STRANDS OR SOLID THREAD BARS SHALL BE SIZED BASED ON 60% OF THE DESIGN LOAD AND 80% FOR THE TEST LOADS. THE MINIMUM TIEBACK DRILL HOLE DIAMETER SHALL BE 6-INCHES.

SOLDIER PILE AND TIEBACK DESIGN PARAMETERS
A MINIMUM SIX INCH TIEBACK DIAMETER DRILL HOLE IS REQUIRED. SEE THE GEOTECHNICAL ENGINEERING REPORT FOR RECOMMENDED TIEBACK ADHESIONS. AN ALLOWABLE TIEBACK/SOIL BOND OF 1.5 KIPS/FT WAS USED IN THE DESIGN WHICH WILL REQUIRE SECONDARY GROUTING TO ACHIEVE THE DESIGN VALUE.

EXCAVATION DEPTH BELOW TIEBACK POCKETS
THE MAXIMUM EXCAVATION DEPTH BELOW TIEBACK POCKETS OR INSTALLED TIEBACKS THAT ARE NOT TESTED AND LOCKED OFF SHALL BE 2 FEET.

SHORING LAYOUT

THE SHORING WALL AS DESIGNED IS TIGHT AGAINST THE BACK OF THE BUILDING BASEMENT WALLS. LAYOUT OF SHORING ELEMENTS PERPENDICULAR TO THE BUILDING WALL SHALL BE BASED ON THE ARCHITECTURAL PLANS TAKING INTO ACCOUNT ANY ADDITIONAL OFFSET REQUIRED TO ALLOW FOR THE BASEMENT WALL DRAINAGE LAYER AND WATERPROOFING BETWEEN THE SHORING WALL AND PERMANENT BASEMENT WALL.

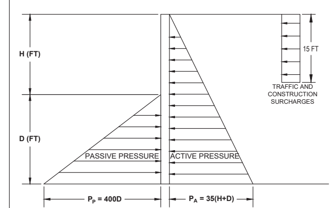
CONTAMINATED SOIL REMOVAL
CONTAMINATED SOIL AND GROUNDWATER WILL BE SCREENED, HANDLED, AND MANAGED IN ACCORDANCE WITH THE MEASURES OUTLINED IN A CONTAMINATED MEDIA MANAGEMENT PLAN (CMMP). THE CMMP WILL BE PREPARED BY ASPECT PRIOR TO CONSTRUCTION.

SPECIAL INSPECTION AND TESTING

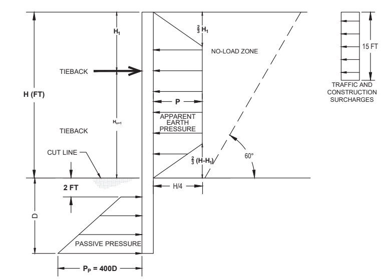
IN ACCORDANCE WITH THE 2015 IBC, SPECIAL INSPECTION SHALL BE PROVIDED FOR THE FOLLOWING TYPES OF CONSTRUCTION:

- VERTICAL ELEMENT INSTALLATION
- SOIL NAIL INSTALLATION AND TESTING
- SOIL NAIL GROUT UNCONFINED COMPRESSIVE STRENGTH
- SHOTCRETE UNCONFINED COMPRESSIVE STRENGTH
- SOLDIER PILE AND VERTICAL ELEMENT INSTALLATION
  - TIEBACK ANCHOR INSTALLATION, TESTING, AND LOCK OFF

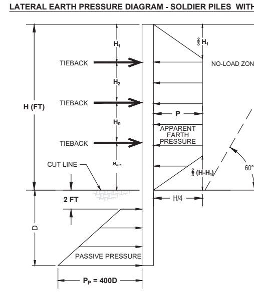
LATERAL EARTH PRESSURE DIAGRAM FOR VERTICAL ELEMENTS, CANTILEVER SOLDIER PILES, AND SOLDIER PILES WITH ONE ROW OF TIEBACKS



LATERAL EARTH PRESSURE DIAGRAM - SOLDIER PILES WITH ONE ROW OF TIEBACK



LATERAL EARTH PRESSURE DIAGRAM - SOLDIER PILES WITH MULTIPLE ROWS OF TIEBACKS



NOTES
D & H ARE MEASURED IN FEET
ALL PRESSURES ARE IN POUNDS PER SQUARE FOOT (PSF)
D = EMBEDMENT DEPTH
H = EXCAVATION HEIGHT

PASSIVE EARTH PRESSURE:
ACTS OVER 3 PILE DIAMETERS
IGNORE HEIGHT = TWO FEET

APPARENT EARTH PRESSURE:
P = 34H FOR ONE TIEBACK CONDITION
$P = (22H^2)/(H - \frac{1}{3}H_1 - \frac{1}{3}H_{n+1})$ FOR MULTIPLE TIEBACK CONDITION

SOLDIER PILE AXIAL CAPACITY:
END BEARING = 30 KSF
CONCRETE TO SOIL ADHESION = 1 KSF

TRAFFIC/CONSTRUCTION SURCHARGES:
TRAFFIC SURCHARGE = 70 PSF

GRAPHIC LEGEND

DETAIL MARK
NUMBER 2
SHEET SH5.0

SECTION MARK
NUMBER 1
SHEET SH4.0

VIEW MARK
NUMBER 1
SHEET SH4.0
TITLE
NOT TO SCALE

REV.	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

GENERAL INFORMATION
GRAND STREET COMMONS - WEST BUILDING
1765 22ND AVE S
SEATTLE WASHINGTON

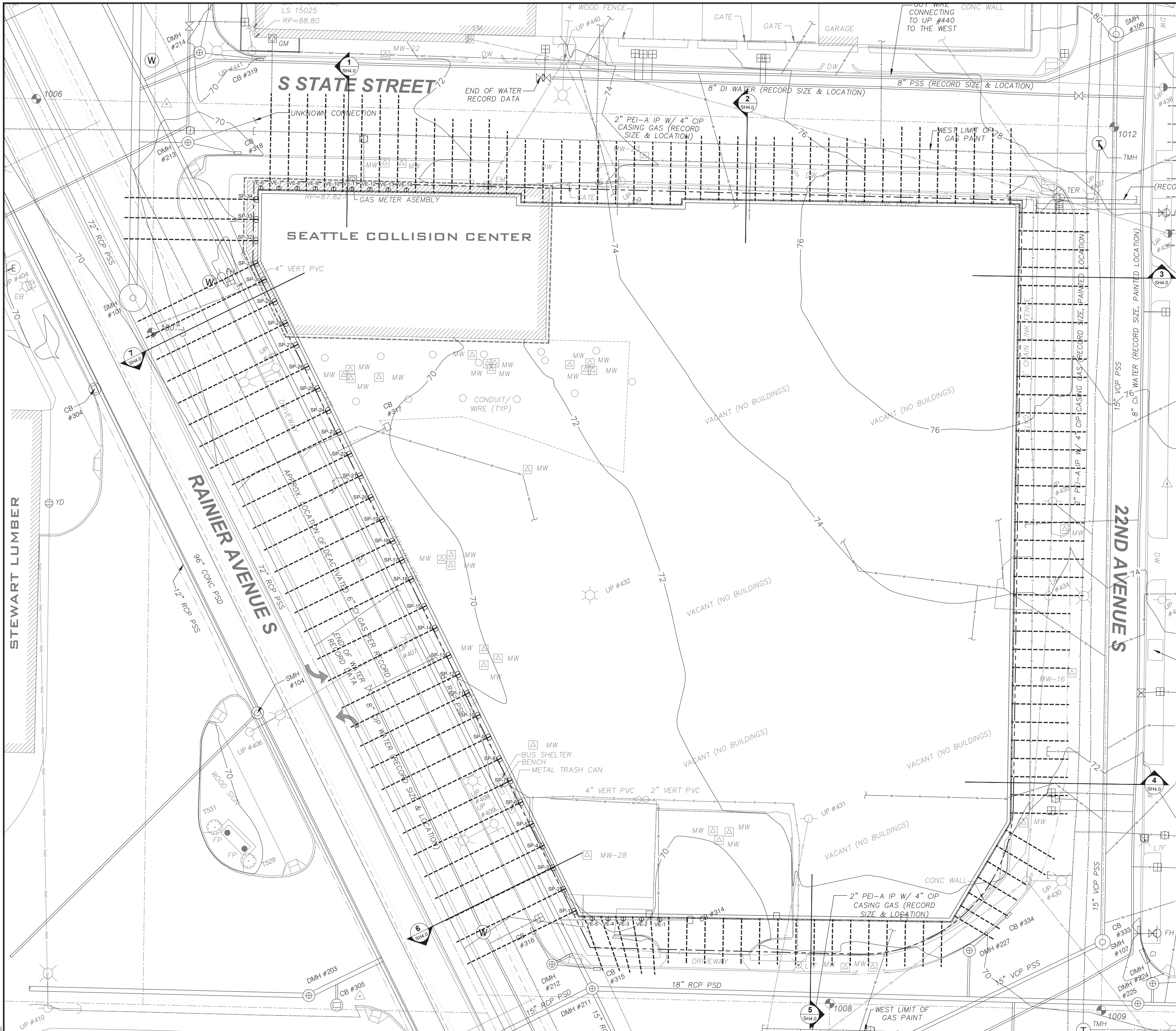
Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

RICHARD D. LUARK STATE OF WASHINGTON 29321 REGISTERED PROFESSIONAL ENGINEER

SH1.0

DESIGNED BY:	YY
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	1 OF 9

LAST SAVED: 7/16/2021



NOTES

1) UTILITIES ON BASE MAP ARE SHADED BACK FOR ILLUSTRATION PURPOSES.
2) WHERE SHORING ELEMENTS ARE WITHIN 5 FEET OF EXISTING ELECTRICAL, WATER, SEWER, GAS, COMMUNICATION, OR FIBEROPTIC LINES THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AS BUILTS. IF AS BUILTS ARE NOT AVAILABLE POTHOLING IS REQUIRED.

SHORING LEGEND

- EXTENT OF SOIL NAILS AND TIEBACKS
- PROPERTY LINE
- SOLDIER PILES AND VERTICAL ELEMENTS

N

10 0 5 10
SCALE IN FEET

REV	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

SITE PLAN

GRAND STREET COMMONS - WEST BUILDING
1765 22ND AVE S

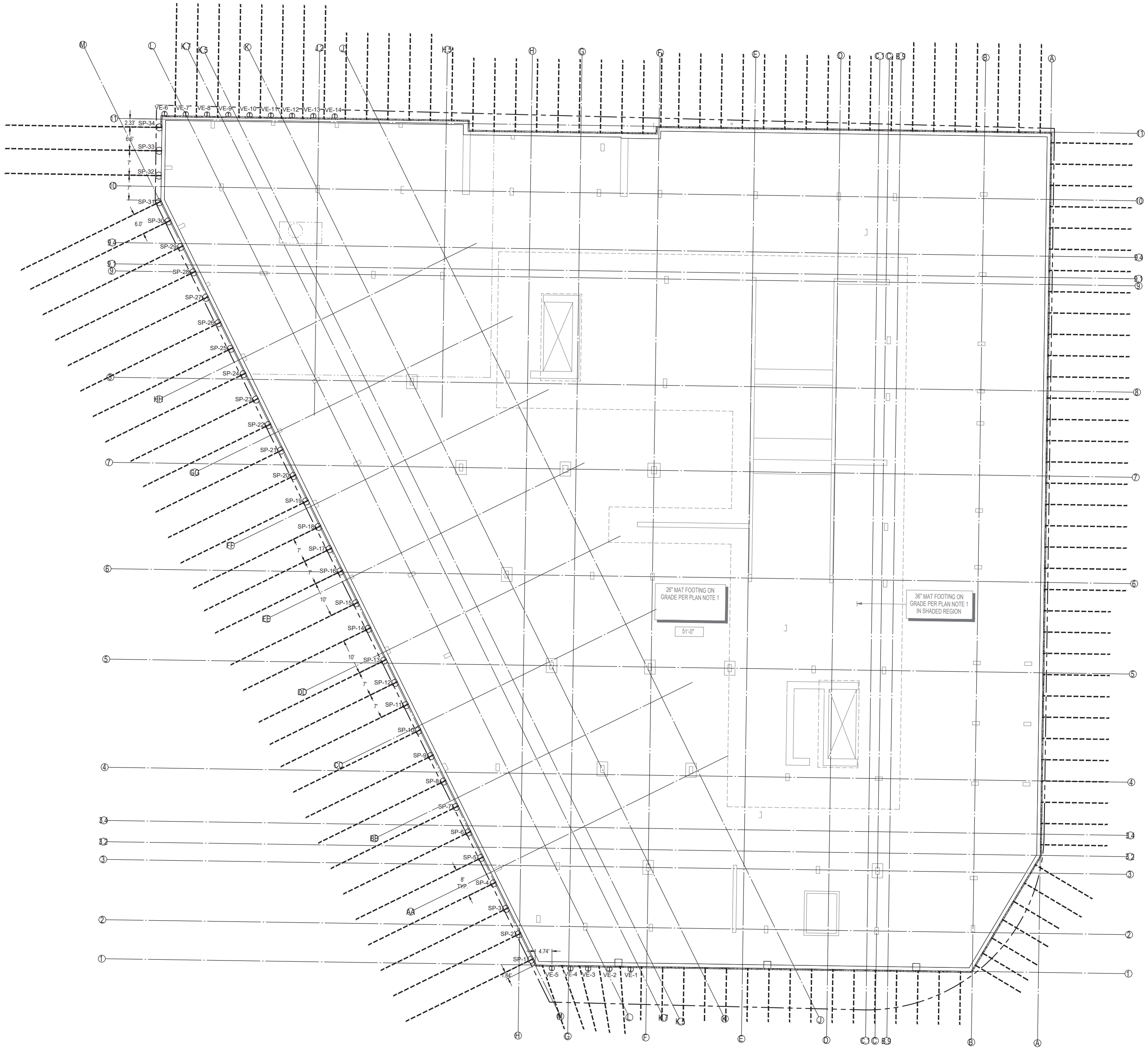
SEATTLE WASHINGTON

Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

RICHARD D. LUARK STATE OF WASHINGTON 29321 REGISTERED PROFESSIONAL ENGINEER

SH2.0

DESIGNED BY:	YY
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	2 OF 9



SHORING LEGEND

- - - -	EXTENT OF SOIL NAILS AND TIEBACKS
—·—·—	PROPERTY LINE
Ⓘ	SOLDIER PILES AND VERTICAL ELEMENTS

N

SCALE IN FEET (10, 0, 5, 10)

REV.	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

SHORING PLAN

GRAND STREET COMMONS - WEST BUILDING

1765 22ND AVE S

SEATTLE WASHINGTON

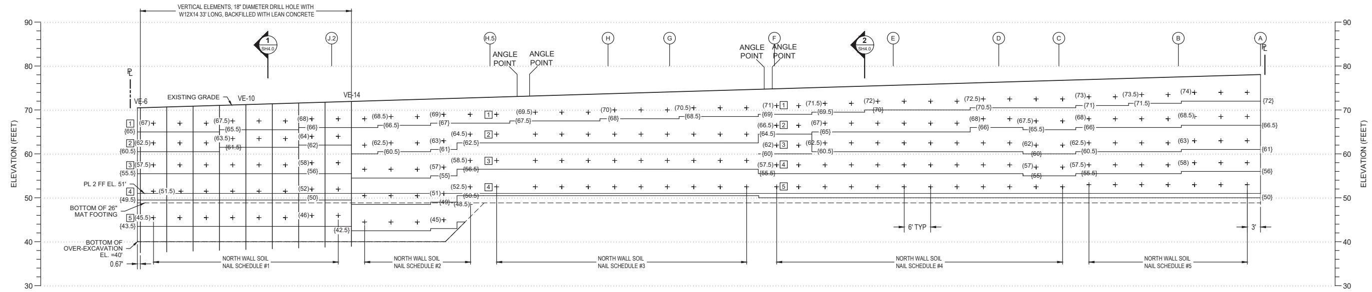
Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

RICHARD D. LUARK STATE OF WASHINGTON 29321 REGISTERED PROFESSIONAL ENGINEER

SH2.1

DESIGNED BY:	YY
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	3 OF 9

LAST SAVED: 7/16/2021



NORTH WALL SOIL NAIL SCHEDULE #1

ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	34	#9	75	6 FT O.C.	20	2
2	32	#9	75	6 FT O.C.	18	2
3	28	#9	75	6 FT O.C.	15	2
4	18	#9	75	6 FT O.C.	15	3.5
5	14	#9	75	6 FT O.C.	15	3.5

NORTH WALL SOIL NAIL SCHEDULE #2

ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	26	#9	75	6 FT O.C.	20	3.5
2	22	#9	75	6 FT O.C.	18	3.5
3	20	#9	75	6 FT O.C.	15	3.5
4	18	#8	75	6 FT O.C.	15	3.5
5	16	#8	75	6 FT O.C.	15	3.5

1
SH3.0

NORTH WALL ELEVATION

0 10 20
SCALE IN FEET

NORTH WALL SOIL NAIL SCHEDULE #3

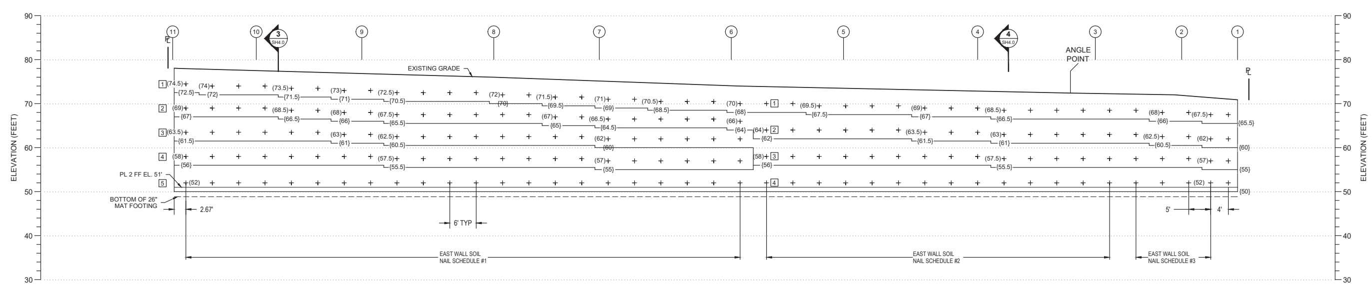
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	22	#9	75	6 FT O.C.	20	3.5
2	20	#9	75	6 FT O.C.	18	3.5
3	18	#8	75	6 FT O.C.	15	3.5
4	14	#8	75	6 FT O.C.	15	3.5

NORTH WALL SOIL NAIL SCHEDULE #4

ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	22	#8	75	6 FT O.C.	20	3.5
2	20	#8	75	6 FT O.C.	18	3.5
3	16	#8	75	6 FT O.C.	15	3.5
4	14	#8	75	6 FT O.C.	15	3.5
5	12	#8	75	6 FT O.C.	15	3.5

NORTH WALL SOIL NAIL SCHEDULE #5

ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	26	#9	75	6 FT O.C.	20	2
2	22	#9	75	6 FT O.C.	18	2
3	18	#9	75	6 FT O.C.	15	3.5
4	14	#9	75	6 FT O.C.	15	3.5
5	12	#9	75	6 FT O.C.	15	3.5



EAST WALL SOIL NAIL SCHEDULE #1

ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	24	#8	75	6 FT O.C.	20	1.5
2	22	#8	75	6 FT O.C.	18	2
3	20	#8	75	6 FT O.C.	15	3.5
4	16	#8	75	6 FT O.C.	15	3.5
5	14	#8	75	6 FT O.C.	15	3.5

2
SH3.0

EAST WALL ELEVATION

0 10 20
SCALE IN FEET

EAST WALL SOIL NAIL SCHEDULE #2

ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	20	#8	75	6 FT O.C.	20	1.5
2	18	#8	75	6 FT O.C.	18	2
3	16	#8	75	6 FT O.C.	15	3.5
4	12	#8	75	6 FT O.C.	15	3.5

EAST WALL SOIL NAIL SCHEDULE #3

ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	16	#8	75	6 FT O.C.	20	1.5
2	16	#8	75	6 FT O.C.	18	2
3	14	#8	75	6 FT O.C.	15	3.5
4	12	#8	75	6 FT O.C.	15	3.5

LEGEND

- GRIDLINE
- SOIL NAIL ROW
- SOIL NAIL
- VERTICAL ELEMENT
- (146) - SOIL NAIL OR TIEBACK ELEVATION
- {132} - SHOTCRETE JOINT ELEVATION
- L - DRILLED NAIL LENGTH (FEET)
- BAR - NAIL BAR SIZE
- GRADE - NAIL BAR STEEL GRADE (Fy)
- α - NAIL DECLINATION (DEGREES) UNLESS SHOWN OTHERWISE ON PLANS
- [15°] - SPLAY ANGLE OF SOIL NAIL
- A_D - ALLOWABLE DESIGN NAIL PULLOUT RESISTANCE (K/FT)

REV.	DATE	BY	DESCRIPTION
0		RDL	PERMIT SUBMITTAL
1		RDL	CYCLE 1 CORRECTIONS
2		RDL	CYCLE 2 CORRECTIONS

NORTH AND EAST WALL ELEVATIONS
GRAND STREET COMMONS - WEST BUILDING
1765 22ND AVE S
SEATTLE WASHINGTON

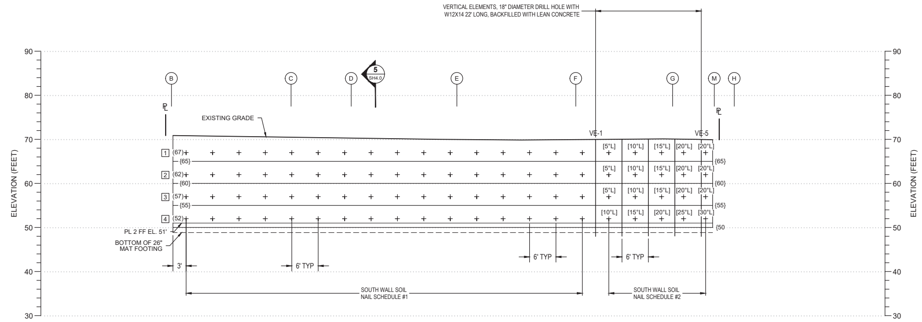
Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

RICHARD D. LUARK
STATE OF WASHINGTON
29321
REGISTERED PROFESSIONAL ENGINEER

SH3.0

DESIGNED BY:	YY
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	4 OF 9

LAST SAVED: 7/16/2021



SOUTH WALL SOIL NAIL SCHEDULE #1						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	16	#8	75	6 FT O.C.	20	3.5
2	14	#8	75	6 FT O.C.	18	3.5
3	12	#8	75	6 FT O.C.	15	3.5
4	12	#8	75	6 FT O.C.	15	3.5

1 SH3.1 **SOUTH WALL ELEVATION**

0 10 20 SCALE IN FEET

SOUTH WALL SOIL NAIL SCHEDULE #2						
ROW	L	BAR	GRADE	HORIZ. SPACING	α	A_D
1	20	#9	75	6 FT O.C.	20	2
2	18	#9	75	6 FT O.C.	18	2
3	16	#9	75	6 FT O.C.	15	3.5
4	14	#9	75	6 FT O.C.	15	3.5

LEGEND

- GRIDLINE
- SOIL NAIL ROW
- SOIL NAIL
- VERTICAL ELEMENT

(146) - SOIL NAIL OR TIEBACK ELEVATION

{132} - SHOTCRETE JOINT ELEVATION

L - DRILLED NAIL LENGTH (FEET)

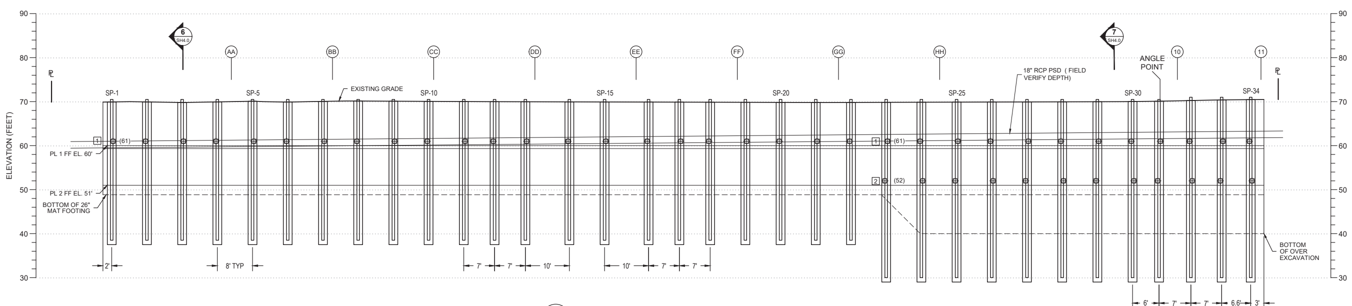
BAR - NAIL BAR SIZE

GRADE - NAIL BAR STEEL GRADE (Fy)

α - NAIL DECLINATION (DEGREES) UNLESS SHOWN OTHERWISE ON PLANS

[15°] - SPLAY ANGLE OF SOIL NAIL

A_D - ALLOWABLE DESIGN NAIL PULLOUT RESISTANCE (K/FT)



2 SH3.1 **WEST WALL ELEVATION**

0 10 20 SCALE IN FEET

PILE	SECTION	SHAFT DIAM.	STEEL LENGTH	ELEV. AT TOP	ELEV. AT BOTTOM	TIEBACK ROW 1: TIEBACK ELEV.	UN-BOND LENGTH	BOND LENGTH	LOAD	TIEBACK INCLINATION	TIEBACK ROW 2: TIEBACK ELEV.	UN-BOND LENGTH	BOND LENGTH	LOAD	TIEBACK INCLINATION
		IN	FT	FT	FT	FT	FT	FT	KIPS	DEGREES	FT	FT	FT	KIPS	DEGREES
SP-1 TO SP-12	W16x45	24	32.0	70.5	38.5	61	15	36	126	45	-	-	-	-	-
SP-13 TO SP-16	W16x50	24	32.0	70.5	38.5	61	15	41	142	45	-	-	-	-	-
SP-17 TO SP-22	W16x45	24	32.0	70.5	38.5	61	15	36	126	45	-	-	-	-	-
SP-23 TO SP-31	W16x45	24	40.5	70.5	30.0	61	19	38	132	40	52	15	23	78	40
SP-32 TO SP-34	W16x45	24	41.0	71.0	30.0	61	19	38	132	40	52	15	23	78	40

REV.	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

SOUTH AND WEST WALL ELEVATIONS

GRAND STREET COMMONS - WEST BUILDING

1765 22ND AVE S

SEATTLE WASHINGTON

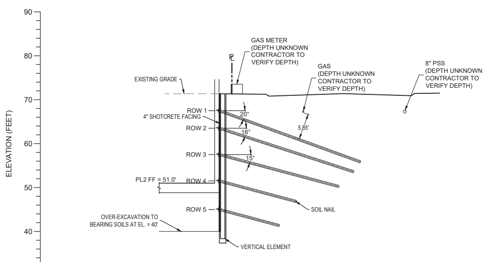
Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

RICHARD D. LUARK STATE OF WASHINGTON 29321 REGISTERED PROFESSIONAL ENGINEER

SH3.1

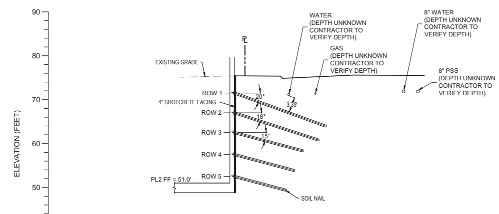
DESIGNED BY:	YY
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	5 OF 9

LAST SAVED: 7/16/2021



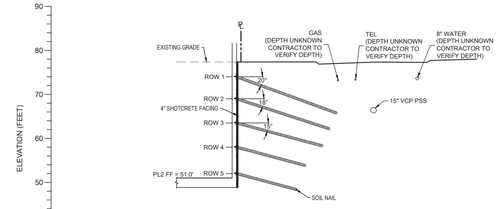
1 SH4.0 **NORTH WALL CROSS SECTION**

0 10 20
SCALE IN FEET



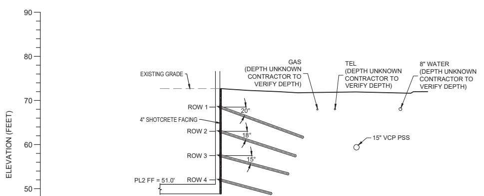
2 SH4.0 **NORTH WALL CROSS SECTION**

0 10 20
SCALE IN FEET



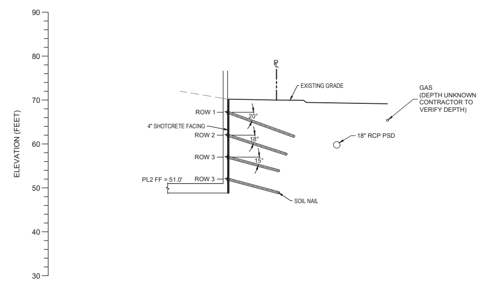
3 SH4.0 **EAST WALL CROSS SECTION**

0 10 20
SCALE IN FEET



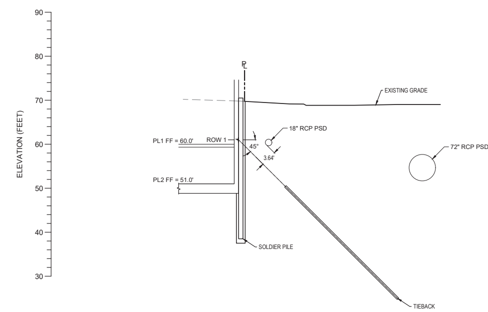
4 SH4.0 **EAST WALL CROSS SECTION**

0 10 20
SCALE IN FEET



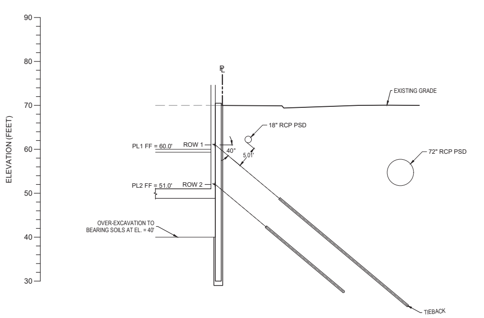
5 SH4.0 **SOUTH WALL CROSS SECTION**

0 10 20
SCALE IN FEET



6 SH4.0 **WEST WALL CROSS SECTION**

0 10 20
SCALE IN FEET



7 SH4.0 **WEST WALL CROSS SECTION**

0 10 20
SCALE IN FEET

LAST SAVED: 7/16/2021

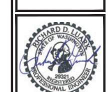
REV.	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

CROSS SECTIONS

GRAND STREET COMMONS - WEST BUILDING
1765 22ND AVE S

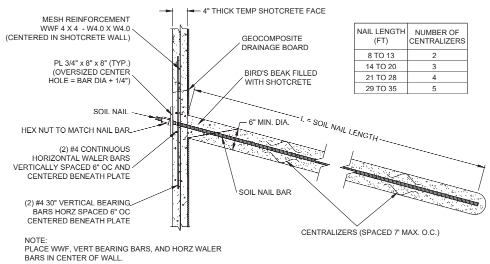
SEATTLE WASHINGTON

Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549



SH4.0

DESIGNED BY:	YY
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	6 OF 9

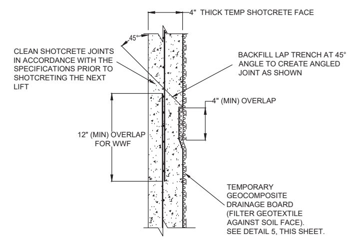


NAIL LENGTH (FT)	NUMBER OF CENTRALIZERS
8 TO 13	2
14 TO 20	3
21 TO 28	4
29 TO 35	5

NOTE:
PLACE WWF, VERT BEARING BARS, AND HORZ WALER BARS IN CENTER OF WALL.

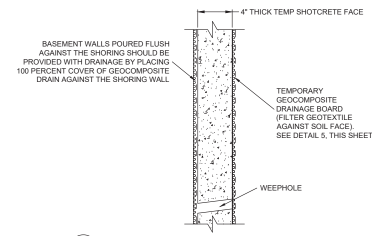
1 / SH5.0 — TEMPORARY SHOTCRETE FACING AND TEMPORARY NAIL DETAIL - PROFILE VIEW

NOT TO SCALE



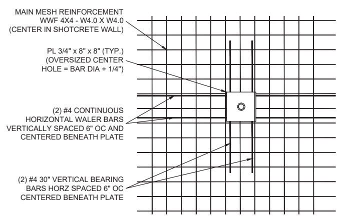
2 / SH5.0 — TEMPORARY SHOTCRETE JOINT DETAIL

NOT TO SCALE



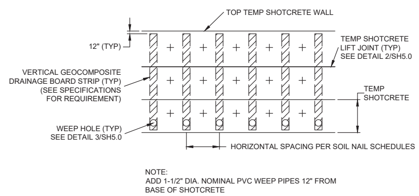
3 / SH5.0 — TEMPORARY DRAINAGE DETAIL

NOT TO SCALE



4 / SH5.0 — TEMPORARY SHOTCRETE FACING AND TEMPORARY NAIL DETAIL (ELEVATION VIEW) FOR NORTH, EAST AND SOUTH WALLS

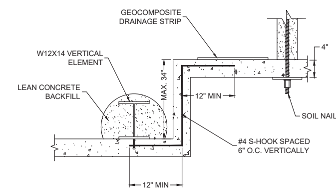
NOT TO SCALE



NOTE:
ADD 1-1/2" DIA. NOMINAL PVC WEEP PIPES 12" FROM BASE OF SHOTCRETE

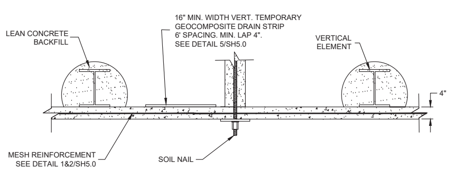
5 / SH5.0 — TEMPORARY WALL DRAINAGE DETAIL, SOIL NAIL WALL

NOT TO SCALE



6 / SH5.0 — INTERIOR CORNERS WITH NO VERTICAL ELEMENTS OR SOIL NAILS DETAIL

NOT TO SCALE



7 / SH5.0 — VERTICAL ELEMENT DETAIL - PLAN VIEW

NOT TO SCALE

REV.	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

DETAILS (1 OF 2)
GRAND STREET COMMONS - WEST BUILDING
1765 22ND AVE S
SEATTLE WASHINGTON

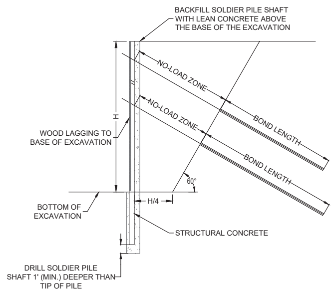
Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

RICHARD D. LUARK STATE OF WASHINGTON 29321 REGISTERED PROFESSIONAL ENGINEER

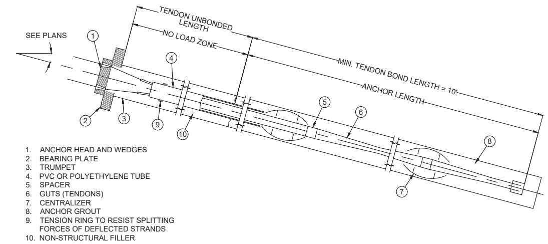
SH5.0

DESIGNED BY:	YY
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	6 OF 9

LAST SAVED: 7/16/2021

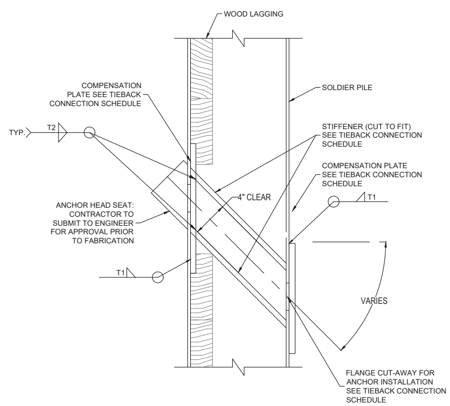


TYPICAL SOLDIER PILE/TIEBACK CROSS-SECTION
1 SH5.1
NOT TO SCALE

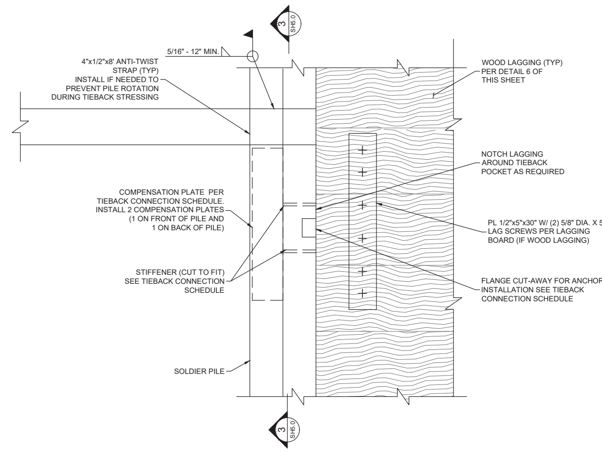


1. ANCHOR HEAD AND WEDGES
2. BEARING PLATE
3. TRUMPET
4. PVC OR POLYETHYLENE TUBE
5. SPACER
6. GUTS (TENDONS)
7. CENTRALIZER
8. ANCHOR GROUT
9. TENSION RING TO RESIST SPLITTING FORCES OF DEFLECTED STRANDS
10. NON-STRUCTURAL FILLER

STRAND TENDON GROUND ANCHOR
2 SH5.1
NOT TO SCALE



ANCHOR TO PILE CONNECTION DETAIL (SECTION)
3 SH5.1
NOT TO SCALE

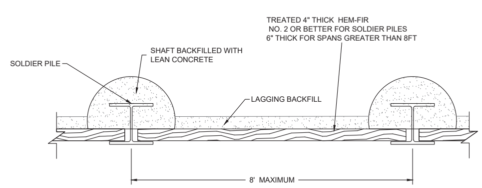


ANCHOR TO PILE CONNECTION DETAIL (ELEVATION)
4 SH5.1
NOT TO SCALE

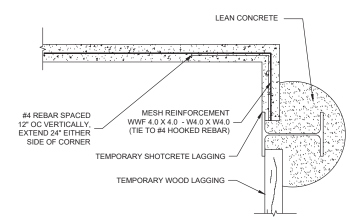
TIEBACK CONNECTION SCHEDULE

PILE SECTION	COMPENSATION PLATE DIMENSIONS (IN)	COMPENSATION PLATE WELD SIZE T1 (IN)	WEB STIFFENER PLATE DIMENSIONS (IN)	WEB STIFFENER PLATE WELD SIZE T2 (IN)	MAX FLANGE CUT AWAY WIDTH DIMENSIONS (IN)
W16X45	1 x 3 x 32	5/16	3/4 x FLANGE WIDTH	1/4	3.0
W16X50	1 x 3 x 32	5/16	3/4 x FLANGE WIDTH	1/4	3.0

NOTE: CUT WEB STIFFENER PLATES TO FIT BETWEEN PILE FLANGES



TEMPORARY WOOD LAGGING DETAIL
5 SH5.1
NOT TO SCALE



SHOTCRETE TO WOOD LAGGING DETAIL
6 SH5.1
NOT TO SCALE

REV.	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

DETAILS (2 OF 2)
GRAND STREET COMMONS - WEST BUILDING
1765 22ND AVE S
SEATTLE WASHINGTON

Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

RICHARD D. LUARK STATE OF WASHINGTON 29321 REGISTERED PROFESSIONAL ENGINEER

SH5.0

DESIGNED BY:	YY
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	6 OF 9

LAST SAVED: 7/16/2021

SECTION 02330 - DRILLED VERTICAL ELEMENTS AND SOLDIER PILES

1.0 GENERAL

A. THE WORK SHALL CONSIST OF DRILLING SHAFTS AND INSTALLING THE VERTICAL ELEMENTS AND SOLDIER PILES AS SPECIFIED HEREIN AND SHOWN ON THE PLANS. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED FOR COMPLETING THE WORK.

B. A PRE-CONSTRUCTION MEETING SHALL BE HELD PRIOR TO THE START OF THE WORK AND SHALL BE ATTENDED BY THE OWNER'S REPRESENTATIVES, THE ENGINEER, THE PRIME CONTRACTOR, THE EXCAVATION CONTRACTOR, AND THE DRILLED SOLDIER PILE SPECIALTY CONTRACTOR. THE PRE-CONSTRUCTION MEETING SHALL BE CONDUCTED TO CLARIFY THE CONSTRUCTION REQUIREMENTS FOR THE WORK, TO COORDINATE THE CONSTRUCTION ACTIVITIES, AND TO IDENTIFY CONTRACTUAL RELATIONSHIPS AND RESPONSIBILITIES.

C. UTILITIES SHOWN ON THE PLANS ARE FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATING AND VERIFYING THE LOCATION OF ALL UTILITIES SHOWN ON THE PLANS PRIOR TO STARTING THE WORK. THE CONTRACTOR SHALL MAINTAIN UNINTERRUPTED SERVICE FOR THOSE UTILITIES DESIGNATED TO REMAIN IN SERVICE THROUGHOUT THE WORK.

1.1 QUALITY ASSURANCE

A. THE CONTRACTOR SHALL SUBMIT A REFERENCE LIST INDICATING THE SUCCESSFUL COMPLETION OF AT LEAST FIVE DRILLED VERTICAL ELEMENT OR SOLDIER PILE PROJECTS OF A SIMILAR NATURE AND COMPLETED DURING THE LAST 3 YEARS. A BRIEF DESCRIPTION OF EACH PROJECT WITH THE OWNER'S NAME AND CURRENT PHONE NUMBER SHALL BE INCLUDED.

B. THE CONTRACTOR'S SUPERINTENDENT SHALL HAVE A MINIMUM OF 3 YEARS OF EXPERIENCE SUPERVISING DRILLED VERTICAL ELEMENT PILE CONSTRUCTION AND THE DRILL OPERATORS AND ON-SITE SUPERVISORS SHALL HAVE A MINIMUM OF 1 YEAR OF EXPERIENCE INSTALLING DRILLED VERTICAL ELEMENTS OR SOLDIER PILES. PRIOR TO STARTING THE WORK, THE CONTRACTOR SHALL SUBMIT A LIST IDENTIFYING THE SUPERINTENDENT, DRILL RIG OPERATORS, AND ON-SITE SUPERVISORS ASSIGNED TO THE PROJECT. THE LIST SHALL CONTAIN A SUMMARY OF EACH INDIVIDUAL'S EXPERIENCE AND SHALL BE SUFFICIENTLY COMPLETE FOR THE ENGINEER TO EVALUATE THE INDIVIDUAL'S QUALIFICATIONS.

C. THE ENGINEER MAY SUSPEND THE WORK IF THE CONTRACTOR SUBSTITUTES NON-APPROVED PERSONNEL FOR APPROVED PERSONNEL. THE CONTRACTOR SHALL BE FULLY LIABLE FOR ADDITIONAL COSTS RESULTING FROM THE SUSPENSION OF WORK AND NO ADJUSTMENTS IN THE CONTRACT TIME RESULTING FROM THE WORK SUSPENSION SHALL BE ALLOWED.

1.2 CONSTRUCTION SITE SURVEY

A. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO ANY CONSTRUCTION ACTIVITY FOR THE PURPOSE OF OBSERVING AND DOCUMENTING THE PRE-CONSTRUCTION CONDITION OF ALL STRUCTURES, SIDEWALKS, ROADWAYS, AND ALL OTHER FACILITIES ADJACENT TO THE PROJECT SITE. DURING CONSTRUCTION, THE CONTRACTOR SHALL OBSERVE THE CONDITIONS ABOVE THE SHORING WALL ON A DAILY BASIS FOR SIGNS OF ANY GROUND OR STRUCTURE MOVEMENTS. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IF ANY SIGN OF MOVEMENT SUCH AS NEW CRACKS IN STRUCTURES, INCREASED SIZE OF OLD CRACKS OR SEPARATION OF JOINTS IN STRUCTURES, FOUNDATIONS, STREETS OR PAVED AND UNPAVED SURFACES ARE OBSERVED; AND PROVIDE THE ENGINEER WRITTEN DOCUMENTATION OF THE OBSERVED CONDITIONS WITHIN 24 HOURS.

1.3 CONSTRUCTION TOLERANCES

A. SHAFTS FOR VERTICAL ELEMENTS SHALL BE CONSTRUCTED SO THAT THE CENTER AT THE TOP OF THE SHAFT IS WITHIN 3 INCHES OF THE PLAN LOCATION. SHAFTS SHALL BE PLUMB, TO WITHIN 1.0% OF THE LENGTH BASED ON THE TOTAL LENGTH OF THE SHAFT. THE ELEVATION AT THE TOP OF SHAFT SHALL BE +/-3 INCHES FROM THE PLAN LOCATION. DURING CONSTRUCTION FOR THE SHAFTS, THE CONTRACTOR SHALL MAKE FREQUENT CHECKS ON THE PLUMBNESS, ALIGNMENT, AND DIMENSIONS OF THE SHAFTS. ANY DEVIATION EXCEEDING THE ALLOWABLE TOLERANCES SHALL BE CORRECTED IMMEDIATELY.

B. STEEL PILES SHALL BE PLACED SO THAT THE CENTER LINE OF THE PILE IS WITHIN 1 INCH OF THE PLAN LOCATION. THE STEEL PILE SHALL BE PLUMB TO WITHIN 0.5% OF THE EXPOSED PILE LENGTH. THE TOP ELEVATION OF THE VERTICAL ELEMENT PILE SHALL BE WITHIN 1 INCH OF THE PLAN ELEVATION.

1.4 SUBMITTALS

A. THE FOLLOWING SUBMITTALS AND VERTICAL ELEMENTS SHALL BE PROVIDED BY THE CONTRACTOR FOR THE ENGINEER'S REVIEW AND APPROVAL. THE CONTRACTOR WILL NOT BE ALLOWED TO BEGIN WALL CONSTRUCTION UNTIL ALL SUBMITTAL REQUIREMENTS ARE SATISFIED AND FOUND ACCEPTABLE TO THE ENGINEER. CHANGES OR DEVIATIONS FROM THE APPROVED SUBMITTALS MUST BE RE-SUBMITTED FOR APPROVAL. NO ADJUSTMENTS IN CONTRACT TIME WILL BE ALLOWED DUE TO INCOMPLETE SUBMITTALS. AT LEAST 15 DAYS PRIOR TO INITIATING THE WORK, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER:

1. WORKING DRAWINGS INDICATING STEEL PILE FABRICATION DETAILS AND MATERIALS.
2. CONCRETE MIX DESIGNS AND PLACEMENT PROCEDURES.
3. SHAFT INSTALLATION PLAN, PROVIDING AT LEAST THE FOLLOWING INFORMATION:

A. LIST AND DESCRIPTION OF PROPOSED EQUIPMENT TO BE USED, INCLUDING BUT NOT LIMITED TO, CRANES, DRILLS, AUGERS, BAILING BUCKETS, FINAL CLEANING EQUIPMENT, TREMIES, PUMPS, ETC.
B. THE CONSTRUCTION SEQUENCE AND THE ORDER OF SHAFT CONSTRUCTION.
C. DETAILS OF SHAFT EXCAVATION METHODS INCLUDING METHODS TO CLEAN THE SHAFT EXCAVATION.
D. DETAILS OF THE SHAFTS AND CASING.
E. DETAILS OF VERTICAL ELEMENT PLACEMENT METHODS INCLUDING INTERNAL SUPPORT BRACING AND CENTRALIZATION METHODS.
F. DETAILS OF CONCRETE PLACEMENT METHODS INCLUDING EQUIPMENT AND PROCEDURES FOR CONCRETING THROUGH A CONDUIT OR TREMIE.
G. THE METHOD TO BE USED TO PREVENT CAVING (TEMPORARY CASING, SLURRY, OR OTHER METHODS).

1.5 MATERIALS

1.5.1 STRUCTURAL STEEL
A. ALL STRUCTURAL STEEL SHALL CONFORM TO THE REQUIREMENTS OF ASTM A992, UNLESS SHOWN OTHERWISE ON THE PLANS.

1.5.2 WELD ELECTRODES AND HEADED STUDS
A. WELD ELECTRODES SHALL BE E70XX AND SHALL CONFORM TO AWS D1.1-88.

B. HEADED STUDS SHALL CONFORM TO ASTM A307.

1.5.3 LEAN CONCRETE

1.5.3.1 GENERAL
A. WHERE INDICATED ON THE PLANS, THE CONTRACTOR SHALL FURNISH PLANT, LABOR, AND MATERIALS AND PERFORM ALL OPERATIONS NECESSARY TO FURNISH, PLACE, AND INSTALL LEAN CONCRETE FOR DRILLED SOLDIER PILE SHAFTS.

1.5.3.2 MIX REQUIREMENTS
A. LEAN CONCRETE FOR DRILLED SHAFTS SHALL BE PROPORTIONED TO MEET THE FOLLOWING REQUIREMENTS:
1. CEMENTITIOUS MATERIAL CONTENT SHALL BE NOT LESS THAN 141 POUNDS PER CUBIC YARD.
2. CEMENTITIOUS MATERIAL MAY BE PORTLAND CEMENT, BLENDED HYDRAULIC CEMENT, OR A COMBINATION OF PORTLAND CEMENT AND FLY ASH AS FOLLOWS:

A. PORTLAND CEMENT SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M85/ASTM C150.
B. BLENDED HYDRAULIC CEMENT SHALL CONFORM TO THE REQUIREMENTS OF ASTM C595 TYPE 1P(MS).
C. FLY ASH SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M295.

3. SLUMP, INCLUDING WATER-REDUCING ADMIXTURES, SHALL BE NO LESS THAN 4 INCHES AND NO GREATER THAN 8 INCHES.

B. ADMIXTURES SHALL CONFORM TO THE REQUIREMENTS OF ASTM C494, SHALL BE USED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, AND SHALL BE APPROVED BY THE ENGINEER.

C. AGGREGATES SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M6/ASTM C33 FOR FINE AGGREGATES AND AASHTO M80, CLASS B FOR COARSE AGGREGATES.

1.6 CONSTRUCTION REQUIREMENTS

1.6.1 SHAFT EXCAVATION
A. SHAFTS SHALL BE EXCAVATED TO THE REQUIRED DEPTH AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. THE EXCAVATION SHALL BE COMPLETED IN A CONTINUOUS OPERATION USING EQUIPMENT CAPABLE OF EXCAVATING THROUGH THE TYPE OF MATERIAL EXPECTED TO BE ENCOUNTERED

B. SHAFT EXCAVATIONS SHALL BE BACKFILLED WITHIN 4 HOURS OF BEGINNING OF EXCAVATION, UNLESS APPROVED OTHERWISE BY THE ENGINEER. IF THE SHAFT EXCAVATION IS STOPPED WITH THE APPROVAL OF THE ENGINEER, THE SHAFT SHALL BE SECURED BY INSTALLATION OF A SAFETY COVER. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THE SAFETY OF THE SHAFT AND SURROUNDING SOIL AND THE STABILITY OF THE SIDE WALLS. A TEMPORARY CASING SHOULD BE USED IF NECESSARY TO ENSURE SUCH SAFETY AND STABILITY.

C. WHERE CAVING CONDITIONS ARE ENCOUNTERED, FURTHER EXCAVATION WILL NOT BE ALLOWED UNTIL THE CONTRACTOR SELECTS A METHOD TO PREVENT GROUND MOVEMENT. THE CONTRACTOR MAY ELECT TO PLACE A TEMPORARY CASING OR USE OTHER METHODS APPROVED BY THE ENGINEER.

D. THE CONTRACTOR SHALL USE APPROPRIATE MEANS (SUCH AS A CLEANOUT BUCKET), TO CLEAN THE BOTTOM OF THE EXCAVATION SUCH THAT NO MORE THAN 1 INCH OF LOOSE OR DISTURBED MATERIAL IS PRESENT.

E. THE EXCAVATED SHAFT SHALL BE INSPECTED AND APPROVED BY THE ENGINEER PRIOR TO PROCEEDING WITH CONSTRUCTION.

F. WHEN UNEXPECTED OBSTRUCTIONS, WHICH REQUIRE SPECIALIZED EQUIPMENT AND/OR LABOR ARE ENCOUNTERED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER PROMPTLY AND THE OBSTRUCTIONS SHALL BE REMOVED AND THE EXCAVATION CONTINUED IN A MANNER APPROVED BY THE ENGINEER.

G. TEMPORARY CASINGS FOR THE SHAFTS SHALL BE REMOVED BEFORE CONCRETE SETUP. A MINIMUM 5 FOOT HEAD OF CONCRETE MUST BE MAINTAINED TO BALANCE THE SOIL AND WATER PRESSURE AT THE BOTTOM OF THE CASING DURING REMOVAL. THE CASING SHALL BE SMOOTH AND WELL OILED WITH FORM OIL.

1.6.2 INSTALLATION OF VERTICAL ELEMENTS
A. THE STEEL SOLDIER PILES SHALL BE LOWERED INTO THE DRILLED SHAFTS AND SECURED IN POSITION.

1.6.3 PLACEMENT OF SHAFT CONCRETE
A. SHAFT CONCRETE SHALL BE PLACED AS SHOWN ON THE PLANS AND SHALL COMMENCE WITHIN 2 HOURS AFTER COMPLETION OF THE EXCAVATION. SHAFT CONCRETE SHALL BE PLACED IN ONE CONTINUOUS OPERATION TO THE TOP OF THE SHAFT.

B. IF WATER IS NOT PRESENT, THE CONCRETE SHALL BE DEPOSITED BY A METHOD WHICH PREVENTS AGGREGATE SEGREGATION. THE CONTRACTOR'S METHOD FOR DEPOSITING CONCRETE SHALL HAVE APPROVAL OF THE ENGINEER PRIOR TO CONCRETE PLACEMENT.

C. IF WATER IS PRESENT, THE CONCRETE SHALL BE DEPOSITED BY TREMIE PLACEMENT METHODS.

SECTION 02340 - SOIL NAILS AND WALL DRAINAGE

PART 1 - GENERAL

1.01 DESCRIPTION
A. THE WORK SHALL CONSIST OF CONSTRUCTING SOIL NAILS AND WALL DRAINAGE AS SPECIFIED HEREIN AND SHOWN ON THE PLANS. THE WORK SHALL ALSO INCLUDE EXCAVATING IN ACCORDANCE WITH THE STAGED LIFTS SHOWN ON THE PLANS; DRILLING SOIL NAIL HOLES TO THE SPECIFIED MINIMUM LENGTH AND ORIENTATION INDICATED ON THE PLANS; PROVIDING, PLACING, AND GROUTING THE NAILS IN THE DRILLED HOLES; PLACING DRAINAGE ELEMENTS; AND PERFORMING ALL SOIL NAIL PULLOUT TESTING. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED FOR COMPLETING THE WORK.

B. A PRE-CONSTRUCTION MEETING SHALL BE HELD PRIOR TO THE START OF THE WORK AND SHALL BE ATTENDED BY THE OWNER'S REPRESENTATIVE, THE ENGINEER, THE PRIME CONTRACTOR, THE EXCAVATION CONTRACTOR, THE SOIL NAIL SPECIALTY SUBCONTRACTOR, AND SEATTLE DEPARTMENT OF TRANSPORTATION (SDOT) AND THE SEATTLE DEPARTMENT OF CONSTRUCTION AND INSPECTION (SDCI). THE PRE-CONSTRUCTION MEETING SHALL BE CONDUCTED TO CLARIFY THE CONSTRUCTION REQUIREMENTS FOR THE WORK, TO COORDINATE THE CONSTRUCTION ACTIVITIES, AND TO IDENTIFY CONTRACTUAL RELATIONSHIPS AND RESPONSIBILITIES.

C. THE OWNER'S REPRESENTATIVE / SOIL NAILING INSPECTOR THAT IS PROVIDING THE SPECIAL INSPECTION AND CONSTRUCTION MONITORING SHALL BE A QUALIFIED GEOTECHNICAL ENGINEER OR HIS REPRESENTATIVE WITH EXPERIENCE MONITORING SOIL NAIL WALL CONSTRUCTION.

D. UTILITIES REFERENCED ON THE PLANS ARE FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATING AND VERIFYING THE LOCATION OF ALL UTILITIES, BOTH THOSE SHOWN ON THE PLANS AND THOSE NOT SHOWN, PRIOR TO STARTING THE WORK. THE CONTRACTOR SHALL MAINTAIN UNINTERRUPTED SERVICE FOR THOSE UTILITIES DESIGNATED TO REMAIN IN SERVICE THROUGHOUT THE WORK.

1.02 QUALITY ASSURANCE
A. THE CONTRACTOR SHALL SUBMIT A REFERENCE LIST INDICATING THE SUCCESSFUL COMPLETION OF AT LEAST FIVE SOIL NAIL OR GROUND ANCHOR RETAINING WALL PROJECTS COMPLETED DURING THE LAST 3 YEARS. A BRIEF DESCRIPTION OF EACH PROJECT WITH THE OWNER'S NAME AND CURRENT PHONE NUMBER SHALL BE INCLUDED

B. THE CONTRACTOR'S SUPERINTENDENT SHALL HAVE A MINIMUM OF 3 YEARS EXPERIENCE SUPERVISING SOIL NAILING AND/OR GROUND ANCHOR WORK, AND THE DRILL OPERATORS AND ON-SITE SUPERVISORS SHALL HAVE A MINIMUM OF 1 YEAR EXPERIENCE INSTALLING SOIL NAILS OR GROUND ANCHORS. PRIOR TO STARTING THE WORK, THE CONTRACTOR SHALL SUBMIT A LIST IDENTIFYING THE SUPERINTENDENT, DRILL RIG OPERATORS, AND ON-SITE SUPERVISORS ASSIGNED TO THE PROJECT. THE LIST SHALL CONTAIN A SUMMARY OF EACH INDIVIDUAL'S EXPERIENCE AND SHALL BE SUFFICIENTLY COMPLETE FOR THE ENGINEER TO EVALUATE THE INDIVIDUAL'S QUALIFICATIONS. WORK SHALL NOT BE STARTED UNTIL WRITTEN APPROVAL OF THE CONTRACTOR'S QUALIFICATIONS IS GIVEN.

C. THE OWNER'S REPRESENTATIVE MAY SUSPEND THE WORK IF THE CONTRACTOR SUBSTITUTES NON-APPROVED PERSONNEL FOR APPROVED PERSONNEL. THE CONTRACTOR SHALL BE FULLY LIABLE FOR ADDITIONAL COSTS RESULTING FROM THE SUSPENSION OF WORK, AND NO ADJUSTMENTS IN THE CONTRACT TIME RESULTING FROM THE WORK SUSPENSION SHALL BE ALLOWED.

1.03 CONSTRUCTION SITE SURVEY
A. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO ANY CONSTRUCTION ACTIVITIES FOR THE PURPOSE OF OBSERVING AND DOCUMENTING THE PRE-CONSTRUCTION CONDITION OF ALL STRUCTURES, INFRASTRUCTURE, SIDEWALKS, ROADWAYS, AND ALL OTHER FACILITIES ADJACENT TO THE SITE. DURING CONSTRUCTION, THE CONTRACTOR SHALL OBSERVE THE CONDITIONS ABOVE THE SOIL NAIL WALL ON A DAILY BASIS FOR SIGNS OF GROUND OR BUILDING MOVEMENTS. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER'S REPRESENTATIVE AND ENGINEER IF SIGNS OF MOVEMENTS SUCH AS NEW CRACKS, INCREASED SIZE OF OLD CRACKS OR SEPARATION OF JOINTS IN STRUCTURES, FOUNDATIONS, STREETS OR PAVED AND UNPAVED SURFACES ARE OBSERVED. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WRITTEN DOCUMENTATION OF THE OBSERVED CONDITIONS WITHIN 24 HOURS.

1.04 SUBMITTALS
A. THE FOLLOWING SUBMITTALS SHALL BE PROVIDED BY THE CONTRACTOR FOR THE ENGINEER'S REVIEW AND APPROVAL. THE CONTRACTOR WILL NOT BE ALLOWED TO BEGIN WALL CONSTRUCTION UNTIL ALL SUBMITTAL REQUIREMENTS ARE SATISFIED AND FOUND ACCEPTABLE TO THE ENGINEER. CHANGES OR DEVIATIONS FROM THE APPROVED SUBMITTALS MUST BE RE-SUBMITTED FOR APPROVAL. NO ADJUSTMENTS IN CONTRACT TIME WILL BE ALLOWED DUE TO INCOMPLETE SUBMITTALS. AT LEAST 15 DAYS PRIOR TO INITIATING THE WORK, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER:
1. A DETAILED CONSTRUCTION SEQUENCE AND PLANNED START OF WORK DATE.
2. METHODS OF EXCAVATING TO THE STAGED LIFTS INDICATED ON THE PLANS, PROVISION OF TEMPORARY STABILITY, AND EXCAVATION EQUIPMENT TYPES.
3. DRILLING METHODS AND EQUIPMENT INCLUDING PROPOSED DRILLHOLE DIAMETER TO ACHIEVE THE SPECIFIED PULLOUT RESISTANCE AND ANY VARIATION OF THESE ALONG THE ALIGNMENT.
4. NAIL GROUT MIX DESIGN INCLUDING: BRAND AND TYPE OF PORTLAND CEMENT; SOURCE, GRADATION, AND QUALITY OF ALL AGGREGATES; PROPORTIONS OF MIX BY WEIGHT AND WATER-CEMENT RATIO; MANUFACTURER AND BRAND NAME OF ALL ADMIXTURES; AND COMPRESSIVE STRENGTH TEST RESULTS (PER ASTM C109 / AASHTO T106) VERIFYING THE SPECIFIED MINIMUM 3 AND 28 DAY GROUT STRENGTHS.
5. NAIL GROUT PLACEMENT PROCEDURES AND EQUIPMENT.
6. SOIL NAIL TESTING METHODS AND EQUIPMENT INCLUDING: DETAILS OF THE JACKING FRAME AND APPURTENANT BRACING; DETAILS SHOWING METHODS OF ISOLATING TEST NAILS DURING SHOTCRETE APPLICATION (I.E., METHODS TO PREVENT BONDING OF THE SOIL NAIL BAR AND THE SHOTCRETE DURING TESTING); DETAILS SHOWING METHODS OF GROUTING THE UNBONDED LENGTH OF TEST NAILS AFTER COMPLETION OF TESTING; AND EQUIPMENT LIST.
7. IDENTIFICATION NUMBERS AND CERTIFIED CALIBRATION RECORDS FOR EACH TEST JACK AND PRESSURE GAUGE PAIR TO BE USED. CALIBRATION RECORDS SHALL INCLUDE THE DATE TESTED, DEVICE IDENTIFICATION NUMBER, AND THE CALIBRATION TEST RESULTS AND SHALL BE CERTIFIED FOR AN ACCURACY OF AT LEAST 2 PERCENT OF THE APPLIED CERTIFICATION LOADS BY A QUALIFIED INDEPENDENT TESTING LABORATORY WITHIN 90 DAYS PRIOR TO SUBMITTAL.
8. CERTIFIED MILL TEST RESULTS FOR NAIL BARS FROM EACH HEAT SPECIFYING THE ULTIMATE STRENGTH, YIELD STRENGTH, ELONGATION AND COMPOSITION.
9. MANUFACTURER CERTIFICATIONS FOR THE SOIL NAIL CENTRALIZERS AND SOIL NAIL BAR COUPLERS
10. A DETAILED CONSTRUCTION DRAINAGE CONTROL PLAN ADDRESSING ALL ELEMENTS NECESSARY TO DIVERT, CONTROL, AND DISPOSE OF SURFACE WATER.

PART 2 - MATERIALS

2.01 GENERAL DESCRIPTION
A. MATERIALS FOR CONSTRUCTION OF SOIL NAIL WALLS SHALL BE FURNISHED NEW AND WITHOUT DEFECTS. DEFECTIVE MATERIALS REJECTED BY THE OWNER'S REPRESENTATIVE SHALL BE REMOVED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. MATERIALS SHALL CONSIST OF THE FOLLOWING: THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED FOR COMPLETING THE WORK.

CENTRALIZERS	SCHEDULE 40 PVC OR OTHER MATERIAL NOT DETRIMENTAL TO THE NAIL STEEL (WOOD SHALL NOT BE USED); SECURELY ATTACHED TO THE NAIL BAR; SIZED TO POSITION THE NAIL BAR WITHIN 1 INCH OF THE CENTER OF THE DRILL HOLE; SIZED TO ALLOW TREMIE PIPE INSERTION TO THE BOTTOM OF THE DRILL HOLE; AND, SIZED TO ALLOW GROUT TO FLOW FREELY UP THE DRILL HOLE.
NAIL GROUT	THE GROUT SHALL BE A NEAT OR SAND/ CEMENT MIXTURE WITH A MINIMUM 3-DAY COMPRESSIVE STRENGTH OF 1500 PSI AND A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3000 PSI PER ASTM C109 / AASHTO T106.
CEMENT	ASTM C150 / AASHTO M85, TYPE I. FINE AGGREGATE ASTM C33 / AASHTO M6.
NAIL BARS	ASTM A615 / AASHTO M31, GRADE 60 OR 75 OR ASTM A722 / AASHTO M275, GRADE 150.
BAR COUPLERS	BAR COUPLERS SHALL DEVELOP THE FULL ULTIMATE TENSILE STRENGTH OF THE BAR AS CERTIFIED BY THE MANUFACTURER AND PROVIDE THE NECESSARY CORROSION PROTECTION AS THE REMAINDER OF THE BAR.
BEARING PLATES	ASTM A709 / AASHTO M270, GRADE 36. NUTS & WASHERS AASHTO M291, GRADE B, HEXAGONAL FITTED WITH BEVELED WASHER OR SPHERICAL SEAT TO PROVIDE UNIFORM BEARING.
HEADED-STUDS	ASTM A307 OR APPROVED EQUAL.
WELD ELECTRODES	E70XX AND IN ACCORDANCE WITH AWS D1.1-88.
DRAINAGE GEOTEXTILE	NEEDLE PUNCHED, NON-WOVEN, PUNCTURE RESISTANCE (ASTM D4833) 335 N, GRAB STRENGTH (ASTM D4632) 690 N, FABRIC WEIGHT (ASTM 3776) 0.2 KG/M2, APPARENT OPENING SIZE (AOS) (COE CW-02215) 70.
DRAINAGE AGGREGATE	ASTM C33 NO. 67 WITH NO MORE THAN FIVE PERCENT PASSING THE #200 SIEVE.
GEOCOMPOSITE DRAINAGE BOARD	MIRADRAIN G100N (OR APPROVED EQUIVALENT).
WEEP PIPES	SCHEDULE 40 PVC.

2.02 MATERIALS HANDLING AND STORAGE
A. CEMENT SHALL BE ADEQUATELY STORED TO PREVENT MOISTURE DEGRADATION AND PARTIAL HYDRATION. CEMENT THAT HAS BECOME CAKED OR LUMPY SHALL NOT BE USED.

B. ALL STEEL REINFORCEMENT SHALL BE CAREFULLY HANDLED AND SHALL BE STORED ON SUPPORTS TO KEEP THE STEEL FROM CONTACT WITH THE GROUND. STEEL BARS SHALL BE PICKED UP IN SUCH A WAY AS TO PREVENT OVERSTRESSING. DAMAGE TO THE NAIL STEEL AS A RESULT OF OVERSTRESSING, ABRASION, CUTS, NICKS, WELDS, AND WELD SPLATTER SHALL BE CAUSE FOR REJECTION BY THE OWNER'S REPRESENTATIVE. GROUNDING OF WELDING LEADS TO THE NAIL STEEL SHALL NOT BE ALLOWED. NAIL STEEL SHALL BE PROTECTED FROM AND SUFFICIENTLY FREE OF DIRT, RUST, AND OTHER DELETERIOUS SUBSTANCES PRIOR TO INSTALLATION. HEAVY CORROSION OR PITTING OF NAILS SHALL BE CAUSE FOR REJECTION BY THE OWNER'S REPRESENTATIVE. LIGHT RUST THAT HAS NOT RESULTED IN PITTING IS ACCEPTABLE.

C. DRAINAGE GEOTEXTILE AND GEOCOMPOSITE DRAINS SHALL BE PROVIDED IN ROLLS WRAPPED WITH A PROTECTIVE COVERING AND STORED IN A MANNER THAT PROTECTS THE FABRIC FROM MUD, DIRT, DUST, DEBRIS, AND SHOTCRETE REBOUND. PROTECTIVE WRAPPING SHALL NOT BE REMOVED UNTIL IMMEDIATELY BEFORE THE GEOTEXTILE OR DRAIN STRIP IS INSTALLED. EXTENDED EXPOSURE TO ULTRA-VIOLET LIGHT SHALL BE AVOIDED.

PART 3 - EXECUTION

3.01 GENERAL
A. THE CONSTRUCTION SEQUENCE SHALL BE IN ACCORDANCE WITH THE APPROVED SUBMITTAL, UNLESS APPROVED OTHERWISE BY THE ENGINEER. NO EXCAVATIONS STEEPER OR HIGHER THAN THOSE SPECIFIED HEREIN SHALL BE MADE ABOVE OR BELOW THE SOIL NAIL WALL WITHOUT WRITTEN APPROVAL OF THE ENGINEER.

3.02 EARTHWORK

3.02.01 MASS EXCAVATION
A. FOR DISTANCES AWAY FROM THE WALL FACE GREATER THAN THE CURRENT WALL HEIGHT, MASS EXCAVATION MAY OCCUR AT ANY TIME, BUT WITH SLOPES NO STEEPER THAN 1H:1V, UNLESS APPROVED OTHERWISE BY THE ENGINEER.

B. SUBSEQUENT MASS EXCAVATION BENEATH A PRECEDING SHOTCRETE LIFT, NO CLOSER THAN 5 FEET FROM THE FACE OF SHOTCRETE, MAY OCCUR ANY TIME THE DAY AFTER SHOTCRETING THE PRECEDING LIFT. ALL TEMPORARY SLOPES THAT ARE HIGHER THAN 4 FEET SHALL NOT BE STEEPER THAN 1H:1V UNLESS APPROVED OTHERWISE BY THE ENGINEER.

C. DURING MASS EXCAVATION OF THE DRILL BENCH FOR THE NEXT ROW OF NAILS, THE CONTRACTOR SHALL MAINTAIN A BENCH OF MATERIAL TO SERVE AS BOTH A PLATFORM FOR THE DRILLING EQUIPMENT, AND AS A STABILIZING BERM AGAINST THE FINAL WALL EXCAVATION FACE NEAT-LINE. THE MATERIAL NEAR THE WALL FACE MAY BE EITHER (A) A NATIVE BERM, (B) A SOFT BERM, OR (C) NEAT CUT AS SUBMITTED IN ACCORDANCE WITH SECTION 1.04 OF THE SUBMITTALS. IN ALL THREE CASES, THE DRILL BENCH SHALL BE ESTABLISHED NOT MORE THAN 3 FEET BELOW THE ROW OF NAILS TO BE INSTALLED AND SHALL EXTEND OUT FROM THE WALL FACE A MINIMUM DISTANCE NECESSARY TO PROVIDE A SAFE WORKING BENCH FOR THE DRILL EQUIPMENT AND WORKERS. THE CONTRACTOR IS COMPLETELY RESPONSIBLE FOR THE SAFETY AND STABILITY OF THE TEMPORARY DRILL BENCH AND WALL FACE CUT, UNTIL THE CORRESPONDING SHOTCRETE LIFT WITH CONNECTION HARDWARE IS CONSTRUCTED .

D. SUBSEQUENT MASS EXCAVATION BENEATH A PRECEDING SHOTCRETE LIFT, CLOSER THAN 5 FEET FROM THE FACE OF SHOTCRETE, SHALL NOT OCCUR UNTIL: (1) IT HAS BEEN SHOWN TO THE DESIGN ENGINEER THAT NAIL GROUT AND SHOTCRETE ON THE PRECEDING LIFT HAVE REACHED 50 PERCENT OF THEIR SPECIFIED 28-DAY COMPRESSIVE STRENGTHS; AND (2) INSTALLATION OF CONNECTION HARDWARE AND NAIL TESTING FOR THE PRECEDING LIFT ARE COMPLETE AND ACCEPTABLE TO THE OWNER'S REPRESENTATIVE. MASS EXCAVATION CLOSER THAN 5 FEET TO THE SHOTCRETE FACE MUST BE IN ACCORDANCE WITH THE DRILL BERM REQUIREMENTS DESCRIBED IN SECTION C.

E. EXCAVATING OF THE GROUND BEYOND THE FINAL WALL FACE SHALL NOT BE ALLOWED. INADVERTENT OVEREXCAVATION BEYOND THE FINAL WALL FACE SHALL BE RESTORED BY THE CONTRACTOR USING A METHOD APPROVED BY THE ENGINEER AND AT NO ADDITIONAL COST TO THE OWNER.

3.02.02 WALL FACE EXCAVATION
A. EXCAVATION TO THE FINAL WALL EXCAVATION FACE (NEAT LINE) SHALL BE DONE USING PROCEDURES THAT : (1) PREVENT GROUND LOSS, SWELLING, AIR SLACKING, OR LOOSENING; (2) MINIMIZE DEGRADATION OF SOIL BEARING SUPPORT BELOW THE OVERLYING PORTIONS OF THE SOIL NAIL WALL AND BELOW THE SOIL NAILS CURRENTLY BEING INSTALLED; (3) PREVENT PREMATURE LOSS OF SOIL MOISTURE AT THE FACE; (4) PREVENT GROUND FREEZING; AND (5) REDUCE THE POTENTIAL FOR SHOTCRETE OVERAGES.

B. THE DURATION OF TIME BETWEEN EXCAVATION TO THE FINAL WALL FACE (NEAT LINE) AND APPLICATION OF THE SHOTCRETE SHALL BE REFERRED TO AS THE "CLOSURE TIME". THE CLOSURE TIME FOR ALL WALL FACES SHALL BE LESS THAN ONE WORK SHIFT UNLESS APPROVED OTHERWISE BY THE ENGINEER, AND THAT THE ENGINEER CAN APPROVE A CLOSURE TIME UP TO 24 HOURS FROM EXCAVATION FACE CUT TO APPLICATION OF SHOTCRETE IF THE CONTRACTOR CAN DEMONSTRATE THAT THE DELAY WILL NOT ADVERSELY AFFECT THE EXCAVATION FACE STABILITY.

C. REQUESTS FOR EXTENSION OF THE CLOSURE TIME SHALL BE SUBMITTED FOR IN ACCORDANCE WITH THE SUBMITTALS SECTION OF THE CONTRACT DOCUMENTS. NO APPROVAL FOR EXTENSION OF CLOSURE TIME SHALL BE GRANTED UNTIL THE CONTRACTOR DEMONSTRATES TO THE ENGINEER THAT THE UNSUPPORTED FINAL EXCAVATION FACE WILL BE STABLE OVER THE PROPOSED EXTENSION OF THE CLOSURE TIME (24 HOURS MAXIMUM). EXTENSIONS TO THE FACE CLOSURE TIME SHALL BE PERIODICALLY REVIEWED AND MAY BE REVOKED BY THE ENGINEER AT HIS DISCRETION AND AT NO ADDITIONAL COST TO THE OWNER.

3.02.03 TEMPORARY END OF WALL CONDITIONS
A. WHERE THE CONTRACTOR'S CONSTRUCTION SEQUENCING RESULT IN A DISCONTINUOUS LIFT ALONG ANY NAIL ROW, THE ENDS OF THE LIFT SHALL EXTEND BEYOND THE ENDS OF THE NEXT LOWER LIFT BY AT LEAST 10 FEET. SLOPES/BERMS IMMEDIATELY BENEATH THESE STEPPED LIFTS SHALL BE CONSTRUCTED TO PREVENT SLOUGHING OR FAILURE THAT WOULD RESULT IN LOSS OF THE FACE SUPPORT PROVIDED BY THE SLOPES/BERMS.

3.02.04 PROTRUSIONS AND VOIDS
A. COBBLES, BOULDERS, RUBBLE, OR OTHER OBJECTS THAT ARE ENCOUNTERED AT THE SOIL FACE DURING EXCAVATION AND THAT PROTRUDE FROM THE SOIL FACE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTING THE SHOTCRETE CONSTRUCTION FACING AND/OR THE FINISH STRUCTURAL FACING TO THE SPECIFIED MINIMUM THICKNESS AND TO THE LINE AND GRADE INDICATED IN THE PLANS. REMOVAL OF FACE PROTRUSIONS TO ACCOMPLISH THIS CONSTRUCTION SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF THE PROPOSED METHOD FOR MITIGATION OF FACE PROTRUSIONS AT LEAST 24 HOURS PRIOR TO INITIATION OF THE WORK. SHOULD THE REMOVAL OF FACE PROTRUSIONS RESULT IN VOIDS BEYOND THE FINISH FACE LINE (NEAT LINE), THE CONTRACTOR SHALL DETERMINE THE APPROPRIATE METHOD OF BACKFILLING AND SHALL SUBMIT TO THE ENGINEER SUCH METHOD(S) AT LEAST 24 HOURS PRIOR TO INITIATING THE WORK.

3.03 WALL DRAINAGE

3.03.01 DESCRIPTION
A. THE DRAINAGE NETWORK SHALL CONSIST OF INSTALLING THE PREFABRICATED GEOCOMPOSITE DRAINAGE STRIPS, PVC CONNECTION PIPES AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. ALL ELEMENTS OF THE DRAINAGE NETWORK SHALL BE INSTALLED PRIOR TO SHOTCRETING.

3.03.02 DRAINAGE CONTROL
A. LOCALIZED AREAS OF PERCHED WATER MAY BE ENCOUNTERED. THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE IF GROUNDWATER OCCURS IN THE EXCAVATION OR AT THE EXCAVATION FACE.

B. THE CONTRACTOR SHALL PROVIDE POSITIVE CONTROL AND DISCHARGE OF ALL SURFACE WATER ENCOUNTERED DURING CONSTRUCTION TO THE EXTENT NECESSARY TO PREVENT ADVERSE CONDITIONS AS DETERMINED BY THE OWNER'S REPRESENTATIVE. DAMAGE CAUSED BY THE FAILURE TO CONTROL SURFACE WATER SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE AT NO ADDITIONAL COST TO THE OWNER.

C. EXISTING SUBSURFACE DRAINAGE FEATURES ENCOUNTERED DURING EXCAVATION SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE OWNER'S REPRESENTATIVE. WORK IN THESE AREAS SHALL BE SUSPENDED UNTIL REMEDIAL MEASURES MEETING THE APPROVAL OF THE OWNER'S REPRESENTATIVE ARE IMPLEMENTED BY THE CONTRACTOR. SURFACE WATER RUNOFF FLOW AND FLOWS FROM EXISTING SUBSURFACE DRAINAGE FEATURES SHALL BE CAPTURED INDEPENDENTLY OF THE WALL DRAINAGE NETWORK AND CONVEYED TO AN OUTFALL STRUCTURE OR STORM SEWER AS DETERMINED BY THE OWNER'S REPRESENTATIVE.

D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONDITION AND MAINTENANCE OF ANY PIPE OR CONDUIT USED TO CONTROL SURFACE WATER DURING CONSTRUCTION. UPON SUBSTANTIAL COMPLETION OF THE WORK, SURFACE WATER CONTROL PIPES OR CONDUITS SHALL BE REMOVED FROM THE SITE. ALTERNATIVELY, PIPES OR CONDUITS THAT ARE LEFT IN PLACE WITH THE APPROVAL OF THE OWNER'S REPRESENTATIVE SHALL BE FULLY GROUTED (ABANDONED) OR LEFT IN A MANNER THAT PROTECTS THE STRUCTURE AND ALL ADJACENT FACILITIES FROM MIGRATION OF FINES THROUGH THE PIPE OR CONDUIT AND POTENTIAL GROUND LOSS.

3.03.03 GEOCOMPOSITE DRAIN STRIPS
A. GEOCOMPOSITE DRAIN STRIPS SHALL BE INSTALLED AS SHOWN ON THE PLANS. DRAIN STRIPS AT CONSTRUCTION JOINTS SHALL BE PLACED SUCH THAT THE JOINT IS ALIGNED AS CLOSE AS PRACTICAL ALONG THE MIDDLE OF THE LONGITUDINAL AXIS OF THE DRAIN STRIP.

B. THE GEOCOMPOSITE DRAIN STRIPS SHALL BE AT LEAST 16 INCHES WIDE AND SHALL BE SECURED TO THE EXCAVATION FACE WITH THE GEOTEXTILE SIDE AGAINST THE GROUND BEFORE SHOTCRETING. DRAIN STRIPS SHALL BE MADE CONTINUOUS BY USING THE "SHINGLE" METHOD OF SPLICING WITH A 4 INCH MINIMUM OVERLAP SUCH THAT THE FLOW OF WATER IS NOT IMPEDED.

3.03.04 CONNECTION PIPES AND WEEP HOLES
A. CONNECTION PIPES AND WEEP HOLES SHALL BE CONNECTED TO THE DRAIN STRIPS AS SHOWN ON THE PLANS, UNLESS APPROVED OTHERWISE BY THE ENGINEER. THE JOINT BETWEEN THE DRAIN PIPE AND THE DRAIN STRIP, AND THE DISCHARGE END OF THE CONNECTOR PIPE SHALL BOTH BE SEALED TO PREVENT SHOTCRETE INTRUSION. DAMAGE OF THE GEOCOMPOSITE DRAIN STRIP WHICH, IN THE OPINION OF THE OWNER'S REPRESENTATIVE, MAY CAUSE INTERRUPTION IN FLOW SHALL REQUIRE INSTALLATION OF ADDITIONAL CONNECTION PIPES OR WEEPHOLES ABOVE THE DAMAGED SECTION. CONNECTION PIPES SHALL BE EXTENDED TO THE EDGE OF THE FOOTING DRAIN BUT NOT THROUGH THE DRAINAGE GEOTEXTILE. THE INTEGRITY OF THE DRAINAGE GEOTEXTILE SHALL NOT BE INTERRUPTED.

3.04 NAIL INSTALLATION

3.04.01 GENERAL
A. TWO SUCCESSFUL VERIFICATION TESTS SHALL BE PERFORMED IN EACH SOIL UNIT IDENTIFIED ON THE PLANS PRIOR TO STARTING INSTALLATION OF PRODUCTION NAILS. THE LOCATIONS OF THE VERIFICATION TESTS ARE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE OWNER'S REPRESENTATIVE. ADDITIONAL VERIFICATION TESTS MAY BE REQUIRED IF THE CONTRACTOR MODIFIES THE INSTALLATION METHODS FROM THOSE USED DURING THE INSTALLATION OF THE APPROVED VERIFICATION TEST NAILS AND WILL BE CONDUCTED AT THE CONTRACTOR'S EXPENSE.

B. NAILS SHALL BE INSTALLED PRIOR TO THE APPLICATION OF SHOTCRETE AT THE LOCATIONS AND TO THE LENGTHS INDICATED ON THE PLANS. THE ENGINEER MAY ADD, ELIMINATE, OR RELOCATE NAILS TO ACCOMMODATE ACTUAL FIELD CONDITIONS. MODIFICATIONS TO THE DESIGN RESULTING FROM ACTIONS OF THE CONTRACTOR SHALL BE DETERMINED BY THE ENGINEER.

3.04.02 DRILLING
A. THE CONTRACTOR SHALL SELECT DRILLING EQUIPMENT AND METHODS SUITABLE FOR THE GROUND CONDITIONS DESCRIBED IN THE GEOTECHNICAL REPORT. DRILLHOLE DIAMETER SHALL BE SELECTED TO PROVIDE THE MINIMUM SPECIFIED GROUT COVER OVER THE SOIL NAIL TENDON AND TO DEVELOP THE SPECIFIED LOAD CARRYING CAPACITY. WATER, DRILLING MUDS, OR OTHER FLUIDS USED TO ASSIST IN CUTTING REMOVAL SHALL NOT BE ALLOWED. UNCASED DRILLHOLES SHALL BE OBSERVED FOR CLEANLINESS PRIOR TO INSERTION OF THE SOIL NAIL TENDON. IN CAVING GROUND, THE CONTRACTOR SHALL USE CASED DRILLING METHODS TO SUPPORT THE DRILLHOLES.

B. THE CONTRACTOR SHALL IMMEDIATELY SUSPEND DRILLING OPERATIONS IF GROUND SUBSIDENCE IS OBSERVED, IF THE SOIL NAIL WALL IS ADVERSELY AFFECTED, OR IF ADJACENT STRUCTURES ARE DAMAGED AS A RESULT OF THE DRILLING OPERATION. THE ADVERSE CONDITIONS SHALL BE STABILIZED IMMEDIATELY AND THE ENGINEER SHALL BE NOTIFIED OF SUCH CONDITIONS WITHIN 24 HOURS.

3.04.03 NAIL TENDON INSTALLATION
A. NAIL TENDONS SHALL BE INSERTED INTO THE DRILLHOLE TO THE REQUIRED LENGTH WITHOUT DIFFICULTY AND IN SUCH A MANNER AS TO PREVENT DAMAGE TO THE DRILLHOLE. TENDONS THAT CANNOT BE FULLY INSERTED TO THE DESIGN DEPTH SHALL BE REMOVED FROM THE DRILLHOLE AND THE DRILLHOLE SHALL BE CLEANED SUFFICIENTLY TO ALLOW UNOBSTRUCTED INSTALLATION OF THE TENDON.

B. IF THE NAIL TENDON IS INSTALLED USING CASED OR HOLLOW-STEM AUGER METHODS, CENTRALIZERS ARE NOT REQUIRED PROVIDED THE INSTALLATION METHOD ENSURES THAT THE TENDON WILL REMAIN IN THE CENTRAL PORTION OF THE NAIL GROUT. IN SUCH SITUATIONS, SLUMP SHALL NOT EXCEED 8 INCHES.

3.05 GROUTING

3.05.01 GROUTING EQUIPMENT
A. GROUT EQUIPMENT SHALL PRODUCE A UNIFORMLY MIXED GROUT FREE OF LUMPY AND UNDISPERSED CEMENT. A POSITIVE DISPLACEMENT GROUT PUMP SHALL BE USED. THE PUMP SHALL BE EQUIPPED WITH A PRESSURE GAUGE THAT CAN MEASURE AT LEAST TWICE BUT NO MORE THAN THREE TIMES THE INTENDED GROUT PRESSURE. THE GROUTING EQUIPMENT SHALL BE SIZED TO ENABLE THE ENTIRE NAIL TO BE GROUTED IN ONE CONTINUOUS OPERATION. THE MIXER SHALL BE CAPABLE OF CONTINUOUSLY AGITATING THE GROUT DURING USAGE.

3.05.02 GROUTING METHODS
A. THE DRILLHOLE SHALL BE GROUTED AFTER INSTALLATION OF THE NAIL TENDON. GROUTING PRIOR TO INSERTION OF THE NAIL TENDON CAN BE ALLOWED PROVIDED NEAT CEMENT GROUT IS USED AND THE NAIL BAR IS IMMEDIATELY INSERTED THROUGH THE GROUT TO THE SPECIFIED LENGTH WITHOUT DIFFICULTY. NO PORTION OF THE NAIL HOLE SHALL BE LEFT OPEN FOR MORE THAN 60 MINUTES PRIOR TO GROUTING UNLESS APPROVED OTHERWISE BY THE ENGINEER. THE GROUT SHALL BE INJECTED AT THE LOWEST POINT OF EACH DRILLHOLE THROUGH A GROUT TREMIE PIPE, CASING, HOLLOW-STEM AUGER, OR DRILL RODS WITH THE DRILLHOLE FILLED IN ONE CONTINUOUS OPERATION. COLD JOINTS IN THE GROUT PLACEMENT ARE ALLOWED FOR CONSTRUCTION OF TEST NAILS. THE CONDUIT DELIVERING THE GROUT SHALL BE KEPT BELOW THE SURFACE OF THE GROUT AS THE CONDUIT IS WITHDRAWN. THE GROUTING CONDUIT SHALL BE WITHDRAWN AS THE NAIL HOLE IS FILLED IN A MANNER WHICH PREVENTS THE CREATION OF VOIDS. THE QUANTITY OF GROUT AND THE GROUTING PRESSURES SHALL BE RECORDED FOR EACH SOIL NAIL. GROUT PRESSURES SHALL BE CONTROLLED TO PREVENT EXCESSIVE GROUND HEAVE OR FRACTURING.

B. DURING CASING REMOVAL FOR DRILLHOLES ADVANCED BY EITHER CASED OR AUGER-CAST METHODS, THE GROUT SURFACE WITHIN THE CASING SHALL BE CONTINUALLY MONITORED FOR MAINTENANCE OF "HEAD" SUFFICIENT TO OFFSET THE EXTERNAL GROUNDWATER/SOIL PRESSURE.

3.05.03 GROUT TESTING
A. NAIL GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI IN 3 DAYS AND 3000 PSI IN 28 DAYS. NAIL GROUT SHALL BE TESTED BY THE CONTRACTOR IN ACCORDANCE WITH ASTM C109 / AASHTO T106 AT A FREQUENCY OF NO LESS THAN ONE TEST FOR EVERY 50 CUBIC YARDS OF GROUT PLACED OR ONCE PER WEEK, WHICHEVER COMES FIRST.

3.05.04 TEST NAIL UNBONDED LENGTH
A. TEMPORARY UNBONDED LENGTHS SHALL BE PROVIDED FOR EACH TEST NAIL. THE TEST NAIL BAR SHALL BE ISOLATED FROM THE SHOTCRETE FACING AND THE REACTION FRAME DURING TESTING. ISOLATION OF A TEST NAIL THROUGH THE SHOTCRETE FACING SHALL NOT AFFECT THE LOCATION OF THE REINFORCING STEEL UNDER THE BEARING PLATE. ACCEPTED TEST NAILS MAY BE INCORPORATED IN THE WORK PROVIDED THE TEMPORARY TEST UNBONDED LENGTH IS FULLY GROUTED SUBSEQUENT TO TESTING.

3.06 NAIL TESTING

3.06.01 GENERAL
A. VERIFICATION TESTS SHALL BE PERFORMED AT THE LOCATIONS SELECTED BY THE CONTRACTOR AND APPROVED BY THE OWNER'S REPRESENTATIVE. PROOF TESTS SHALL BE PERFORMED AT LOCATIONS SELECTED BY THE OWNER'S REPRESENTATIVE. ALL TEST DATA SHALL BE RECORDED BY THE OWNER'S REPRESENTATIVE, UNLESS APPROVED OTHERWISE AND SUBMITTED TO THE ENGINEER. PULLOUT TESTING OF NAILS SHALL NOT BE PERFORMED UNTIL THE NAIL GROUT AND SHOTCRETE FACING HAVE ATTAINED AT LEAST 50 PERCENT OF THEIR SPECIFIED 28-DAY COMPRESSIVE STRENGTHS.

B. WHERE TEMPORARY CASING OF THE UNBONDED LENGTH OF TEST NAILS IS PROVIDED, THE CASING SHALL BE INSTALLED TO PREVENT ANY REACTION BETWEEN THE CASING AND THE GROUTED BOND LENGTH OF THE NAIL AND/OR THE STRESSING APPARATUS.

3.06.02 TESTING EQUIPMENT
A. TESTING EQUIPMENT SHALL INCLUDE TWO DIAL GAUGES, A DIAL GAUGE SUPPORT, JACK AND PRESSURE GAUGE, A PUMP, AND A REACTION FRAME.

B. A MINIMUM OF TWO DIAL GAUGES CAPABLE OF MEASURING TO 0.001-INCH SHALL BE AVAILABLE AT THE SITE TO MEASURE THE NAIL MOVEMENT. THE DIAL GAUGES SHALL HAVE A MINIMUM TRAVEL SUFFICIENT TO ALLOW THE TEST TO BE PERFORMED WITHOUT RE-SETTING THE DIAL GAUGE. THE DIAL GAUGES SHALL BE ALIGNED WITHIN 5 DEGREES OF THE AXIS OF THE NAIL AND SHALL BE SUPPORTED INDEPENDENT OF THE JACKING SET-UP AND THE WALL. A HYDRAULIC JACK, PRESSURE GAUGE, AND PUMP SHALL BE USED TO APPLY AND MEASURE THE TEST LOAD. THE CONTRACTOR SHALL PROVIDE CURRENT CALIBRATION CURVES IN ACCORDANCE WITH THE SUBMITTALS SECTION.

C. THE JACK AND PRESSURE GAUGE SHALL BE CALIBRATED BY AN INDEPENDENT TESTING LABORATORY AS A UNIT. THE PRESSURE GAUGE SHALL BE GRADUATED IN 100 PSI INCREMENTS OR LESS AND SHALL HAVE A RANGE NOT EXCEEDING TWICE THE ANTICIPATED MAXIMUM PRESSURE DURING TESTING UNLESS APPROVED OTHERWISE BY THE ENGINEER. THE RAM TRAVEL OF THE JACK SHALL BE SUFFICIENT TO ENABLE THE TEST TO BE PERFORMED WITHOUT RE-SETTING THE JACK. THE JACK SHALL BE CAPABLE OF APPLYING EACH TEST LOAD INCREMENT IN LESS THAN 1 MINUTE.

D. THE JACK SHALL BE INDEPENDENTLY SUPPORTED AND CENTERED OVER THE NAIL SO THAT THE NAIL DOES NOT CARRY THE WEIGHT OF THE JACK. THE STRESSING EQUIPMENT SHALL BE PLACED OVER THE NAIL IN SUCH A MANNER THAT THE JACK, BEARING PLATES, AND STRESSING ANCHORAGE ARE IN ALIGNMENT. THE JACK SHALL BE POSITIONED AT THE BEGINNING OF THE TEST SUCH THAT UNLOADING AND REPOSITIONING OF THE JACK DURING THE TEST WILL NOT BE REQUIRED.

E. THE REACTION FRAME SHALL BE SUFFICIENTLY RIGID AND OF ADEQUATE DIMENSION SUCH THAT EXCESSIVE DEFORMATION OF THE TEST APPARATUS REQUIRING REPOSITIONING OF ANY COMPONENTS DOES NOT OCCUR DURING TESTING. WHERE THE REACTION FRAME BEARS DIRECTLY ON THE SHOTCRETE FACING, THE REACTION FRAME SHALL BE DESIGNED TO PREVENT FRACTURE OF THE SHOTCRETE.

3.06.03 VERIFICATION TESTING OF SACRIFICIAL NAILS
A. TWO VERIFICATION TESTS SHALL BE PERFORMED IN EACH SOIL UNIT PRIOR TO INSTALLATION OF PRODUCTION NAILS IN THAT UNIT TO VERIFY THE CONTRACTOR'S INSTALLATION METHODS, NAIL PULLOUT CAPACITY, AND DESIGN ASSUMPTIONS. THE NAILS USED FOR THE VERIFICATION TESTS SHALL BE SACRIFICIAL AND SHALL NOT BE INCORPORATED AS PRODUCTION NAILS.

B. TEST NAILS SHALL BE CONSTRUCTED USING THE SAME EQUIPMENT, METHODS, AND HOLE DIAMETER AS PLANNED FOR THE PRODUCTION NAILS. CHANGES IN THE DRILLING OR INSTALLATION METHOD MAY REQUIRE ADDITIONAL VERIFICATION TESTING AS DETERMINED BY THE ENGINEER AND SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.

C. THE UNBONDED LENGTH OF THE TEST NAIL SHALL BE AT LEAST 3 FEET UNLESS APPROVED OTHERWISE BY THE ENGINEER. THE BONDED LENGTH OF THE TEST NAIL SHALL BE DETERMINED BY THE ENGINEER BASED ON THE BAR GRADE AND SIZE SUCH THAT THE ALLOWABLE BAR LOAD IS NOT EXCEEDED, BUT SHALL NOT BE LESS THAN 10 FEET. THE ALLOWABLE BAR LOAD DURING TESTING SHALL NOT EXCEED 80 PERCENT OF THE STEEL ULTIMATE STRENGTH FOR GRADE 150 BARS OR 90 PERCENT OF THE YIELD STRENGTH FOR GRADE 60 AND GRADE 75 BARS.

D. THE DESIGN TEST LOAD (DTL) DURING TESTING SHALL BE DETERMINED BY MULTIPLYING THE BOND LENGTH OF THE NAIL TIMES THE DESIGN ADHESION. VERIFICATION TEST NAILS SHALL BE INCREMENTALLY LOADED AND UNLOADED IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

LOAD	HOLD TIME	LOAD	HOLD TIME
AL	1 MINUTE	1.75DTL	UNTIL STABLE
0.25DTL	10 MINUTES	1.50DTL	UNTIL STABLE
0.50DTL	10 MINUTES	1.25DTL	UNTIL STABLE
0.75DTL	10 MINUTES	1.00DTL	UNTIL STABLE
1.00DTL	10 MINUTES	0.75DTL	UNTIL STABLE
1.25DTL	10 MINUTES	0.50DTL	UNTIL STABLE
1.50DTL	60 MINUTES	0.25DTL	UNTIL STABLE
1.75DTL	10 MINUTES	AL	UNTIL STABLE
2.00DTL	10 MINUTES		

E. THE ALIGNMENT LOAD (AL) SHALL BE THE MINIMUM LOAD REQUIRED TO ALIGN THE TESTING APPARATUS AND SHOULD NOT EXCEED 0.05DTL. DIAL GAUGES SHALL BE ZEROED AFTER THE ALIGNMENT LOAD HAS BEEN APPLIED. EACH LOAD INCREMENT SHALL BE HELD FOR AT LEAST 10 MINUTES. THE VERIFICATION TEST NAIL SHALL BE MONITORED FOR CREEP FOR 60 MINUTES AT THE 1.50 DTL LOAD INCREMENT. NAIL MOVEMENTS DURING THE CREEP PORTION OF THE TEST SHALL BE MEASURED AND RECORDED AT 1, 2, 3, 5, 6, 10, 20, 30, 50, AND 60 MINUTES.

3.06.04 PROOF TESTING OF PRODUCTION NAILS
A. PROOF TESTING SHALL BE PERFORMED ON APPROXIMATELY 5 PERCENT OF THE PRODUCTION NAILS IN EACH SHOTCRETE LIFT AS DETERMINED BY THE OWNER'S REPRESENTATIVE.

B. THE UNBONDED LENGTH OF THE TEST NAIL SHALL BE AT LEAST 3 FEET. THE BONDED LENGTH OF THE TEST NAIL SHALL BE DETERMINED BY THE OWNER'S REPRESENTATIVE SUCH THAT THE ALLOWABLE BAR LOAD IS NOT EXCEEDED BUT SHALL NOT BE LESS THAN 10 FEET. THE ALLOWABLE BAR LOAD DURING TESTING SHALL NOT EXCEED 80 PERCENT OF THE STEEL ULTIMATE STRENGTH FOR GRADE 150 BARS OR 90 PERCENT OF THE STEEL YIELD STRENGTH FOR GRADE 60 AND GRADE 75 BARS.

C. PROOF TEST NAILS SHALL BE INCREMENTALLY LOADED IN 0.25DTL INCREMENTS TO A MAXIMUM LOAD OF 1.50DTL IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

AL	1.00DTL
0.25DTL	1.25DTL
0.50DTL	1.50DTL
0.75DTL	

D. THE ALIGNMENT LOAD (AL) SHALL BE THE MINIMUM LOAD REQUIRED TO ALIGN THE TESTING APPARATUS AND SHOULD NOT EXCEED 0.05DTL. DIAL GAUGES SHALL BE ZEROED AFTER THE ALIGNMENT LOAD HAS BEEN APPLIED.

E. ALL INCREMENTS SHALL BE MAINTAINED WITHIN 5 PERCENT OF THE INTENDED LOAD. DEPENDING ON PERFORMANCE, EITHER A 10 MINUTE OR 60 MINUTE CREEP TEST SHALL BE PERFORMED AT 1.50DTL. NAIL MOVEMENT SHALL BE MEASURED AND RECORDED AT 1, 2, 3, 5, 6, AND 10 MINUTES. WHERE THE NAIL MOVEMENT BETWEEN 1 MINUTE AND 10 MINUTES EXCEEDS 0.04 INCHES, THE MAXIMUM TEST LOAD SHALL BE MAINTAINED AN ADDITIONAL 50 MINUTES, AND MOVEMENTS SHALL BE RECORDED AT 20, 30, 50, AND 60 MINUTES.

3.06.05 TEST NAIL ACCEPTANCE CRITERIA
A. A TEST NAIL SHALL BE CONSIDERED ACCEPTABLE WHEN:
1. FOR VERIFICATION TESTS, A CREEP RATE LESS THAN 0.08 INCHES PER LOG CYCLE OF TIME BETWEEN THE 6 AND 60 MINUTE READINGS IS OBSERVED DURING CREEP TESTING, AND THE RATE IS LINEAR OR DECREASING THROUGHOUT THE CREEP TEST LOAD HOLD PERIOD.
2. FOR PROOF TESTS, A CREEP RATE LESS THAN 0.04 INCHES PER LOG CYCLE OF TIME BETWEEN THE 1 AND 10 MINUTE READINGS IS OBSERVED OR A CREEP RATE LESS THAN 0.08 INCHES PER LOG CYCLE OF TIME BETWEEN THE 6 AND 60 MINUTE READINGS, AND THE CREEP RATE IS LINEAR OR DECREASING THROUGHOUT THE CREEP TEST LOAD HOLD PERIOD.
3. THE TOTAL MOVEMENT AT THE MAXIMUM TEST LOAD EXCEEDS 80 PERCENT OF THE THEORETICAL ELASTIC ELONGATION OF THE TEST NAIL UNBONDED LENGTH.
4. PULLOUT FAILURE DOES NOT OCCUR DURING TESTING. PULLOUT FAILURE IS DEFINED AS THE LOAD AT WHICH ATTEMPTS TO INCREASE THE TEST LOAD SIMPLY RESULT IN CONTINUED PULLOUT MOVEMENT OF THE TEST NAIL.

B. AT THE CONTRACTOR'S OPTION, SUCCESSFUL PROOF TEST NAILS MEETING THE ABOVE TEST ACCEPTANCE CRITERIA MAY BE INCORPORATED AS PRODUCTION NAILS, PROVIDED THAT (1) THE UNBONDED TEST LENGTH OF THE NAIL HOLE HAS NOT COLLAPSED DURING TESTING, (2) THE MINIMUM REQUIRED HOLE DIAMETER HAS BEEN MAINTAINED, AND (3) THE TEST NAIL LENGTH AND BAR SIZE ARE EQUAL TO OR GREATER THAN THE SCHEDULED PRODUCTION NAIL LENGTH AND BAR SIZE. TEST NAILS MEETING THESE REQUIREMENTS SHALL BE COMPLETED BY SATISFACTORILY GROUTING THE UNBONDED TEST LENGTH. MAINTAINING THE TEMPORARY UNBONDED TEST LENGTH FOR SUBSEQUENT GROUTING IS THE CONTRACTOR'S RESPONSIBILITY.

3.06.06 INADEQUATE TEST NAIL PERFORMANCE
A. THE ENGINEER SHALL EVALUATE THE RESULTS OF EACH VERIFICATION TEST. INSTALLATION METHODS THAT DO NOT SATISFY THE NAIL TESTING REQUIREMENTS SHALL BE CONSIDERED INADEQUATE. THE CONTRACTOR SHALL PROPOSE ALTERNATIVE METHODS AND INSTALL REPLACEMENT VERIFICATION TEST NAILS. REPLACEMENT TEST NAILS SHALL BE INSTALLED AND TESTED AT NO ADDITIONAL COST TO THE OWNER.

B. THE ENGINEER MAY REQUIRE THAT THE CONTRACTOR REPLACE SOME OR ALL OF THE PRODUCTION NAILS REPRESENTED BY THE INADEQUATE PROOF TEST NAIL. ALTERNATIVELY, THE ENGINEER MAY REQUIRE PROOF TESTING OF ADDITIONALLY INSTALLED PROOF TEST NAILS BE CONDUCTED TO VERIFY THAT ADJACENT PREVIOUSLY INSTALLED PRODUCTION NAILS HAVE SUFFICIENT LOAD CARRYING CAPACITY. COSTS DUE TO ADDITIONAL PROOF TESTS OR INSTALLATION OF ADDITIONAL OR MODIFIED NAILS AS A RESULT OF POOR PROOF TEST NAIL PERFORMANCE SHALL BE AT NO ADDITIONAL COST TO THE OWNER, UNLESS DETERMINED BY THE ENGINEER TO BE DUE TO CAUSES BEYOND THE CONTRACTOR'S CONTROL.

3.07 SOIL NAIL TOLERANCES
A. THE SOIL NAILS SHALL NOT EXTEND BEYOND THE LIMITS SHOWN ON THE PLANS, UNLESS APPROVED OTHERWISE. BARS SHALL BE CENTERED WITHIN 1 INCH OF THE CENTER OF THE DRILLHOLE. INDIVIDUAL NAILS SHALL BE POSITIONED PLUS OR MINUS 12 INCHES FROM THE DESIGN LOCATIONS SHOWN IN THE PLANS. LOCATION TOLERANCES SHALL BE CONSIDERED APPLICABLE TO ONLY ONE NAIL AND NOT CUMULATIVE OVER LARGE WALL AREAS. THE NAIL INCLINATION SHALL BE PLUS OR MINUS 3 DEGREES OF THAT SHOWN IN THE PLANS. NAIL SPLAY ANGLE SHALL BE WITHIN PLUS OR MINUS 3 DEGREES. NAILS THAT ENCOUNTER UNANTICIPATED OBSTRUCTIONS DURING DRILLING SHALL BE RELOCATED BY THE ENGINEER AT THE OWNER'S COST. SOIL NAILS THAT DO NOT SATISFY THE SPECIFIED TOLERANCES DUE TO THE CONTRACTOR'S INSTALLATION METHODS SHALL BE REPLACED TO THE ENGINEER'S SATISFACTION AT NO ADDITIONAL COST TO THE OWNER.

SECTION 02345 - WOOD LAGGING

1.1 GENERAL
A. THE CONTRACTOR SHALL INSTALL TIMBER LAGGING AT THE LOCATIONS SHOWN ON THE PLANS, AND IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.

1.2 MATERIAL
A. TIMBER LAGGING SHALL BE HEM-FIR GRADE NO. 2 OR AN APPROVED EQUAL. TIMBER LAGGING SHALL BE PRESSURE TREATED IN ACCORDANCE WITH AWPA SPECIFICATIONS C1 OR C2.

1.3 EXECUTION

1.3.1 INSTALLATION OF LAGGING
A. THE EXCAVATION OF SOIL AND REMOVAL OF LEAN CONCRETE FOR THE LAGGING INSTALLATION SHALL PROCEED IN ADVANCE OF THE LAGGING BY A VERTICAL HEIGHT OF NOT MORE THAN 4 FEET, UNLESS APPROVED OTHERWISE BY THE ENGINEER. LAGGING SHALL BE INSTALLED SUCH THAT CAVING OR LOSS OF GROUND DOES NOT OCCUR, AS SOIL CONDITIONS REQUIRE.

B. THE BOTTOM OF THE EXCAVATION SHALL BE LEVEL AND SHALL BE NO MORE THAN 2 FEET BELOW GROUND ANCHOR LEVEL UNTIL ALL GROUND ANCHORS AT THAT LEVEL ARE INSTALLED, STRESSED, AND LOCKED OFF.

C. THE TIMBER LAGGING SHALL BE INSTALLED FROM THE TOP OF THE PILE PROCEEDING DOWNWARD. THE LAGGING SHALL MAKE DIRECT CONTACT WITH THE SOIL. VOIDS BEHIND THE LAGGING SHALL BE FILLED WITH APPROVED GRANULAR FREE DRAINING MATERIAL WHERE SEEPAGE IS PRESENT. CONTROLLED DENSITY FILL (CDF) MAY BE APPROVED BY THE ENGINEER IF SEEPAGE IS NOT PRESENT.THE CDF MIX DESIGN SHALL BE APPROVED BY THE ENGINEER.

SECTION 02360 - SHOTCRETE FACING

PART 1 - GENERAL

1.01 DESCRIPTION

A. THE WORK DESCRIBED IN THIS SECTION SHALL CONSIST OF FURNISHING ALL MATERIALS AND LABOR REQUIRED FOR PLACING REINFORCED SHOTCRETE FOR THE SOIL NAIL WALL AND SOLDIER PILE WALL WHEN THE PLANS REQUIRE. THE WORK SHALL INCLUDE PLACEMENT OF THICKNESS PINS OR FINISHING WIRES, AND PREPARATORY TRIMMING AND CLEANING OF SOIL/ROCK SURFACES AND SHOTCRETE COLD JOINTS FOR THE SOIL NAIL WALLS SHOWN ON THE PLANS.

B. SHOTCRETE SHALL COMPLY WITH THE REQUIREMENTS OF ACI 506.2-94, "SPECIFICATION FOR SHOTCRETE", EXCEPT AS SPECIFIED OTHERWISE HEREIN.

C. THE OWNER'S REPRESENTATIVE / SHOTCRETE INSPECTOR SHALL BE QUALIFIED TO INSPECT REINFORCEMENT AND SHOTCRETE PLACEMENT.

1.02 QUALITY ASSURANCE

A. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING A QUALITY ASSURANCE PROGRAM. ALL WORKERS, INCLUDING FOREMAN, NOZZLEMEN, FINISHERS AND DELIVERY EQUIPMENT OPERATORS SHALL BE FULLY QUALIFIED TO PERFORM THE WORK. ALL NOZZLEMEN SHALL HAVE AT LEAST ONE YEAR OF CUMULATIVE EXPERIENCE IN THE PAST 3 YEARS IN SIMILAR SHOTCRETE APPLICATION WORK AND SHALL DEMONSTRATE ABILITY TO SATISFACTORILY PLACE THE MATERIAL IN ACCORDANCE WITH THE RECOMMENDATIONS OF ACI 506.3R "GUIDE TO CERTIFICATION TO SHOTCRETE NOZZLEMEN" AND ANY LOCAL CODE REQUIREMENTS.

B. QUALIFICATION OF NOZZLEMEN SHALL BE BASED ON A VISUAL INSPECTION OF THE SHOTCRETE DENSITY AND VOID STRUCTURE AND ON ACHIEVING THE SPECIFIED 3-DAY AND 28- DAY COMPRESSIVE STRENGTH REQUIREMENTS DETERMINED FROM THE AVERAGE TEST RESULTS FROM THREE CORES EXTRACTED FROM EACH PRE CONSTRUCTION AND PRODUCTION TEST PANEL. PRE CONSTRUCTION AND PRODUCTION TEST PANELS, CORE EXTRACTION AND COMPRESSIVE STRENGTH TESTING SHALL BE CONDUCTED IN ACCORDANCE WITH ACI 506.2-94 UNLESS SPECIFIED OTHERWISE HEREIN.

C. THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE NOT LESS THAN 2 DAYS PRIOR TO THE SHOOTING OF A QUALIFICATION PANEL. SHOTCRETE MIX AND EQUIPMENT USED TO MAKE QUALIFICATION TEST PANELS SHALL BE THE SAME AS THOSE TO BE USED FOR THE SOIL NAIL WALL.

D. EACH FINISHER SHALL HAVE AT LEAST ONE YEAR OF CUMULATIVE EXPERIENCE IN THE PAST 3 YEARS IN SIMILAR STRUCTURAL SHOTCRETE APPLICATION WORK.

1.03 SUBMITTALS

A. AT LEAST 15 DAYS PRIOR TO INITIATING THE WORK, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL:
1. WRITTEN DOCUMENTATION LISTING AT LEAST 5 SIMILAR SHOTCRETE WALLS SUCCESSFULLY COMPLETED WITHIN THE PAST 3 YEARS, INCLUDING PHOTOGRAPHS OF THE PROJECT AS WELL AS NAME, ADDRESS, AND PHONE NUMBER OF THE OWNER'S REPRESENTATIVE.
2. WRITTEN DOCUMENTATION OF THE NOZZLEMEN AND FINISHERS QUALIFICATIONS AND PROPOSED METHOD OF SHOTCRETE PLACEMENT.
3. SHOP DRAWINGS ILLUSTRATING REINFORCING LAYOUT AND SCHEDULES.
4. SHOTCRETE MIX DESIGN INCLUDING: BRAND AND TYPE OF PORTLAND CEMENT TO BE USED: SOURCE, GRADATION, AND QUALITY OF AGGREGATES AS SPECIFIED HEREIN; MIX PROPORTIONS BY WEIGHT; PROPOSED ADMIXTURES, AND THEIR MANUFACTURER, DOSAGE, AND TECHNICAL LITERATURE; AND COMPRESSIVE STRENGTH TEST RESULTS FROM THE MANUFACTURES RECORDS NO OLDER THAN 6 MONTHS VERIFYING THE 28-DAY COMPRESSIVE STRENGTH.
5. CERTIFIED MILL TESTS FOR ALL REINFORCING STEEL FROM EACH HEAT SPECIFYING THE MINIMUM ULTIMATE STRENGTH, YIELD STRENGTH, ELONGATION, AND COMPOSITION.
6. CERTIFICATIONS OF COMPLIANCE FOR BEARING PLATES, NUTS, AND CURING COMPOUNDS.
7. SPECIFICATION AND DATA FOR REVIEW ON EQUIPMENT PROPOSED FOR THE PROJECT INCLUDING SHOTCRETING AND COMPRESSED AIR EQUIPMENT, PROPOSED ACCESS ARRANGEMENTS, AND CAPACITIES.
8. METHODS OF CONTROLLING THE LOCATION OF THE FINISH FACE AND DETERMINING SHOTCRETE THICKNESS.

PART 2 - MATERIALS

2.01 GENERAL

A. ALL MATERIALS FOR SHOTCRETE SHALL CONFORM TO THE FOLLOWING REQUIREMENTS.

CEMENT	- ASTM C150 / AASHTO M85, TYPE I.
FINE AGGREGATE	- ASTM C33 / AASHTO M6.
COARSE AGGREGATE	- AASHTO M-80, CLASS B FOR QUALITY.
WATER	- POTABLE, CLEAN, AND FREE FROM SUBSTANCES DELETERIOUS TO CONCRETE AND STEEL, OR THAT WOULD CAUSE STAINING. CHEMICAL ADMIXTURES ACCELERATOR FLUID TYPE, APPLIED AT NOZZLE, MEETING THE REQUIREMENTS HEREIN.
WATER-REDUCER	- ASTM C494 / AASHTO M194, TYPE AND SUPER- A, D, F,G. PLASTICIZER AIR-ENTRAINING ASTM C260 / AASHTO M154. AGENT MINERAL ADMIXTURES:
FLY ASH	- ASTM C618 / AASHTO M295, TYPE F OR G, CEMENT REPLACEMENT UP TO 35 PERCENT BY WEIGHT OF CEMENT. SILICA FUME ASTM C1240, 90 PERCENT MINIMUM SILICON DIOXIDE SOLIDS CONTENT, NOT TO EXCEED 12 PERCENT BY WEIGHT OF CEMENT.
WELDED WIRE FABRIC	- ASTM A185 / AASHTO M55.
REINFORCING BARS	- ASTM A615 / AASHTO M31, GRADE 60, DEFORMED.
CURING COMPOUNDS	- AASHTO M148, TYPE ID OR TYPE 2.
FILM PROTECTION	- AASHTO M171 OR POLYETHYLENE FILM.

2.02 ADMIXTURES

A. SHOTCRETE ADMIXTURES SHALL NOT BE USED UNLESS APPROVED BY THE ENGINEER. ADMIXTURES USED TO ENTRAIN AIR, TO REDUCE WATER-CEMENT RATIO, TO RETARD OR ACCELERATE SETTING TIME, OR TO ACCELERATE THE DEVELOPMENT OF STRENGTH SHALL BE THOROUGHLY MIXED INTO THE SHOTCRETE AT THE RATE SPECIFIED BY THE MANUFACTURER UNLESS SPECIFIED OTHERWISE. ACCELERATING ADDITIVES SHALL BE COMPATIBLE WITH THE CEMENT USED, BE NON-CORROSIVE TO STEEL AND SHALL NOT PROMOTE OTHER DETRIMENTAL EFFECTS SUCH AS CRACKING OR EXCESSIVE SHRINKAGE. THE MAXIMUM ALLOWABLE CHLORIDE ION CONTENT OF ALL INGREDIENTS SHALL NOT EXCEED 0.10 PERCENT WHEN TESTED PER AASHTO T260.

2.03 MATERIALS HANDLING AND STORAGE

A. MATERIALS SHALL BE DELIVERED STORED AND HANDLED TO PREVENT CONTAMINATION, SEGREGATION, CORROSION OR DAMAGE. LIQUID ADMIXTURES SHALL BE STORED TO PREVENT EVAPORATION AND FREEZING.

2.04 SHOTCRETE MIX DESIGN

A. AGGREGATES FOR SHOTCRETE SHALL MEET THE STRENGTH AND DURABILITY REQUIREMENT OF AASHTO M80 AND SHALL MEET THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE SIZE	PERCENT PASSING BY WEIGHT	SIEVE SIZE	PERCENT PASSING BY WEIGHT
1/2 INCH	100	NO. 16	35-55
3/8 INCH	90-100	NO. 30	20-35
NO. 4	70-85	NO. 50	8-20
NO. 8	50-70	NO. 100	2-10

B. CEMENT CONTENT SHALL BE AT LEAST 600 POUNDS PER CUBIC YARD. THE WATER/CEMENT RATIO SHALL NOT BE GREATER THAN 0.45. FOR WET-MIX SHOTCRETE EXPOSED TO FREEZING AND THAWING, THE AIR CONTENT AT THE TRUCK SHALL BE BETWEEN 7 TO 10 PERCENT WHEN TESTED IN ACCORDANCE WITH ASTM C231 / AASHTO T152. THE MIX SHALL BE PROPORTIONED TO BE PUMPABLE WITH THE CONCRETE PUMP FURNISHED FOR THE WORK. ADMIXTURES SHALL BE USED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

B. SHOTCRETE SHALL BE PROPORTIONED TO PRODUCE A MIX CAPABLE OF ATTAINING A COMPRESSIVE STRENGTH OF 2000 PSI IN 3 DAYS AND 4000 PSI IN 28 DAYS. THE AVERAGE COMPRESSIVE STRENGTH OF EACH SET OF THREE CORES EXTRACTED FROM TEST PANELS OR WALL FACE SHALL BE EQUAL TO OR EXCEED 85 PERCENT, WITH NO INDIVIDUAL CORE LESS THAN 75 PERCENT OF THE SPECIFIED COMPRESSIVE STRENGTH IN ACCORDANCE WITH ACI 506.2.

PART 3 - EXECUTION

3.01 SHOTCRETE MIXING AND BATCHING

A. AGGREGATE AND CEMENT MAY BE BATCHED BY WEIGHT OR BY VOLUME IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM C94 / AASHTO M157. MIXING EQUIPMENT SHALL BE CAPABLE OF THOROUGHLY MIXING THE MATERIALS IN SUFFICIENT QUANTITY TO MAINTAIN PLACING CONTINUITY. READY-MIX SHOTCRETE SHALL BE DELIVERED AND PLACED WITHIN 90 MINUTES OF BEING BATCHED UNLESS APPROVED OTHERWISE BY THE ENGINEER.

3.02 SHOTCRETE TEST PANELS

3.02.01 GENERAL
A. PRE CONSTRUCTION AND PRODUCTION SHOTCRETE TEST PANELS ARE REQUIRED (UNLESS WAIVED BY THE ENGINEER). PRE CONSTRUCTION AND PRODUCTION TEST PANELS SHALL NOT BE DISTURBED OR MOVED WITHIN THE FIRST 24 HOURS AFTER SHOOTING. TEST PANELS SHALL BE FIELD CURED UNDER CONDITIONS SIMILAR TO THOSE ANTICIPATED FOR THE WORK. SHOTCRETING AND CORING OF TEST PANELS SHALL BE PERFORMED BY QUALIFIED PERSONNEL IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE

B. UNLESS WAIVED BY THE ENGINEER, THE CONTRACTOR SHALL PROVIDE EQUIPMENT, MATERIALS, AND PERSONNEL AS NECESSARY TO OBTAIN SHOTCRETE CORES FOR TESTING INCLUDING CONSTRUCTION OF TEST PANEL BOXES, FIELD CURING REQUIREMENTS AND CORING. COMPRESSIVE STRENGTH TESTING WILL BE PERFORMED BY THE OWNER. SHOTCRETE WILL BE ACCEPTED BASED ON THE 28-DAY STRENGTH. THE FREQUENCY SPECIFIED FOR TEST PANELS IS APPROXIMATE. A GREATER OR LESSER NUMBER OF PANELS MAY BE MADE AS REQUIRED BY THE ENGINEER.

3.02.02 PRECONSTRUCTION TEST PANELS
A. EACH SHOTCRETE APPLICATION CREW SHALL FURNISH AT LEAST TWO PRECONSTRUCTION TEST PANELS FOR EACH PROPOSED MIXTURE BEING CONSIDERED AND FOR EACH SHOOTING POSITION ENCOUNTERED ON THE JOB. PRECONSTRUCTION TEST PANELS SHALL BE MADE BY EACH APPLICATION CREW USING THE EQUIPMENT, MATERIALS, MIXTURE PROPORTIONS, AND PROCEDURES PROPOSED FOR THE JOB PRIOR TO THE COMMENCEMENT OF WORK.

A. PRECONSTRUCTION TEST PANELS FOR PLAN SHOTCRETE SHALL BE 30 IN. X 30 IN. IN ACCORDANCE WITH ACI 506.2-94, WITH THE FOLLOWING EXCEPTIONS:
1. ONE PRECONSTRUCTION TEST PANEL SHALL BE OF THE MAXIMUM SHOTCRETE THICKNESS SHOWN ON THE PLANS AND SHALL INCLUDE THE MAXIMUM ANTICIPATED REINFORCING CONGESTION. CORES EXTRACTED FROM THE TEST PANEL SHALL DEMONSTRATE ENCAPSULATION OF THE REINFORCEMENT IN ACCORDANCE WITH ACI 506.2 EQUAL TO CORE GRADE 2 OR BETTER.
2. ONE PRECONSTRUCTION TEST PANEL SHALL BE AT LEAST 6 INCHES THICK AND CONSTRUCTED WITHOUT REINFORCEMENT AND USED FOR ABSORPTION AND COMPRESSIVE STRENGTH TESTING
3. THE CORNERS OF PRODUCTION AND PRECONSTRUCTION TEST PANELS SHALL BE CHAMFERED OUTWARD AT 45 DEGREES OVER THE FULL THICKNESS OF THE PANEL.

3.02.03 PRODUCTION TEST PANELS
A. THE CONTRACTOR SHALL FURNISH AT LEAST ONE PRODUCTION TEST PANEL, OR, IN LIEU OF PRODUCTION TEST PANELS, SIX 3-INCH DIAMETER CORES FROM THE SHOTCRETE FACE DURING THE FIRST APPLICATION OF SHOTCRETE AND HENCEFORTH FOR EVERY FIFTH APPLICATION OF SHOTCRETE, OR EVERY 5000 SQ. FT., OR EVERY 50 CU. YDS., WHICHEVER IS LESS. THE PRODUCTION TEST PANELS SHALL BE CONSTRUCTED SIMULTANEOUSLY WITH THE SHOTCRETE FACING INSTALLATION AT TIMES DESIGNATED BY THE OWNER'S REPRESENTATIVE. THE PRODUCTION TEST PANELS SHALL HAVE MINIMUM DIMENSIONS OF 18" X 18" X 6".

3.02.04 CORE TESTING
A. AT LEAST NINE CORE SAMPLES WILL BE CUT FROM EACH PRECONSTRUCTION AND PRODUCTION TEST PANEL FOR COMPRESSIVE STRENGTH. CORES SHALL BE AT LEAST 3-IN. DIAMETER AND SHALL HAVE A MINIMUM LENGTH TO WIDTH RATIO OF ONE. WHEN THE LENGTH OF THE CORE IS LESS THAN TWICE THE DIAMETER, APPLY THE CORRECTION FACTORS GIVEN IN ASTM C42 TO OBTAIN THE COMPRESSIVE STRENGTH OF INDIVIDUAL CORES. THREE CORES SHALL BE TESTED AT 3-DAYS AND THREE CORE SHALL BE TESTED AT 28-DAYS FOR COMPRESSIVE STRENGTH.

3.03 SHOTCRETE ALIGNMENT CONTROL

A. ALIGNMENT WIRES AND/OR THICKNESS CONTROL PINS SHALL BE PROVIDED AS NECESSARY TO ESTABLISH AND MAINTAIN THE MINIMUM SHOTCRETE THICKNESS SHOWN ON THE PLANS. THE MAXIMUM DISTANCE BETWEEN WIRES AND/OR THICKNESS CONTROL PINS ON ANY SURFACE SHALL BE EQUAL TO THE VERTICAL NAIL SPACING. THE CONTRACTOR SHALL ENSURE THAT ALIGNMENT WIRES ARE TIGHT, TRUE TO LINE, AND PLACED TO ALLOW FURTHER TIGHTENING.

3.04 SURFACE PREPARATION

A. PRIOR TO SHOTCRETING THE UNGROUTED ZONE ABOVE THE NAIL GROUT AT THE EXCAVATION CUT FACE (BIRDS BEAK), THE CONTRACTOR SHALL REMOVE ALL LOOSE MATERIALS FROM THE SURFACE OF THE GROUT AND PREPARE THE JOINT IN ACCORDANCE WITH ALL REQUIREMENTS FOR JOINT PREPARATION SPECIFIED HEREIN.

B. THE CONTRACTOR SHALL REMOVE ALL LOOSE MATERIALS AND LOOSE DRIED SHOTCRETE FROM PREVIOUS PLACEMENT OPERATIONS AND FROM ALL RECEIVING SURFACES BY METHODS ACCEPTABLE TO THE OWNER'S REPRESENTATIVE. THE REMOVAL SHALL BE ACCOMPLISHED IN SUCH A MANNER AS NOT TO LOOSEN, CRACK, OR SHATTER THE SURFACES TO RECEIVE THE SHOTCRETE. ANY SURFACE MATERIAL THAT, IN THE OPINION OF THE OWNER'S REPRESENTATIVE, IS SO LOOSENED OR DAMAGED SHALL BE REMOVED TO SUFFICIENT DEPTH TO PROVIDE A BASE THAT IS SUITABLE TO RECEIVE THE SHOTCRETE. MATERIAL THAT LOOSENS AS THE SHOTCRETE IS APPLIED SHALL BE REMOVED. SHOTCRETE SHALL NOT BE PLACED ON FROZEN SURFACES.

3.05 DELIVERY AND APPLICATION

A. A CLEAN, DRY, OIL-FREE SUPPLY OF COMPRESSED AIR SUFFICIENT FOR MAINTAINING ADEQUATE NOZZLE VELOCITY FOR ALL PARTS OF THE WORK AND FOR SIMULTANEOUS OPERATION OF A BLOW PIPE FOR CLEANING AWAY REBOUND SHALL BE MAINTAINED AT ALL TIMES. THE EQUIPMENT SHALL BE CAPABLE OF DELIVERING THE PREMIXED MATERIAL ACCURATELY, UNIFORMLY, AND CONTINUOUSLY THROUGH THE DELIVERY HOSE.

B. THE SHOTCRETE SHALL BE APPLIED FROM THE LOWER PART OF THE WORK AREA UPWARDS TO PREVENT ACCUMULATION OF REBOUND ON UNCOVERED SURFACES. THICKNESS, METHODS OF SUPPORT, AIR PRESSURE, AND RATE OF PLACEMENT OF SHOTCRETE SHALL BE CONTROLLED TO PREVENT SAGGING OR SLOUGHING OF FRESHLY APPLIED SHOTCRETE. WHERE SHOTCRETE IS USED TO COMPLETE THE UNGROUTED ZONE OF THE NAIL DRILL HOLE NEAR THE EXCAVATION CUT FACE, THE NOZZLE SHALL BE POSITIONED INTO THE MOUTH OF THE DRILLHOLE TO COMPLETELY FILL THE VOID. REBOUND SHALL NOT BE WORKED BACK INTO THE PLACEMENT NOR SHALL THE REBOUND BE SALVAGED. REBOUND THAT DOES NOT FALL CLEAR OF THE WORKING AREA SHALL BE REMOVED. THE NOZZLE SHALL BE HELD AT A DISTANCE AND AT AN ANGLE APPROXIMATELY PERPENDICULAR TO THE WORKING FACE SO THAT REBOUND WILL BE MINIMAL AND COMPACTION WILL BE MAXIMIZED. THE NOZZLE SHALL BE ROTATED STEADILY IN A SMALL CIRCULAR PATTERN.

C. SHOTCRETE PLACEMENT SHALL BE BY THE BENCH GUNNING METHOD WHEN THE THICKNESS OF THE SHOTCRETE LAYER IS 6 IN. OR GREATER. THE GUNNING METHOD SHALL CONSIST OF BUILDING UP A THICK LAYER OF SHOTCRETE FROM THE BOTTOM OF THE LIFT AND MAINTAINING THE TOP SURFACE AT APPROXIMATELY A 45-DEGREE SLOPE.

3.06 VISUAL OBSERVATION

A. A CLEARLY DEFINED PATTERN OF CONTINUOUS HORIZONTAL OR VERTICAL RIDGES OR DEPRESSIONS AT THE REINFORCING ELEMENTS AFTER THEY ARE COVERED WILL BE CONSIDERED INDICATION OF INSUFFICIENT COVER OF REINFORCEMENT OR POOR APPLICATION AND PROBABLE VOID. IN THIS CASE, THE WORK SHALL BE IMMEDIATELY SUSPENDED AND THE WORK CAREFULLY INSPECTED BY THE OWNER'S REPRESENTATIVE. THE CONTRACTOR SHALL IMPLEMENT AND COMPLETE CORRECTIVE MEASURES PRIOR TO RESUMING THE SHOTCRETE OPERATIONS.

3.07 DEFECTIVE SHOTCRETE

A. SURFACE DEFECTS SHALL BE REPAIRED AS SOON AS POSSIBLE AFTER INITIAL PLACEMENT OF SHOTCRETE. ALL SHOTCRETE THAT LACKS UNIFORMITY, EXHIBITS SEGREGATION, SAGGING, HONEYCOMBING, OR LAMINATION, OR CONTAINS ANY VOIDS OR SAND POCKETS SHALL BE REMOVED AND REPLACED WITH FRESH SHOTCRETE BY THE CONTRACTOR TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE.

3.08 CONSTRUCTION JOINTS

A. CONSTRUCTION JOINTS SHALL BE WATERTIGHT AND UNIFORMLY TAPERED TOWARD THE EXCAVATION FACE OVER A MINIMUM DISTANCE EQUAL TO THE THICKNESS OF THE SHOTCRETE LAYER. THE SURFACE OF THE JOINTS SHALL BE ROUGH, CLEAN, SOUND AND DAMP. THE HARDENED SURFACE SHALL BE CLEANED OF ALL LAITANCE, FOREIGN SUBSTANCES, WASHED WITH CLEAN WATER, AND WETTED THOROUGHLY PRECEDING PLACEMENT OF FRESH SHOTCRETE.
THE SHOTCRETING PROCEDURE MAY BE CORRECTED BY ADJUSTING THE NOZZLE DISTANCE AND ORIENTATION PERPENDICULAR TO THE SURFACE, ADJUSTING THE WATER CONTENT OF THE SHOTCRETE MIX, OR OTHER MEANS ACCEPTABLE TO THE OWNER'S REPRESENTATIVE. ALL OVERSPRAY AND REBOUND SHALL BE REMOVED FROM THE SURFACE.

3.09 FINISH

A. SHOTCRETE FINISH SHALL BE EITHER AN UNDISTURBED GUN FINISH AS APPLIED FROM THE NOZZLE, A SCREEDED FINISH, OR A WOOD OR STEEL TROWELED FINISH, UNLESS SHOWN OTHERWISE ON THE PLANS.

REV	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-6-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

SPECIFICATIONS (1 OF 2)
GRAND STREET COMMONS - WEST BUILDING
1765 22ND AVE S
SEATTLE WASHINGTON

Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

SH6.0

DESIGNED BY:	YY
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.:	81205043
SHEET NO.:	8 OF 9

3.10 ATTACHMENT OF THE NAIL HEAD CONNECTION HARDWARE

A. FOR TEMPORARY SHOTCRETE FACINGS, THE BEARING PLATE SHALL BE WET-SET WHILE THE SHOTCRETE IS PLASTIC TO ASSURE FULL SHOTCRETE BEARING BEHIND THE PLATE. HOWEVER, THE RETENTION NUT SHALL ONLY BE HAND TIGHTENED SUCH THAT FULL BEARING IS ACHIEVED WITHOUT EXCESSIVELY SQUEEZING FRESH SHOTCRETE OUT FROM UNDER THE PLATE.

B. FOR PERMANENT SHOTCRETE FACINGS, THE HEADED STUD PLATE SHALL BE LOCATED WITHIN THE WALL SUCH THAT THE PROPER SHOTCRETE COVER IS PROVIDED AS SHOWN ON THE PLANS. IN ADDITION, THE PLATE, WASHER, AND NUT SHALL BE PULLED UP FLUSH TOGETHER BY WIRING TO THE REINFORCEMENT OR OTHER MEANS NECESSARY TO ASSURE ADEQUATE CONTACT BETWEEN THESE PARTS.

3.11 CURING

3.11.01 GENERAL

A. TEMPORARY SHOTCRETE SHALL NOT REQUIRE CURING.

B. PERMANENT SHOTCRETE SHALL BE PROTECTED FROM LOSS OF MOISTURE FOR AT LEAST 7 DAYS AFTER PLACEMENT. WHEN SHOTCRETE IS BEING PROTECTED FROM LOW TEMPERATURES, CURING SHALL BE TERMINATED NO SOONER THAN ONE DAY AFTER THE REMOVAL OF LOW TEMPERATURE PROTECTION. CURING OF SHOTCRETE SHALL BE BY METHODS THAT WILL KEEP SHOTCRETE SURFACES ADEQUATELY WET AND PROTECTED DURING THE SPECIFIED PERIOD. CURING SHALL COMMENCE WITHIN ONE HOUR OF SHOTCRETE APPLICATION. WHEN THE AMBIENT TEMPERATURE EXCEEDS 80 DEGREES FAHRENHEIT, THE CONTRACTOR SHALL PLAN THE WORK SUCH THAT CURING CAN COMMENCE IMMEDIATELY AFTER FINISHING. CURING SHALL BE COMPLETED IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS.

3.11.02 WATER CURING

A. THE RATE OF WATER APPLICATION SHALL BE REGULATED TO PROVIDE COMPLETE SURFACE COVERAGE WITH A MINIMUM OF RUNOFF.

3.11.03 MEMBRANE CURING

A. CURING COMPOUNDS SHALL NOT BE USED ON ANY SURFACES AGAINST WHICH ADDITIONAL SHOTCRETE OR OTHER CEMENTITIOUS FINISHING MATERIALS ARE TO BE BONDED UNLESS THE SURFACE IS THOROUGHLY SANDBLASTED IMMEDIATELY PRIOR TO SHOTCRETE PLACEMENT IN A MANNER ACCEPTABLE TO THE OWNER'S REPRESENTATIVE. MEMBRANE CURING COMPOUNDS SHALL BE SPRAY APPLIED AS QUICKLY AS PRACTICAL AFTER INITIAL SHOTCRETE SET AT A COVERAGE OF NOT LESS THAN 40 SQ. FT. PER GALLON.

3.11.04 FILM CURING

A. FILM CURING WITH POLYETHYLENE SHEETING MAY BE USED TO SUPPLEMENT WATER CURING ON SHOTCRETE THAT WILL BE COVERED LATER WITH ADDITIONAL SHOTCRETE OR CONCRETE. THE SHEETING SHALL COMPLETELY COVER ALL SURFACES, AND HAVE EDGES OVERLAPPED FOR PROPER SEALING AND ANCHORAGES.

3.12 WEATHER LIMITATIONS

A. SHOTCRETE SHALL NOT BE PLACED IN COLD WEATHER UNLESS ADEQUATELY PROTECTED WHEN THE AMBIENT TEMPERATURE IS BELOW 40° F AND FALLING AND/OR WHEN THE SHOTCRETE IS LIKELY TO BE SUBJECTED TO FREEZING TEMPERATURES BEFORE REACHING A MINIMUM STRENGTH OF 750 PSI. COLD WEATHER PROTECTION SHALL BE MAINTAINED UNTIL THE STRENGTH OF THE IN-PLACE SHOTCRETE IS GREATER THAN 750 PSI. COLD WEATHER PROTECTION SHALL INCLUDE HEATING UNDER TENTS, BLANKETS OR OTHER MEANS ACCEPTABLE TO THE OWNER'S REPRESENTATIVE. THE TEMPERATURE OF THE SHOTCRETE, WHEN DEPOSITED, SHALL BE NOT LESS THAN 50° F NOR MORE THAN 80° F. THE AIR IN CONTACT WITH SHOTCRETE SURFACES SHALL BE MAINTAINED AT TEMPERATURES ABOVE 32° F FOR A MINIMUM OF 7 DAYS.

B. SHOTCRETE APPLICATION SHALL BE SUSPENDED DURING HIGH WINDS AND HEAVY RAINS WHEN IN THE OPINION OF THE OWNER'S REPRESENTATIVE THE QUALITY OF THE APPLICATION IS NOT ACCEPTABLE. NEWLY PLACED SHOTCRETE EXPOSED TO RAIN THAT WASHES OUT CEMENT OR OTHERWISE MAKES THE SHOTCRETE UNACCEPTABLE TO THE OWNER'S REPRESENTATIVE SHALL BE REMOVED AND REPLACED. THE CONTRACTOR SHALL PROVIDE ADEQUATELY SECURED POLYETHYLENE SHEETING OR EQUIVALENT WHEN ADVERSE EXPOSURE TO WEATHER IS ANTICIPATED.

3.13 TOLERANCES

A. THE TOLERANCES FOR TEMPORARY SHOTCRETE FACINGS SHALL BE AS FOLLOWS:

VERTICAL LOCATION OF SHOTCRETE JOINT	12"
THICKNESS OF SHOTCRETE	- 0.5"
HORIZONTAL LOCATION OF REINFORCEMENT	1"
REINFORCING LAP LENGTH	- 1"
REINFORCEMENT SPACING	1"

SECTION 02365 - GROUND ANCHORS

1.1 GENERAL

A. THE WORK SHALL CONSIST OF INSTALLING GROUND ANCHORS AT THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE PLANS AND THIS SECTION. THE CONTRACTOR SHALL FURNISH ALL LABOR AND MATERIALS AND PERFORM ALL OPERATIONS NECESSARY TO PERFORM THE WORK IN ACCORDANCE WITH THE PLANS AND THIS SECTION.

B. THE CONTRACTOR SHALL SELECT THE GROUND ANCHOR TYPE, THE INSTALLATION METHOD, THE ANCHOR DIAMETER (6 IN MINIMUM), AND THE METHOD OF GROUTING, IN ORDER TO DEVELOP THE DESIGN LOADS WITHIN THE BOND LENGTHS INDICATED ON THE PLANS, DETERMINED IN ACCORDANCE WITH THE ANCHOR TESTING PROGRAM. CONTRACTOR CAN LENGTHEN THE TIEBACK BOND ZONE PROVIDED THE INCREASE IN LENGTH DOES NOT REQUIRE ADDITIONAL EASEMENT AGREEMENTS OR CONFLICT WITH UTILITIES.

1.2 DEFINITIONS

GROUND ANCHOR: A SYSTEM, REFERRED TO AS A TIEBACK OR ANCHOR, USED TO TRANSFER TENSILE EARTH RETENTION LOADS TO SOIL OR ROCK. AN ANCHOR INCLUDES ALL PRESTRESSING STEEL, ANCHORAGE DEVICES, GROUT, COATINGS, SHEATHINGS AND COUPLERS IF USED.

GUTS: THE GUARANTEED ULTIMATE TENSILE STRENGTH OF THE ANCHOR STEEL AS DEFINED BY THE SPECIFIED STANDARD.

DESIGN LOAD: THE DESIGN LOAD IS THE MAXIMUM ANTICIPATED LOAD THAT WILL BE APPLIED TO THE ANCHOR DURING ITS SERVICE LIFE AFTER TESTING IS COMPLETED.

BOND LENGTH: THE LENGTH OF THE ANCHOR WHICH IS BONDED TO THE GROUND AND TRANSMITS THE TENSILE FORCE TO THE SOIL OR ROCK.

UNBONDED LENGTH: THE LENGTH OF THE ANCHOR WHICH IS NOT BONDED TO THE GROUND (I.E., THE LENGTH OVER WHICH NON-STRUCTURAL FILLER OR BOND BREAKER IS PROVIDED IN LIEU OF GROUT.)

TENDON BOND LENGTH: THE LENGTH OF THE TENDON WHICH IS BONDED TO THE ANCHOR GROUT.

TENDON UNBONDED LENGTH: THE LENGTH OF THE TENDON WHICH IS NOT BONDED TO THE ANCHOR GROUT (I.E., LENGTH OF GREASED AND SHEATHED STRAND OR BAR).

TOTAL ANCHOR LENGTH: THE UNBONDED LENGTH PLUS THE BOND LENGTH OR THE TENDON UNBONDED LENGTH PLUS THE TENDON BOND LENGTH.

1.3 QUALITY ASSURANCE

A. THE CONTRACTOR SHALL SUBMIT A REFERENCE LIST INDICATING THE SUCCESSFUL COMPLETION OF AT LEAST FIVE GROUND ANCHOR PROJECTS OF A SIMILAR NATURE AND COMPLETED DURING THE LAST 3 YEARS. A BRIEF DESCRIPTION OF EACH PROJECT WITH THE OWNER'S NAME AND CURRENT PHONE NUMBER SHALL BE INCLUDED.

B. THE CONTRACTOR'S SUPERINTENDENT SHALL HAVE A MINIMUM OF 3 YEARS EXPERIENCE SUPERVISING GROUND ANCHOR CONSTRUCTION AND THE DRILL OPERATORS AND ON-SITE SUPERVISORS SHALL HAVE A MINIMUM OF 1 YEAR EXPERIENCE INSTALLING GROUND ANCHORS. PRIOR TO STARTING THE WORK, THE CONTRACTOR SHALL SUBMIT A LIST IDENTIFYING THE SUPERINTENDENT, DRILL RIG OPERATORS, AND ON-SITE SUPERVISORS ASSIGNED TO THE PROJECT. THE LIST SHALL CONTAIN A SUMMARY OF EACH INDIVIDUAL'S EXPERIENCE AND SHALL BE SUFFICIENTLY COMPLETE FOR THE ENGINEER TO EVALUATE THE INDIVIDUAL'S QUALIFICATIONS. WORK SHALL NOT BE STARTED UNTIL WRITTEN APPROVAL OF THE CONTRACTOR'S QUALIFICATIONS IS GIVEN.

C. THE ENGINEER MAY SUSPEND THE WORK IF THE CONTRACTOR SUBSTITUTES NON-APPROVED PERSONNEL FOR APPROVED PERSONNEL. THE CONTRACTOR SHALL BE FULLY LIABLE FOR ADDITIONAL COSTS RESULTING FROM THE SUSPENSION OF WORK AND NO ADJUSTMENTS IN THE CONTRACT TIME RESULTING FROM THE WORK SUSPENSION SHALL BE ALLOWED.

1.4 SUBMITTALS

A. THE CONTRACTOR SHALL PREPARE AND SUBMIT TO THE ENGINEER FOR REVIEW AND APPROVAL WORKING DRAWINGS AND A DESIGN SUBMISSION DESCRIBING THE GROUND ANCHOR SYSTEM OR SYSTEMS INTENDED FOR USE. THE WORKING DRAWINGS AND DESIGN SUBMISSION SHALL BE SUBMITTED AS AT LEAST ONE WEEK PRIOR TO START OF GROUND ANCHOR INSTALLATION. THE GROUND ANCHOR INSTALLATION SHALL NOT BEGIN UNTIL THE SUBMITTALS HAVE BEEN APPROVED BY THE ENGINEER. THE WORKING DRAWINGS AND DESIGN SUBMISSION SHALL INCLUDE THE FOLLOWING:

1. GROUND ANCHOR SCHEDULE GIVING:

A. GROUND ANCHOR NUMBER.
B. GROUND ANCHOR DESIGN LOAD.
C. TYPE AND SIZE OF TENDON.
D. MINIMUM TOTAL ANCHOR LENGTH.
E. MINIMUM BOND LENGTH.
F. MINIMUM UNBONDED LENGTH.
G. MINIMUM TENDON BOND LENGTH.
H. MINIMUM TENDON UNBONDED LENGTH.

2. DRAWING OF THE GROUND ANCHOR TENDON AND THE CORROSION PROTECTION SYSTEM (IF REQUIRED BY THE PLANS) INCLUDE DETAILS OF THE FOLLOWING:

A. SPACERS AND THEIR LOCATIONS.
B. CENTRALIZERS AND THEIR LOCATION.
C. TENDON UNBONDED LENGTH CORROSION PROTECTION SYSTEM (IF REQUIRED BY THE PLANS).
D. TENDON BOND LENGTH CORROSION PROTECTION SYSTEM (IF REQUIRED BY THE PLANS).
E. ANCHORAGE AND TRUMPET.
F. ANCHORAGE CORROSION PROTECTION SYSTEM (IF REQUIRED BY THE PLANS).
G. ANCHORS USING NON-RESTRESSABLE ANCHORAGE DEVICES.

3. SHOP PLANS FOR ALL STRUCTURAL STEEL.
4. CERTIFIED MILL TEST RESULTS AND TYPICAL STRESS-STRAIN CURVES FOR THE PRESTRESSING STEEL. THE TYPICAL STRESS-STRAIN CURVE SHALL BE OBTAINED BY APPROVED STANDARD PRACTICES. THE GUARANTEED ULTIMATE STRENGTH, YIELD STRENGTH, ELONGATION, AND COMPOSITION SHALL BE SPECIFIED.
5. GROUT MIX DESIGN AND THE PROCEDURES FOR GROUT PLACEMENT.
6. DETAILED PLANS FOR THE PROPOSED GROUND ANCHOR TESTING METHOD. THIS SHALL INCLUDE ALL NECESSARY DRAWINGS AND DETAILS TO CLEARLY DESCRIBE THE PROPOSED METHOD.
7. CALIBRATION DATA FOR EACH TEST JACK, PRESSURE GAUGE AND REFERENCE PRESSURE GAUGE TO BE USED. THE CALIBRATION TESTS SHALL HAVE BEEN PERFORMED BY AN INDEPENDENT TESTING LABORATORY AND TESTS SHALL HAVE BEEN PERFORMED WITHIN 60 CALENDAR DAYS OF THE DATE SUBMITTED.
8. CALIBRATION DATA FOR THE STROKE COUNTER ON THE GROUT PUMP.

B. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER WITHIN 30 CALENDAR DAYS AFTER COMPLETION OF THE GROUND ANCHOR WORK A REPORT CONTAINING:

1. PRESTRESSING STEEL MANUFACTURER'S MILL TEST REPORTS FOR THE TENDONS INCORPORATED IN THE INSTALLATION.
2. GROUTING RECORDS INDICATING THE CEMENT TYPE, QUANTITY PLACED, AND THE GROUT PRESSURES.

1.5 MATERIALS

1.5.1 ADMIXTURES

A. ADMIXTURES SHALL CONFORM TO THE REQUIREMENTS OF ASTM C494. ADMIXTURES WHICH CONTROL BLEED, IMPROVE FLOWABILITY, REDUCE WATER CONTENT, AND RETARD SET MAY BE USED IN THE GROUT SUBJECT TO THE APPROVAL OF THE ENGINEER. EXPANSIVE ADMIXTURES SHALL ONLY BE ADDED TO THE GROUT USED FOR FILLING SEALED ENCAPSULATIONS, TRUMPETS AND ANCHORAGE COVERS. ACCELERATORS WILL NOT BE PERMITTED. ADMIXTURES SHALL BE COMPATIBLE WITH PRESTRESSING STEELS AND MIXED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION.

1.5.2 AGGREGATES

A. FINE AGGREGATES SHALL CONSIST OF CLEAN, NATURAL SAND, CONFORMING TO THE REQUIREMENTS OF ASTM C33. ARTIFICIAL OR MANUFACTURED SAND IS ACCEPTABLE PROVIDED IT IS SUITABLE FOR PUMPING IN ACCORDANCE WITH ACI 304, SECTION 4.2.2.

1.5.3 ANCHORAGE COVERS

A. ANCHORAGE COVERS SHALL BE FABRICATED FROM STEEL WITH A MINIMUM THICKNESS OF 0.10 INCHES. THE COVER SHALL BE SECURELY ATTACHED TO THE ANCHORAGE DEVICE OR BEARING PLATE. IF THE COVER IS TO BE GREASE FILLED, THEN THE COVER MUST FORM A PERMANENT WATERTIGHT ENCLOSURE FOR THE ANCHORAGE DEVICE.

1.5.4 ANCHORAGE DEVICES

A. ANCHORAGE DEVICES SHALL BE CAPABLE OF DEVELOPING 95% OF THE MINIMUM SPECIFIED ULTIMATE TENSILE STRENGTH OF THE PRESTRESSING STEEL TENDON. THE ANCHORAGE DEVICES SHALL CONFORM TO THE STATIC STRENGTH REQUIREMENTS OF SECTION 3.1.6(1) AND SECTION 3.1.8(1) OF THE PTI "GUIDE SPECIFICATION FOR POST TENSIONING MATERIALS".

1.5.5 BEARING PLATE

A. THE BEARING PLATES SHALL BE FABRICATED FROM STEEL CONFORMING TO AASHTO M183/ASTM A36. THE BEARING PLATES SHALL BE SIZED SO THE ALLOWABLE BENDING STRESSES IN THE PLATE PER AISC-ASD ARE NOT EXCEEDED WHEN THE DESIGN LOAD OF THE GROUND ANCHOR IS APPLIED.

1.5.6 BONDBREAKER

A. THE BONDBREAKER SHALL BE FABRICATED FROM A SMOOTH PLASTIC TUBE OR PIPE HAVING THE FOLLOWING PROPERTIES:

1. RESISTANT TO CHEMICAL ATTACK FROM AGGRESSIVE ENVIRONMENTS, GROUT OR GREASE;
2. RESISTANT TO AGING BY ULTRA-VIOLET LIGHT;
3. FABRICATED FROM MATERIAL NON-DETRIMENTAL TO THE TENDON;
4. CAPABLE OF WITHSTANDING ABRASION, IMPACT, AND BENDING DURING HANDLING AND INSTALLATION;
5. ENABLE THE TENDON TO ELONGATE DURING TESTING AND STRESSING; AND
6. ALLOW THE TENDON TO REMAIN UNBONDED AFTER LOCK-OFF.

1.5.7 CEMENT

A. TYPE I, II, OR III CEMENT CONFORMING TO THE REQUIREMENTS OF AASHTO M85.

1.5.8 CENTRALIZERS

A. CENTRALIZERS SHALL BE FABRICATED FROM PLASTIC, STEEL, OR MATERIAL WHICH IS NOT DETRIMENTAL TO THE PRESTRESSING STEEL. WOOD SHALL NOT BE USED. THE CENTRALIZER SHALL BE ABLE TO SUPPORT THE TENDON IN THE DRILLHOLE AND POSITION THE TENDON SO A MINIMUM OF 0.5 INCHES OF COVER IS PROVIDED AND SHALL PERMIT GROUT TO FREELY FLOW UP THE DRILLHOLE.

1.5.9 CORROSION INHIBITING GREASE

A. WHEN THE PLANS REQUIRE, THE CORROSION INHIBITING GREASE SHALL CONFORM TO THE REQUIREMENTS OF SECTION 3.2.5 OF THE POST TENSIONING INSTITUTE, "SPECIFICATION FOR UNBONDED SINGLE STRAND TENDONS".

1.5.10 HEAT SHRINKABLE TUBES

A. HEAT SHRINKABLE TUBES SHALL BE FABRICATED FROM A RADIATION CROSSLINKED POLYOLEFIN TUBE INTERNALLY COATED WITH AN ADHESIVE SEALANT. BEFORE SHRINKING, THE TUBE SHALL HAVE A NOMINAL WALL THICKNESS OF 24 MILS. THE ADHESIVE SEALANT INSIDE THE TUBE SHALL HAVE A NOMINAL THICKNESS OF 20 MILS.

1.5.11 GROUT

A. THE GROUT SHALL BE A NEAT OR SAND/CEMENT MIXTURE WITH A MINIMUM 3-DAY COMPRESSIVE STRENGTH OF 1,500 PSI AND A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,000 PSI PER ASTM C109.

1.5.12 PRESTRESSING STEEL

A. GROUND ANCHOR TENDONS SHALL CONSIST OF ONE OF THE FOLLOWING:

1. BAR TENDONS WITH AN ULTIMATE TENSILE STRENGTH OF 150 KSI CONFORMING TO AASHTO M275/ASTMA722.
2. SEVEN-WIRE, LOW-RELAXATION STRANDS WITH AN ULTIMATE TENSILE STRENGTH OF 270 KSI CONFORMING TO AASHTO M203/ASTM A416.
3. "COMPACT", SEVEN-WIRE, LOW-RELAXATION STRANDS CONFORMING TO ASTM A779.

B. BAR TENDON COUPLERS, IF REQUIRED, SHALL BE FURNISHED BY THE MANUFACTURER OF THE BARS AND SHALL DEVELOP THE ULTIMATE TENSILE STRENGTH OF THE BARS WITHOUT EVIDENCE OF ANY FAILURE. COUPLERS SHALL BE PLACED IN THE BOND ZONE. STRAND COUPLERS WILL NOT BE ALLOWED.

1.5.13 SHEATH

A. IF REQUIRED BY THE PLANS, A SHEATH SHALL BE USED AS PART OF THE CORROSION PROTECTION SYSTEM FOR THE UNBONDED LENGTH PORTION OF THE TENDON. THE SHEATH SHALL BE FABRICATED FROM ONE OF THE FOLLOWING:

1. A POLYETHYLENE TUBE PULLED OR PUSHED OVER THE PRESTRESSING STEEL. THE POLYETHYLENE SHALL BE TYPE II, III, OR IV AS DEFINED BY ASTM D1248 (OR APPROVED EQUAL). THE TUBING SHALL HAVE A MINIMUM WALL THICKNESS OF 60 MILS +/- 10 MILS.
2. A HOT-MELT EXTRUDED POLYPROPYLENE TUBE. THE POLYPROPYLENE SHALL BE CELL CLASSIFICATION PP 210 B5554211 AS DEFINED BY ASTMD4101 (OR APPROVED EQUAL). THE TUBING SHALL HAVE A MINIMUM WALL THICKNESS OF 60 MILS +/- 10 MILS.
3. A HOT-MELT EXTRUDED POLYETHYLENE TUBE. THE POLYETHYLENE SHALL BE HIGH DENSITY TYPE III AS DEFINED BY ASTM D3350 AND ASTMD1248 (OR APPROVED EQUAL). THE TUBING SHALL HAVE A MINIMUM WALL THICKNESS OF 60 MILS PLUS/MINUS 10 MILS.
4. STEEL TUBING CONFORMING TO ASTM A500, MINIMUM WALL THICKNESS OF 0.20 INCHES.
5. PLASTIC PIPE CONFORMING TO ASTM A1185, SCHEDULE 40.
6. A CORRUGATED TUBE CONFORMING TO THE REQUIREMENT OF THE TENDON BOND LENGTH ENCAPSULATION.

1.5.14 SPACERS

A. SPACERS SHALL BE USED TO SEPARATE ELEMENTS OF A MULTI-ELEMENT TENDON AND SHALL PERMIT GROUT TO FREELY FLOW UP THE DRILLHOLE OR CORROSION ENCAPSULATION. SPACERS SHALL BE FABRICATED FROM PLASTIC, STEEL, OR MATERIAL WHICH IS NON-DETRIMENTAL TO THE PRESTRESSING STEEL. WOOD SHALL NOT BE USED.

1.5.15 TENDON BOND LENGTH ENCAPSULATION

A. WHEN THE PLANS REQUIRE THE TENDON BOND LENGTH TO BE ENCAPSULATED TO PROVIDE ADDITIONAL CORROSION PROTECTION, THE TENDON ENCAPSULATION SHALL BE FABRICATED FROM ONE OF THE FOLLOWING:

1. HIGH DENSITY CORRUGATED POLYETHYLENE TUBING CONFORMING TO THE REQUIREMENTS OF AASHTO M252 AND HAVING A MINIMUM WALL THICKNESS OF 30 MILS.
2. DEFORMED STEEL TUBING OR PIPES WITH A MINIMUM WALL THICKNESS OF 25 MILS.
3. CORRUGATED POLYVINYL CHLORIDE TUBES MANUFACTURED FROM RIGID PVC COMPOUNDS CONFORMING TO ASTM D1784, CLASS 13464-B.
4. FUSION-BONDED EPOXY CONFORMING TO THE REQUIREMENTS OF AASHTO M284, EXCEPT THAT IT SHALL HAVE A FILM THICKNESS OF 15 MILS.

1.5.16 TRUMPET

A. THE TRUMPET USED TO PROVIDE A TRANSITION FROM THE ANCHORAGE TO THE UNBONDED LENGTH CORROSION PROTECTION SHALL BE FABRICATED FROM A STEEL PIPE OR TUBE CONFORMING TO THE REQUIREMENTS OF ASTM A53 FOR PIPE OR ASTM A500 FOR TUBING. THE TRUMPET SHALL HAVE A MINIMUM WALL THICKNESS OF 0.125 INCHES FOR DIAMETERS UP TO 4 INCHES AND 0.20 INCHES FOR LARGER DIAMETERS.

1.5.17 WATER

A. WATER FOR MIXING GROUT SHALL BE POTABLE.

1.6 CONSTRUCTION REQUIREMENTS

1.6.1 TENDON FABRICATION

A. THE CONTRACTOR SHALL SELECT THE TYPE OF TENDON TO BE USED. THE TENDON SHALL BE SIZED SO THE DESIGN LOAD DOES NOT EXCEED 60% OF THE MINIMUM GUTS OF THE TENDON. IN ADDITION, THE TENDON SHALL BE SIZED SO THE MAXIMUM TEST LOAD DOES NOT EXCEED 80% OF THE MINIMUM GUTS OF THE TENDON.

B. UNLESS SHOWN OTHERWISE ON THE PLANS, THE MINIMUM ANCHOR BOND LENGTH SHALL BE 10 FEET IN ROCK AND 15 FEET IN SOIL. THE MINIMUM UNBONDED LENGTH SHALL BE AS INDICATED ON THE PLANS.

C. WHEN THE PLANS REQUIRE GROUT PROTECTED GROUND ANCHOR TENDONS THE FOLLOWING APPLY:

1. CORROSION PROTECTION OF THE TENDON BOND LENGTH SHALL BE PROVIDED BY THE CEMENT GROUT COVER.
2. SPACERS SHALL BE USED ALONG THE TENDON BOND LENGTH OF MULTI-ELEMENT TENDONS TO SEPARATE EACH OF THE INDIVIDUAL ELEMENTS OF THE TENDON SO THE PRESTRESSING STEEL WILL BOND TO THE GROUT. SPACERS SHALL BE POSITIONED SO THEIR CENTER-TO-CENTER SPACING DOES NOT EXCEED 10 FEET. IN ADDITION, THE UPPER SPACER SHALL BE LOCATED A MAXIMUM OF 5 FEET FROM THE TOP OF THE TENDON BOND LENGTH AND THE LOWER SPACER SHALL BE LOCATED A MAXIMUM OF 5 FEET FROM THE BOTTOM OF THE TENDON BOND LENGTH.
3. CENTRALIZERS SHALL BE USED TO INSURE A MINIMUM OF 0.5 INCHES OF GROUT COVER OVER THE TENDON BOND LENGTH. CENTRALIZERS SHALL BE POSITIONED SO THEIR CENTER-TO-CENTER SPACING DOES NOT EXCEED 10 FEET. IN ADDITION, THE UPPERMOST CENTRALIZER SHALL BE LOCATED A MAXIMUM OF 10% OF THE TOTAL LENGTH OR 5 FEET, WHICHEVER IS LESS, FROM THE WALL FACE AND THE LOWEST CENTRALIZER SHALL BE LOCATED A MAXIMUM OF 1 FOOT FROM THE BOTTOM OF THE TENDON BONDED LENGTH.

D. WHEN THE PLANS REQUIRE THE TENDON BOND LENGTH TO BE ENCAPSULATED THE FOLLOWING APPLY:

1. THE TENDON BOND LENGTH PORTION OF THE TENDON SHALL BE CORROSION PROTECTED BY ENCAPSULATING THE TENDON IN A GROUT-FILLED CORRUGATED PLASTIC OR DEFORMED STEEL TUBE, OR BY A FUSION-BONDED EPOXY COATING. THE ANCHORAGE DEVICE AND BEARING PLATE OF TENDONS PROTECTED WITH FUSION-BONDED EPOXY SHALL BE ELECTRICALLY ISOLATED FROM THE STRUCTURE. EXPANSIVE ADMIXTURES CAN BE MIXED WITH THE ENCAPSULATION GROUT IF THE TENDON IS GROUTED INSIDE THE ENCAPSULATION PRIOR TO INSERTING IT IN THE DRILLHOLE. THE TENDON SHALL BE CENTRALIZED WITHIN THE TENDON BOND LENGTH ENCAPSULATION WITH A MINIMUM OF 0.10 INCHES OF GROUT COVER. SPACERS SHALL BE USED ALONG THE TENDON BOND LENGTH OF MULTI-ELEMENT TENDONS TO SEPARATE THE ELEMENTS OF THE TENDON SO THE PRESTRESSING STEEL WILL BOND TO THE ENCAPSULATION GROUT.
2. CENTRALIZERS SHALL PERMIT FREE GROUT FLOW AND PROVIDE A MINIMUM OF 0.5 INCHES OF GROUT COVER OVER THE TENDON BOND LENGTH ENCAPSULATION. CENTRALIZERS SHALL BE SECURELY ATTACHED TO THE ENCAPSULATION AND THE CENTER-TO-CENTER SPACING SHALL NOT EXCEED 10 FEET. THE UPPER CENTRALIZER SHALL BE LOCATED A MAXIMUM OF 5 FEET FROM THE TOP OF THE TENDON BOND LENGTH AND THE LOWER CENTRALIZER SHALL BE LOCATED A MAXIMUM OF 1 FOOT FROM THE BOTTOM OF THE TENDON BOND LENGTH.

E. THE TOTAL ANCHOR LENGTH SHALL NOT BE LESS THAN THAT INDICATED IN THE PLANS OR THE APPROVED WORKING DRAWINGS.

F. NON-RESTRESSABLE ANCHORAGE DEVICES CAN BE USED EXCEPT WHERE INDICATED IN THE PLANS. RESTRESSABLE ANCHORAGES SHALL BE PROVIDED ON THOSE GROUND ANCHORS THAT REQUIRE RELOADING. THE POST-TENSIONING SUPPLIER SHALL PROVIDE A RESTRESSABLE ANCHORAGE COMPATIBLE WITH THE POST-TENSIONING SYSTEM PROVIDED.

G. THE TRUMPET SHALL BE WELDED TO THE BEARING PLATE. THE TRUMPET SHALL HAVE AN INSIDE DIAMETER EQUAL TO OR LARGER THAN THE HOLE OR PATTERN OF HOLES IN THE BEARING PLATE. THE TRUMPET SHALL BE LONG ENOUGH TO ACCOMMODATE MOVEMENTS OF THE STRUCTURE DURING TESTING AND STRESSING. FOR STRAND TENDONS WITH ENCAPSULATION OVER THE UNBONDED LENGTH, THE TRUMPET SHALL BE LONG ENOUGH TO ENABLE THE TENDON TO MAKE A TRANSITION FROM THE DIAMETER OF THE TENDON IN THE UNBONDED LENGTH TO THE DIAMETER OF THE TENDON AT THE ANCHOR HEAD WITHOUT DAMAGING THE ENCAPSULATION. TRUMPETS FILLED WITH CORROSION-INHIBITING GREASE SHALL HAVE AN APPROVED PERMANENT SEAL PROVIDED BETWEEN THE TRUMPET AND THE UNBONDED LENGTH CORROSION PROTECTION. TRUMPETS FILLED WITH GROUT SHALL HAVE A TEMPORARY SEAL PROVIDED BETWEEN THE TRUMPET AND THE UNBONDED LENGTH CORROSION PROTECTION ADEQUATE TO CONTAIN THE FLUID GROUT.

1.6.2 TENDON STORAGE AND HANDLING

A. TENDONS SHALL BE HANDLED AND STORED IN SUCH A MANNER AS TO AVOID DAMAGE OR CORROSION. DAMAGE TO THE PRESTRESSING STEEL AS A RESULT OF ABRASIONS, CUT, NICKS, WELDS AND WELD SPLATTER WILL BE CAUSE FOR REJECTION BY THE ENGINEER. THE PRESTRESSING STEEL SHALL BE PROTECTED IF WELDING IS TO BE PERFORMED IN THE VICINITY. GROUNDING OF WELDING LEADS TO THE PRESTRESSING STEEL IS FORBIDDEN. PRESTRESSING STEEL SHALL BE PROTECTED FROM DIRT, RUST, AND DELETERIOUS SUBSTANCES. A LIGHT COATING OF RUST ON THE STEEL IS ACCEPTABLE. IF HEAVY CORROSION OR PITTING IS NOTED, THE ENGINEER WILL REJECT THE AFFECTED TENDONS.

B. THE CONTRACTOR SHALL USE CARE IN HANDLING AND STORING THE TENDONS AT THE SITE. PRIOR TO INSERTING A TENDON IN THE DRILLHOLE, THE CONTRACTOR AND THE ENGINEER WILL EXAMINE THE TENDON FOR ENCAPSULATION OR SHEATHING DAMAGE. IF IN THE OPINION OF THE ENGINEER, THE ENCAPSULATION IS DAMAGED, THE CONTRACTOR SHALL REPAIR IT IN ACCORDANCE WITH THE TENDON SUPPLIER'S RECOMMENDATIONS AND AS APPROVED BY THE ENGINEER. IF IN THE OPINION OF THE ENGINEER, THE SHEATHING HAS BEEN DAMAGED, THE CONTRACTOR SHALL REPAIR IT WITH ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE TAPE. THE TAPE SHALL BE SPIRAL WOUND AROUND THE TENDON SO AS TO COMPLETELY SEAL THE DAMAGED AREA. THE PITCH OF THE SPIRAL SHALL ENSURE A DOUBLE THICKNESS AT ALL POINTS.

1.6.3 GROUND ANCHOR INSTALLATION REQUIREMENTS

1.6.3.1 DRILLING

A. AT THE GROUND SURFACE, THE DRILLHOLE SHALL BE LOCATED WITHIN 4 INCHES OF THE LOCATION SHOWN ON THE PLANS OR THE APPROVED WORKING DRAWINGS. THE DRILLHOLE SHALL BE LOCATED SO THE LONGITUDINAL AXIS OF THE DRILLHOLE AND THE LONGITUDINAL AXIS OF THE TENDON ARE PARALLEL. THE GROUND ANCHOR SHALL NOT BE DRILLED IN A LOCATION THAT REQUIRES THE TENDON TO BE BENT IN ORDER TO CONNECT THE BEARING PLATE TO THE SUPPORTED STRUCTURE. AT THE POINT OF ENTRY, THE GROUND ANCHOR SHALL BE INSTALLED WITHIN +/- 3 DEGREES OF THE INCLINATION FROM HORIZONTAL SHOWN IN THE PLANS. AT THE POINT OF ENTRY THE HORIZONTAL ANGLE MADE BY THE GROUND ANCHOR AND THE STRUCTURE FACE SHALL BE WITHIN +/- 3 DEGREES OF A LINE DRAWN PERPENDICULAR TO THE PLANE OF THE STRUCTURE UNLESS SHOWN OTHERWISE ON THE PLANS OR APPROVED WORKING DRAWINGS (ZERO SPLAY). THE GROUND ANCHORS SHALL NOT EXTEND BEYOND THE RIGHT-OF-WAY OR EASEMENT LIMITS SHOWN ON THE PLANS.

B. WHEN CAVING CONDITIONS ARE ENCOUNTERED, NO FURTHER DRILLING WILL BE ALLOWED UNTIL THE CONTRACTOR SELECTS A METHOD TO PREVENT GROUND MOVEMENT. THE CONTRACTOR MAY USE A TEMPORARY CASING. THE CONTRACTOR'S METHOD TO PREVENT GROUND MOVEMENT SHALL BE APPROVED BY THE ENGINEER. THE CASINGS FOR THE ANCHOR DRILL HOLES, IF USED, SHALL BE REMOVED.

1.6.3.2 TENDON INSERTION

A. THE TENDON SHALL BE INSERTED INTO THE DRILLHOLE TO THE DESIRED DEPTH WITHOUT DIFFICULTY. WHEN THE TENDON CANNOT BE COMPLETELY INSERTED, THE CONTRACTOR SHALL REMOVE THE TENDON FROM THE DRILLHOLE AND CLEAN OR REDRILL THE HOLE TO PERMIT INSERTION. PARTIALLY INSERTED TENDONS SHALL NOT BE DRIVEN OR FORCED INTO THE HOLE.

1.6.3.3 GROUTING

A. THE CONTRACTOR SHALL USE A NEAT-CEMENT OR A SAND-CEMENT GROUT. THE CEMENT SHALL NOT CONTAIN LUMPS OR OTHER INDICATIONS OF HYDRATION. ADMIXTURES, IF USED, SHALL BE MIXED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

B. THE GROUT EQUIPMENT SHALL PRODUCE A GROUT FREE OF LUMPS AND UNDISPERSED CEMENT. A POSITIVE DISPLACEMENT GROUT PUMP SHALL BE USED. THE PUMP SHALL BE EQUIPPED WITH A PRESSURE GAUGE TO MONITOR GROUT PRESSURES AND A STROKE COUNTER. THE PRESSURE GAUGE SHALL BE CAPABLE OF MEASURING PRESSURES OF AT LEAST 150 PSI OR TWICE THE ACTUAL GROUT PRESSURES USED BY THE CONTRACTOR, WHICHEVER IS GREATER. THE GROUTING EQUIPMENT SHALL BE SIZED TO ENABLE THE GROUT TO BE PUMPED IN ONE CONTINUOUS OPERATION. THE MIXER SHALL BE CAPABLE OF CONTINUOUSLY AGITATING THE GROUT.

C. THE GROUT SHALL BE INJECTED FROM THE LOWEST POINT OF THE DRILLHOLE. THE GROUT MAY BE PUMPED THROUGH GROUT TUBES, CASING, OR DRILL RODS. THE GROUT CAN BE PLACED BEFORE OR AFTER INSERTION OF THE TENDON. THE QUANTITY OF THE GROUT AND THE GROUT PRESSURES SHALL BE RECORDED. THE GROUT PRESSURES AND GROUT TAKES SHALL BE CONTROLLED TO PREVENT EXCESSIVE HEAVE IN SOILS OR FRACTURING OF ROCK FORMATIONS.

D. NO GROUT SHALL BE PLACED ABOVE THE TOP OF THE BONDED LENGTH DURING THE TIME THE ANCHOR LENGTH GROUT IS PLACED. THE GROUT AT THE TOP OF THE DRILLHOLE SHALL NOT CONTACT THE BACK OF THE STRUCTURE OR THE BOTTOM OF THE TRUMPET. ONLY NONSTRUCTURAL FILLER CAN BE PLACED ABOVE THE BOND LENGTH GROUT PRIOR TO TESTING AND ACCEPTANCE OF THE ANCHOR, UNLESS APPROVED OTHERWISE BY THE ENGINEER. ALTERNATIVELY, AN APPROVED BOND BREAKER CAN BE USED IN THE ABOVE ZONE COMBINED WITH STRUCTURAL GROUT. UNDER NO CIRCUMSTANCE IS STRUCTURAL GROUTING ALLOWED IN THE NO LOAD ZONE PRIOR TO A TIEBACK VERIFICATION TEST.

E. AFTER GROUTING, THE TENDON SHALL NOT BE LOADED UNTIL THE GROUT HAS ATTAINED SUFFICIENT STRENGTH TO CARRY THE TEST LOAD.

1.6.3.4 INSTALLATION OF TRUMPET AND ANCHORAGE

A. IF REQUIRED BY THE PLANS, THE CORROSION PROTECTION SURROUNDING THE UNBONDED LENGTH OF THE TENDON SHALL EXTEND UP BEYOND THE BOTTOM SEAL OF THE TRUMPET OR 1 FOOT INTO THE TRUMPET IF NO TRUMPET SEAL IS PROVIDED. IF THE PROTECTION DOES NOT EXTENT BEYOND THE SEAL OR SUFFICIENTLY FAR ENOUGH INTO THE TRUMPET, THE CONTRACTOR SHALL EXTEND THE CORROSION PROTECTION OR LENGTHEN THE TRUMPET.

B. IF REQUIRED BY THE PLANS, THE CORROSION PROTECTION SURROUNDING THE TENDON UNBONDED LENGTH SHALL NOT CONTACT THE BEARING PLATE OR THE ANCHOR HEAD DURING TESTING AND STRESSING. IF THE PROTECTION IS TOO LONG, THE CONTRACTOR SHALL TRIM THE CORROSION PROTECTION TO PREVENT CONTACT.

C. THE BEARING PLATE AND ANCHOR HEAD SHALL BE PLACED SO THE AXIS OF THE TENDON AND THE DRILLHOLE ARE BOTH PERPENDICULAR TO THE BEARING PLATE WITHIN +/- 3 DEGREES, AND THE AXIS OF THE TENDON PASSES THROUGH THE CENTER OF THE BEARING PLATE.

D. THE TRUMPET SHALL BE COMPLETELY FILLED WITH CORROSION INHIBITING GREASE OR GROUT. TRUMPET GREASE CAN BE PLACED ANYTIME DURING CONSTRUCTION. TRUMPET GROUT SHALL BE PLACED AFTER THE GROUND ANCHOR HAS BEEN TESTED AND LOCKED OFF. THE CONTRACTOR SHALL DEMONSTRATE TO THE ENGINEER THAT THE PROCEDURES SELECTED BY THE CONTRACTOR FOR PLACEMENT OF EITHER GREASE OR GROUT WILL PRODUCE A COMPLETELY FILLED TRUMPET. IF THE PLANS REQUIRE RESTRESSABLE ANCHORAGES, CORROSION INHIBITING GREASE MUST BE USED TO FILL THE TRUMPET.

E. ALL ANCHORAGES PERMANENTLY EXPOSED TO THE ATMOSPHERE SHALL BE COVERED WITH A CORROSION INHIBITING GREASE-FILLED OR GROUT-FILLED COVER. THE CONTRACTOR SHALL DEMONSTRATE TO THE ENGINEER THAT THE PROCEDURES SELECTED BY THE CONTRACTOR FOR PLACEMENT OF EITHER GREASE OR GROUT WILL PRODUCE A COMPLETELY FILLED COVER.

1.7 GROUND ANCHOR TESTING AND LOCKOFF

1.7.1 GENERAL

A. EACH GROUND ANCHOR SHALL BE TESTED. THE MAXIMUM TEST LOAD SHALL NOT EXCEED 80% OF THE MINIMUM GUTS OF THE TENDON. THE TEST LOAD SHALL BE SIMULTANEOUSLY APPLIED TO THE ENTIRE TENDON. STRESSING OF SINGLE ELEMENTS OF MULTI-ELEMENT TENDONS WILL NOT BE PERMITTED. TEST DATA WILL BE RECORDED BY THE ENGINEER.

1.7.2 TEST EQUIPMENT

A. THE TESTING EQUIPMENT SHALL CONSIST OF:

1. A DIAL GAUGE OR VERNIER SCALE CAPABLE OF MEASURING TO 0.001 INCHES SHALL BE USED TO MEASURE THE GROUND ANCHOR MOVEMENT. THE MOVEMENT-MEASURING DEVICE SHALL HAVE A MINIMUM TRAVEL EQUAL TO THE THEORETICAL ELASTIC ELONGATION OF THE TOTAL ANCHOR LENGTH AT THE MAXIMUM TEST LOAD PLUS 1 INCH. THE DIAL GAUGE OR VERNIER SCALE SHALL BE SUPPORTED INDEPENDENT OF THE JACKING SYSTEM AND RETAINED STRUCTURE AND SHALL BE ALIGNED SO THAT ITS AXIS IS WITHIN 5 DEGREES FROM THE AXIS OF THE GROUND ANCHOR.
2. A HYDRAULIC JACK AND PUMP SHALL BE USED TO APPLY THE TEST LOAD. THE JACK AND PRESSURE GAUGE SHALL BE CALIBRATED BY AN INDEPENDENT TESTING LABORATORY AS A UNIT. THE PRESSURE GAUGE SHALL BE GRADUATED IN100 PSI INCREMENTS OR LESS. THE PRESSURE GAUGE WILL BE USED TO MEASURE THE APPLIED LOAD. THE RAM TRAVEL OF THE JACK SHALL NOT BE LESS THAN THE THEORETICAL ELASTIC ELONGATION OF THE TOTAL ANCHOR LENGTH AT THE MAXIMUM TEST LOAD PLUS ONE INCH. THE JACK SHALL BE INDEPENDENTLY SUPPORTED AND CENTERED OVER THE TENDON SO THAT THE TENDON DOES NOT CARRY THE WEIGHT OF THE JACK.

1.7.3 VERIFICATION TESTS

A. VERIFICATION TESTS SHALL BE PERFORMED TO VERIFY THE CONTRACTOR'S DESIGN OF THE ANCHOR SYSTEM AND SHALL BE APPROVED BY THE ENGINEER PRIOR TO ORDERING ANCHOR MATERIAL. TWO SUCCESSFUL VERIFICATION TESTS SHALL BE CONDUCTED IN EACH SOIL UNIT ENCOUNTERED PER METHOD USED. THE LOCATIONS SHALL BE CLOSE TO THE LOCATION OF THE PRODUCTION ANCHORS, SHALL BE SELECTED BY THE CONTRACTOR, AND APPROVED BY THE ENGINEER.

B. ALL ASPECTS OF THE TEST ANCHOR INSTALLATION METHOD AND MATERIALS, INCLUDING THE DRILLING METHOD, ANCHOR DIAMETER, GROUTING METHOD, AND DEPTH OF ANCHORAGE, SHALL BE IDENTICAL TO THAT USED FOR THE PRODUCTION ANCHORS.

C. THE TEST ANCHOR SHALL BE LOADED TO 200% OF THE DESIGN LOAD (DL). THE JACK SHALL BE POSITIONED AT THE BEGINNING OF THE TEST SUCH THAT UNLOADING AND REPOSITIONING OF THE JACK DURING THE TEST WILL NOT BE REQUIRED.

D. THE VERIFICATION TESTS SHALL BE MADE BY INCREMENTALLY LOADING THE GROUND ANCHOR IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

LOAD	HOLD TIME	LOAD	HOLD TIME
AL	1 MINUTE	1.75DL	UNTIL STABLE
0.25DL	10 MINUTES	1.50DL	UNTIL STABLE
0.50DL	10 MINUTES	1.25DL	UNTIL STABLE
0.75DL	10 MINUTES	1.00DL	UNTIL STABLE
1.00DL	10 MINUTES	0.75DL	UNTIL STABLE
1.25DL	10 MINUTES	0.50DL	UNTIL STABLE
1.50DL	60 MINUTES	0.25DL	UNTIL STABLE
1.75DL	10 MINUTES	AL	UNTIL STABLE
2.00DL	10 MINUTES		

E. THE ALIGNMENT LOAD (AL) SHOULD BE THE MINIMUM LOAD REQUIRED TO ALIGN THE TESTING APPARATUS AND SHOULD NOT EXCEED 0.05DL. DIAL GAUGES SHOULD BE SET AT "ZERO" AFTER THE ALIGNMENT LOAD HAS BEEN APPLIED.

F. A CREEP TEST SHALL BE PERFORMED AT THE 1.50DL INCREMENT. ANCHOR MOVEMENT DURING THE CREEP TEST SHALL BE MEASURED AND RECORDED AT 1, 2, 3, 5, 6, 10, 20, 30, 50, AND 60 MINUTES OF ELAPSED TIME FROM WHEN THE INCREMENT IS APPLIED. IF AN ANCHOR FAILS IN CREEP, RETESTING WILL NOT BE ALLOWED.

G. THE ENGINEER WILL GIVE THE CONTRACTOR A WRITTEN ORDER CONCERNING GROUND ANCHOR CONSTRUCTION WITHIN 3 WORKING DAYS AFTER COMPLETION OF THE VERIFICATION TESTS. THIS WRITTEN ORDER WILL EITHER CONFIRM THE ANCHOR LENGTHS AS SHOWN IN THE CONTRACTOR'S PLANS FOR GROUND ANCHORS OR REJECT THE ANCHORS BASED UPON THE RESULTS OF THE VERIFICATION TESTS.

1.7.4 BLANK

1.7.5 PROOF TESTS

A. PROOF TESTS SHALL BE PERFORMED ON ALL PRODUCTION ANCHORS NOT VERIFICATION TESTED BY INCREMENTALLY LOADING THE GROUND ANCHOR TO THE DESIGN LOAD (DL) IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

LOAD	HOLD TIME
AL	1 MINUTE
0.25DL	UNTIL STABLE
0.50DL	UNTIL STABLE
0.75DL	UNTIL STABLE
1.00DL	UNTIL STABLE
1.33DL	10 MINUTES UNLESS 0.04 INCHES OF CREEP IS OBSERVED THEN HOLD FOR AN ADDITIONAL 50 MINUTES TO DETERMINE IS CREEP IS LESS THAN 0.08 INCHES IN ONE HOUR.

B. THE ALIGNMENT LOAD (AL) SHOULD BE THE MINIMUM LOAD REQUIRED TO ALIGN THE TESTING APPARATUS AND SHOULD NOT EXCEED 0.05DL. DIAL GAUGES SHOULD BE SET AT "ZERO" AFTER THE ALIGNMENT LOAD HAS BEEN APPLIED.

C. AT LOAD INCREMENTS OTHER THAN MAXIMUM TEST LOAD, THE LOAD SHALL BE HELD LONG ENOUGH TO OBTAIN A STABLE READING. THE MAXIMUM TEST LOAD SHALL BE HELD FOR 10 MINUTES. THE LOAD-HOLD PERIOD SHALL START AS SOON AS THE MAXIMUM TEST LOAD IS APPLIED AND THE ANCHOR MOVEMENT SHALL BE MEASURED AND RECORDED AT 1, 2, 3, 5, 6, AND 10 MINUTES. IF THE ANCHOR MOVEMENT BETWEEN 1 AND 10 MINUTES EXCEEDS 0.04 INCHES, THE MAXIMUM TEST LOAD SHALL BE HELD OF AN ADDITIONAL 50 MINUTES. IF THE LOAD HOLD IS EXTENDED, THE ANCHOR MOVEMENTS SHALL BE RECORDED AT 20, 30, 50, AND 60 MINUTES. IF AN ANCHOR FAILS IN CREEP, RETESTING WILL NOT BE ALLOWED.

1.7.6 TEST ACCEPTANCE CRITERIA

A. A VERIFICATION OR PROOF TESTED GROUND ANCHOR WITH A 10 MINUTE LOAD HOLD IS CONSIDERED ACCEPTABLE WHEN:

1. THE GROUND ANCHOR CARRIES THE MAXIMUM TEST LOAD WITH LESS THAN 0.04 INCHES OF MOVEMENT BETWEEN THE 1 AND 10 MINUTE READINGS AND THE CREEP RATE IS LINEAR OR DECREASING.
2. THE TOTAL MOVEMENT AT THE MAXIMUM TEST LOAD EXCEEDS 80% OF THE THEORETICAL ELASTIC ELONGATION OF THE UNBONDED LENGTH.

B. A VERIFICATION OR PROOF TESTED GROUND ANCHOR WITH A 60-MINUTE LOAD HOLD IS CONSIDERED ACCEPTABLE WHEN:

1. THE GROUND ANCHOR CARRIES THE MAXIMUM TEST LOAD WITH LESS THAN 0.08 INCHES OF MOVEMENT BETWEEN THE 6 AND 60 MINUTE READINGS AND THE CREEP RATE IS LINEAR OR DECREASING.
2. THE TOTAL MOVEMENT AT THE MAXIMUM TEST LOAD EXCEEDS 80% OF THE THEORETICAL ELASTIC ELONGATION OF THE UNBONDED LENGTH.

C. IN ADDITION TO THE ABOVE, A VERIFICATION TESTED OR PROOF TESTED GROUND ANCHOR MUST NOT EXPERIENCE A PULLOUT FAILURE AT THE MAXIMUM TEST LOAD. A PULLOUT FAILURE IS DEFINED AS THE LOAD AT WHICH ATTEMPTS TO INCREASE THE TEST LOAD RESULT IN CONTINUED PULLOUT MOVEMENT OF THE TEST ANCHOR.

D. IF THE TOTAL MOVEMENT OF THE GROUND ANCHORS AT THE MAXIMUM TEST LOAD DOES NOT EXCEED 80% OF THE THEORETICAL ELASTIC ELONGATION OF THE UNBONDED LENGTH, THE CONTRACTOR SHALL REPLACE THE GROUND ANCHOR AT NO ADDITIONAL COST TO THE OWNER.

E. GROUND ANCHORS WHICH HAVE A CREEP RATE GREATER THAN SPECIFIED CAN BE INCORPORATED IN THE FINISHED WORK AT A LOAD EQUAL TO ONE-HALF ITS FAILURE LOAD. THE FAILURE LOAD IS THE LOAD CARRIED BY THE ANCHOR AFTER THE LOAD HAS BEEN ALLOWED TO STABILIZE FOR TEN MINUTES.

F. WHEN A GROUND ANCHOR FAILS REQUIRED TESTS, THE CONTRACTOR SHALL MODIFY THE ANCHOR DESIGN, THE CONSTRUCTION PROCEDURES, OR BOTH. THESE MODIFICATIONS MAY INCLUDE, BUT ARE NOT LIMITED TO: INSTALLING REPLACEMENT GROUND ANCHORS, MODIFYING THE INSTALLATION METHODS, INCREASING THE BOND LENGTH, OR CHANGING THE GROUND ANCHOR TYPE. ANY MODIFICATION WHICH REQUIRES CHANGES TO THE STRUCTURE SHALL HAVE PRIOR APPROVAL OF THE ENGINEER. ANY MODIFICATIONS OF DESIGN OR CONSTRUCTION PROCEDURES SHALL BE AT THE CONTRACTOR'S EXPENSE.

1.7.7 GROUND ANCHOR LOCK OFF

A. UPON COMPLETION OF THE TEST, THE LOAD SHALL BE ADJUSTED TO 100% OF THE DESIGN LOAD INDICATED ON THE PLANS AND TRANSFERRED TO THE ANCHORAGE DEVICE. AFTER TRANSFERRING THE LOAD AND PRIOR TO REMOVING THE JACK, A LIFT-OFF READING SHALL BE MADE. THE LIFT-OFF READING SHALL BE WITHIN 5% OF OF THE DESIGN LOAD. IF THE LOAD IS NOT WITHIN 5% OF THE DESIGN LOAD, THE ANCHORAGE SHALL BE RESET AND ANOTHER LIFT-OFF READING SHALL BE MADE. THIS PROCESS SHALL BE REPEATED UNTIL THE DESIRED LOCK-OFF LOAD IS OBTAINED.

1.7.8 GROUND ANCHOR DESTRESSING

A. ONCE THE BELOW GRADE PORTION OF THE BUILDING HAS BEEN CONSTRUCTED SUCH THAT IT HAS THE STRUCTURAL CAPACITY TO SUPPORT THE EARTH PRESSURES, THE TIEBACKS CAN BE DESTRESSED. VERIFY WITH THE STRUCTURAL ENGINEER OF RECORD FOR THE BUILDING PRIOR TO DESTRESSING THE TIEBACKS. ALL TIEBACKS MUST BE DESTRESSED PRIOR TO OCCUPANCY OF THE BUILDING

SECTION 02380 - SOIL NAIL WALL CONSTRUCTION OBSERVATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. SOIL NAIL WALL CONSTRUCTION OBSERVATION SHALL BE PERFORMED IN GENERAL ACCORDANCE WITH FHWA GUIDE LINES (SOIL NAILING INSPECTORS MANUAL - SOIL NAIL WALLS, 1994)

B. SOIL NAIL INSPECTOR OR PROJECT MANAGER IN CHARGE OF SOIL NAIL CONSTRUCTION OBSERVATION SHALL BE A REGISTERED PROFESSIONAL ENGINEER AND HAVE A MINIMUM OF 3 YEARS EXPERIENCE IN THE DESIGN OF SOIL NAIL WALLS AND THE CONSTRUCTION OF SOIL NAIL WALLS.

C. THE EXCAVATION FACE SHALL BE LOGGED AND PRESENTED IN GRAPHICAL FORMAT AS PART OF THE SOIL NAIL SPECIAL INSPECTION. GRAPHICAL LOGS OF SHORING WALLS SHALL BE PRESENTED ON A WEEKLY BASIS TO THE SHORING ENGINEER.

D. VARIATIONS FROM THE GEOTECHNICAL REPORT OR THE ASSUMED SOIL CONDITIONS SHALL BE IMMEDIATELY PRESENTED IN WRITING TO THE SHORING DESIGNER AND GEOTECHNICAL ENGINEER OF RECORD PRIOR TO PROCEEDING WITH THE SUBSEQUENT SHORING.

SECTION 02370 - SHORING WALL MONITORING

PART 1 - GENERAL

1.01 DESCRIPTION

A. CONSTRUCTION MONITORING OF THE SOIL NAIL WALL/VERTICAL ELEMENTS/SOLDIER PILE WALLS SHALL BE THE RESPONSIBILITY OF LICENSED SURVEYOR AND SHALL CONSIST OF CONTROLLED SURVEYING AS DESCRIBED IN THIS SECTION. EXECUTION OF THE SURVEYING SHALL BE PERFORMED BY A LICENSED SURVEYOR UNDER CONTRACT TO THE OWNER. CONTROLLED SURVEYING SHALL BE PERFORMED AT LEAST ONCE A WEEK TO DETERMINE: (A) ELEVATION AND PLAN LOCATION OF MONITORING POINTS; AND (B) VERTICAL AND HORIZONTAL MOVEMENT OF THE MONITORING POINTS. MONITORING SHALL BE COMPLETED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT.

B. MONITORING POINTS SHALL CONSIST OF BOLTS OR RODS EMBEDDED INTO THE OBJECT OF INTEREST, OR CROSS-HAIRS SCRIBED ONTO A PLATE THAT IS ATTACHED TO THE FACE OF THE OBJECT OF INTEREST. SURVEY ACCURACY SHALL BE TO +/- 0.01 FT.

C. MONITORING POINTS SHALL BE ESTABLISHED: (A) AT THE TOP OF THE SOIL NAIL WALLS AND SPACED NO GREATER THAN 20 FEET ON CENTER AROUND THE ENTIRE WALL PERIMETER; (B) ON TOP EVERY OTHER SOLDIER PILE; (C) ON ALL EXISTING STRUCTURES THAT ARE SENSITIVE TO MOVEMENT AND WITHIN 30 FEET OF THE EXCAVATION; AND (D) AT THE CURB LINE AT 25 FOOT INTERVALS.

1.02 MONITORING FREQUENCY AND REPORTING

A. SURVEY AND REPORTING OF MOVEMENT OF MONITORING POINTS SHALL BE PERFORMED A MINIMUM OF TWICE PER WEEK, WITH AT LEAST ONE OF THE READINGS BY A LICENSED LAND SURVEYOR, DURING SHORING INSTALLATION AND EXCAVATION. SURVEY FREQUENCY CAN BE DECREASED AFTER THE SHORING SYSTEM HAS BEEN INSTALLED AND EXCAVATION IS COMPLETE IF THE DATA INDICATES LITTLE OR NO ADDITIONAL MOVEMENT. SURVEYING MUST CONTINUE UNTIL THE PERMANENT STRUCTURE (INCLUDING FLOOR SLABS AS BRACES) IS COMPLETE UP TO FINAL AND STREET GRADES. THE SURVEY FREQUENCY WILL BE DETERMINED BY THE GEOTECHNICAL ENGINEER AFTER REVIEW AND APPROVAL BY SDCI AND SDOT.

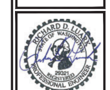
B. MONITORING RESULTS SHALL BE PRESENTED WEEKLY TO THE GEOTECHNICAL ENGINEER OF RECORD. THE GEOTECHNICAL ENGINEER SHALL REVIEW THE SURVEY DATA AND PROVIDE AN EVALUATION OF WALL PERFORMANCE ALONG WITH GRAPHICAL REPRESENTATION OF WALL MOVEMENT VERSUS TIME AND SURVEY DATA TO SDCI AND SDOT ON AT LEAST A WEEKLY BASIS. IMMEDIATELY AND DIRECTLY, NOTIFY SDCI AND SDOT IF ANY UNUSUAL OR SIGNIFICANTLY INCREASED MOVEMENT OCCURS.

C. IMMEDIATELY AND DIRECTLY NOTIFY THE GEOTECHNICAL ENGINEER, WALL DESIGNER, SDCI, AND SDOT IF 0.5 INCHES OF MOVEMENT OCCURS BETWEEN TWO CONSECUTIVE READINGS AND WHEN TOTAL MOVEMENTS REACH 0.5 INCH. AT THAT AMOUNT OF MOVEMENT, THE ENGINEERS AND DESIGNERS SHALL DETERMINE THE CAUSE OF DISPLACEMENT AND DEVELOP REMEDIAL MEASURES SUFFICIENT TO LIMIT TOTAL WALL MOVEMENTS TO 1 INCH. ALL EARTHWORK AND CONSTRUCTION ACTIVITIES MUST BE DIRECTED TOWARDS IMMEDIATE IMPLEMENTATION OF REMEDIAL MEASURES NECESSARY TO LIMIT TOTAL WALL MOVEMENTS TO WHAT HAS BEEN DEFINED AS ACCEPTABLE BY THE DESIGN TEAM, SDCI, AND SDOT (AS INDICATED ABOVE).

REV.	DATE	BY	DESCRIPTION
0	10-12-20	RDL	PERMIT SUBMITTAL
1	4-9-21	RDL	CYCLE 1 CORRECTIONS
2	7-19-21	RDL	CYCLE 2 CORRECTIONS

SPECIFICATIONS (2 OF 2)
GRAND STREET COMMONS - WEST BUILDING
1765 22ND AVE S
SEATTLE WASHINGTON

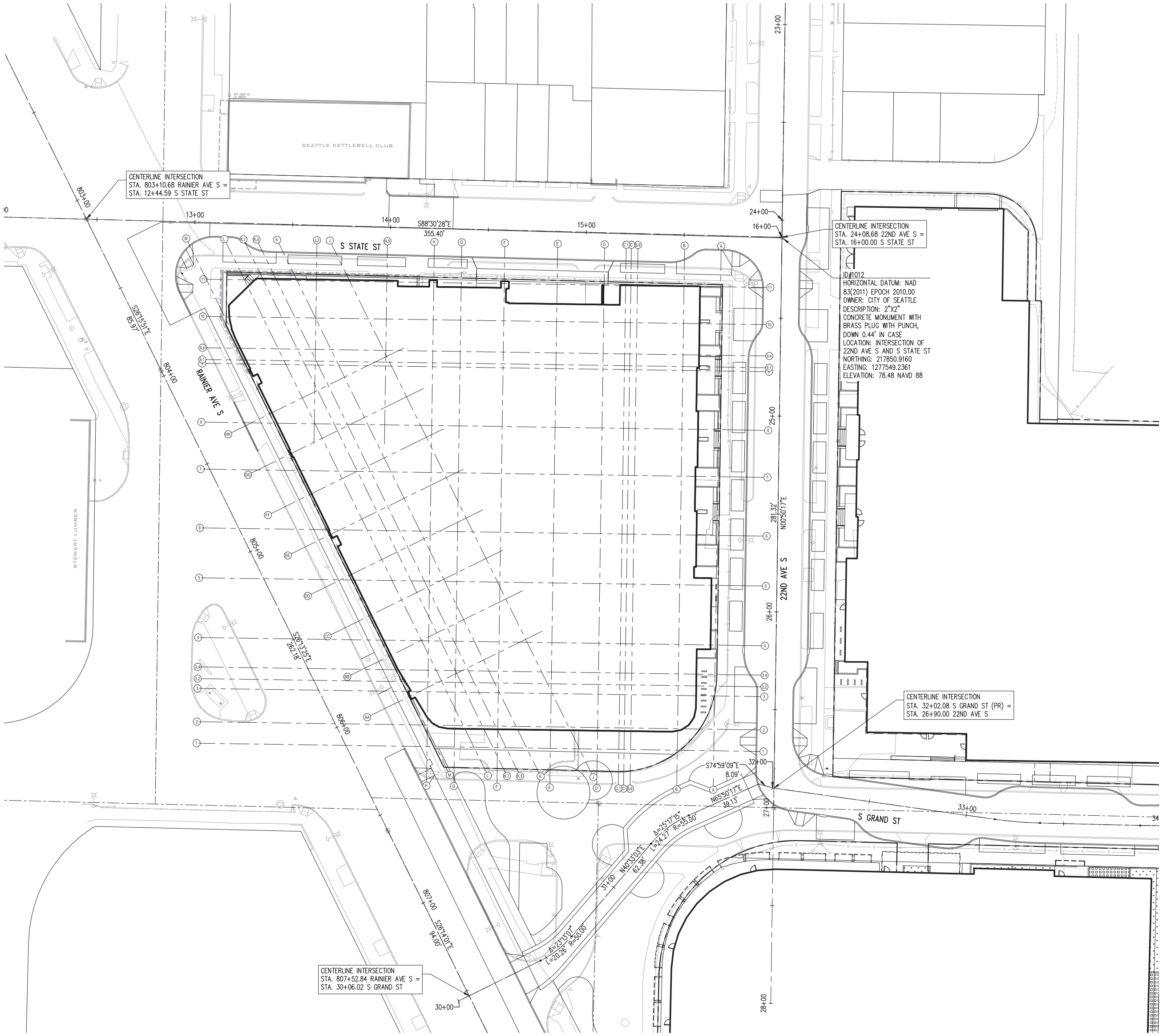
Terracon
Consulting Engineers and Scientists
21905 64TH AVENUE W, SUITE 100 MOUNTLAKE TERRACE, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549



SH6.1

DESIGNED BY:	YY
DRAWN BY:	AMP
APPVD. BY:	RDL
SCALE:	AS SHOWN
DATE:	OCT 2020
JOB NO.	81205043
SHEET NO.:	9 OF 9

LAST SAVED: 7/16/2021



CONSTRUCTION BASELINE NOTES

1. REFER TO STREET IMPROVEMENT PLANS (SDOT PROJECT NO. SUSIP0000078) FOR WORK WITHIN THE RIGHT-OF-WAY.
2. REFER TO LANDSCAPE PLANS FOR HORIZONTAL CONTROL OF SURFACE IMPROVEMENTS OVER STRUCTURE AND SITE FURNISHINGS.
3. REFER TO ARCHITECTURAL PLANS FOR BUILDING GRID LOCATION AND LAYOUT.

LEGEND

- PROPERTY LINE
- ROAD CENTERLINE
- EASEMENT
- BUILDING WALL
- BUILDING BELOW GRADE
- BUILDING ABOVE GRADE

RUNBERG ARCHITECTURE GROUP
One Yesler Way | Suite 200
Seattle, WA 98104
206.956.1970 Main
206.956.1971 Fax
www.runberg.com

kpff
1601 5th Avenue, Suite 1600
Seattle, WA 98101
206.622.5822
www.kpff.com

CONSULTANT'S STAMP:

09/29/2021

GRAND STREET COMMONS WEST

1765 22ND AVE S,
SEATTLE, WA 98144

SUBMITTALS

MUP SUBMITTAL	2020.04.24
100% SCHEMATIC DESIGN	2020.05.15
BUILDING PERMIT SUBMITTAL	2020.10.14
100% DESIGN DEVELOPMENT	2020.12.18
GMP	2021.04.30
95% CD	2021.10.01

REVISIONS

1	MUP CORRECTION 1	2020.09.25
2	MUP CORRECTION 2	2020.12.22
3	MUP CORRECTION 3	2021.04.13
4	BP CORRECTION 1	2021.04.19
5	BP CORRECTION 2	2021.07.19

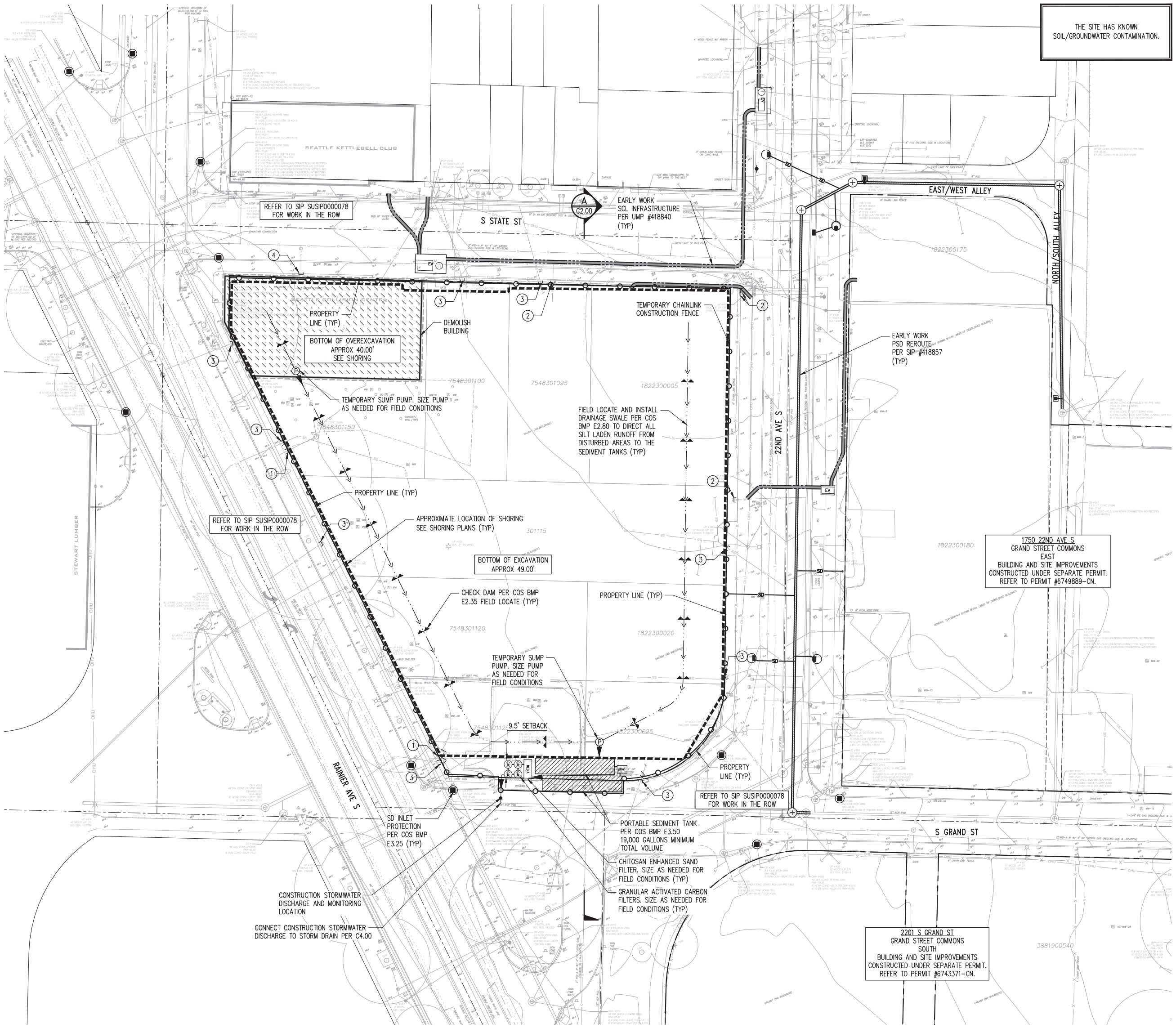
CONSTRUCTION BASELINE

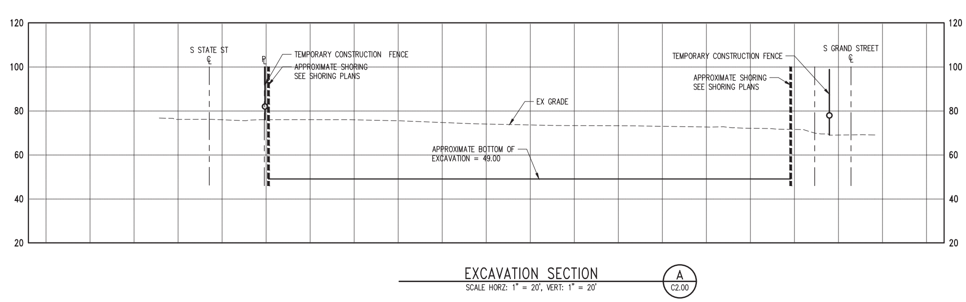
SDCI STAMP:

DATE: 2021/10/01
SCALE:
DRAWN: MDH, CMK
JOB # : 1900530
SDCI MUP #: 3035344-LU
SDCI BP #: 6750983-CN
--
--

WEST SHEET

C1.10





EXCAVATION SECTION (A / C2.00)

SCALE HORZ: 1" = 20', VERT: 1" = 20'

LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- LIMIT OF SHORING
- TEMPORARY CHAINLINK FENCE
- DEMOLISH EXISTING UTILITY
- DRAINAGE SWALE PER COS BMP E2.80
- TEMPORARY SUMP PUMP
- SD INLET PROTECTION PER COS BMP E3.25
- CHECK DAM PER COS BMP E2.35
- PORTABLE SEDIMENT TANK PER COS BMP E3.50
- DEMOLISH BUILDING

TEMPORARY EROSION AND SEDIMENT CONTROL NOTES

1. ALL NOTES FOUND ON THE COS'S TESC STANDARD PLANS SHALL APPLY TO THIS PROJECT.
2. ALL BMPS SHALL BE CONSTRUCTED AND INSTALLED PER 2017 COS STORMWATER MANUAL.
3. THE IMPLEMENTATION, MAINTENANCE, AND REPLACEMENT OF ALL TESC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS APPROVED.
4. THE TESC FACILITIES SHALL BE INSPECTED BY THE CONTRACTOR AND MAINTAINED AS NECESSARY OR AS DIRECTED BY THE CITY OF SEATTLE INSPECTOR.
5. CONTRACTOR SHALL PROVIDE TEMPORARY CHAINLINK CONSTRUCTION FENCING AS REQUIRED FOR SAFETY AND AS DIRECTED BY THE CITY OF SEATTLE INSPECTOR. FENCING SHALL BE PLACED IN A MANNER THAT ALLOWS FULL USE OF ADJACENT FACILITIES.
6. CATCH BASIN INSERTS SHALL BE PROVIDED FOR ALL STORM DRAIN INLETS AND CATCH BASINS DOWN SLOPE OF DISTURBED AREAS, WITHIN 500 FEET OF THE PROJECT SITE.
7. STORM DRAIN INLETS AND CATCH BASINS IN THE ROW SHALL BE INSPECTED DAILY BY THE CONTRACTOR. WATER LEAVING THE SITE DURING CONSTRUCTION, INCLUDING WATER CARRIED BY TRUCK TIRES, SHALL BE CLEAN. THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL SEDIMENTATION CONTROL METHODS AS NEEDED OR AS DIRECTED BY THE CITY OF SEATTLE INSPECTOR.
8. NO SEDIMENT SHALL BE TRACKED INTO THE STREET OR ONTO PAVED SURFACES. SEDIMENT SHALL BE REMOVED FROM ALL TRUCKS AND EQUIPMENT PRIOR TO LEAVING THE SITE.
9. WATER FROM DISTURBED AREAS SHALL BE DIRECTED TO A SUMP PUMP VIA SHEET FLOW OR TEMPORARY INTERCEPTOR SWALES, CONSTRUCTED AS NEEDED, OR AS DIRECTED BY THE COS INSPECTOR. WATER COLLECTED IN THE SUMP SHALL BE PUMPED TO SETTLING TANKS.
10. CONTRACTOR SHALL PROVIDE BACK-UP PUMPS WITH SUFFICIENT HORSEPOWER TO DELIVER WATER INTO THE SETTLING TANKS AS SHOWN ON THE PLAN.
11. PORTABLE SEDIMENT TANK SHALL HAVE A MINIMUM CAPACITY AS NOTED ON THE PLAN. SETTLING TANK SHALL BE "BAKER TANK," "RAIN FOR RENT," OR AN APPROVED EQUAL. CONTRACTOR TO FIELD LOCATE PER CONSTRUCTION MEANS AND METHODS. IF LOCATED IN THE PUBLIC ROW, CONTRACTOR TO OBTAIN TEMPORARY ROW USE PERMIT FROM SDOT AND PROVIDE PEDESTRIAN PASSAGE AROUND THE TANK.
12. CONTAMINATED SOIL AND GROUNDWATER WILL BE SCREENED, HANDLED, AND MANAGED IN ACCORDANCE WITH THE MEASURES OUTLINED IN A CONTAMINATED MEDIA MANAGEMENT PLAN (CMMP). THE CMMP WILL BE PREPARED BY ASPECT PRIOR TO CONSTRUCTION.

COS CSC GENERAL NOTES

1. A FIRST GROUND DISTURBANCE INSPECTION IS REQUIRED PRIOR TO START OF WORK ON ALL SITES WITH LAND DISTURBING ACTIVITY.
2. SCHEDULE A FIRST GROUND DISTURBANCE INSPECTION FOR AN ISSUED BUILDING PERMIT AT 206-684-8900 OR ONLINE AT WWW.SEATTLE.GOV/DPD/PERMITS/INSPECTIONS/
3. THE APPLICANT SHALL DESIGNATE AN EROSION AND SEDIMENT CONTROL (ESC) SUPERVISOR WHO SHALL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMPs). FOR LARGE CONSTRUCTION PROJECTS, THE ESC SUPERVISOR SHOULD BE A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL). PROVIDE THE NAME AND PHONE NUMBER OF THE ESC SUPERVISOR TO THE SITE INSPECTOR AT THE FIRST GROUND DISTURBANCE INSPECTION.
4. BMPs SHALL BE INSTALLED PRIOR TO STARTING CONSTRUCTION TO ENSURE SEDIMENT-LADEN WATER DOES NOT LEAVE THE PROJECT SITE OR ENTER ROADSIDE DITCHES, STORM DRAINS, SURFACE WATERS, OR WETLANDS.
5. THE BMPs INCLUDED IN THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. THE APPLICANT IS RESPONSIBLE FOR ENSURING THAT BMPs ARE MODIFIED AS NEEDED FOR UNEXPECTED STORM EVENTS OR OTHER UNFORESEEN CIRCUMSTANCES, AND TO ACCOUNT FOR CHANGING SITE CONDITIONS.
6. ANY AREAS OF DISTURBED SOIL THAT WILL NOT BE WORKED FOR TWO CONSECUTIVE DAYS DURING THE WET SEASON (OCT 1 TO APRIL 30) OR SEVEN DAYS DURING THE DRY SEASON (MAY 1 TO SEPT 30) SHALL BE IMMEDIATELY STABILIZED WITH APPROVED BMPs METHODS (E.G. STRAW, MULCH, PLASTIC COVERING, COLD MIX, ETC.)
7. GRADING AND/OR SOIL DISTURBING ACTIVITIES MAY BE LIMITED OR PROHIBITED FOR CERTAIN SITES SUBJECT TO ECA STANDARDS (I.E. ECA STEEP SLOPES, LANDSLIDE PRONE AREAS, ETC.) BETWEEN OCTOBER 31ST AND APRIL 1ST. IF NOTED IN THE GEOTECHNICAL SPECIAL INSPECTIONS REQUIREMENTS, A GRADING SEASON EXTENSION LETTER (GSEL) ISSUED BY SDCI IS REQUIRED FOR ALL GRADING AND/OR SOIL DISTURBING ACTIVITIES DURING THIS PERIOD. THE GEOTECHNICAL SPECIAL INSPECTOR MUST SUBMIT ELECTRONIC APPLICATIONS FOR A GSEL USING THE SDCI PROJECT PORTAL. ALLOW FOUR TO SIX WEEKS FOR PROCESSING. FAILURE TO OBTAIN THE GSEL PRIOR TO OCTOBER 31 MAY RESULT IN A WORK STOPPAGE.
8. CITY STREETS AND SIDEWALKS SHALL BE KEPT CLEAN AT ALL TIMES. NO MATERIAL SHALL BE STORED ON CITY STREETS OR SIDEWALKS WITHOUT A STREET USE PERMIT FROM THE SEATTLE DEPARTMENT OF TRANSPORTATION (SDOT).
9. POLLUTION CONTROL MEASURES SHALL BE FOLLOWED TO ENSURE THAT NO LIQUID PRODUCTS OR CONTAMINATED WATER ENTERS ANY STORM DRAINAGE FACILITIES OR OTHERWISE LEAVES THE PROJECT SITE. ANY HAZARDOUS MATERIALS OR LIQUID PRODUCTS THAT HAVE THE POTENTIAL TO POLLUTE RUNOFF SHALL BE STORED AND DISPOSED OF PROPERLY.
10. ENSURE THAT WASHOUT FROM CONCRETE TRUCKS IS PERFORMED OFF-SITE OR IN DESIGNATED CONCRETE WASHOUT AREAS ONLY. DO NOT WASH OUT CONCRETE TRUCKS ONTO THE GROUND, OR TO STORM DRAINS OR OPEN DITCHES. DO NOT DUMP EXCESS CONCRETE ONSITE, EXCEPT IN DESIGNATED CONCRETE WASHOUT AREAS.
11. ALL AREAS OF DISTURBED SOIL SHALL BE FULLY STABILIZED WITH THE APPROPRIATE SOIL AMENDMENT AND COVER MEASURES AT COMPLETION OF THE PROJECT. TYPICAL COVER MEASURES INCLUDE LANDSCAPING OR HYDROSEED WITH MULCH.

DEMOLITION NOTES

1. CONTRACTOR SHALL WALK THE SITE WITH THE OWNER AND OWNER'S REPRESENTATIVES PRIOR TO CONSTRUCTION TO VERIFY THE APPROXIMATE LIMIT OF WORK AND EXISTING FEATURES, UTILITIES, AND STRUCTURES TO REMAIN.
2. ALL EXISTING SURFACE IMPROVEMENTS AND UNDERGROUND UTILITIES AND ASSOCIATED UTILITY STRUCTURES WITHIN THE PROPERTY LINE SHALL BE DEMOLISHED UNLESS NOTED OTHERWISE.
3. ALL EXISTING SURFACE IMPROVEMENTS AND UNDERGROUND UTILITIES AND ASSOCIATED UTILITY STRUCTURES OUTSIDE THE PROPERTY LINE SHALL BE PROTECTED TO REMAIN UNLESS NOTED OTHERWISE.
4. IF AN UNKNOWN UTILITY SERVICE IS FOUND DURING CONSTRUCTION, NOTIFY THE OWNER AND PROTECT IN PLACE UNLESS DIRECTED OTHERWISE
5. UNDERGROUND PIPING AND STRUCTURES TO BE DEMOLISHED SHALL BE REMOVED COMPLETELY FROM THE GROUND UNLESS NOTED OTHERWISE.
6. ANY FEATURES INTENDED TO REMAIN THAT ARE DAMAGED DURING DEMOLITION OR CONSTRUCTION ACTIVITIES SHALL BE FULLY REPAIRED AT CONTRACTORS EXPENSE AS DIRECTED BY THE OWNER.
7. PRIOR TO DEMOLITION ACTIVITIES, VERIFY THE DEPTH OF EXISTING UTILITIES TO REMAIN WITHIN THE LIMIT OF WORK.
8. REFER TO ELECTRICAL FOR ELECTRICAL DEMOLITION SCOPE INCLUDING, BUT NOT LIMITED TO, LIGHT POLE REMOVAL, POWER AND COMM. DEMOLITION, ELECTRICAL VAULT DEMOLITION, AND DISCONNECT FROM POWER SOURCE.
9. REFER TO LANDSCAPE FOR TREE PROTECTION AND TREE REMOVAL.
10. EXISTING UTILITIES SHALL REMAIN IN SERVICE UNTIL SUCH TIME THAT THE REROUTE OR REPLACEMENT CONNECTIONS HAVE BEEN MADE. SHUTDOWNS FOR UTILITIES SERVING OTHER PARCELS WILL NOT BE ALLOWED (OTHER THAN ON A TEMPORARY BASIS FOR RE-ROUTE). UTILITY RE-ROUTES, WHEN REQUIRED, ARE TO BE FULLY IN PLACE PRIOR TO ANY SHUT DOWN.
11. PROVIDE CONSTRUCTION FENCING, SIGNAGE, AND BARRIERS AS REQUIRED TO PREVENT UNAUTHORIZED ACCESS TO DEMOLITION AREAS. FIELD ADJUST FENCE AS REQUIRED FOR SPECIFIC SITE CONDITIONS.
12. IMMEDIATELY REMOVE ALL DEMOLITION DEBRIS FALLING OUTSIDE THE APPROXIMATE LIMIT OF WORK SHOWN ON THE PLAN.
13. DISPOSE OF EXCESS DEMOLITION MATERIAL OFF-SITE IN A SAFE AND LEGAL MANNER.
14. MAKE VERTICAL SAWCUTS BETWEEN EXISTING PAVEMENT TO REMAIN AND THE PORTION TO BE REMOVED. PROTECT IN PLACE PAVEMENT OUTSIDE THE SAWCUT LINE.
15. HAZARDOUS MATERIAL ABATEMENT BY OTHERS, IF NECESSARY FOR BUILDING DEMOLITION.

DEMOLITION FLAG NOTES

(1) EXISTING STORM DRAIN. CUT AND CAP AT PROPERTY LINE UNDER SEPARATE PERMIT.

(2) EXISTING WATER SERVICE TO BE RETIRED. CUT AND CAP AT PROPERTY LINE UNDER SEPARATE PERMIT. SPU TO REMOVE METER AND CAP SERVICE AT MAIN (SEE SIP SUSIP0000078).

(3) EXISTING SIDE SEWER. CUT AND CAP AT PROPERTY LINE UNDER SEPARATE PERMIT.

(4) EXISTING GAS SERVICE TO BE RETIRED. CUT AND CAP AT PROPERTY LINE (SEE SIP SUSIP0000078).

SHORING AND EXCAVATION NOTES

1. THE SHORING AND EXCAVATION INFORMATION SHOWN ON THIS PLAN IS FOR REFERENCE ONLY AND SHALL NOT BE USED FOR BIDDING PURPOSES.
2. CONTRACTOR SHALL VERIFY BOTTOM OF FOOTING ELEVATIONS WITH THE STRUCTURAL ENGINEER PRIOR TO ANY EXCAVATION ACTIVITIES.
3. BOTTOM OF EXCAVATION ELEVATION SHOWN IS EQUAL TO TOP OF SLAB ELEVATION MINUS 2.0' TO ALLOW FOR MAT SLAB CONSTRUCTION. REFER TO STRUCTURAL AND ARCHITECTURAL FOR FOOTING LOCATION AND DEPTH WHICH MAY REQUIRE ADDITIONAL EXCAVATION.
4. ALL SHORING AND EXCAVATION SHALL BE PERFORMED PER THE RECOMMENDATIONS PROVIDED IN THE GEOTECHNICAL ENGINEERING REPORT DATED OCTOBER 12, 2020 PREPARED BY ASPECT CONSULTING.

CONTRACTOR IS ALERTED TO THE FACT THAT WORK WILL BE ACCOMPLISHED AROUND ACTIVE PSE GAS AND ENERGIZED SEATTLE CITY LIGHT (SCL) FACILITIES THAT ARE SERVING EXISTING CUSTOMERS. CONTRACTOR SHALL COORDINATE WITH PSE AND SCL TO DETERMINE WHICH FACILITIES ARE ACTIVE AND ENERGIZED AND SHALL IMPLEMENT SAFETY PROCEDURES PER PSE AND SCL REQUIREMENTS. CONTRACTOR SHALL COORDINATE WITH PSE AND SCL TO ENSURE THAT FACILITIES ARE IN PLACE TO MAINTAIN SERVICE TO CUSTOMERS THROUGHOUT CONSTRUCTION.

N

0 10 20 40

1 inch = 20 feet

RUNBERG ARCHITECTURE GROUP
One Yesler Way | Suite 200
Seattle, WA 98104
206.956.1970 Main
206.956.1971 Fax
www.runberg.com

kpff
1601 5th Avenue, Suite 1600
Seattle, WA 98101
206.622.5822
www.kpff.com

CONSULTANT'S STAMP:

THADDEUS J. EGGING
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
09/29/2021

GRAND STREET COMMONS WEST

1765 22ND AVE S, SEATTLE, WA 98144

SUBMITTALS

MUP SUBMITTAL	2020.04.24
100% SCHEMATIC DESIGN	2020.05.15
BUILDING PERMIT SUBMITTAL	2020.10.14
100% DESIGN DEVELOPMENT	2020.12.18
GMP	2021.04.30
95% CD	2021.10.01

REVISIONS

1	MUP CORRECTION 1	2020.09.25
2	MUP CORRECTION 2	2020.12.22
3	MUP CORRECTION 3	2021.04.13
4	BP CORRECTION 1	2021.04.19
5	BP CORRECTION 2	2021.07.19

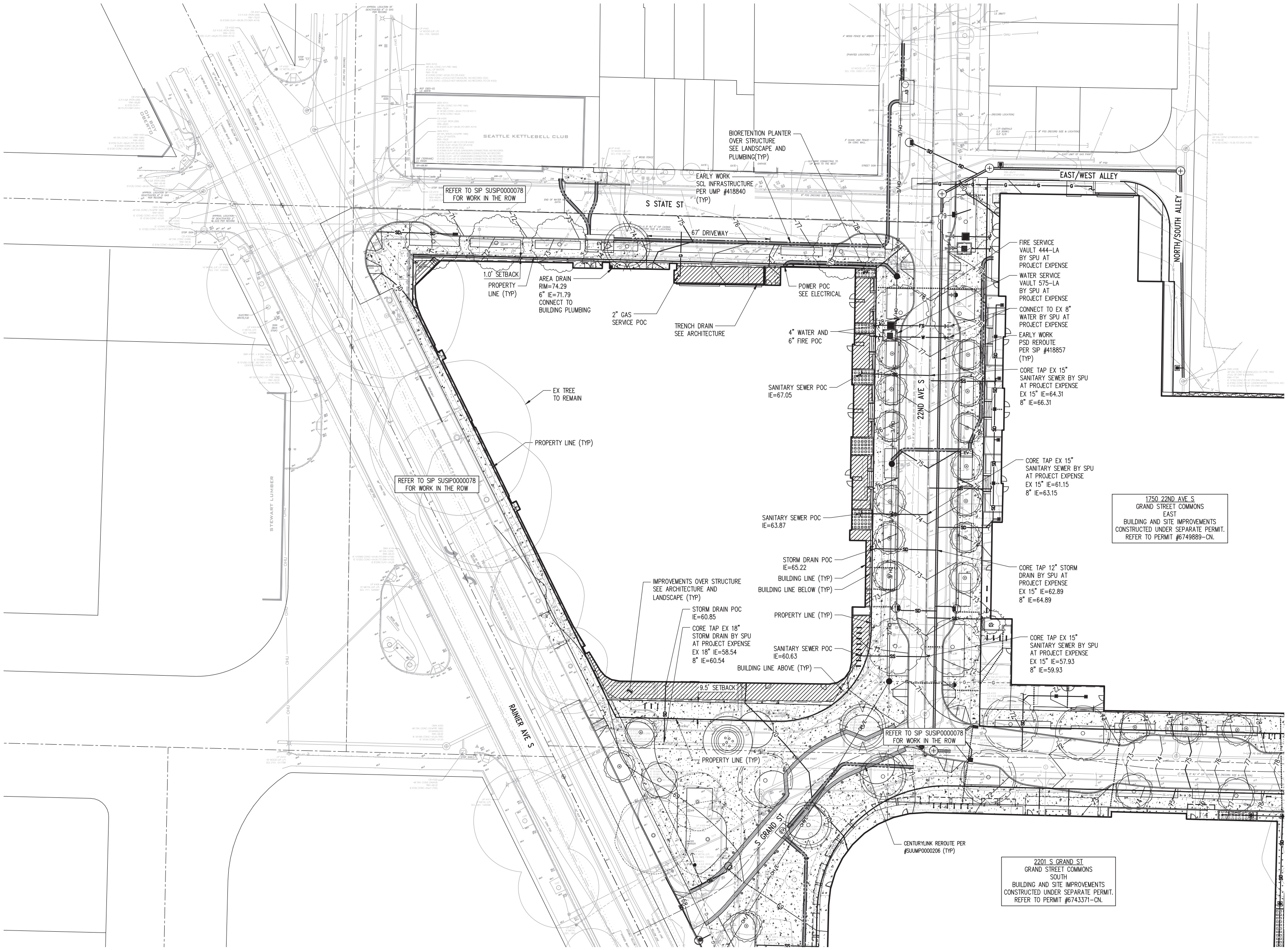
TESC & DEMOLITION PLAN

SDCI STAMP:

DATE: 2021/10/01
SCALE:
DRAWN: MDH, CMK
JOB #: 1900530
SDCI MUP #: 3035344-LU
SDCI BP #: 6750983-CN
--
--

WEST SHEET

C2.00

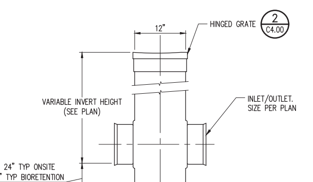


NOTES

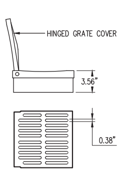
1. TRENCHING AND BEDDING FOR SANITARY SEWERS SHALL BE PER COS STD. PLANS 284 AND 285.
2. CONNECTIONS TO EXISTING WATER MAINS TO BE PERFORMED BY SEATTLE PUBLIC UTILITIES (SPU) AT PROJECT EXPENSE. THE NEW SERVICE LINE(S) WILL BE EXTENDED BY SPU TO THE UNION POINT APPROXIMATELY 2 FEET BEYOND THE METER. SPU WILL INCLUDE METER INSTALLATION. THE CONTRACTOR WILL BE RESPONSIBLE FOR INSTALLATION OF SERVICE LINES BEYOND THE UNION POINT AND SURFACE RESTORATION. CONTRACTOR TO COORDINATE WITH SPU.
3. ALL EXISTING UTILITY STRUCTURES TO REMAIN SHALL HAVE RIMS/LIDS ADJUSTED TO FINISH GRADE.
4. SEE STREET IMPROVEMENT PLANS (SUSIP0000078) FOR WORK IN THE RIGHT-OF-WAY.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING SIDE SEWER AND MINOR UTILITY PERMITS FROM THE CITY OF SEATTLE TO CONSTRUCT STORM DRAIN AND SEWER SERVICES.
6. FOUNDATION DRAINAGE CONSISTS OF DRAINAGE BOARD CONNECTED DIRECTLY TO THE GROUNDWATER TABLE. SEE BUILDING ENVELOPE AND ARCHITECTURE.
7. CAPILLARY BREAK REQUIRED BELOW BUILDING SLAB PER PROJECT SPECIFICATIONS AND BUILDING ENVELOPE.
8. SEE PLUMBING FOR BUILDING WATER, FIRE, STORM DRAIN, AND SANITARY SEWER SERVICE CONTINUATIONS.

LEGEND

- PROPERTY LINE
- BUILDING WALL
- BUILDING ABOVE
- BUILDING BELOW
- STORM DRAIN <12"
- STORM DRAIN >12"
- SEWER
- POWER
- DOMESTIC WATER
- FIRE SERVICE
- GAS SERVICE
- TYPE 241 CB
- TYPE 204B SDMH
- AREA DRAIN (1 / C4.00)
- WATER METER
- FIRE DCVA
- STREET LIGHT
- ELECTRICAL VAULT (SIZE PER SCL)
- BIORETENTION OVER STRUCTURE SEE LANDSCAPE AND PLUMBING
- IMPROVEMENTS OVER STRUCTURE SEE ARCHITECTURE AND LANDSCAPE



AREA DRAIN (1 / C4.00)
NTS



NOTES:

MATERIAL: CAST IRON

QUALITY: MATERIAL SHALL CONFORM TO ASTM A48 - CLASS 30B

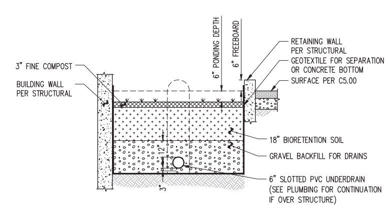
PAINT: BLACK PAINT

GRATE TO BE EMBOSSED WITH "NO DUMPING, DRAINS TO RIVER"

GRATE SHALL BE MANUFACTURED TO FIT AREA DRAIN

OPEN GRATE AREA = 50.60 SQ. INCH MIN

FLUSH GRATE (2 / C4.00)
NTS



TYPICAL BIORETENTION SECTION (3 / C4.00)
NTS

N

1 inch = 20 feet

RUNBERG ARCHITECTURE GROUP
One Yesler Way | Suite 200
Seattle, WA 98104
206.956.1970 Main
206.956.1971 Fax
www.runberg.com

kpff
1601 5th Avenue, Suite 1600
Seattle, WA 98101
206.622.5822
www.kpff.com

CONSULTANTS STAMP:
09/29/2021

GRAND STREET COMMONS WEST
1765 22ND AVE S, SEATTLE, WA 98144

SUBMITTALS

MUP SUBMITTAL	2020.04.24
100% SCHEMATIC DESIGN	2020.05.15
BUILDING PERMIT SUBMITTAL	2020.10.14
100% DESIGN DEVELOPMENT	2020.12.18
GMP	2021.04.30
95% CD	2021.10.01

REVISIONS

1	MUP CORRECTION 1	2020.09.25
2	MUP CORRECTION 2	2020.12.22
3	MUP CORRECTION 3	2021.04.13
4	BP CORRECTION 1	2021.04.19
5	BP CORRECTION 2	2021.07.19

STORM DRAIN & UTILITY PLAN

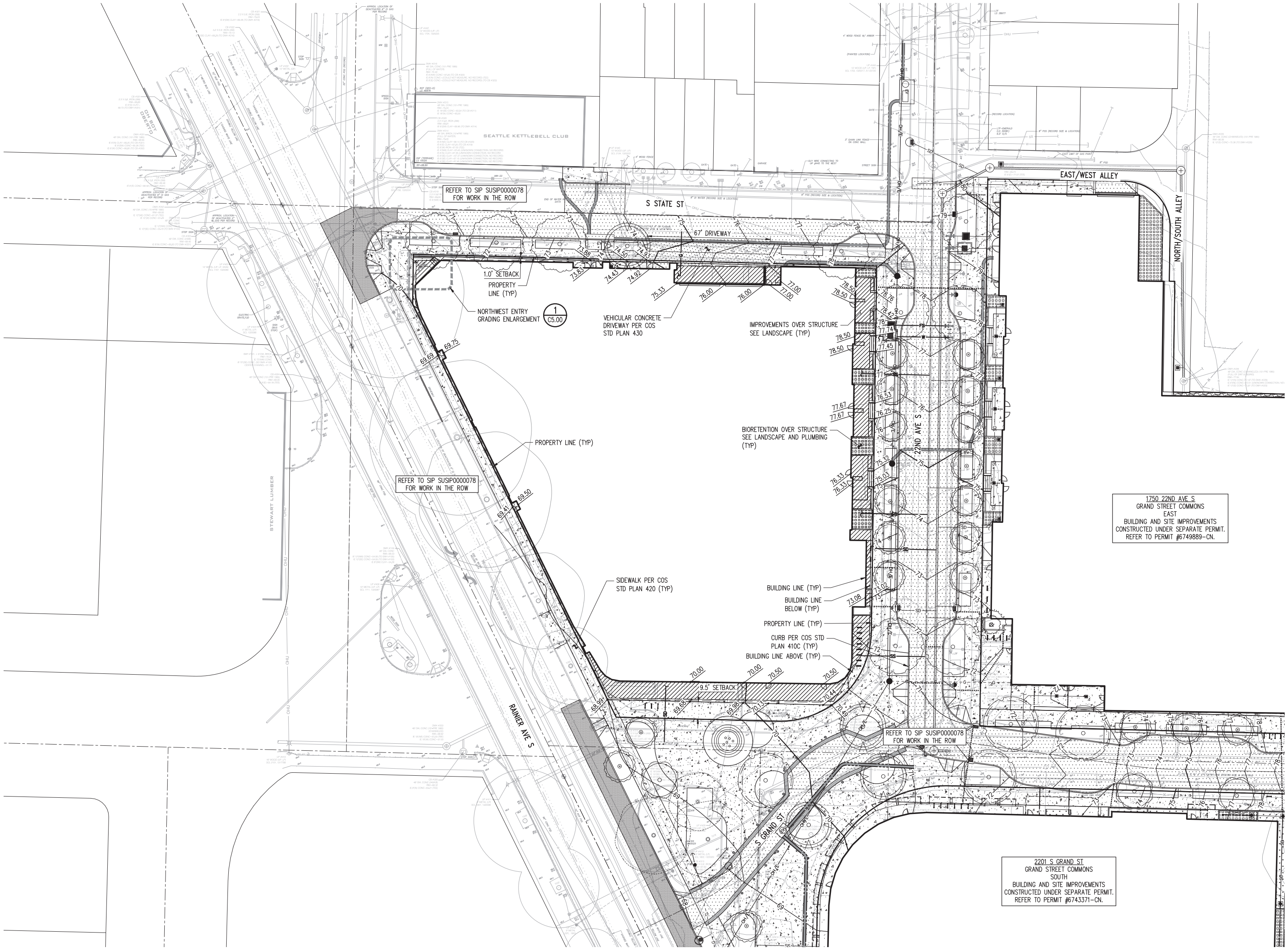
SDCI STAMP:

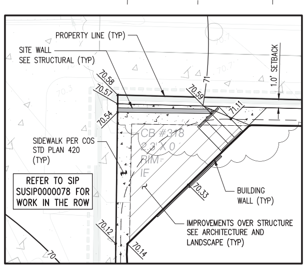
DATE: 2021/10/01
SCALE:
DRAWN: MDH, CMK
JOB # : 1900530
SDCI MUP #: 3035344-LU
SDCI BP #: 6750983-CN
--
--

WEST SHEET
C4.00

NOTES

1. REFER TO LANDSCAPE FOR SITE FURNISHINGS, PLANTING DESIGN, AND SIDEWALK LAYOUT.
2. SEE STREET IMPROVEMENT PLANS (SUSIP0000078) FOR WORK IN THE RIGHT-OF-WAY.
3. ALL STATIONS, OFFSETS, AND DIMENSIONS ARE GIVEN TO BOTTOM FACE OF CURB, BOTTOM OUTSIDE FACE OF WALL, EDGE OF PAVEMENT, OR CENTER OF STRIPING UNLESS NOTED OTHERWISE.





NORTHWEST ENTRY GRADING ENLARGEMENT
NTS
1 C5.00

0 10 20 40
1 inch = 20 feet

LEGEND

	PROPERTY LINE
	BUILDING WALL
	BUILDING ABOVE
	BUILDING BELOW
78	MINOR CONTOUR
80	MAJOR CONTOUR
	TYPE 410C CURB
	SIDEWALK PER COS STD PLAN 420
	BIORETENTION OVER STRUCTURE SEE LANDSCAPE AND PLUMBING
	IMPROVEMENTS OVER STRUCTURE SEE ARCHITECTURE AND LANDSCAPE
	PLANTING (SEE LANDSCAPE)

RUNBERG ARCHITECTURE GROUP
One Yesler Way | Suite 200
Seattle, WA 98104
206.956.1970 Main
206.956.1971 Fax
www.runberg.com

kpff
1601 5th Avenue, Suite 1600
Seattle, WA 98101
206.622.5822
www.kpff.com

CONSULTANTS STAMP:
09/29/2021

GRAND STREET COMMONS WEST
1765 22ND AVE S, SEATTLE, WA 98144

SUBMITTALS

MUP SUBMITTAL	2020.04.24
100% SCHEMATIC DESIGN	2020.05.15
BUILDING PERMIT SUBMITTAL	2020.10.14
100% DESIGN DEVELOPMENT	2020.12.18
GMP	2021.06.30
90% CD	2021.10.01

REVISIONS

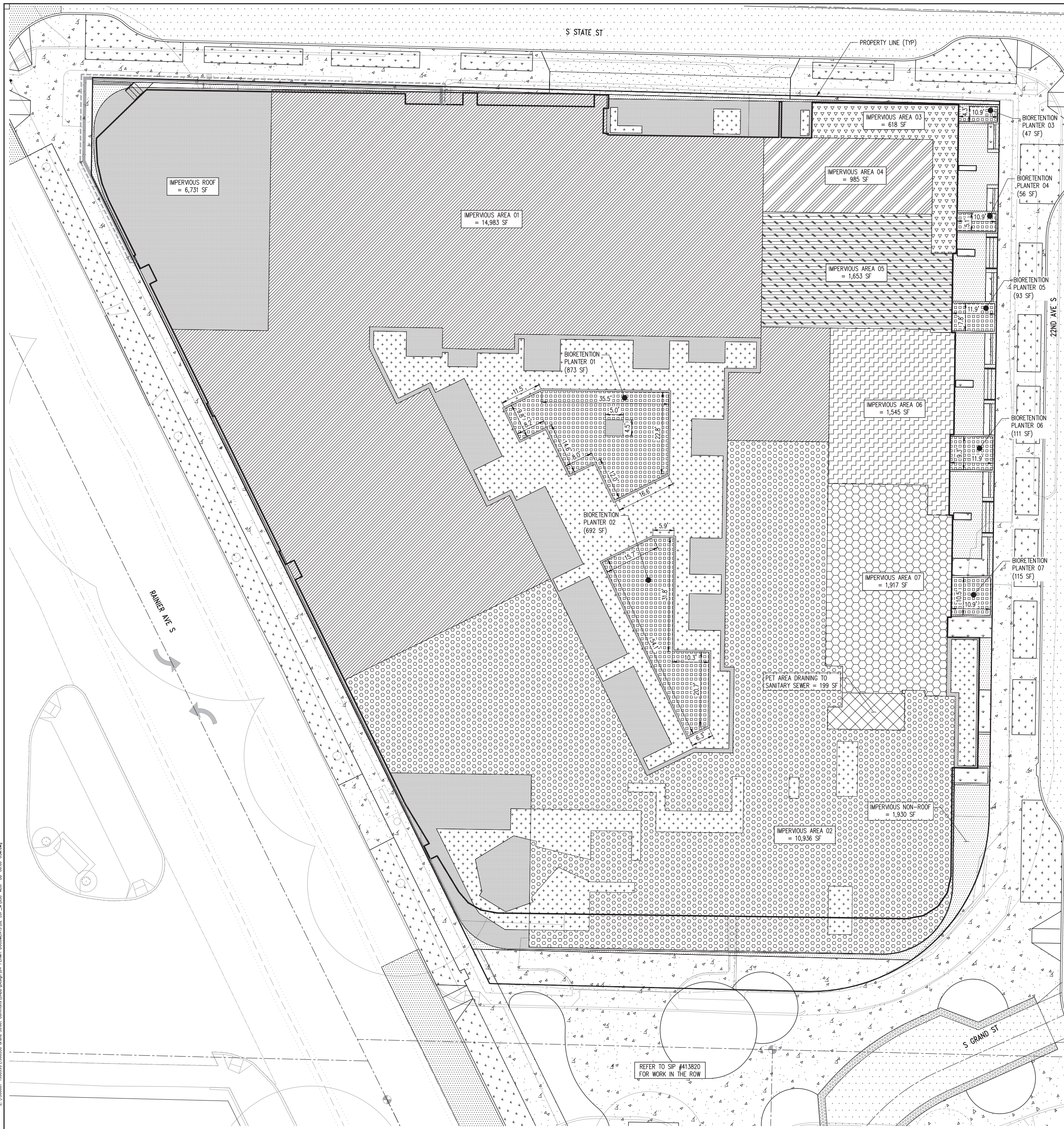
1	MUP CORRECTION 1	2020.09.25
2	MUP CORRECTION 2	2020.12.22
3	MUP CORRECTION 3	2021.04.13
4	BP CORRECTION 1	2021.04.19
5	BP CORRECTION 2	2021.07.19

GRADING & PAVING PLAN

SDCI STAMP:

DATE: 2021/10/01
SCALE:
DRAWN: MDH, CMK
JOB #: 1900330
SDCI MUP #: 3035344-LU
SDCI BP #: 6750963-CN

WEST SHEET
C5.00



On-site Stormwater Management - List Approach Calculator
Site and Drainage Control Summary

Version 07-28-2017

To use the On-Site List Calculator you must select "Enable Content" when the Security Warning appears.

Project Information

Site Address	1765 22nd Ave S	SDCI Project Number	6750983-CN
Primary Contact	Michael Herseth	SDOT Project Number	413820
Project Type	Parcel-Based	Primary Contact E-mail or Phone	michael.herseth@kpff.com

Total Site Area	48,712	sf
Total New plus Replaced Hard Surface Area	46,391	sf
Existing Hard Surface Area to Remain	0	sf
Total New and/or Replaced Lawn and Landscaping	2,321	sf
Undisturbed and protected site area	0	sf
Was the project lot created or reduced in size after Jan 1, 2016?	No	

Project Engineer: Michael Herseth — Engineer E-mail: michael.herseth@kpff.com

On-site Stormwater Management required for ≥ 1,500 sf of new plus replaced area.

On-site Performance Standard will be used (professional engineer required)? No

Site Information

Note: If required for your project, reference the Preliminary Assessment Report (PAR) to complete this section. If the total areas proposed are different form those provided in the PAR, requirements may change.

- Approved Point of Stormwater Discharge: Public Storm Drain Main
  - Drainage Basin: Designated Receiving Water
  - Is the downstream drainage system considered Capacity Constrained by SPU? No
- Approved Point of Wastewater Discharge: Public Sanitary Sewer Main
- Approved Point of Sub-Surface Discharge: Public Storm Drain Main
- Flow Control is required: No
  - Flow Control Standard
- Water Treatment for pollution-generating surfaces is required: No
  - Select required treatment: ☐ Oil Control ☐ Phosphorus ☐ Enhanced ☐ Basic
  - Total Pollution Generating Hard Surface Area ___ sf
  - Total Pollution Generating Pervious Surface Area ___ sf
- Source Control is required: No
- Environmentally Critical Areas: No
  - ☐ Steep Slope ☐ Potential Slide ☐ Riparian Corridor ☐ Wetland ☐ Liquefaction ☐ Flood Prone
  - ☐ Landfill ☐ Known Landslide ☐ Fish / Wildlife ☐ Peat / Groundwater Management ☐ Shoreline Habitat
- Temporary dewatering required: No — Permanent dewatering required
- Is there known soil and/or groundwater contamination on this site? Yes
- A licensed professional recommends dispersion not be used anywhere within the project site due to reasonable concerns of erosion, slope failure, or flooding. No

Infiltration Information

- Is infiltration investigation required? Yes — Type of test: Simple infiltration test
  - Is infiltration on the site feasible? No — Why? Site cannct meet required horizontal setbacks
  - Site Measured Infiltration Rate ___ x Infiltration Rate Correction Factor 0.5 = 0 Site Design Inf Rate

On-site Stormwater Management

- Number of roof areas: 10
- Number of other surface areas: 1

Surface	Surfaces Description	On-site BMP	Contrib. Area (sf)	Facility Size (sf)	Facility Configuration
1	Roof:Bioretention 01	Non-Infiltrating Bioretention #1	14,983	839 sf	Vertical sides 6 inch
2	Roof:Bioretention 02	Non-Infiltrating Bioretention #2	10,936	612 sf	Vertical sides 6 inch
3	Roof:Bioretention 03	Non-Infiltrating Bioretention #3	618	35 sf	Vertical sides 6 inch
4	Roof:Bioretention 04	Non-Infiltrating Bioretention #4	985	55 sf	Vertical sides 6 inch
5	Roof:Bioretention 05	Non-Infiltrating Bioretention #5	1,653	93 sf	Vertical sides 6 inch
6	Roof:Bioretention 06	Non-Infiltrating Bioretention #6	1,545	87 sf	Vertical sides 6 inch
7	Roof:Bioretention 07	Non-Infiltrating Bioretention #7	1,917	107 sf	Vertical sides 6 inch
8	Roof:Vegetated Roof	Vegetated Roof System	4,894	4,894 sf	4 inch Single-Course
9	Roof:Pet Area	None Feasible	199	-	
10	Roof:Impervious Roof	None Feasible	6,731	-	
11	Surface:Impervious Non-	None Feasible	1,930	-	

Total New/Replaced Roof Area	44,461	Total Roof Area Managed	44,461
Total New/Replaced Other Surface Area	1,930	Total Other Surface Managed	1,930
Total Area Managed	46,391	Total Volume Managed On Site	271,060 gal
Estimated compost required for soil amendment	14.3902 cy	*Volume of compost required for soil amendment will be verified by the DPD Site Inspector for SDCI permitted projects.*	

OSM – LANDSCAPING
LANDSCAPING (334 SF)
TOTAL AREA = 334 SF

OSM – BIORETENTION 01
IMPERVIOUS AREA (14,983 SF)
BIORETENTION PLANTER 01 (873 SF)
TOTAL AREA = 15,856 SF

OSM – BIORETENTION 02
IMPERVIOUS AREA (10,936 SF)
BIORETENTION PLANTER 02 (692 SF)
TOTAL AREA = 11,628 SF

OSM – BIORETENTION 03
IMPERVIOUS AREA (618 SF)
BIORETENTION PLANTER 03 (47 SF)
TOTAL AREA = 665 SF

OSM – BIORETENTION 04
IMPERVIOUS AREA (985 SF)
BIORETENTION PLANTER 04 (56 SF)
TOTAL AREA = 1,041 SF

OSM – BIORETENTION 05
IMPERVIOUS AREA (1,653 SF)
BIORETENTION PLANTER 05 (93 SF)
TOTAL AREA = 1,746 SF

OSM – BIORETENTION 06
IMPERVIOUS AREA (1,545 SF)
BIORETENTION PLANTER 06 (111 SF)
TOTAL AREA = 1,656 SF

OSM – BIORETENTION 07
IMPERVIOUS AREA (1,917 SF)
BIORETENTION PLANTER 07 (115 SF)
TOTAL AREA = 2,032 SF

OSM – VEGETATED ROOF
VEGETATED ROOF (4,894 SF)
TOTAL AREA = 4,894 SF

OSM – PET AREA
PET AREA DRAINING TO SANITARY SEWER (199 SF)
TOTAL AREA = 199 SF

OSM – IMPERVIOUS ROOF
IMPERVIOUS ROOF (6,731 SF)
TOTAL AREA = 6,731 SF

OSM – IMPERVIOUS NON-ROOF
IMPERVIOUS NON-ROOF (1,930 SF)
TOTAL AREA = 1,930 SF

THIS SHEET IS INCLUDED FOR USE BY THE CITY OF SEATTLE TO VERIFY COMPLIANCE WITH PERMIT REQUIREMENTS

0 5 10 20
1 inch = 10 feet

N

RUNBERG ARCHITECTURE GROUP
One Yesler Way | Suite 200
Seattle, WA 98104
206.956.1970 Main
206.956.1971 Fax
www.runberg.com

kpff
1601 5th Avenue, Suite 1600
Seattle, WA 98101
206.622.5822
www.kpff.com

CONSULTANTS STAMP:

09/29/2021

GRAND STREET COMMONS WEST
1765 22ND AVE S, SEATTLE, WA 98144

SUBMITTALS

MUP SUBMITTAL	2020.04.24
100% SCHEMATIC DESIGN	2020.05.15
BUILDING PERMIT SUBMITTAL	2020.10.14
100% DESIGN DEVELOPMENT	2020.12.18
GMP	2021.04.30
95% CD	2021.10.01

REVISIONS

1	MUP CORRECTION 1	2020.09.25
2	MUP CORRECTION 2	2020.12.22
3	MUP CORRECTION 3	2021.04.13
4	BP CORRECTION 1	2021.04.19
5	BP CORRECTION 2	2021.07.19

ON-SITE STORMWATER MANAGEMENT PLAN

SDCI STAMP:

DATE: 2021/10/01
SCALE:
DRAWN: MDH, CMK
JOB # : 1900530
SDCI MUP #: 3035344-LU
SDCI BP #: 6750983-CN
--
--

WEST SHEET
C6.00

APPENDIX J

Geotechnical Reports

GEOTECHNICAL ENGINEERING REPORT
GRAND STREET COMMONS WEST

South Grand Street and 22nd Avenue South
Seattle, Washington

Prepared for: Grand Street Commons, LLC

Project No. 170304 • October 12, 2020 • FINAL

Aspect CONSULTING

e a r t h + w a t e r

GEOTECHNICAL ENGINEERING REPORT
GRAND STREET COMMONS WEST

South Grand Street and 22nd Avenue South
Seattle, Washington

Prepared for: Grand Street Commons, LLC

Project No. 170304 • October 12, 2020 • FINAL

Aspect Consulting, LLC

ERIC SCHELLENGER
STATE OF WASHINGTON
56315
REGISTERED
PROFESSIONAL ENGINEER
10/12/2020

Eric Schellenger, PE
Geotechnical Engineer
eschellenger@aspectconsulting.com

Erik O. Andersen
Principal Geotechnical Engineer
eandersen@aspectconsulting.com

V:\170304 Mt Baker Housing and Lake Union Partners – Belshaw Site - Rainier Ave S\Deliverables\Geotech Eng Rpt\Final Geotechnical Engineering Reports\West Block\Geotech Eng Report_Grand Street Commons_West.doc

Contents

1 Introduction ... 1

1.1 Project Description ... 1

2 Site Conditions ... 2

2.1 Surface Conditions ... 2

2.2 Subsurface Conditions ... 2

2.2.1 Geology ... 2

2.2.2 Stratigraphy ... 3

2.2.3 Groundwater ... 3

3 Geotechnical Engineering Conclusions and Recommendations ... 4

3.1 Earthquake Engineering ... 4

3.1.1 Ground Response ... 4

3.1.2 Liquefaction Susceptibility ... 5

3.2 Temporary Shoring ... 5

3.2.1 Soldier Piles and Tieback Anchor Walls ... 6

3.2.2 Soil Nails and Shotcrete Walls ... 7

3.2.3 Shoring Design Considerations ... 9

3.3 Groundwater Inflow ... 9

3.4 Building Foundations ... 9

3.4.1 Allowable Bearing Pressure ... 9

3.4.2 Settlement ... 10

3.4.3 Lateral Resistance ... 10

3.5 Permanent Below-Grade Walls ... 10

3.5.1 Walls Constructed Against Temporary Shoring ... 10

3.5.2 Backfilled Walls ... 10

3.5.3 Seismic Lateral Earth Pressures ... 10

3.5.4 Surcharge Loads ... 10

3.5.5 Lateral Resistance ... 11

3.6 Subsurface Drainage ... 11

3.6.1 Walls Constructed Against Temporary Shoring ... 11

3.6.2 Other Drainage Recommendations ... 11

4 Earthwork Considerations and Recommendations ... 12

4.1 Temporary Shoring Construction ... 12

4.1.1 Soldier Pile and Tieback Anchor Walls ... 12

4.1.2 Soil Nail and Shotcrete Walls ... 13

4.1.3 Ground Anchor Testing 14
4.1.4 Shoring Wall Performance and Monitoring 14
4.2 Temporary Excavation Slopes 14
4.3 Subgrade Preparation 15
4.3.1 Foundations 15
4.3.2 Pavements 15
4.4 Structural Fill 15
4.4.1 Utility Bedding and Backfill 16
4.5 Temporary Erosion and Sedimentation Control 17
4.6 Wet Weather Construction 17
5 References 18
6 Limitations 19

List of Tables

1 Seismic Design Parameters 5

2 Allowable Pullout Resistance for Design of Tieback Anchors 7

3 Soil Nail Design Parameters 8

List of Figures

1 Vicinity Map

2 Aspect Explorations Map

3 Temporary Shoring Design Sections

4 Earth Pressure Diagrams for Temporary Soldier Pile and Tieback Shoring Walls

5 Recommended Surcharge Pressures

6 Lateral Earth Pressures for Permanent Walls

List of Appendices

A Subsurface Explorations

B Groundwater Levels Measured in Monitoring Wells

C Results of Geotechnical Laboratory Testing

D Ground Anchor Load Testing and Shoring Monitoring Program

E Report Limitations and Guidelines for Use

1 Introduction

This report presents the results of a geotechnical engineering study completed by Aspect Consulting, LLC (Aspect) for the Grand Street Commons Project (GSC; Project) West Block redevelopment (GSC West) located at S Grand St. and 22nd Ave. S in Seattle, Washington (Site; Figure 1).

GSC West is part of the Grand Street Commons Project, which consists of the redevelopment of 16 parcels within three adjacent blocks (designated the West, East, and South Blocks) with three new mixed-use buildings (one on each block). This report presents the geotechnical data collected to date and our geotechnical engineering conclusions and recommendations for design and construction of GSC West. Aspect is currently preparing geotechnical engineering reports for the East Block redevelopment (GSC East) and the South Block redevelopment (GSC South) under separate covers.

1.1 Project Description

GSC West consists of the redevelopment of nine contiguous parcels with a new seven story mixed-use building. The parcels occupy approximately 1.2 acres within a city block located northwest of the intersection of S Grand St. and 22nd Ave. S. The planned seven-story building at GSC West will have two levels of below-grade parking. The mass excavation for the below-grade portion of the building will also remediate historic soil and groundwater contamination at the Site and will extend approximately 10 feet deeper than the finished floor for the P2 level in the northwest corner of the building. The portions of the building that extend below groundwater will be waterproofed, and the P2 floor will be a mat foundation to resist upward buoyancy forces.

The GSC Project has an environmental cleanup component that is being performed under Prospective Purchaser Consent Decrees (PPCD Nos. 18-2-14708-5 SEA and 18-2-147414-0). A PPCD is a legal agreement between the applicant and the Washington State Department of Ecology (Ecology) and the Attorney General’s office, whereby all environmental activities associated with the project are formally overseen by Ecology. The GSC project is identified in Ecology's Cleanup Sites database as Facility Site ID #97763114 and Cleanup Site ID #3018. As required by the PPCDs, a Remedial Investigation and Feasibility Study (RI/FS) report and a Cleanup Action Plan (CAP) will be prepared and submitted to Ecology by October 2020.

Also, a Contaminated Media Management Plan (CMMP) will be prepared, prior to the construction in 2021. The CMMP will be available via public records after Ecology’s approval like the RI/FS and CAP documents.

2 Site Conditions

2.1 Surface Conditions

The West Block is bordered by South State Street to the north, South Grand Street to the south, 22nd Avenue South to the east, and Rainier Avenue South to the west. An autobody shop at 1752 Rainier Avenue South (Seattle Collision Center) currently occupies the northwest corner of the block and will be demolished for the Project. The auto body shop is a single-story masonry structure originally constructed in 1947 (King County, 2019). A remnant floor slab from a previous structure and small paved asphalt area are present at the southwest corner of the block. With exception to the features described above, the ground surface across the block is generally covered with gravel and slopes gently from about Elevation 77[1] at the northeast corner to about Elevation 70 at the southwest corner based on the most topographic survey at the Site (Goldsmith, 2020).

2.2 Subsurface Conditions

Our understanding of the Site subsurface conditions is based on our review of geologic maps and the results of our environmental and geotechnical explorations between August 2017 and September 2020. Our explorations included direct push probes, dual environmental/geotechnical borings (some of which were completed as monitoring wells), and cone penetrometer test (CPT) soundings advanced at the locations shown on Figure 2. A description of the exploration methods is provided in Appendix A.

2.2.1 Geology

The *Geologic Map of Seattle – a Progress Report* (Troost et al., 2005) maps the Site as underlain by Vashon recessional lacustrine deposits (Qvrl). These are described as laminated silt and clay, low to high plasticity, with local sand layers, peat, and other organic sediments deposited in stagnant water behind the receding glacier during the most recent glaciation of Puget Sound between 15,000 and 20,000 years ago. Nearby, Vashon recessional outwash (Qvr), Vashon ice-contact deposits (Qvi), Vashon advance outwash (Qva), and Vashon till (Qvt) are also mapped.

Stratigraphically, the Vashon recessional lacustrine and ice contact units overlie the till and advance outwash units. The recessional lacustrine deposits were not glacially overridden and are unconsolidated deposits typically in a medium dense/medium stiff state. The ice-contact unit may or may not have been glacially overridden and can vary from a loose to dense state. The Vashon till and advance outwash units were glacially overridden/glacially consolidated and are typically in a dense to very dense/hard state.

[1] All elevations presented are in feet and reference the North American Vertical Datum of 1988 (NAVD88).

2.2.2 *Stratigraphy*

Based on the results of our subsurface explorations, we grouped the Site soils into three units: fill, glacial recessional deposits, and glacially consolidated soil. Our explorations reveal that the Site is located within a former topographically low area during the most recent glaciation that was filled in with glacial recessional deposits as the glacier receded. The infilled glacial recessional deposits overly glacially consolidated soil. Fill from previous site grading and development is also present at the ground surface.

The composition and distribution of these units observed in our explorations are described below, ordered from shallowest to deepest. The logs of the explorations and the CPT soundings data report are presented in Appendix A.

Fill

We observed up to about 4 feet of fill at the ground surface in our explorations. The fill typically consists of loose, moist, gray/brown, gravel (GP) and silty sand (SM).

Glacial Recessional Deposits

Below the fill, we observed glacial recessional deposits that extended to a maximum depth of about 20 feet below the ground surface (bgs). Our explorations reveal these deposits vary from less than 5 feet thick along portions of the northern and southern property lines, to about 15 feet thick in the northwest corner of the Site. In two borings (such as AC-MW-20 and AC-SB-05, both in the middle of the Site) we did not observe this soil unit.

The glacial recessional deposits typically consist of medium stiff to stiff, moist, brown to gray-brown, silt (ML) and clay (CL) with varying amounts of sand, and loose to medium dense, moist to very moist, silty sand (SM).

Glacially Consolidated Soil

We observed glacially consolidated soil below the fill or glacial recessional deposits. The glacially consolidated soil typically consists of dense to very dense/hard, moist to very moist, gray, silty sand (SM) and sandy silt (ML). The top of glacially consolidated soil varies from Elevation 70 to 51 across the Site.

2.2.3 *Groundwater*

Groundwater levels measured in the monitoring wells at the Site are presented in Appendix B. Groundwater levels measured in 36 monitoring wells in November 2019 revealed the average groundwater elevation at the Site was 54.3 feet, with the high measured at 58.5 feet and the low measured at 46.4 feet. Groundwater levels measured in 40 wells in March 2020 after a period of heavy, extended precipitation revealed the average groundwater elevation at the Site was 56.4 feet, with the high measured at 60.2 feet and the low at 54.3 feet.

Based on the groundwater measurements, we recommend a design groundwater Elevation of 58 feet at the Site for calculating buoyant and hydrostatic forces on the building for design.

3 Geotechnical Engineering Conclusions and Recommendations

A summary of key Project geotechnical conclusions and recommendations are listed below and described in more detail in the following sections.

- The excavation for the two levels of below-grade parking will expose dense glacially consolidated soil that are suitable for foundation support. The remedial excavation in the northwest corner of the Site will extend even further into the glacially consolidated soil and will be backfilled with high shear-strength structural fill. The building may be supported on a mat foundation bearing on the glacially consolidated soil and remedial excavation backfill.
- Temporary shoring will be necessary to support the below-grade excavation. Soldier piles with tieback anchors, and soil nails with vertical elements and shotcrete fascia are two suitable types of temporary shoring at this Site. We understand soldier piles and tieback anchors will be used to support the west excavation wall (due to the presence of a deep utility below Rainier Avenue S), and soil nails, limited vertical elements, and shotcrete will be used to support the north, south, and east excavation walls.
- The below-grade excavation will encounter shallow groundwater seepage that can be managed with sumps and pumps. Contaminated soil and groundwater derived from the excavation will need to comply with environmental management protocols in accordance with a future Contaminated Media Management Plan (CMMP) that will be prepared and submitted to Ecology, prior to construction.
- Permanent subsurface drainage is not planned. The building will need to be waterproof and designed to resist buoyancy and hydrostatic forces acting on the building below Elevation 58 feet (design groundwater elevation).

3.1 Earthquake Engineering

The Site is located within a region of active tectonic forces associated with the interaction of the offshore Juan de Fuca Plate, the Pacific Plate, and the onshore North American Plate. Seismic hazards include strong ground shaking from earthquakes associated with the Seattle Fault Zone (SFZ), the Cascadia Subduction Zone (CSZ), and deep intraslab earthquakes. The Site will experience strong ground shaking during earthquakes that the building will be designed to withstand in accordance with the applicable building codes.

3.1.1 Ground Response

Seismic design for the building will be in accordance with the 2015 Seattle Building Code (SBC) which references the 2015 International Building Code (IBC; ICC, 2015) and the American Society of Civil Engineers (ASCE) Standard ASCE/SEI 7-10, *Minimum Design Loads for Buildings and Other Structures* (ASCE, 2010). In accordance with these codes, seismic design for the building will consider a "Maximum lConsidered Earthquake" (MCE) ground motion with a 2 percent probability of exceedance in 50 years, or a return period of 2,475 years.

The effects of Site-specific subsurface conditions on the earthquake ground motion at the ground surface are determined based on the "Site Class." The Site Class is correlated to the average standard penetration resistance (N-value) or average shear wave velocity in the upper 100 feet of the soil profile. Based on the subsurface explorations completed at the Site, the soil profile below the building would classify as Site Class D (Stiff Soil Profile). The seismic design parameters in accordance with these codes, and adjusted for Site Class D, are presented in Table 1.

Table 1. Seismic Design Parameters

Parameter	Recommended Value
Site Class	D– "Stiff Soil"
Short Period Spectral Acceleration, S_s (g)	1.402
1-Second Period Spectral Acceleration, S_1 (g)	0.541
Site Coefficient (F_a)	1.0
Site Coefficient (F_v)	1.5
Design Short Period Spectral Acceleration, S_{DS} (g)	0.935
Design 1-Second Period Spectral Acceleration, S_{D1} (g)	0.541

Note: Parameters based on the latitude and longitude of the Site: 47.58691°N, 122.30422°W

3.1.2 Liquefaction Susceptibility

Liquefaction occurs when loose, saturated, and relatively cohesionless soil deposits temporarily lose strength and stiffness as a result of earthquake ground shaking. Potential effects of soil liquefaction at the Site include temporary loss of shallow foundation bearing capacity and vertical ground settlement. Primary factors controlling the triggering of liquefaction include intensity and duration of strong ground motion, characteristics of subsurface soils, *in situ* stress conditions, and the depth to groundwater.

The mass excavation for the planned two levels of below-grade parking will expose dense, glacially consolidated soil from property line to property line across the entire Site. Our explorations reveal the soils below groundwater are glacially consolidated and therefore non-liquefiable. Therefore, we conclude that liquefaction is not a design consideration at the Site.

3.2 Temporary Shoring

The finished floor for the P2 level is planned at Elevation 51 feet and will extend from property line to property line across the entire block. The remedial excavation in the northwest corner of the Site will extend even deeper to Elevation 40. Based on existing grades along the property lines, the below-grade excavation will extend between 20 and 30 feet deep along the building perimeter, and temporary shoring will be necessary.

In our opinion, the subsurface conditions at the Site are appropriate for a soil nail and shotcrete shoring wall system. However, we understand that soldier piles and tieback anchors will be used to shore the western excavation wall due to the presence of a deep utility below adjacent Rainier Avenue S. Soil nails and shotcrete will be used to support the north, south, and east excavation walls. The extents of these shoring systems and soil stratigraphy for design are shown in Figure 3.

A description of these shoring systems is provided below, followed by our recommendations for design. Construction and testing recommendations for these systems are presented in Section 4 of this report.

3.2.1 Soldier Piles and Tieback Anchor Walls

Soldier piles consist of steel beams (W or HP sections) placed into concrete-filled drilled shafts. The soldier piles are typically installed at a horizontal spacing of about 6 to 8 feet along the perimeter of the excavation and extend below the base of the excavation by at least 10 feet. As the excavation is advanced, timber lagging is installed between the beams to retain the soil between the soldier piles.

When excavation depths require additional lateral support, ground anchors (tieback anchors) are used. Tieback anchors consist of steel tendons that are installed in drilled boreholes behind the shoring wall, then grouted into place. Tieback anchors are typically installed in horizontal rows with horizontal spacing to match the soldier piles, vertical spacings of 8 to 10 feet, and at a slight declination from horizontal (typically 10 to 20 degrees). The tiebacks are structurally connected to the soldier piles and prestressed to a specified load to reduce deflection of the shoring wall. Once the interior bracing and horizontal diaphragm elements of the new building are in place, the tieback anchors are destressed. It is conventional practice to leave destressed tieback anchors in the ground.

3.2.1.1 Lateral Earth Pressures

Soldier pile walls with one or more rows of tieback anchors should be designed using the apparent earth pressures presented in Figure 4. The lateral earth pressures assume level ground conditions exist behind the walls and the walls are free draining through gaps in the timber lagging and build-up of unbalanced hydrostatic pressures behind the walls do not occur. Additional lateral earth pressures from surcharge loads should be calculated using the methods shown on Figure 5.

3.2.1.2 Soldier Pile Design

We recommend the following for soldier pile design:

- Design the soldier piles using the apparent earth pressures presented on Figure 4 and surcharge pressures on Figure 5.
- Soldier piles should be embedded at least 10 feet below the base of the excavation and should be set into shafts with a minimum diameter of 24 inches.

- The passive earth pressures presented in Figure 4 act over three concreted shaft diameters or the horizontal pile spacing, whichever is less.
- Vertical resistance of soldier piles can be calculated using an allowable toe resistance of 30 kips per square foot (ksf) and an allowable shaft friction of 3.5 ksf. Side friction should be neglected above the base of excavation.

3.2.1.3 Tieback Anchor Design

Tieback anchors should be designed using the allowable pullout resistance values presented in Table 2.

Table 2. Allowable Pullout Resistance for Design of Tieback Anchors

Soil Unit	Allowable Pullout Resistance (klf)
Fill	1.5
Glacial Recessional Deposits	2.0
Glacially Consolidated Soil	3.5

These values assume low pressure (gravity) grout injection methods. Higher resistance values may be achieved with alternate anchor installation techniques. The design pullout resistance values should be verified in the field using a tieback anchor testing program.

Tieback anchor bond zones should be entirely beyond the no-load zones illustrated on Figure 4. Tieback anchors should carry no loads within the no-load zone. In accordance with the Federal Highway Administration (FHWA) Geotechnical Engineering Circular No. 4, tieback anchor unbonded lengths should be at least 10 feet for bars and 15 feet for strands (FHWA, 1999).

3.2.1.4 Timber Lagging Design

Temporary lagging should be designed in accordance with the FHWA Geotechnical Engineering Circular No. 4, Table 12—Recommended Thickness of Temporary Timber Lagging. For lagging design, the soil description may be taken as ‘Competent Soils’.

3.2.2 Soil Nails and Shotcrete Walls

Soil nail and shotcrete walls consist of ground anchors (soil nails) that are drilled and grouted into the face of the excavation on close horizontal and vertical spacing (typically 5 to 6 feet) and structurally connected with sprayed-on-concrete (shotcrete) and mesh fascia. The soil nails are installed at a slight declination from horizontal, typically 10 to 20 degrees.

In conditions where soils are prone to sloughing in vertical cuts, or where cantilevered sections are required to avoid impacts to utilities, a composite method of soil nailing, referred to as soil nails with vertical elements, can be used to provide increased additional support and stand-up time. Vertical elements consist of slender steel beams placed vertically into augered shafts and backfilled with lean concrete. Vertical elements are typically installed on horizontal spacings of one-half the soil nail horizontal spacing and are staggered to avoid the soil nails. Depending on soil conditions, the vertical elements sometimes terminate above the base of excavation, and sometimes they extend the full depth of the excavation.

3.2.2.1 Soil Nail Design

Soil nails should be designed in accordance with the FHWA Geotechnical Engineering Circular No. 7 (FHWA, 2015). The soil nail design should meet the minimum factors of safety for global stability, sliding, soil nail pullout, and bar tensile strength.

Soil nails should be designed using the soil parameters and allowable pullout resistance values presented in Table 3.

Table 3. Soil Nail Design Parameters

Soil Unit	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)	Allowable Pullout Resistance (klf)
Fill	115	30	0	1.5
Glacial Recessional Deposits	115	32	100	2.0
Glacially Consolidated Soil	130	40	100	3.5

3.2.2.2 Shotcrete Facing

The shotcrete wall facing should be designed in accordance with the FHWA Geotechnical Engineering Circular No. 7. The mesh reinforcement and shotcrete thickness must be designed to meet the minimum factors of safety for facing flexure, punching shear, and nut-and-washer plate failure.

3.2.2.3 Vertical Elements

The relatively loose, sandy zones within the glacial recessional deposits that are present below the west side of the Site are prone to sloughing in vertical cuts and may exhibit short stand-up times. We recommend vertical elements in the northwest and southwest corners to increase cut face stability and prolong stand-up time within these soils. In our opinion, vertical elements are not necessary for the remaining lengths of the soil nail and shotcrete walls because the glacial recessional deposits in those areas are primarily silt and clay that are expected to reasonably stand when exposed by vertical cuts. Our recommended locations and minimum tip elevations for vertical elements to be incorporated into the shoring plans are presented on Figure 3. The vertical elements should be considered as part of the means and methods for soil nail and shotcrete shoring wall construction; therefore, more or fewer vertical elements may be deemed necessary by the shoring contractor or Aspect based on soil conditions exposed in the excavation.

Vertical elements can be designed using an equivalent fluid density of 35 pcf within the fill and glacial recessional deposits. Allowable passive resistance over embedded portions of the vertical elements can be assumed to be 250 pcf within the fill and glacial recessional deposits and 400 pcf within the glacially consolidated soils. These passive values are allowable values and include a factor of safety of 1.5. The allowable passive resistance can be assumed to act over two times the concreted vertical element diameter or the horizontal vertical element spacing, whichever is less.

3.2.3 Shoring Design Considerations

Ground anchor layout should be carefully checked to avoid impacting utilities and to maintain City of Seattle (City) minimum clearances. Ground anchors extending into adjacent private properties will require easement agreements and ground anchors extending into adjacent rights-of-way will require indemnity agreements with the Seattle Department of Transportation.

3.3 Groundwater Inflow

The excavation for the P2 level (finished floor Elevation 51) mat foundation will extend approximately 9 feet below the design groundwater elevation (Elevation 58). The temporary remedial excavation below the northwest corner of the building will extend to Elevation 40, or about 18 feet below the design groundwater elevation.

The soils within the planned excavation depth below groundwater are very dense and have low permeability. Based on the results of pumping tests completed at the Site and considering the planned excavation dimensions, flow rates of up to 15 gallons per minute are expected into the excavation. We expect that groundwater inflow into the excavation can be managed using sumps and pumps. The excavation walls are expected to be damp and the excavation could encounter more permeable zones that produce higher flows, but any such zones should drain fairly quickly. Contaminated groundwater expected to flow into the excavation will need to be managed and treated prior to discharge as permitted by the applicable agency.

3.4 Building Foundations

The building will have two levels of below-grade parking with the finished floor for the P2 level planned at Elevation 51. The mat foundation will extend a few feet deeper than this. The remedial excavation in the northwest corner of the building will extend to Elevation 40. Our explorations at the Site encountered dense, glacially consolidated soil at or above Elevation 51. With this, the mat foundation will bear on a combination of glacially consolidated soil and remedial excavation backfill placed over glacially consolidated soil.

3.4.1 Allowable Bearing Pressure

The mat foundation bearing on undisturbed glacially consolidated soil may be designed for an allowable bearing pressure of 7 kips per square foot (ksf). Where the mat foundation spans the remedial excavation structural backfill, the average bearing pressure should be limited to 5 ksf. To simplify the structural design, the entire slab could be designed for 5 ksf. The allowable bearing pressure may be increased by one-third for short-duration loading, such as wind and seismic loading.

3.4.2 Settlement

We estimate foundations designed and constructed in accordance with our recommendations will experience average total settlements of 1 inch or less. Total and differential settlement will occur rapidly as building loads are applied and no long-term settlement is expected.

3.4.3 Lateral Resistance

Lateral loads will be resisted through passive soil resistance against embedded portions of the mat foundation and frictional resistance along base of the mat foundation. We recommend using an allowable passive equivalent fluid density of 400 pcf and an allowable base friction coefficient of 0.36 to calculate resistance to lateral loads. These allowable values include a factor of safety of 1.5 and assume the foundations are embedded in undisturbed glacially consolidated soil or properly compacted structural fill.

3.5 Permanent Below-Grade Walls

3.5.1 Walls Constructed Against Temporary Shoring

Permanent below-grade walls that are formed and constructed against temporary shoring walls should be designed using the lateral earth pressures presented on Figure 6. The lateral earth pressures assume level ground conditions exist behind the walls and adequate drainage is provided behind the walls to alleviate the potential buildup of additional hydrostatic pressures above the design groundwater elevation.

3.5.2 Backfilled Walls

Permanent below-grade walls that are backfilled (i.e. not constructed against temporary shoring) should be designed using the lateral earth pressures presented on Figure 6. Walls allowed to yield 0.1 to 0.2 percent of the retained height may should be designed for active earth-pressures using an equivalent fluid density of 35 pcf (triangular distribution against the back of the wall). Restrained or nonyielding walls may be designed using an equivalent fluid density of 55 pcf.

3.5.3 Seismic Lateral Earth Pressures

Permanent below-grade walls will be subject to a temporary additional lateral earth pressure during earthquake shaking. To account for this, a uniformly distributed seismic lateral earth pressure equal to 13H should be added to the earth pressure distribution, where H is the height of the wall. This seismic lateral earth pressure is included on Figure 6.

3.5.4 Surcharge Loads

For permanent below-grade walls that will be subjected to light vehicular loading, a traffic surcharge load of 70 psf should be added to the earth pressure distribution as shown on Figure 6. The traffic surcharge load should be distributed uniformly over the upper 15 feet of the wall. The seismic lateral earth pressure and traffic surcharge should not be applied simultaneously.

Surcharge pressures acting on the permanent below-grade walls from foundations, limited sloping backfill, or other loads should be calculated using the methods shown on Figure 5.

3.5.5 Lateral Resistance

For permanent below-grade walls with foundations embedded in undisturbed glacially consolidated soil, lateral resistance can be calculated using allowable values presented in Section 3.4.3.

3.6 Subsurface Drainage

3.6.1 Walls Constructed Against Temporary Shoring

Our recommendations for subsurface drainage for walls constructed against temporary shoring are as follows:

- Where walls are constructed against soldier pile and tieback anchor shoring walls, subsurface drainage should consist of drainage composite installed in 12- to 24-inch-wide vertical strips down the face of the timber lagging. The drainage composite strips should be installed with shingled overlap and should be centered between soldier piles.
- Where walls are constructed against soil nail and shotcrete shoring walls, subsurface drainage should consist of drainage composite installed in 12-to 24-inch-wide vertical strips on the excavation face prior to the application of shotcrete. The drainage composite strips should be installed with singled overlap between soil nails on horizontal spacing equal to that of the soil nails.
- The drainage composite should start from about 3 feet below finished grade behind the wall (to prevent surface water from entering the system) and extend down and terminate at or slightly above the design groundwater elevation.

The recommendations presented above should generally be adequate to prevent the buildup of additional hydrostatic pressures above the design groundwater elevation. The coverage recommendations should be modified as necessary based on conditions observed during construction. A building waterproofing expert should be consulted to recommend waterproofing for the mat foundation and the basement walls.

3.6.2 Other Drainage Recommendations

Final grades around the building should be sloped such that surface water drains away from the buildings.

4 Earthwork Considerations and Recommendations

We expect that excavation can be accomplished with standard construction equipment suited to working in very dense and hard soils, such as large tracked excavations equipped with toothed buckets. The contractor should be prepared to encounter and deal with rubble and debris in the surficial fill, or oversized particles, such as cobbles, in the native soil during excavation activities and drilling of temporary shoring elements. As stated earlier, contaminated soil and groundwater will need to be managed during construction in accordance with the environmental management protocols that will be outlined in a future CMMP document. Aspect will prepare and submit the CMMP to Ecology, prior to construction.

The following sections present earthwork considerations and recommendations relevant to temporary shoring construction, subgrade preparation, and structural fill.

4.1 Temporary Shoring Construction

4.1.1 Soldier Pile and Tieback Anchor Walls

We provide the following recommendations for soldier pile and tieback anchor wall construction:

- If perched groundwater, caving, and/or heaving soils are encountered during drilling of the soldier pile shafts, the contractor should be prepared to use temporary casing and/or drilling mud to maintain an open hole and prevent caving and soil loss. If there is standing water in the shaft, concrete should be placed with a tremie pipe to displace the water.

- The bottom of the soldier pile shafts should be relatively undisturbed and clear of loose/slough soils and debris prior to placing the beams and filling the shafts with concrete.

- For soldier piles with center-to-center spacing of less than three pile diameters, every other shaft should be drilled and the concrete should be placed and allowed to cure at least 24 hours before adjacent shafts are drilled.

- Excavation for the installation of lagging should be accomplished in 4-foot (maximum) vertical lifts. When the first lift of lagging is complete, the contractor can continue with the excavation in 4-foot lifts until all required lagging has been installed. If caving soils are encountered during excavation, the contractor should be prepared to excavate and install the lagging in shorter lifts. All excavations should be supported by lagging the same working day.

- Any voids that form behind the wall due to caving soils during excavation for lagging should be backfilled with free-draining granular material approved by the geotechnical engineer. Voids should be backfilled the same working day.

- The tieback anchors should be drilled using a method that will minimize caving and soil loss. Temporary casing should be used in soils prone to caving.
- Tieback anchors should be installed with centralizers to keep the anchor tendons in the center of the shaft during grouting. Structural grout should be used to infill the bond zone of the tieback anchors.
- Drill holes should be thoroughly cleaned of loose drill cuttings and slough prior to tendon installation and grouting. Tieback anchors should be installed with centralizers to keep the anchor tendons in the center of the shaft during grouting. Structural grout should be used to infill the bond zone of the tieback anchors.

4.1.2 Soil Nail and Shotcrete Walls

Proper construction sequencing is especially important for soil nail and shotcrete shoring walls because they are constructed from the top down in stages with temporary unsupported vertical cuts. We provide the following recommendations for excavation cuts, soil nail installation, and shotcrete application. Ultimately, it is the responsibility of the contractor to assess ground conditions during construction and to determine appropriate methods and procedures for installing the shoring wall and achieving the soil nail design pullout resistances.

4.1.2.1 Excavation and Soil Nail Installation

- Prior to excavation, surface water controls should be implemented to prevent surface water from flowing into the excavation.
- Cut face height should not exceed 6 feet and the exposed length of excavation should be limited to the length that can be nailed and covered with shotcrete in a single shift.
- The contractor should complete excavation test sections in each soil type to evaluate the stability and adjust the allowable stand-up time, as necessary, to maintain safe working conditions and prevent sloughing and soil loss.
- The contractor should actively monitor the cut face for signs of instability. If significant instability is observed or is imminent, the cut face should be stabilized as necessary. Depending on conditions, we expect this can be accomplished by constructing a soil berm in front of the cut face, applying a flashcoat of shotcrete, or installing vertical elements.
- Cut faces or soil nail drill holes should not be left open overnight.
- The soil nails should be drilled using a method that will minimize caving and soil loss. A temporary casing should be used in soils prone to caving.
- Drill holes should be thoroughly cleaned of loose drill cuttings and slough prior to soil nail bar installation and grouting. The soil nail bars should include centralizers to keep the bar centered in the drill hole.

4.1.2.2 Shotcrete Facing

- Shotcrete application test panels should be completed by each nozzleman using the proposed means and methods under field conditions.
- Drainage composite placed on the cut face should be properly overlapped and protected so that its drainage characteristics are not altered by shotcrete placement.
- If sloughing occurs after soil nail installation but prior to shotcrete application, a flashcoat of shotcrete can be applied to the cut face.

4.1.3 Ground Anchor Testing

Tieback anchors and soil nails should be load tested to verify that the pullout resistance values assumed for ground anchor design are achieved by the contractor’s means and methods of installation. Test soil nails should include a short unbonded zone near the face established using a temporary sleeve or casing. A large-area, stiff reaction plate to bear against the soil face should be provided by the contractor for verification testing. Refer to Appendix D for tieback anchor and soil nail verification and proof load testing requirements.

4.1.4 Shoring Wall Performance and Monitoring

We recommend temporary shoring walls be designed such that wall deflections and ground surface settlements behind the walls are 1 inch or less. Based on our experience with temporary shoring construction methods and practices, we conclude that shoring walls designed in accordance with our recommendations, with properly sequenced excavation and prompt installation of ground anchors, would effectively mitigate excessive deformations of the shoring wall and adverse impacts to adjacent structures and utilities.

A monitoring program for the shoring walls should be implemented for the Project, as described in Appendix D.

4.2 Temporary Excavation Slopes

In addition to temporary shoring, temporary excavation slopes could be required elsewhere during construction. Temporary excavation and slopes should not exceed the limits specified in the local, state, and federal regulations. The stability of temporary excavations and slopes shall be the responsibility of the contractor. The fill and glacial recessional deposits (typically within the upper 10 to 15 feet of the Site) would classify as Type C soil, and the glacially consolidated soils (typically below depths of about 10 to 15 feet) would classify as Type A soil in accordance with the Washington Administrative Code (WAC) 296-155 Part N (WAC, 2016). Temporary excavation slopes in Type A and C soils are anticipated to stand as steep as 0.75H:1V (horizontal:vertical) and 1.5H:1V, respectively. The presence of seepage may require that temporary excavation slopes be flattened to remain stable.

We also recommend the following:

- Surface water should be diverted away from slopes.

- Slopes should be protected using plastic sheet, flash coating, or tarps to control erosion and stability, as necessary.
- The duration that excavations or slopes are open should be minimized.
- Traffic, equipment, and material stockpiles should not be allowed near the top of excavations or slopes.
- The conditions of the excavations and slopes should be periodically observed by a competent person who is a representative of the contractor to evaluate safety and stability.

4.3 Subgrade Preparation

4.3.1 Foundations

The mat foundation subgrade should be observed by Aspect prior to placing steel and pouring concrete to verify they have been prepared in conformance with our recommendations. The foundation subgrade should be firm and unyielding and clear of all construction debris, loose or disturbed soil, and standing water prior to foundation construction. Soft or disturbed foundation subgrade areas identified during evaluation should be removed to expose undisturbed glacially consolidated soils and replaced with appropriate structural fill material.

The glacially consolidated soils are susceptible to disturbance from construction traffic or wet weather. We recommend that the contractor consider pouring a mud slab over the approved mat foundation subgrade to protect it from construction traffic and wet weather.

4.3.2 Pavements

Pavement subgrade preparation should be observed and evaluated by a representative of Aspect prior to placement of the pavement section. All subgrades should be firm and unyielding under the proof-rolling load of heavy rubber-tired equipment where accessible and should be clear of any loose or disturbed soil or standing water. Disturbed or soft subgrade areas identified during evaluation should be removed and replaced with appropriate structural fill material.

4.4 Structural Fill

Soils placed beneath or around foundations, walls, utilities, or below pavements should be considered structural fill. For these fill areas, we provide the following recommendations:

- Site-derived soils are not suitable for reuse as structural fill due to their high fines (material passing the U.S. No. 200 sieve) content and moisture sensitivity. All materials derived from Site excavations should be exported to a suitable disposal site.
- Structural fill to be used below foundations, including backfill for the remedial excavation, should consist of material meeting the requirements for City of Seattle Gravel Backfill for Foundations, Class A (City of Seattle, 2020).

- Structural fill to be used for drainage directly behind cast-in-place walls should consist of free-draining sand and gravel meeting the requirements for City of Seattle Mineral Aggregate Type 17.
- Structural fill to be used as crushed surfacing base course below new pavements should consist of material meeting the requirements for City of Seattle Mineral Aggregate Type 2.
- Structural fill should only be placed on a relatively firm and unyielding subgrade.
- Structural fill should be compacted to a relatively firm and unyielding condition to a minimum density of 95 percent of the maximum dry density as determined by ASTM International (ASTM) D1557 (ASTM, 2018). Structural fill placed behind walls should be compacted to between 90 to 92 percent of the maximum dry density to avoid overstressing the walls.
- Structural fill should be placed in lifts with a loose thickness no greater than 12 inches when using relatively large compaction equipment, such as a vibrating plate attached to an excavator (hoe pack) or a vibratory smooth drum roller. If small, hand-operated compaction equipment is used to compact structural fill, lifts should not exceed 6 inches in loose thickness.
- Moisture content of the structural fill should be controlled to within 2 to 3 percent of the optimum moisture. Optimum moisture is the moisture content corresponding to the maximum modified proctor dry density.
- Fill placed in softscape, general grading, landscape, or common areas that are not beneath or around structures, utilities, slabs-on-grade, or below paved areas that can accommodate some settlement should be compacted to a relatively firm and unyielding condition.

4.4.1 Utility Bedding and Backfill

General recommendations for bedding of utilities and backfill of utility trenches include:

- Materials to be used for utility bedding should meet the requirements for City of Seattle Mineral Aggregate Type 22, or as specified in the Standard Specification section applicable to the type of pipe being installed.
- Prior to installation of the pipe, the bedding material should be shaped to fit the lower portion of the pipe exterior with reasonable closeness to provide continuous support along the pipe.
- Bedding placed around the pipe should be placed in layers and tamped around the pipe to obtain complete contact. Pipe bedding material should be used as trench backfill to at least 6 inches above the crown of the pipe, for the full width of the trench. In areas where a trench box is used, the bedding material should be placed before the trench box is advanced.
- Trench backfill should meet the requirements for Structural Fill as described in Section 4.3 of this report. During placement of the initial lifts, the trench backfill

material should not be bulldozed into the trench or dropped directly on the pipe. Furthermore, heavy vibratory equipment should not be permitted to operate over the pipe until at least 2 feet of backfill has been placed.

4.5 Temporary Erosion and Sedimentation Control

Temporary erosion control measures should be implemented to prevent the migration of soil, dust, and turbid water off-Site or into stormwater systems. Such measures should include silt fences and straw wattles at the Site boundary, silt socks in nearby catch basins, wetting exposed soil during dry periods, and quarry spalls and wheel wash stations at truck and equipment exits.

4.6 Wet Weather Construction

The soils at the Site are moisture sensitive and may be difficult to handle, prepare, or compact with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions, we provide the following recommendations:

- Earthwork should be performed in small areas to minimize exposure to wet weather. The size and type of construction equipment used may have to be limited to prevent soil disturbance.
- Excavations for foundations, floor slabs, and pavements should be covered or protected (with concrete or Seattle Type 2 Aggregate) following approval of the subgrade by Aspect and should not be left open and exposed.
- Material used as structural fill should consist of clean, granular soil containing less than 7 percent fines.
- The ground surface within the construction area should be sealed by a smooth drum vibratory roller (or equivalent) and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials.
- Excavation and placement of fill should be observed by Aspect to verify that all unsuitable materials are removed, and suitable compaction is achieved.
- Local best management practices (BMPs) for erosion protection should be strictly followed.

5 References

American Concrete Institute (ACI) Committee 360, 2010, Guide to Design of Slabs-on-Ground.

American Society of Civil Engineers (ASCE), 2010, ASCE Standard ASCE/SEI 7-10, Minimum Design Loads for Buildings and Other Structures.

ASTM International (ASTM), 2018, 2018 Annual Book of ASTM Standards, West Conshohocken, Pennsylvania.

City of Seattle, 2020, Standard Specifications for Road, Bridge, and Municipal Construction.

Federal Highway Administration (FHWA), 1999, Geotechnical Engineering Circular No. 4., Ground Anchors and Anchored Systems, Publication No. FHWA-IF-99-015.

Federal Highway Administration (FHWA), 2015, Geotechnical Engineering Circular No. 7, Soil Nail Walls – Reference Manual, Publication No. FHWA-NHI-14-007.

Goldsmith Land Development Services (Goldsmith), 2020, Topography and S.I.P Survey for Grand Street Commons, Sheets 1 through 7, April 2020.

International Code Council (ICC), 2015, International Building Code.

Troost, K.G., D.B. Booth, A.P. Wisher, S.A. Shimel, 2005, The Geologic Map of Seattle – a Progress Report, U.S. Geological Survey, Open-File Report 2005-1252.

Washington State Legislature, 2016, Washington Administrative Code (WAC), May 20, 2016.

6 Limitations

Work for this project was performed for Grand Street Commons, LLC (Client), and this report was prepared consistent with recognized standards of professionals in the same locality and involving similar conditions, at the time the work was performed. No other warranty, expressed or implied, is made by Aspect Consulting, LLC (Aspect).

Recommendations presented herein are based on our interpretation of site conditions, geotechnical engineering calculations, and judgment in accordance with our mutually agreed-upon scope of work. Our recommendations are unique and specific to the project, site, and Client. Application of this report for any purpose other than the project should be done only after consultation with Aspect.

Variations may exist between the soil and groundwater conditions reported and those actually underlying the site. The nature and extent of such soil variations may change over time and may not be evident before construction begins. If any soil conditions are encountered at the site that are different from those described in this report, Aspect should be notified immediately to review the applicability of our recommendations.

Risks are inherent with any site involving slopes and no recommendations, geologic analysis, or engineering design can assure slope stability. Our observations, findings, and opinions are a means to identify and reduce the inherent risks to the Client.

It is the Client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, and agents, are made aware of this report in its entirety. At the time of this report, design plans and construction methods have not been finalized, and the recommendations presented herein are based on preliminary project information. If project developments result in changes from the preliminary project information, Aspect should be contacted to determine if our recommendations contained in this report should be revised and/or expanded upon.

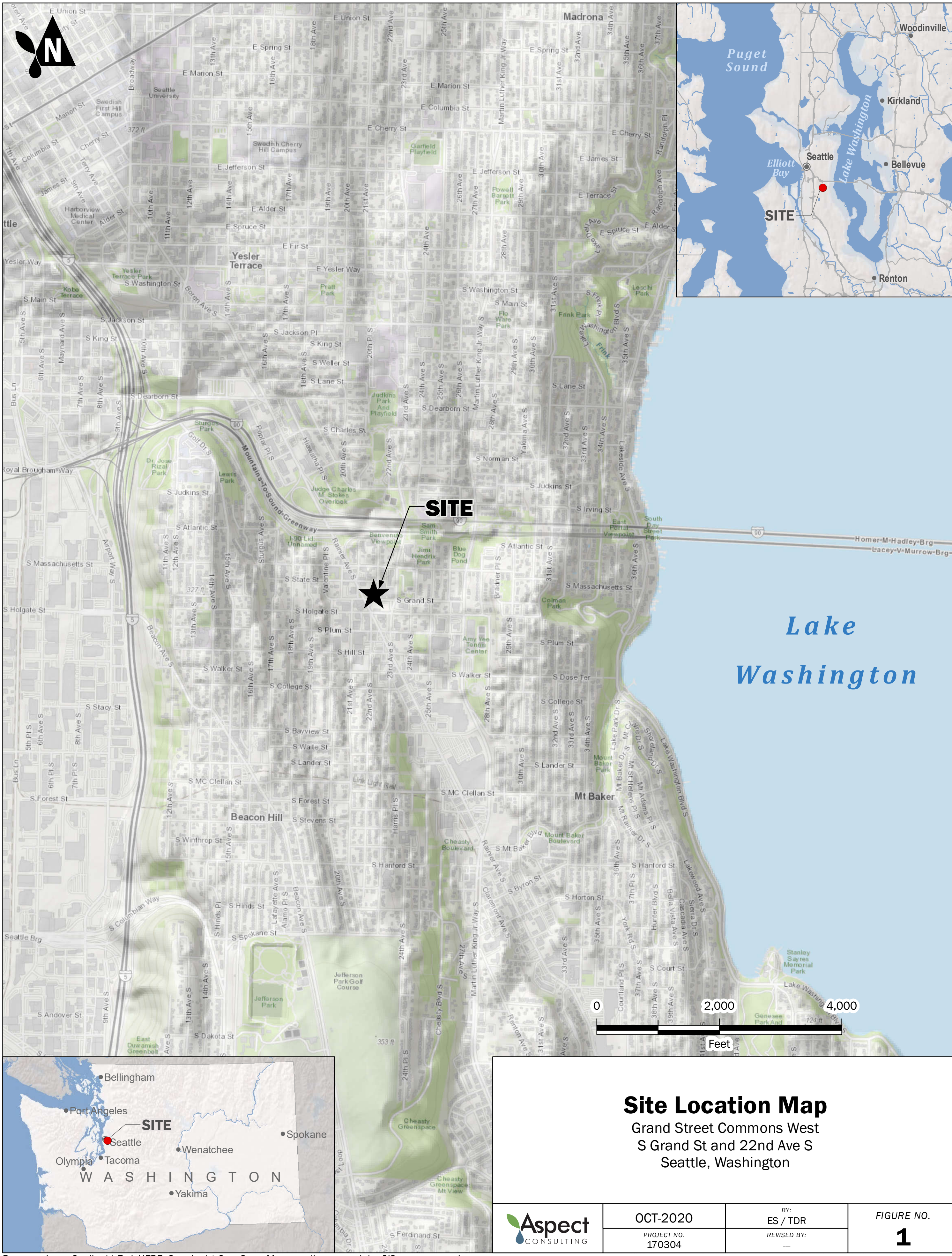
The scope of work does not include services related to construction safety precautions. Site safety is typically the responsibility of the contractor, and our recommendations are not intended to direct the contractor’s site safety methods, techniques, sequences, or procedures. The scope of our work also does not include the assessment of environmental characteristics, particularly those involving potentially hazardous substances in soil or groundwater.

All reports prepared by Aspect for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect. Aspect’s original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix E titled “Report Limitations and Guidelines for Use” for additional information governing the use of this report.

We appreciate the opportunity to perform these services. If you have any questions, please call Eric Schellenger PE, Geotechnical Engineer, at 206-780-7745.

FIGURES



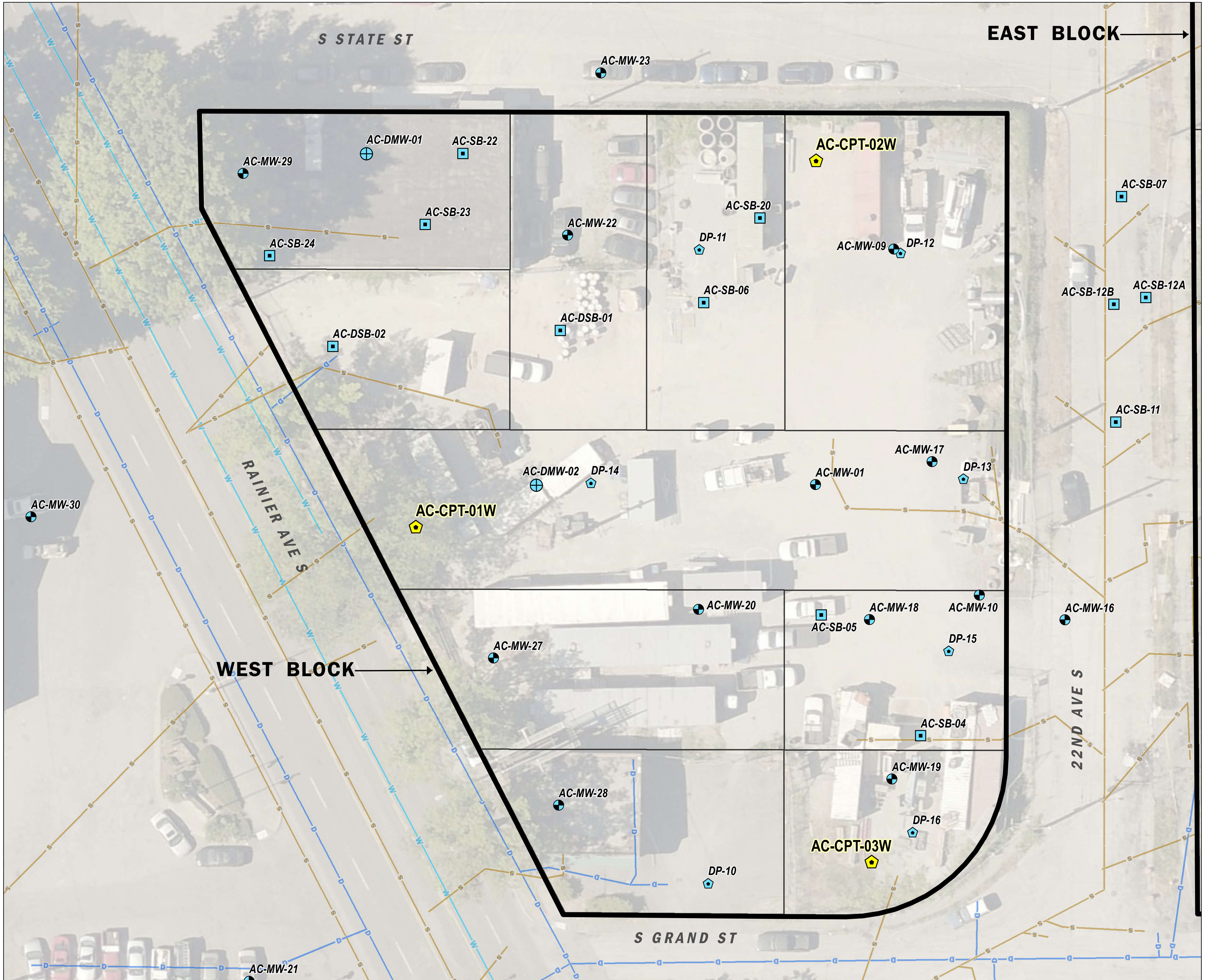
Site Location Map

Grand Street Commons West
S Grand St and 22nd Ave S
Seattle, Washington

Aspect CONSULTING	OCT-2020	BY: ES / TDR	FIGURE NO. 1
	PROJECT NO. 170304	REVISED BY: ---	

Basemap Layer Credits || Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

GIS Path: T:\projects_8\MBHA_Belshaw_170304\Delivered\GeotechReports_2020\WestBlock\01 Site Location Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 2020-10-08 || User: trullen || Print Date: 2020-10-08



Cone Penetration Test (Aspect)
Deep Monitoring Well (Aspect)
Shallow Monitoring Well (Aspect)
Soil Boring (Aspect)
Direct-Push Soil Boring (Aspect)
Subject Property
King County Tax Parcel

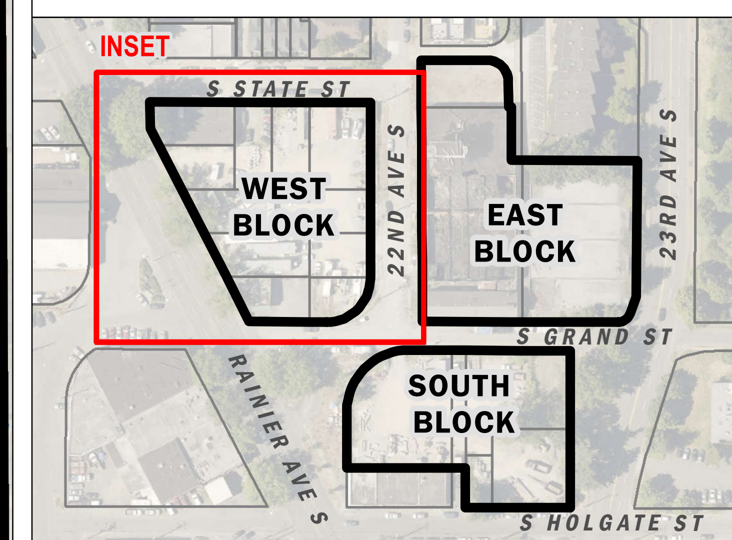
Utility Lines

Sanitary Sewer
Storm Drain
Water

Notes:

- Aerial from King County, 2017.
- Site features are approximate.

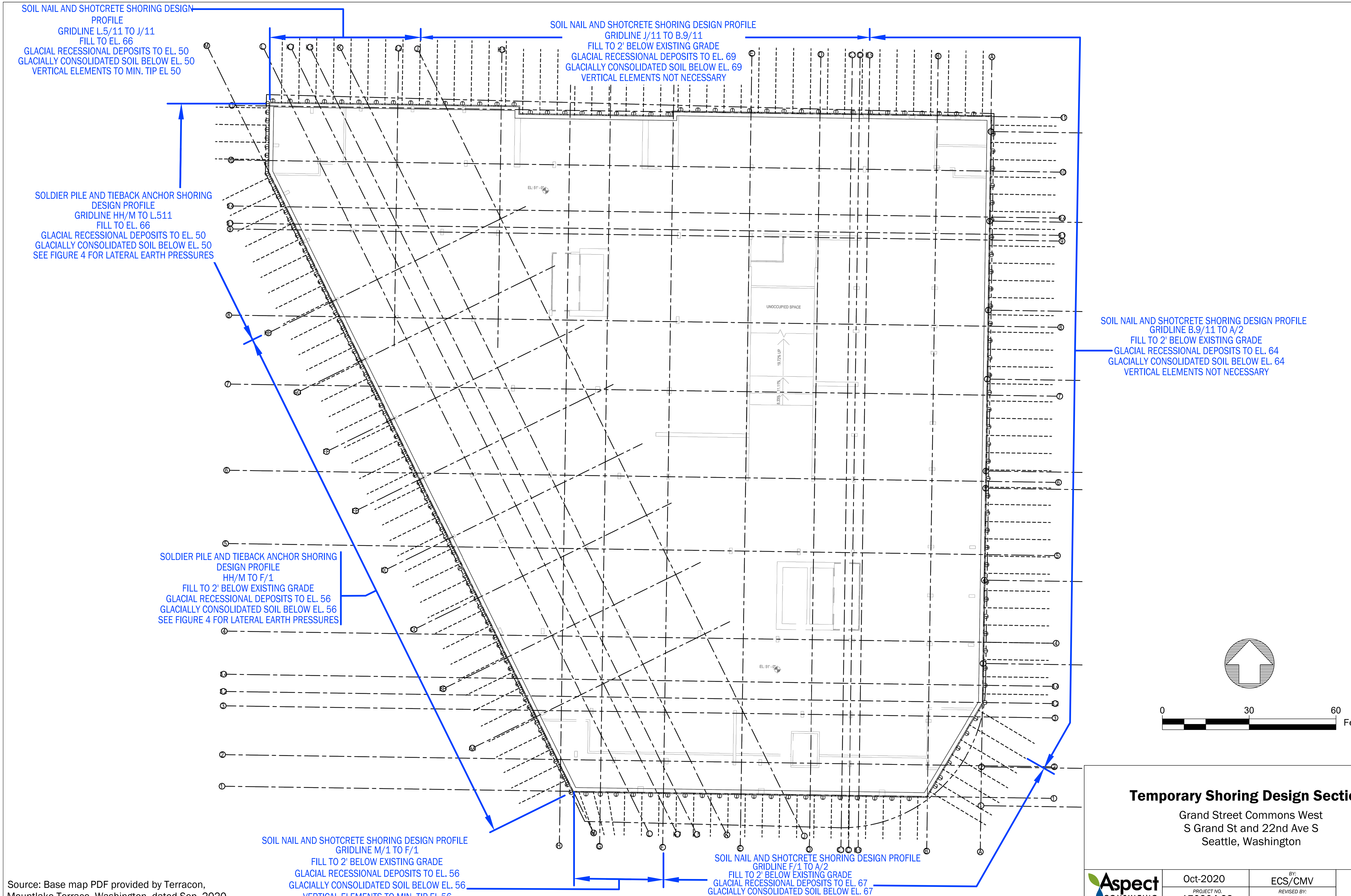
0 30 60
Feet



Site Plan

Grand Street Commons West
S Grand St and 22nd Ave S
Seattle, Washington

Aspect CONSULTING	OCT-2020	BY: ES / TDR	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: - - -	2



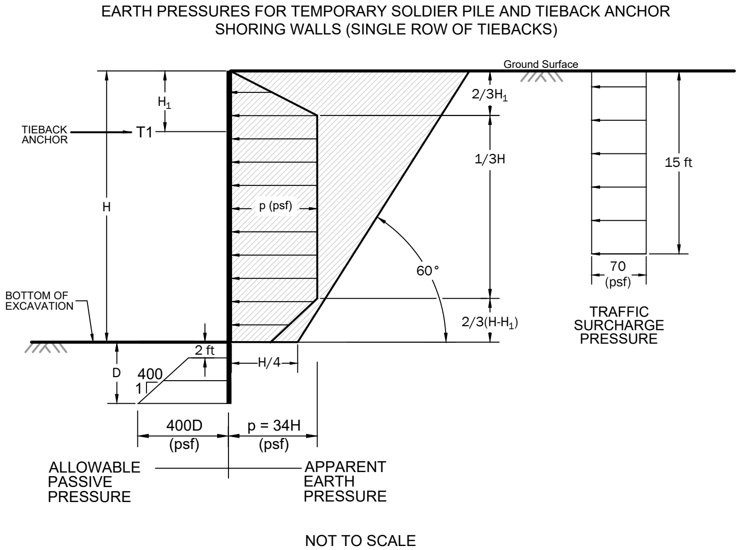
Source: Base map PDF provided by Terracon, Mountlake Terrace, Washington, dated Sep. 2020.

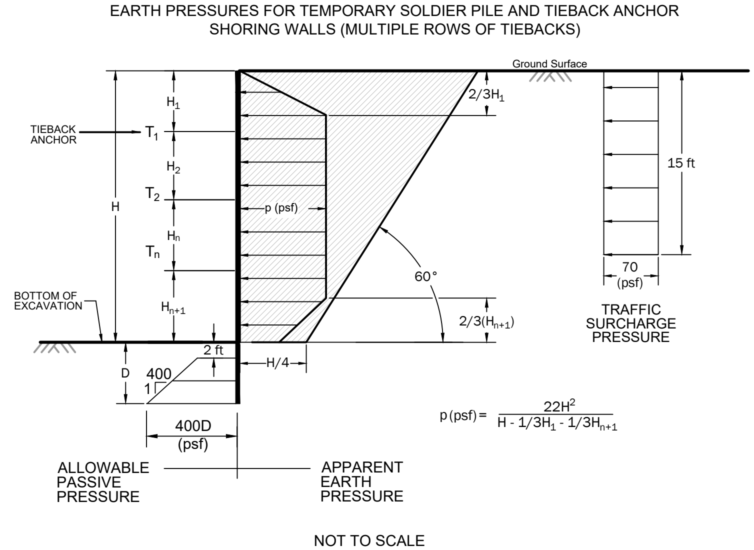
Temporary Shoring Design Sections

Grand Street Commons West
S Grand St and 22nd Ave S
Seattle, Washington

Aspect CONSULTING	Oct-2020	BY: ECS/CMV	FIGURE NO.
	PROJECT NO. 170304-23	REVISED BY: -	3

CAD Path: Q:\MBHA Development\170304 Grand Street Commons\2020-09 Shoring Design\170304-West-03.dwg Fig 3 || Date Saved: Oct 12, 2020 10:20am || User: cvanslyke





$$p\,(psf) = \frac{22H^2}{H - 1/3H_1 - 1/3H_{n+1}}$$

NOTES

1. ACTIVE/APPARENT EARTH PRESSURE AND TRAFFIC SURCHARGE PRESSURE ACT OVER THE PILE SPACING ABOVE THE BASE OF THE EXCAVATION.

2. PASSIVE EARTH PRESSURE ACTS OVER 3 TIMES THE CONCRETED DIAMETER OF THE SOLDIER PILES, OR THE PILE SPACING, WHICHEVER IS LESS.

3. PASSIVE EARTH PRESSURE INCLUDES A FACTOR OF SAFETY OF 1.5.

4. THIS PRESSURE DIAGRAM IS APPROPRIATE FOR TEMPORARY SOLDIER PILE AND TIEBACK WALLS. IF ADDITIONAL SURCHARGE LOADING (SUCH AS FROM SOIL STOCKPILES, EXCAVATORS, DUMP TRUCKS, CRANES, OR CONCRETE TRUCKS) IS ANTICIPATED, ASPECT SHOULD BE CONSULTED TO PROVIDE REVISED SURCHARGE PRESSURES.

Legend

No Load Zone

H = Height of Excavation (Feet)
D = Soldier Pile Embedment Below Bottom of Excavation (Feet)
p = Maximum Apparent Earth Pressure (Pounds Per Square Foot)
H_1 = Distance from Ground Surface to Uppermost Tieback (Feet)
T_1 = Horizontal Load in Uppermost Ground Anchor

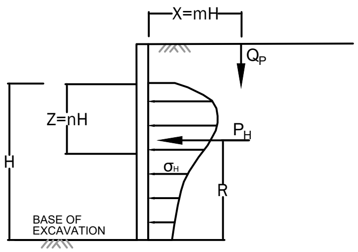
Earth Pressure Diagrams Temporary Soldier Pile and Tieback Shoring Walls

Grand Street Commons West
S Grand St and 22nd Ave S
Seattle, Washington

Aspect CONSULTING

OCT-2020	BY: ECS / MO/CMV	FIGURE NO. 4
PROJECT NO. 170304	REVISED BY: -	

LATERAL EARTH PRESSURE FROM POINT LOAD, Q_P (SPREAD FOOTING)



FOR $m \le 0.4$

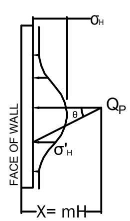
$$\sigma_H = \frac{0.28\, Q_P\, n^2}{H^2\,(0.16 + n^2)^3}$$

FOR $m > 0.4$

$$\sigma_H = \frac{1.77\, Q_P\, m^2\, n^2}{H^2\,(m^2 + n^2)^3}$$

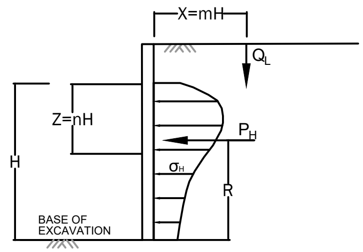
$$\sigma'_H = \sigma_H\, COS^2(1.1\,\theta)$$

M	$P_H\left(\frac{H}{Q_P}\right)$	R
0.2	0.78	0.59H
0.4	0.78	0.59H
0.6	0.45	0.48H



Pressures from Point Load Q_P

LATERAL EARTH PRESSURE FROM LINE LOAD, Q_L (CONTINUOUS WALL FOOTING)



FOR $m \le 0.4$

$$\sigma_H = \frac{0.2\, Q_L\, n}{H\,(0.16 + n^2)^2}$$

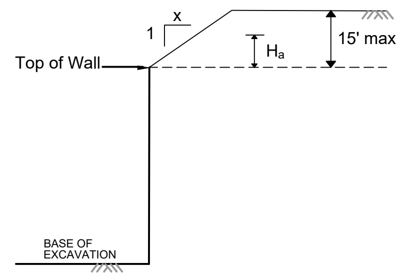
FOR $m > 0.4$

$$\sigma_H = \frac{1.28\, Q_L\, m^2\, n}{H\,(m^2 + n^2)^2}$$

$$\text{RESULTANT } P_H = \frac{0.64\, Q_L}{(m^2 + 1)}$$

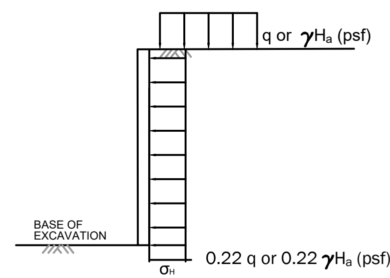
M	R
0.1	0.60H
0.3	0.60H
0.5	0.56H
0.7	0.48H

EFFECTIVE HEIGHT, H_a, FOR SLOPED CUTS ABOVE TEMPORARY SHORING



x	Slope Height, ft 5	10	15	
1	5	9	12	Values of H_a
1 1/2	4	7	9	

UNIFORM SURCHARGES, q (FLOOR LOADS, LARGE FOUNDATION ELEMENTS)



σ_H = LATERAL SURCHARGE PRESSURE FROM UNIFORM SURCHARGE

NOTES

1. Procedures for estimating surcharge pressures shown above are based on Manual 7.02 Naval Facilities Engineering Command, September 1986 (NAVFAC DM 7.02).
2. Lateral earth pressures from surcharge should be added to temporary earth pressures recommended in Figure 3 on a case-by-case basis.
3. See report text for where surcharge pressures are appropriate.

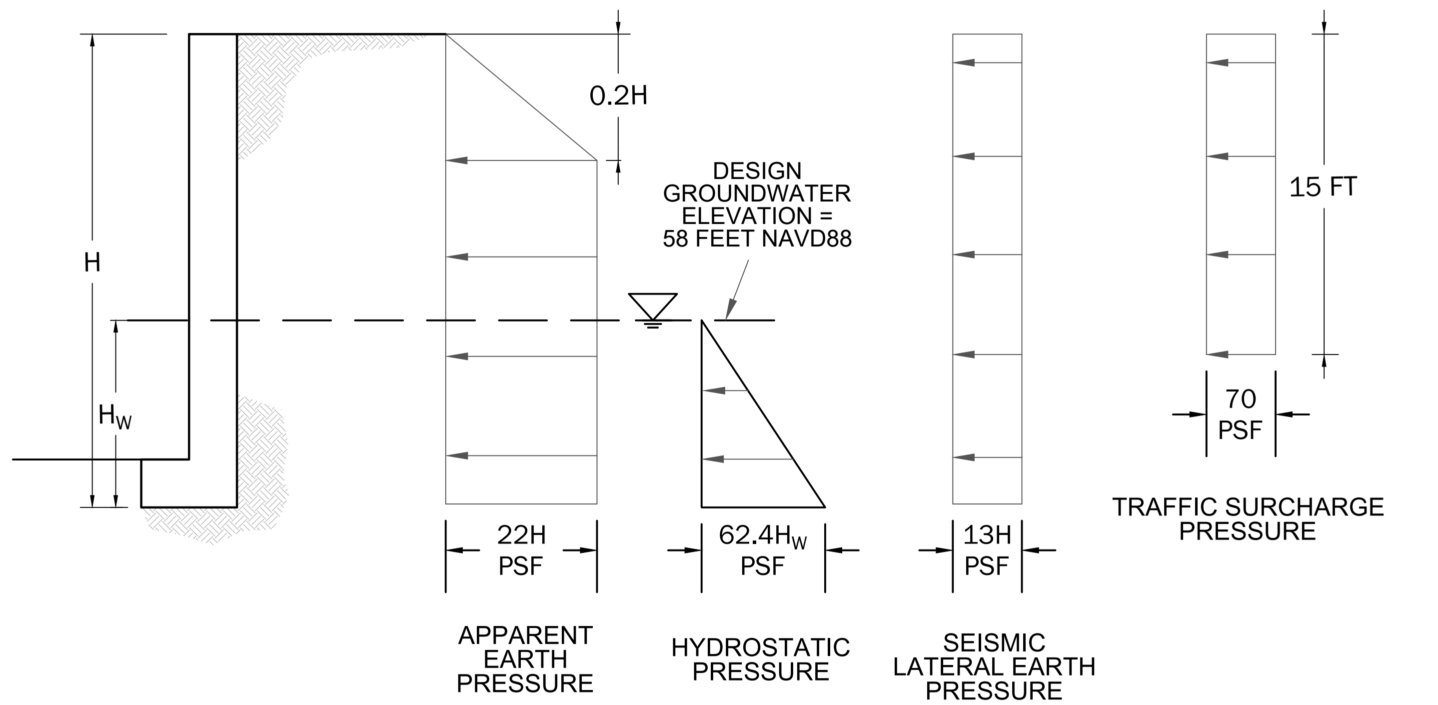
Recommended Surcharge Pressures

Grand Street Commons West
S Grand St and 22nd Ave S
Seattle, Washington

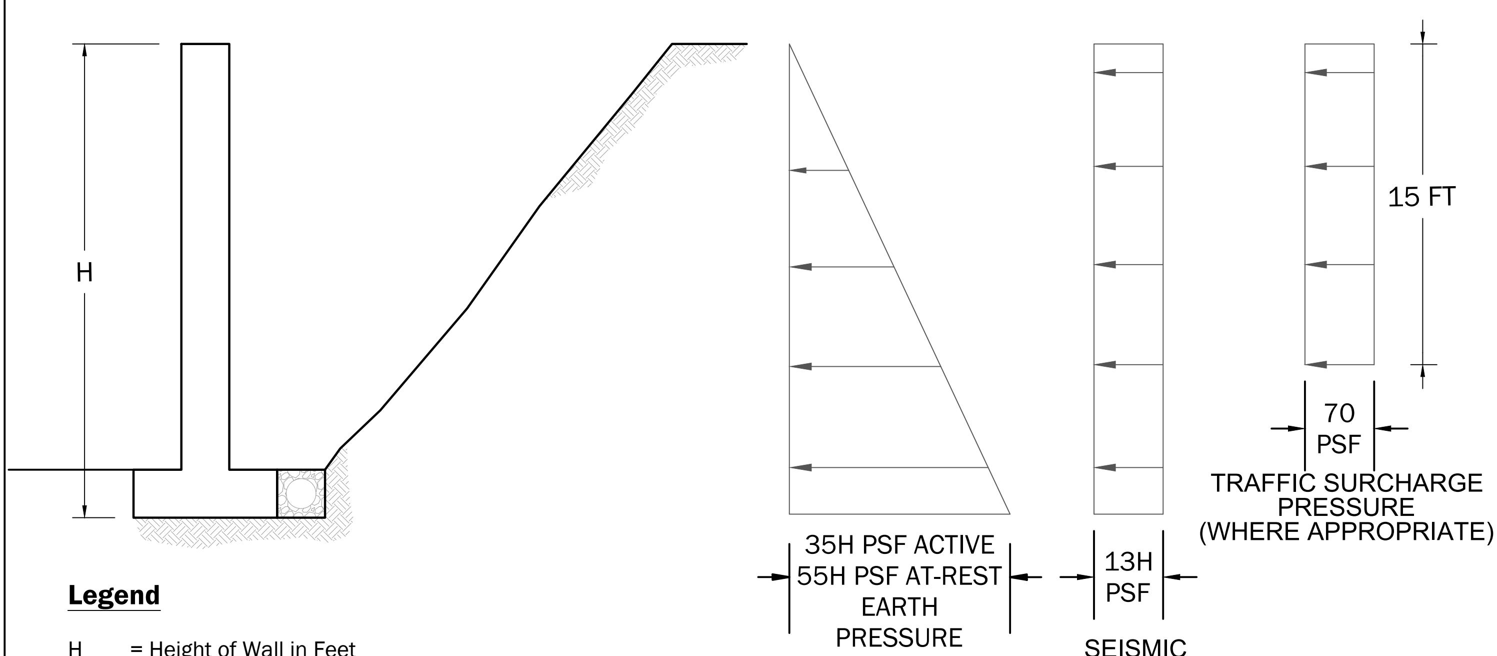
Aspect CONSULTING

OCT-2020	BY: ECS / MO/CMV	FIGURE NO.
PROJECT NO. 170304	REVISED BY: -	5

Lateral Earth Pressures for Walls Constructed Against Temporary Shoring



Lateral Earth Pressures for Backfilled Walls



Legend

H = Height of Wall in Feet
H_W = Depth of Wall Below Groundwater
PSF = Pounds per Square Foot

Notes:

1. Diagrams are not to scale.
2. All dimensions are in units of feet and pressures are in units of pounds per square foot.
3. Lateral earth pressures presented assume the ground surface behind the walls is level and the walls are provided with adequate drainage such that build up of additional unbalanced hydrostatic pressures above the design groundwater elevation does not occur.
4. Seismic earth pressure and traffic surcharge pressure should not be applied simultaneously.
5. To calculate surcharge pressures from loads other than light traffic, refer to Figure 5.

Lateral Earth Pressures for Permanent Walls

Grand Street Commons West
S Grand St and 22nd Ave S
Seattle, Washington

Aspect CONSULTING	OCT-2020	BY: ECS / MO	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: -	6

APPENDIX A

Subsurface Explorations

A.1 Field Exploration Program

A.1.1 Hollow-Stem Auger Borings

Between August 2017 and February 2020, Aspect Consulting, LLC (Aspect) completed 26 machine-drilled borings (designated with prefixes AC-MW, AC-SB, and AC-DMW) at the Site. The machine-drilled borings were advanced with hollow-stem auger drilling methods using CME-55 and CME-75 truck and track-mounted drill rigs operated by Cascade Drilling under subcontract to Aspect.

In the machine-drilled borings, disturbed soil samples were obtained at 2.5- to 5-foot intervals by driving a 1) 2-inch split barrel sampler a distance of 18 inches into the soil with a 140-pound automatic trip hammer free falling a distance of 30 inches or 2) a 3-inch split-barrel sampler (Dames & Moore sampler) a distance of 18 inches into the soil with a 300-pound hammer free-falling a distance of 30 inches. The number of blows required to drive the sampler 18 inches is recorded in three 6-inch intervals. The number of blows required to drive the sampler the last two intervals is known as the blow count. The blow count provides a measure of relative density or consistency of granular and cohesive soils, respectively. The blow counts obtained from driving a 3-inch split barrel sampler a distance of 18 inches with a 300-pound hammer is roughly equivalent to the blow count or “N-value” obtained from driving a 2-inch split barrel sampler a distance of 18 inches with a 140-pound hammer in accordance with ASTM D1586, *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils.*

An Aspect staff geologist was present throughout the exploration program to observe the drilling procedures, assist in sampling, and to prepare descriptive logs of the explorations. Soils were identified in general accordance with ASTM D2488, *Standard Practice for Description and Identification of Soils* (*Visual-Manual Procedure)* (ASTM, 2018). The summary exploration logs represent our interpretation of the contents of the field logs. The stratigraphic contacts shown on the individual summary logs represent the approximate boundaries between soil types; actual transitions may be more gradual. The subsurface conditions depicted are only for the specific date and locations reported, and therefore, are not necessarily representative of other locations and times.

Upon completion, the machine-drilled borings were either completed as 2-inch monitoring wells or backfilled with 3/8-inch bentonite chips in accordance with requirements of the Washington State Department of Ecology.

A.1.2 Cone Penetration Test Soundings

In September 2019 and September 2020, Aspect completed three cone penetrometer test (CPT) soundings (designated AC-CPT-01W through AC-CPT-03W) at the Site. The CPT soundings were completed using truck-mounted CPT rigs operated by ConeTec under subcontract to Aspect.

The CPT soundings were completed in accordance with ASTM D5778, *Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils*. The CPT is conducted by pushing steel rods with an instrumented tip that collects continuous data as the tip is advanced through the subsurface. The data collected includes a measure of soil resistance to penetration of by the tip, a measure of frictional resistance of the soil developed along the friction sleeve, and pore water pressure. The data provides information by which soil type and relative density/consistency may be correlated, as well as groundwater information. A detailed CPT investigation data report with CPT logs and raw data obtained from the soundings is presented in this appendix.

Major Division	Subdivision	Fines	Group Symbol	Group Name
Coarse-Grained Soils - More than 50%[1] Retained on No. 200 Sieve	Gravels - More than 50%[1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines	GW	Well-graded GRAVEL Well-graded GRAVEL WITH SAND
			GP	Poorly-graded GRAVEL Poorly-graded GRAVEL WITH SAND
		≥15% Fines	GM	SILTY GRAVEL SILTY GRAVEL WITH SAND
			GC	CLAYEY GRAVEL CLAYEY GRAVEL WITH SAND
	Sands - 50%[1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines	SW	Well-graded SAND Well-graded SAND WITH GRAVEL
			SP	Poorly-graded SAND Poorly-graded SAND WITH GRAVEL
		≥15% Fines	SM	SILTY SAND SILTY SAND WITH GRAVEL
			SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL
Fine-Grained Soils - 50%[1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50%		ML	SILT SANDY or GRAVELLY SILT SILT WITH SAND SILT WITH GRAVEL
			CL	LEAN CLAY SANDY or GRAVELLY LEAN CLAY LEAN CLAY WITH SAND LEAN CLAY WITH GRAVEL
			OL	ORGANIC SILT SANDY or GRAVELLY ORGANIC SILT ORGANIC SILT WITH SAND ORGANIC SILT WITH GRAVEL
	Silts and Clays Liquid Limit 50% or More		MH	ELASTIC SILT SANDY or GRAVELLY ELASTIC SILT ELASTIC SILT WITH SAND ELASTIC SILT WITH GRAVEL
			CH	FAT CLAY SANDY or GRAVELLY FAT CLAY FAT CLAY WITH SAND FAT CLAY WITH GRAVEL
			OH	ORGANIC CLAY SANDY or GRAVELLY ORGANIC CLAY ORGANIC CLAY WITH SAND ORGANIC CLAY WITH GRAVEL
Highly Organic Soils			PT	PEAT and other mostly organic soils

"WITH SILT" or "WITH CLAY" means 5 to 15% silt and clay, denoted by a "-" in the group name; e.g., SP-SM • "SILTY" or "CLAYEY" means >15% silt and clay • "WITH SAND" or "WITH GRAVEL" means 15 to 30% sand and gravel. • "SANDY" or "GRAVELLY" means >30% sand and gravel. • "Well-graded" means approximately equal amounts of fine to coarse grain sizes • "Poorly graded" means unequal amounts of grain sizes • Group names separated by "/" means soil contains layers of the two soil types; e.g., SM/ML.

Soils were described and identified in the field in general accordance with the methods described in ASTM D2488. Where indicated in the log, soils were classified using ASTM D2487 or other laboratory tests as appropriate. Refer to the report accompanying these exploration logs for details.

1. Estimated or measured percentage by dry weight
2. (SPT) Standard Penetration Test (ASTM D1586)
3. Determined by SPT, DCPT (ASTM STP399) or other field methods. See report text for details.

GEOTECHNICAL LAB TESTS

MC	=	Natural Moisture Content
PS	=	Particle Size Distribution
FC	=	Fines Content (% < 0.075 mm)
GH	=	Hydrometer Test
AL	=	Atterberg Limits
C	=	Consolidation Test
Str	=	Strength Test
OC	=	Organic Content (% Loss by Ignition)
Comp	=	Proctor Test
K	=	Hydraulic Conductivity Test
SG	=	Specific Gravity Test

CHEMICAL LAB TESTS

Organic Chemicals

BTEX	=	Benzene, Toluene, Ethylbenzene, Xylenes
TPH-Dx	=	Diesel and Oil-Range Petroleum Hydrocarbons
TPH-G	=	Gasoline-Range Petroleum Hydrocarbons
VOCs	=	Volatile Organic Compounds
SVOCs	=	Semi-Volatile Organic Compounds
PAHs	=	Polycyclic Aromatic Hydrocarbon Compounds
PCBs	=	Polychlorinated Biphenyls

Metals

RCRA8	=	As, Ba, Cd, Cr, Pb, Hg, Se, Ag, (d = dissolved, t = total)
MTCA5	=	As, Cd, Cr, Hg, Pb (d = dissolved, t = total)
PP-13	=	Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, Zn (d=dissolved, t=total)

FIELD TESTS

PID	=	Photoionization Detector
Sheen	=	Oil Sheen Test
SPT[2]	=	Standard Penetration Test
NSPT	=	Non-Standard Penetration Test
DCPT	=	Dynamic Cone Penetration Test

COMPONENT DEFINITIONS

Descriptive Term		*Size Range and Sieve Number*
Boulders	=	Larger than 12 inches
Cobbles	=	3 inches to 12 inches
Coarse Gravel	=	3 inches to 3/4 inches
Fine Gravel	=	3/4 inches to No. 4 (4.75 mm)
Coarse Sand	=	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	=	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	=	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	=	Smaller than No. 200 (0.075 mm)

ESTIMATED[1] PERCENTAGE

% by Weight		*Modifier*	*% by Weight*		*Modifier*
<1	=	Subtrace	15 to 25	=	Little
1 to <5	=	Trace	30 to 45	=	Some
5 to 10	=	Few	>50	=	Mostly

MOISTURE CONTENT

Dry	=	Absence of moisture, dusty, dry to the touch
Slightly Moist	=	Perceptible moisture
Moist	=	Damp but no visible water
Very Moist	=	Water visible but not free draining
Wet	=	Visible free water, usually from below water table

RELATIVE DENSITY

Non-Cohesive or Coarse-Grained Soils

Density[3]		*SPT[2] Blows/Foot*	*Penetration with 1/2" Diameter Rod*
Very Loose	=	0 to 4	≥ 2'
Loose	=	5 to 10	1' to 2'
Medium Dense	=	11 to 30	3" to 1'
Dense	=	31 to 50	1" to 3"
Very Dense	=	> 50	< 1"

CONSISTENCY

Cohesive or Fine-Grained Soils

Consistency[3]		*SPT[2] Blows/Foot*	*Manual Test*
Very Soft	=	0 to 1	Penetrated >1" easily by thumb. Extrudes between thumb & fingers.
Soft	=	2 to 4	Penetrated 1/4" to 1" easily by thumb. Easily molded.
Medium Stiff	=	5 to 8	Penetrated >1/4" with effort by thumb. Molded with strong pressure.
Stiff	=	9 to 15	Indented ~1/4" with effort by thumb.
Very Stiff	=	16 to 30	Indented easily by thumbnail.
Hard	=	> 30	Indented with difficulty by thumbnail.

GEOLOGIC CONTACTS

Observed and Distinct | Observed and Gradual | Inferred

Aspect CONSULTING

Exploration Log Key

AI Path: Q:_ACAD Standards\FIELD REFERENCE\MASTERS\Exploration Log Key-2018.ai // user: jinman // last saved: 12/31/2018

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277459 N:217715	**AC-MW-01**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	CME 75 truck rig	300-lb autohammer w/ Dames & Moore sampler		74.5'	Ecology Well Tag No. BKA 324
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis	Hollow Stem Auger	8/28/2017		73.9'	19.62' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		Flush 8-inch-diameter monument Expansion plug					**FILL** Loose, dry, gray, sandy GRAVEL (GP); coarse gravel, fine to medium sand.	
		Concrete surface seal					Loose, moist, dark brown, silty SAND (SM); fine to medium sand, trace gravel.	
				Chemically Analyzed	Blows/ft (non-SPT)= 7 Sheen= None Odor= None PID= <1 ppm		**GLACIAL RECESSIONAL DEPOSITS** Medium stiff, moist, gray-brown, CLAY (CL); low plasticity.	
5	70	2-inch-diameter Sch 40 PVC casing			Blows/ft (non-SPT)= 13 Sheen= None Odor= None PID= <1 ppm		Becomes stiff	5
10	65			Chemically Analyzed	Blows/ft (non-SPT)= 23 Sheen= None Odor= None PID= <1 ppm		Becomes very stiff with subtrace organics	10
		3/8 inch bentonite chips, hydrated						
15	60				Blows/ft (non-SPT)= 66 Sheen= None Odor= None PID= <1 ppm		**GLACIALLY CONSOLIDATED SOIL** Very dense, slightly moist, gray, silty to very silty SAND (SM); fine to medium sand, trace to some gravel; diamict fabric.	15
		2-inch-diameter Sch 40 PVC screen 0.010 inch slot						
20	55	▼ 3/1/2020 ▼ 6/25/2019 ▼ 11/15/2017			Blows/ft (non-SPT)= 100 Sheen= None Odor= None PID= <1 ppm		Becomes moist	20
25	50	12x20 sand			Blows/ft (non-SPT)= 100 Sheen= None Odor= None PID= <1 ppm			25
30	45	Threaded cap			Blows/ft (non-SPT)= 100 Sheen= None Odor= None PID= <1 ppm		Hard, slightly moist, gray, slightly sandy to sandy SILT (ML); low plasticity, fine to medium sand, trace coarse sand and fine gravel. Bottom of exploration at 30 ft. bgs.	30
35	40							35
40	35							40

Legend

Sample Method: No Soil Sample Recovery; Split Barrel 3.25" X 2.375" (D&M)

Water Level: ▼ Static Water Level

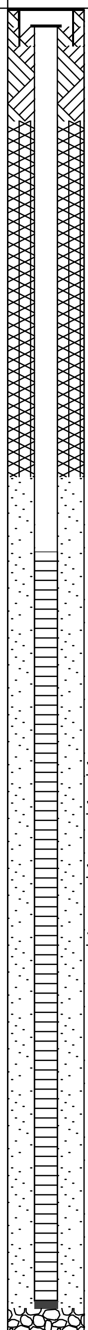
See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log AC-MW-01

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277485 N:217785	**AC-MW-09**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	CME 55	300-lb autohammer w/ Dames & Moore sampler		77'	Ecology Well Tag No. BKA 456
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis	Hollow Stem Auger	11/3/2017		76.3'	20.46' (Static)



Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	77	Flush 8-inch-diameter monument				**FILL** Loose, moist, silty GRAVEL (GM)
	75	2-inch-diamter PVC casing in concrete				**GLACIAL RECESSIONAL DEPOSITS** Soft, moist, gray-brown, CLAY (CL); low plasticity.
5		2-inch-diameter PVC casing in bentonite chips	Split Barrel		Blows (non-SPT)= 2,2,2 Sheen= None Odor= None PID= <1 ppm	
	70					
10			Split Barrel		Blows (non-SPT)= 2,2,3 Sheen= None Odor= None PID= <1 ppm	Becomes medium stiff
	65					
15			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 20,22,28 Sheen= None Odor= None PID= <1 ppm	**GLACIALLY CONSOLIDATED SOIL** Dense, moist, brown, gravelly, silty to very silty SAND (SM); fine to medium sand.
	60	slotted screen in sand				
20		3/1/2020	Split Barrel; No Soil Sample Recovery	Chemically Analyzed	Blows (non-SPT)= 8,18,30 Sheen= None Odor= None PID= <1 ppm	
		6/25/2019				
	55	11/15/2017				
25		11/3/2019	Split Barrel		Blows (non-SPT)= 18,22,31 Sheen= None Odor= None PID= <1 ppm	Becomes very dense, wet, gray
	50					
30			Split Barrel		Blows (non-SPT)= 19,23,26 Sheen= None Odor= None PID= <1 ppm	
	45					
35			Split Barrel		Blows (non-SPT)= 18,25,36 Sheen= None Odor= None PID= <1 ppm	Bottom of exploration at 35.5 ft. bgs.
	40					
40						

Legend

Sample Method: No Soil Sample Recovery; Split Barrel 3.25" X 2.375" (D&M)

Water Level: ▼ Static Water Level; ▽ Water Level ATD

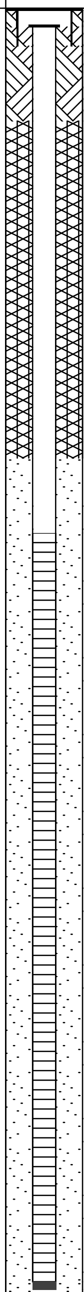
See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log AC-MW-09

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277511 N:217675	**AC-MW-10**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	CME 55	300-lb autohammer w/ Dames & Moore sampler		73.5'	Ecology Well Tag No. BKA 457
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis	Hollow Stem Auger	11/6/2017		NA	17.55' (Static)



Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0		Flush 8-inch-diameter monument				**FILL** Loose, moist, silty GRAVEL (GM)	
		2-inch-diamter PVC casing in concrete				Loose, moist, brown, slightly gravelly, silty SAND (SM); fine to medium sand.	
	70						
5		2-inch-diameter PVC casing in bentonite chips	Split Barrel		Blows (non-SPT)= 2,5,6 Sheen= None Odor= None PID= <1 ppm	**GLACIAL RECESSIONAL DEPOSITS** Stiff, moist, brown, sandy CLAY (CL); low to medium plasticity.	5
	65						
10			Split Barrel		Blows (non-SPT)= 13,30,35 Sheen= None Odor= None PID= <1 ppm	**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, brown-gray, slightly gravelly, silty to very silty SAND (SM); fine to medium sand, fine subrounded gravel.	10
	60						
15		slotted screen in sand	Split Barrel	Chemically Analyzed	Blows (non-SPT)= 25,50,50 Sheen= None Odor= None PID= <1 ppm	Becomes gray	15
		▼ 3/1/2020					
	55	▼ 6/25/2019					
		▼ 11/15/2017					
20			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 35,50/6 Sheen= Heavy Odor= strong gasoline PID= 742 ppm		20
	50						
25			Split Barrel		Blows (non-SPT)= 36,50/4 Sheen= Heavy Odor= strong gasoline PID= 334 ppm		25
	45						
30		▽ 11/6/2017	Split Barrel		Blows (non-SPT)= 13,50/3 Sheen= Heavy Odor= strong gasoline PID= 263 ppm	Becomes wet	30
	40						
35			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	Hard, moist, gray, slightly sandy SILT (ML); low plasticity, fine to medium sand.	35
						Bottom of exploration at 34.5 ft. bgs.	
	35						
40							40

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ▮ Split Barrel 3.25" X 2.375" (D&M)

Water Level
- ▼ Static Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log AC-MW-10

Sheet 1 of 1

Aspect Consulting	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277535 N:217671	**AC-MW-16**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	Ecology Well Tag No. BLK-175
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop		72.66'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
James Goble	Hollow Stem Auger	5/14/2019		72.24'	15.61' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0		Expansion plug; Flush-mount well box in concrete				Concrete	
	70					**FILL** Loose, moist, brown, silty SAND (SM); fine to coarse sand; fine gravel.	
5		2 inch diam Sch 40 PVC casing			Blows (non-SPT)= 26, 30, 50; Sheen= None; Odor= None; PID= 4.1	**GLACIAL RECESSIONAL DEPOSITS** Medium stiff to stiff, moist, brown, CLAY (CL); with fine sand; trace sand-sized organics; blow counts overstated	5
	65	Hydrated bentonite chips					
10					Blows (non-SPT)= 19, 22, 21; Sheen= Slight; Odor= None; PID= <1 ppm	**GLACIALLY CONSOLIDATED SOIL** Very dense, slightly moist, gray, slightly silty SAND (SP-SM); fine to medium sand.	10
	60						
15		3/1/2020		Chemically Analyzed	Blows (non-SPT)= 18, 26, 19; Sheen= Slight; Odor= None; PID= 1.2	Becomes moist	15
	55	6/25/2019; 5/14/2019					
20				Chemically Analyzed	Blows (non-SPT)= 18, 25, 25; Sheen= Slight; Odor= None; PID= <1 ppm	Increased silt content; becomes very moist	20
	50	12x20 sand					
25				Chemically Analyzed	Blows (non-SPT)= 50/6; Sheen= Heavy; Odor= Stong; PID= 1871	Become very dense, wet; strong chemical odor	25
	45	2 inch diam Sch 40 PVC screen 0.01 inch slot					
30				Chemically Analyzed	Blows (non-SPT)= 50/6; Sheen= Slight; Odor= Moderate; PID= 63	Very dense, slightly moist, gray, sandy SILT (ML); non-plastic to low plasticity; fine to medium sand; slight chemical odor.	30
	40						
35					Blows (non-SPT)= 50/6; Sheen= Slight; Odor= None; PID= 1.6	Becomes dry, no chemical odor. Bottom of exploration at 34.5 ft. bgs.	35
	35						
40							40

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- Static Water Level
- Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: IV
Approved by: MvA 4/28/2020

Exploration Log AC-MW-16

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277497 N:217717	**AC-MW-17**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	Ecology Well Tag No. BKA 457
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop		74.4'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis Askew	Hollow Stem Auger	4/3/2019		74.01'	19.34' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0		Expansion plug Flush-mount well box in concrete				**FILL** Loose, slightly moist, gray, slightly silty GRAVEL (GP-GM); fine gravel. Loose, moist, gray-brown, silty SAND (SM); fine to medium sand.	
5	70	2 inch diam Sch 40 PVC casing			Blows (non-SPT)= 10,10,8 Sheen= None Odor= None PID= <1 ppm	**GLACIAL RECESSIONAL DEPOSITS** very stiff, moist, mottled gray and orange brown, CLAY (CL); medium plasticity; fine to medium sand; thin beds of sandy silt.	5
		Hydrated bentonite chips					
10	65			Chemically Analyzed	Blows (non-SPT)= 15,14,19 Sheen= Slight Odor= None PID= 1.2	Becomes hard, very moist	10
15	60	12x20 sand			Blows (non-SPT)= 13,19,17 Sheen= None Odor= None PID= 3	**GLACIALLY CONSOLIDATED SOIL** Dense, very moist, gray-brown, silty SAND (SM); fine to medium sand; trace coarse sand; trace fine gravel.	15
20	55	3/1/2020 6/25/2019		Chemically Analyzed	Blows (non-SPT)= 17,20,20 Sheen= None Odor= None PID= 1.9		20
25	50	2 inch diam Sch 40 PVC screen 0.01 inch slot		Chemically Analyzed	Blows (non-SPT)= 22,50/6 Sheen= None Odor= None PID= 2.1	Becomes very dense	25
30	45				Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 1.2	Very dense, very moist, gray brown, slightly silty SAND (SP-SM); fine to medium sand, trace coarse sand.	30
35	40	4/3/2019			Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	Hard, moist, gray brown, SILT (ML) with sand ; low to medium plasticity, fine to medium sand, trace coarse sand, trace fine gravel. Bottom of exploration at 34.5 ft. bgs.	35
40	35						40

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- Static Water Level
- Water Level ATD

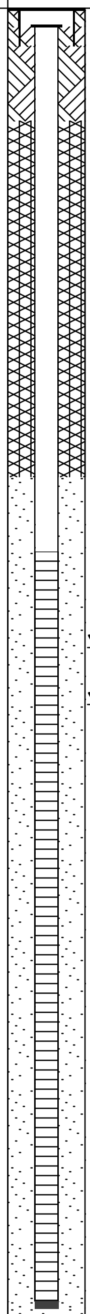
See Exploration Log Key for explanation of symbols

Logged by: IV
Approved by: MvA 4/28/2020

Exploration Log AC-MW-17

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location			Coordinates (SPN NAD83 ft)	Exploration Number
	S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277478 N:217668	AC-MW-18
Contractor	Equipment	Sampling Method		Ground Surface (GS) Elev. (NAVD88)	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop		73.19'	Ecology Well Tag No. BKA 457
Operator	Exploration Method(s)	Work Start/Completion Dates		Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Curtis Askew	Hollow Stem Auger	4/2/2019		72.7'	17.06' (Static)



Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0		Expansion plug; Flush-mount well box in concrete				**FILL** Loose, moist, gray, silty GRAVEL (GM); fine to coarse angular gravel.	
						Soft, moist, gray brown, sandy SILT (ML); low plasticity; fine to medium sand.	
	70						
5		2 inch diam Sch 40 PVC casing	Split Barrel	Chemically Analyzed	Blows (non-SPT)= 12,15,18 Sheen= None Odor= None PID= 12.4	**GLACIALLY CONSOLIDATED SOIL** Hard, slightly moist, sandy SILT (ML) with gravel ; non-plastic; fine sand, trace coarse sand; trace fine to coarse gravel; diamict texture.	5
	65	Hydrated bentonite chips					
10			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 20,21,23 Sheen= None Odor= None PID= 17.4	Poker chip fractures	10
	60						
15		12x20 sand	Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 6.6	Very dense, moist, gray, silty SAND (SM) with gravel ; fine to medium sand; fine gravel.	15
		▼ 3/1/2020					
	55	▼ 6/25/2019					
20			Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 10.7		20
		2 inch diam Sch 40 PVC screen 0.010 inch slot					
	50						
25			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50/5 Sheen= None Odor= None PID= 30.6	Hard, slightly moist, gray brown, sandy SILT (ML); fine to coarse sand; trace fine gravel; diamict fabric; chemical odor.	25
	45						
30			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 5.2	Very dense, moist, mottled gray and brown, silty SAND (SM); fine to coarse sand, trace fine gravel.	30
	40						
35			Split Barrel		Blows (non-SPT)= 41,50/6 Sheen= None Odor= None PID= 3.1	Mottled gray and orange brown	35
						Bottom of exploration at 35 ft. bgs.	
	35						
40							40

Legend

Sample Method: Split Barrel 3.25" X 2.375" (D&M)

Water Level: ▼ Static Water Level

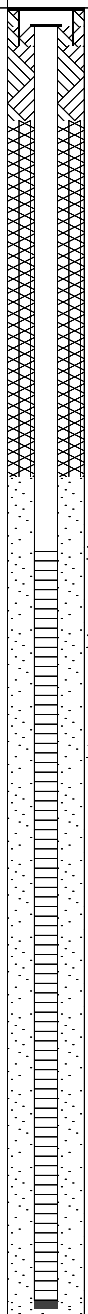
See Exploration Log Key for explanation of symbols

Logged by: IV
Approved by: MvA 4/28/2020

Exploration Log AC-MW-18

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277483 N:217616	**AC-MW-19**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	Ecology Well Tag No. BKA 457
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop		72.37'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis Askew	Hollow Stem Auger	4/2/2019		71.83'	14.7' (Static)



Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0		Expansion plug Flush-mount well box in concrete					**FILL** Loose, moist, gray, GRAVEL (GP); crushed rock surfacing	
	70						Loose, moist, gray-brown, silty SAND (SM); fine to medium sand.	
5		2 inch diam Sch 40 PVC casing		Chemically Analyzed	Blows (non-SPT)= 5,7,9 Sheen= None Odor= None PID= <1 ppm		**GLACIAL RECESSIONAL DEPOSITS** Medium dense, moist, gray brown, silty SAND (SM); fine to medium sand; thin beds of sandy clay.	5
	65	Hydrated bentonite chips						
10				Chemically Analyzed	Blows (non-SPT)= 16,19,21 Sheen= Slight Odor= None PID= 14		**GLACIALLY CONSOLIDATED SOIL** Dense, moist, gray, silty SAND (SM); fine to medium sand, trace coarse sand, trace coarse gravel.	10
	60							
15		3/1/2020			Blows (non-SPT)= 24,50/6 Sheen= None Odor= None PID= 4.6		Becomes very dense and very moist; trace fine gravel	15
	55	6/25/2019						
20		4/2/2019		Chemically Analyzed	Blows (non-SPT)= 34,50/6 Sheen= None Odor= None PID= 2.5		Becomes wet and gray-brown with fine sand	20
	50	12x20 sand						
25		2 inch diam Sch 40 PVC screen 0.01 inch slot		Chemically Analyzed	Blows (non-SPT)= 19,15,19 Sheen= None Odor= None PID= 1		Becomes medium dense; with fine to medium sand	25
	45							
30					Blows (non-SPT)= 10,11,16 Sheen= None Odor= None PID= 3.1		Medium dense, wet, gray-brown, silty GRAVEL (GM) with sand ; fine to coarse gravel, fine to coarse sand, silt lenses with orange mottling.	30
	40							
35					Blows (non-SPT)= 20,50/6 Sheen= None Odor= None PID= 2		Very dense, very moist, gray, silty SAND (SM) with gravel ; fine to coarse sand, fine gravel. Bottom of exploration at 35 ft. bgs.	35
	35							
40								40

Legend

Sample Method: No Soil Sample Recovery; Split Barrel 3.25" X 2.375" (D&M)

Water Level: Static Water Level; Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: IV
Approved by: MvA 4/28/2020

Exploration Log AC-MW-19

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304	Monitoring Well Log	
	Project Address & Site Specific Location	*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block	E:1277422 N:217674	**AC-MW-20**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	Ecology Well Tag No. BLK174
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	72.63'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
James Goble	Hollow Stem Auger	5/13/2019	72.11'	13.65' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0		Expansion plug; Flush-mount well box in concrete			**FILL** Loose, moist, gray, GRAVEL (GP); crushed rock surfacing.
	70				Loose, moist, brown, silty SAND (SM); fine to medium sand.
5		2 inch diam Sch 40 PVC casing	Chemically Analyzed	Blows (non-SPT)= 12,16,13; Sheen= Slight; Odor= Faint; PID= 6.8	**GLACIALLY CONSOLIDATED SOIL** Medium dense, slightly moist, brown, silty SAND (SM); fine to medium sand, trace coarse; few thin orange-stained sand beds.
	65	Hydrated bentonite chips			
10			Chemically Analyzed	Blows (non-SPT)= 27,50; Sheen= None; Odor= None; PID= 3.2	Becomes very dense; fine to coarse sand; with fine to coarse gravel; diamict texture
	60	3/1/2020 (static water level)			
15			Chemically Analyzed	Blows (non-SPT)= 50; Sheen= Slight; Odor= Faint; PID= 7.8	Very dense, moist, gray-brown, slightly silty SAND (SP-SM); fine to medium sand; trace silt; few thin silt beds.
	55	6/25/2019 (static water level); 5/13/2019 (water level ATD)			
20				Blows (non-SPT)= 42,50; Sheen= Slight; Odor= Faint; PID= 9.2	
	50	12x20 sand			
25		2 inch diam Sch 40 PVC screen 0.01 inch slot		Blows (non-SPT)= 33,50; Sheen= None; Odor= None; PID= 8.6	Very dense, wet, brown gray, sandy SILT (ML); non-plastic; fine to coarse sand; fine gravel; diamict fabric.
	45				
30			Chemically Analyzed	Blows (non-SPT)= 50; Sheen= None; Odor= None; PID= 6.9	Very dense, very moist, brown gray, gravelly, silty SAND (SM); fine to coarse sand; fine to coarse gravel; diamict fabric.
	40				
35				Blows (non-SPT)= 50; Sheen= Slight; Odor= Faint; PID= 10.1	Becomes slightly moist
	35				
40				Blows (non-SPT)= 50; Sheen= None; Odor= None; PID= 3.7	Poker-chip fractures; some orange mottling. Bottom of exploration at 39.5 ft. bgs.

Legend

Sample Method:
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level:
- Static Water Level
- Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: IV
Approved by: MvA 4/28/2020

Exploration Log AC-MW-20

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location			Coordinates (SPN NAD83 ft)	Exploration Number
	S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277381 N:217790	AC-MW-22
Contractor	Equipment	Sampling Method		Ground Surface (GS) Elev. (NAVD88)	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop		73.62'	Ecology Well Tag No. BKA 457
Operator	Exploration Method(s)	Work Start/Completion Dates		Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Curtis Askew	Hollow Stem Auger	4/4/2019		77.5'	17.84' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0		Expansion plug; Flush-mount well box in concrete					**FILL** Loose, moist, gray, GRAVEL (GP); crushed rock surfacing.	
							Loose, moist, gray-brown, silty SAND (SM); fine to medium sand.	
	70						**GLACIALLY CONSOLIDATED SOIL**	
5		2 inch diam Sch 40 PVC casing		Chemically Analyzed	Blows (non-SPT)= 23,50/6 Sheen= None Odor= None PID= <1 ppm		Dense, slightly moist, gray brown, silty SAND (SM); fine to coarse sand; trace fine gravel.	5
	65	Hydrated bentonite chips						
10					Blows (non-SPT)= 20,50/6 Sheen= Slight Odor= Faint PID= <1 ppm		Becomes moist	10
	60	12x20 sand						
15				Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 17		Faint 1-2 inch stratification	15
	55	▼ 3/1/2020; ▼ 6/25/2019						
20					Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Becomes diamict fabric	20
	50							
25		2 inch diam Sch 40 PVC screen 0.01 inch slot			Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Hard, moist, gray, sandy SILT (ML); no-plastic; fine to coarse sand.	25
	45							
30				Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 1			30
	40	▽ 4/4/2019						
35					Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 3.2		Very dense, wet, gray brown, silty SAND (SM); fine to medium sand.	35
	35							
40					Blows (non-SPT)= 50 Sheen= None Odor= None PID= 1.6		Becomes gravelly	
							Bottom of exploration at 39.5 ft. bgs.	40

Legend

Sample Method: ○ No Soil Sample Recovery; ▮ Split Barrel 3.25" X 2.375" (D&M)

Water Level: ▼ Static Water Level; ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: IV
Approved by: MvA 4/28/2020

Exploration Log AC-MW-22

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277394 N:217841 (est)	**AC-MW-23**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop		73.88'(est)	Ecology Well Tag No. BLK 090
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
James Goble	Hollow Stem Auger	5/17/2019		77.52'	15.63' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0		Expansion plug; Flush-mount well box in concrete				Concrete (5 inches thick)
						FILL Loose, moist, brown, silty SAND (SM); fine to medium sand; trace sand-sized organics.
5	70	2 inch diam Sch 40 PVC casing	Split Barrel	Chemically Analyzed	Blows (non-SPT)= 18,23,32 Sheen= None Odor= None PID= 2	**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, brown, silty SAND (SM); fine to medium sand; trace gravel.
		Hydrated bentonite chips				
10	65		Split Barrel		Blows (non-SPT)= 28,31,32 Sheen= None Odor= None PID= 5.5	Becomes diamict fabric
		12x20 sand				
15	60	▼ 3/1/2020; ▼ 6/25/2019	Split Barrel / No Recovery		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 6.1	
20	55	2 inch diam Sch 40 PVC screen 0.01 inch slot	Split Barrel / No Recovery	Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 3.1	
25	50		Split Barrel		Blows (non-SPT)= 50/5 Sheen= None Odor= None PID= 4	With pockets of medium sand
30	45		Split Barrel / No Recovery		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 1.1	
35	40	▽ 5/17/2019	Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50/5 Sheen= None Odor= None PID= 1.2	Very dense, wet, gray, slightly silty SAND (SP-SM); fine to medium sand.
						Bottom of exploration at 34.5 ft. bgs.
40	35					

Legend

Sample Method
- ○ No Soil Sample Recovery
- ▮ Split Barrel 3.25" X 2.375" (D&M)

Water Level
- ▼ Static Water Level
- ▽ Water Level ATD

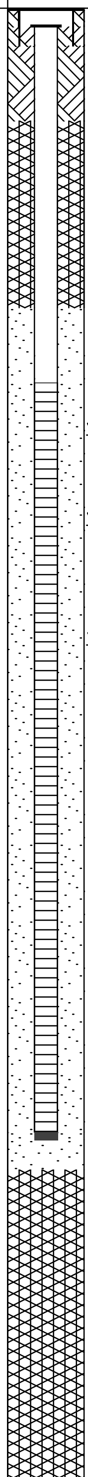
See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-MW-23
Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304		Monitoring Well Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block		E:1277356 N:217662 (est)	**AC-MW-27**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	70.46'(est)	Ecology Well Tag No. BLK-173
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
James Goble	Hollow Stem Auger	5/13/2019	77.45'	11.4' (Static)



Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
	70	Expansion plug Flush-mount well box in concrete					**FILL** Loose, dry, gray, GRAVEL (GP); crushed rock surfacing Loose, moist, brown, silty SAND (SM); fine to coarse sand.	
5	65	2 inch diam Sch 40 PVC casing			Blows (non-SPT)= 4,4,5 Sheen= Slight Odor= None PID= 2.4		**GLACIAL RECESSIONAL DEPOSITS** Medium dense, moist, brown, silty SAND (SM); fine to medium sand.	5
		Hydrated bentonite chips						
10	60	▼ 3/1/2020			Blows (non-SPT)= 4,6,7 Sheen= Slight Odor= None PID= 3.0		Becomes gray brown	10
		▼ 6/25/2019						
15	55	▽ 5/13/2019			Blows (non-SPT)= 22,50 Sheen= None Odor= None PID= 3.9		**GLACIALLY CONSOLIDATED SOIL** Very dense, slightly moist, gray brown, silty SAND (SM); fine to medium sand, trace coarse sand; trace fine to coarse gravel; diamict fabric.	15
20	50				Blows (non-SPT)= 20,50/6 Sheen= Slight Odor= None PID= 3.6			20
		2 inch diam Sch 40 PVC screen 0.01 inch slot						
25	45				Blows (non-SPT)= 50/6 Sheen= Slight Odor= None PID= 6.7		Hard, slightly moist, brown, sandy SILT (ML); low plasticity; medium and coarse sand; trace fine gravel; diamict fabric.	25
30	40				Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 5.8		Very dense, slightly moist, gray brown, silty SAND (SM); fine to medium sand; trace fine gravel; diamict fabric.	30
35	35				Blows (non-SPT)= 50/6 Sheen= None Odor= None PID		Hard, slightly moist, mottled gray brown and orange brown, sandy SILT (ML); low plasticity; medium and coarse sand; trace fine gravel; diamict fabric.	35
40	30				Blows (non-SPT)= 30,50 Sheen= Slight Odor= None PID= 3.4		Becomes very sandy; fine sand Bottom of exploration at 39.5 ft. bgs.	40

Legend

Sample Method
- ○ No Soil Sample Recovery
- ▮ Split Barrel 3.25" X 2.375" (D&M)

Water Level
- ▼ Static Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: IV
Approved by: MvA 4/28/2020

Exploration Log AC-MW-27

Sheet 1 of 1

OLD STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\GRAND STREET COMMONS - 170304.GPJ October 12, 2020

Aspect CONSULTING	Grand Street Commons - 170304		Monitoring Well Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block		E:1277375 N:217611	**AC-MW-28**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	70.09'	Ecology Well Tag No. BKA 457
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis Askew	Hollow Stem Auger	4/1/2019	76.95'	11.27' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		Expansion plug; Flush-mount well box in concrete					Concrete (4 inches thick)	
		2 inch diam Sch 40 PVC casing					**FILL** Loose, moist, gray-brown, silty SAND (SM); fine to medium sand.	
5	65	Hydrated bentonite chips	Split Barrel; No Soil Sample Recovery	Chemically Analyzed	Blows (non-SPT)= 6,5,5 Sheen= Slight Odor= None PID= 9.4		**GLACIAL RECESSIONAL DEPOSITS** Medium dense, slightly moist, gray brown, silty SAND (SM); fine sand.	5
		2x12 sand						
10	60	3/1/2020 (Static Water Level)	Split Barrel; No Soil Sample Recovery		Blows (non-SPT)= 19,29,31 Sheen= Slight Odor= None PID= 9.4		**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, gray brown, silty SAND (SM) with gravel ; fine to medium sand; fine gravel.	10
15	55	6/25/2019 (Static Water Level)	Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 9.4			15
20	50	2 inch diam Sch 40 PVC screen 0.01 inch slot	Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 9.4			20
25	45		Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 6.3			25
		4/1/2019 (Water Level ATD)						
30	40		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 17		Becomes wet and very silty Bottom of exploration at 29.5 ft. bgs.	30
35	35							35
40	30							40

Legend

Sample Method:
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level:
- Static Water Level
- Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: IV
Approved by: MvA 4/28/2020

Exploration Log AC-MW-28
Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277486 N:217634 (est)	**AC-SB-04**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	CME 55	Downhole jars, 300 lb hammer, 30-inch drop		72'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis	Hollow Stem Auger	11/6/2017		NA	19' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	72	Borehole backfilled with bentonite chips and capped with gravel.					**FILL** Loose, moist, sandy GRAVEL (GP); fine to coarse angular gravel. Loose, moist, brown, gravelly, silty SAND (SM); fine to medium sand; fine gravel; trace roots.	
	70							
5			Split Barrel / No Soil Sample Recovery	Chemically Analyzed	Blows (non-SPT)= 2,2,3 Sheen= None Odor= None PID= <1 ppm			5
	65						**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, gray, gravelly, silty to very silty SAND (SM); fine to medium sand; fine gravel.	
10			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 20,36,39 Sheen= Moderate Odor= Gasoline PID= 350 ppm			10
	60							
15			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50,50/6 Sheen= None Odor= None PID= <1 ppm			15
	55	▽ 11/6/2017						
20			Split Barrel / No Soil Sample Recovery		Blows (non-SPT)= 50,50/6 Sheen= None Odor= None PID= <1 ppm		Becomes wet and slightly gravelly	20
	50							
25			Split Barrel		Blows (non-SPT)= 30,29,36 Sheen= None Odor= None PID= <1 ppm			25
	45							
30			Split Barrel / No Soil Sample Recovery	Chemically Analyzed	Blows (non-SPT)= 19,50/6 Sheen= None Odor= None PID= <1 ppm		Hard, moist, gray, slightly sandy SILT (ML); low plasticity, fine to medium sand. Bottom of exploration at 30 ft. bgs.	30
	40							
35								35
	35							
40								40

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ▮ Split Barrel 3.25" X 2.375" (D&M)

Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log AC-SB-04

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304		Environmental Exploration Log	
	Project Address & Site Specific Location: S Grand St and 22nd Ave S - Seattle, WA, West Block		Coordinates (SPN NAD83 ft): E:1277455 N:217672 (est)	Exploration Number: **AC-SB-05**
Contractor: Cascade	Equipment: CME 55	Sampling Method: Downhole jars, 300 lb hammer, 30-inch drop	Ground Surface (GS) Elev. (NAVD88): 73'(est)	
Operator: Curtis	Exploration Method(s): Hollow Stem Auger	Work Start/Completion Dates: 11/7/2017	Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): 30' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0–1		Borehole backfilled with bentonite chips and capped with gravel.				GP	**FILL** Loose, moist, sandy GRAVEL (GP); fine to coarse angular gravel.	
1–3	70					SM	Loose, moist, brown, gravelly, silty SAND (SM); fine to medium sand; fine gravel; trace roots.	
3–5			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 27,50/6 Sheen= None Odor= None PID= <1 ppm	SM	**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, brown-gray, gravelly, silty to very silty SAND (SM); fine to medium sand.	5
9–10	65		Split Barrel		Blows (non-SPT)= 25,50/5 Sheen= None Odor= None PID= <1 ppm	SM	Becomes gray	10
14	60		Split Barrel		Blows (non-SPT)= 50/2 Sheen= None Odor= None PID= <1 ppm	SM		15
19	55		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	SM		20
24	50		Split Barrel		Blows (non-SPT)= 50/5 Sheen= None Odor= None PID= <1 ppm	SM		25
29–30	45	∇ 11/7/2017	Split Barrel	Chemically Analyzed	Blows (non-SPT)= 28,50/5 Sheen= None Odor= None PID= <1 ppm	SM	Becomes wet	30
34–34.5	40		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	ML	Hard, moist, gray, slightly sandy SILT (ML); low plasticity; fine to medium sand. Bottom of exploration at 34.5 ft. bgs.	35
40	35							40

Legend

Sample Method:
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level:
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log AC-SB-05

Sheet 1 of 1

Aspect CONSULTING

Grand Street Commons - 170304			Environmental Exploration Log	
Project Address & Site Specific Location			Coordinates (SPN NAD83 ft)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277421 N:217771 (est)	AC-SB-06
Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	
Cascade	CME 55	Downhole jars, 300 lb hammer, 30-inch drop	75'(est)	
Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Curtis	Hollow Stem Auger	11/3/2017	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0–1		Borehole backfilled with bentonite chips and capped with gravel.					**FILL** Loose, moist, sandy GRAVEL (GP); fine to coarse angular gravel.	
1–7							Loose, moist, brown-gray, gravelly, silty SAND (SM); fine to medium sand; fine to coarse gravel.	
5	70				Blows (non-SPT)= 2,4,2 Sheen= None Odor= None PID= <1 ppm			5
7							**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, brown, gravelly, silty to very silty SAND (SM); fine to medium sand.	
10	65				Blows (non-SPT)= 11,45,50 Sheen= None Odor= None PID= <1 ppm			10
15	60				Blows (non-SPT)= 15,50/6 Sheen= None Odor= None PID= <1 ppm		Becomes gray	15
20	55			Chemically Analyzed	Blows (non-SPT)= 26,50/6 Sheen= None Odor= None PID= <1 ppm			20
25	50			Chemically Analyzed	Blows (non-SPT)= 32,50/6 Sheen= None Odor= None PID= <1 ppm		Becomes very moist	25
30	45				Blows (non-SPT)= 46,50/6 Sheen= None Odor= None PID= <1 ppm			30
35	40				Blows (non-SPT)= 42,50/6 Sheen= None Odor= None PID= <1 ppm		Becomes moist	35
40	35				Blows (non-SPT)= 36,50/6 Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 39.5 ft. bgs.	40

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log AC-SB-06

Sheet 1 of 1

Grand Street Commons - 170304

Environmental Exploration Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, 23rd Ave between East and West Block	E:217767.4 N:1277560 (est)	AC-SB-12A

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	77'(est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
James Goble	Hollow Stem Auger	5/15/2019	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		Concrete surface seal					**FILL** Moist, dark brown, silty SAND (SM); fine sand; trace organics.	
	75							
5		Borehole backfilled with hydrated bentonite chips		Chemically Analyzed	Blows (non-SPT)= 5,6,8 Sheen= None Odor= None PID= <1 ppm		**GLACIAL RECESSIONAL DEPOSITS** Stiff, moist, gray, SILT (ML); medium plasticity; trace sand.	5
	70			Chemically Analyzed	Blows (non-SPT)= 9,6,4 Sheen= Moderate Odor= Moderate PID= 212		Loose, very moist, gray, silty SAND (SM); fine sand.	
10				Chemically Analyzed	Blows (non-SPT)= 6,3,4 Sheen= None Odor= None PID= 7		Medium stiff, moist, brown, CLAY (CL); medium plasticity.	10
							Bottom of exploration at 10.5 ft. bgs.	
	65							
15								15
	60							
20								20
	55							
25								25
	50							
30								30
	45							
35								35
	40							
40								40

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ▮ Split Barrel 3.25" X 2.375" (D&M)

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-12A

Sheet 1 of 1

![Aspect Consulting]

Grand Street Commons - 170304	Environmental Exploration Log	
Project Address & Site Specific Location S Grand St and 22nd Ave S - Seattle, WA, 23rd Ave between East and West Block	*Coordinates (SPN NAD83 ft)* E:217765.5 N:1277550 (est)	*Exploration Number* **AC-SB-12B**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	76'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
James Goble	Hollow Stem Auger	5/15/2019	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0	75	Concrete surface seal				Concrete(6 inches)	
						FILL Loose, moist, dark brown, silty SAND (SM); fine sand; trace gravel.	
5	70		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 4,5,8 Sheen= None Odor= None PID= <1 ppm	**GLACIAL RECESSIONAL DEPOSITS** Stiff, moist, gray, SILT (ML); medium plasticity; trace sand.	5
			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 10,14,7 Sheen= Slight Odor= None PID= 62		
10	65	Borehole backfilled with hydrated bentonite chips	Split Barrel	Chemically Analyzed	Blows (non-SPT)= 10,7,7 Sheen= None Odor= None PID= <1 ppm	Medium stiff, moist, brown, CLAY (CL); medium plasticity.	10
15	60		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 13,50/6 Sheen= None Odor= None PID= <1 ppm	**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, gray, silty SAND (SM); fine to medium sand; trace fine to coarse gravel.	15
20	55		Split Barrel / No Recovery		Blows (non-SPT)= 13,50/6 Sheen= None Odor= None PID= <1 ppm		20
25	50		Split Barrel / No Recovery		Blows (non-SPT)= 14,50/5 Sheen= None Odor= None PID= <1 ppm		25
30	45		Split Barrel / No Recovery		Blows (non-SPT)= 22,50/4 Sheen= None Odor= None PID= <1 ppm	Hard, moist, gray, SILT (ML); low to medium plasticity; trace sand.	30
						Bottom of exploration at 30 ft. bgs.	
35	40						35
40							40

Legend

Sample Method: No Soil Sample Recovery; Split Barrel 3.25" X 2.375" (D&M)

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-12B

Sheet 1 of 1

OLD STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\GRAND STREET COMMONS - 170304.GPJ October 12, 2020

Aspect Consulting	Grand Street Commons - 170304		Environmental Exploration Log	
	Project Address & Site Specific Location		Coordinates (SPN NAD83 ft)	Exploration Number
	S Grand St and 22nd Ave S - Seattle, WA, West Block		E:217794.8 N:1277440 (est)	AC-SB-20

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	76'(est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Curtis Askew	Hollow Stem Auger	3/29/2019	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	76	Concrete surface seal				**GLACIAL RECESSIONAL DEPOSITS** Stiff, moist, gray brown, CLAY (CL); low to medium plasticity.
5	71		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 2,4,5 Sheen= None Odor= None PID= <1 ppm	
9	67		Split Barrel / No Soil Sample Recovery		Blows (non-SPT)= 32,50/6 Sheen= None Odor= None PID= <1 ppm	**GLACIALLY CONSOLIDATED SOIL** Hard, moist, gray brown, sandy SILT (ML); fine to medium sand; diamict fabric.
10	66	Borehole backfilled with hydrated bentonite chips				
14	62		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	Very dense, moist, gray brown, silty SAND (SM); fine sand; trace fine gravel; diamict fabric.
19	57		Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	Very dense, moist, gray brown, silty SAND (SM) with gravel ; fine to coarse sand.
24.3	51.7		Split Barrel		Blows (non-SPT)= 50/4 Sheen= None Odor= None PID= <1 ppm	Bottom of exploration at 24.3 ft. bgs. Note: Practical drilling refusal at 24.3 ft bgs.

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-20

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304	Environmental Exploration Log	
	Project Address & Site Specific Location: S Grand St and 22nd Ave S - Seattle, WA, West Block	Coordinates (SPN NAD83 ft): E:1277627 N:217841 (est)	Exploration Number: **DP-01**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)
Cascade	Direct push rig	Percussion hammer	80'(est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Tim	Direct push	9/5/2017	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0		Borehole backfilled with bentonite chips and capped with gravel.					**FILL** Moist, gray, GRAVEL (GP); angular fine to coarse gravel.	
							Moist, brown, slightly gravelly, silty SAND (SM); fine to medium sand.	
5	75			Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm		Moist, gray and brown, sandy SILT (ML); low plasticity; fine sand.	5
							Very moist, brown, gravelly, silty SAND (SM); fine to coarse sand.	
							Moist, brown, SAND (SP); fine to medium sand.	
10	70				Sheen= None Odor= None PID= <1 ppm			10
15	65			Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			15
							GLACIALLY CONSOLIDATED SOILS Moist, gray, silty to very silty SAND (SM); fine to medium sand.	
							Slightly moist, gray, sandy SILT (ML); low plasticity; fine sand.	

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-01

Sheet 1 of 2

Grand Street Commons - 170304		Environmental Exploration Log	
Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
S Grand St and 22nd Ave S - Seattle, WA, West Block		E:1277627 N:217841 (est)	**DP-01**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*
Cascade	Direct push rig	Percussion hammer	80'(est)
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/5/2017	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
					Sheen= None Odor= None PID= <1 ppm		Slightly moist, gray, sandy SILT (ML); low plasticity; fine sand. (continued)	
							Trace gravel observed.	
							Becomes slightly gravelly.	
25	55				Sheen= None Odor= None PID= <1 ppm		Moist, gray, gravelly, silty to very silty SAND (SM); fine to medium sand.	25
30	50				Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 30 ft. bgs.	30
35	45							35

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-01

Sheet 2 of 2

Aspect CONSULTING	Grand Street Commons - 170304	Environmental Exploration Log	
	Project Address & Site Specific Location	*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block	E:1277418 N:217589 (est)	**DP-10**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	Direct push rig	Percussion hammer	69'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/5/2017	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	69	Borehole backfilled with bentonite chips and capped with asphalt.					Asphalt(3 inches)	
							GLACIALLY CONSOLIDATED SOILS Moist, gray, gravelly, silty SAND (SM); fine to medium sand; fine, subrounded to rounded gravel.	
	65							
5				Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			5
8					Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 8 ft. bgs. Note: Refusal encountered at 8 ft bgs.	
	60							
10								10
	55							
15								15
	50							

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-10

Sheet 1 of 1

Aspect CONSULTING

Grand Street Commons - 170304			Environmental Exploration Log	
Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277420 N:217788 (est)	**DP-11**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	Direct push rig	Percussion hammer	75'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/5/2017	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0–1		Borehole backfilled with bentonite chips and capped with gravel.	Continuous core			**FILL** Moist, gray, GRAVEL (GP); fine to coarse, angular gravel.	
1–8.5						Moist, gray and brown, slightly gravelly, silty SAND (SM); fine to medium sand; fine to coarse, subrounded to rounded gravel; trace organics.	
5	70			Chemically Analyzed	Sheen= Slight Odor= None PID= <1 ppm		5
8.5–15						**GLACIALLY CONSOLIDATED SOILS** Moist, gray, gravelly, silty SAND (SM); fine to medium sand; fine, subrounded to rounded gravel.	
10	65			Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm		10
15	60				Sheen= None Odor= None PID= <1 ppm	Bottom of exploration at 15 ft. bgs.	15

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-11

Sheet 1 of 1

Grand Street Commons - 170304	Environmental Exploration Log	
Project Address & Site Specific Location	*Coordinates (SPN NAD83 ft)*	*Exploration Number*
S Grand St and 22nd Ave S - Seattle, WA, West Block	E:1277483 N:217785 (est)	**DP-12**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*
Cascade	Direct push rig	Percussion hammer	77'(est)

Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/5/2017	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
							FILL Moist, gray, GRAVEL (GP); fine to coarse, angular gravel.	
							Moist, gray and brown, slightly gravelly, silty SAND (SM); fine to medium sand, trace organics.	
	75	Borehole backfilled with bentonite chips and capped with gravel.						
5				Chemically Analyzed	Sheen= Slight Odor= None PID= <1 ppm		**GLACIAL RECESSIONAL SOILS** Moist, brown, CLAY (CL); low plasticity.	5
	70			Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			
10							**GLACIALLY CONSOLIDATED SOILS** Very moist, gray, gravelly, silty SAND (SM); fine to medium sand; fine, subrounded to rounded gravel.	10
	65							
15					Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 15 ft. bgs.	15
	60							

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-12
Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304	Environmental Exploration Log	
	Project Address & Site Specific Location	*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block	E:1277501 N:217714 (est)	**DP-13**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*
Cascade	Direct push rig	Percussion hammer	75'(est)

Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/5/2017	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0–1		Borehole backfilled with bentonite chips and capped with gravel.					**FILL** Moist, gray, GRAVEL (GP); fine to coarse, angular gravel.	
1–3							Moist, gray and brown, slightly gravelly, silty SAND (SM); fine to medium sand; trace organics.	
5	70			Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm		**GLACIAL RECESSIONAL SOILS** Moist, brown, CLAY (CL); low plasticity.	5
10	65			Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			10
11							**GLACIALLY CONSOLIDATED SOILS** Moist, gray, gravelly, silty SAND (SM); fine to medium sand; fine, subrounded to rounded gravel.	
15	60				Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 15 ft. bgs.	15

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-13

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277384 N:217715 (est)	**DP-14**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	Direct push rig	Geoprobe 6600		71'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/6/2017		NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
							FILL Moist, gray, GRAVEL (GP); fine to coarse, angular gravel.	
	70	Borehole backfilled with bentonite chips and capped with gravel.					Moist, gray and brown, slightly gravelly, silty SAND (SM); fine to medium sand; trace wood debris.	
				Chemically Analyzed	Sheen= Slight Odor= None PID= <1 ppm			
							GLACIALLY CONSOLIDATED SOILS Moist, gray, gravelly, silty SAND (SM); fine to medium sand; fine, subrounded to rounded gravel.	
5					Sheen= None Odor= None PID= <1 ppm			5
	65							
10				Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			10
	60							
15					Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 15 ft. bgs.	15
	55							

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-14

Sheet 1 of 1

OLD STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\GRAND STREET COMMONS - 170304.GPJ October 12, 2020

Aspect CONSULTING	Grand Street Commons - 170304		Environmental Exploration Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, West Block		E:1277495 N:217660 (est)	**DP-15**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	Direct push rig	Geoprobe 6600	73'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/6/2017	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	73						**FILL** Moist, gray, GRAVEL (GP); fine to coarse angular gravel.	
1		Borehole backfilled with bentonite chips and capped with gravel.					Moist, gray and brown, slightly gravelly, silty SAND (SM); fine to medium sand.	
2							**GLACIAL RECESSIONAL SOILS** Moist, brown, CLAY (CL); low plasticity.	
3	70			Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm		**GLACIALLY CONSOLIDATED SOILS** Moist, gray, silty SAND (SM); fine to medium sand.	
5					Sheen= None Odor= None PID= <1 ppm			5
8	65							
10					Sheen= None Odor= None PID= <1 ppm			10
13	60							
15				Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 15 ft. bgs.	15
18	55							

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-15

Sheet 1 of 1

OLD STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\GRAND STREET COMMONS - 170304.GPJ October 12, 2020

Aspect Consulting	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			Coordinates (SPN NAD83 ft)	Exploration Number
	S Grand St and 22nd Ave S - Seattle, WA, West Block			E:1277483 N:217604 (est)	DP-16
Contractor	Equipment	Sampling Method		Ground Surface (GS) Elev. (NAVD88)	
Cascade	Direct push rig	Geoprobe 6600		72'(est)	
Operator	Exploration Method(s)	Work Start/Completion Dates		Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Tim	Direct push	9/6/2017		NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
							FILL Moist, gray, GRAVEL (GP); fine to coarse, angular gravel.	
							Moist, gray and brown, slightly gravelly, silty SAND (SM); fine to medium sand; trace roots.	
	70	Borehole backfilled with bentonite chips and capped with gravel.						
				Chemically Analyzed	Sheen= Slight Odor= None PID= <1 ppm		**GLACIALLY CONSOLIDATED SOILS** Moist, gray, gravelly, silty SAND (SM); fine to medium sand.	
5					Sheen= None Odor= None PID= <1 ppm			5
	65							
10				Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			10
	60							
15					Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 15 ft. bgs.	15
	55							

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-16

Sheet 1 of 1

Grand Street Commons - 170304

Monitoring Well Log

Aspect CONSULTING

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Rainier Ave S & S Grand St, Seattle, Washington, Center of SCC shop	E:1277300 N:217810	AC-DMW-01

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)	
Cascade Drilling	TerraSonic T150	5-inch diameter continuous core; grab samples	70.6'	Ecology Well Tag No. BMG191

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Tim Dabner	7-inch core barrel	2/15/2020	70.32'	15.98' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	70	Flush well box in concrete, expansion plug	S1		PID=0 Sheen=None Chemical Odor=None	CONCRETE; with base course (shop floor)
						TOPSOIL TOPSOIL; moist, light brown and dark brown; fine sand; "topsoil" odor; organic fines
5	65	Hydrated 3/8-inch bentonite chips 4-68 ft	S2		PID=0 Sheen=None Chemical Odor=None	**GLACIAL RECESSIONAL DEPOSITS** SILTY SAND WITH GRAVEL (SM); slightly moist, brown; fine to medium sand; fine to coarse gravel. Becomes moist.
10	60		S3	ACDMW1-10 Chemically analyzed	PID=0 Sheen=None Chemical Odor=None	
15	55	▼ 3/1/2020	S4	ACDMW1-15 Chemically analyzed	PID=0 Sheen=None Chemical Odor=None	**GLACIALLY CONSOLIDATED SOIL** SILTY SAND (SM); moist, brown; fine to coarse sand.
						SILTY SAND WITH GRAVEL (SM); slightly moist, brown; fine to coarse sand; fine to coarse gravel.
						SILT WITH SAND (ML); slightly moist, brown to gray; fine sand.
20	50		S5	ACDMW1-20 Chemically analyzed	PID=0 Sheen=None Chemical Odor=None	SILTY SAND (SM); moist, brown; fine to coarse sand; fine to coarse gravel; faint 1-3" stratification
						SILT WITH SAND (ML); slightly moist, brown; fine sand; fine to coarse gravel.
25	45	▽ 2/16/2020	S6		PID=0 Sheen=None Chemical Odor=None	SILTY SAND WITH GRAVEL (SM); moist, brown; fine to coarse sand; fine to coarse gravel.
						SILT WITH SAND (ML); moist, brown; fine sand; fine gravel.
30	40	Conductor casing to 30 ft, bentonite seal 27-30 ft	S7	ACDMW1-30 Chemically analyzed	PID=0 Sheen=None Chemical Odor=None	SAND WITH SILT AND GRAVEL (SW-SM); wet, brown; fine to coarse sand; fine to coarse gravel.
						SILTY SAND (SM); moist, gray to brown; fine to coarse sand; fine to coarse gravel; faint 1-6" beds of sand with silt (SP-SM).
35	35		S8		PID=0 Sheen=None Chemical Odor=None	SAND WITH SILT AND GRAVEL (SP-SM); moist, brown; fine to medium sand; fine to coarse gravel
						SILTY SAND (SM); moist, gray to brown; fine to coarse sand; fine to coarse gravel; faint 1-6" beds of sand with silt
						SILTY SAND WITH GRAVEL (SM); wet, brown; fine to medium sand; fine to coarse gravel
40	30		S9			

Legend

Sample Type: No Soil Sample Recovery; Continuous core 5" ID; Grab sample

Water Level: ▼ Static Water Level; ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-DMW-01

Grand Street Commons - 170304			Monitoring Well Log	
Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
Rainier Ave S & S Grand St, Seattle, Washington, Center of SCC shop			E:1277300 N:217810	**AC-DMW-01**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	Ecology Well Tag No. BMG191
Cascade Drilling	TerraSonic T150	5-inch diameter continuous core; grab samples	70.6'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim Dabner	7-inch core barrel	2/15/2020	70.32'	15.98' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
			S9	ACDMW1-40 Chemically analyzed	PID=0 Sheen=None Chemical Odor=None		SILT WITH SAND (ML); gray, slightly moist; fine to coarse sand; fine to coarse gravel; diamict fabric	
45	25						Brown 45-46 ft	45
			S10	ACDMW1-50 Chemically analyzed	PID=0 Sheen=None Chemical Odor=None			
50	20		S11				Driller notes drilling becomes extremely difficult.	50
55	15		S12		PID=0 Sheen=None Chemical Odor=None		Becomes with mottled gray to brown, 1-2" pockets of silty sand (SM).	55
				ACDMW1-60 Chemically analyzed			Very moist and brown 59 to 61 ft	
60	10		S13		PID=0 Sheen=None Chemical Odor=None			60
65	5		S14		PID=0 Sheen=None Chemical Odor=None		SILTY SAND (SM); moist, gray; fine to coarse sand; fine to coarse gravel; diamict.	65
70	0	#2/12 sand 68-90 ft.		ACDMW1-70 Chemically analyzed				70
			S15		PID=0 Sheen=None Chemical Odor=None		SANDY SILT (ML); wet, gray; fine sand	
75	-5	prepacked 0.010" slot screen 70-90 ft.	S16	ACDMW1-78 Chemically analyzed	PID=0 Sheen=None Chemical Odor=None		SAND WITH SILT (SP-SM); wet, gray; fine to medium sand.	75
80	-10		S17		PID=0 Sheen=None			80

Legend

Sample Type: No Soil Sample Recovery; Continuous core 5" ID; Grab sample

Water Level: Static Water Level; Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-DMW-01

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location: Rainier Ave S & S Grand St, Seattle, Washington, Center of SCC shop			Coordinates (SPN NAD83 ft): E:1277300 N:217810	Exploration Number: AC-DMW-01
Contractor: Cascade Drilling	Equipment: TerraSonic T150	Sampling Method: 5-inch diameter continuous core; grab samples		Ground Surface Elev. (NAVD88): 70.6'	Ecology Well Tag No. BMG191
Operator: Tim Dabner	Exploration Method(s): 7-inch core barrel	Work Start/Completion Dates: 2/15/2020		Top of Casing Elev. (NAVD88): 70.32'	Depth to Water (Below GS): 15.98' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
			S17		Chemical Odor=None		SAND WITH SILT (SP-SM); wet, gray; fine to medium sand. (continued)	
85	-15		S18					85
				ACDMW1-90 Chemically analyzed	PID=0 Sheen=None Chemical Odor=None		Becomes fine sand.	
90	-20	Threaded cap					Bottom of exploration at 90 ft. bgs.	90
95	-25							95
100	-30							100
105	-35							105
110	-40							110
115	-45							115
120	-50							120

Legend

Sample Type
- No Soil Sample Recovery
- Continuous core 5" ID
- Grab sample

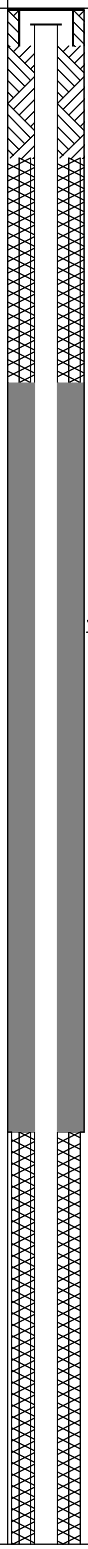
Water Level
- Static Water Level
- Water Level ATD

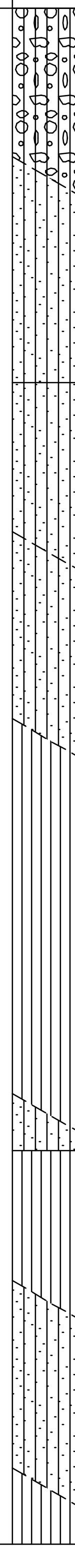
See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-DMW-01

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location Rainier Ave S & S Grand St, Seattle, Washington, Gravel lot west of 22nd Ave S			*Coordinates (SPN NAD83 ft)* E:1277400 N:217710	*Exploration Number* **AC-DMW-02**
Contractor Cascade Drilling	*Equipment* CME 75	*Sampling Method* Downhole jars; 300-lb hammer, 30-inch drop		*Ground Surface Elev. (NAVD88)* 70.9'	Ecology Well Tag No. BLK615
Operator James Goble	*Exploration Method(s)* 8.5" OD X 4.25" ID Hollow-Stem Auger	*Work Start/Completion Dates* 2/4/2020 to 2/5/2020		*Top of Casing Elev. (NAVD88)* 70.52'	*Depth to Water (Below GS)* 16.66' (Static)





Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
	70	Flush well box in concrete, expansion plug				**FILL** SILTY GRAVEL (GM); loose, moist, gray; fine to coarse, angular gravel (parking lot)	
						Wet 3-4 ft	
5	65	Hydrated 3/8" bentonite chips 4-10 ft.	S1	ACDMW2-5 Chemically analyzed	D&M=12,12,9 PID=0 Sheen=None Chemical Odor=None	**GLACIAL RECESSIONAL DEPOSITS** SILTY SAND (SM); medium dense, moist, brown; fine to coarse sand; faint 1-3-inch bedding of silty sand. Iron-oxide staining at 6 ft	5
10	60		S2	ACDMW2-10 Chemically analyzed	D&M=40,50/5 PID=0 Sheen=None Chemical Odor=None	**GLACIALLY CONSOLIDATED SOIL** SILTY SAND (SM); very dense, moist, brown; fine to coarse sand; trace fine gravel	10
15	55	Bentonite grout 10-30 ft; ▼ 3/1/2020	S3	ACDMW2-15 Chemically analyzed	D&M=80/5 PID=0 Sheen=None Chemical Odor=None	SILTY SAND WITH GRAVEL (SM); very dense, moist, brown; fine to coarse sand; fine to coarse gravel	15
20	50		S4	ACDMW2-20 Chemically analyzed	D&M=31,50/5 PID=0 Sheen=None Chemical Odor=None	SANDY SILT (ML); hard, moist, gray; non-plastic; trace fine to coarse gravel.	20
25	45		S5		D&M=48,50/4 PID=0 Sheen=None Chemical Odor=None	Becomes slightly moist.	25
30	40	Conductor casing to 30 ft, bentonite seal 27-30 ft	S6	ACDMW2-30 Chemically analyzed	D&M=26,34,47 PID=0 Sheen=None Chemical Odor=None	SILTY SAND (SM); very dense, very moist, brown; fine to medium sand. SANDY SILT (ML); very dense, slightly moist, brown; non-plastic; fine to coarse sand; fine gravel.	30
35	35	Hydrated 3/8" bentonite chips 30-68 ft.	S7		D&M=19,25,62 PID=0 Sheen=None Chemical Odor=None	SILTY SAND WITH GRAVEL (SM); very dense, very moist, brown; fine to coarse sand; fine to coarse gravel.	35
40			S8	ACDMW2-40	D&M=19,21,20 PID=0		40

Legend

Sample Type: ○ No Soil Sample Recovery; ▌ Split Barrel 3.25" X 2.375" (D&M)

Water Level: ▼ Static Water Level; ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-DMW-02

Aspect Consulting	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location Rainier Ave S & S Grand St, Seattle, Washington, Gravel lot west of 22nd Ave S			*Coordinates (SPN NAD83 ft)* E:1277400 N:217710	*Exploration Number* **AC-DMW-02**
Contractor Cascade Drilling	*Equipment* CME 75	*Sampling Method* Downhole jars; 300-lb hammer, 30-inch drop		*Ground Surface Elev. (NAVD88)* 70.9'	Ecology Well Tag No. BLK615
Operator James Goble	*Exploration Method(s)* 8.5" OD X 4.25" ID Hollow-Stem Auger	*Work Start/Completion Dates* 2/4/2020 to 2/5/2020		*Top of Casing Elev. (NAVD88)* 70.52'	*Depth to Water (Below GS)* 16.66' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
				Chemically analyzed	Sheen=None Chemical Odor=None	SILT (ML); hard, moist, gray; low to medium plasticity; trace fine to coarse sand; diamict. (continued)	
45	25		S9		D&M=17,29,34 PID=0 Sheen=None Chemical Odor=None	SANDY SILT (ML); hard, moist, brown; non-plastic; fine to medium sand.	45
						SILTY SAND (SM); very dense, slightly moist, gray; fine to coarse sand; trace fine to coarse gravel; diamict.	
50	20		S10	ACDMW2-50 Chemically analyzed	D&M=39,50/5 PID=0 Sheen=None Chemical Odor=None	SANDY SILT (ML); hard, slightly moist, gray; non-plastic; fine to coarse sand; diamict; few 1-2-inch beds of brown silty sand (SM).	50
55	15		S11		D&M=41,50/5 PID=0 Sheen=None Chemical Odor=None	SILT WITH SAND (ML); hard, slightly moist, gray; non-plastic; fine to coarse sand; few 1-2-inch beds of brown silty sand (SM).	55
60	10		S12	ACDMW2-60 Chemically analyzed	D&M=22,25,31 PID=0 Sheen=None Chemical Odor=None	Becomes with sand partings and 0.25-inch-thick sand-filled horizontal fractures.	60
65	5		S13		D&M=15,17,20 PID=0 Sheen=None Chemical Odor=None	SILT (ML); hard, slightly moist, gray; non-plastic; trace fine to coarse sand.	65
70	0	#2/12 sand 68-90 ft	S14	ACDMW2-70 Chemically analyzed	D&M=17,20,20 PID=0 Sheen=None Chemical Odor=None	SILTY SAND (SM); dense, moist, gray; fine to medium sand; few 1-3-inch beds of sandy silt (ML); iron-oxide staining from 71-71.1'.	70
75	-5	∇ 2/4/2020	S15		D&M=17,22,33 PID=0 Sheen=None Chemical Odor=None	Becomes very dense and wet.	75
80	-10	0.010" slot prepacked screen 70-90 ft.	S16	ACDMW2-80 Chemically analyzed	D&M=19,21,40 PID=0 Sheen=None Chemical	Sample is likely heave.	80

Legend

Sample Type
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- Static Water Level
- Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-DMW-02

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location Rainier Ave S & S Grand St, Seattle, Washington, Gravel lot west of 22nd Ave S			*Coordinates (SPN NAD83 ft)* E:1277400 N:217710	*Exploration Number* **AC-DMW-02**
Contractor Cascade Drilling	*Equipment* CME 75	*Sampling Method* Downhole jars; 300-lb hammer, 30-inch drop		*Ground Surface Elev. (NAVD88)* 70.9'	Ecology Well Tag No. BLK615
Operator James Goble	*Exploration Method(s)* 8.5" OD X 4.25" ID Hollow-Stem Auger	*Work Start/Completion Dates* 2/4/2020 to 2/5/2020		*Top of Casing Elev. (NAVD88)* 70.52'	*Depth to Water (Below GS)* 16.66' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description
					Odor=None	SM	SILTY SAND (SM); dense, moist, gray; fine to medium sand; few 1-3-inch beds of sandy silt (ML); iron-oxide staining from 71-71.1'. (continued)
85	-15		S17		D&M=12,19,33 PID=0 Sheen=None Chemical Odor=None		Sample is likely heave.
90	-20	Threaded cap	S18	ACDMW2-90 Chemically analyzed	D&M=12,13,34 PID=0 Sheen=None Chemical Odor=None		Becomes dense with predominantly fine and trace medium sand.
							Bottom of exploration at 91.5 ft. bgs.
95	-25						
100	-30						
105	-35						
110	-40						
115	-45						
120	-50						

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 3.25" X 2.375" (D&M)

Water Level: Static Water Level; Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-DMW-02

Aspect CONSULTING

Grand Street Commons - 170304

Environmental Exploration Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Rainier Ave S & S Grand St, Seattle, Washington, Gravel lot west of 22nd Ave S	E:1277400 N:217760 (est)	AC-DSB-01

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)
Cascade Drilling	CME 75	Downhole jars; 300-lb hammer, 30-inch drop	72' (est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
James Goble	8.5" OD X 4.25" ID Hollow-Stem Auger	2/3/2020	NA	35' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	72	Concrete surface seal				**FILL** GRAVEL WITH SILT AND SAND (GP-GM); loose, moist (gravel parking lot)
5	67		S1	AC-DSB1-5 Chemically analyzed	D&M=11,14,17 PID=0 Sheen=None Chemical Odor=None	**GLACIALLY CONSOLIDATED SOIL** SILTY SAND (SM); dense, moist, gray brown; fine to medium sand with trace coarse sand
10	62		S2	AC-DSB1-10 Chemically analyzed	D&M=34,50/5 PID=0 Sheen=None Chemical Odor=None	Becomes very dense, slightly moist
15	57	Hydrated 3/8-inch bentonite chips 4-101.5 ft	S3	AC-DSB1-15 Chemically analyzed	D&M=27,50/5 PID=0 Sheen=None Chemical Odor=None	Becomes moist with trace fine to coarse gravel
20	52		S4	AC-DSB1-20 Chemically analyzed	D&M=29,33,35 PID=0 Sheen=None Chemical Odor=None	
21.5						SILTY GRAVEL (GM); very dense, very moist, brown; fine to coarse sand; fine to coarse gravel
25	47		S5		D&M=40,50/3 PID=0 Sheen=None Chemical Odor=None	SILTY SAND (SM); very dense, moist; fine to medium sand; trace fine gravel
30	42	Conductor casing to 30 ft, bentonite seal 27-30 ft	S6	AC-DSB1-30 Chemically analyzed	D&M=30,39,46 PID=0 Sheen=None Chemical Odor=None	Becomes with few fine to coarse gravel
35	37	∇ 2/3/2020				SILTY SAND WITH GRAVEL (SM); very dense, wet, gray brown; fine to coarse sand; fine to coarse gravel No samples collected 35 to 44 ft due to heave. Descriptions based on cuttings and drill action
40	32					

Legend

Sample Type: Split Barrel 3.25" X 2.375" (D&M)

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-DSB-01

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location: Rainier Ave S & S Grand St, Seattle, Washington, Gravel lot west of 22nd Ave S			Coordinates (SPN NAD83 ft): E:1277400 N:217760 (est)	Exploration Number: AC-DSB-01
Contractor: Cascade Drilling	Equipment: CME 75	Sampling Method: Downhole jars; 300-lb hammer, 30-inch drop		Ground Surface Elev. (NAVD88): 72' (est)	
Operator: James Goble	Exploration Method(s): 8.5" OD X 4.25" ID Hollow-Stem Auger	Work Start/Completion Dates: 2/3/2020		Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): 35' (ATD)

Depth (feet)	Elev. (feet)	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
	30				SILTY SAND WITH GRAVEL (SM); very dense, wet, gray brown; fine to coarse sand; fine to coarse gravel (continued) Drill action suggests gravel
45		S7	AC-DSB1-44 Chemically analyzed	D&M=24,45,50/5 PID=0 Sheen=None Chemical Odor=None	SILT WITH SAND (ML); very dense, moist, brown; non-plastic, fine to coarse sand Becomes gray
	25				
50		S8	AC-DSB1-50 Chemically analyzed	D&M=49,50/5 PID=0 Sheen=None Chemical Odor=None	SANDY SILT (ML); hard, moist, brown; non-plastic; fine to coarse sand; 4" interbed of silty sand
	20				
55		S9		D&M=49,50/4 PID=0 Sheen=None Chemical Odor=None	Becomes gray with rusty mottling
	15				
60		S10	AC-DSB1-60 Chemically analyzed	D&M=21,30,43 PID=0 Sheen=None Chemical Odor=None	SILT (ML); hard, moist, brown; non-plastic; trace fine sand Becomes gray
	10				
65		S11		D&M=35,50/5 PID=0 Sheen=None Chemical Odor=None	SANDY SILT (ML); hard, moist, interbedded gray ML and brown SM; fine to medium sand
	5				
70		S12	AC-DSB1-70 Chemically analyzed	D&M=21,31,40 PID=0 Sheen=None Chemical Odor=None	SILTY SAND WITH GRAVEL (SM); very dense, very moist; fine to medium sand; fine to coarse gravel
	0				
75		S13		D&M=21,24,40 PID=0 Sheen=None Chemical Odor=None	SILTY SAND (SM); very dense, wet, gray; fine to medium sand Brown 76-76.5 ft
	-5				
80		S14	AC-DSB1-80 Chemically analyzed	D&M=21,25,33 PID=0 Sheen=None Chemical	Becomes with fine sand

Legend

Sample Type: Split Barrel 3.25" X 2.375" (D&M)

Water Level: ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-DSB-01

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location: Rainier Ave S & S Grand St, Seattle, Washington, Gravel lot west of 22nd Ave S			Coordinates (SPN NAD83 ft): E:1277400 N:217760 (est)	Exploration Number: AC-DSB-01
Contractor: Cascade Drilling	Equipment: CME 75	Sampling Method: Downhole jars; 300-lb hammer, 30-inch drop		Ground Surface Elev. (NAVD88): 72' (est)	
Operator: James Goble	Exploration Method(s): 8.5" OD X 4.25" ID Hollow-Stem Auger	Work Start/Completion Dates: 2/3/2020		Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): 35' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
					Odor=None		SILTY SAND (SM); very dense, wet, gray; fine to medium sand (continued)	
85			S15		D&M=11,17,25 PID=0 Sheen=None Chemical Odor=None		Becomes dense	85
	-15							
90			S16	AC-DSB1-90 Chemically analyzed	D&M=12,15,17 PID=0 Sheen=None Chemical Odor=None			90
	-20							
95			S17		D&M=14,21,24 PID=0 Sheen=None Chemical Odor=None			95
	-25							
100			S18	AC-DSB1-100 Chemically analyzed	D&M=15,23,27 PID=0 Sheen=None Chemical Odor=None		Bottom of exploration at 101.5 ft. bgs.	100
	-30							
105								105
	-35							
110								110
	-40							
115								115
	-45							
120								120
	-50							

Legend

Sample Type: Split Barrel 3.25" X 2.375" (D&M)

Water Level: Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-DSB-01

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location Rainier Ave S & S Grand St, Seattle, Washington, Gravel lot west of 22nd Ave S			*Coordinates (SPN NAD83 ft)* E:1277300 N:217760 (est)	*Exploration Number* **AC-DSB-02**
Contractor Cascade Drilling	*Equipment* CME 75	*Sampling Method* Autohammer to 20', downhole 300-lb jars to bottom		*Ground Surface Elev. (NAVD88)* 71' (est)	
Operator James Goble	*Exploration Method(s)* 8.5" OD X 4.25" ID Hollow-Stem Auger	*Work Start/Completion Dates* 2/5/2020		*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* 80' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
	70	Concrete surface seal				**FILL** GRAVEL (GP); loose, wet, brown to gray sand; fine to coarse sand; fine to coarse gravel	
			S1		SPT=2,2,1 PID=0 Sheen=None Chemical Odor=None	**GLACIAL RECESSIONAL DEPOSITS** CLAY (CL); soft, moist, brown	
5	65		S2	ACDSB2-5 Chemically analyzed	SPT=2,4,5 PID=0 Sheen=None Chemical Odor=None	Becomes medium stiff	5
			S3		SPT=5,7,8 PID=0 Sheen=None Chemical Odor=None	SILTY SAND (SM); medium dense, moist, brown; fine sand; faint 1-2" stratification	
10	60		S4	ACDSB2-10 Chemically analyzed	SPT=6,9,8 PID=0 Sheen=None Chemical Odor=None		10
			S5		SPT=7,12,15 PID=0 Sheen=None Chemical Odor=None		
15	55	Hydrated 3/8-inch bentonite chips 4-101.5 ft	S6	ACDSB2-15 Chemically analyzed	SPT=7,14,23 PID=0 Sheen=None Chemical Odor=None	SANDY SILT (ML); hard, moist, brown	15
						GLACIALLY CONSOLIDATED SOIL SILTY SAND (SM); dense, moist, brown; fine sand, trace medium to coarse sand; trace fine gravel	
			S7		SPT=49,50/5 PID=0 Sheen=None Chemical Odor=None	Becomes very dense	
20	50		S8	ACDSB2-20 Chemically analyzed	SPT=39,50/5 PID=0 Sheen=None Chemical Odor=None	SANDY SILT (ML); hard, slightly moist, gray; fine sand, trace medium to coarse sand; trace fine subround to subangular gravel	20
						Drill action suggests gravel	
25	45		S9		D&M=49,50/5 PID=0 Sheen=None Chemical Odor=None	SILTY SAND (SM); very dense, moist, brown; fine with trace medium to coarse sand; faint stratification	25
						SANDY SILT (ML); very dense, moist, brown; non-plastic; trace fine to coarse subround gravel; diamict fabric.	
30	40	Conductor casing to 30 ft, bentonite seal 27-30 ft	S10	ACDSB2-30 Chemically analyzed	D&M=34,39,41 PID=0 Sheen=None Chemical Odor=None	SILTY SAND WITH GRAVEL (SM); very dense, moist, mottled brown and gray; fine to medium sand, trace coarse; trace fine to coarse subround gravel	30
						SANDY SILT (ML); hard, moist, brown; non-plastic; fine to medium sand, trace coarse subround sand; diamict fabric	
35	35		S11		D&M=70/6 PID=0 Sheen=None Chemical Odor=None	SILTY SAND WITH GRAVEL (SM); very dense, moist, brown; fine to medium sand, trace coarse subround sand; trace fine subround to subangular gravel; faint 1-3" stratification	35
40			S12	ACDSB2-40	D&M=48,50/4 PID=0	Where not stratified, diamict fabric.	40

Legend

Sample Type:
- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)
- Split Barrel 3.25" X 2.375" (D&M)

Water Level:
- Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-DSB-02

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location: Rainier Ave S & S Grand St, Seattle, Washington, Gravel lot west of 22nd Ave S			Coordinates (SPN NAD83 ft): E:1277300 N:217760 (est)	Exploration Number: AC-DSB-02
Contractor: Cascade Drilling	Equipment: CME 75	Sampling Method: Autohammer to 20', downhole 300-lb jars to bottom		Ground Surface Elev. (NAVD88): 71' (est)	
Operator: James Goble	Exploration Method(s): 8.5" OD X 4.25" ID Hollow-Stem Auger	Work Start/Completion Dates: 2/5/2020		Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): 80' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
				Chemically analyzed	Sheen=None Chemical Odor=None	SILTY SAND WITH GRAVEL (SM); very dense, moist, brown; fine to medium sand, trace coarse subround sand; trace fine subround to subangular gravel; faint 1-3" stratification (continued)	
45	25		S13		D&M=41,50 PID=0 Sheen=None Chemical Odor=None	Becomes wet with slow dilatancy	45
50	20		S14	ACDSB2-50 Chemically analyzed	D&M=37,50/5 PID=0 Sheen=None Chemical Odor=None	SANDY SILT (ML); hard, moist, brown; low plasticity; fine to medium with trace coarse sand; fine to coarse subround to subangular gravel; pockets of silty sand Becomes gray	50
55	15		S15		D&M=47,50/6 PID=0 Sheen=None Chemical Odor=None	SANDY SILT (ML); hard, moist, gray; low plasticity; fine to coarse sand; trace fine to coarse gravel; structureless diamict	55
60	10		S16	ACDSB2-60 Chemically analyzed	D&M=27,31,38 PID=0 Sheen=None Chemical Odor=None	Becomes non-plastic with no dilatancy; trace fine sand; no gravel; some interbeds, 0.5-1", of silty sand	60
65	5		S17		D&M=36,37,40 PID=0 Sheen=None Chemical Odor=None	Gently inclined 0.5-1" interbeds of silty sand	65
70	0		S18	ACDSB2-70 Chemically analyzed	D&M=34,50/5 PID=0 Sheen=None Chemical Odor=None	SILTY SAND (SM); very dense, very moist, gray; slow dilatancy ; fine to medium with trace coarse subround to angular sand; faint 0.5-1" interbeds of sandy silt (ML)	70
75	-5		S19		D&M=19,22,29 PID=0 Sheen=None Chemical Odor=None	Becomes dense, wet; low sample recovery due to heave	75
80	-10	∇ 2/5/2020	S20	ACDSB2-80 Chemically analyzed	D&M=11,25,29 PID=0 Sheen=None Chemical	Becomes fine with some medium sand	80

Legend

Sample Type:
- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)
- Split Barrel 3.25" X 2.375" (D&M)

Water Level:
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-DSB-02

Grand Street Commons - 170304		Environmental Exploration Log	
Project Address & Site Specific Location Rainier Ave S & S Grand St, Seattle, Washington, Gravel lot west of 22nd Ave S		*Coordinates (SPN NAD83 ft)* E:1277300 N:217760 (est)	*Exploration Number* **AC-DSB-02**
Contractor Cascade Drilling	*Equipment* CME 75	*Sampling Method* Autohammer to 20', downhole 300-lb jars to bottom	*Ground Surface Elev. (NAVD88)* 71' (est)
Operator James Goble	*Exploration Method(s)* 8.5" OD X 4.25" ID Hollow-Stem Auger	*Work Start/Completion Dates* 2/5/2020	*Top of Casing Elev. (NAVD88)* NA / *Depth to Water (Below GS)* 80' (ATD)

Depth (feet)	Elev. (feet)	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
				Odor=None	SILTY SAND (SM); very dense, very moist, gray; slow dilatancy ; fine to medium with trace coarse subround to angular sand; faint 0.5-1" interbeds of sandy silt (ML) (continued)
85	-15	S21		D&M=19,25,39 PID=0 Sheen=None Chemical Odor=None	Becomes very dense; low sample recovery due to heave
90	-20	S22	ACDSB2-90 Chemically analyzed	D&M=23,50/6 PID=0 Sheen=None Chemical Odor=None	Sample is likely all heave
95	-25	S23		D&M=29,30,39 PID=0 Sheen=None Chemical Odor=None	Becomes fine with trace medium sand
100	-30	S24	ACDSB2-100 Chemically analyzed	D&M=15,32,27 PID=0 Sheen=None Chemical Odor=None	
					Bottom of exploration at 101.5 ft. bgs.
105	-35				
110	-40				
115	-45				
120	-50				

Legend

Sample Type
- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)
- Split Barrel 3.25" X 2.375" (D&M)

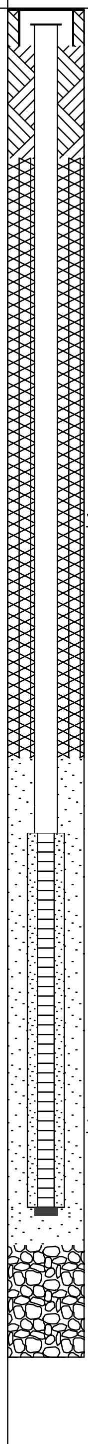
Water Level
- Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-DSB-02

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location Rainier Ave S & S Grand St, Seattle, Washington, Gravel lot west of 22nd Ave S			*Coordinates (SPN NAD83 ft)* E:1277300 N:217570	*Exploration Number* **AC-MW-21**
Contractor Cascade Drilling	*Equipment* CME 75	*Sampling Method* Downhole jars; 300-lb hammer, 30-inch drop		*Ground Surface Elev. (NAVD88)* 68.8'	Ecology Well Tag No. BLK616
Operator Weseley Kennedy	*Exploration Method(s)* 8.5" OD X 4.25" ID Hollow-Stem Auger	*Work Start/Completion Dates* 2/8/2020		*Top of Casing Elev. (NAVD88)* 68.41'	*Depth to Water (Below GS)* 13.83' (Static)



Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description
0		Flush well box in concrete, expansion plug					ASPHALT; over base course
							FILL SILTY SAND WITH GRAVEL (SM); medium dense, moist, brown; fine to coarse sand; fine to coarse gravel; trace cobbles; observations made from soil cuttings. Tree roots from 1-2'. Vacuum excavated to 5'.
	65						
5			S1	ACMW21-5 Chemically analyzed	Blows (non-SPT)=13,15,14 PID=0 Sheen=None Chemical Odor=None		**GLACIALLY CONSOLIDATED SOIL** SAND WITH SILT (SP-SM); medium dense, moist, brown; fine to coarse sand.
	60						
10		Hydrated 3/8" bentonite chips 4-20 ft.	S2		Blows (non-SPT)=16,21,22 PID=0 Sheen=None Chemical Odor=None		Becomes dense and slightly moist.
	55	▼ 3/1/2020					
15			S3	ACMW21-15 Chemically analyzed	Blows (non-SPT)=48,50/5" PID=0 Sheen=None Chemical Odor=None		SILTY SAND WITH GRAVEL (SM); very dense, very moist, brown; fine sand; diamict. Becomes moist.
	50						
20			S4		Blows (non-SPT)=49,50/6" PID=0 Sheen=None Chemical Odor=None		SANDY SILT WITH GRAVEL (ML); hard, moist, brown; fine to coarse sand; fine to coarse gravel.
		#2/12 sand 20-33 ft.					
	45						
25			S5		Blows (non-SPT)=100/12" PID=0 Sheen=None Chemical Odor=None		Becomes slightly moist.
		0.010" slot prepacked screen 22-32 ft.					
	40						
30		▽ 2/8/2020	S6		Blows (non-SPT)=100/11" PID=0 Sheen=None Chemical Odor=None		Becomes moist and gray brown with faint stratification and mottled texture. Wood (tree branch) fragments.
		Threaded cap					
	35						
35		Slough	S7		Blows (non-SPT)=38,50/6" PID=0 Sheen=None Chemical Odor=None		SILT WITH SAND (ML); hard, moist, gray; fine to coarse sand; little fine to coarse gravel.
							Bottom of exploration at 36 ft. bgs.
	30						
40							

Legend

Sample Type: Split Barrel 3.25" X 2.375" (D&M)

Water Level: ▼ Static Water Level; ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-MW-21

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location Rainier Ave S & S Grand St, Seattle, Washington, Northwest corner of SCC shop.			*Coordinates (SPN NAD83 ft)* E:1277300 N:217810	*Exploration Number* **AC-MW-29**
Contractor Cascade Drilling	*Equipment* CME 55	*Sampling Method* Autohammer; 140 lb hammer; 30" drop		*Ground Surface Elev. (NAVD88)* 70.5'	Ecology Well Tag No. BLK607
Operator James Goble	*Exploration Method(s)* 8.5" OD X 4.25" ID Hollow-Stem Auger	*Work Start/Completion Dates* 2/22/2020		*Top of Casing Elev. (NAVD88)* 70'	*Depth to Water (Below GS)* 15.06' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	70	Flush well box in concrete, expansion plug				CONCRETE; shop floor. **FILL** GRAVEL WITH SILT (GP-GM); base course. SILTY SAND (SM); medium dense, dry, brown; fine sand.
			S1		SPT=6,7,7 PID=0 Sheen=None Chemical Odor=None	
5	65	Hydrated 3/8" bentonite chips 4-8 ft.	S2	ACMW29-5 Chemically analyzed	SPT=8,13,14 PID=0 Sheen=None Chemical Odor=None	**GLACIAL RECESSIONAL DEPOSITS** SANDY SILT (ML); very stiff, moist, brown; charcoal and wood fragments.
		#2/12 sand 8-30.3 ft.	S3		SPT=5,7,8 PID=0 Sheen=None Chemical Odor=None	SILT (MH); stiff, moist, mottled gray to brown; medium plasticity; thin laminae of silt. Becomes very moist.
10	60	0.010" slot prepacked screen 10-30 ft.	S4	ACMW29-10 Chemically analyzed	SPT=4,5,9 PID=0 Sheen=None Chemical Odor=None	Becomes moist and brown with low plasticity, trace fine sand, and fine laminae of silt.
			S5		SPT=10,12,12 PID=0 Sheen=None Chemical Odor=None	SAND WITH SILT (SP-SM); medium dense, very moist, brown; fine to medium sand; interbeds of silty sand.
15	55	3/1/2020 (static water level)	S6	ACMW29-15 Chemically analyzed	SPT=8,10,13 PID=0 Sheen=None Chemical Odor=None	SILTY SAND (SM); medium dense, very moist, gray; fine to medium sand; faint 1-3" deformed stratification.
			S7		SPT=10,10,11 PID=0 Sheen=None Chemical Odor=None	Becomes wet and brown with 1-2" beds of fine to medium and fine sand.
20	50	2/22/2020 (water level ATD)	S8	ACMW29-20 Chemically analyzed	SPT=18,16,16 PID=0 Sheen=None Chemical Odor=None	**GLACIALLY CONSOLIDATED SOIL** SAND WITH SILT (SP-SM); dense, wet, brown and gray; thin beds of silt (ML).
25	45		S9		SPT=22,50/5" PID=0 Sheen=None Chemical Odor=None	SILTY SAND (SM); very dense, moist, brown to gray; fine to medium sand; 1-3" beds of sandy silt (ML) and silty sand (SM).
30	40	Threaded cap	S10	ACMW29-30 Chemically analyzed	SPT=50/4" PID=0 Sheen=None Chemical Odor=None	SILTY SAND WITH GRAVEL (SM); very dense, moist, brown; fine to coarse sand; fine gravel; diamict. Bottom of exploration at 30.3 ft. bgs.
35	35					
40	30					

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Water Level: Static Water Level; Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-MW-29

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\170304 - GRAND STREET_JBM.GPJ October 12, 2020

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location: Rainier Ave S & S Grand St, Seattle, Washington, West Parcel			Coordinates (SPN NAD83 ft): E:1277200 N:217720	Exploration Number: AC-MW-30
Contractor: Cascade Drilling	Equipment: CME 75	Sampling Method: Downhole jars; 300-lb hammer, 30-inch drop		Ground Surface Elev. (NAVD88): 69.3'	Ecology Well Tag No. BLK617
Operator: James Goble	Exploration Method(s): 8.5" OD X 4.25" ID Hollow-Stem Auger	Work Start/Completion Dates: 2/9/2020		Top of Casing Elev. (NAVD88): 68.98'	Depth to Water (Below GS): 14.02' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	69.3	Flush well box in concrete, expansion plug				ASPHALT; with base course
						TOPSOIL SILTY SAND (SM); loose, moist, brown; fine to coarse sand; observations from soil cuttings.
5	65		S1	ACMW30-5 Chemically analyzed	SPT=4,5,5 PID=0 Sheen=None Chemical Odor=None	Becomes very moist and brown; tree root.
		Hydrated 3/8" bentonite chips 4-12 ft.				**GLACIAL RECESSIONAL DEPOSITS** SILT (ML); stiff, moist, gray; fine laminae of silt; iron-oxide staining.
10	60		S2		SPT=4,5,5 PID=0 Sheen=None Chemical Odor=None	CLAY (CL); stiff, moist, light brown; medium plasticity; trace fine sand; fine laminae; red brown iron-oxide staining.
	55	#2/12 sand 12-36.5 ft. ▼ 3/1/2020				
15			S3		SPT=7,9,10 PID=0 Sheen=None Chemical Odor=None	SILTY SAND WITH GRAVEL (SM); medium dense, very moist, brown; fine to coarse sand; fine to coarse gravel; trace fine organics; pockets of mottled silty sand and sandy silt; red brown iron-oxide staining.
20	50	0.010" slot screen 14-36 ft.	S4		SPT=16,29,30 PID=0 Sheen=None Chemical Odor=None	**GLACIALLY CONSOLIDATED SOIL** SILTY SAND WITH GRAVEL (SM); very dense, moist, brown; fine to coarse sand.
25	45	▽ 2/9/2020	S5		SPT=41,50/5" PID=0 Sheen=None Chemical Odor=None	Becomes slightly moist. Becomes wet.
30	40		S6		SPT=29,30,33 PID=0 Sheen=None Chemical Odor=None	Becomes moist to very moist.
35	35	Threaded cap	S7		SPT=27,29,31 PID=0 Sheen=None Chemical Odor=None	
						Bottom of exploration at 36.5 ft. bgs.
40	30					

Legend

Sample Type: Split Barrel 2" X 1.375" (SPT)

Water Level: ▼ Static Water Level; ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-MW-30

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\170304 - GRAND STREET_JBM.GPJ October 12, 2020

Grand Street Commons - 170304

Environmental Exploration Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Rainier Ave S & S Grand St, Seattle, Washington, NE portion of SCC shop	E:1277300 N:217820 (est)	AC-SB-22

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)
Cascade Drilling	CME 55	Autohammer; 140 lb hammer; 30" drop	70.5' (est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
James Goble	8.5" OD X 4.25" ID Hollow-Stem Auger	2/23/2020	NA	25' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	70	Concrete surface seal				CONCRETE; with base course (shop floor)
						FILL SILTY SAND (SM); medium dense, moist, brown; fine to medium sand.
			S1		SPT=8,11,15 PID=0 Sheen=None Chemical Odor=None	**GLACIALLY CONSOLIDATED SOIL** SILTY SAND (SM); very dense, moist, brown; fine to medium sand
5	65		S2	ACSB22-5.0 Chemically analyzed	SPT=17,18,21 PID=0 Sheen=None Chemical Odor=None	
					SPT=27,50/6" PID=0 Sheen=None Chemical Odor=None	
10	60		S3	ACSB22-10.0 Chemically analyzed	SPT=38,50/4" PID=0 Sheen=None Chemical Odor=None	Grades to with trace gravel.
					SPT=33,50/6" PID=0 Sheen=None Chemical Odor=None	
15	55	Hydrated 3/8" bentonite chips 4 to 35.5 ft.	S4	ACSB22-15.0 Chemically analyzed	SPT=37,50/5" PID=0 Sheen=None Chemical Odor=None	
					SPT=50/6" PID=0 Sheen=None Chemical Odor=None	
20	50		S5	ACSB22-20.0 Chemically analyzed	SPT=50/6" PID=0 Sheen=None Chemical Odor=None	
25	45	∇ 2/23/2020	S6	ACSB22-25.0 Chemically analyzed	SPT=35,38,40 PID=0 Sheen=None Chemical Odor=None	Becomes wet.
30	40		S7	ACSB22-30.0 Chemically analyzed	SPT=50/6" PID=0 Sheen=None Chemical Odor=None	Becomes moist to wet.
35	35		S8		SPT=50/6" PID=0 Sheen=None Chemical Odor=None	Becomes moist with interbeds hard silt.
						Bottom of exploration at 35.5 ft. bgs.
40	30					

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA, 4/28/2020

Exploration Log AC-SB-22

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\170304 - GRAND STREET_JBM.GPJ October 12, 2020

Grand Street Commons - 170304

Environmental Exploration Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Rainier Ave S & S Grand St, Seattle, Washington, SE corner SCC shop	E:1277300 N:217800 (est)	AC-SB-23

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)
Cascade Drilling	CME 55	Autohammer; 140 lb hammer; 30" drop	70.5' (est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
James Goble	8.5" OD X 4.25" ID Hollow-Stem Auger	2/23/2020	NA	22' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	70	Concrete surface seal				CONCRETE; with base course (shop floor)
						FILL SILTY SAND (SM); medium dense, moist, dark brown to brown; fine to medium sand.
			S1		SPT=5,10,13 PID=0 Sheen=None Chemical Odor=None	
5	65		S2	ACSB23-5.0 Chemically analyzed	SPT=10,15,18 PID=0 Sheen=None Chemical Odor=None	**GLACIALLY CONSOLIDATED SOIL** SILT WITH SAND (ML); hard, moist, brown; fine to medium sand.
10	60		S3	ACSB23-10.0 Chemically analyzed	SPT=23,50/6" PID=0 Sheen=None Chemical Odor=None	SILTY SAND (SM); very dense, moist, brown; fine to medium sand.
15	55	Hydrated 3/8" bentonite chips 4 to 31.5 ft.	S4	ACSB23-15.0 Chemically analyzed	SPT=38,50/6" PID=0 Sheen=None Chemical Odor=None	Grades to with trace gravel.
20	50		S5	ACSB23-20.0 Chemically analyzed	SPT=39,50/5" PID=0 Sheen=None Chemical Odor=None	
		∇ 2/23/2020				
25	45		S6	ACSB23-25.0 Chemically analyzed	SPT=23,50/5" PID=0 Sheen=None Chemical Odor=None	Becomes wet with predominantly fine to medium sand.
30	40		S7	ACSB23-30.0 Chemically analyzed	SPT=21,33,50/4" PID=0 Sheen=None Chemical Odor=None	
						Bottom of exploration at 31.3 ft. bgs.
35	35					
40	30					

Legend

Sample Type
- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)

Water Level
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA, 4/28/2020

Exploration Log AC-SB-23

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location: Rainier Ave S & S Grand St, Seattle, Washington, SW corner SCC shop			Coordinates (SPN NAD83 ft): E:1277300 N:217790 (est)	Exploration Number: AC-SB-24
Contractor: Cascade Drilling	Equipment: CME 55	Sampling Method: Autohammer; 140 lb hammer; 30" drop		Ground Surface Elev. (NAVD88): 70.5' (est)	
Operator: James Goble	Exploration Method(s): 8.5" OD X 4.25" ID Hollow-Stem Auger	Work Start/Completion Dates: 2/22/2020		Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): 15' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
	70	Concrete surface seal				CONCRETE; with base course (shop floor)	
						FILL SILTY SAND (SM); loose, moist, brown to gray; fine to medium sand; 1-2" beds of brown and gray material; has 'topsoil' odor.	
5	65		S1	ACSB24-5 Chemically analyzed	SPT=4,4,3 PID=0 Sheen=None Chemical Odor=None		5
10	60	Hydrated 3/8-inch bentonite chips 4-31 ft	S2	ACSB24-10 Chemically analyzed	SPT=5,5,7 PID=0 Sheen=None Chemical Odor=None	**GLACIAL RECESSIONAL DEPOSITS** SILT (MH); stiff, moist, gray to brown; medium plasticity; thin laminae of silt.	10
15	55	∇ 2/22/2020	S3	ACSB24-15 Chemically analyzed	SPT=9,12,15 PID=0 Sheen=None Chemical Odor=None	SILTY SAND (SM); medium dense, wet, gray; fine to medium sand; 2-3" beds of sandy silt.	15
20	50		S4	ACSB24-20 Chemically analyzed	SPT=13,16,20 PID=0 Sheen=None Chemical Odor=None	**GLACIALLY CONSOLIDATED SOIL** SAND WITH SILT (SP-SM); dense, wet, gray; fine to medium sand; thick laminae and scattered 6" interbeds of sandy silt.	20
25	45		S5	ACSB24-25 Chemically analyzed	SPT=32,50/4" PID=0 Sheen=None Chemical Odor=None	Becomes very dense.	25
30	40		S6	ACSB24-30 Chemically analyzed	SPT=27,50/5" PID=0 Sheen=None Chemical Odor=None	SILTY SAND (SM); very dense, moist, brown; fine to medium sand; diamict.	30
						Bottom of exploration at 30.9 ft. bgs.	
35	35						35
40	30						40

Legend

Sample Type: Split Barrel 2" X 1.375" (SPT)

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: MvA
Approved by: MvA, 4/28/2020

Exploration Log AC-SB-24

Sheet 1 of 1

PRESENTATION OF SITE INVESTIGATION RESULTS

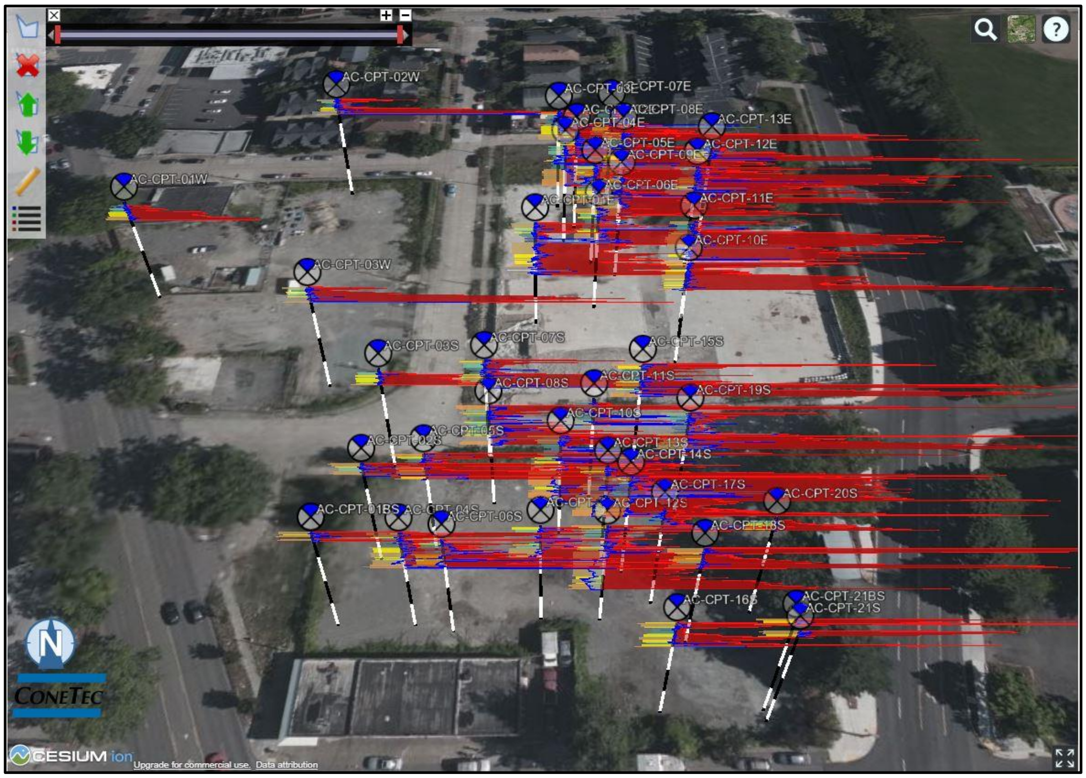
Grand Street Commons

Prepared for:

Aspect Consulting

ConeTec Job No: 20-59-21343

Project Start Date: 10-Sep-2020
Project End Date: 14-Sep-2020
Report Date: 25-Sep-2020



Prepared by:

ConeTec Inc.
1508 O Street SW, Unit 103-104
Auburn, WA 98001

Tel: (253) 397-4861

ConeTecWA@conetec.com
www.conetec.com
www.conetecdataservices.com

Introduction

The enclosed report presents the results of the site investigation program conducted by ConeTec Inc. for Aspect Consulting at 1818 Rainier Ave S, Seattle, WA, 98144. The program consisted of cone penetration tests.

Project Information

Project	
Client	Aspect Consulting
Project	Grand Street Commons
ConeTec project number	20-59-21343

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

Rig Description	Deployment System	Test Type
C20-30Ton Truck 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 (psi/bar)
661:T1500F15U35	661	15	225	1500	15	35bar
536:T1500F15U500	536	15	225	1500	15	500psi
595:T1500F15U500	595	15	225	1500	15	500psi
The CPTu summary indicates which cone was used for each sounding						

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 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.

Sampling	
Depth reference	Depths are referenced to the existing ground surface at the time of each sample collection.

Limitations

This report has been prepared for the exclusive use of Aspect Consulting (Client) for the project titled "Grand Street Commons". 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.

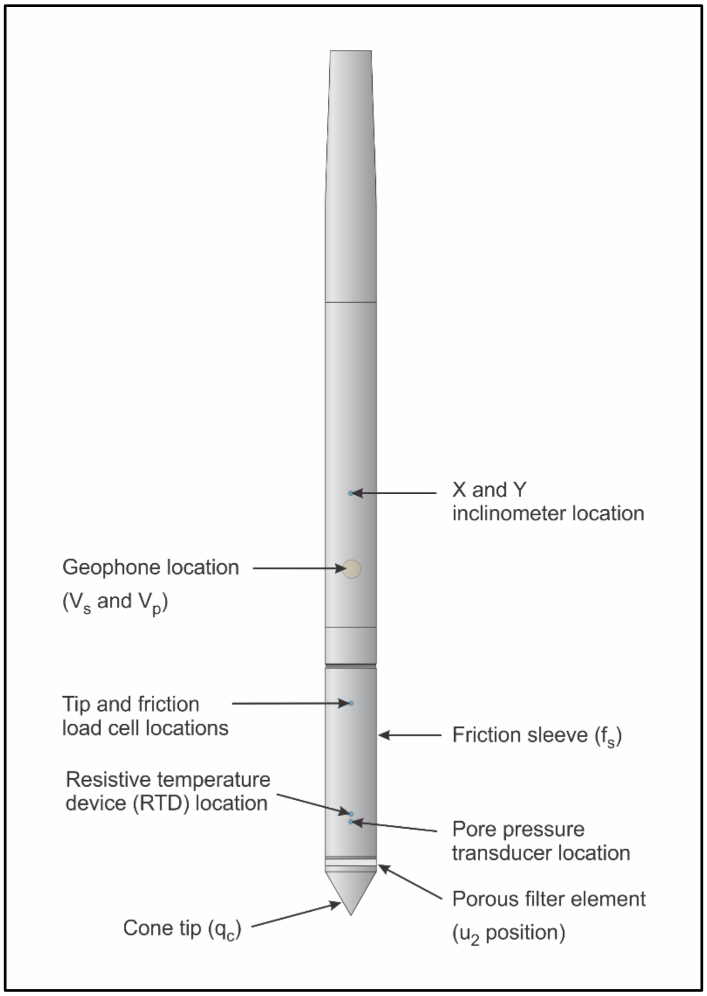


Figure CPTu. Piezocone Penetrometer (15 cm^2)

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).

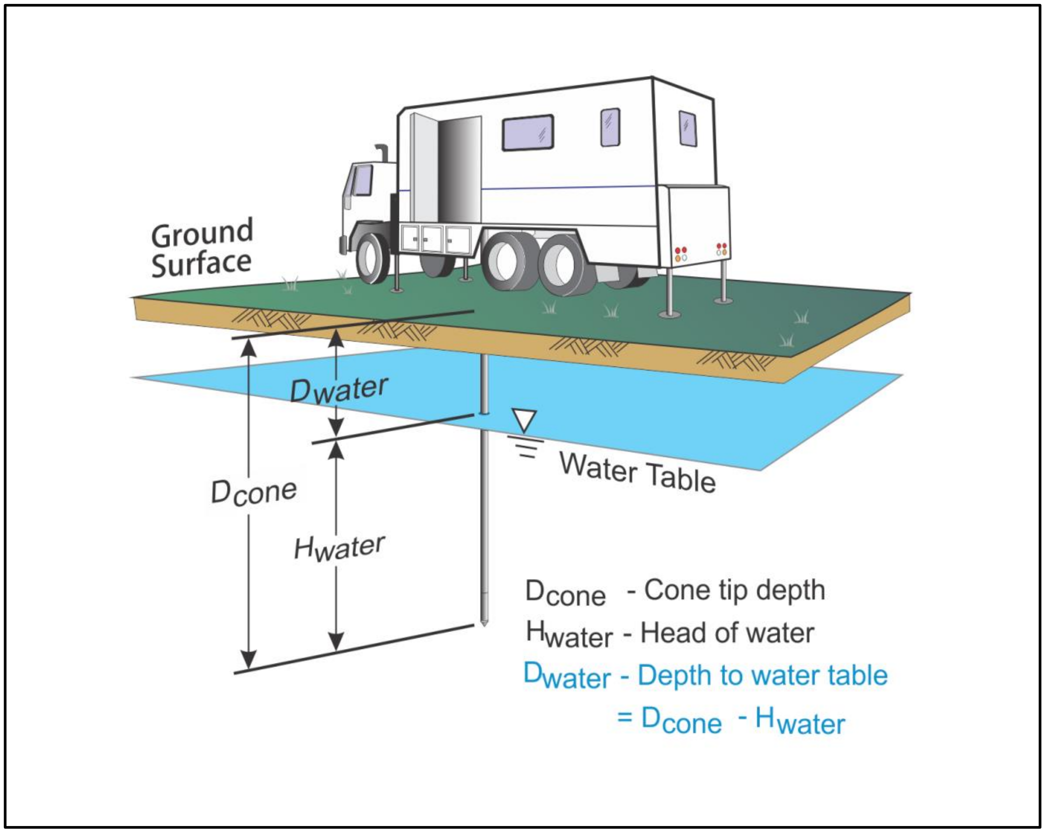


Figure PPD-1. Pore pressure dissipation test setup

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.

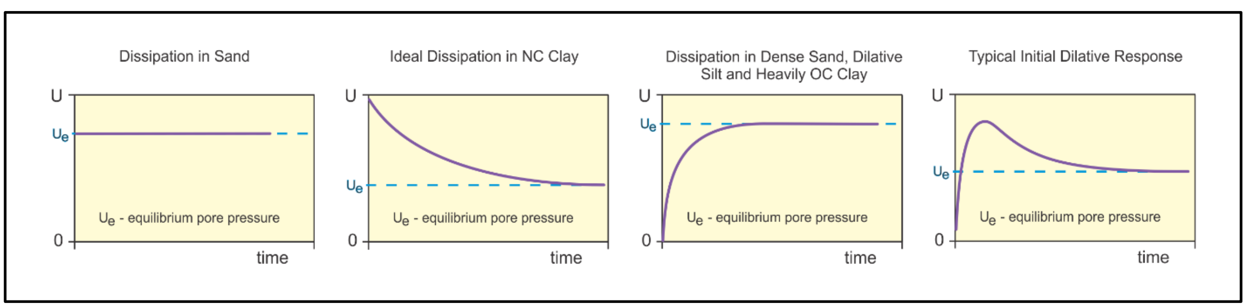


Figure PPD-2. Pore pressure dissipation curve examples

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: 20-59-21343
Client: Aspect Consulting
Project: Grand Street Commons
Start Date: 10-Sep-2020
End Date: 14-Sep-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface (ft)	Final Depth (ft)	Latitude[5] (deg)	Longitude[5] (deg)	Refer to Notation Number
AC-CPT-01E	20-59-21343_CP01E	14-Sep-2020	661:T1500F15U35		33.46	47.58718	-122.30365	4
AC-CPT-01S	20-59-21343_CP01S	23-Sep-2019	536:T1500F15U500		3.12	47.58656	-122.30405	4
AC-CPT-01BS	20-59-21343_CP01BS	23-Sep-2019	536:T1500F15U500		5.74	47.58656	-122.30405	4
AC-CPT-01W	20-59-21343_CP01W	23-Sep-2019	536:T1500F15U500		11.65	47.58728	-122.30473	4
AC-CPT-02E	20-59-21343_CP02E	24-Sep-2019	595:T1500F15U500		16.16	47.58747	-122.30353	4
AC-CPT-02S	20-59-21343_CP02S	11-Sep-2020	661:T1500F15U35		7.79	47.58667	-122.30398	4
AC-CPT-02W	20-59-21343_CP02W	14-Sep-2020	661:T1500F15U35		9.92	47.58762	-122.30424	4
AC-CPT-03E	20-59-21343_CP03E	14-Sep-2020	661:T1500F15U35		19.69	47.58755	-122.30358	4
AC-CPT-03S	20-59-21343_CP03S	23-Sep-2019	536:T1500F15U500		10.09	47.58685	-122.30398	4
AC-CPT-03W	20-59-21343_CP03W	14-Sep-2020	661:T1500F15U35		9.35	47.58702	-122.30418	4
AC-CPT-04E	20-59-21343_CP04E	14-Sep-2020	661:T1500F15U35		26.903	47.58743	-122.30356	4
AC-CPT-04S	20-59-21343_CP04S	11-Sep-2020	661:T1500F15U35	19.2	23.458	47.58656	-122.30389	2
AC-CPT-05E	20-59-21343_CP05E	14-Sep-2020	661:T1500F15U35		24.688	47.58736	-122.30348	4
AC-CPT-05S	20-59-21343_CP05S	11-Sep-2020	661:T1500F15U35		16.24	47.58669	-122.30386	4
AC-CPT-06E	20-59-21343_CP06E	14-Sep-2020	661:T1500F15U35		23.458	47.58722	-122.30348	4
AC-CPT-06S	20-59-21343_CP06S	23-Sep-2019	536:T1500F15U500		17.634	47.58655	-122.30381	4
AC-CPT-07E	20-59-21343_CP07E	14-Sep-2020	661:T1500F15U35		19.931	47.58756	-122.30343	4
AC-CPT-07S	20-59-21343_CP07S	11-Sep-2020	661:T1500F15U35		17.224	47.58687	-122.30375	4

Job No: 20-59-21343
Client: Aspect Consulting
Project: Grand Street Commons
Start Date: 10-Sep-2020
End Date: 14-Sep-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface (ft)	Final Depth (ft)	Latitude[5] (deg)	Longitude[5] (deg)	Refer to Notation Number
AC-CPT-08E	20-59-21343_CP08E	14-Sep-2020	661:T1500F15U35	25.0	37.155	47.58747	-122.30340	3
AC-CPT-08S	20-59-21343_CP08S	11-Sep-2020	661:T1500F15U35	18.7	24.606	47.58677	-122.30374	
AC-CPT-09E	20-59-21343_CP09E	24-Sep-2019	595:T1500F15U500		24.688	47.58732	-122.30342	4
AC-CPT-09S	20-59-21343_CP09S	23-Sep-2019	536:T1500F15U500	18.4	21.489	47.58657	-122.30363	
AC-CPT-10E	20-59-21343_CP10E	14-Sep-2020	661:T1500F15U35		16.896	47.58707	-122.30328	4
AC-CPT-10S	20-59-21343_CP10S	11-Sep-2020	661:T1500F15U35	18.4	43.307	47.58672	-122.30359	
AC-CPT-11E	20-59-21343_CP11E	14-Sep-2020	661:T1500F15U35		25.016	47.58718	-122.30325	4
AC-CPT-11S	20-59-21343_CP11S	23-Sep-2019	536:T1500F15U500		15.994	47.58678	-122.30352	4
AC-CPT-12E	20-59-21343_CP12E	14-Sep-2020	661:T1500F15U35		17.798	47.58735	-122.30321	4
AC-CPT-12S	20-59-21343_CP12S	10-Sep-2020	661:T1500F15U35	19.5	42.896	47.58657	-122.30351	
AC-CPT-13E	20-59-21343_CP13E	14-Sep-2020	661:T1500F15U35		12.303	47.58742	-122.30316	4
AC-CPT-13S	20-59-21343_CP13S	24-Sep-2019	595:T1500F15U500	19.9	33.382	47.58667	-122.30350	
AC-CPT-14S	20-59-21343_CP14S	11-Sep-2020	661:T1500F15U35	19.2	25.016	47.58665	-122.30346	2
AC-CPT-15S	20-59-21343_CP15S	11-Sep-2020	661:T1500F15U35	19.2	19.767	47.58684	-122.30341	2
AC-CPT-16S	20-59-21343_CP16S	10-Sep-2020	661:T1500F15U35		15.83	47.58643	-122.30340	4
AC-CPT-17S	20-59-21343_CP17S	23-Sep-2019	536:T1500F15U500		14.354	47.58659	-122.30340	4
AC-CPT-18S	20-59-21343_CP18S	11-Sep-2020	661:T1500F15U35		12.631	47.58653	-122.30334	4
AC-CPT-19S	20-59-21343_CP19S	11-Sep-2020	661:T1500F15U35	19.2	22.638	47.58675	-122.30333	2

CONETEC	Job No:	20-59-21343
	Client:	Aspect Consulting
	Project:	Grand Street Commons
	Start Date:	10-Sep-2020
	End Date:	14-Sep-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface (ft)	Final Depth (ft)	Latitude[5] (deg)	Longitude[5] (deg)	Refer to Notation Number
AC-CPT-20S	20-59-21343_CP20S	23-Sep-2019	536:T1500F15U500		8.858	47.58657	-122.30320	4
AC-CPT-21S	20-59-21343_CP21S	10-Sep-2020	661:T1500F15U35		3.36	47.58641	-122.30320	4
AC-CPT-21BS	20-59-21343_CP21BS	10-Sep-2020	661:T1500F15U35		3.61	47.58643	-122.30321	4
	39 soundings				738.10			

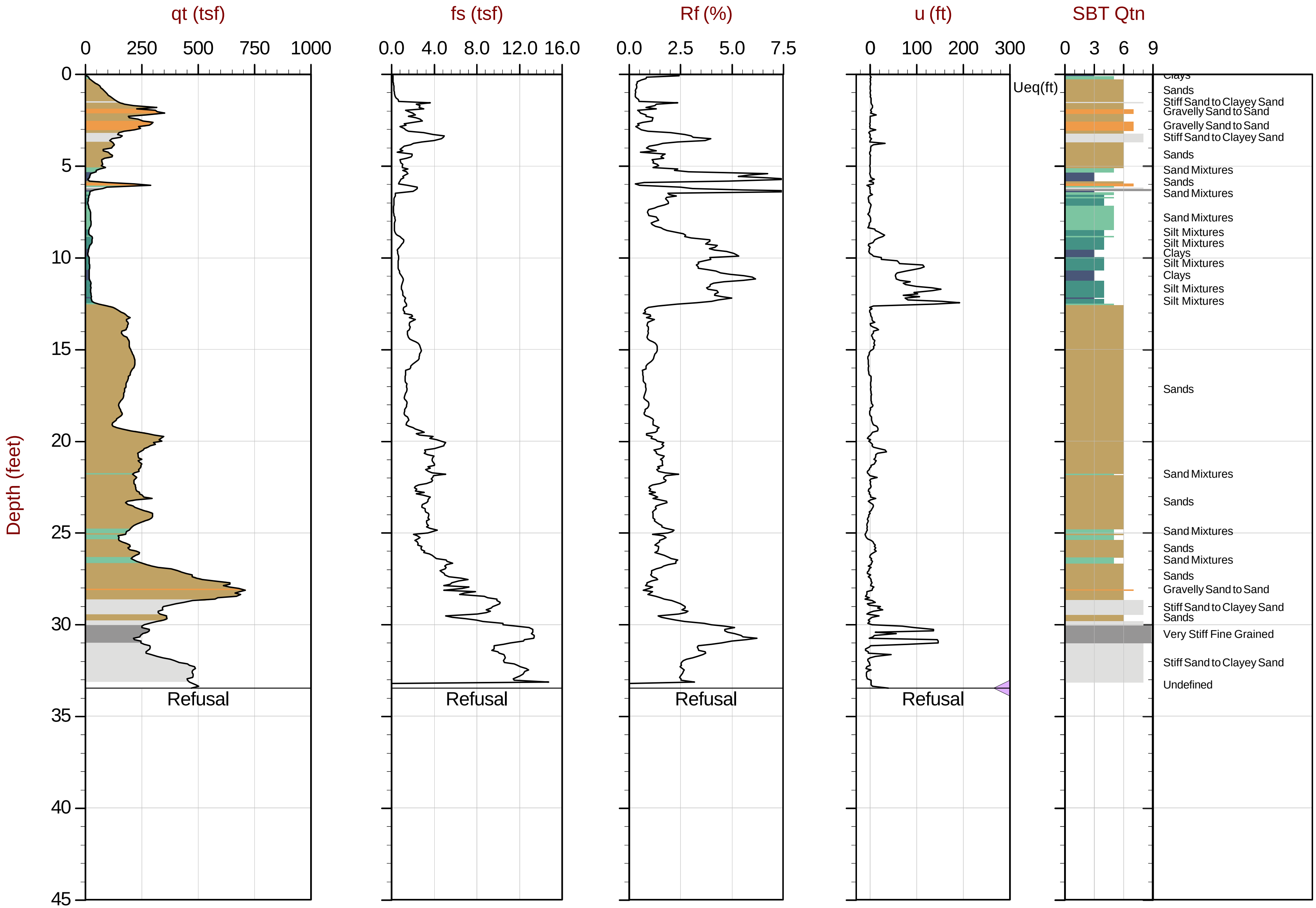
1. Phreatic surface based on pore pressure dissipation test unless otherwise noted. Hydrostatic profile applied to interpretation tables
2. Phreatic surface based on adjacent CPT dissipation test. Hydrostatic profile applied to interpretation tables
3. Phreatic surface based on CPT profile Hydrostatic profile applied to interpretation tables
4. Phreatic surface assumed to be beyond final test depth
5. Coordinates were collected using a handheld GPS - WGS 84 Lat/Long

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 13:29
Site: Grand Street Commons

Sounding: AC-CPT-01E
Cone: 661:T1500F15U35



Max Depth: 10.200 m / 33.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58718 Long: -122.30365

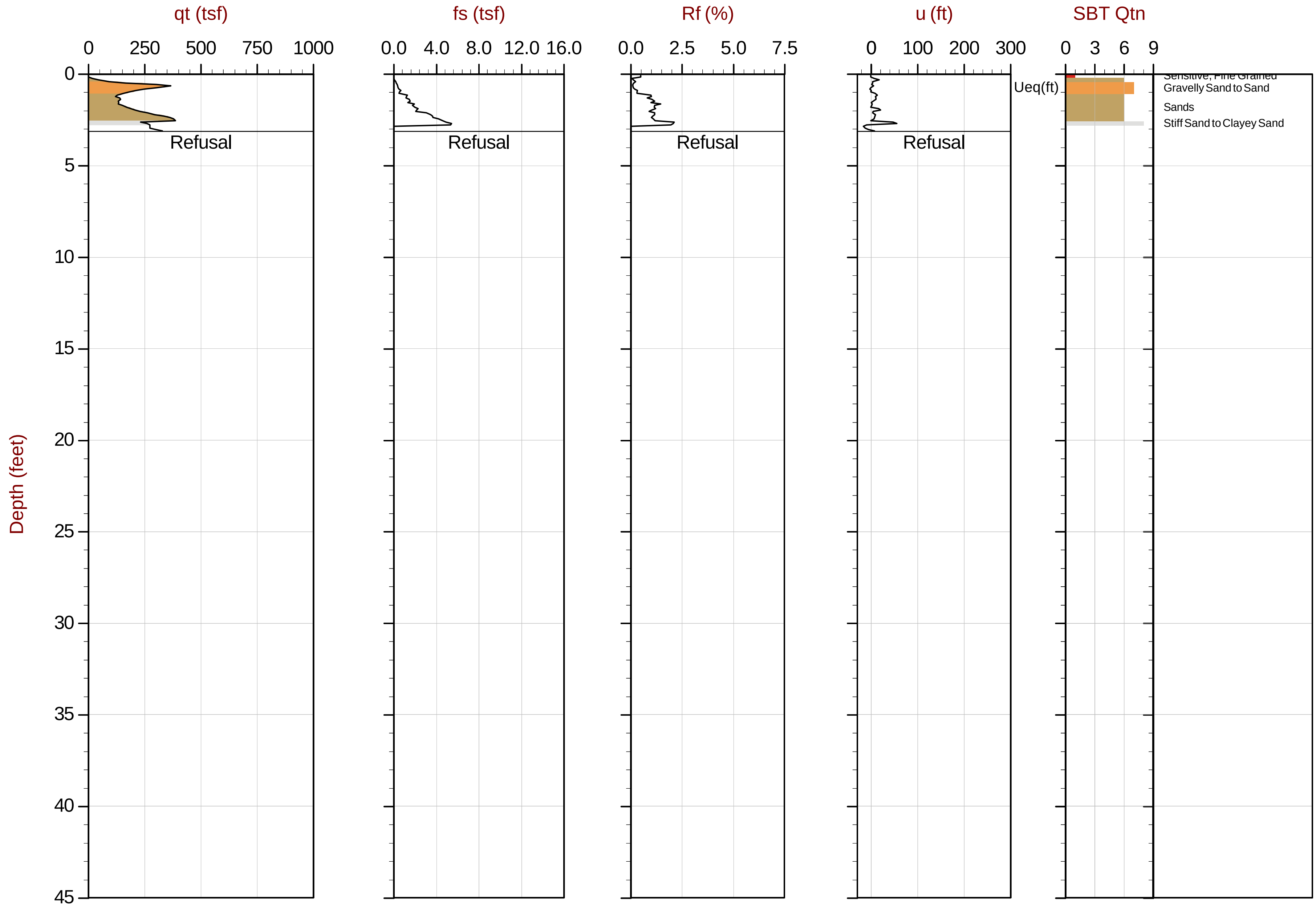
Equilibrium Pore Pressure (Ueq) · Assumed Ueq · Dissipation, Ueq achieved · Dissipation, Ueq not achieved · Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 07:41
Site: Grand Street Commons

Sounding: AC-CPT-01S
Cone: 536:T1500F15U500



Max Depth: 0.950 m / 3.12 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30405

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

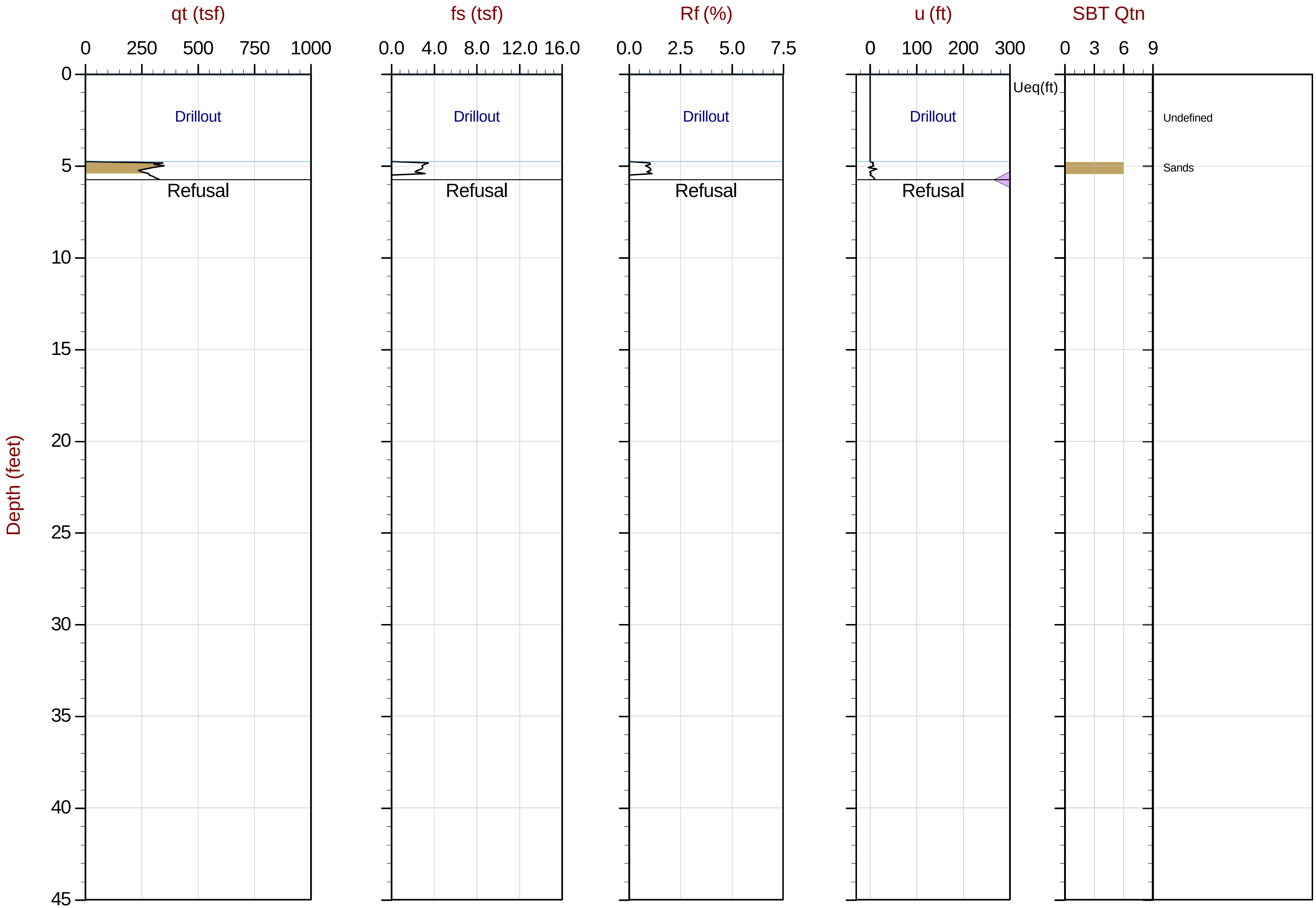
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 08:18
Site: Grand Street Commons

Sounding: AC-CPT-01BS
Cone: 536:T1500F15U500



Max Depth: 1.750 m / 5.74 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01BS.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30405

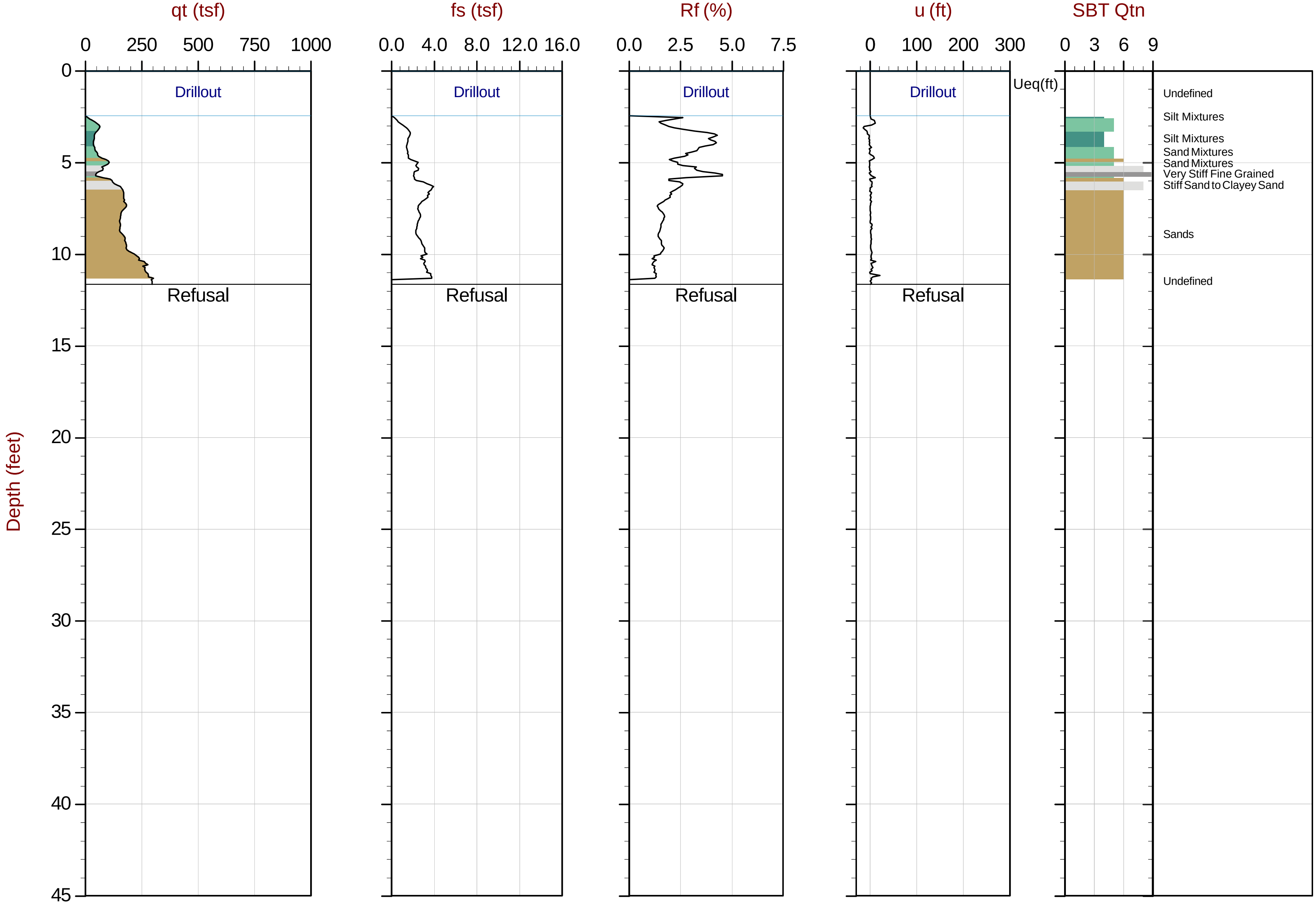
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 16:36
Site: Grand Street Commons
Sounding: AC-CPT-01W
Cone: 536:T1500F15U500



Max Depth: 3.550 m / 11.65 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01W.COR
Unit Wt: SBTQtn (PKR2009)

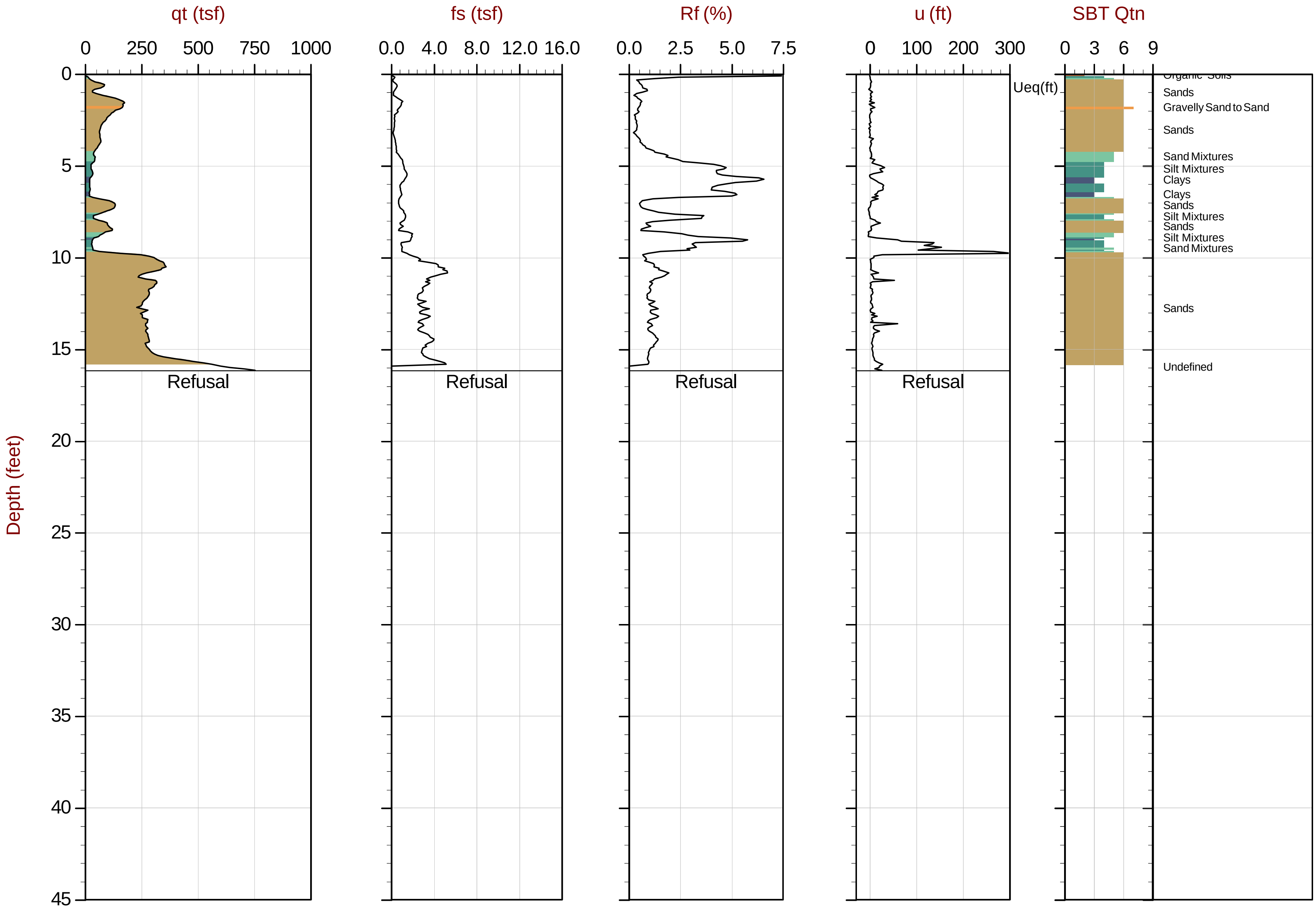
SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58728 Long: -122.30473

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.

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 14:10
Site: Grand Street Commons
Sounding: AC-CPT-02E
Cone: 595:T1500F15U500



Max Depth: 4.925 m / 16.16 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP02E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58747 Long: -122.30353

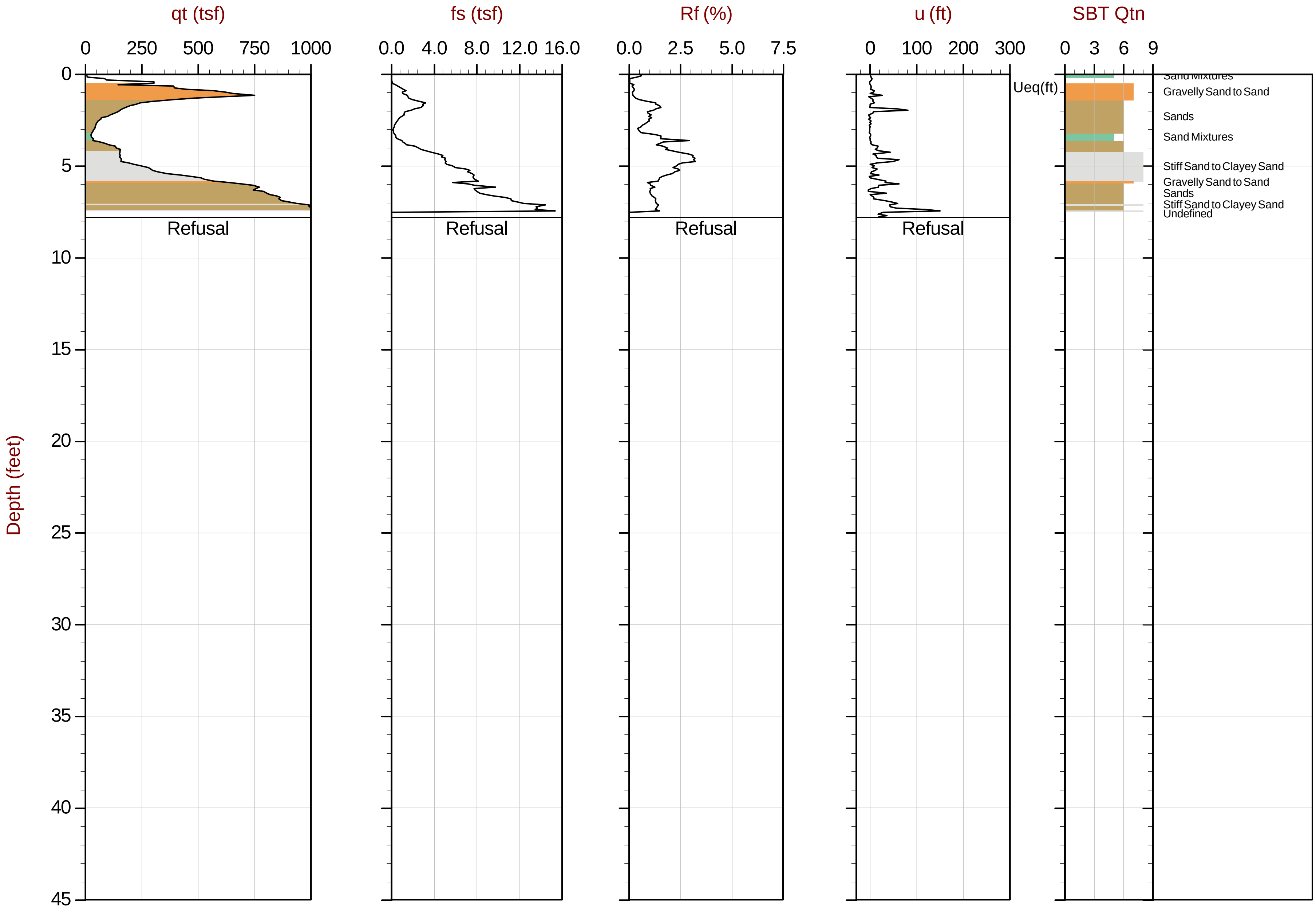
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 11:13
Site: Grand Street Commons
Sounding: AC-CPT-02S
Cone: 661:T1500F15U35



Max Depth: 2.375 m / 7.79 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP02S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58667 Long: -122.30398

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

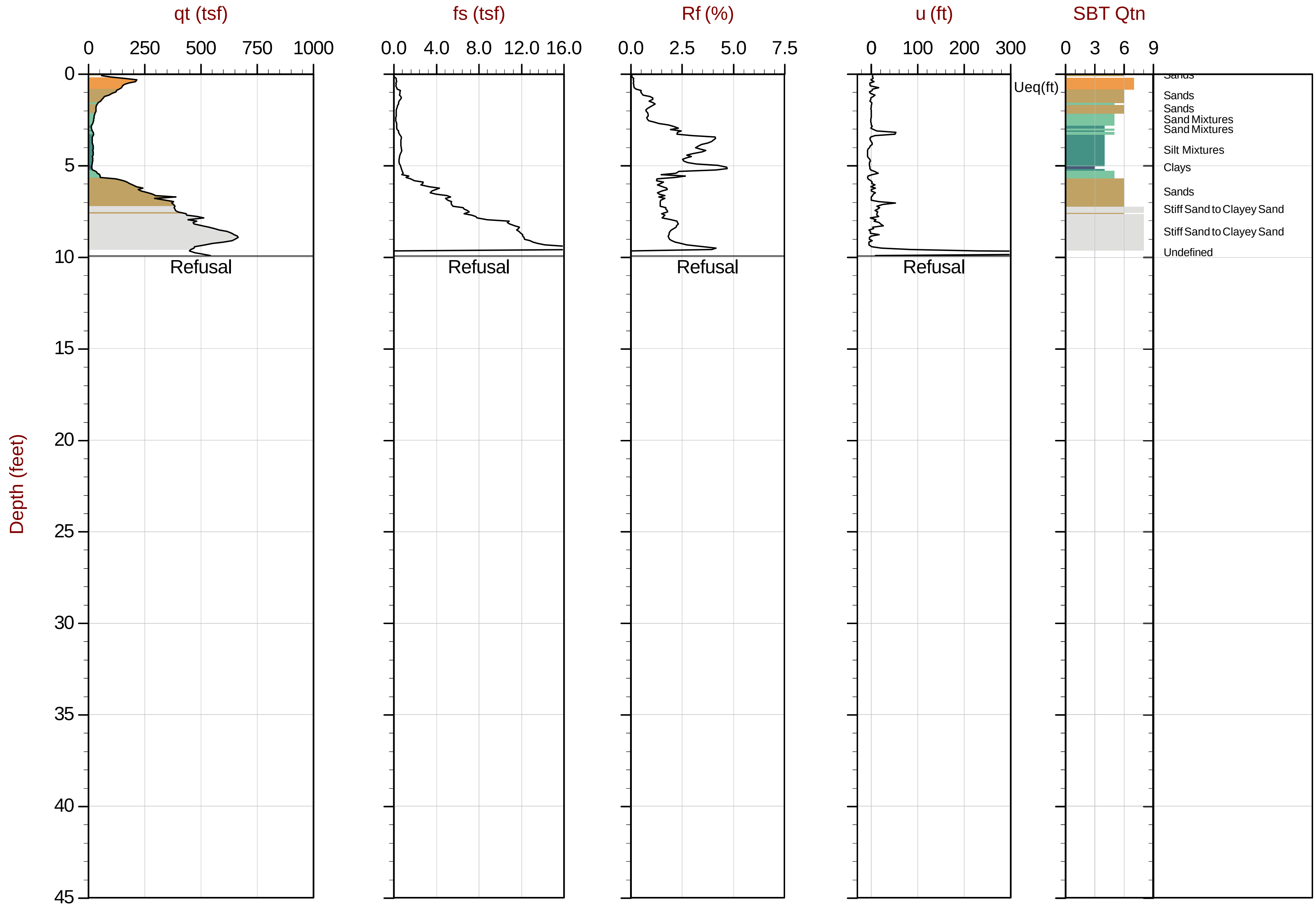
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 14:26
Site: Grand Street Commons

Sounding: AC-CPT-02W
Cone: 661:T1500F15U35



Max Depth: 3.025 m / 9.92 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP02W.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58761 Long: -122.30424

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

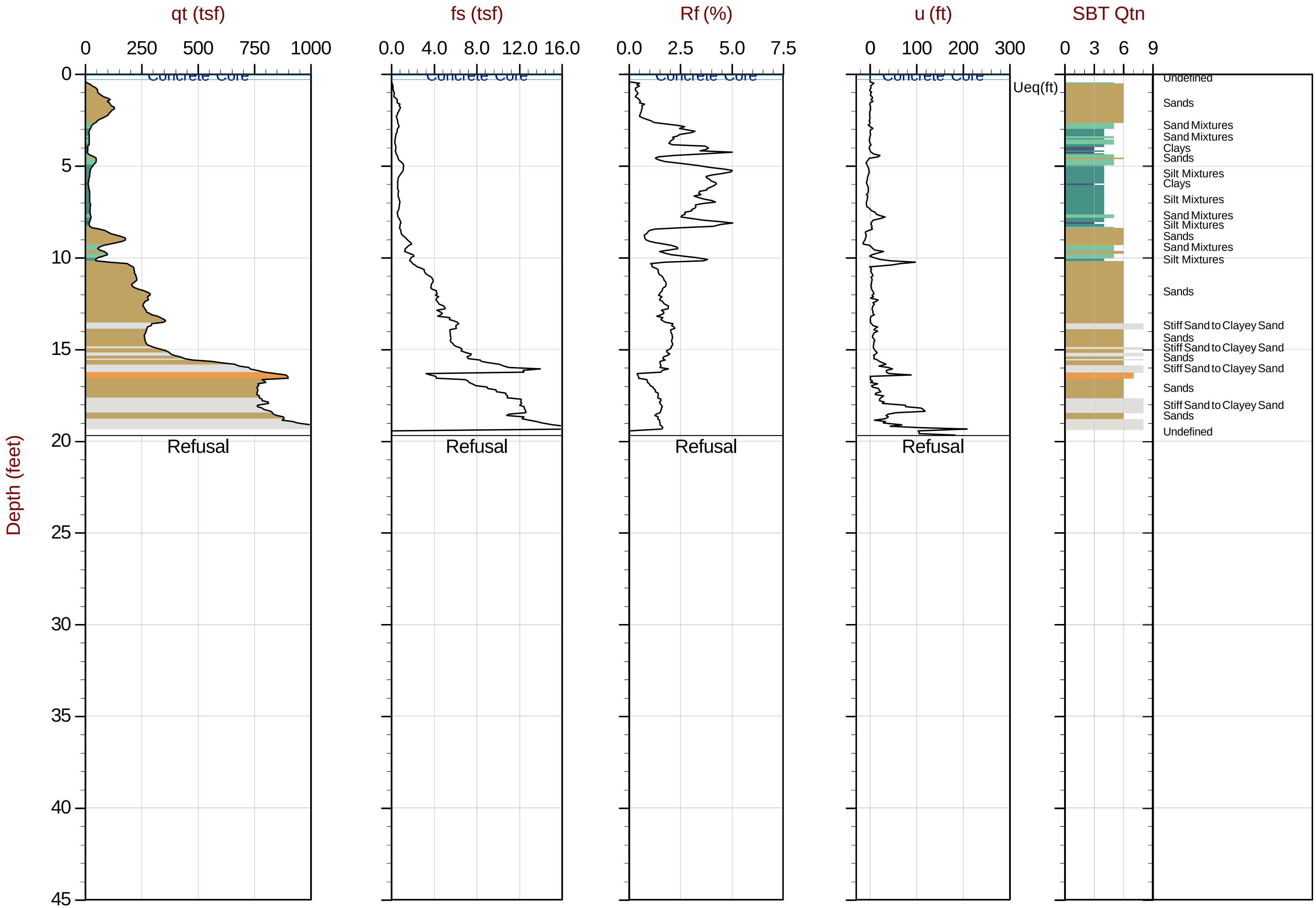
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 12:52
Site: Grand Street Commons

Sounding: AC-CPT-03E
Cone: 661:T1500F15U35



Max Depth: 6.000 m / 19.68 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP03E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58755 Long: -122.30358

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

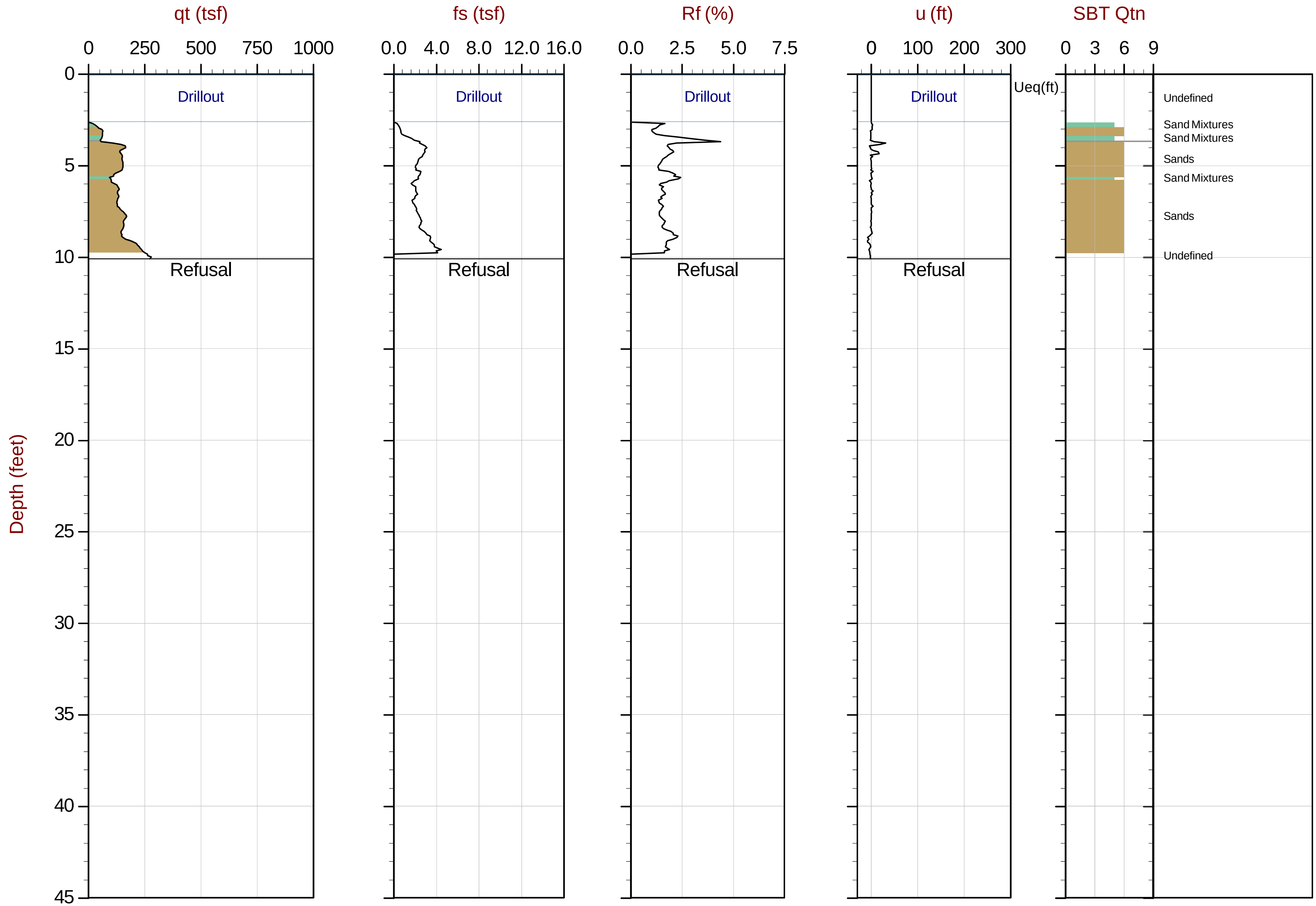
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 15:37
Site: Grand Street Commons

Sounding: AC-CPT-03S
Cone: 536:T1500F15U500



Max Depth: 3.075 m / 10.09 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP03S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58685 Long: -122.30398

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

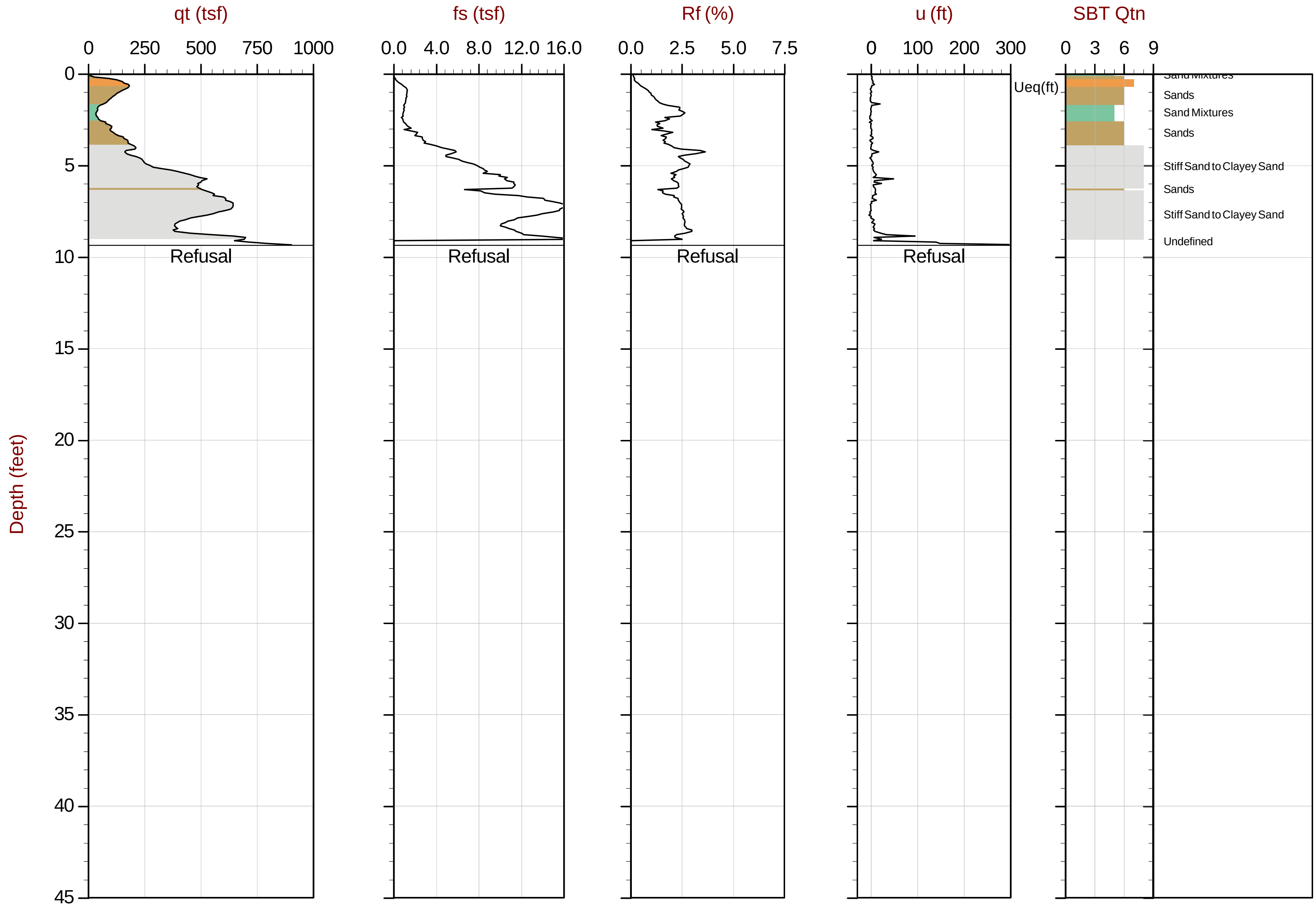
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 14:50
Site: Grand Street Commons

Sounding: AC-CPT-03W
Cone: 661:T1500F15U35



Max Depth: 2.850 m / 9.35 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP03W.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58702 Long: -122.30418

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

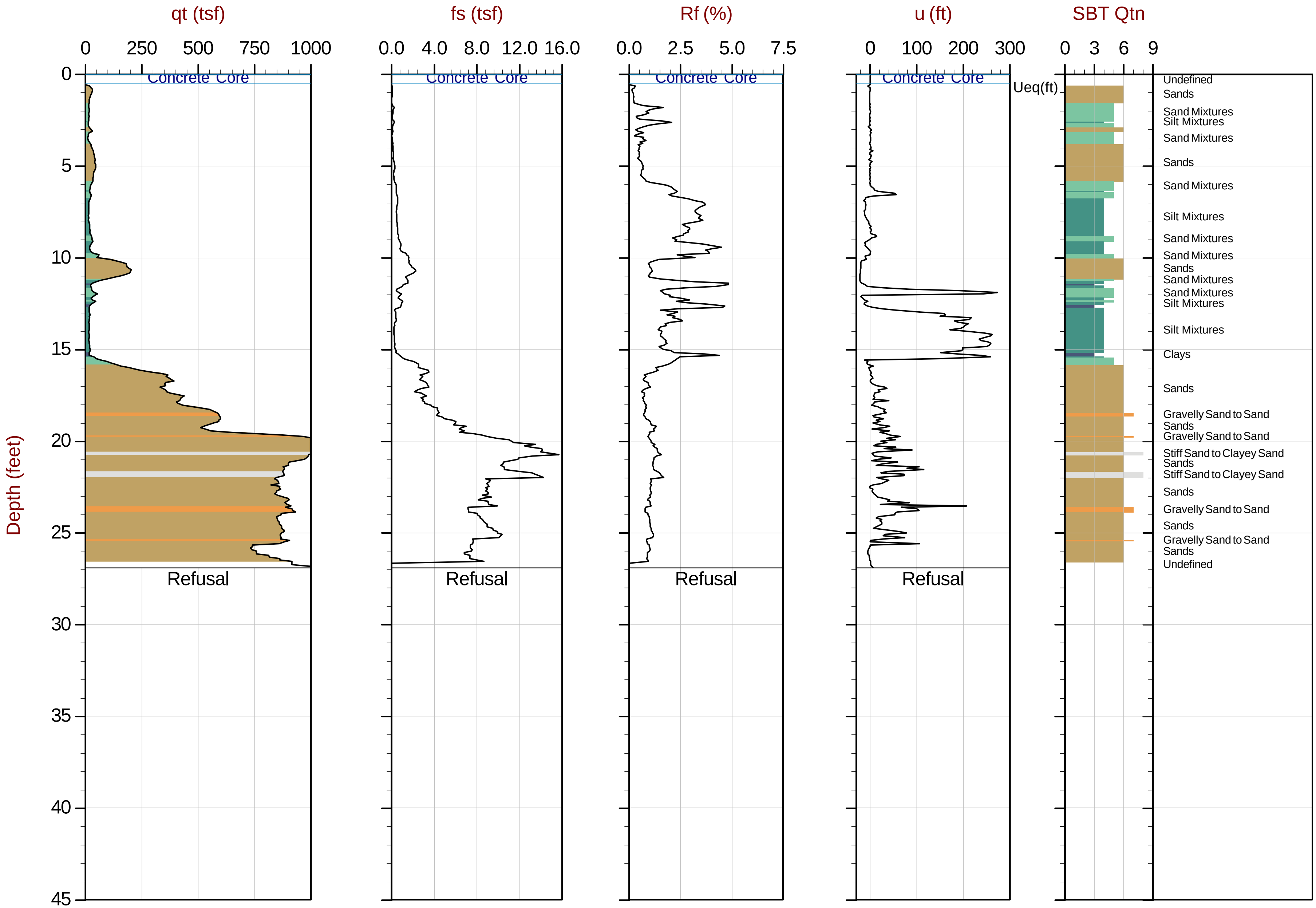
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 12:15
Site: Grand Street Commons

Sounding: AC-CPT-04E
Cone: 661:T1500F15U35



Max Depth: 8.200 m / 26.90 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP04E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58743 Long: -122.30356

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

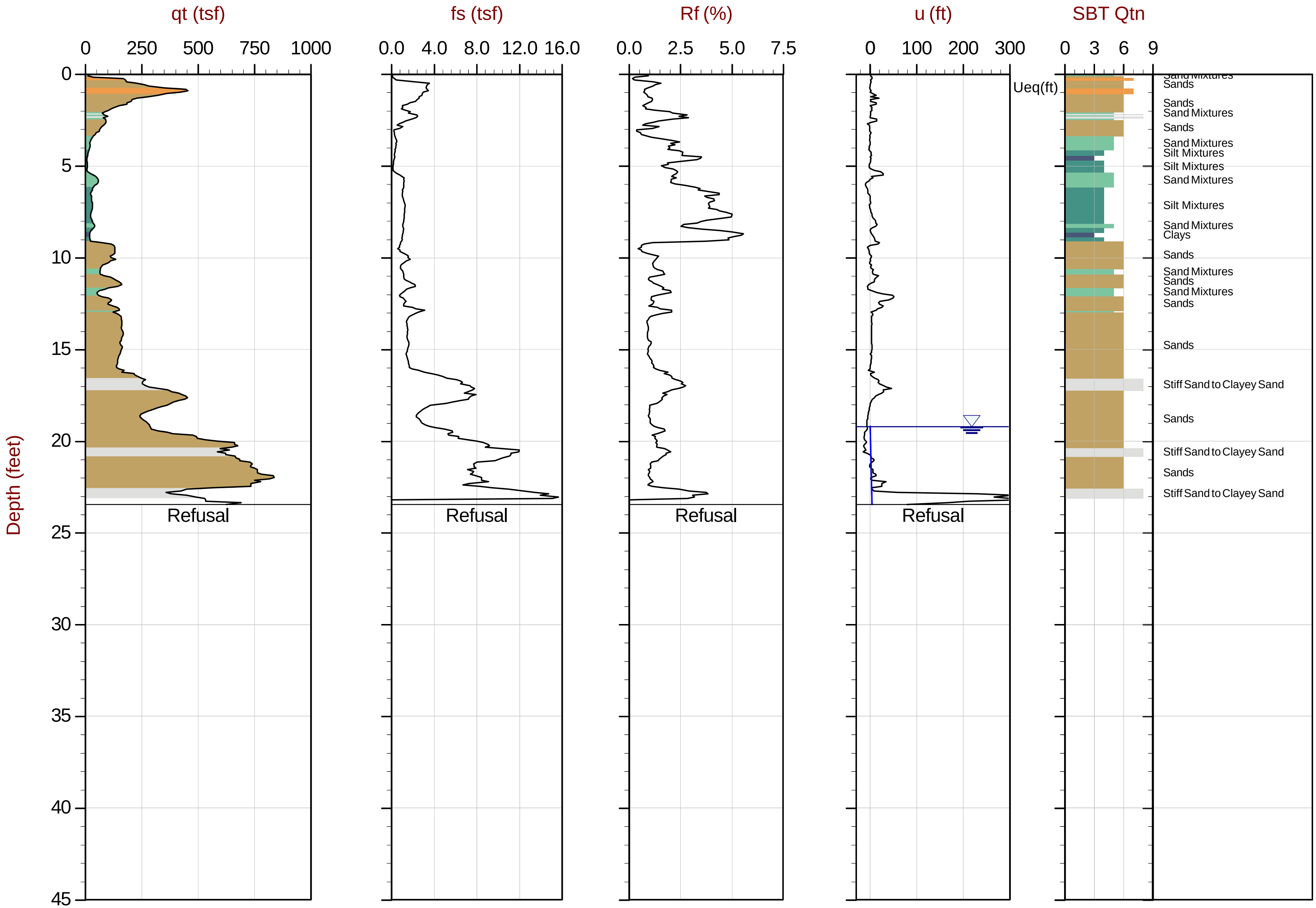
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 11:48
Site: Grand Street Commons

Sounding: AC-CPT-04S
Cone: 661:T1500F15U35



Max Depth: 7.150 m / 23.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP04S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30389

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

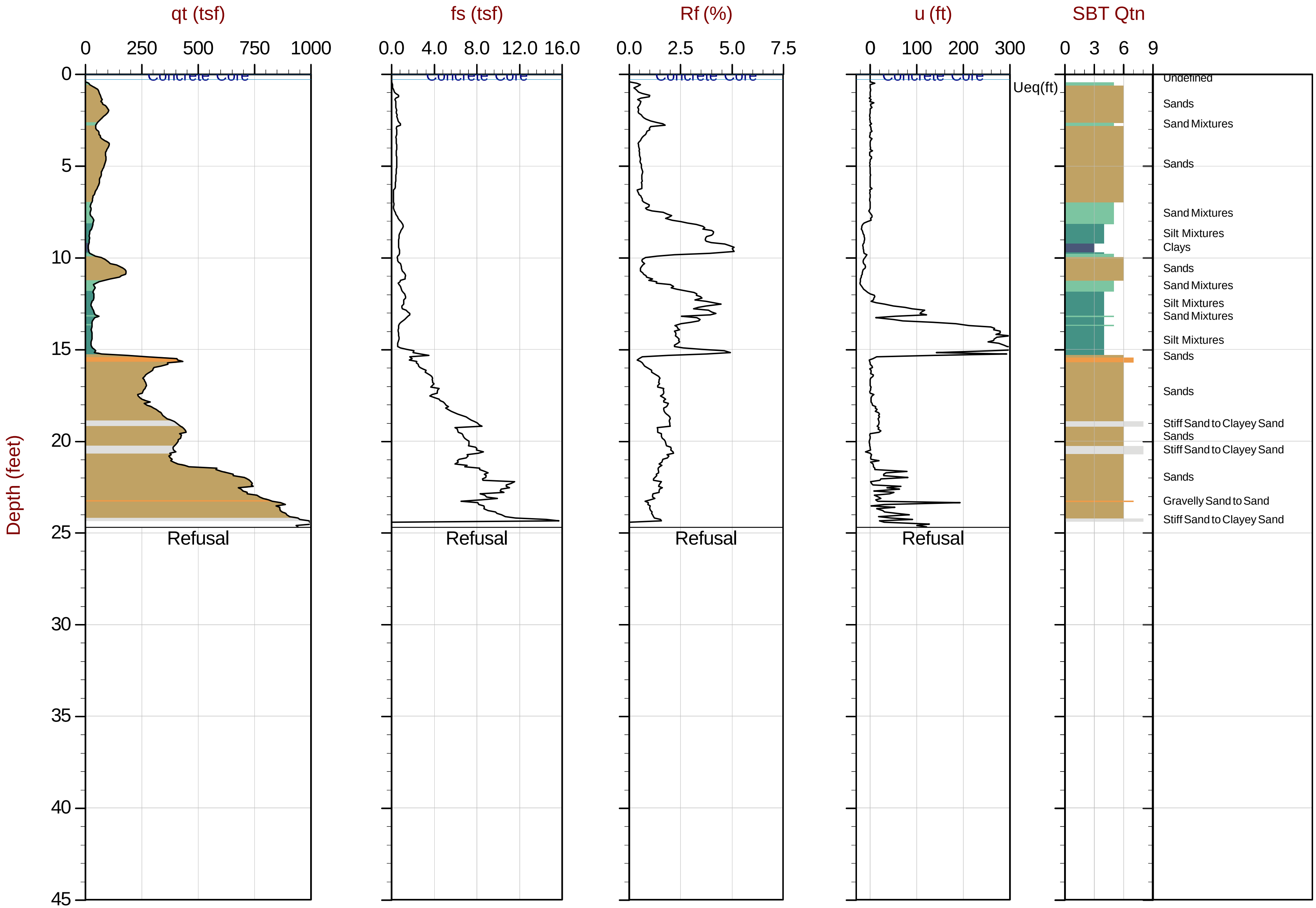
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 11:28
Site: Grand Street Commons

Sounding: AC-CPT-05E
Cone: 661:T1500F15U35



Max Depth: 7.525 m / 24.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP05E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58736 Long: -122.30348

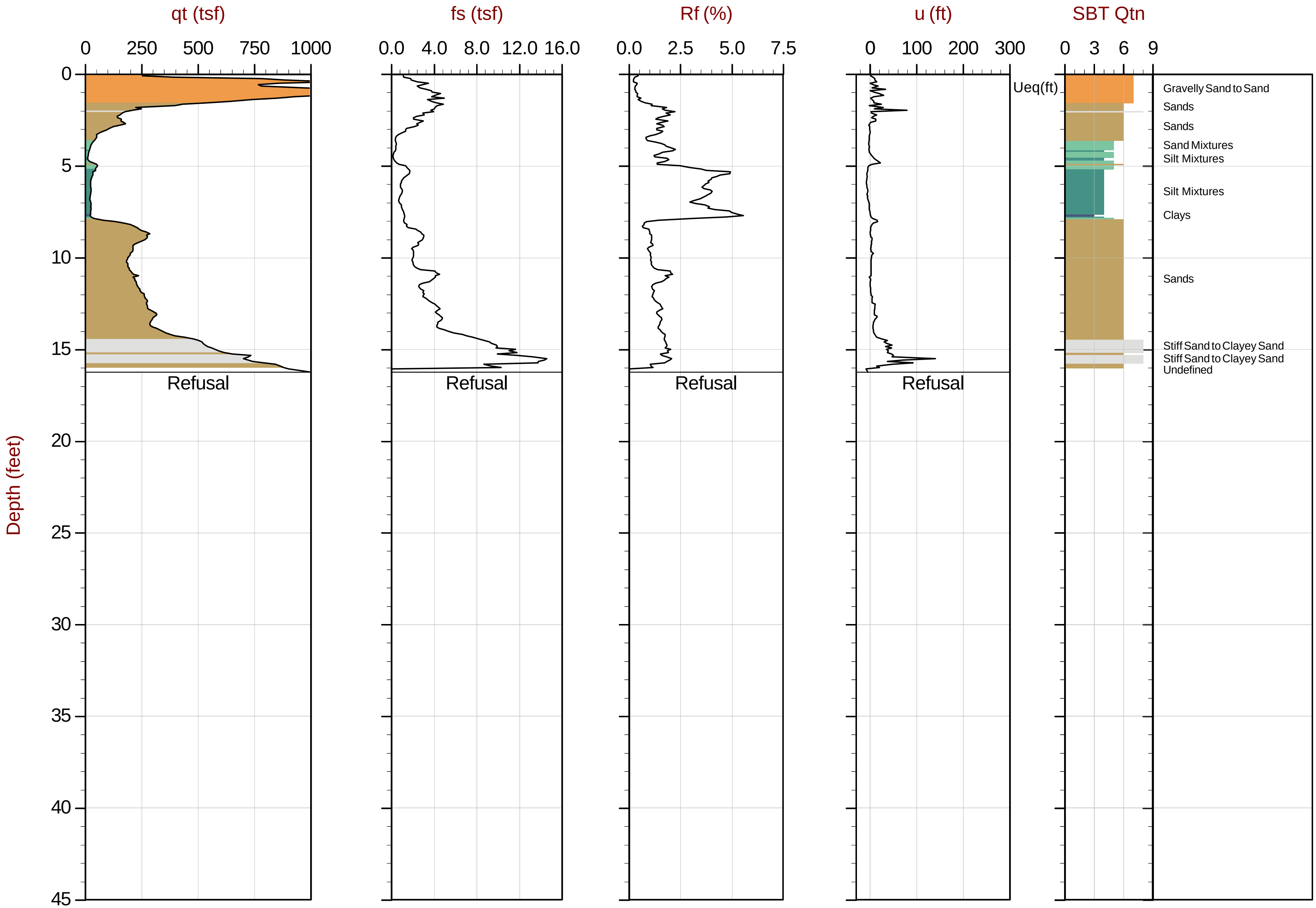
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 10:31
Site: Grand Street Commons
Sounding: AC-CPT-05S
Cone: 661:T1500F15U35



Max Depth: 4.950 m / 16.24 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP05S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58669 Long: -122.30386

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

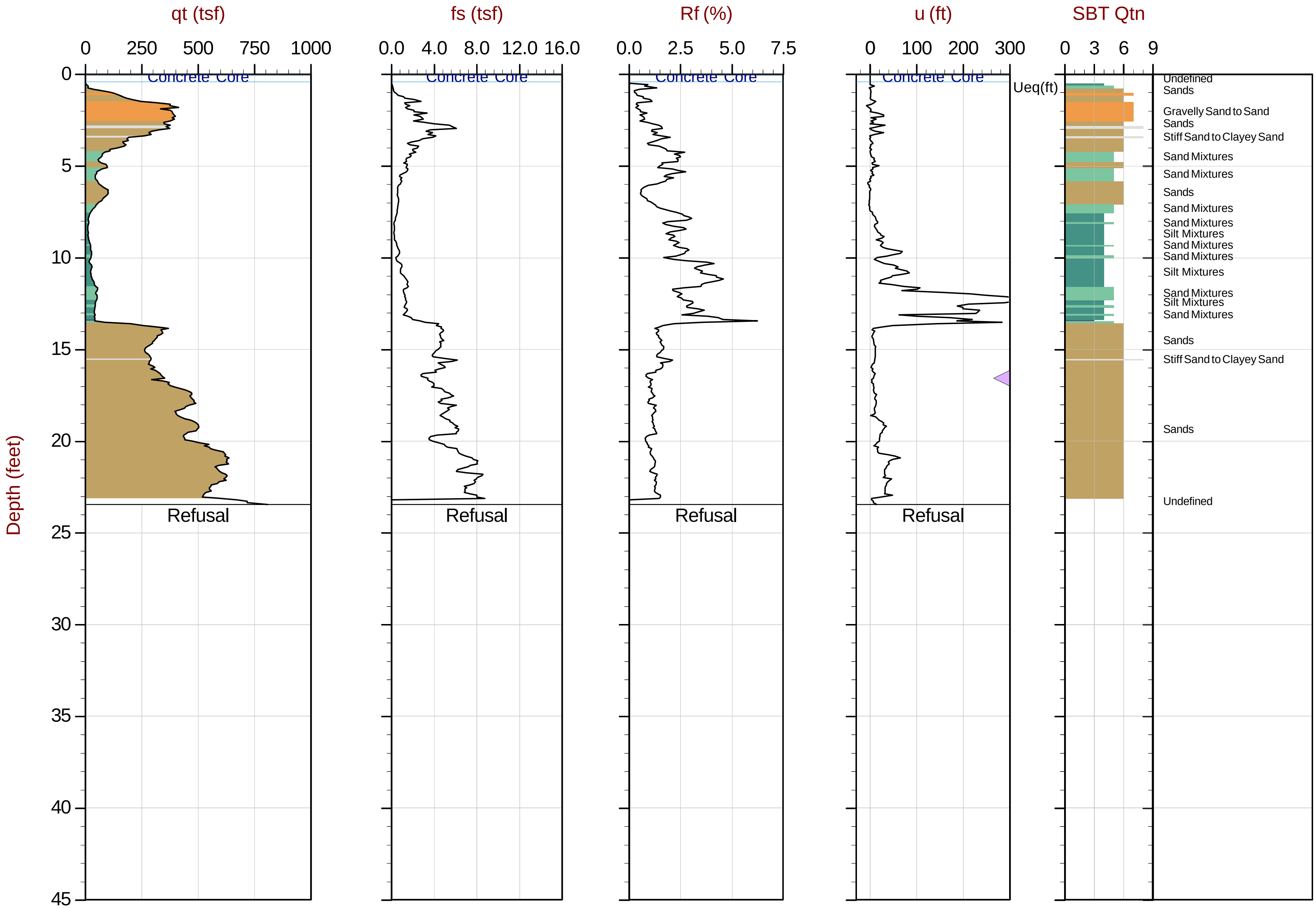
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 10:47
Site: Grand Street Commons

Sounding: AC-CPT-06E
Cone: 661:T1500F15U35



Max Depth: 7.150 m / 23.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP06E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58722 Long: -122.30348

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

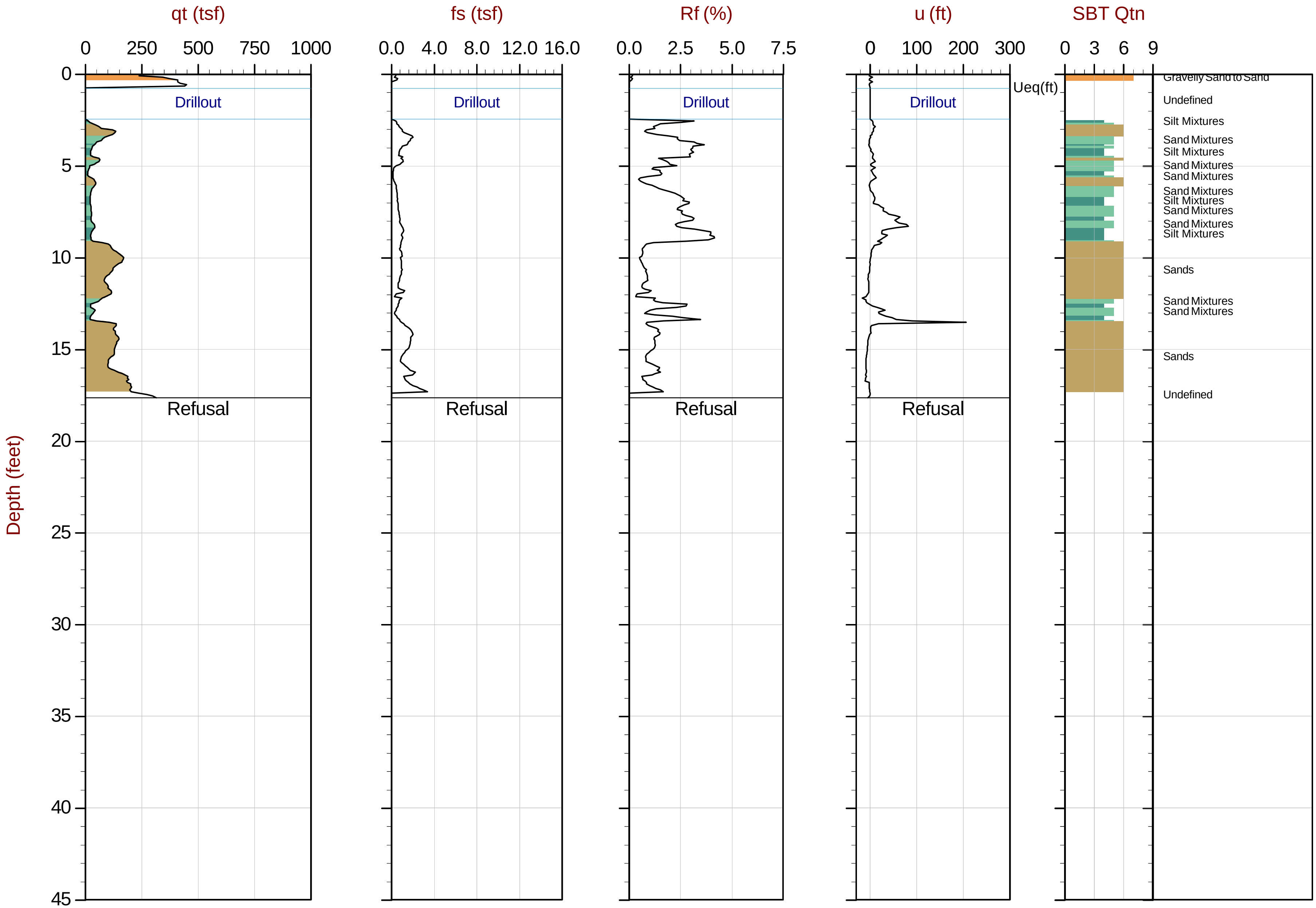
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 10:31
Site: Grand Street Commons

Sounding: AC-CPT-06S
Cone: 536:T1500F15U500



Max Depth: 5.375 m / 17.63 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP06S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58655 Long: -122.30381

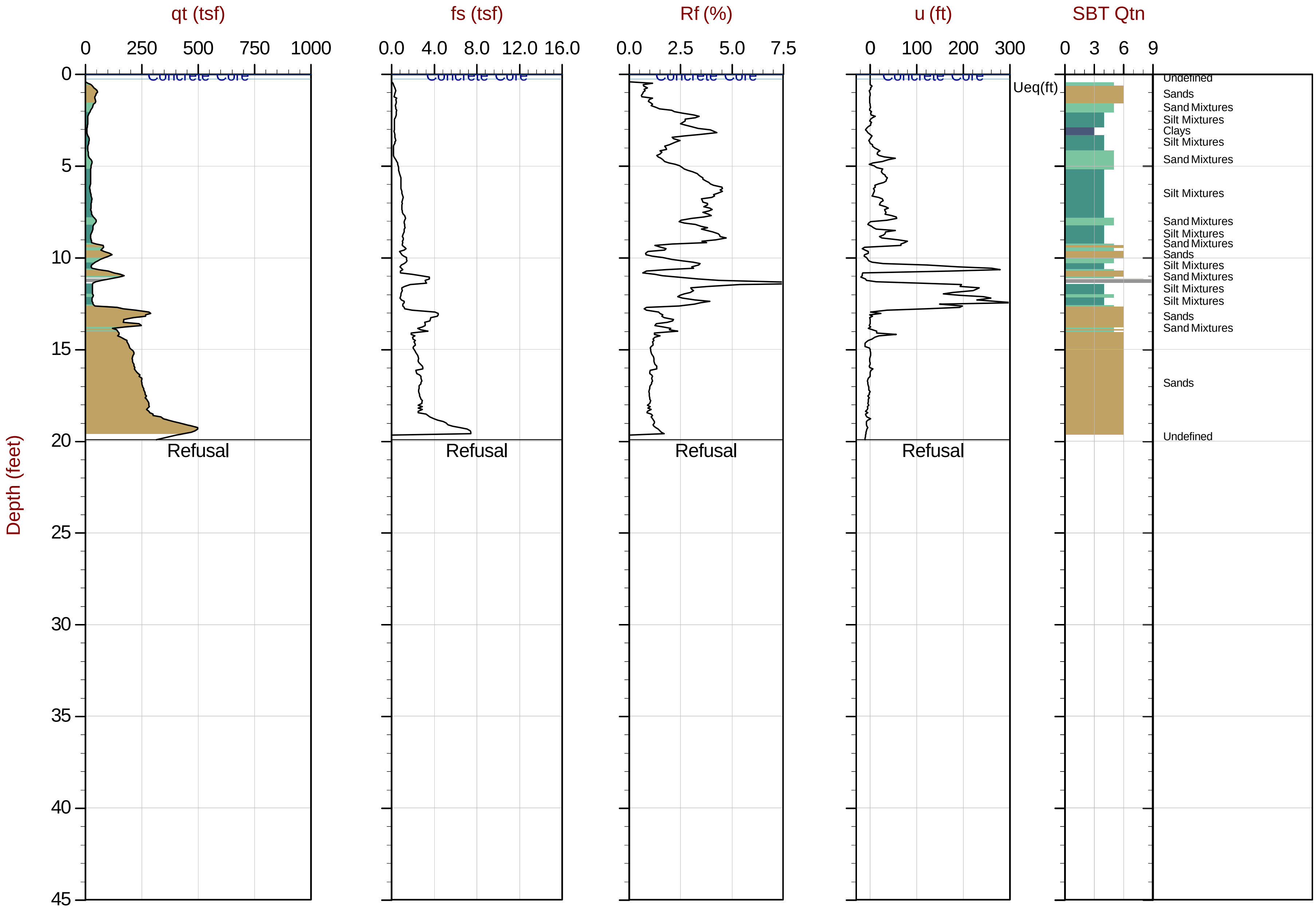
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 07:15
Site: Grand Street Commons
Sounding: AC-CPT-07E
Cone: 661:T1500F15U35



Max Depth: 6.075 m / 19.93 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP07E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58756 Long: -122.30343

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

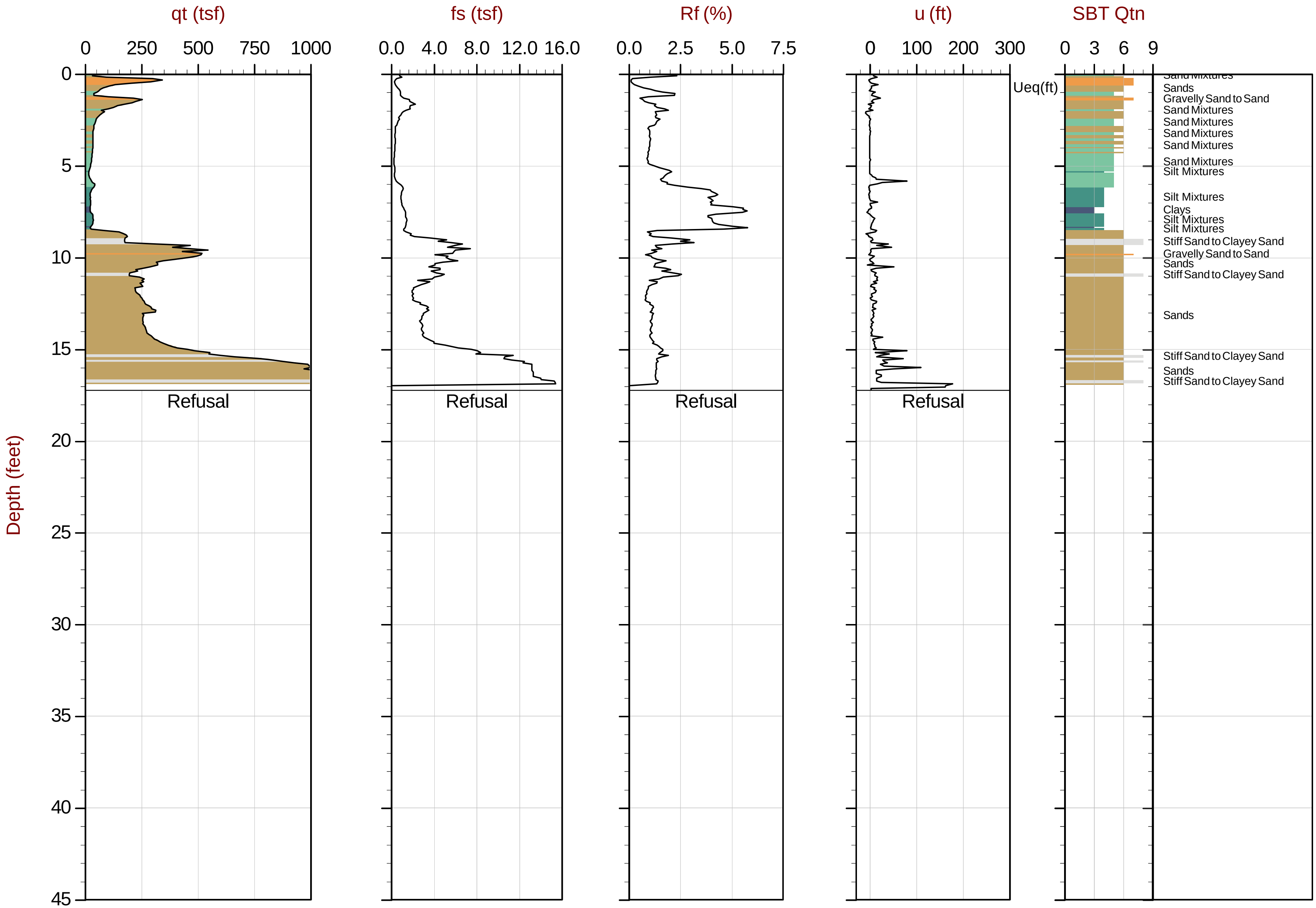
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 12:32
Site: Grand Street Commons

Sounding: AC-CPT-07S
Cone: 661:T1500F15U35



Max Depth: 5.250 m / 17.22 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP07S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58687 Long: -122.30375

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

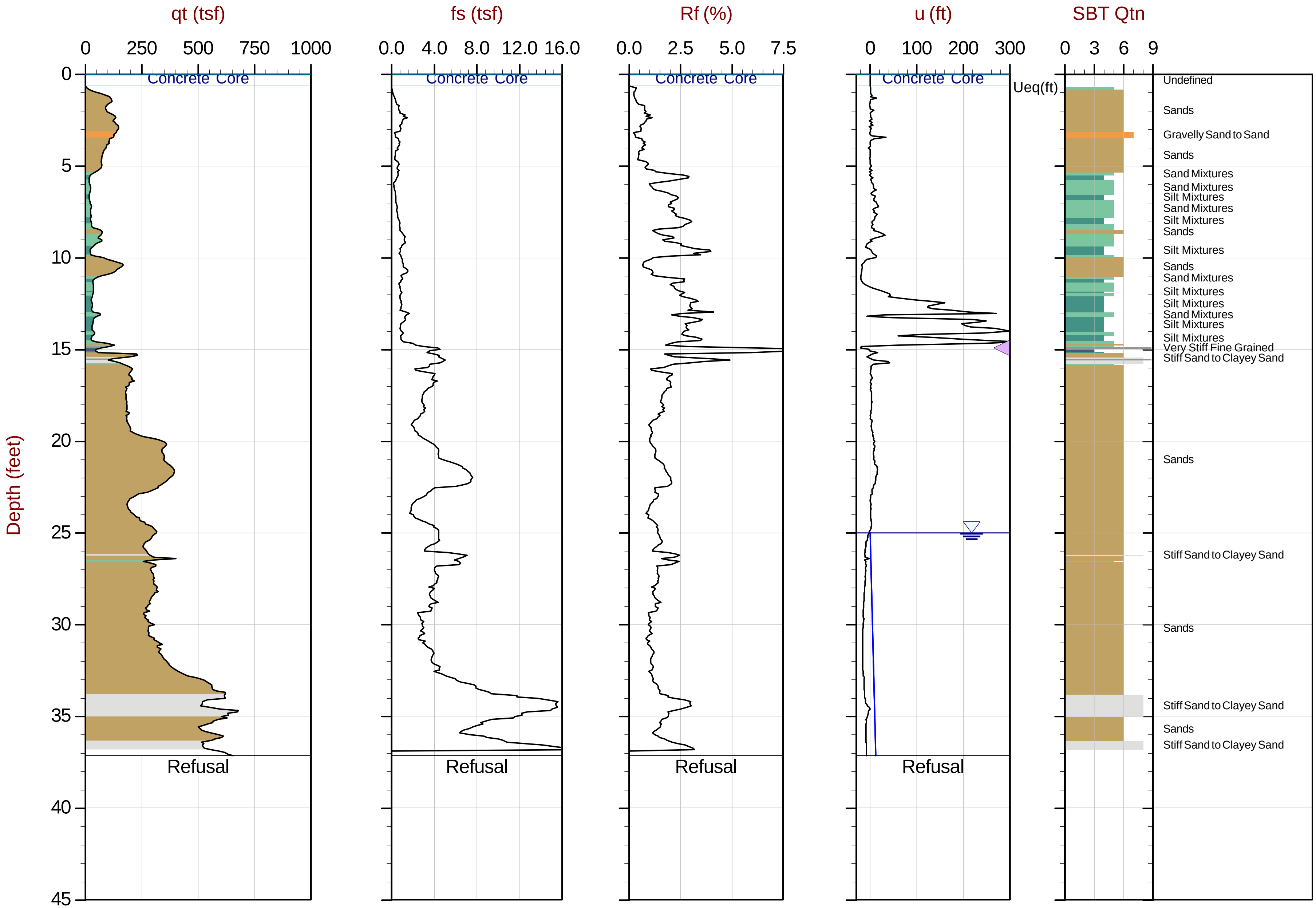
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 07:46
Site: Grand Street Commons

Sounding: AC-CPT-08E
Cone: 661:T1500F15U35



Max Depth: 11.325 m / 37.16 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP08E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58747 Long: -122.30340

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

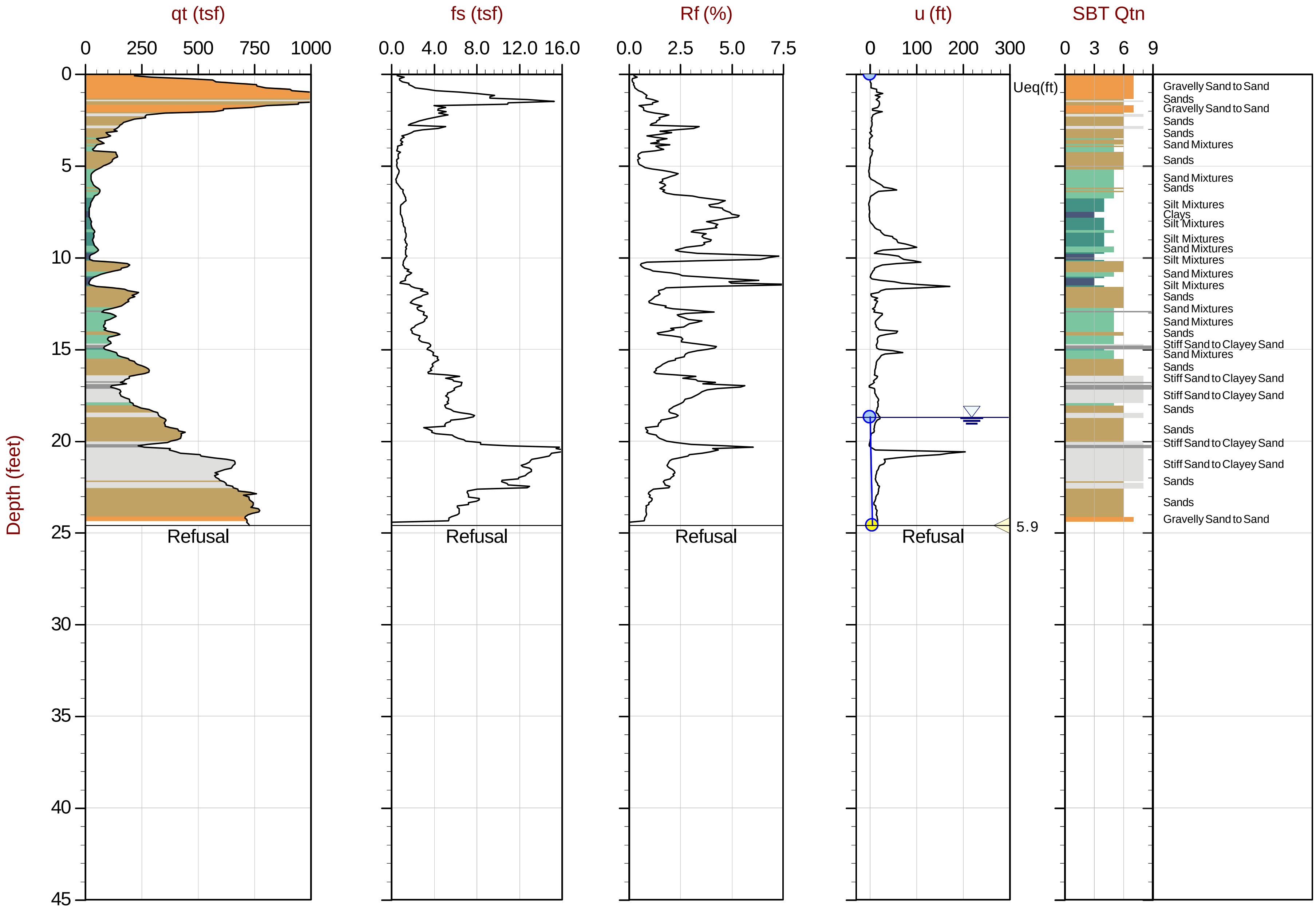
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 09:15
Site: Grand Street Commons

Sounding: AC-CPT-08S
Cone: 661:T1500F15U35



Max Depth: 7.500 m / 24.61 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP08S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58677 Long: -122.30374

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

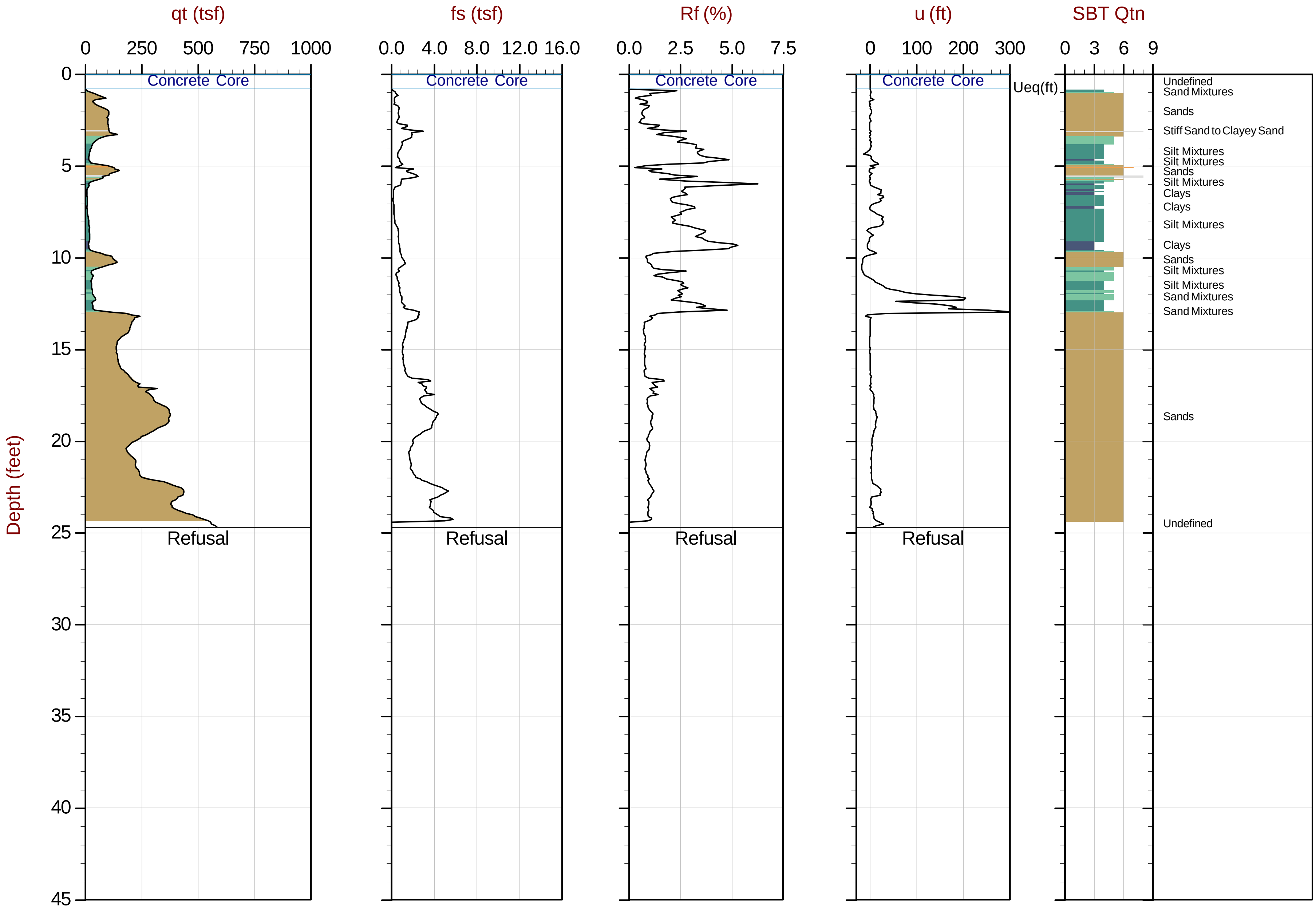
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 12:54
Site: Grand Street Commons

Sounding: AC-CPT-09E
Cone: 595:T1500F15U500



Max Depth: 7.525 m / 24.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP09E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58732 Long: -122.30342

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

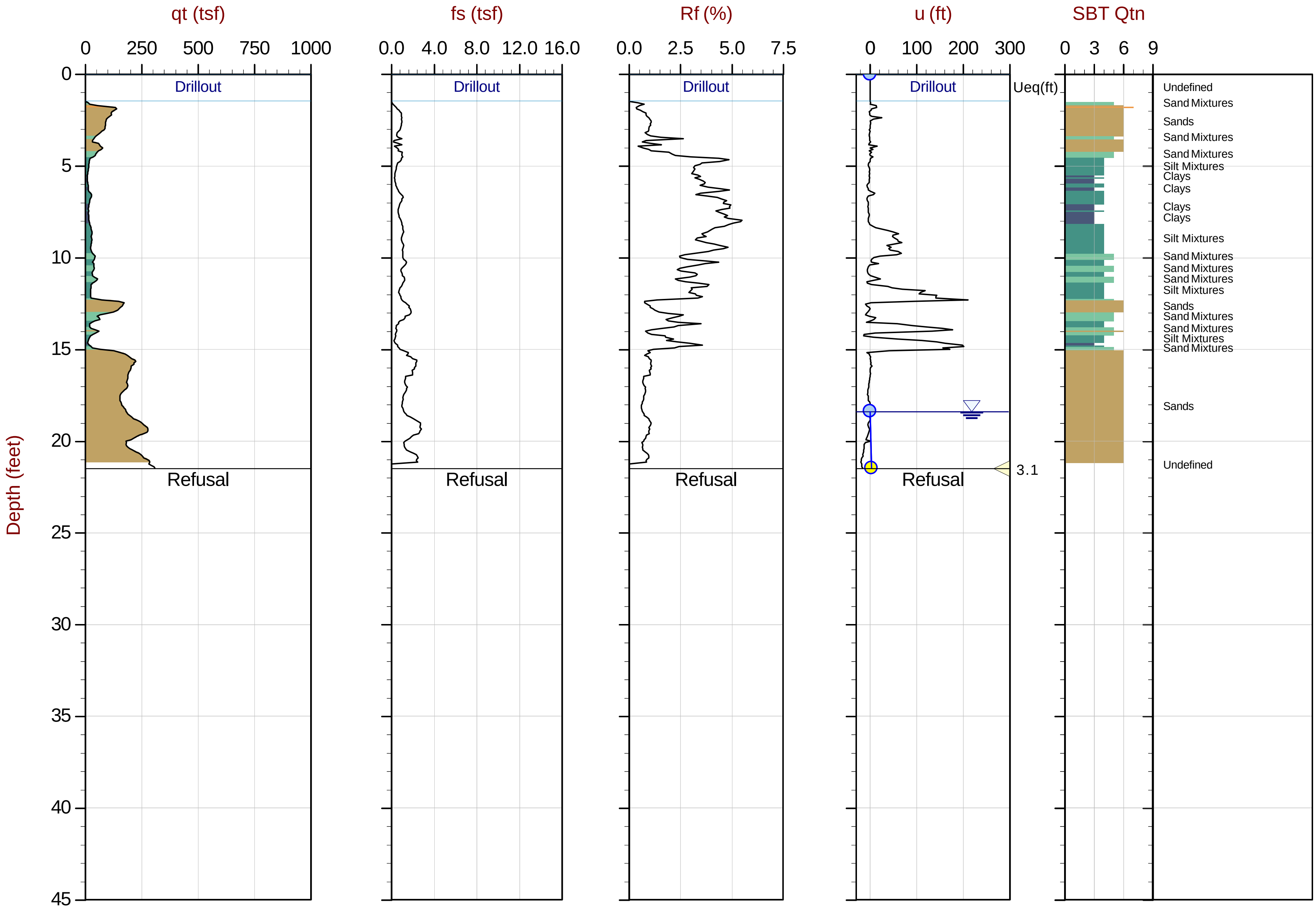
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 11:20
Site: Grand Street Commons

Sounding: AC-CPT-09S
Cone: 536:T1500F15U500



Max Depth: 6.550 m / 21.49 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP09S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30363

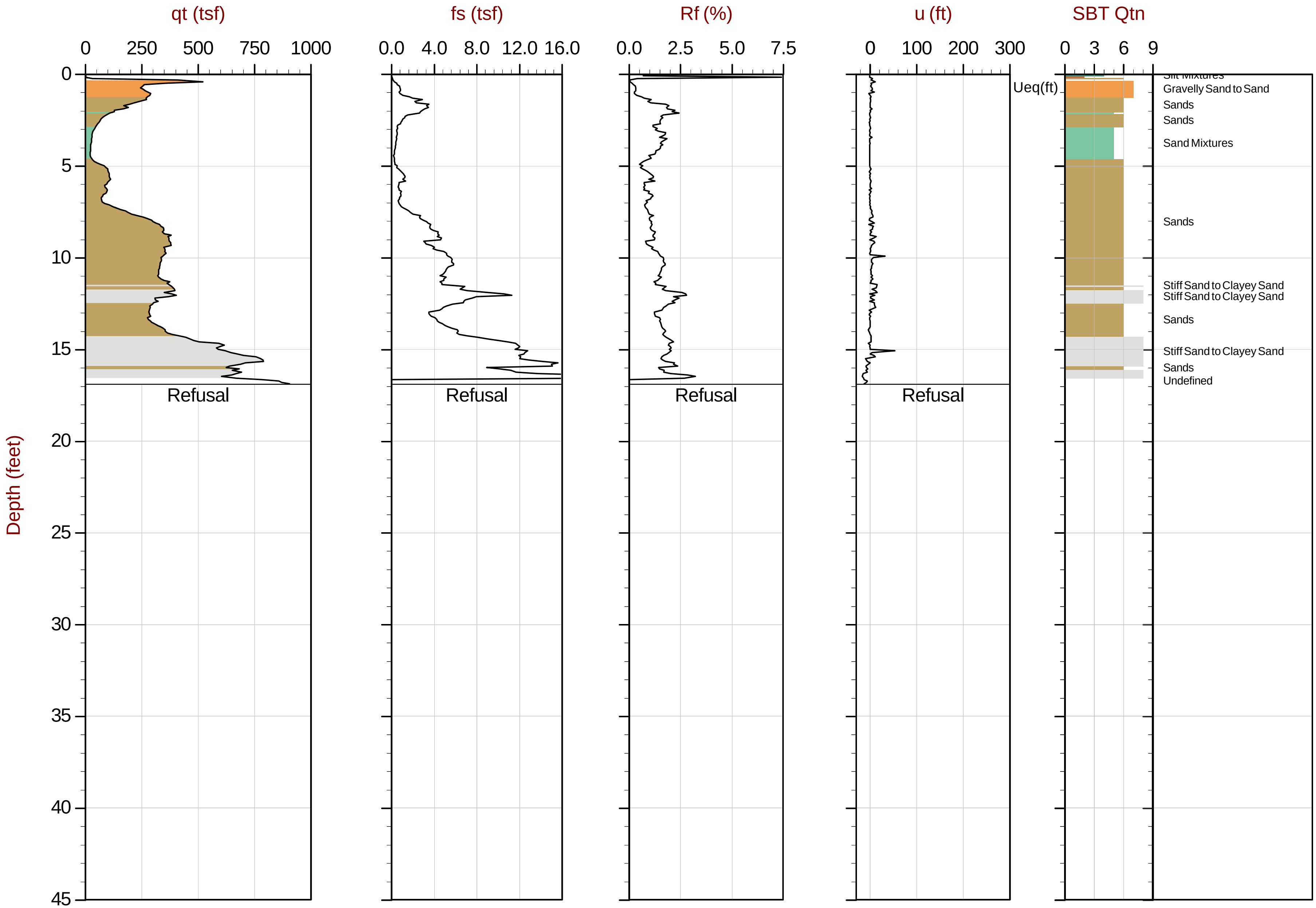
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 16:33
Site: Grand Street Commons
Sounding: AC-CPT-10E
Cone: 661:T1500F15U35



Max Depth: 5.150 m / 16.90 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP10E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58707 Long: -122.30328

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

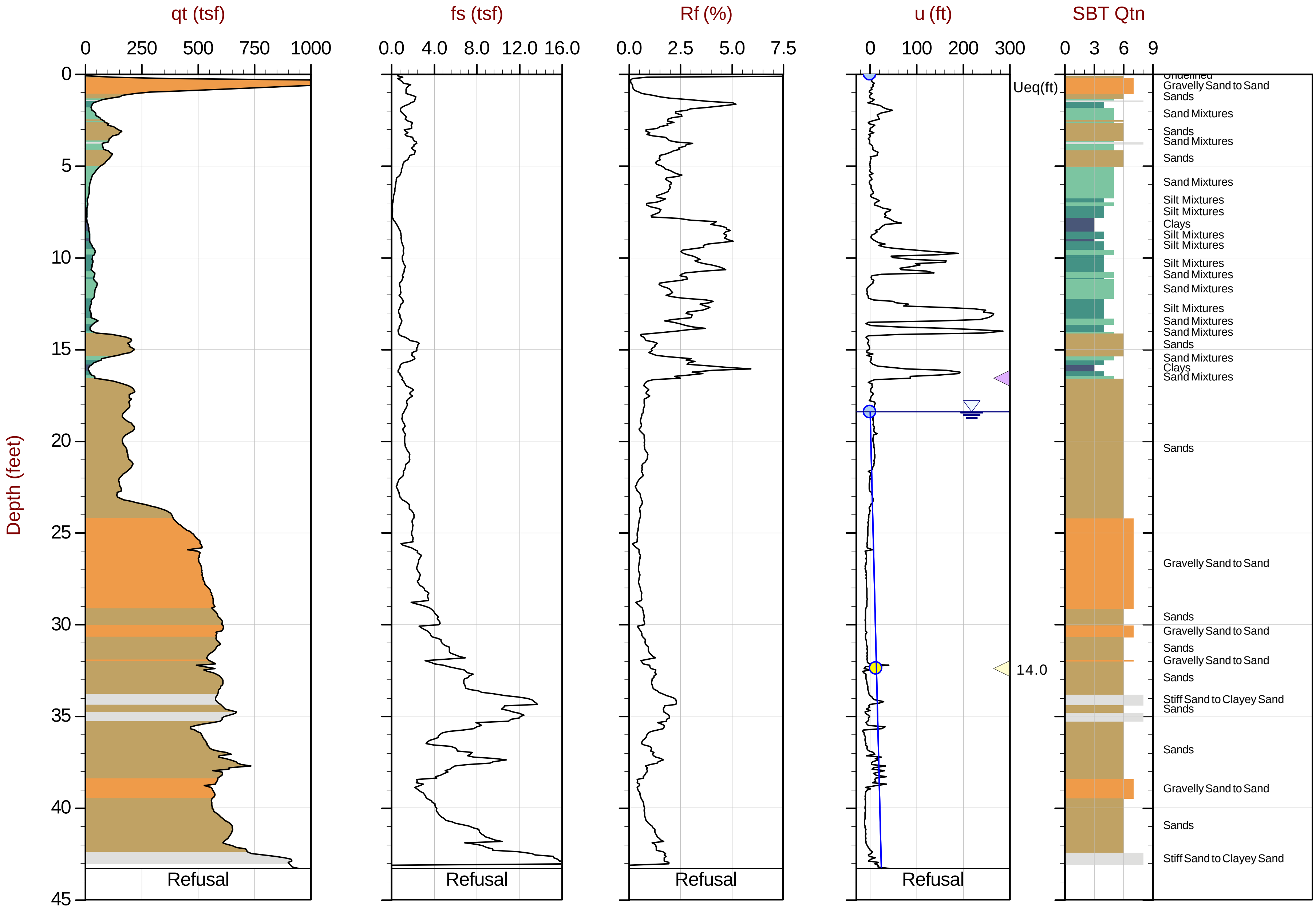
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 13:53
Site: Grand Street Commons

Sounding: AC-CPT-10S
Cone: 661:T1500F15U35



Max Depth: 13.200 m / 43.31 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP10S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58672 Long: -122.30359

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

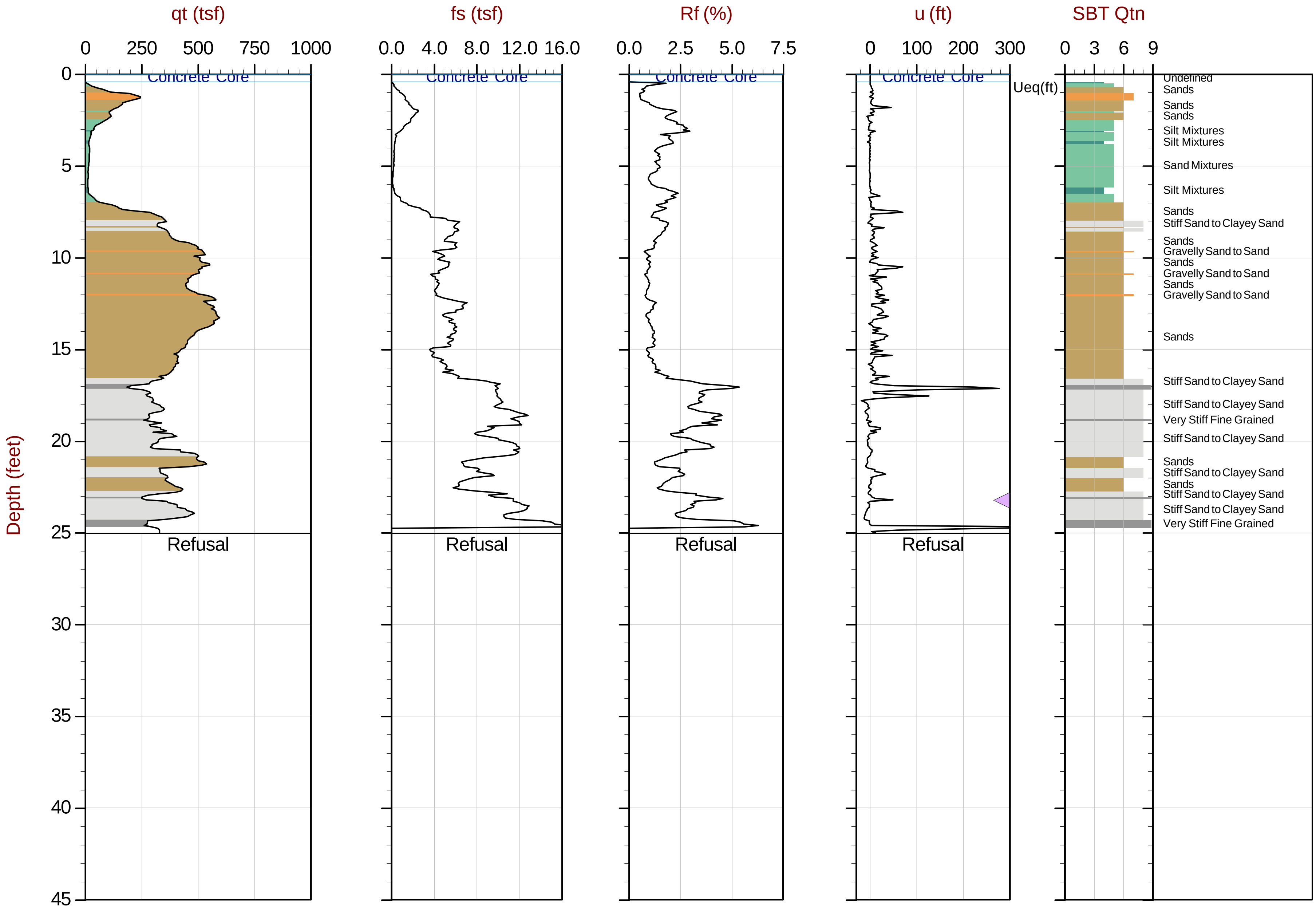
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 08:45
Site: Grand Street Commons

Sounding: AC-CPT-11E
Cone: 661:T1500F15U35



Max Depth: 7.625 m / 25.02 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP11E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58718 Long: -122.30325

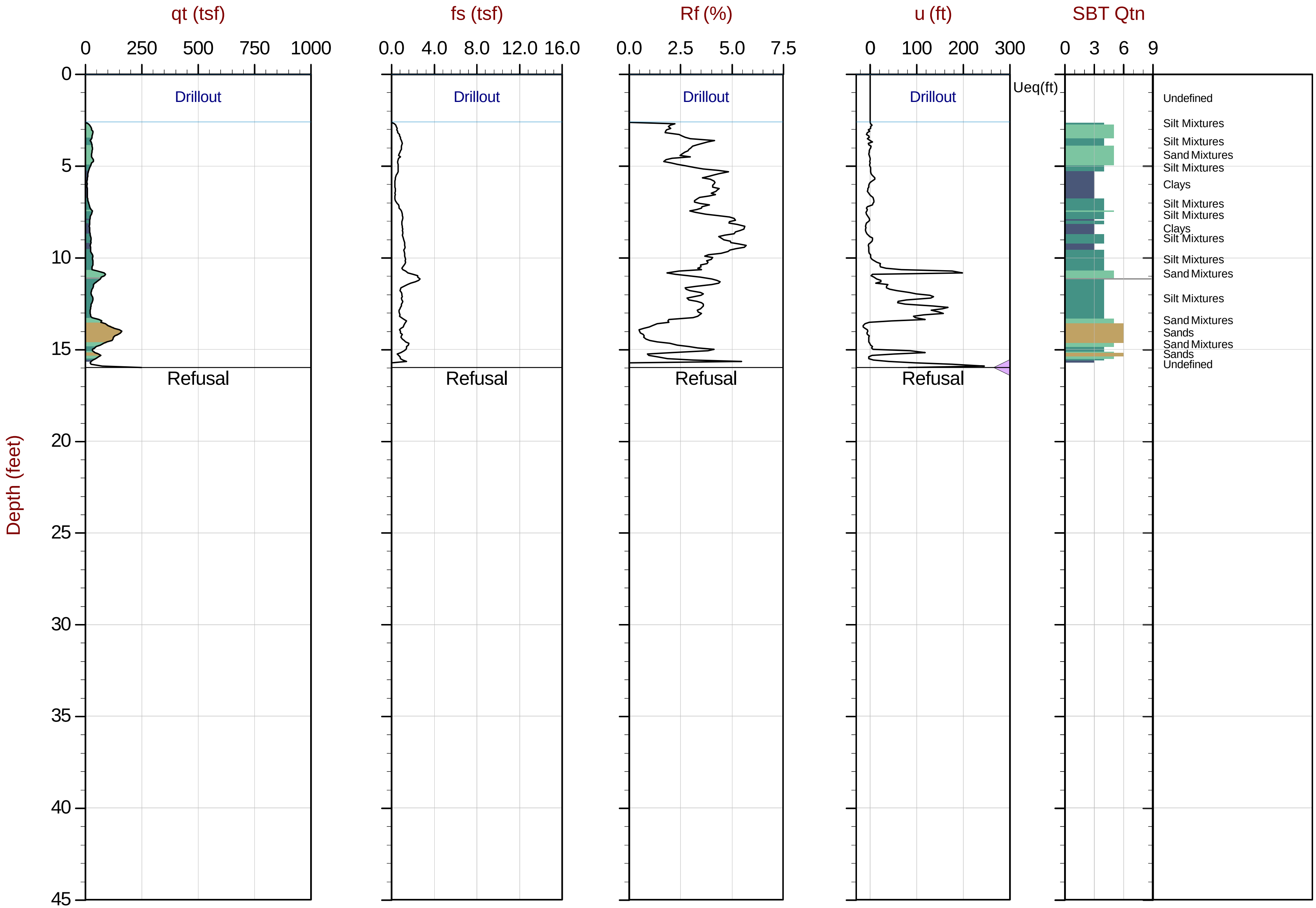
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 14:56
Site: Grand Street Commons

Sounding: AC-CPT-11S
Cone: 536:T1500F15U500



Max Depth: 4.875 m / 15.99 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP11S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58678 Long: -122.30352

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

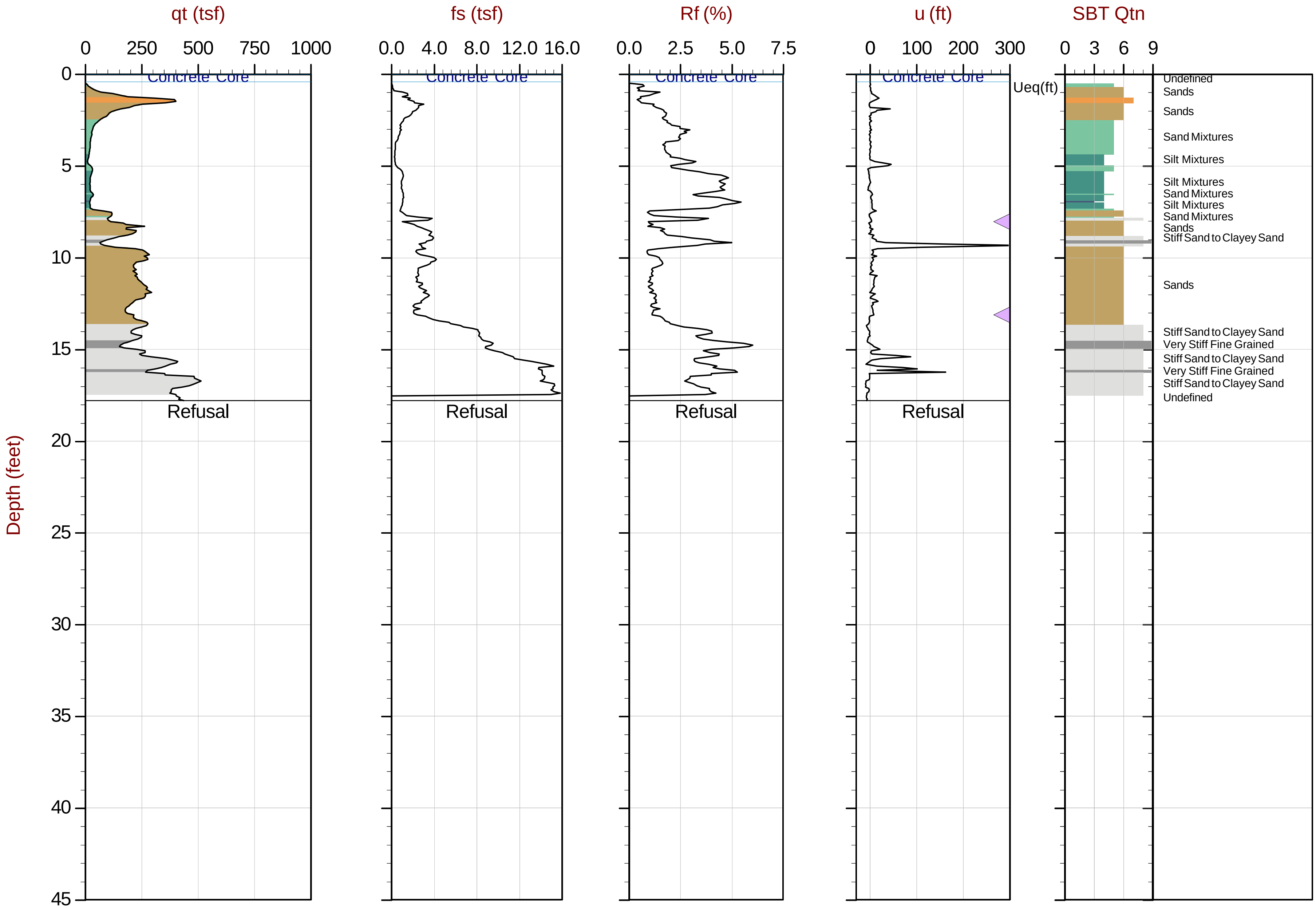
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 09:55
Site: Grand Street Commons

Sounding: AC-CPT-12E
Cone: 661:T1500F15U35



Max Depth: 5.425 m / 17.80 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP12E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58734 Long: -122.30321

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

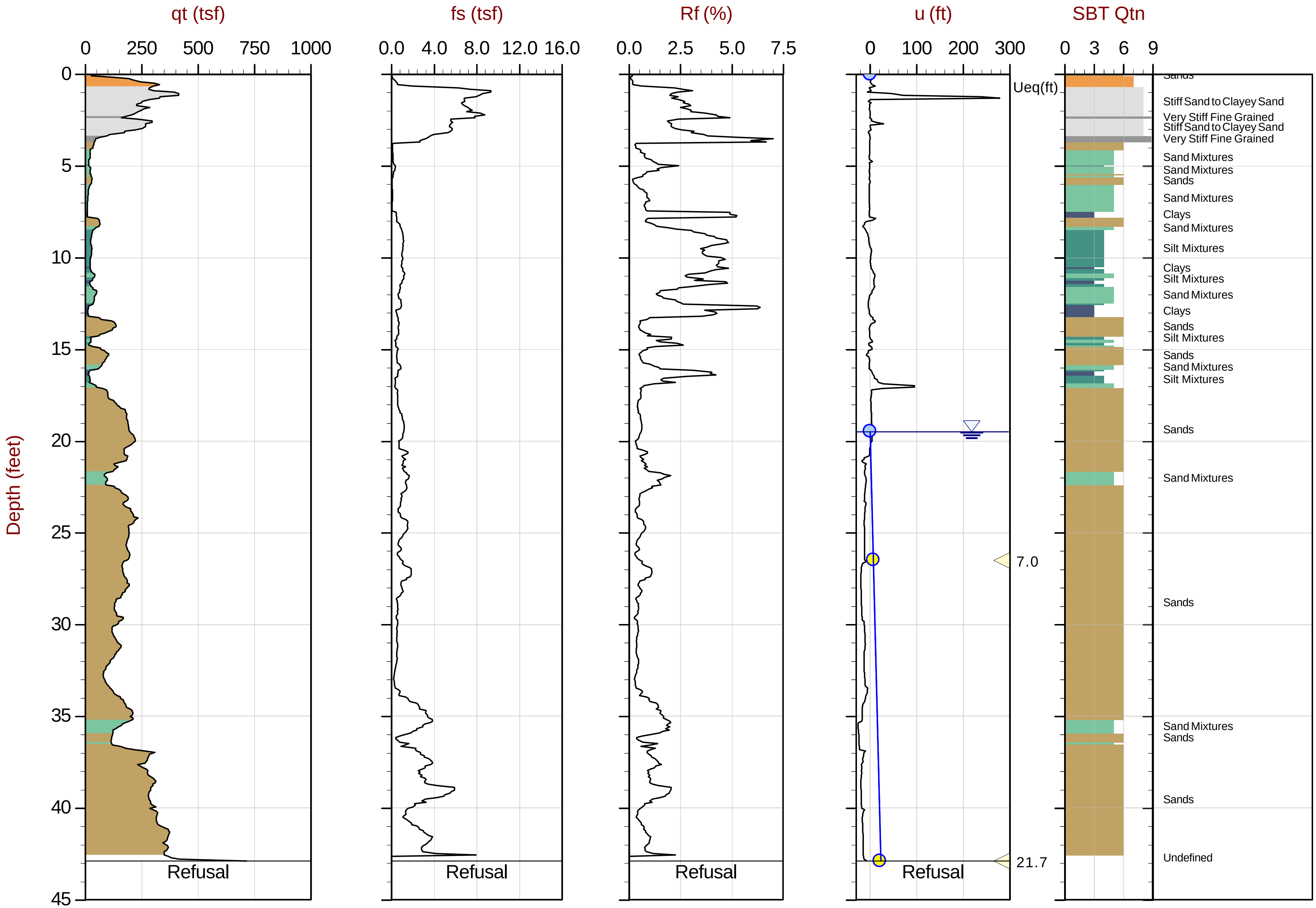
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 13:46
Site: Grand Street Commons

Sounding: AC-CPT-12S
Cone: 661:T1500F15U35



Max Depth: 13.075 m / 42.90 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP12S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30351

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

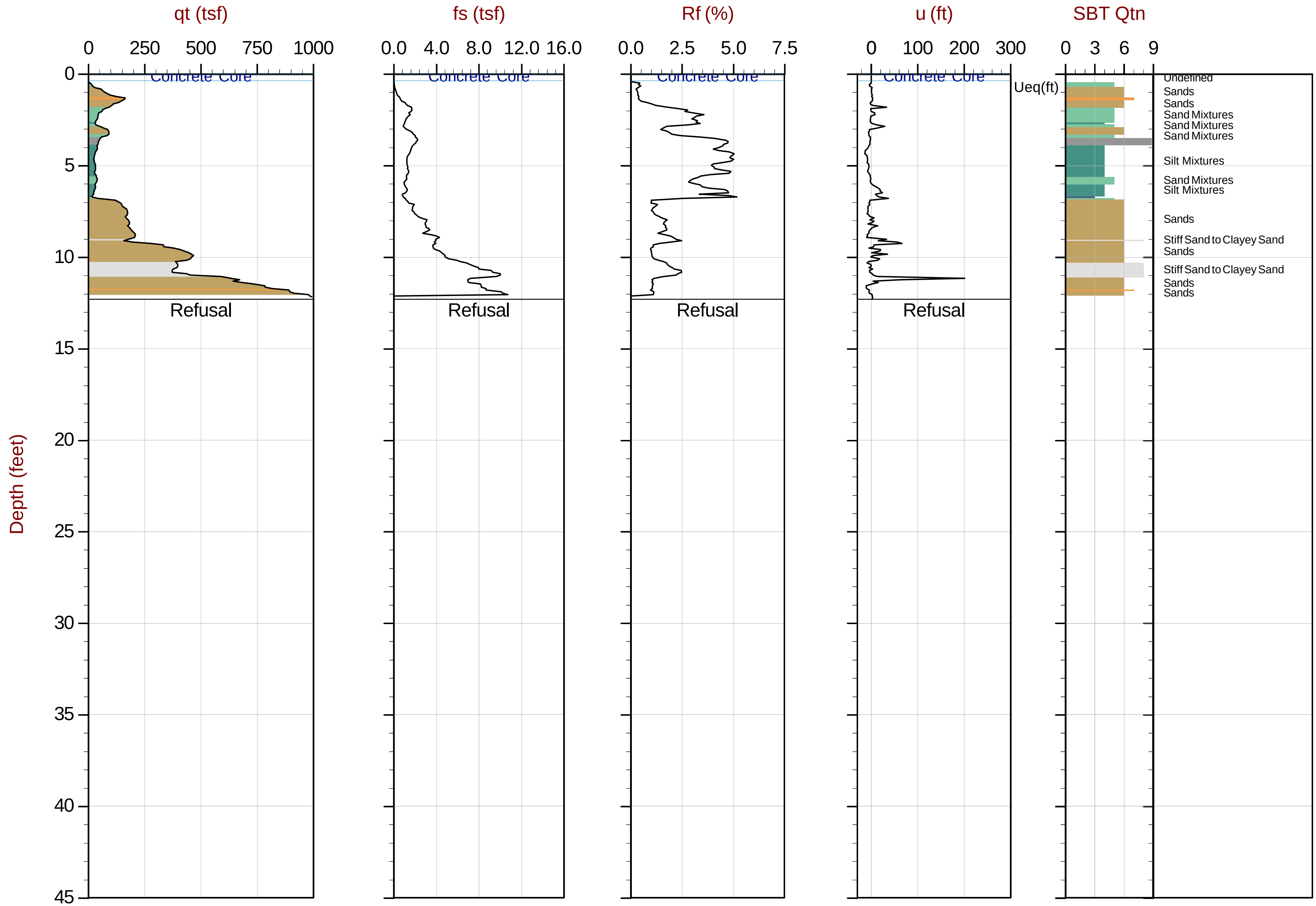
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 09:29
Site: Grand Street Commons

Sounding: AC-CPT-13E
Cone: 661:T1500F15U35



Max Depth: 3.750 m / 12.30 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP13E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58742 Long: -122.30316

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

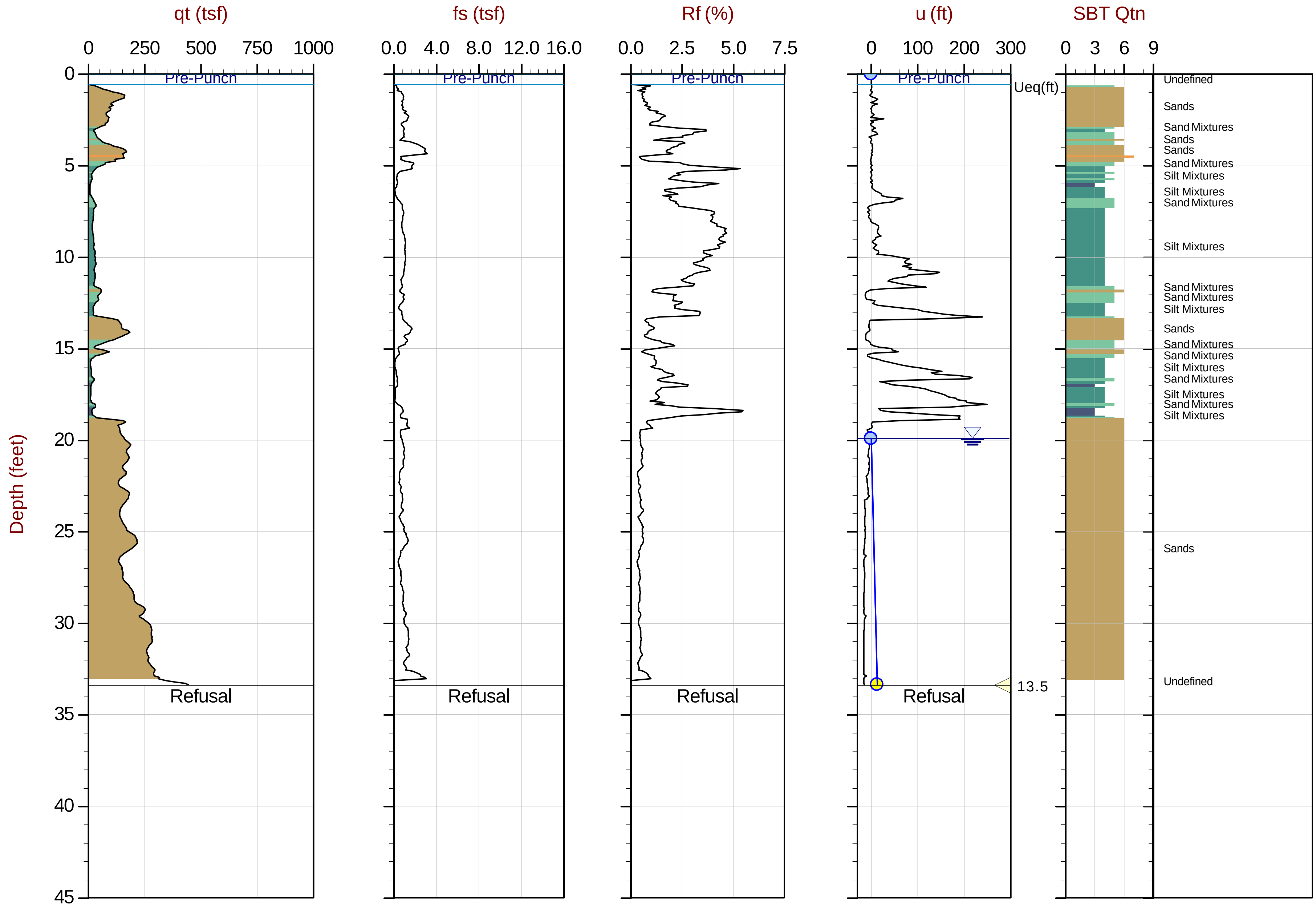
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 15:17
Site: Grand Street Commons

Sounding: AC-CPT-13S
Cone: 595:T1500F15U500



Max Depth: 10.175 m / 33.38 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP13S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58667 Long: -122.30350

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

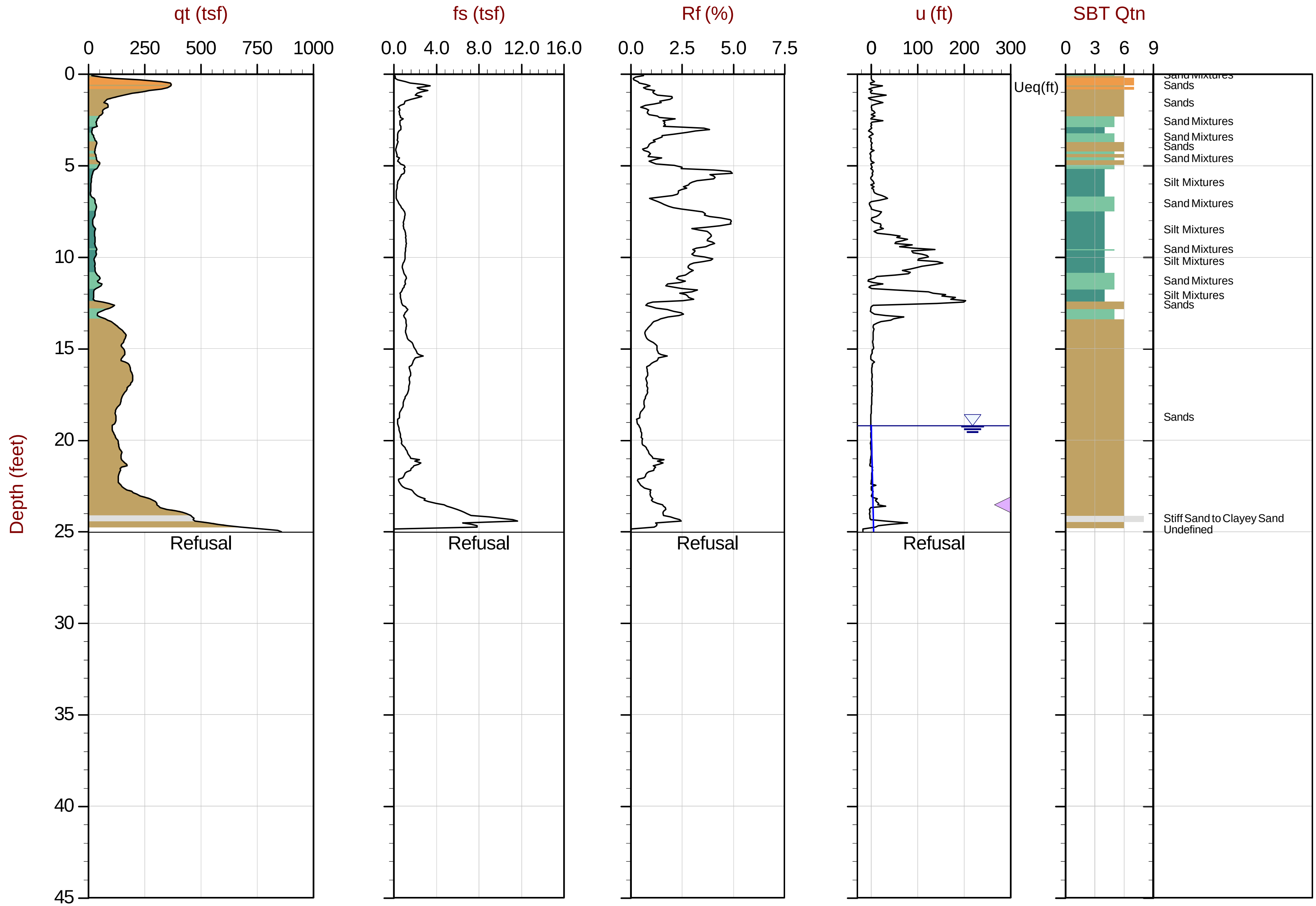
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 16:06
Site: Grand Street Commons

Sounding: AC-CPT-14S
Cone: 661:T1500F15U35



Max Depth: 7.625 m / 25.02 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP14S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58665 Long: -122.30346

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

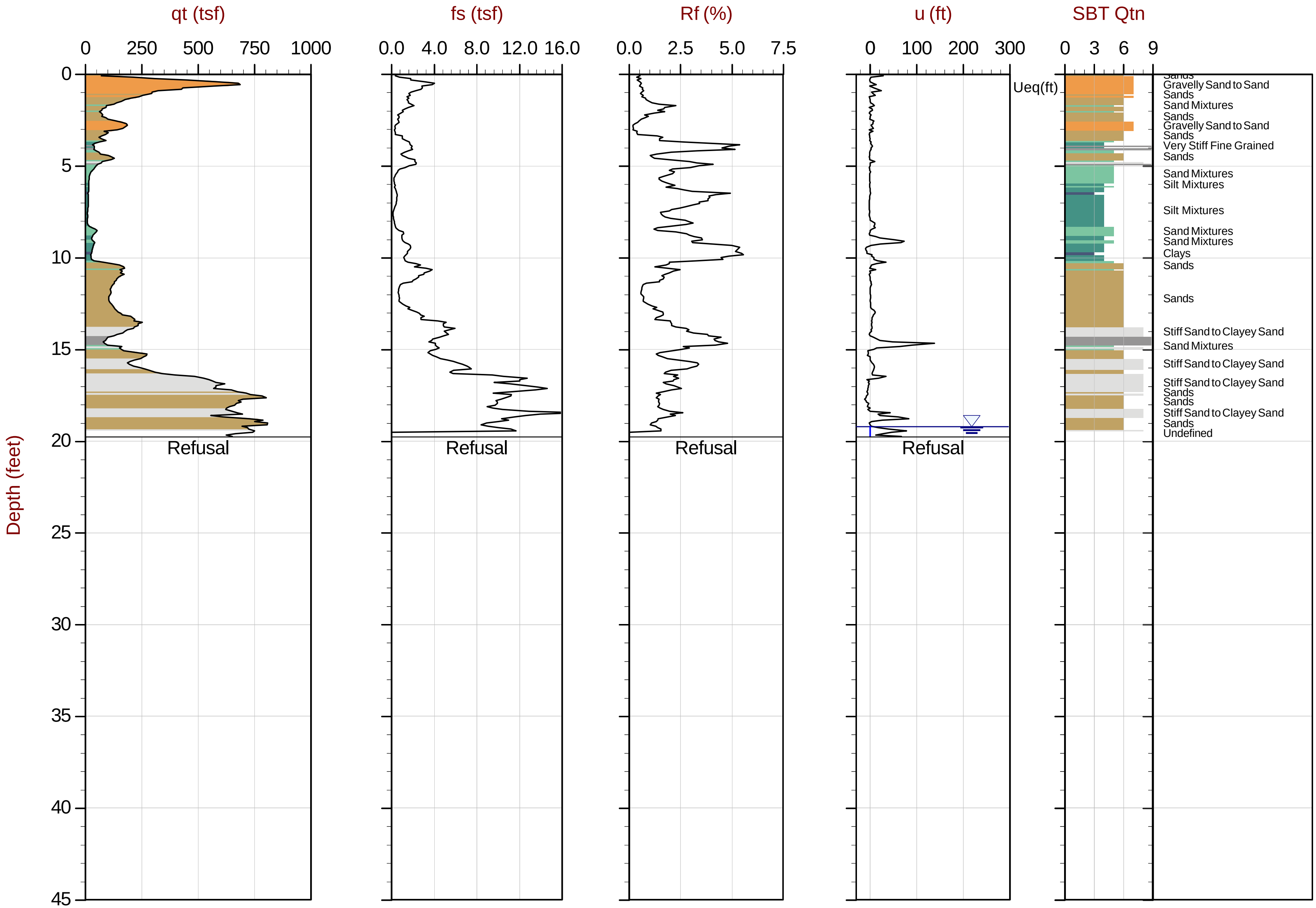
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 13:09
Site: Grand Street Commons

Sounding: AC-CPT-15S
Cone: 661:T1500F15U35



Max Depth: 6.025 m / 19.77 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP15S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58684 Long: -122.30341

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

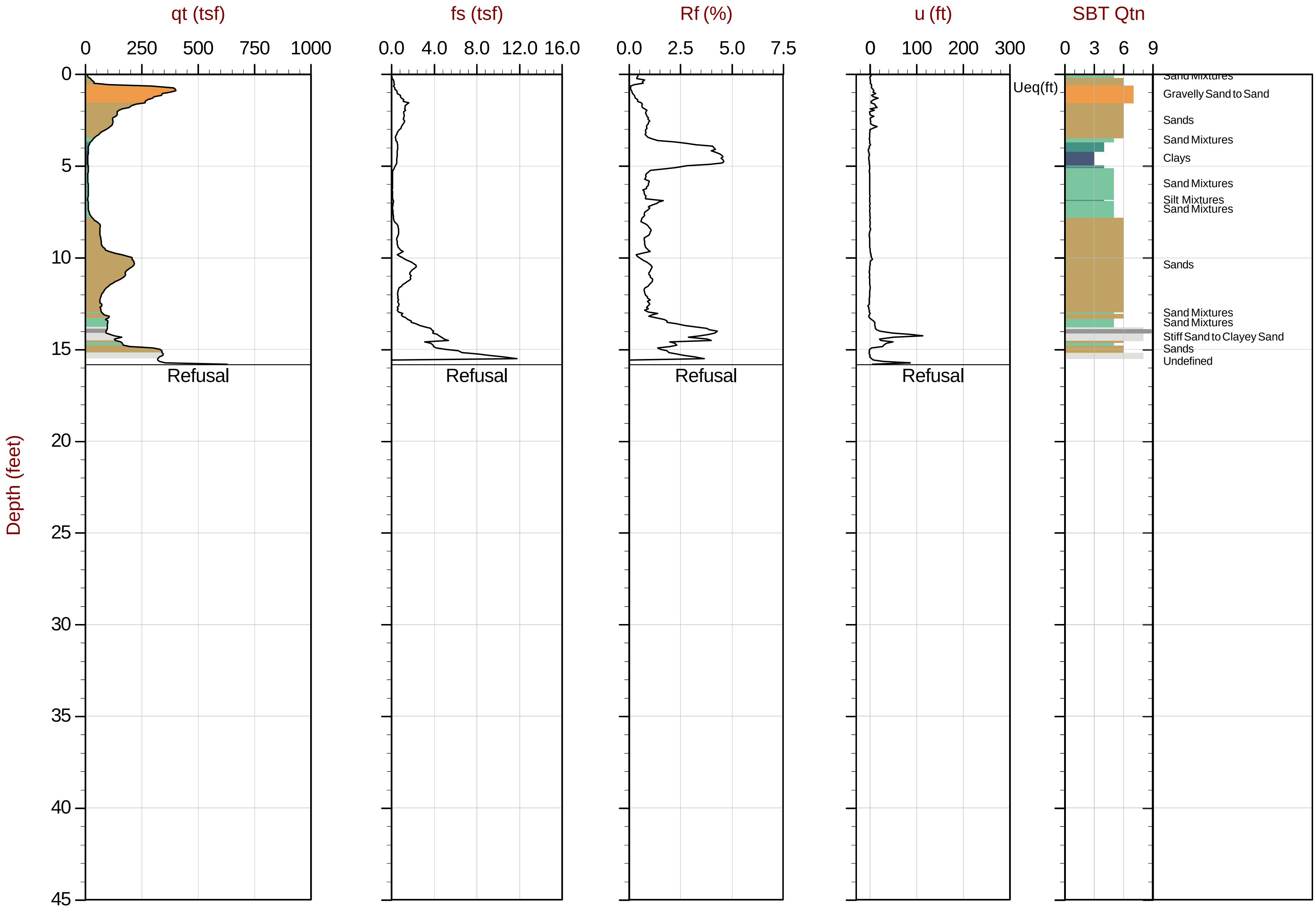
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 15:04
Site: Grand Street Commons

Sounding: AC-CPT-16S
Cone: 661:T1500F15U35



Max Depth: 4.825 m / 15.83 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP16S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58643 Long: -122.30340

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

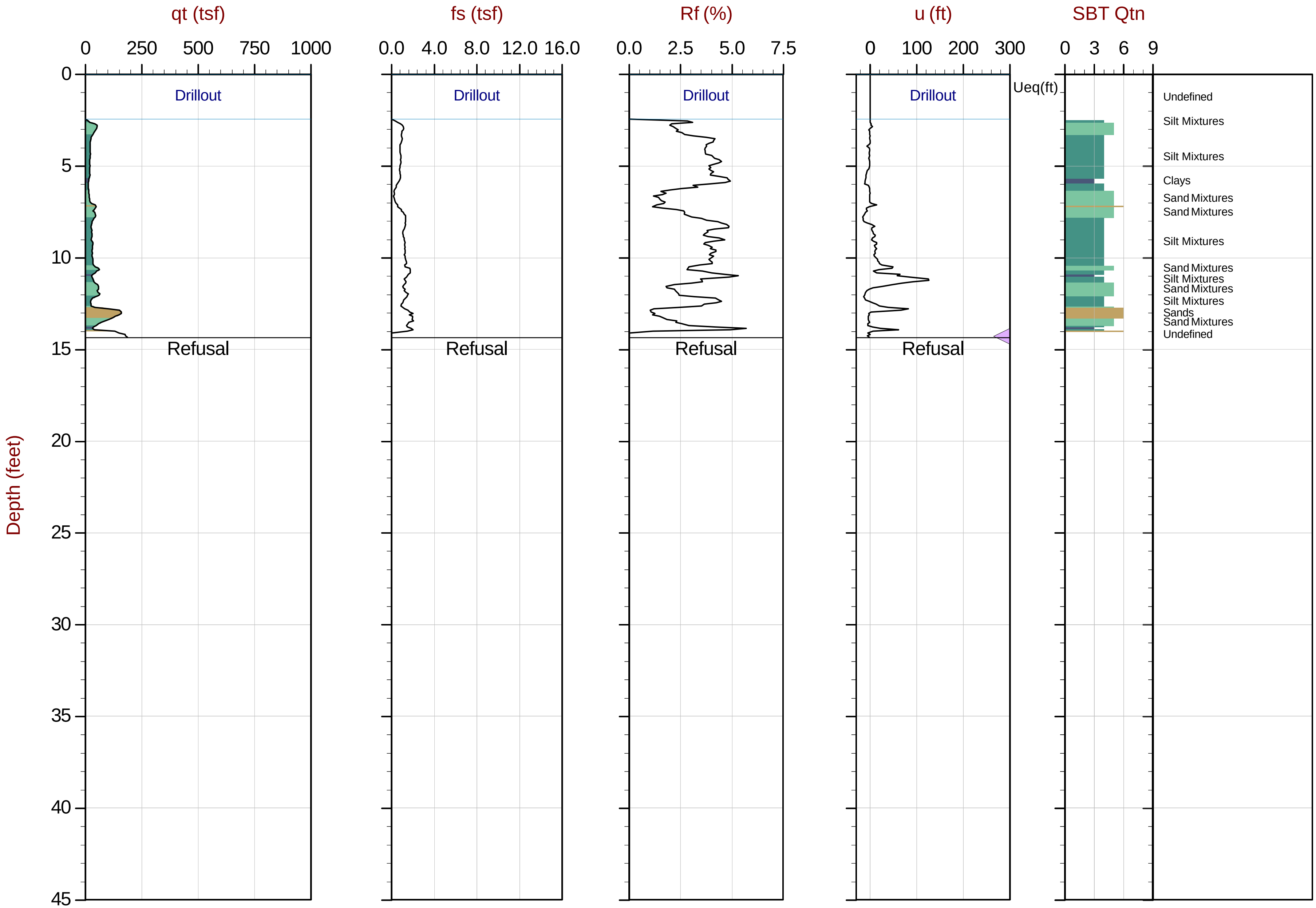
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 13:11
Site: Grand Street Commons

Sounding: AC-CPT-17S
Cone: 536:T1500F15U500



Max Depth: 4.375 m / 14.35 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP17S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58659 Long: -122.30340

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

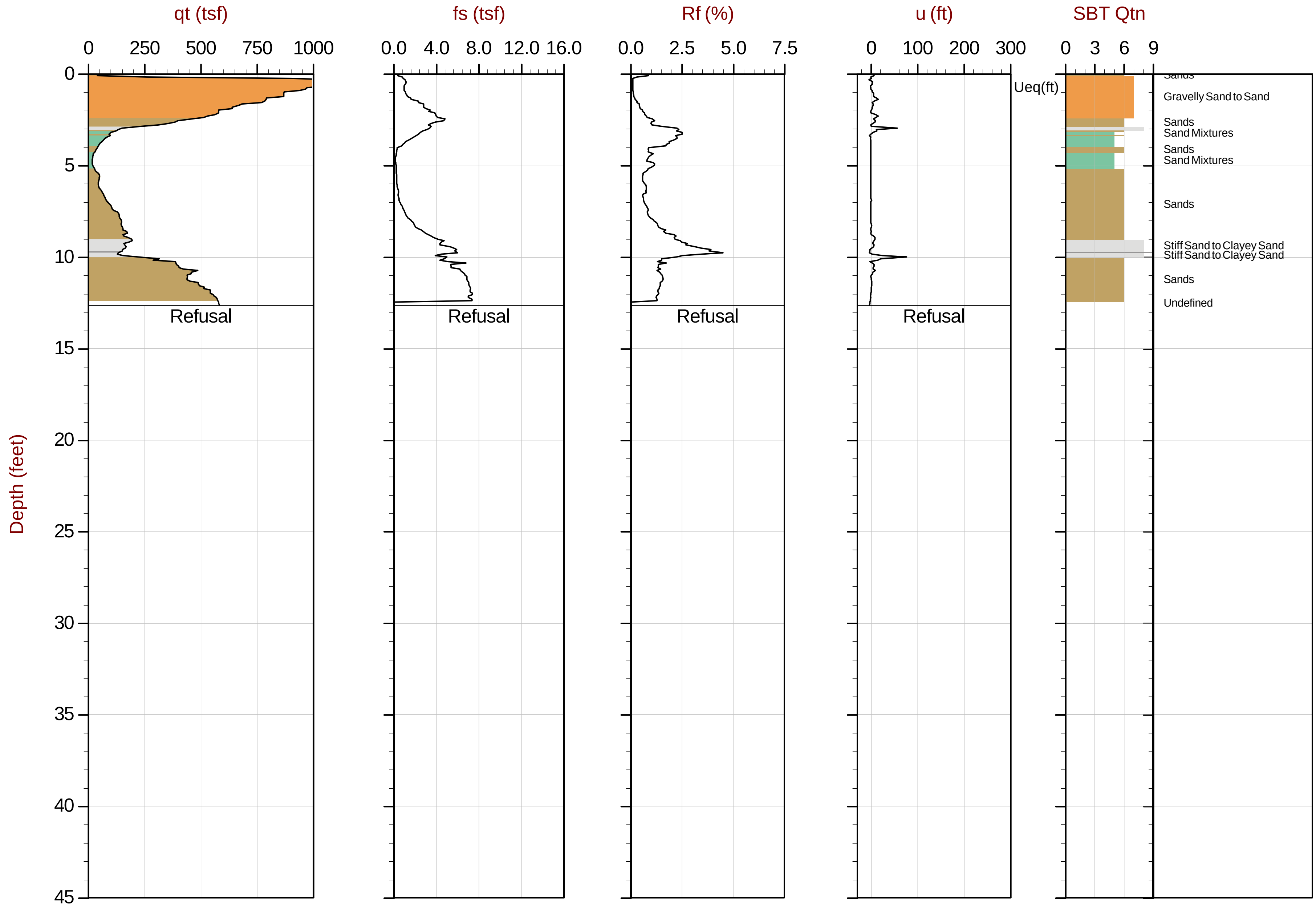
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 08:14
Site: Grand Street Commons

Sounding: AC-CPT-18S
Cone: 661:T1500F15U35



Max Depth: 3.850 m / 12.63 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP18S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58653 Long: -122.30334

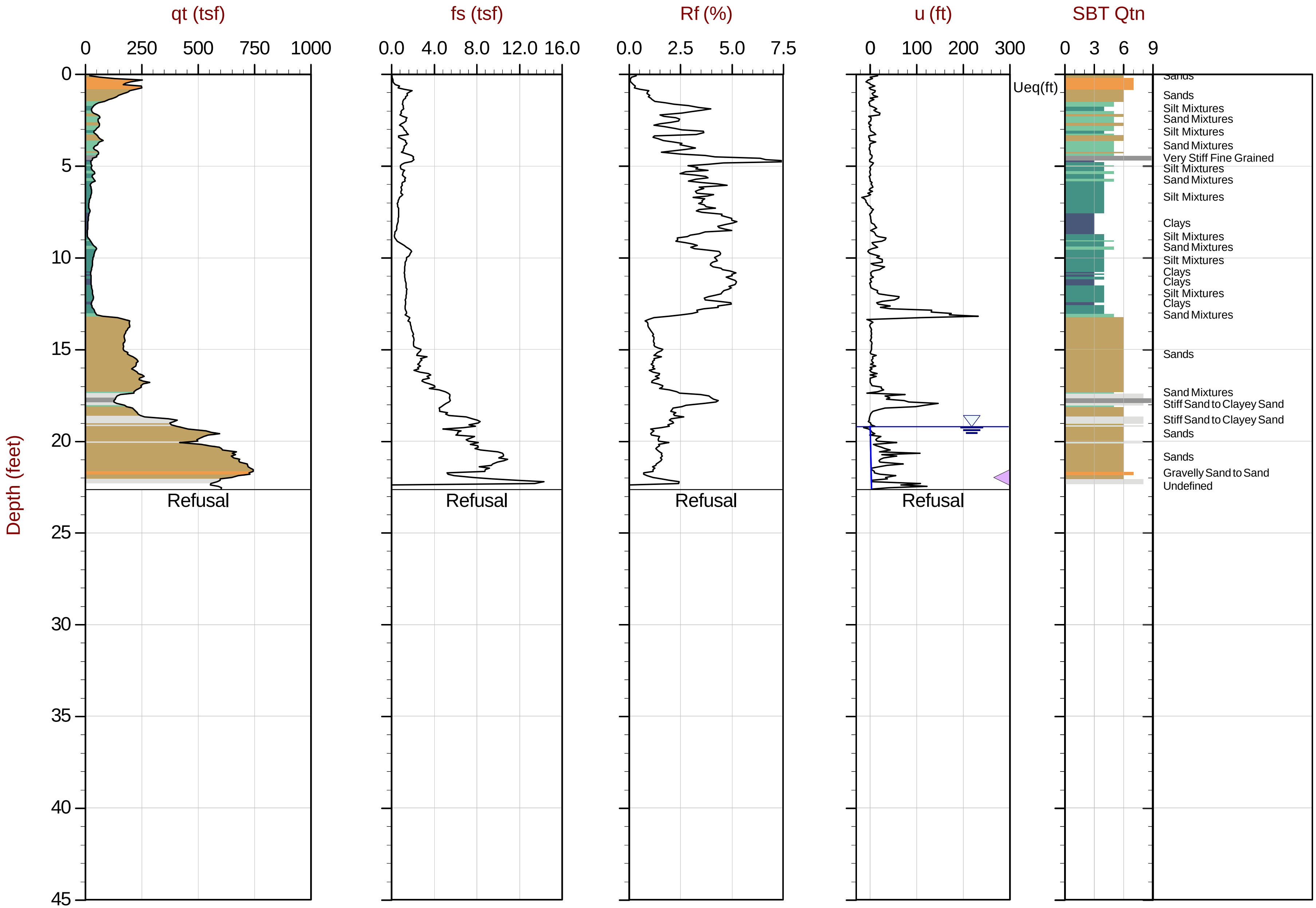
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 15:20
Site: Grand Street Commons
Sounding: AC-CPT-19S
Cone: 661:T1500F15U35



Max Depth: 6.900 m / 22.64 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP19S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58675 Long: -122.30333

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

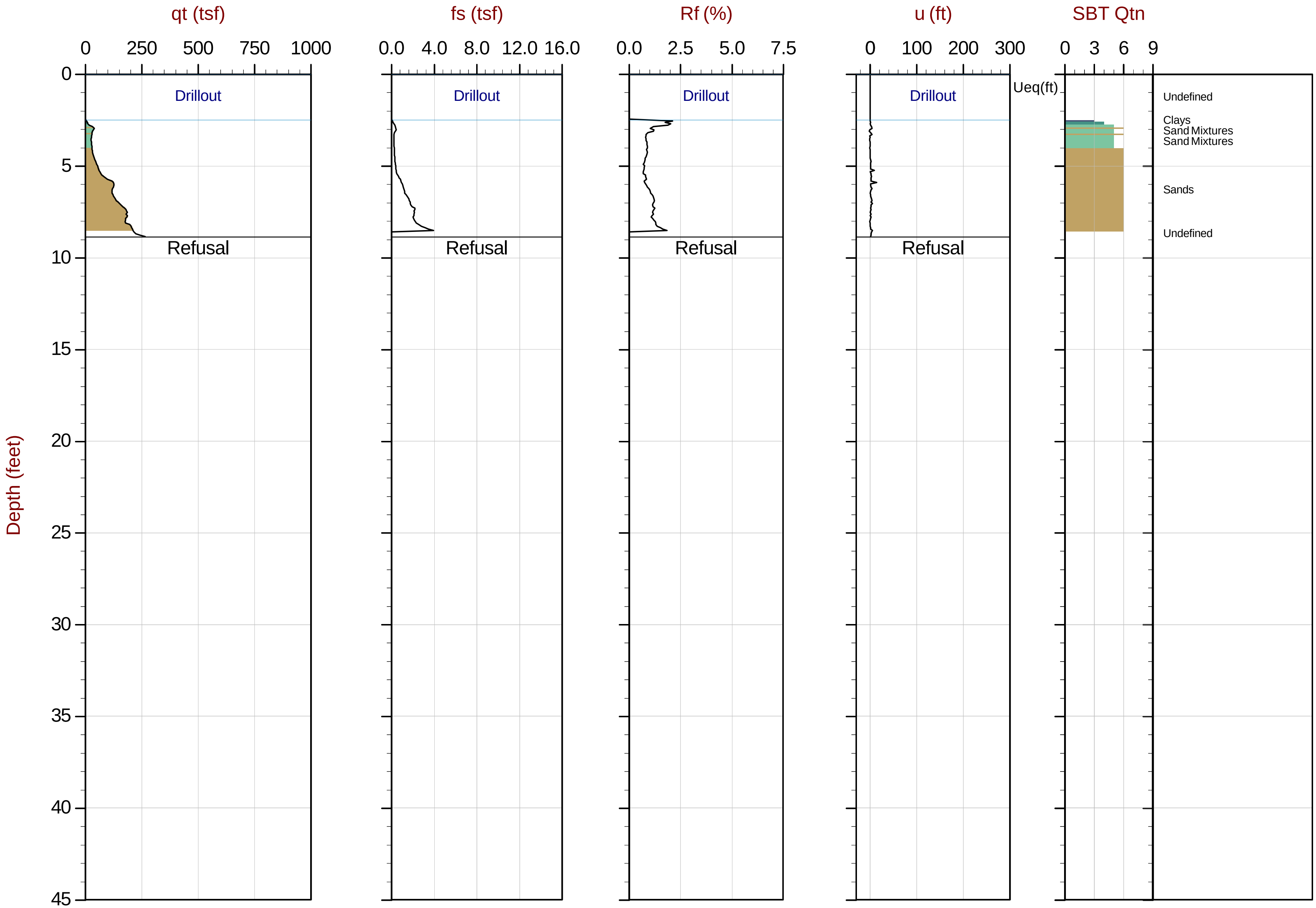
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 12:10
Site: Grand Street Commons

Sounding: AC-CPT-20S
Cone: 536:T1500F15U500



Max Depth: 2.700 m / 8.86 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP20S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30320

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

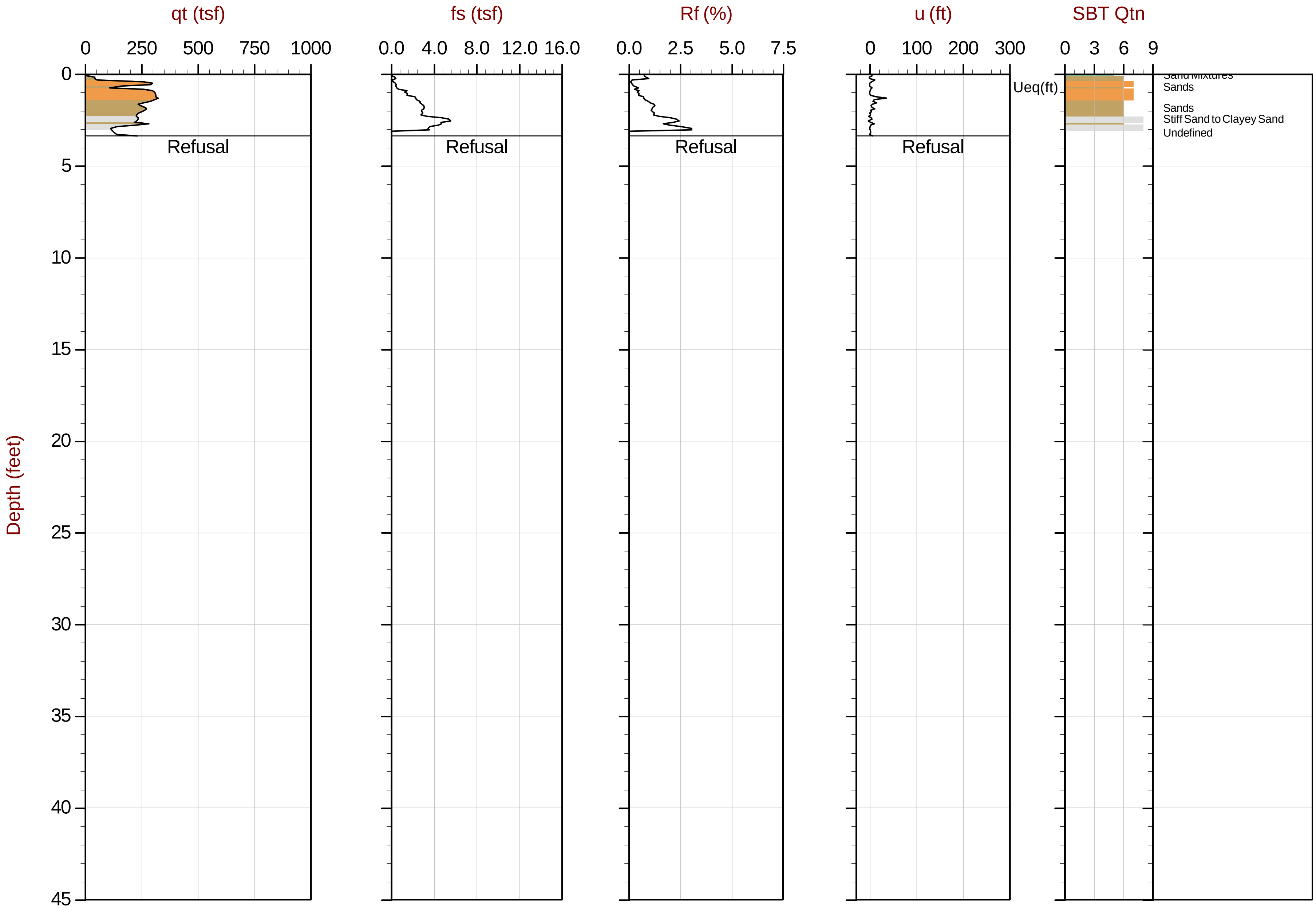
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 15:51
Site: Grand Street Commons

Sounding: AC-CPT-21S
Cone: 661:T1500F15U35



Max Depth: 1.025 m / 3.36 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP21S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58641 Long: -122.30320

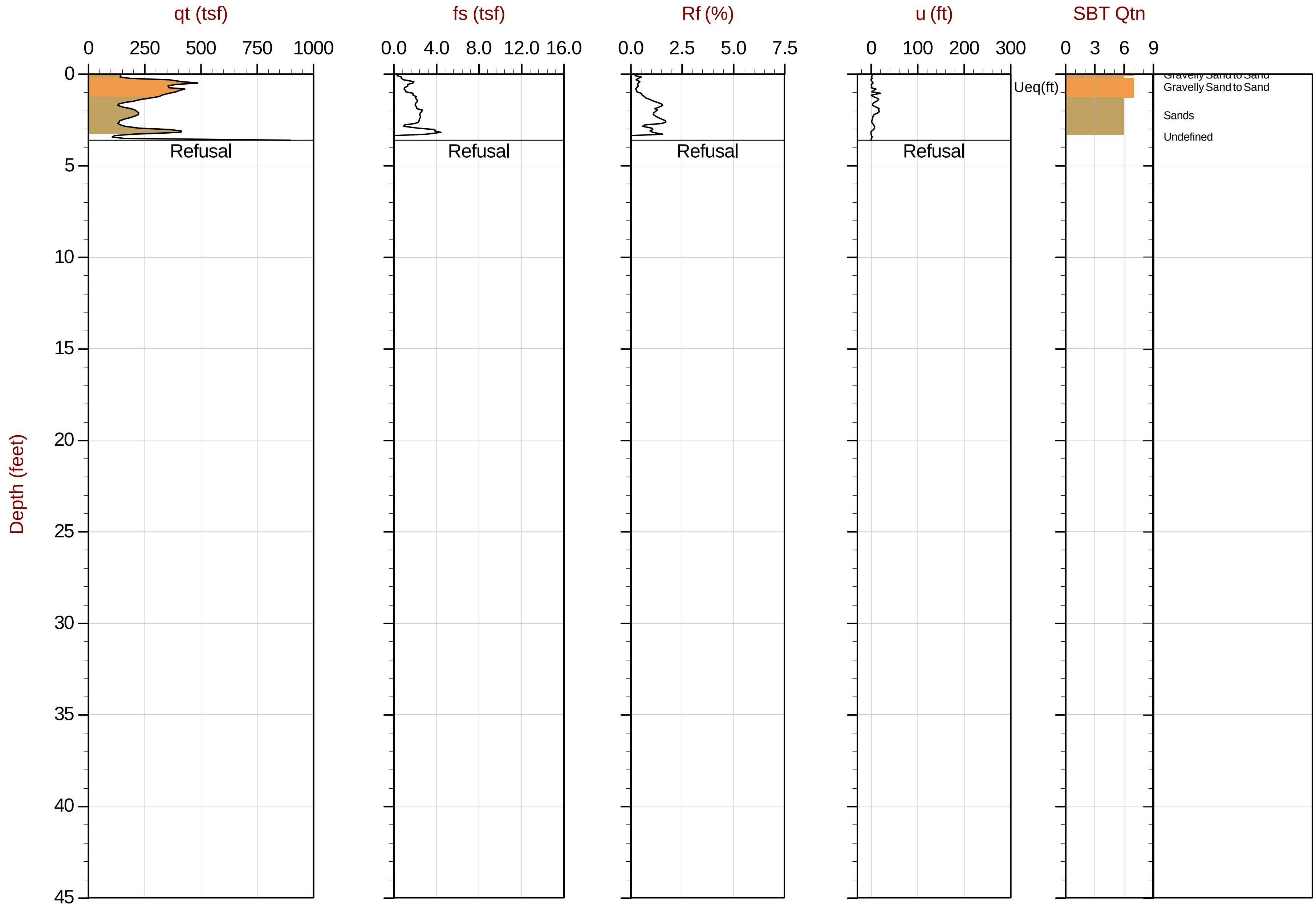
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 16:09
Site: Grand Street Commons
Sounding: AC-CPT-21BS
Cone: 661:T1500F15U35



Max Depth: 1.100 m / 3.61 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP21BS.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58643 Long: -122.30321

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)

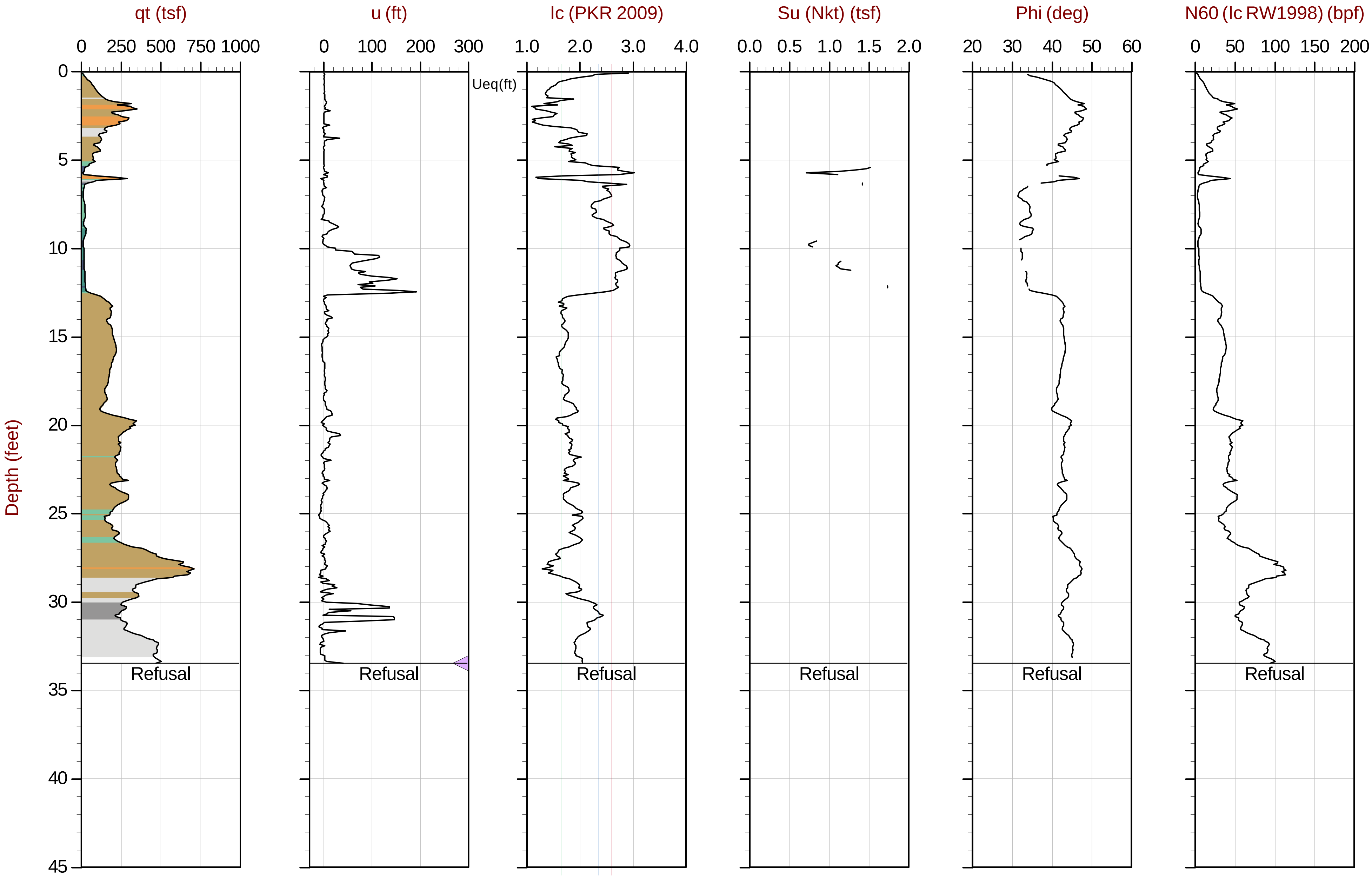
ConeTec

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 13:29
Site: Grand Street Commons

Sounding: AC-CPT-01E
Cone: 661:T1500F15U35



Max Depth: 10.200 m / 33.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58718 Long: -122.30365

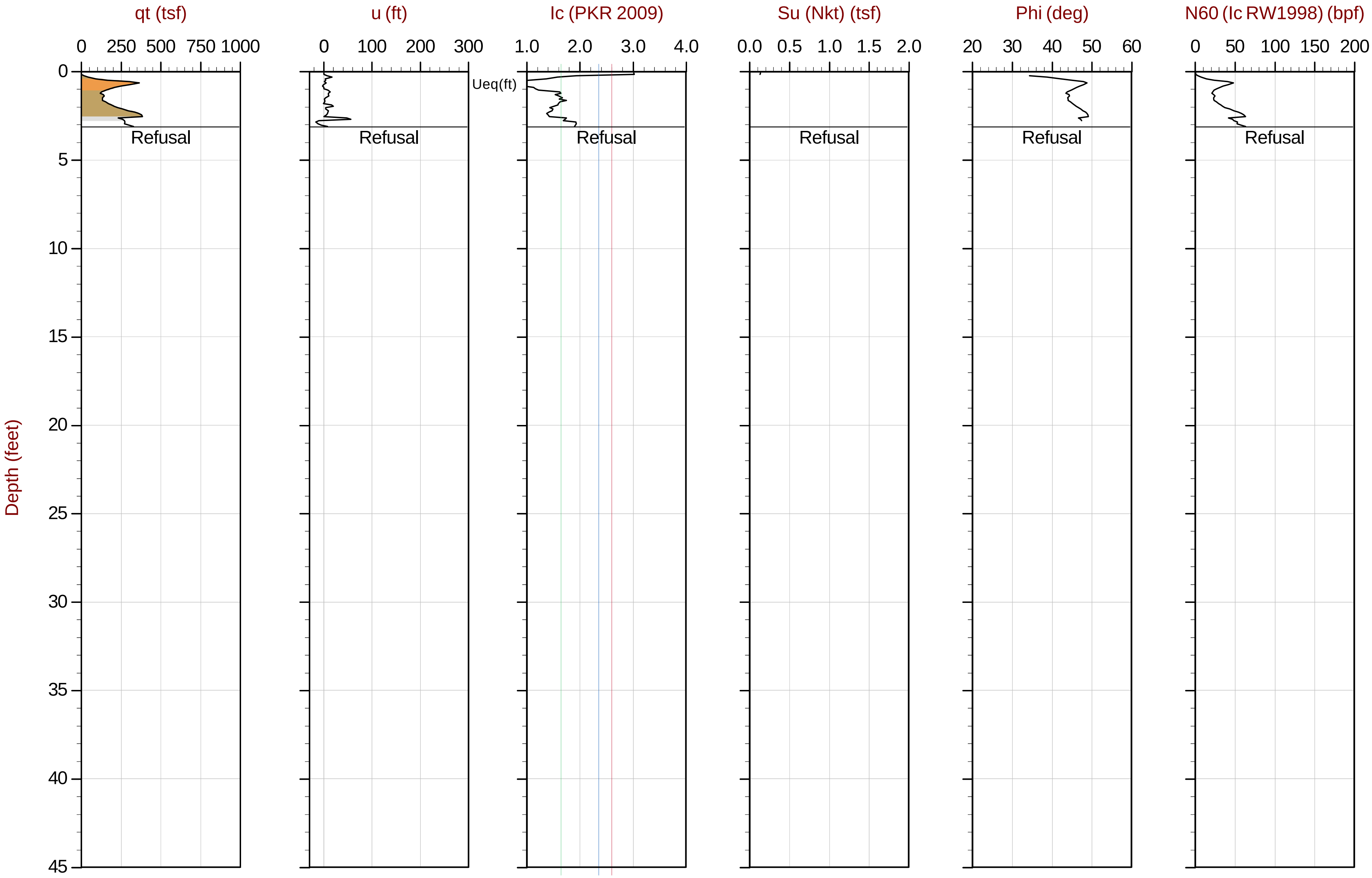
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 07:41
Site: Grand Street Commons
Sounding: AC-CPT-01S
Cone: 536:T1500F15U500



Max Depth: 0.950 m / 3.12 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30405

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

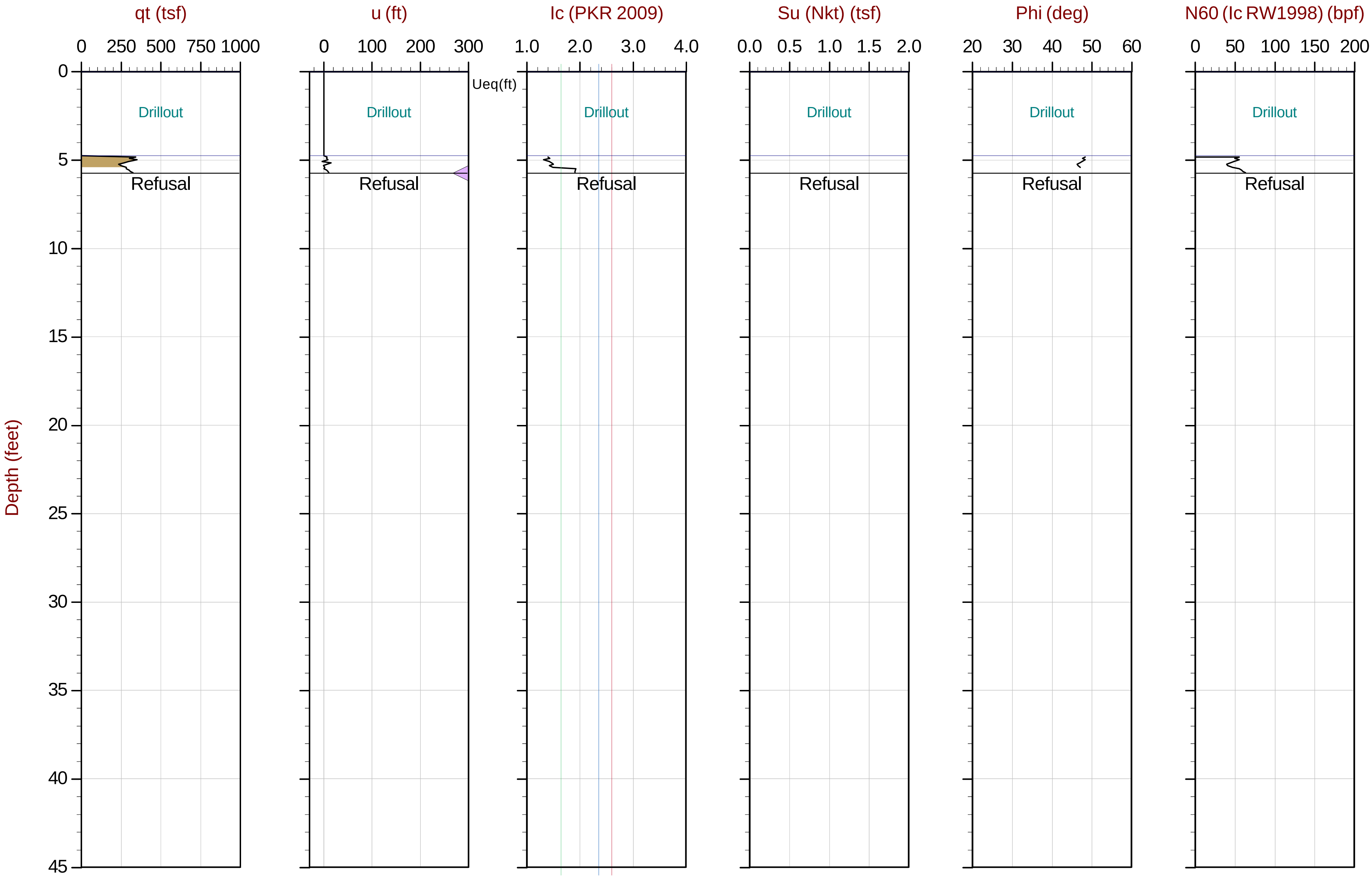
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 08:18
Site: Grand Street Commons

Sounding: AC-CPT-01BS
Cone: 536:T1500F15U500



Max Depth: 1.750 m / 5.74 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01BS.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30405

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

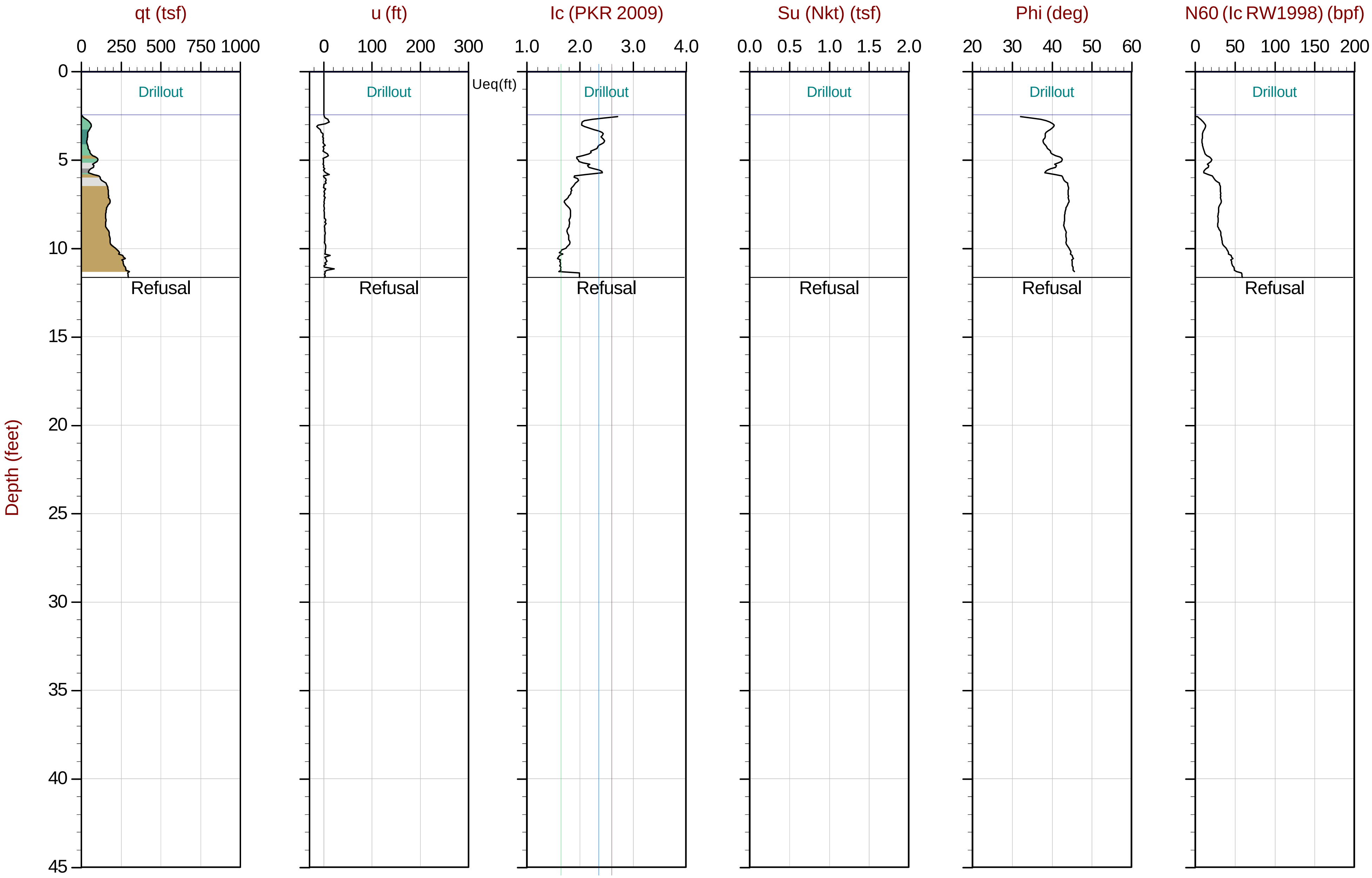
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 16:36
Site: Grand Street Commons

Sounding: AC-CPT-01W
Cone: 536:T1500F15U500



Max Depth: 3.550 m / 11.65 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01W.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58728 Long: -122.30473

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

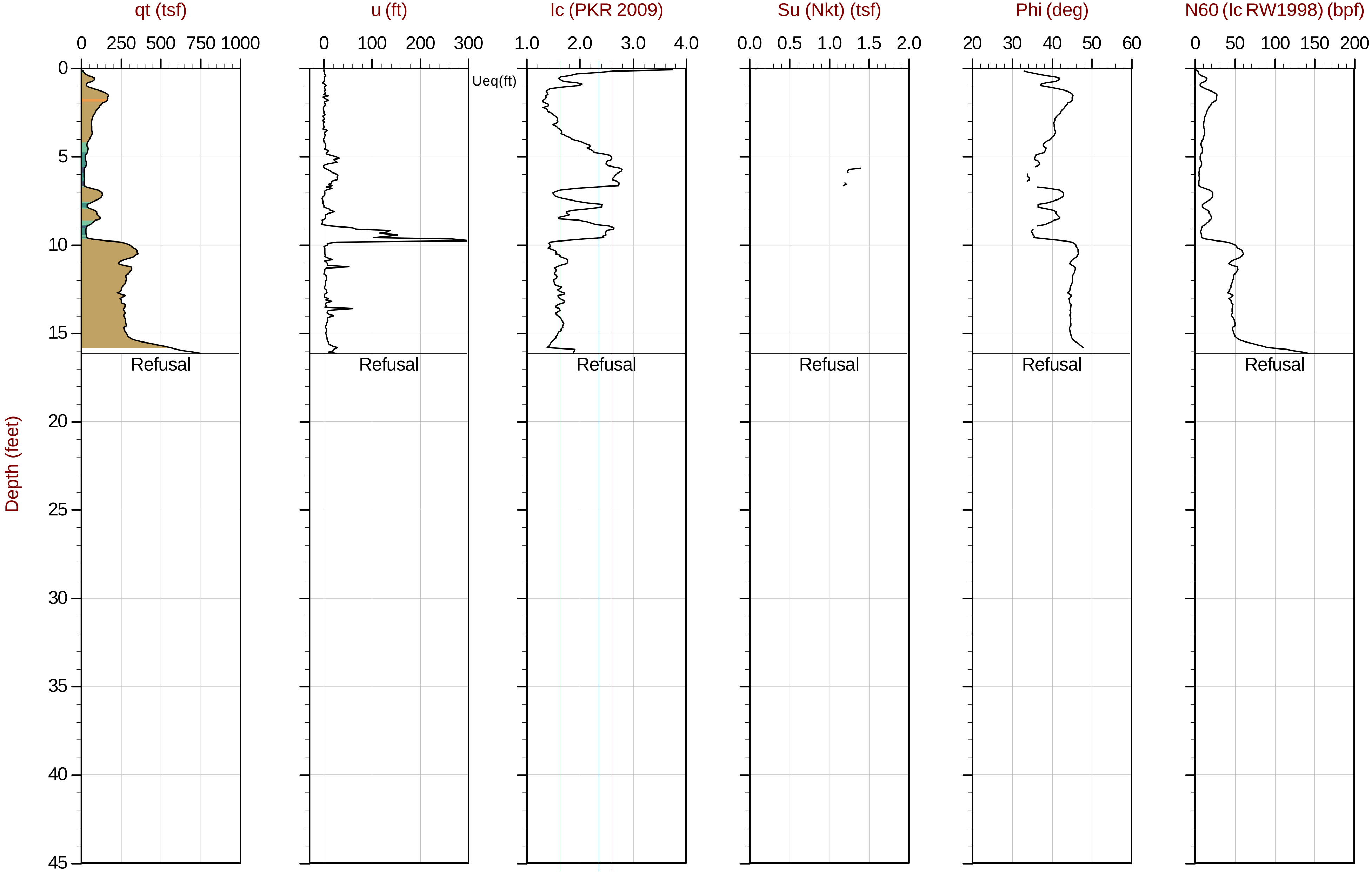
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 14:10
Site: Grand Street Commons

Sounding: AC-CPT-02E
Cone: 595:T1500F15U500



Max Depth: 4.925 m / 16.16 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP02E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58747 Long: -122.30353

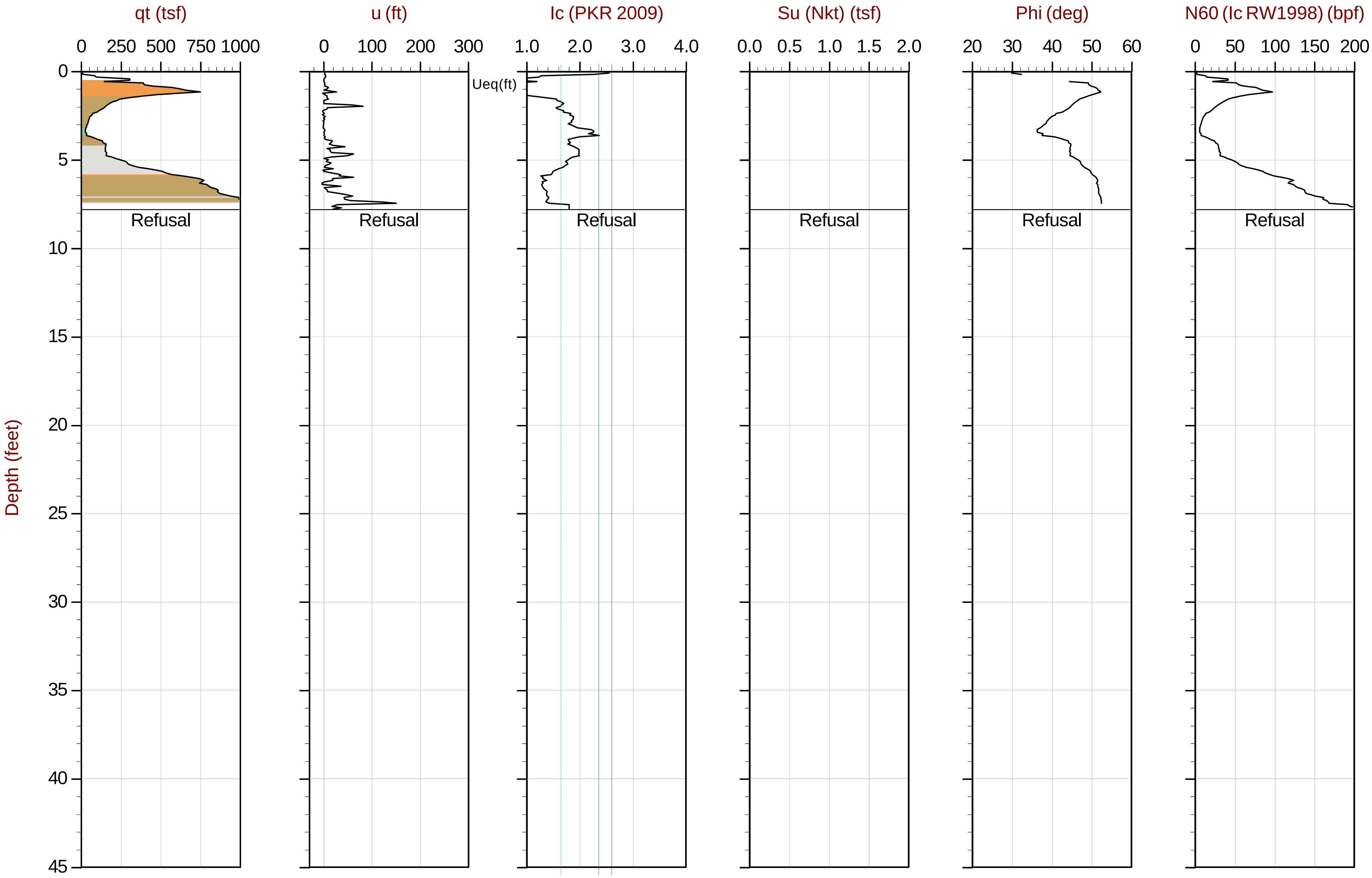
Equilibrium Pore Pressure (Ueq) · Assumed Ueq · Dissipation, Ueq achieved · Dissipation, Ueq not achieved · Hydrostatic Line

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

Job No: 20-59-21343
Date: 2020-09-11 11:13
Site: Grand Street Commons

Sounding: AC-CPT-02S
Cone: 661:T1500F15U35

Aspect Consulting



Max Depth: 2.375 m / 7.79 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP02S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58667 Long: -122.30398

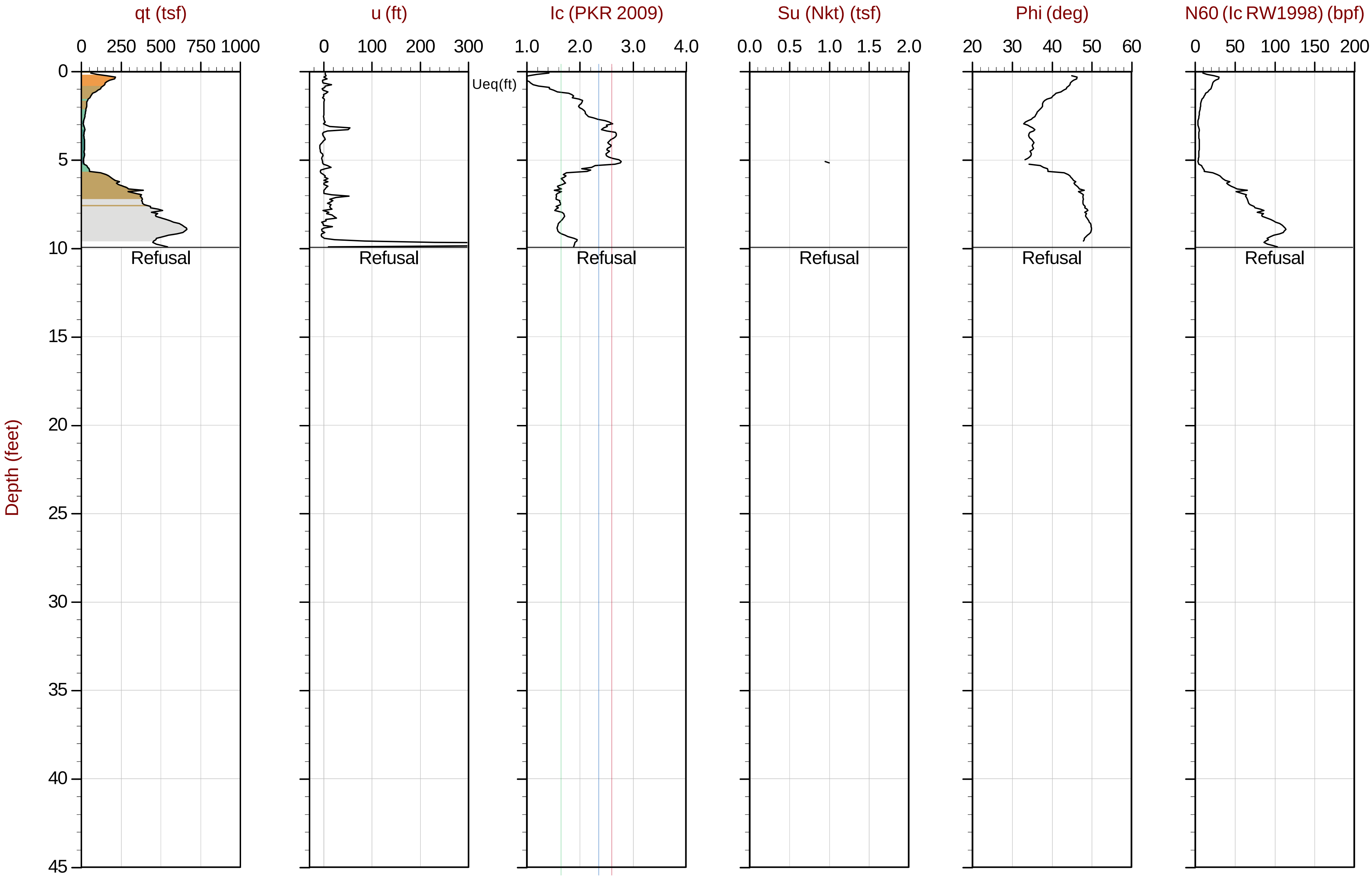
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 14:26
Site: Grand Street Commons
Sounding: AC-CPT-02W
Cone: 661:T1500F15U35



Max Depth: 3.025 m / 9.92 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP02W.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58761 Long: -122.30424

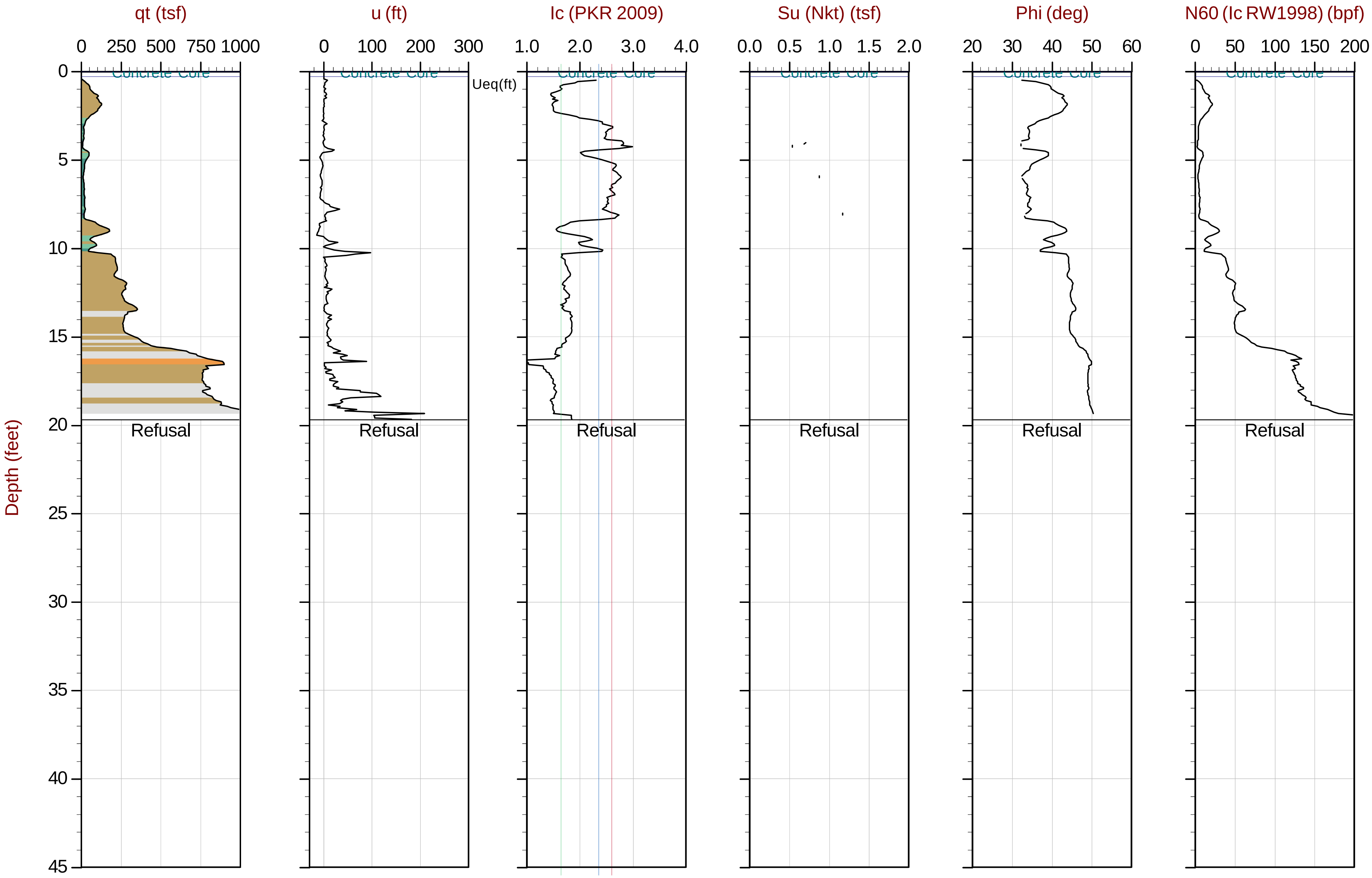
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 12:52
Site: Grand Street Commons
Sounding: AC-CPT-03E
Cone: 661:T1500F15U35



Max Depth: 6.000 m / 19.68 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP03E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58755 Long: -122.30358

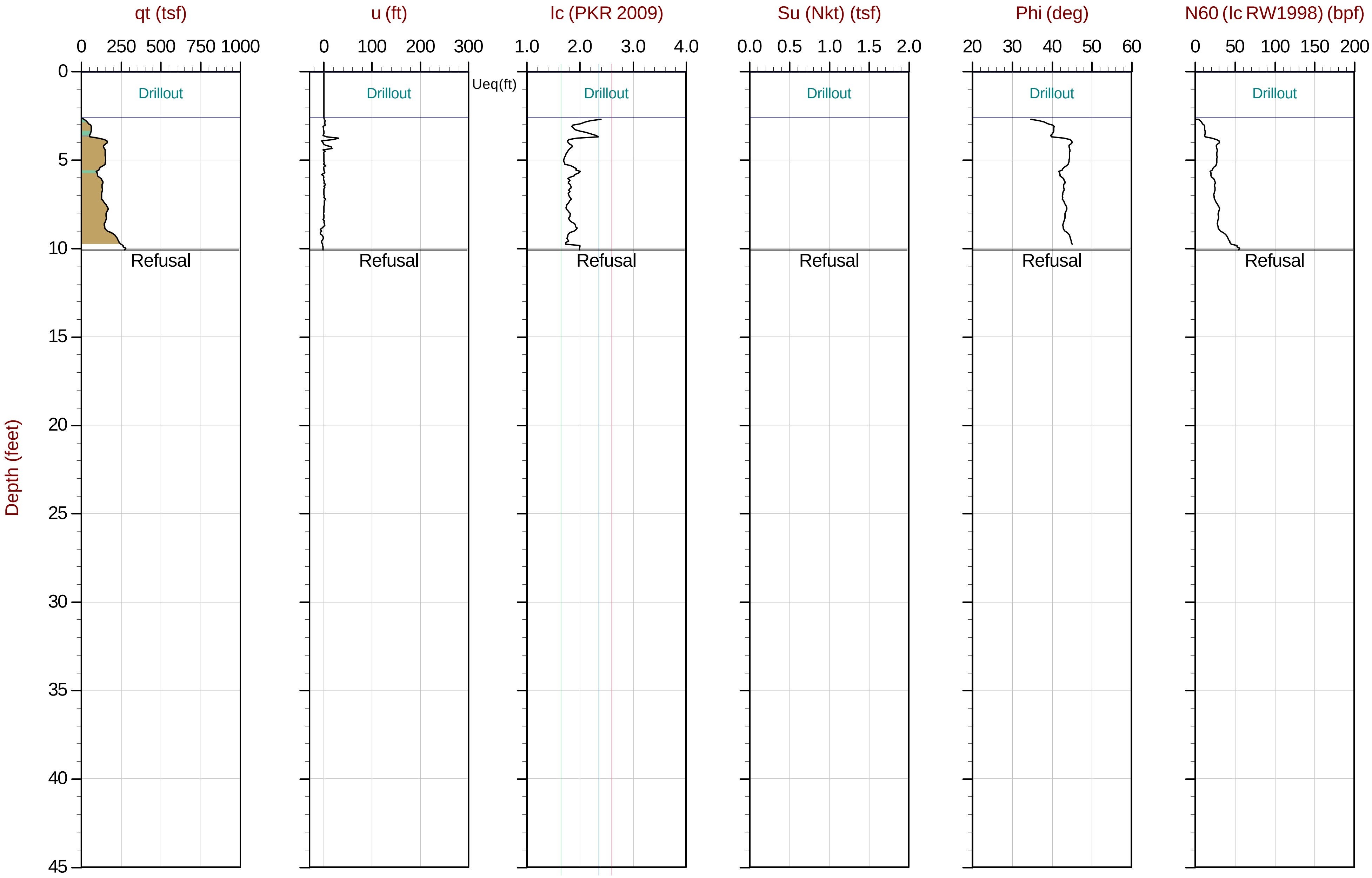
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 15:37
Site: Grand Street Commons

Sounding: AC-CPT-03S
Cone: 536:T1500F15U500



Max Depth: 3.075 m / 10.09 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP03S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58685 Long: -122.30398

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

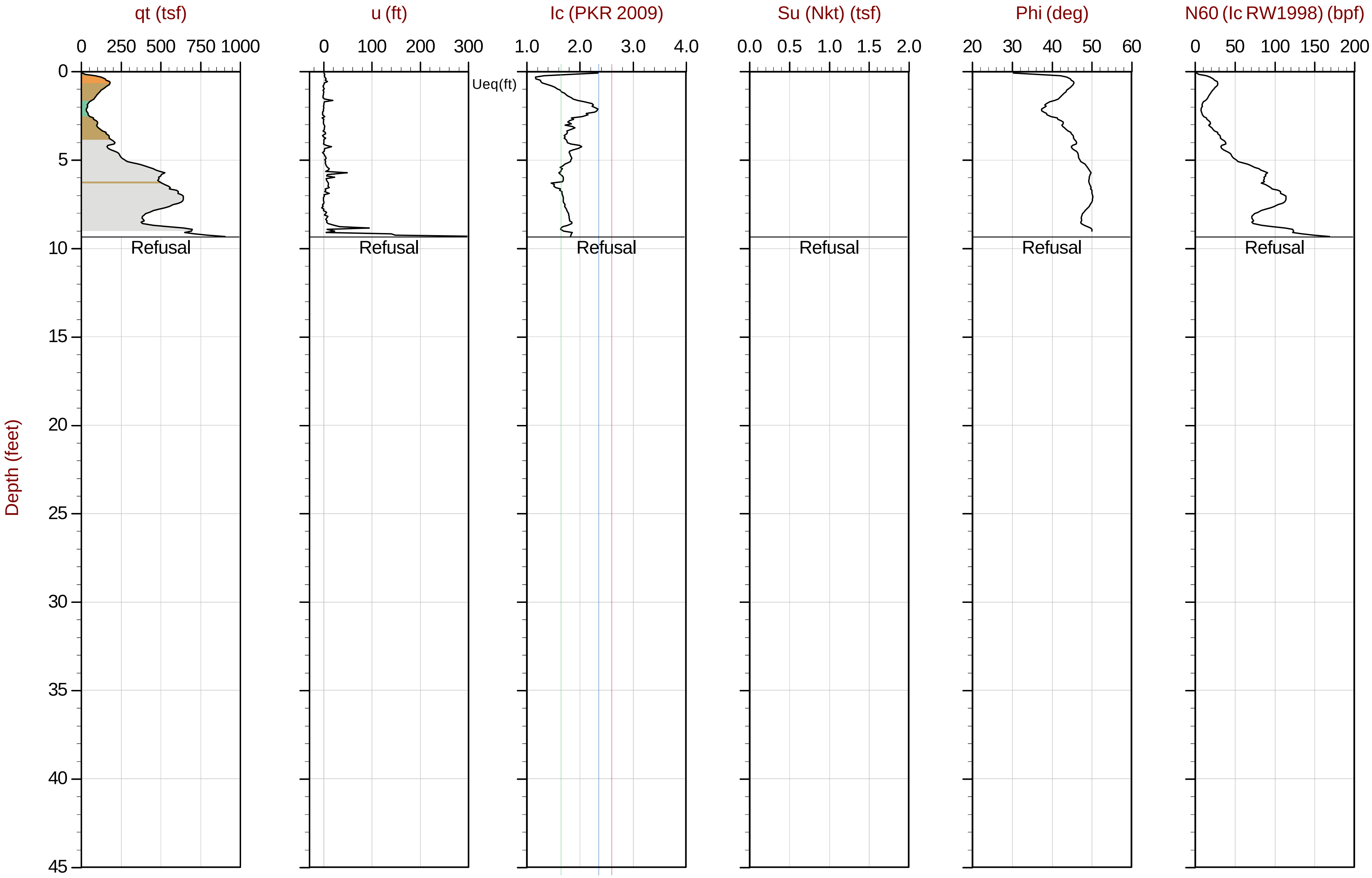
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 14:50
Site: Grand Street Commons

Sounding: AC-CPT-03W
Cone: 661:T1500F15U35



Max Depth: 2.850 m / 9.35 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP03W.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58702 Long: -122.30418

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

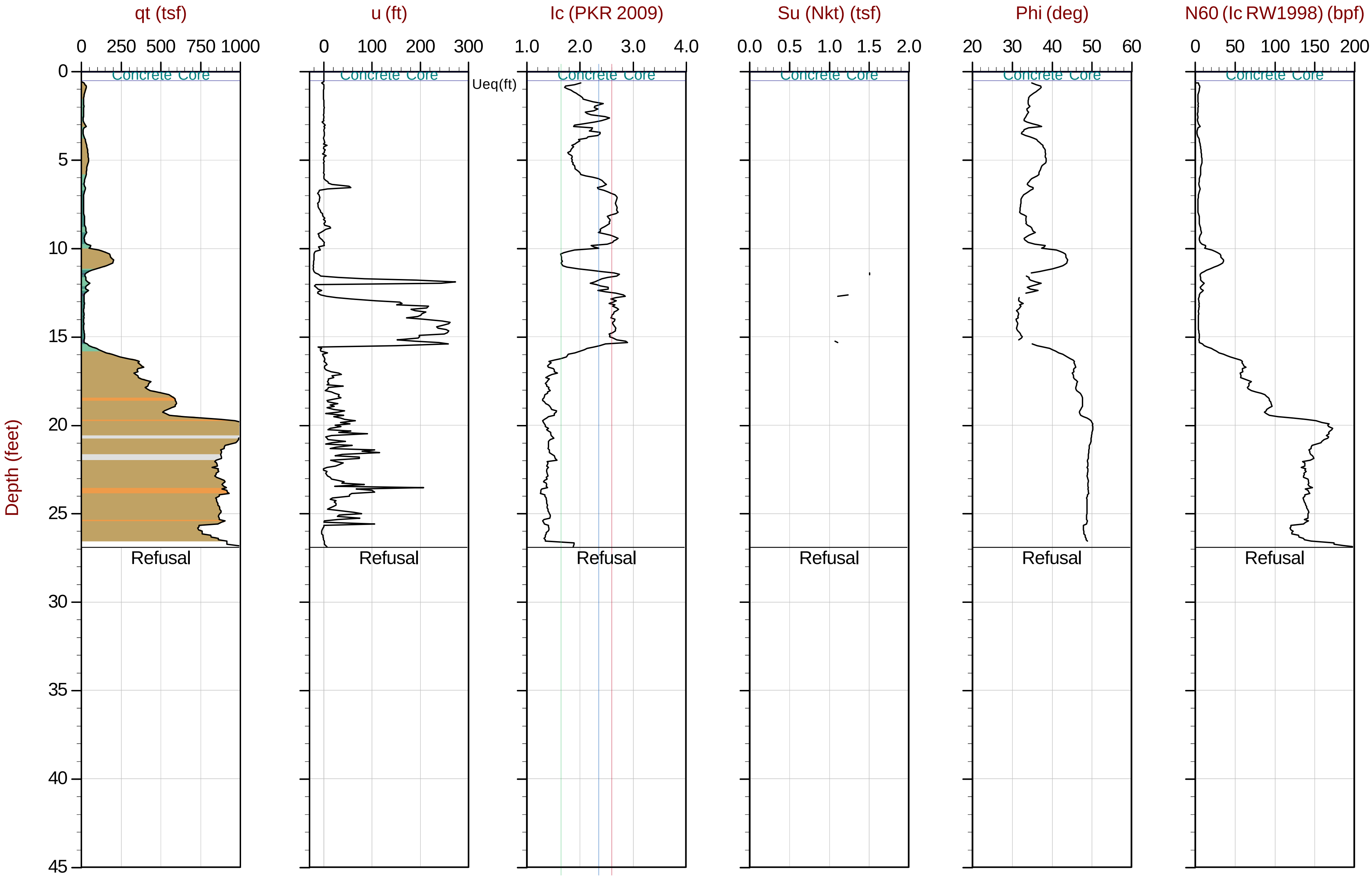
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 12:15
Site: Grand Street Commons

Sounding: AC-CPT-04E
Cone: 661:T1500F15U35



Max Depth: 8.200 m / 26.90 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP04E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58743 Long: -122.30356

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

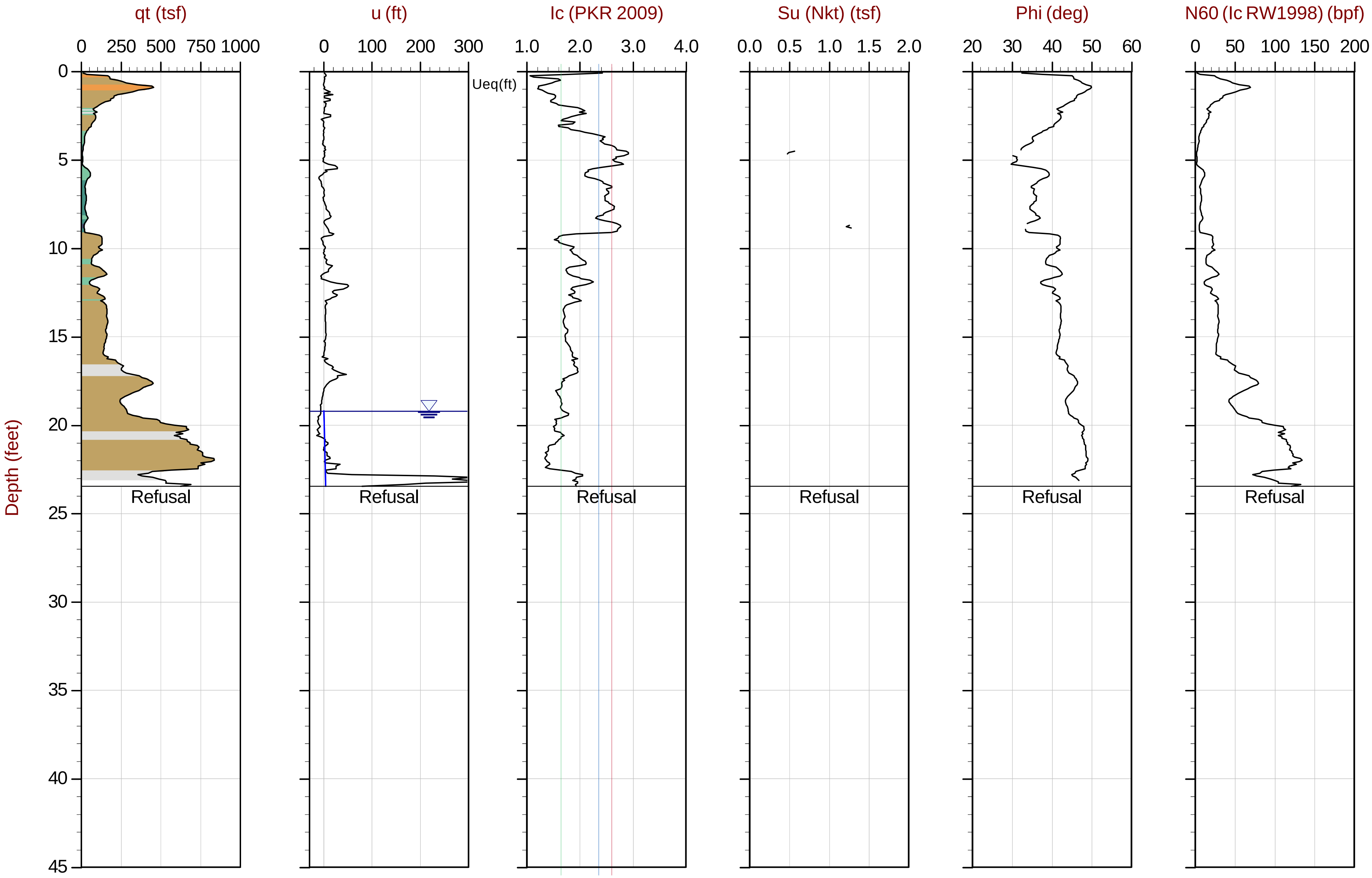
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 11:48
Site: Grand Street Commons

Sounding: AC-CPT-04S
Cone: 661:T1500F15U35



Max Depth: 7.150 m / 23.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP04S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30389

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

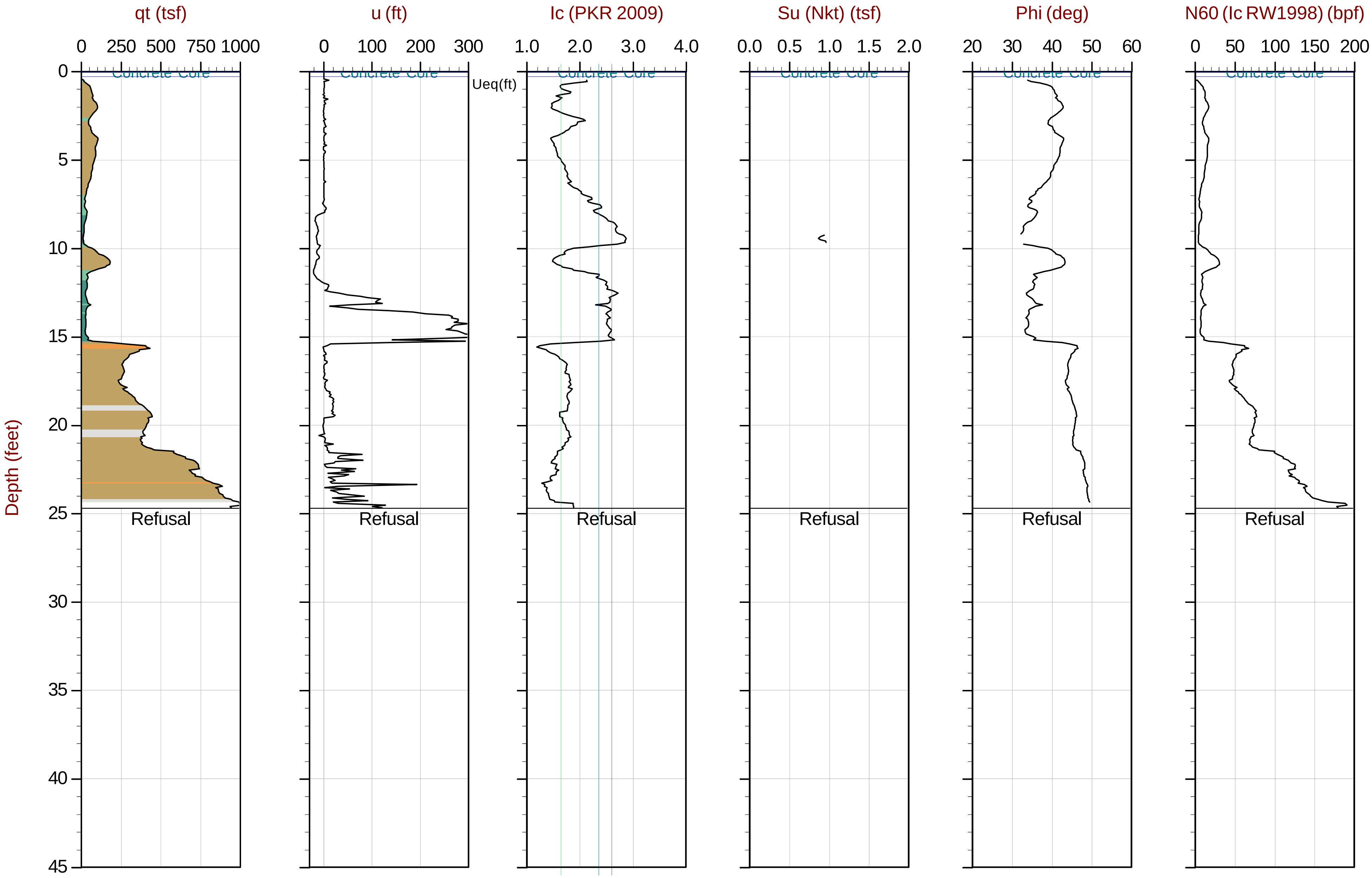
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 11:28
Site: Grand Street Commons

Sounding: AC-CPT-05E
Cone: 661:T1500F15U35



Max Depth: 7.525 m / 24.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP05E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58736 Long: -122.30348

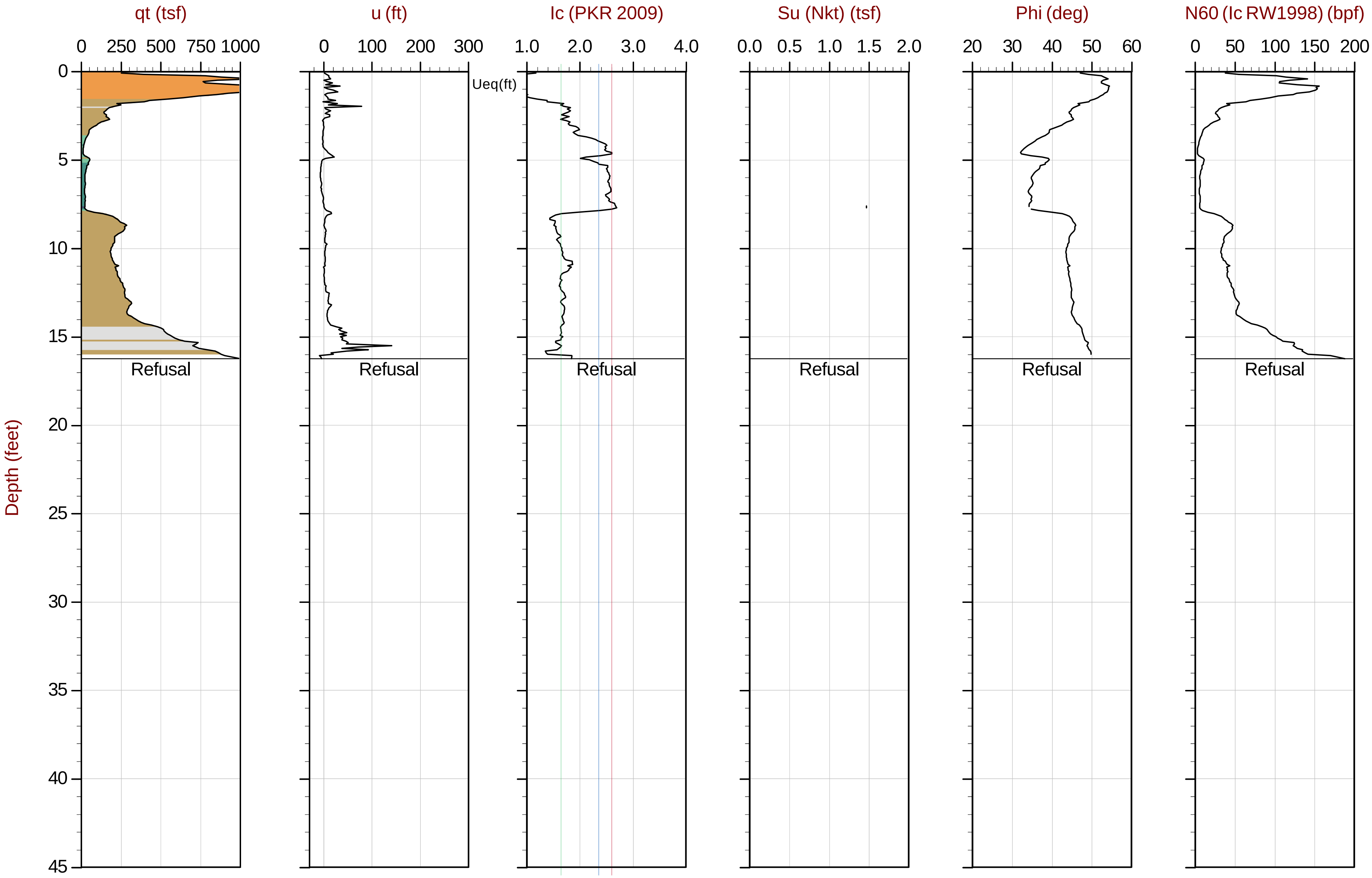
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 10:31
Site: Grand Street Commons

Sounding: AC-CPT-05S
Cone: 661:T1500F15U35



Max Depth: 4.950 m / 16.24 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP05S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58669 Long: -122.30386

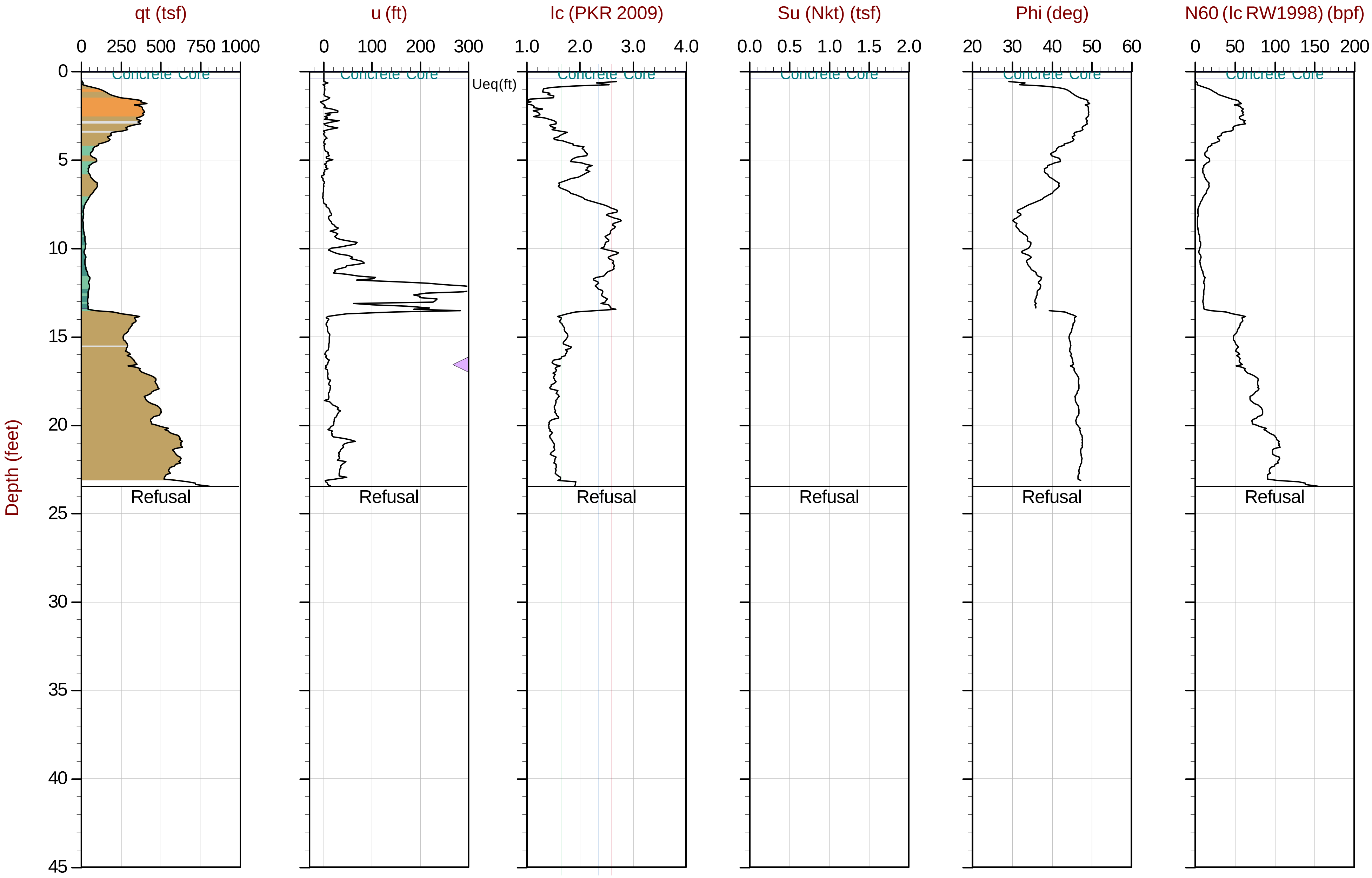
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 10:47
Site: Grand Street Commons
Sounding: AC-CPT-06E
Cone: 661:T1500F15U35



Max Depth: 7.150 m / 23.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP06E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58722 Long: -122.30348

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

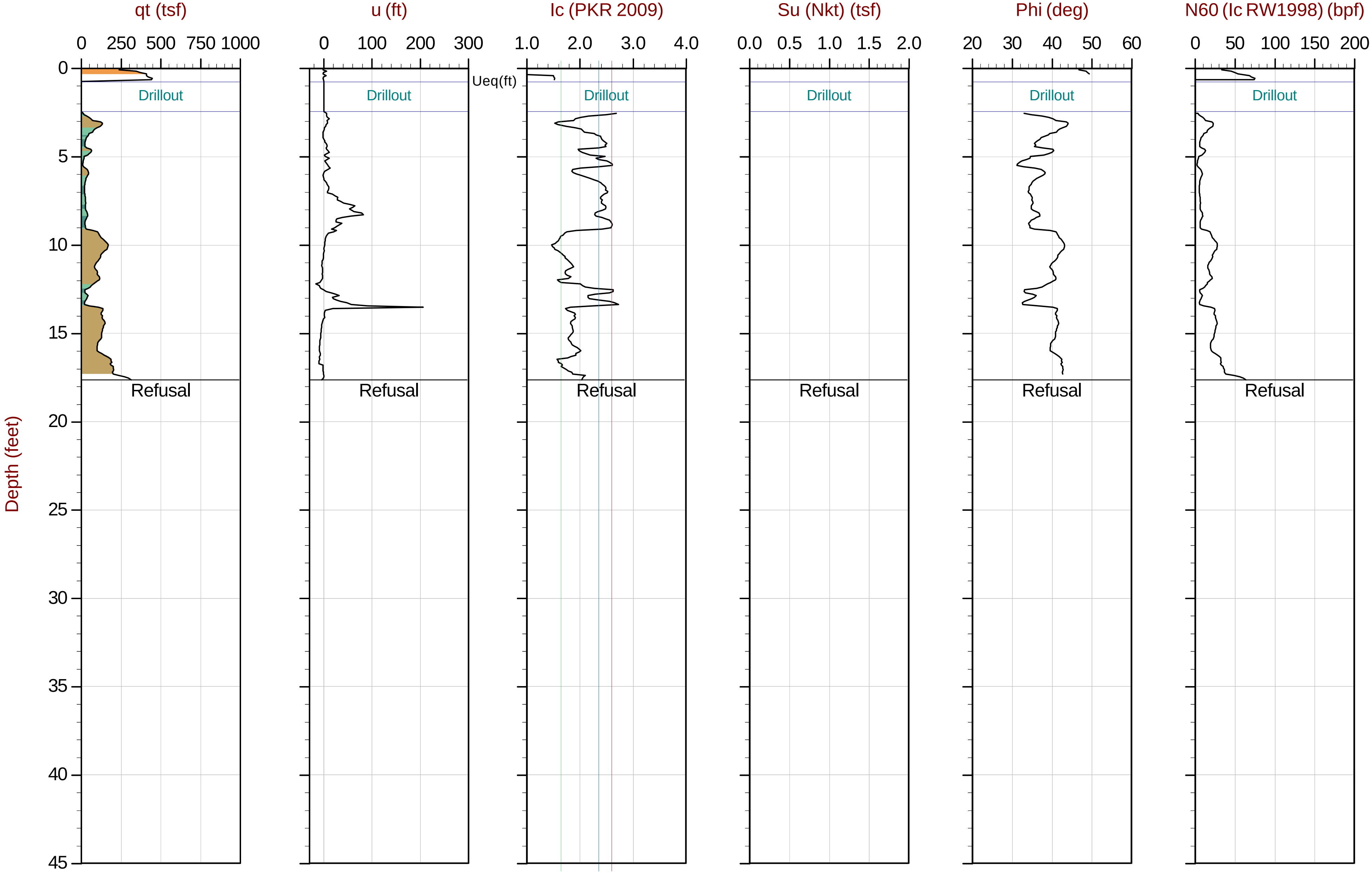
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 10:31
Site: Grand Street Commons

Sounding: AC-CPT-06S
Cone: 536:T1500F15U500



Max Depth: 5.375 m / 17.63 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP06S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58655 Long: -122.30381

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

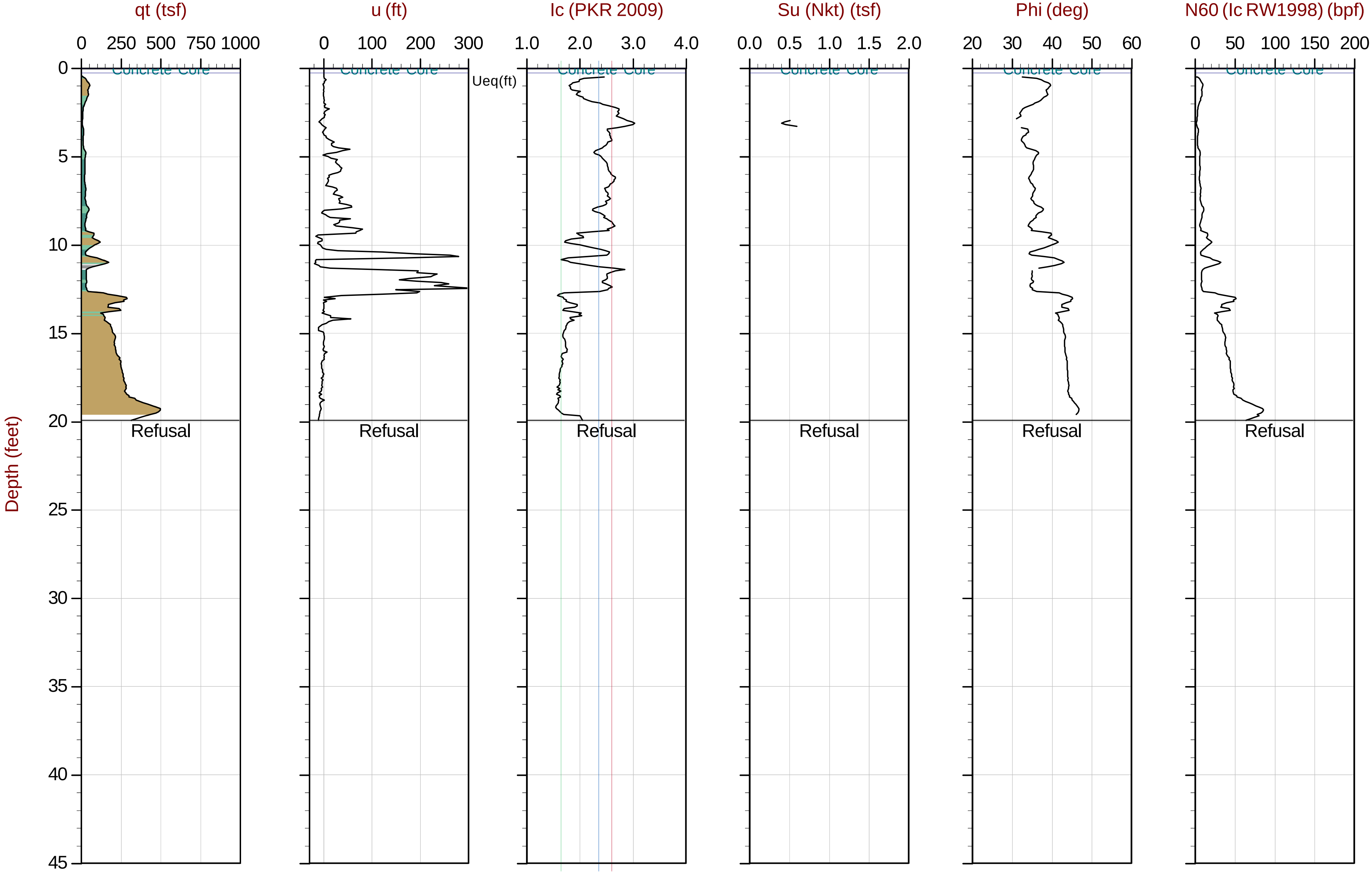
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 07:15
Site: Grand Street Commons

Sounding: AC-CPT-07E
Cone: 661:T1500F15U35



Max Depth: 6.075 m / 19.93 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP07E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

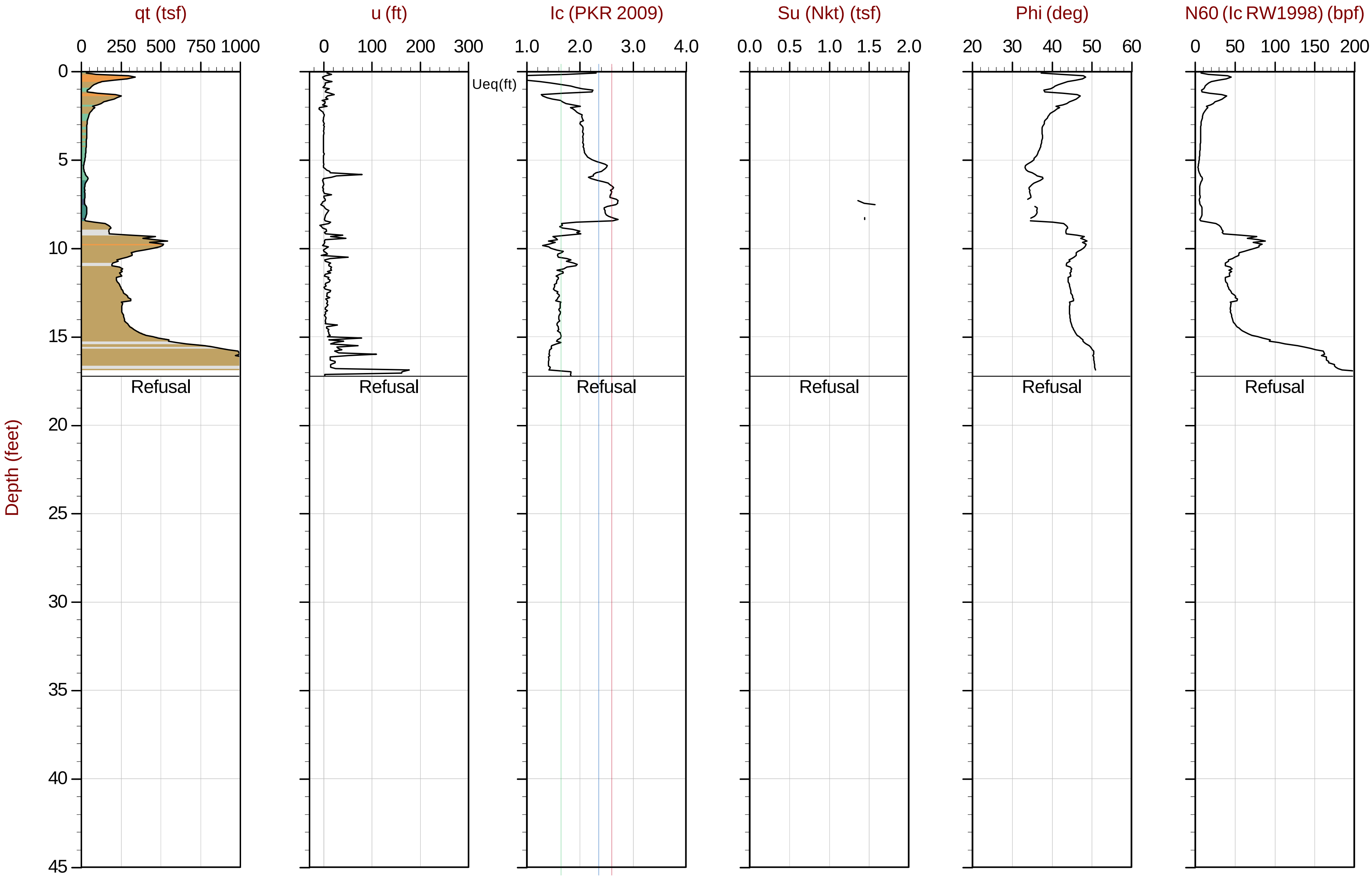
SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58756 Long: -122.30343

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.

Job No: 20-59-21343	Sounding: AC-CPT-07S
Date: 2020-09-11 12:32	Cone: 661:T1500F15U35
Site: Grand Street Commons	

CONETEC — *Aspect Consulting*



Max Depth: 5.250 m / 17.22 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP07S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58687 Long: -122.30375

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

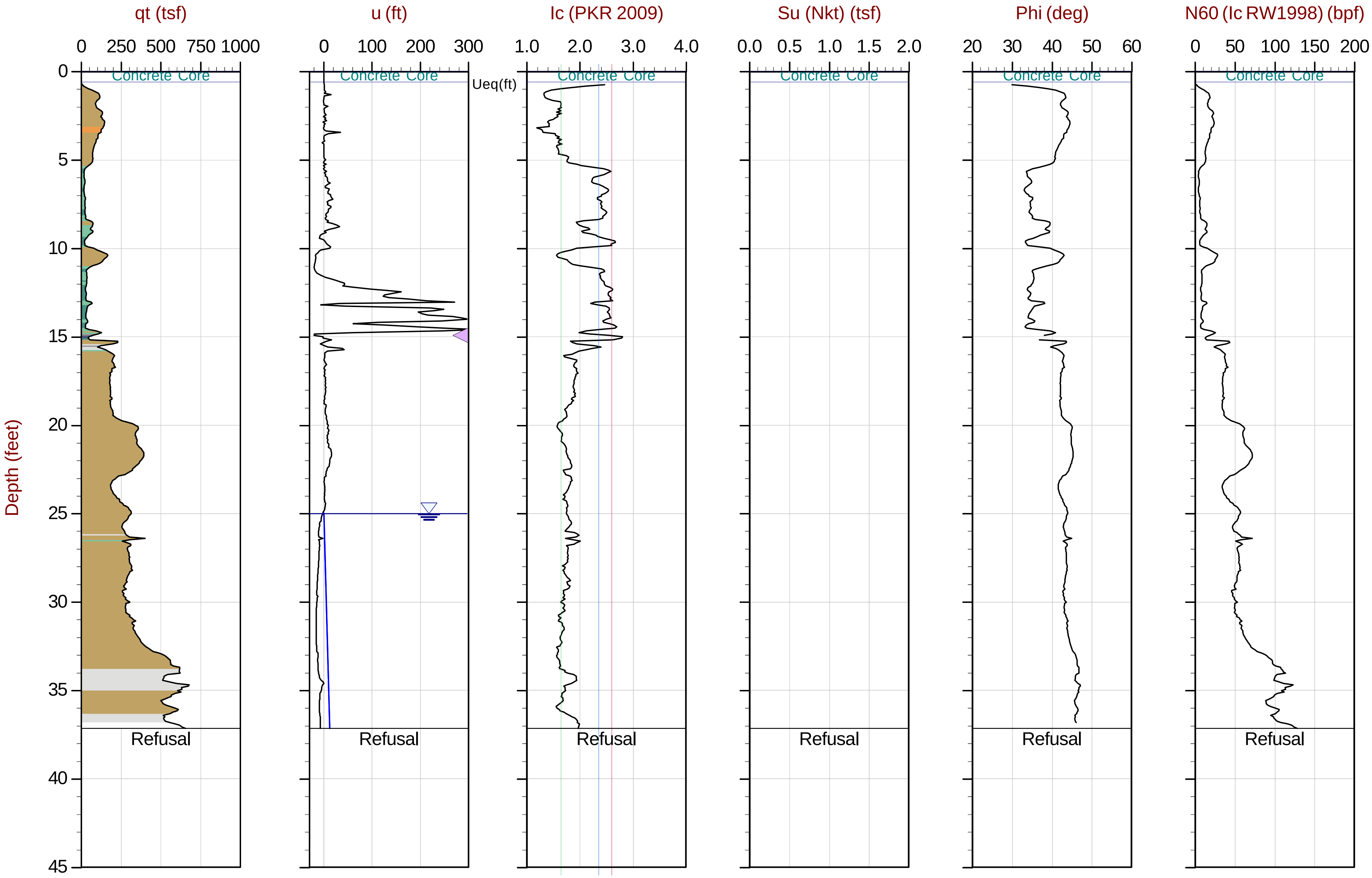
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 07:46
Site: Grand Street Commons

Sounding: AC-CPT-08E
Cone: 661:T1500F15U35



Max Depth: 11.325 m / 37.16 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP08E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58747 Long: -122.30340

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

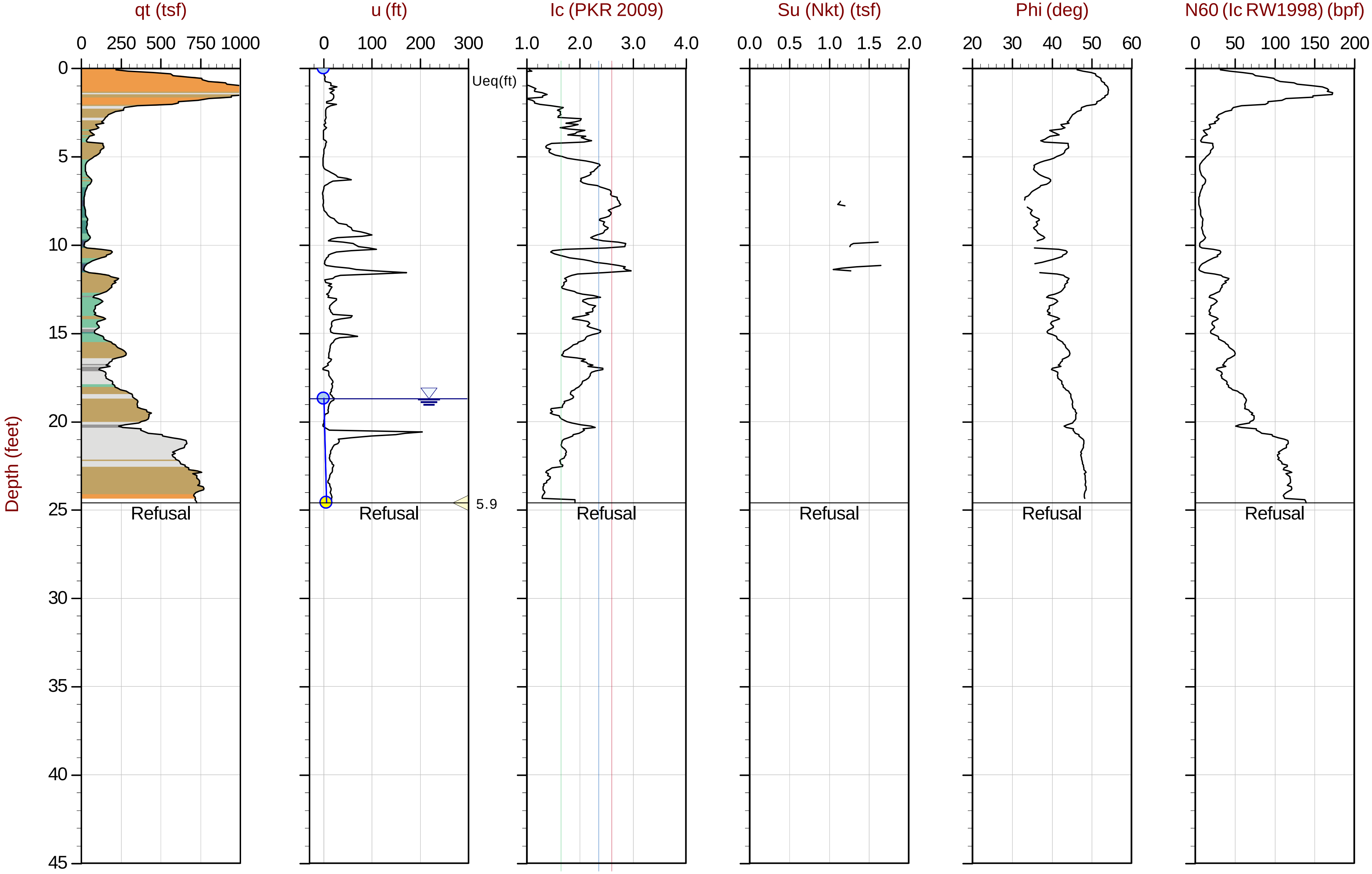
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 09:15
Site: Grand Street Commons

Sounding: AC-CPT-08S
Cone: 661:T1500F15U35



Max Depth: 7.500 m / 24.61 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP08S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58677 Long: -122.30374

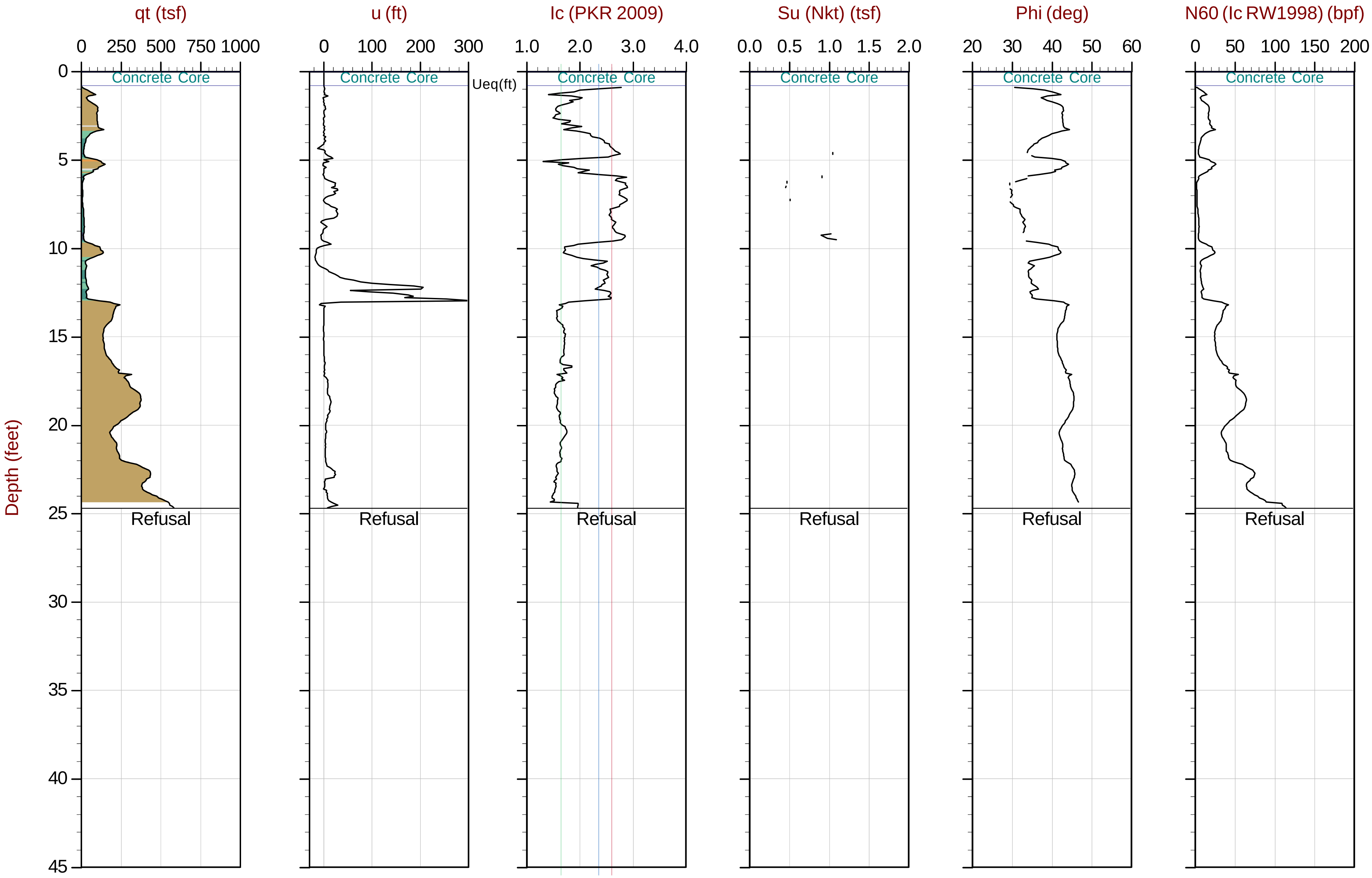
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 12:54
Site: Grand Street Commons
Sounding: AC-CPT-09E
Cone: 595:T1500F15U500



Max Depth: 7.525 m / 24.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

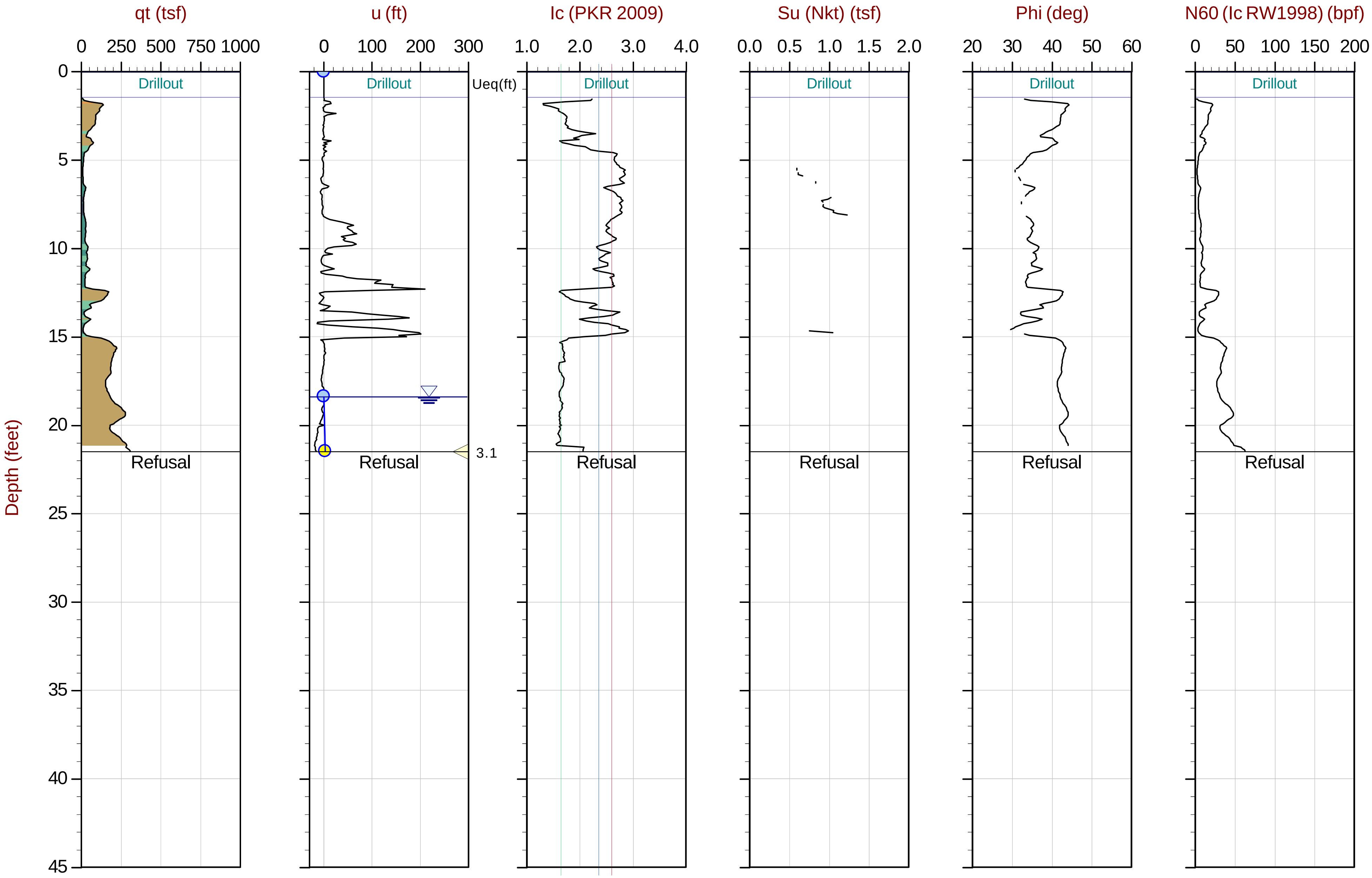
File: 20-59-21343_CP09E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58732 Long: -122.30342

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	*Aspect Consulting*	Job No: 20-59-21343 Date: 2019-09-23 11:20 Site: Grand Street Commons	Sounding: AC-CPT-09S Cone: 536:T1500F15U500



Max Depth: 6.550 m / 21.49 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP09S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30363

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

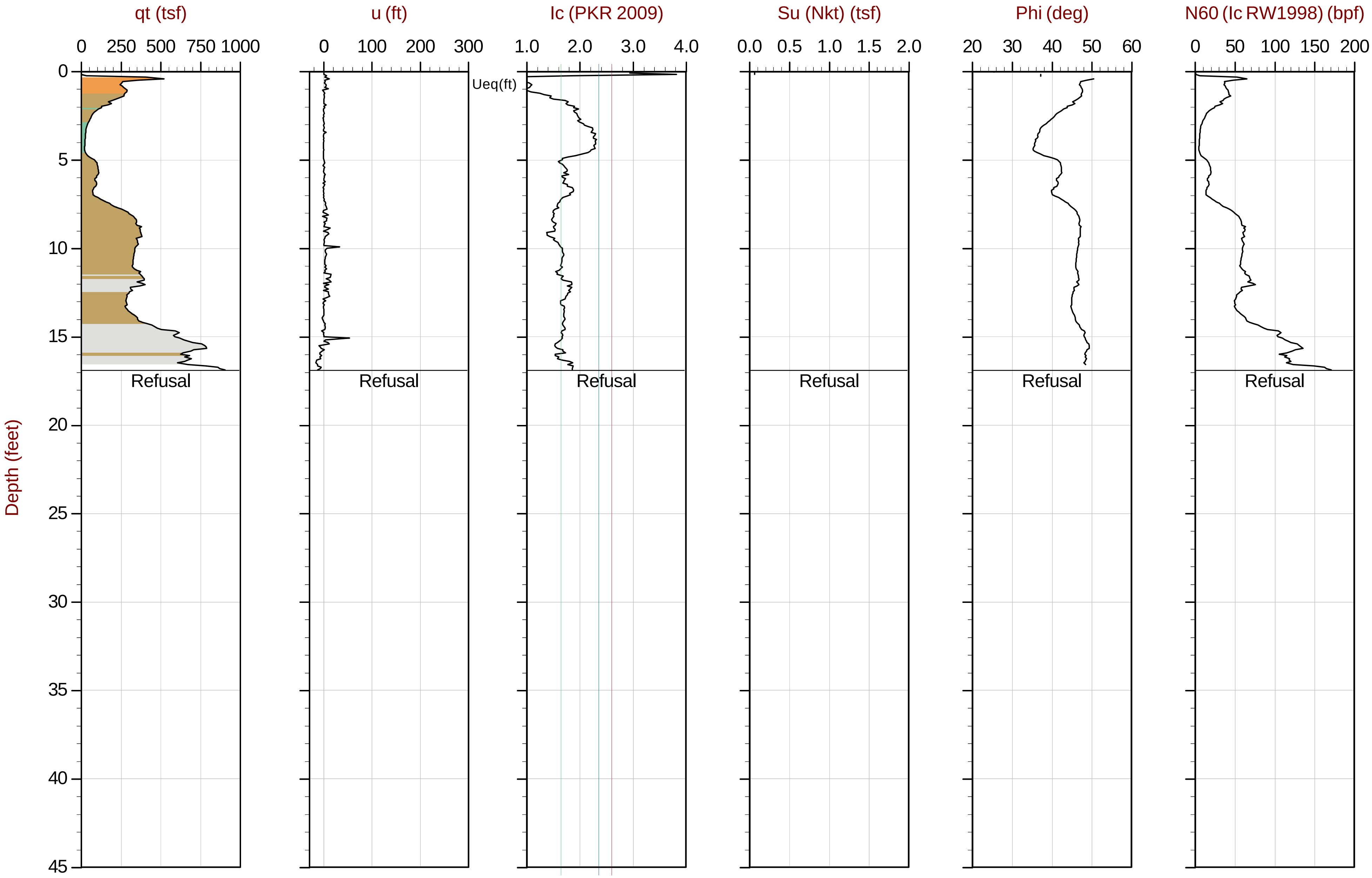
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 16:33
Site: Grand Street Commons

Sounding: AC-CPT-10E
Cone: 661:T1500F15U35



Max Depth: 5.150 m / 16.90 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP10E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58707 Long: -122.30328

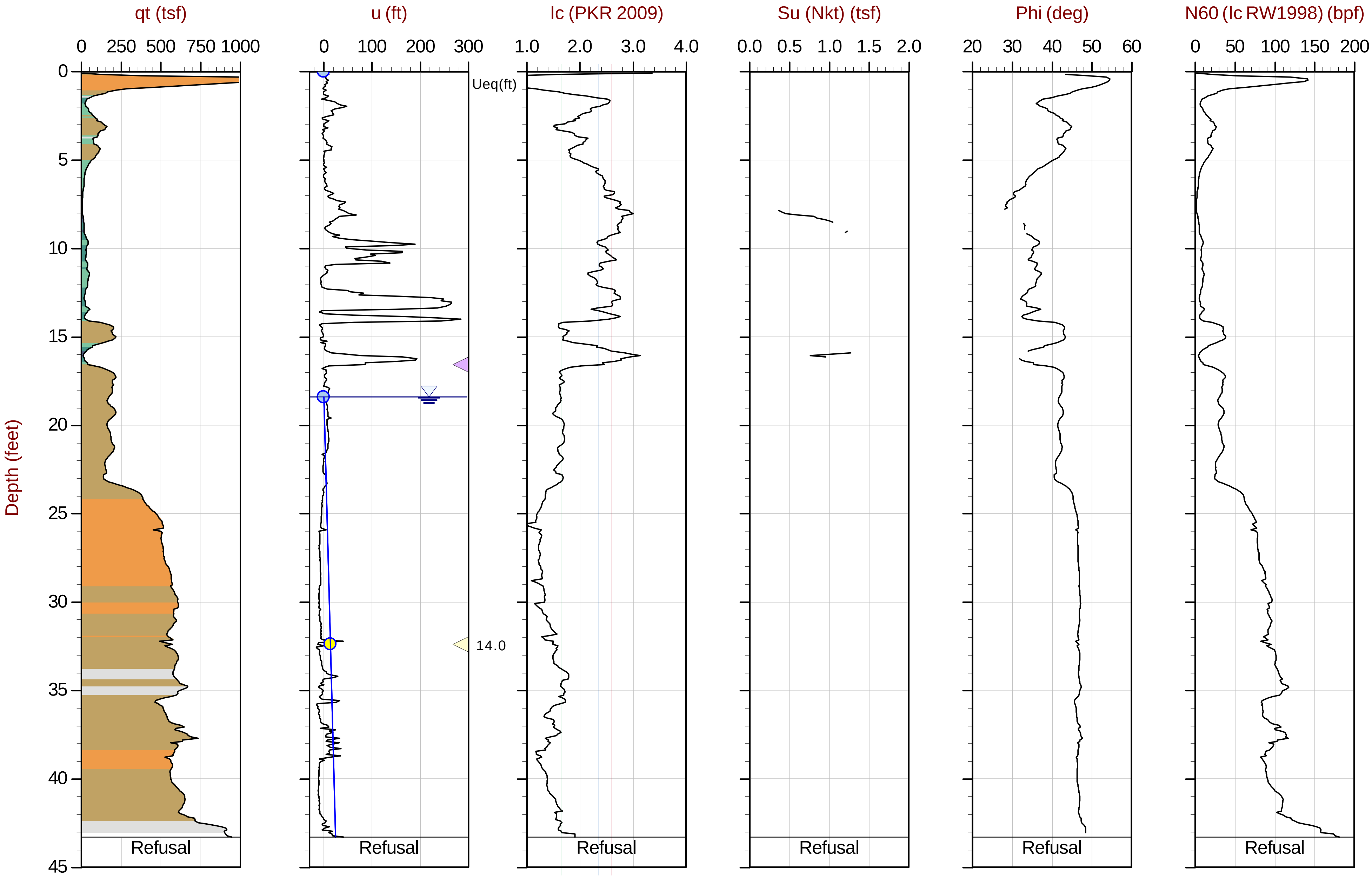
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 13:53
Site: Grand Street Commons

Sounding: AC-CPT-10S
Cone: 661:T1500F15U35



Max Depth: 13.200 m / 43.31 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP10S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58672 Long: -122.30359

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

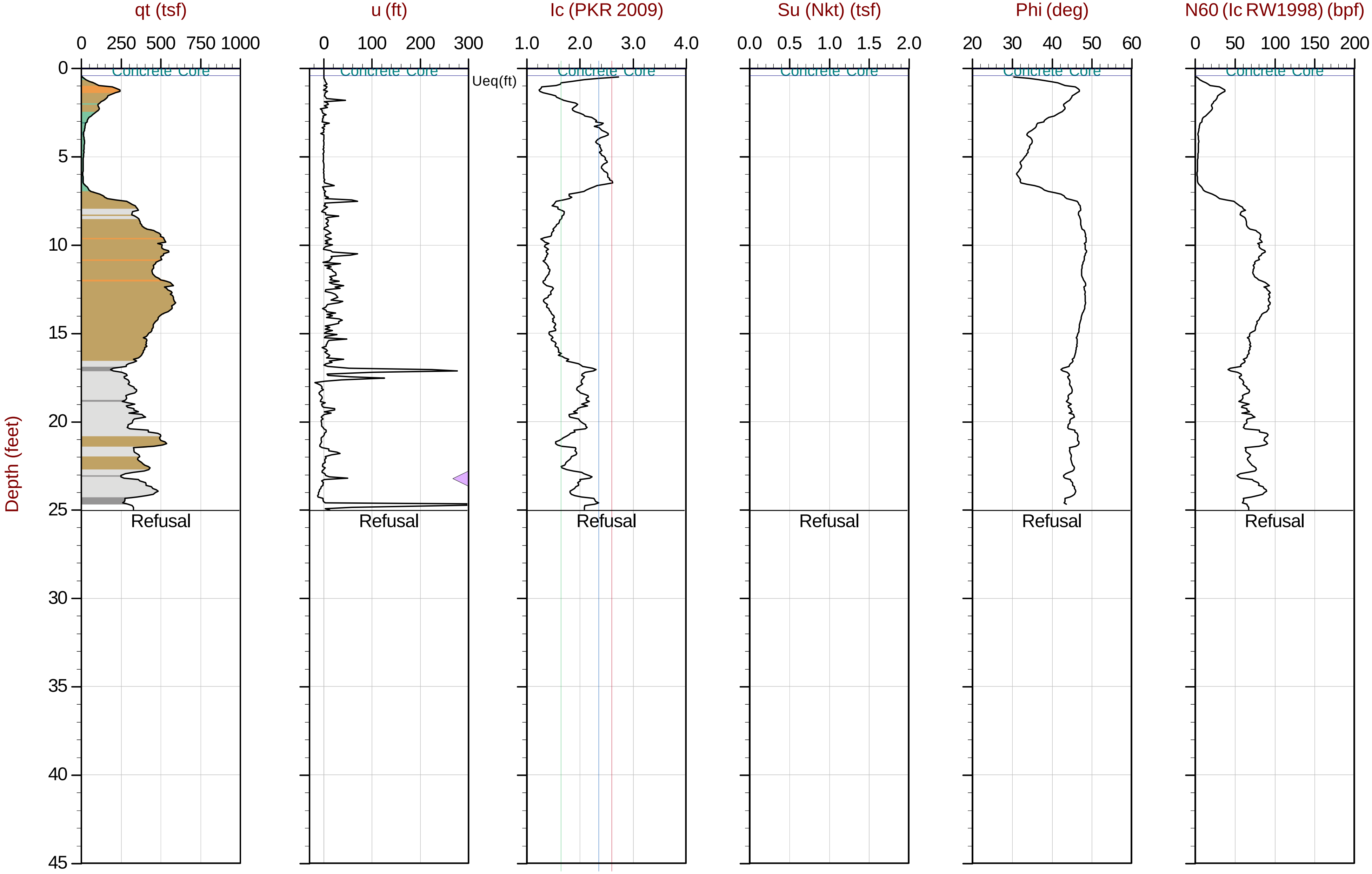
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 08:45
Site: Grand Street Commons

Sounding: AC-CPT-11E
Cone: 661:T1500F15U35



Max Depth: 7.625 m / 25.02 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP11E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58718 Long: -122.30325

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

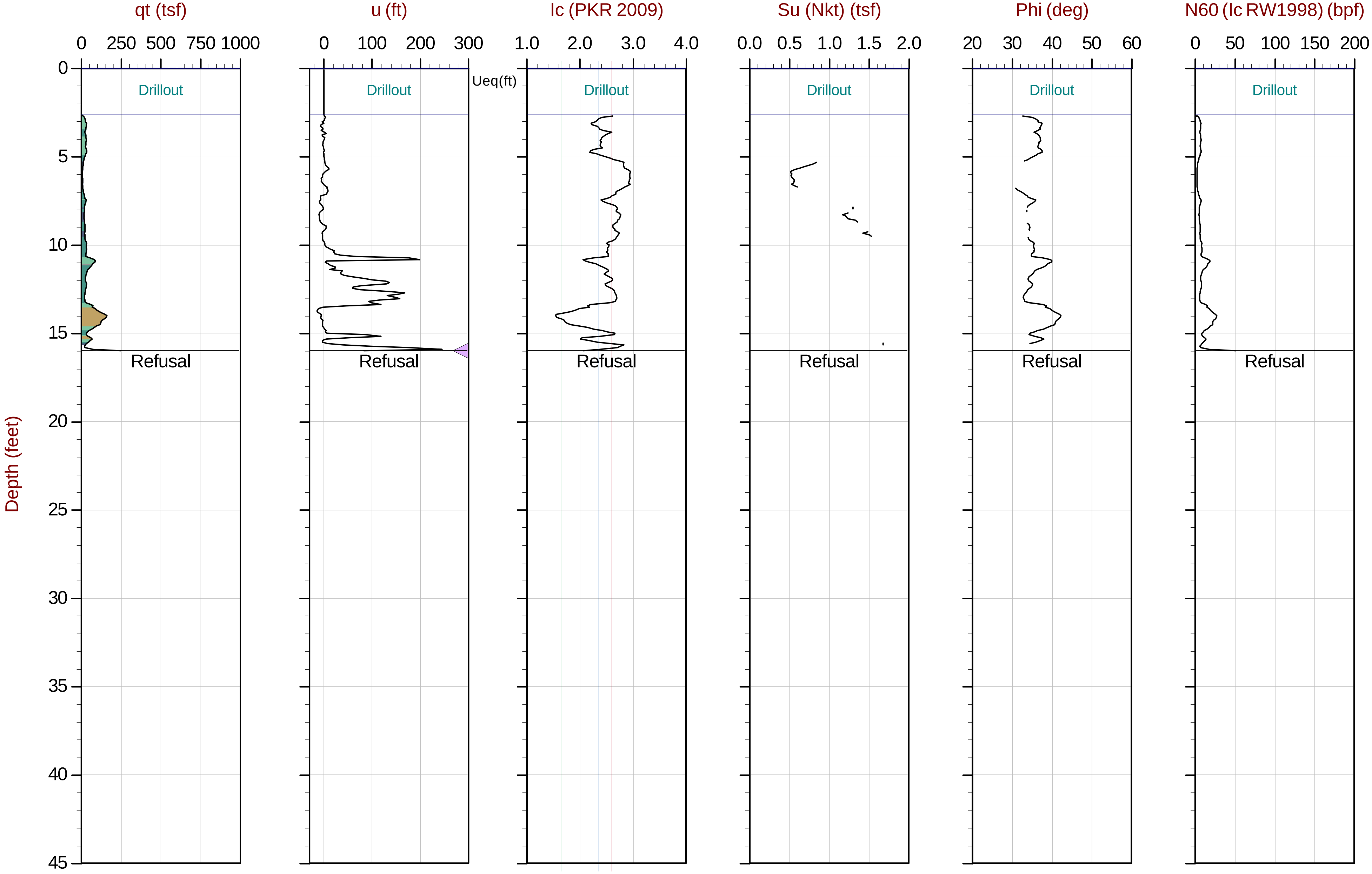
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 14:56
Site: Grand Street Commons

Sounding: AC-CPT-11S
Cone: 536:T1500F15U500



Max Depth: 4.875 m / 15.99 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP11S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58678 Long: -122.30352

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

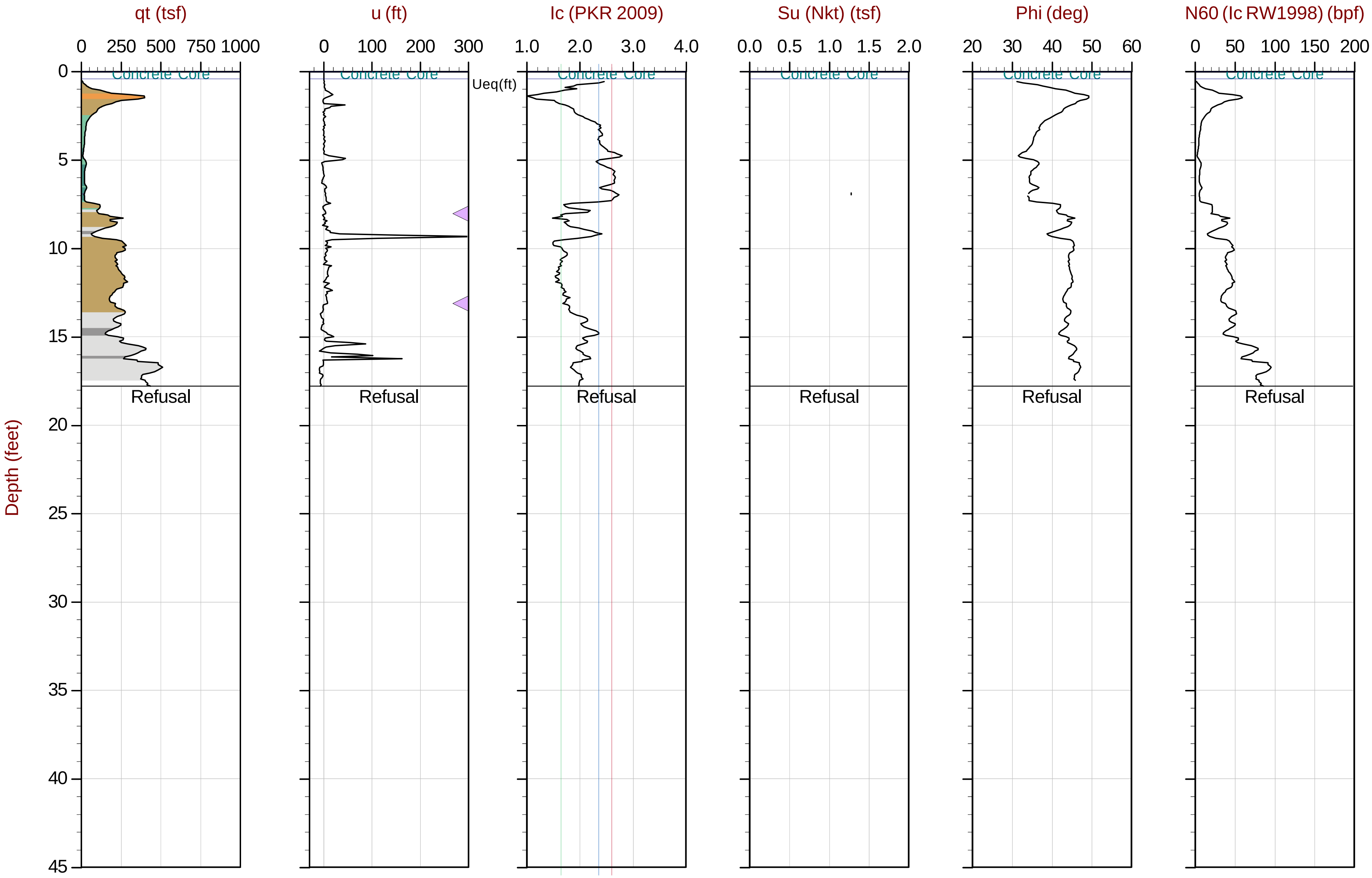
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 09:55
Site: Grand Street Commons

Sounding: AC-CPT-12E
Cone: 661:T1500F15U35



Max Depth: 5.425 m / 17.80 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP12E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58734 Long: -122.30321

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

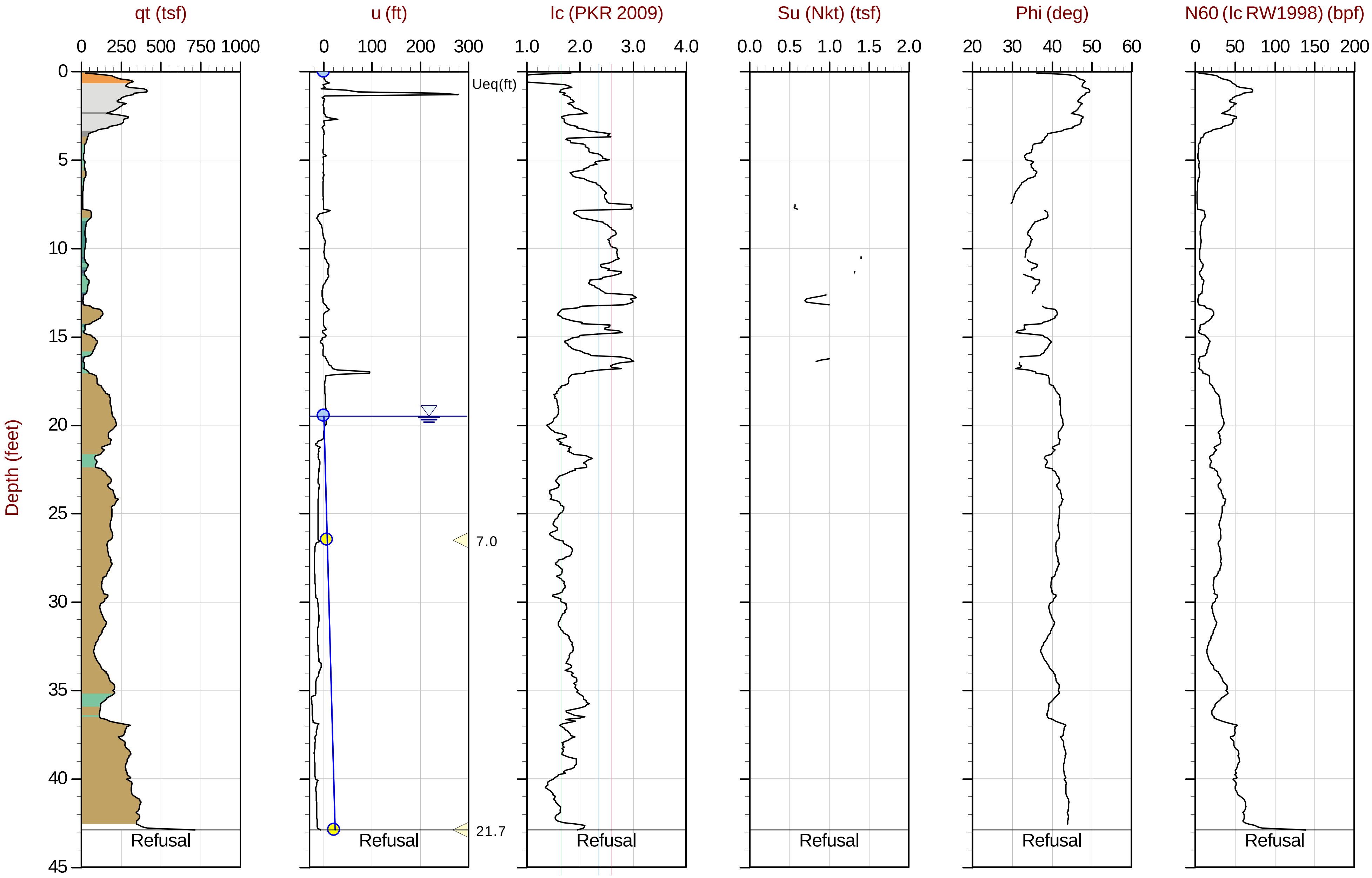
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 13:46
Site: Grand Street Commons

Sounding: AC-CPT-12S
Cone: 661:T1500F15U35



Max Depth: 13.075 m / 42.90 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP12S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30351

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

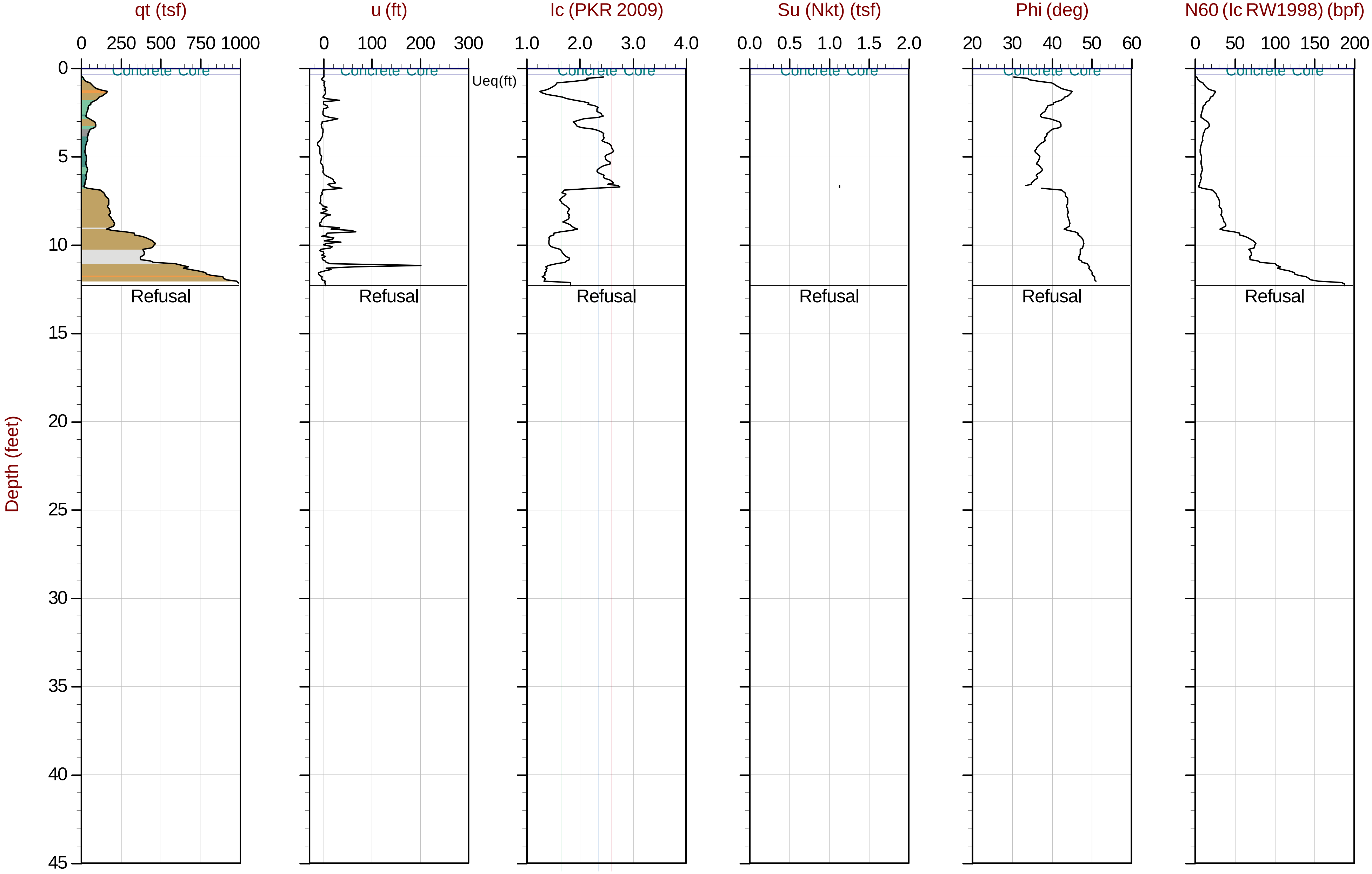
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 09:29
Site: Grand Street Commons

Sounding: AC-CPT-13E
Cone: 661:T1500F15U35



Max Depth: 3.750 m / 12.30 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP13E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58742 Long: -122.30316

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

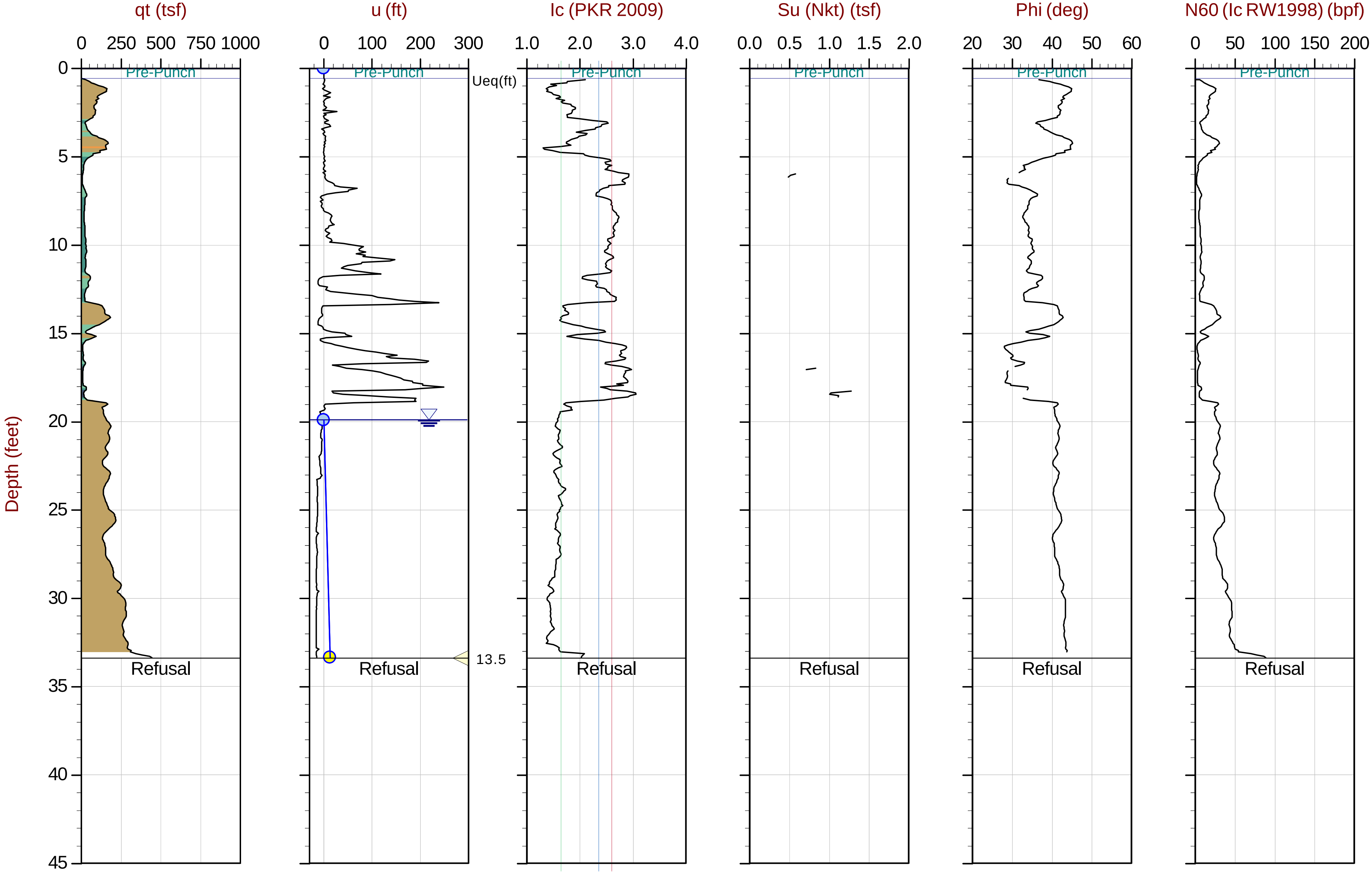
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 15:17
Site: Grand Street Commons

Sounding: AC-CPT-13S
Cone: 595:T1500F15U500



Max Depth: 10.175 m / 33.38 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP13S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58667 Long: -122.30350

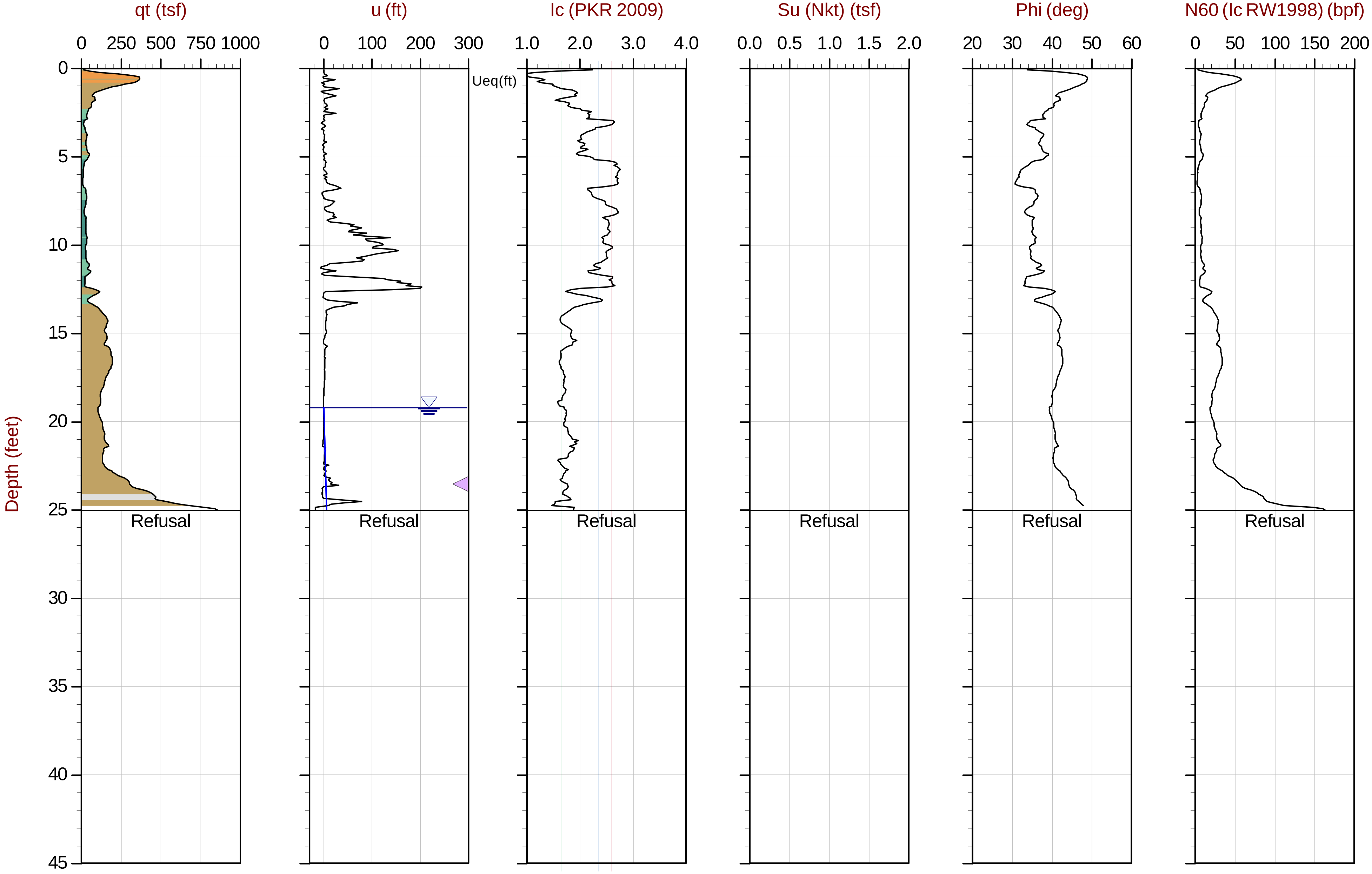
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 16:06
Site: Grand Street Commons

Sounding: AC-CPT-14S
Cone: 661:T1500F15U35



Max Depth: 7.625 m / 25.02 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP14S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58665 Long: -122.30346

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

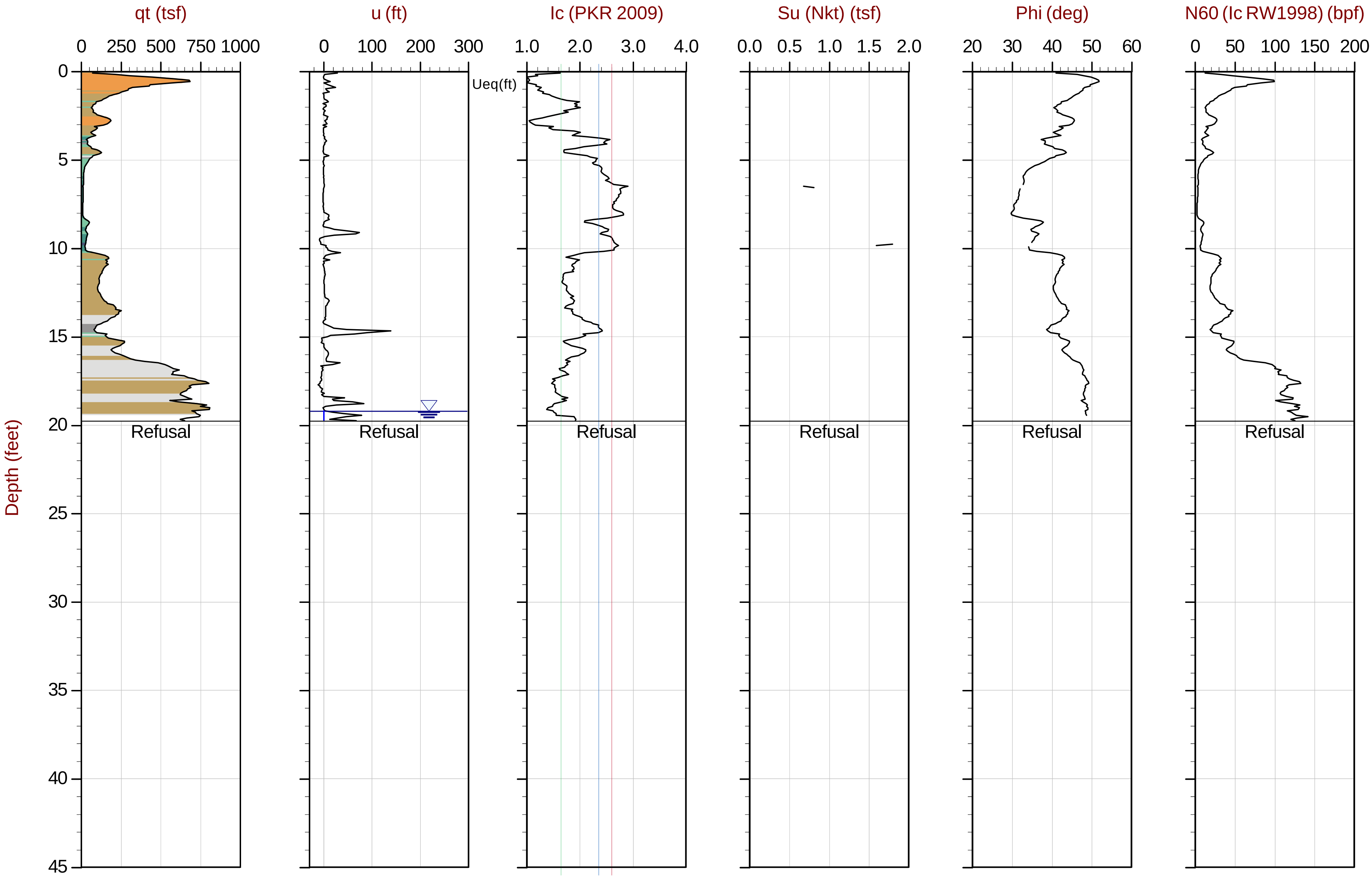
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 13:09
Site: Grand Street Commons

Sounding: AC-CPT-15S
Cone: 661:T1500F15U35



Max Depth: 6.025 m / 19.77 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP15S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58684 Long: -122.30341

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

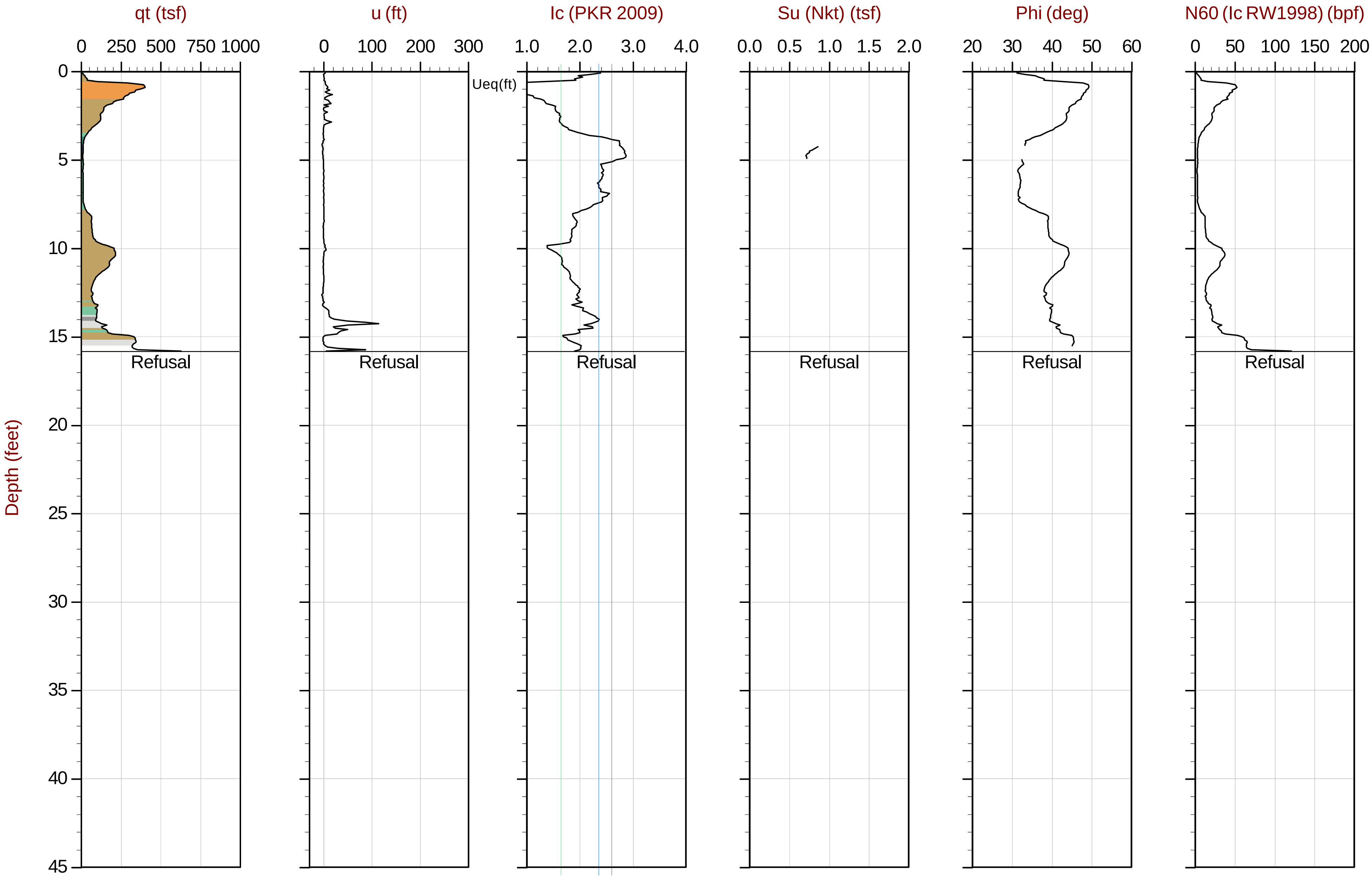
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 15:04
Site: Grand Street Commons

Sounding: AC-CPT-16S
Cone: 661:T1500F15U35



Max Depth: 4.825 m / 15.83 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP16S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

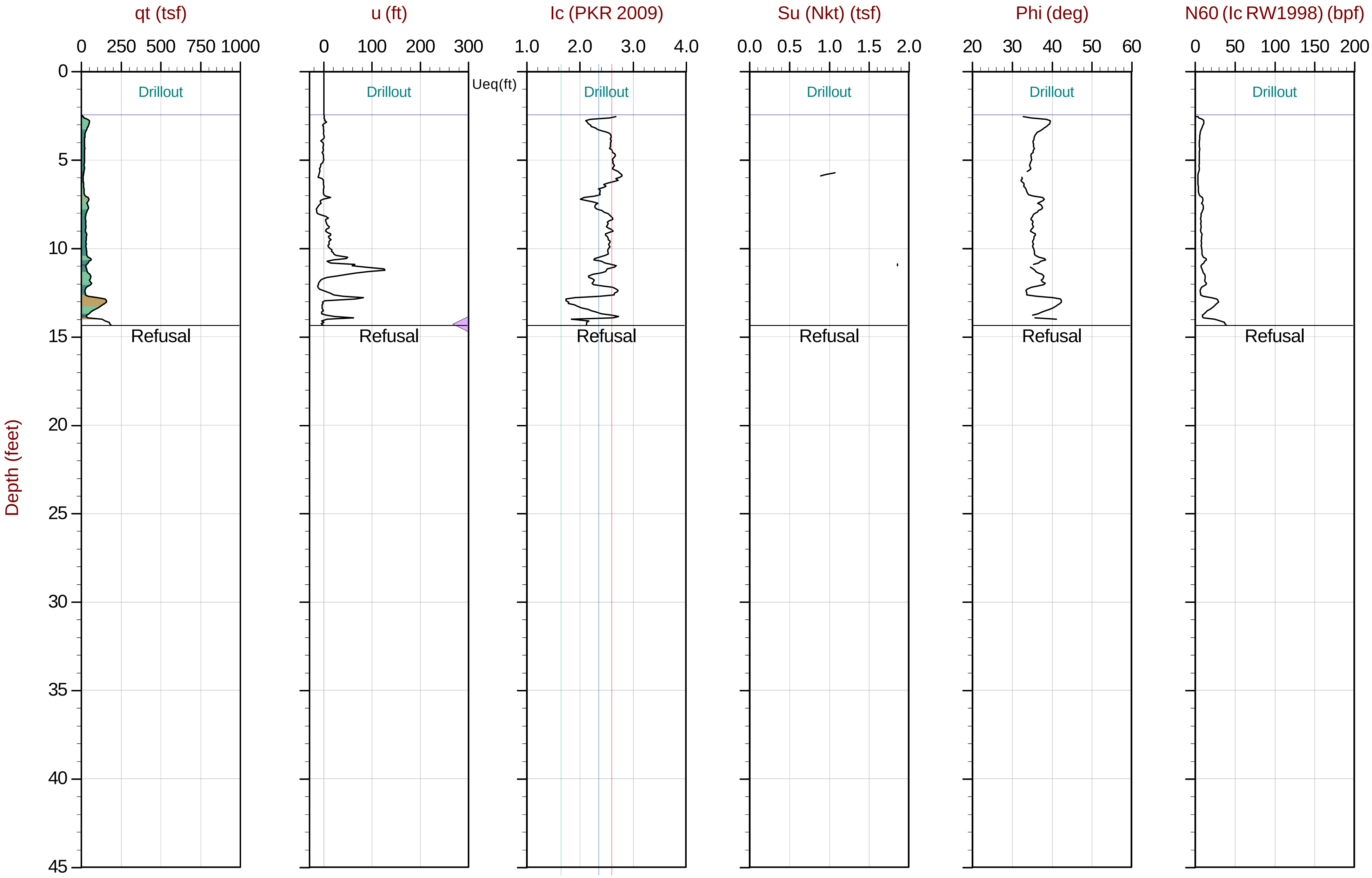
SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58643 Long: -122.30340

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.

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 13:11
Site: Grand Street Commons
Sounding: AC-CPT-17S
Cone: 536:T1500F15U500



Max Depth: 4.375 m / 14.35 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP17S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58659 Long: -122.30340

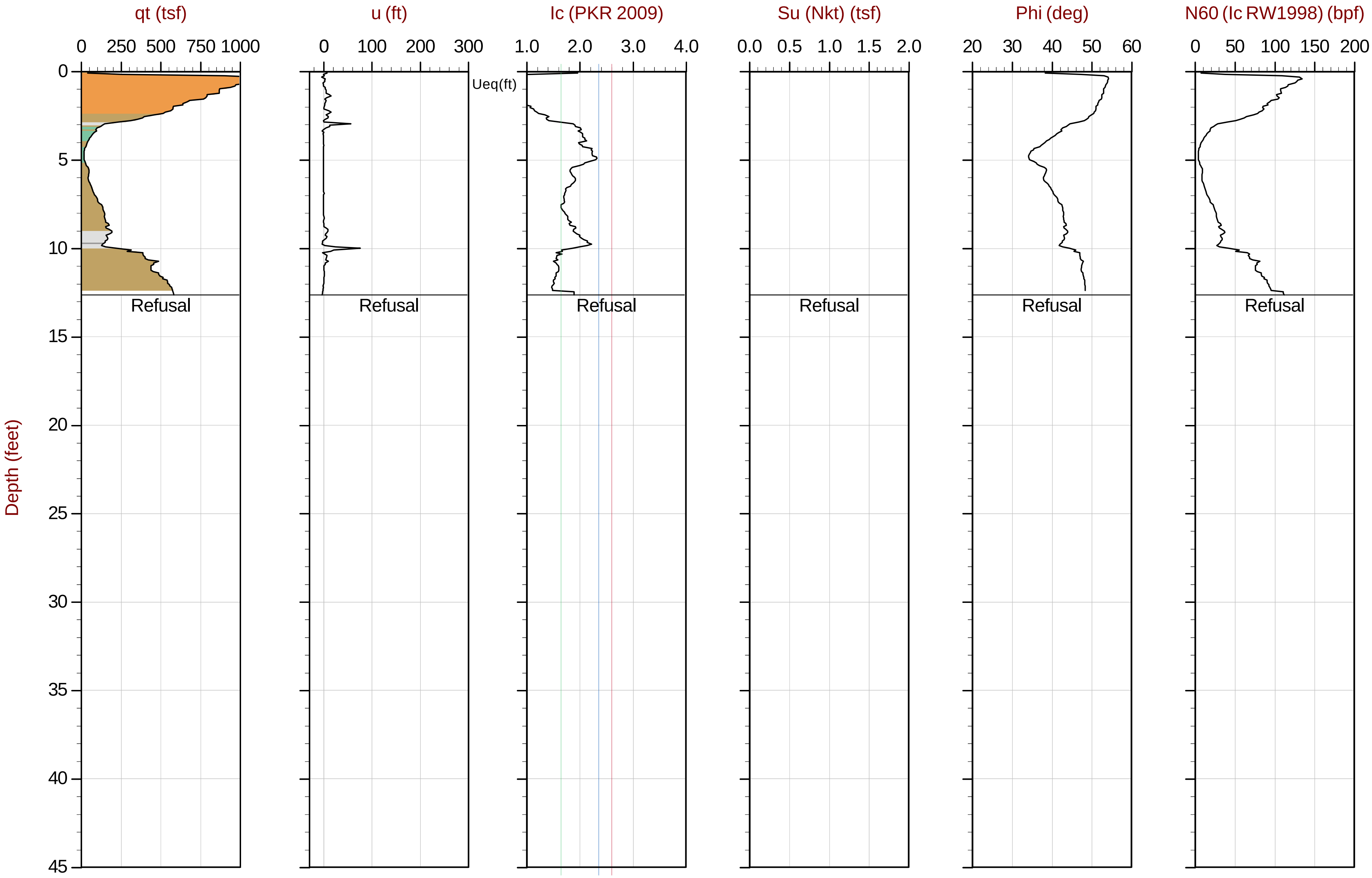
Equilibrium Pore Pressure (Ueq) — Assumed Ueq — Dissipation, Ueq achieved — Dissipation, Ueq not achieved — Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 08:14
Site: Grand Street Commons
Sounding: AC-CPT-18S
Cone: 661:T1500F15U35



Max Depth: 3.850 m / 12.63 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP18S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58653 Long: -122.30334

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

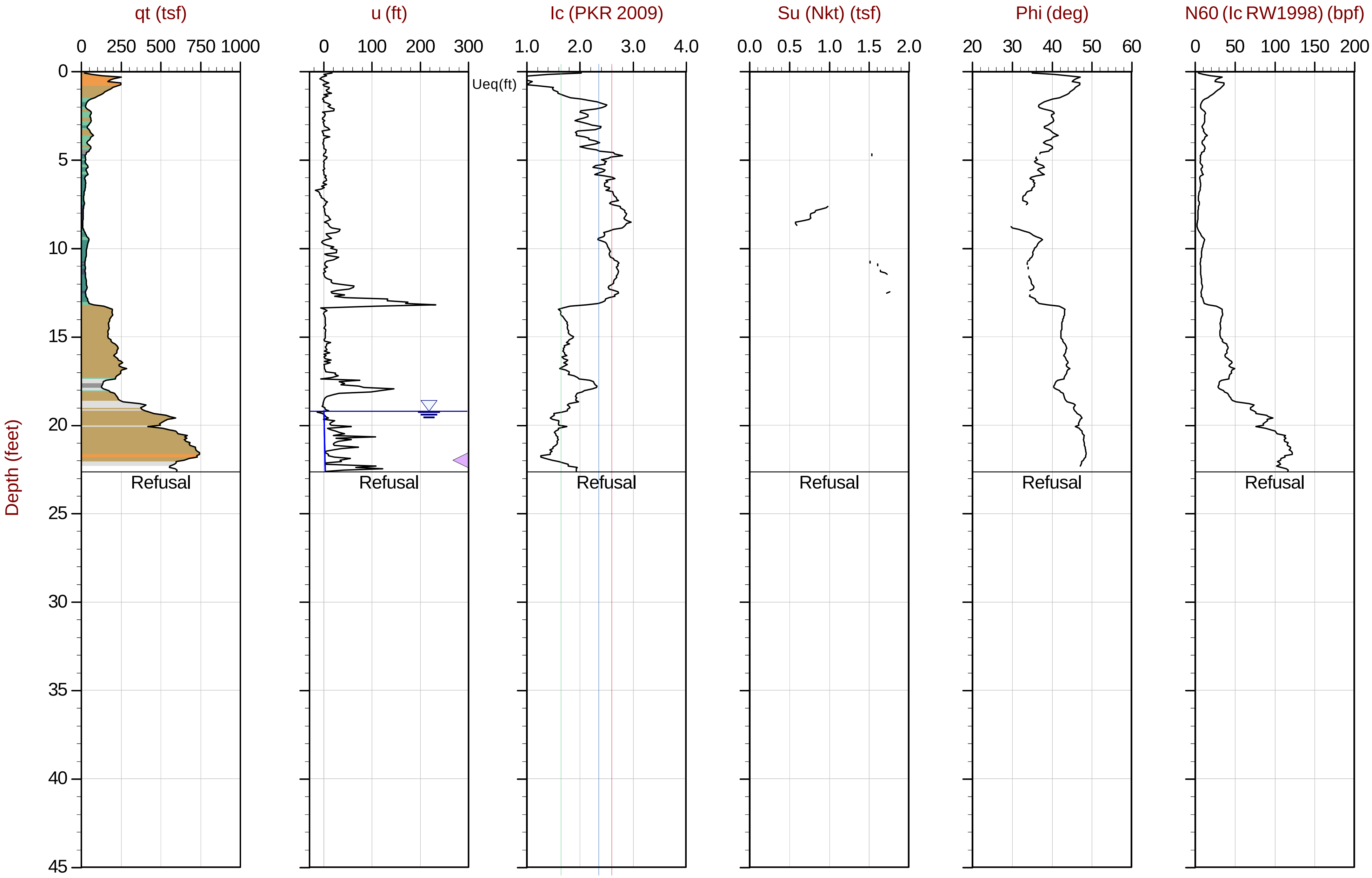
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 15:20
Site: Grand Street Commons

Sounding: AC-CPT-19S
Cone: 661:T1500F15U35



Max Depth: 6.900 m / 22.64 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP19S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58675 Long: -122.30333

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

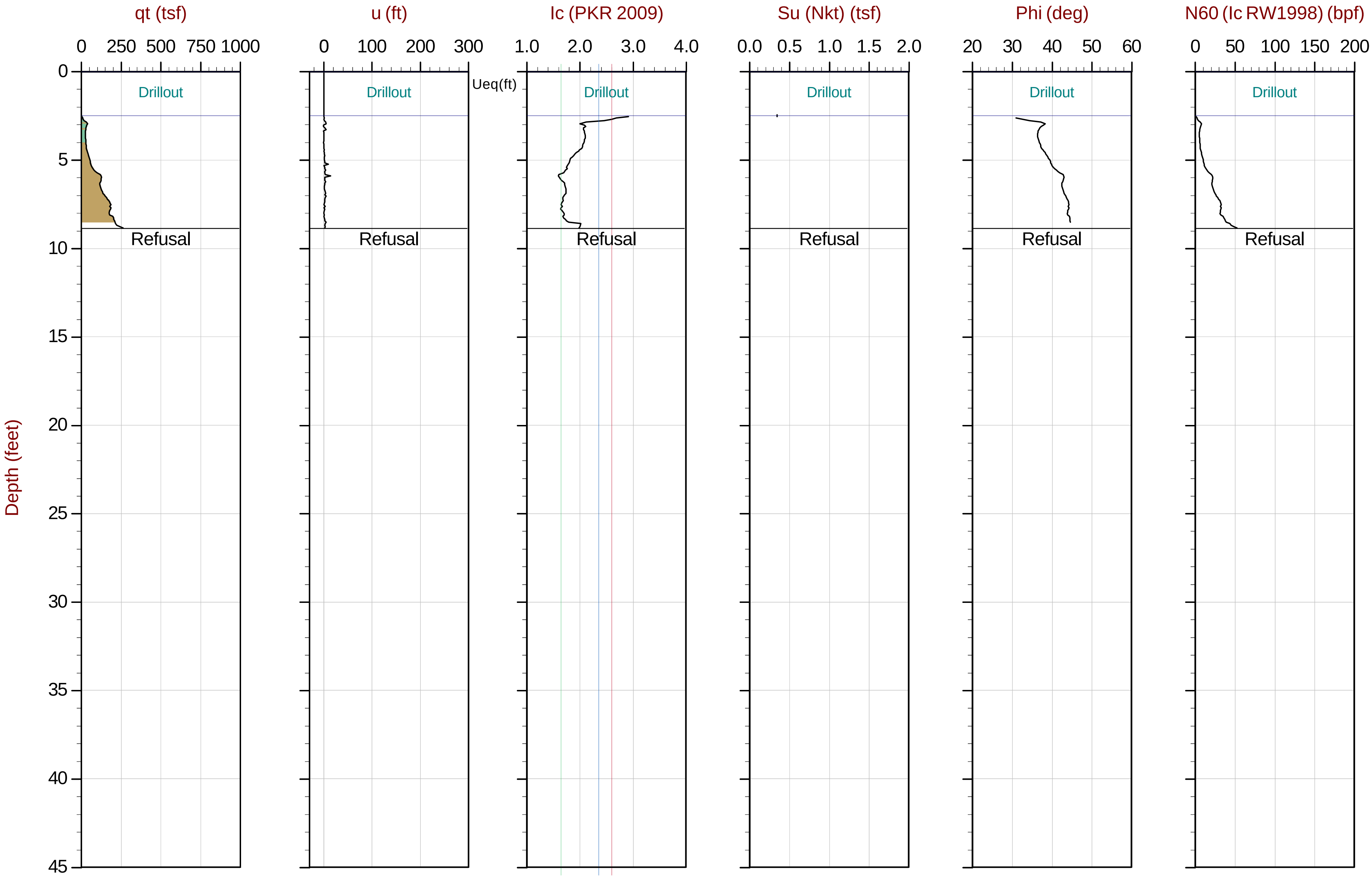
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 12:10
Site: Grand Street Commons

Sounding: AC-CPT-20S
Cone: 536:T1500F15U500



Max Depth: 2.700 m / 8.86 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP20S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30320

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

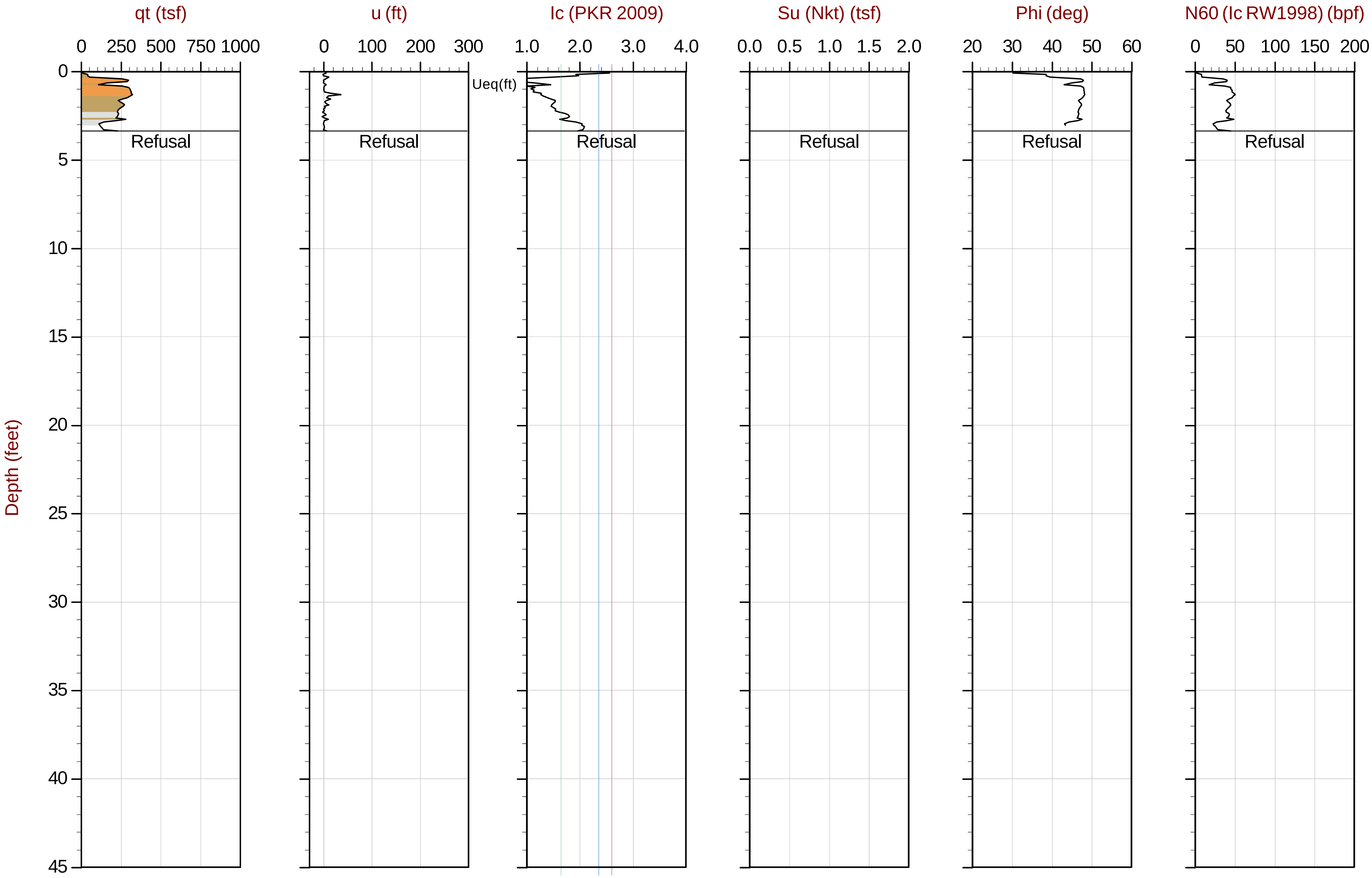
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 15:51
Site: Grand Street Commons

Sounding: AC-CPT-21S
Cone: 661:T1500F15U35



Max Depth: 1.025 m / 3.36 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP21S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58641 Long: -122.30320

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

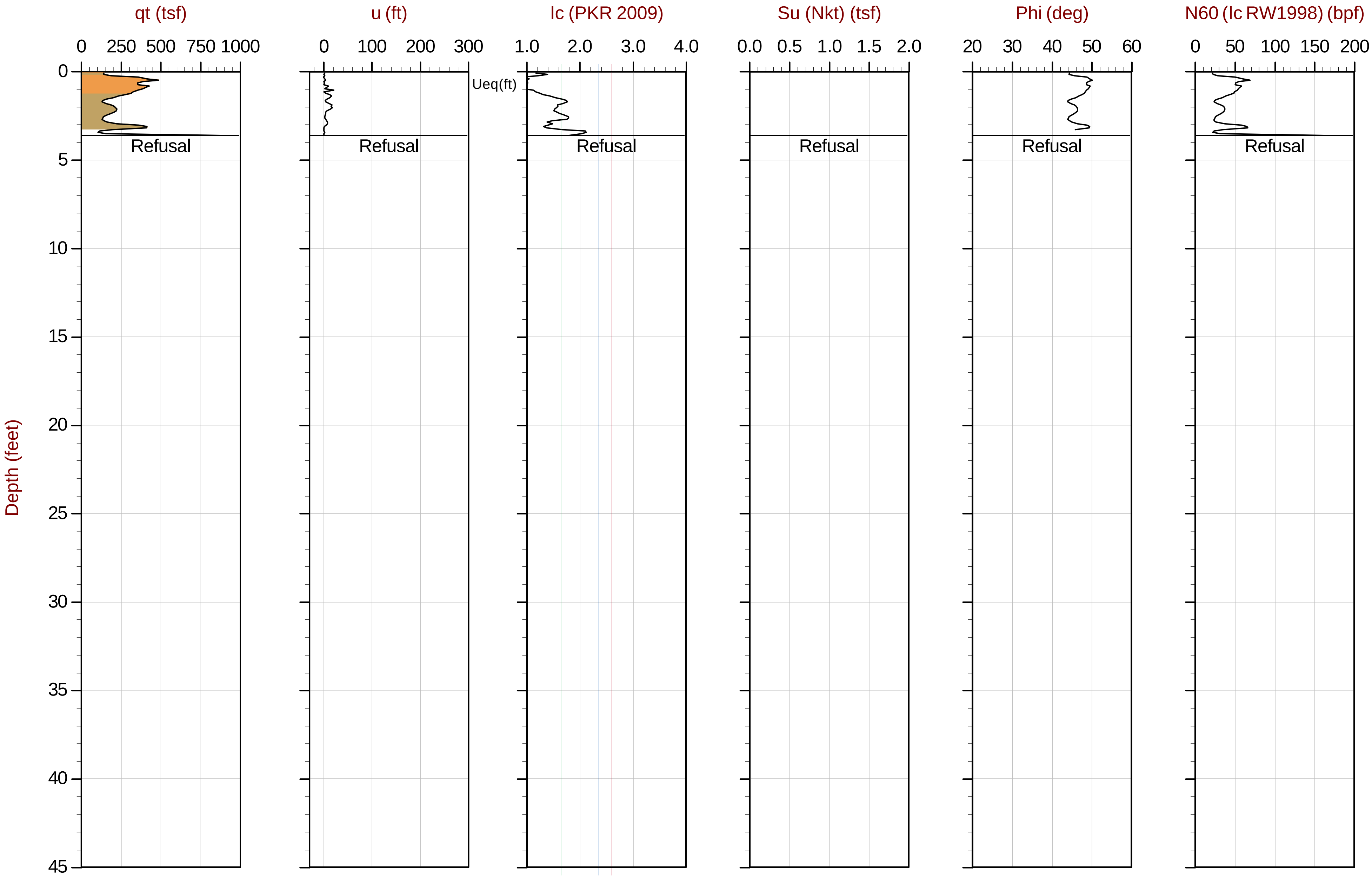
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 16:09
Site: Grand Street Commons

Sounding: AC-CPT-21BS
Cone: 661:T1500F15U35



Max Depth: 1.100 m / 3.61 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP21BS.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58643 Long: -122.30321

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

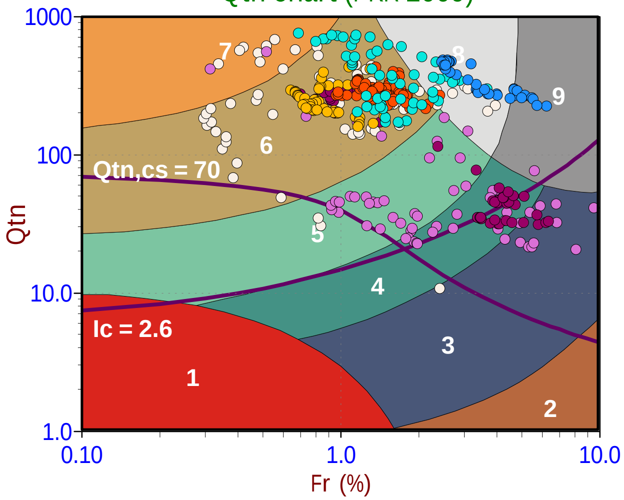
CONETEC

Aspect Consulting

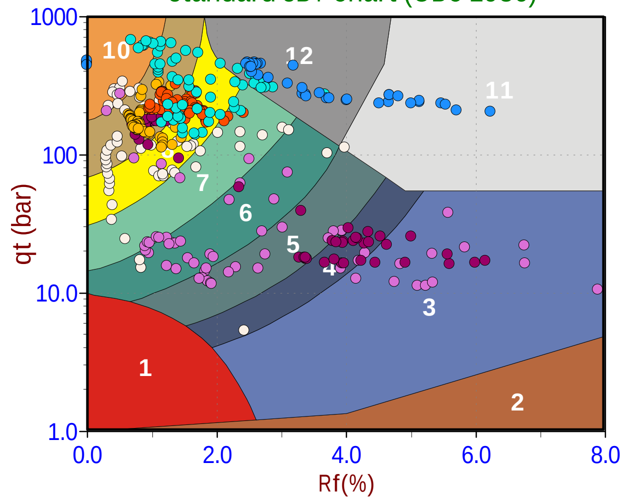
Job No: 20-59-21343
Date: 2020-09-14 13:29
Site: Grand Street Commons

Sounding: AC-CPT-01E
Cone: 661:T1500F15U35

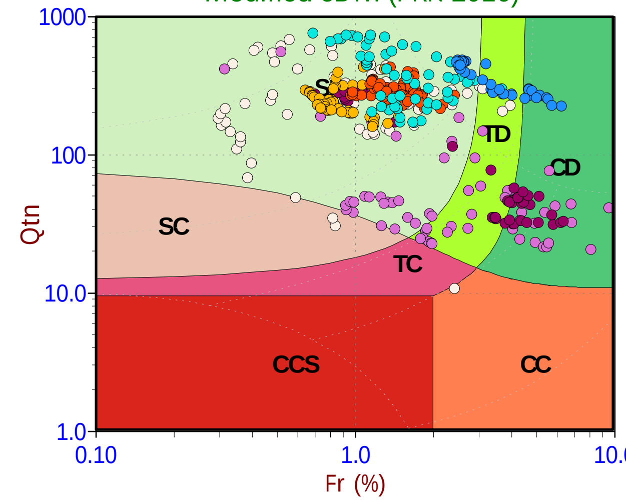
Qtn Chart (PKR 2009)



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)

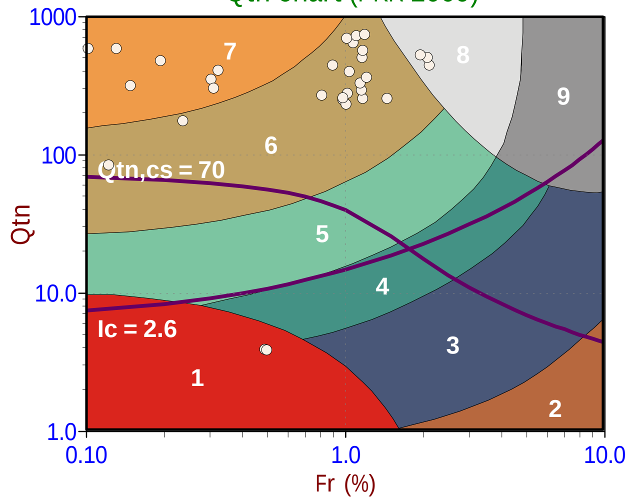
CONETEC

Aspect Consulting

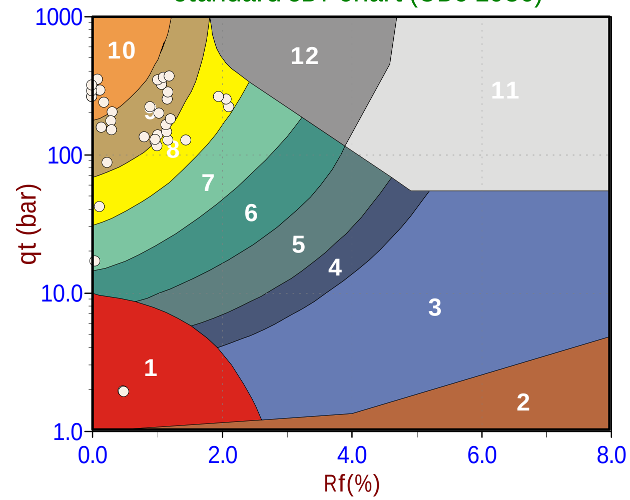
Job No: 20-59-21343
Date: 2019-09-23 07:41
Site: Grand Street Commons

Sounding: AC-CPT-01S
Cone: 536:T1500F15U500

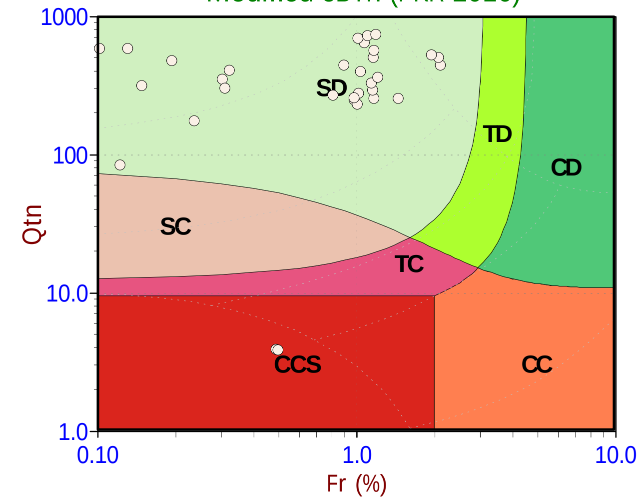
Qtn Chart (PKR 2009)



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)

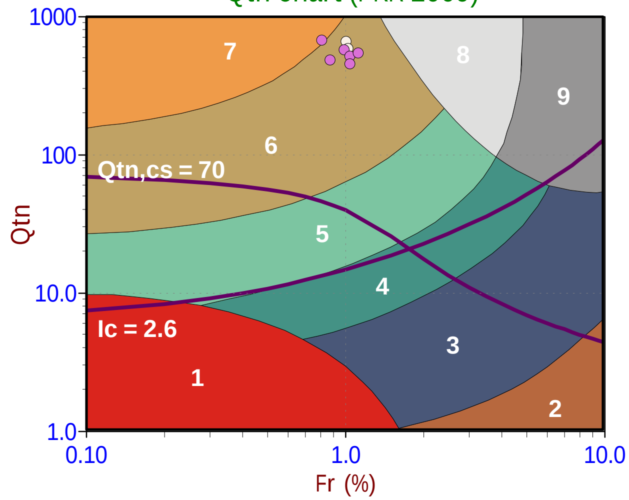
CONETEC

Aspect Consulting

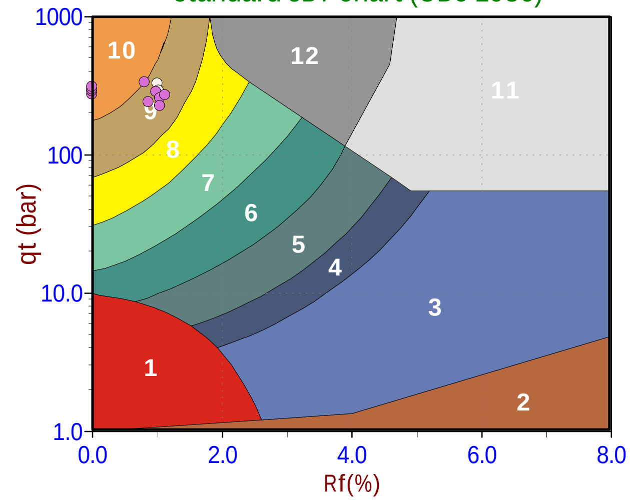
Job No: 20-59-21343
Date: 2019-09-23 08:18
Site: Grand Street Commons

Sounding: AC-CPT-01BS
Cone: 536:T1500F15U500

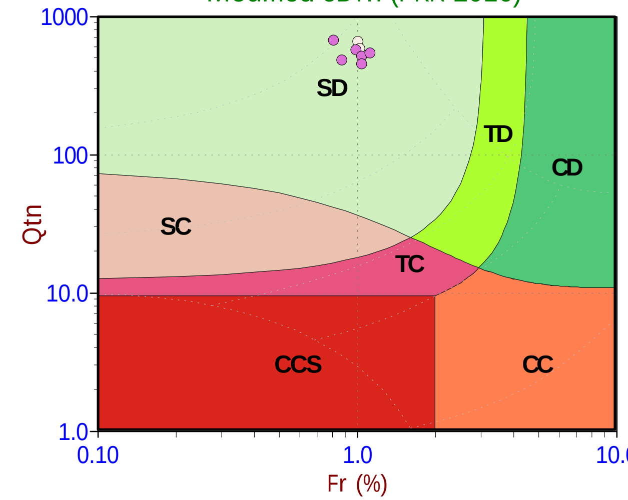
Qtn Chart (PKR 2009)



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)

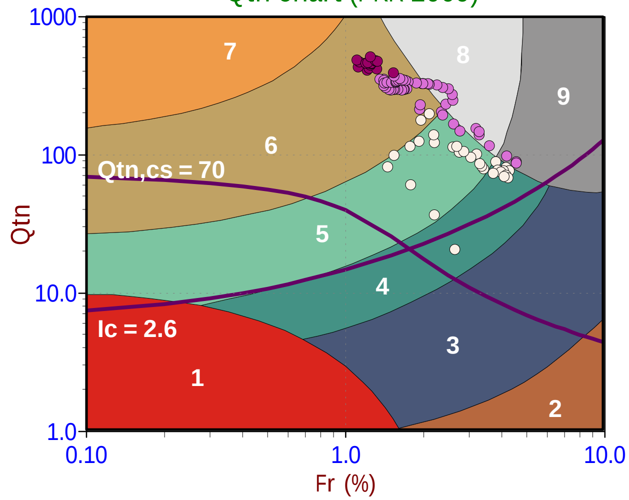
CONETEC

Aspect Consulting

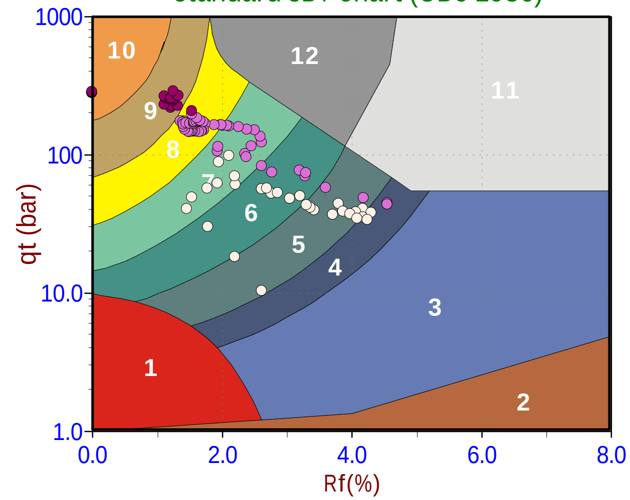
Job No: 20-59-21343
Date: 2019-09-23 16:36
Site: Grand Street Commons

Sounding: AC-CPT-01W
Cone: 536:T1500F15U500

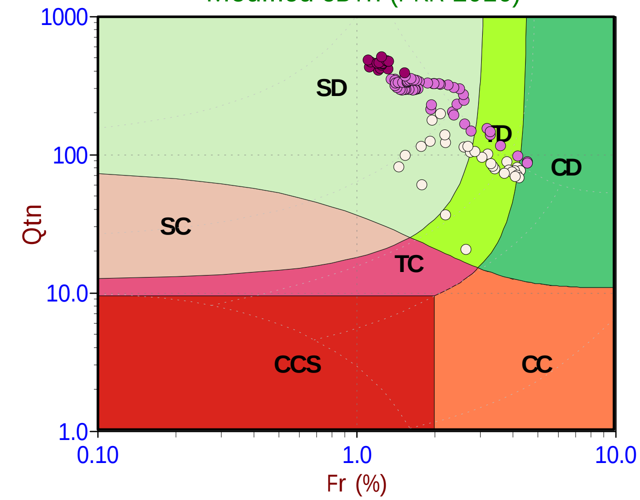
Qtn Chart (PKR 2009)



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)

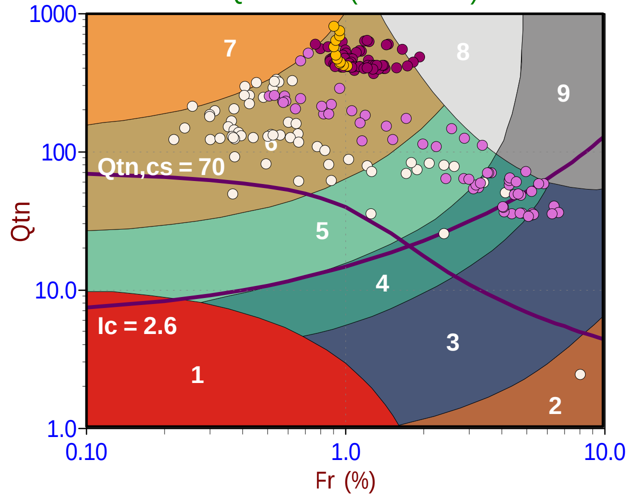
CONETEC

Aspect Consulting

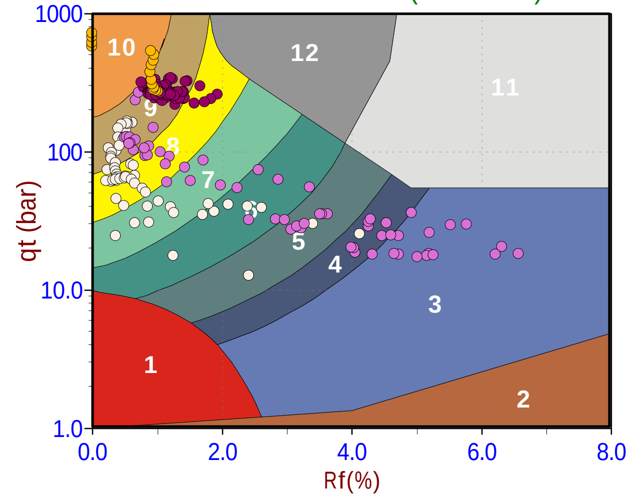
Job No: 20-59-21343
Date: 2019-09-24 14:10
Site: Grand Street Commons

Sounding: AC-CPT-02E
Cone: 595:T1500F15U500

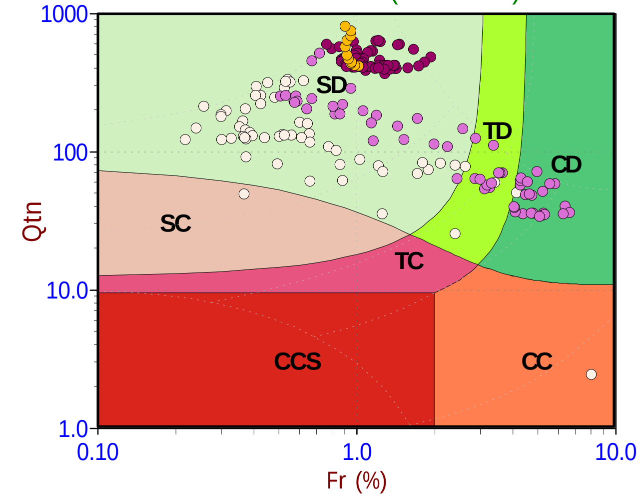
Qtn Chart (PKR 2009)



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)

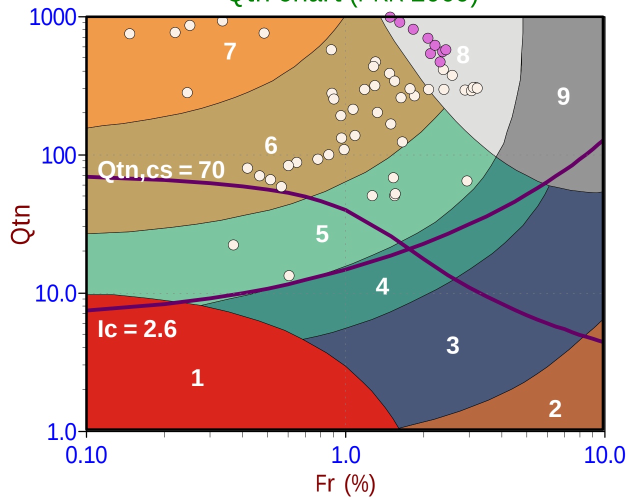
CONETEC

Aspect Consulting

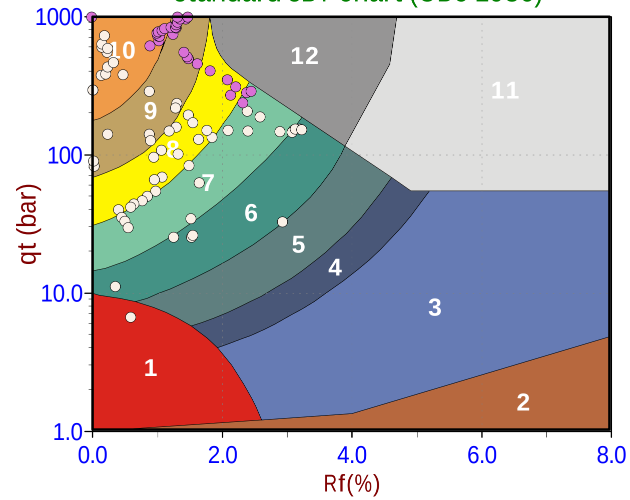
Job No: 20-59-21343
Date: 2020-09-11 11:13
Site: Grand Street Commons

Sounding: AC-CPT-02S
Cone: 661:T1500F15U35

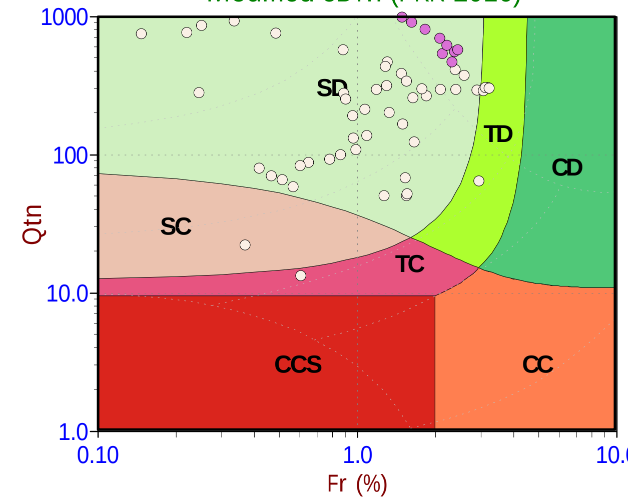
Qtn Chart (PKR 2009)



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

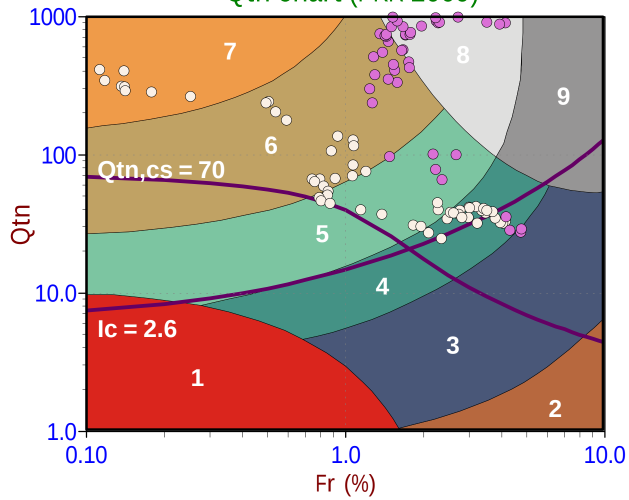
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

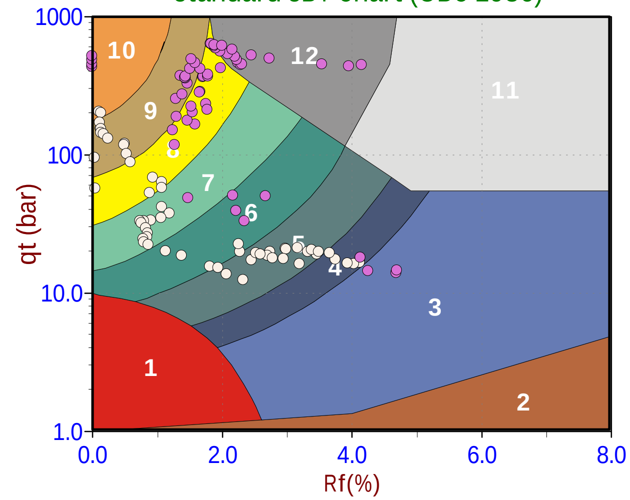
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 14:26
Site: Grand Street Commons
Sounding: AC-CPT-02W
Cone: 661:T1500F15U35

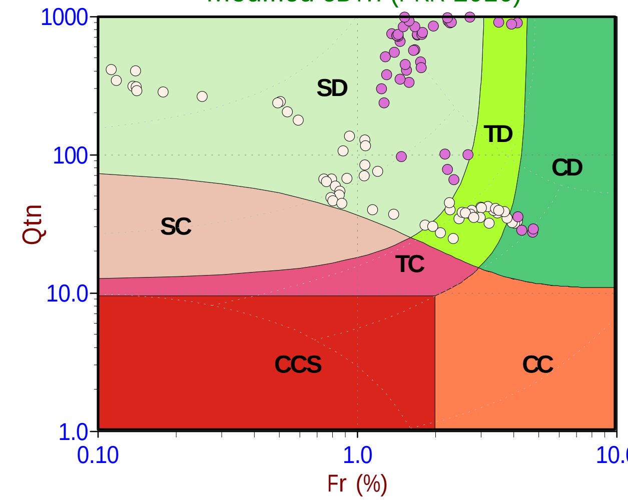
Qtn Chart (PKR 2009)



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

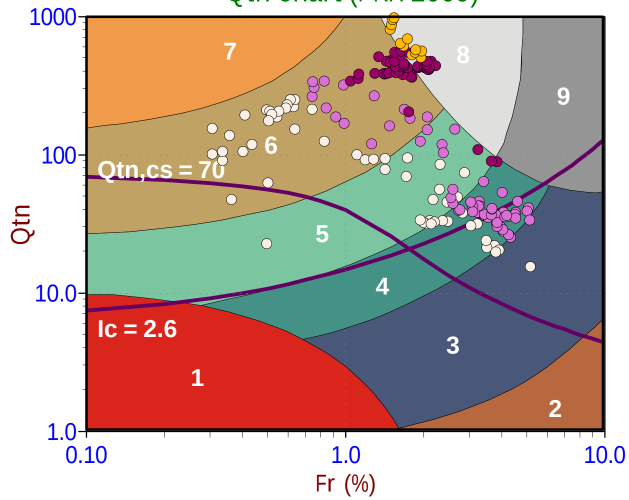
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

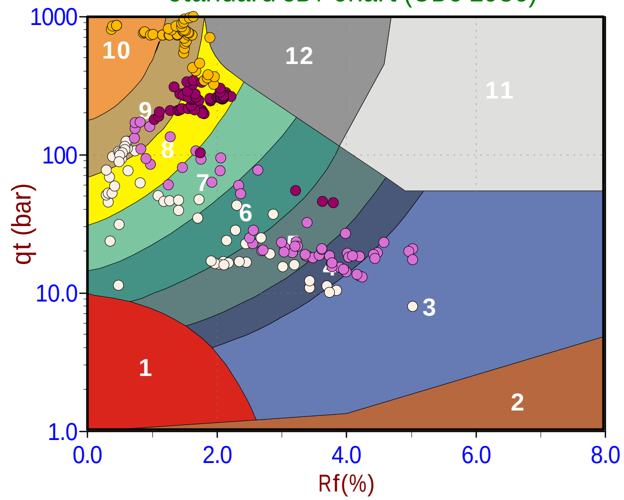
ConeTec

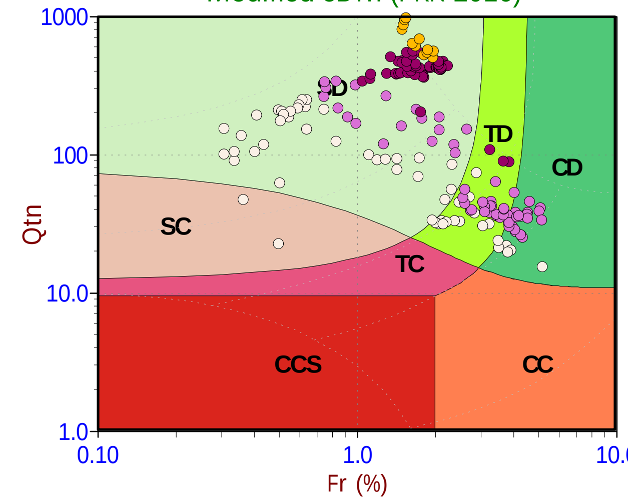
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 12:52
Site: Grand Street Commons

Sounding: AC-CPT-03E
Cone: 661: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)

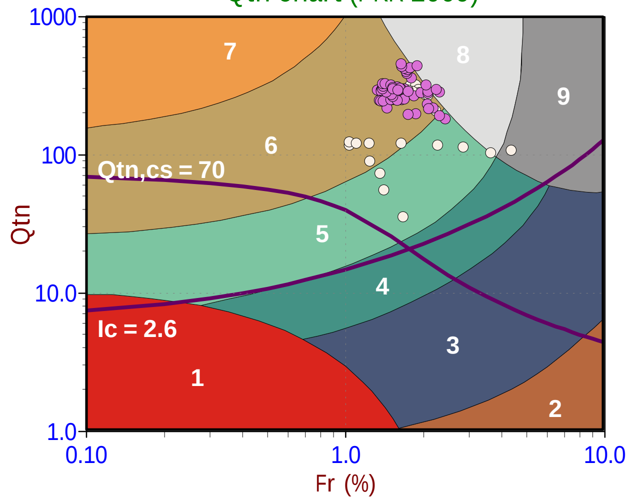
CONETEC

Aspect Consulting

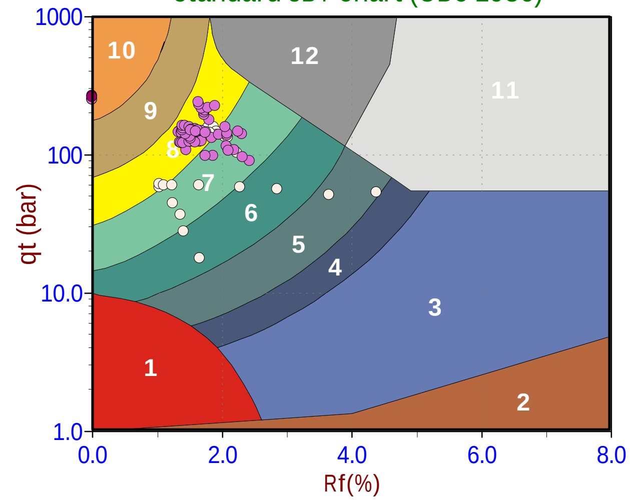
Job No: 20-59-21343
Date: 2019-09-23 15:37
Site: Grand Street Commons

Sounding: AC-CPT-03S
Cone: 536:T1500F15U500

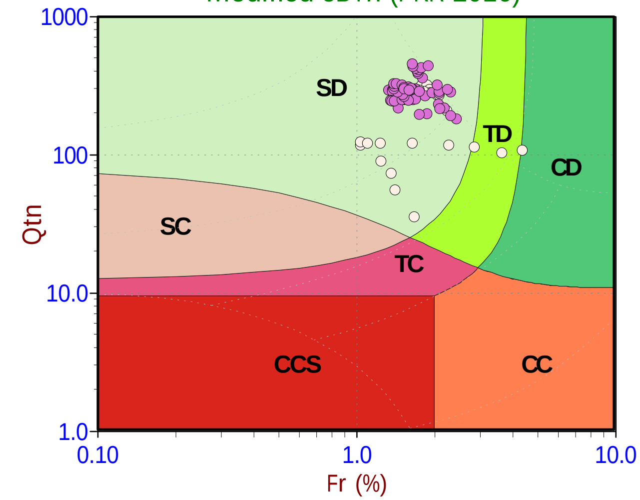
Qtn Chart (PKR 2009)



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)

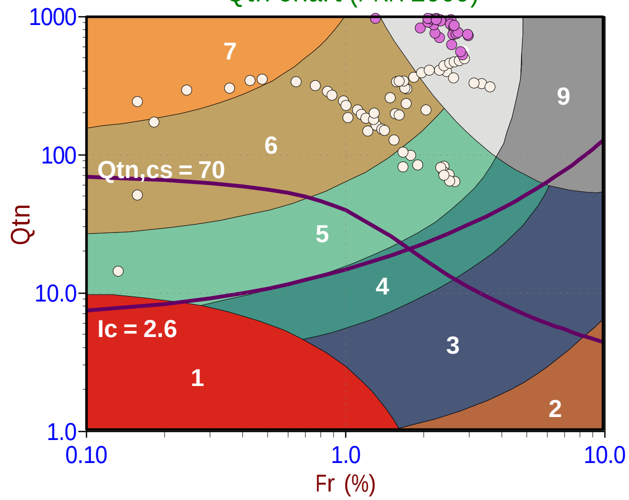
ConeTec

Aspect Consulting

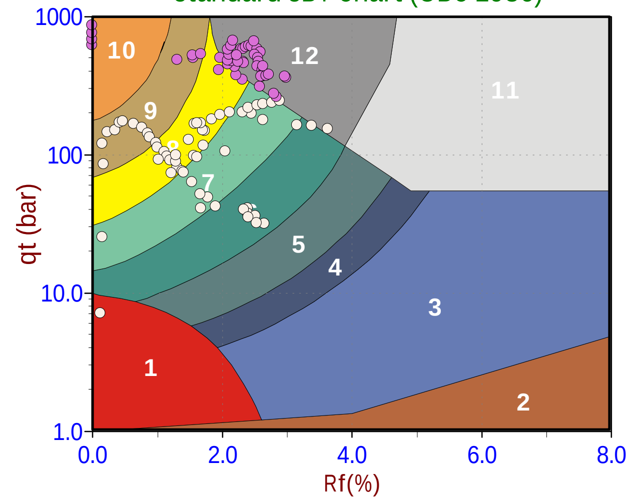
Job No: 20-59-21343
Date: 2020-09-14 14:50
Site: Grand Street Commons

Sounding: AC-CPT-03W
Cone: 661:T1500F15U35

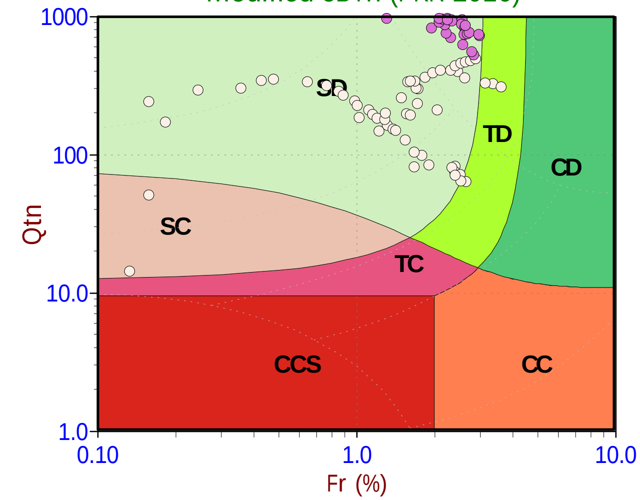
Qtn Chart (PKR 2009)



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

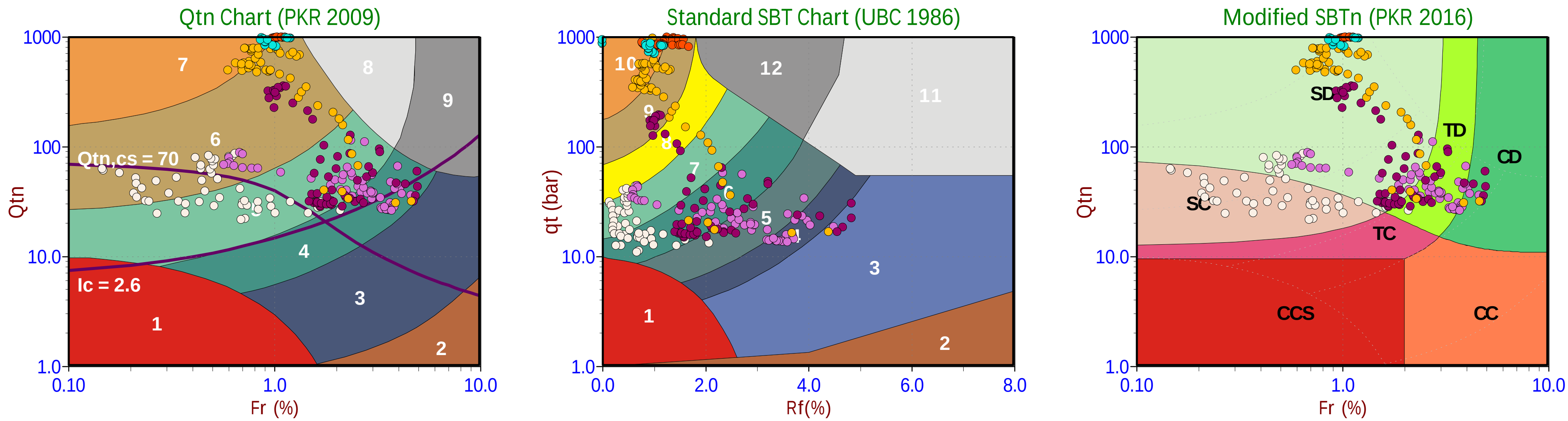
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 12:15
Site: Grand Street Commons

Sounding: AC-CPT-04E
Cone: 661: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

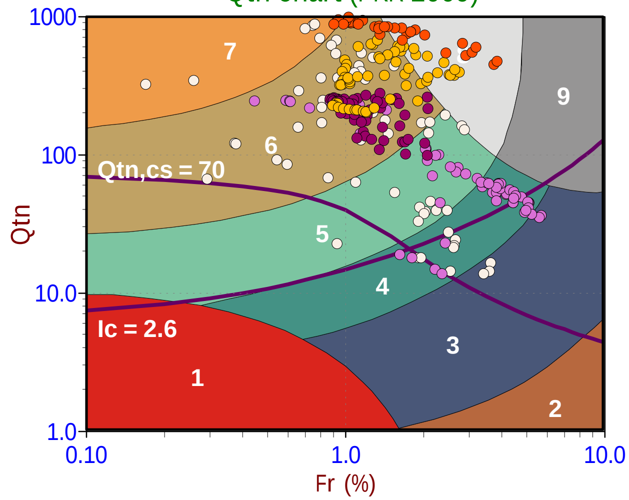
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

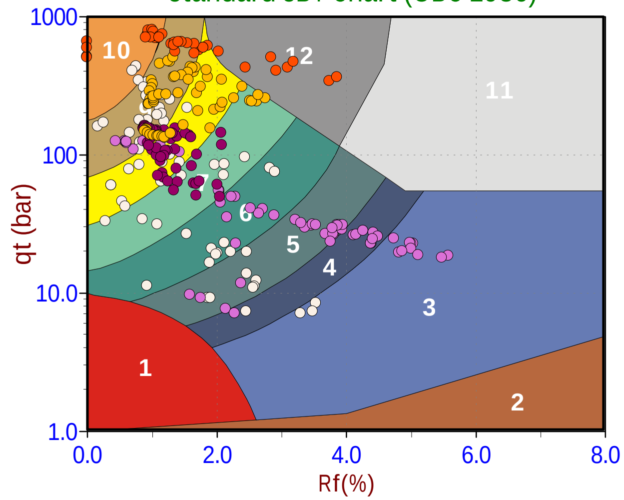
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 11:48
Site: Grand Street Commons
Sounding: AC-CPT-04S
Cone: 661:T1500F15U35

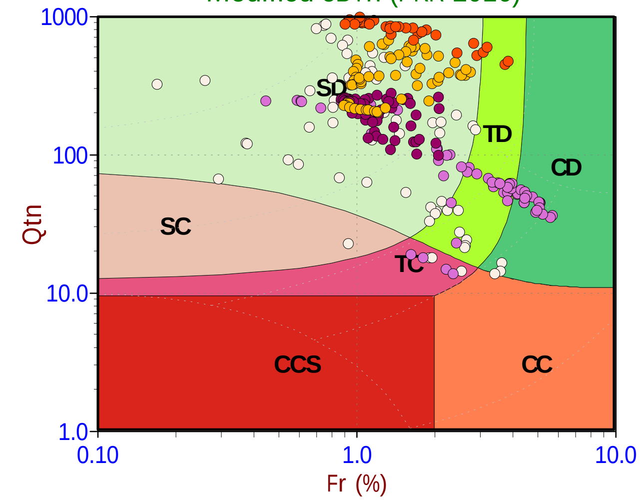
Qtn Chart (PKR 2009)



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

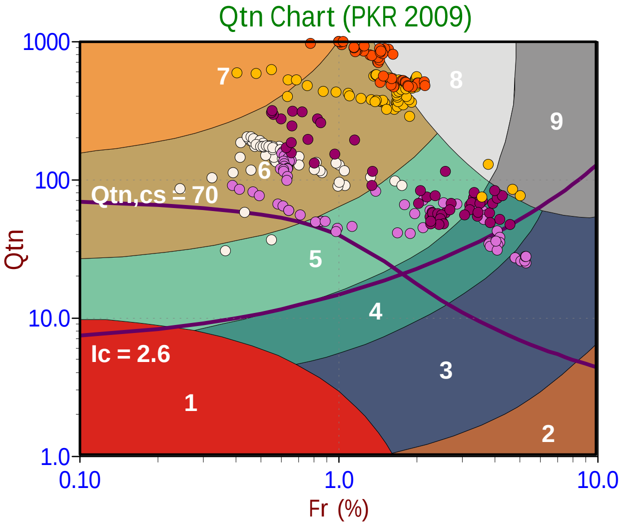
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

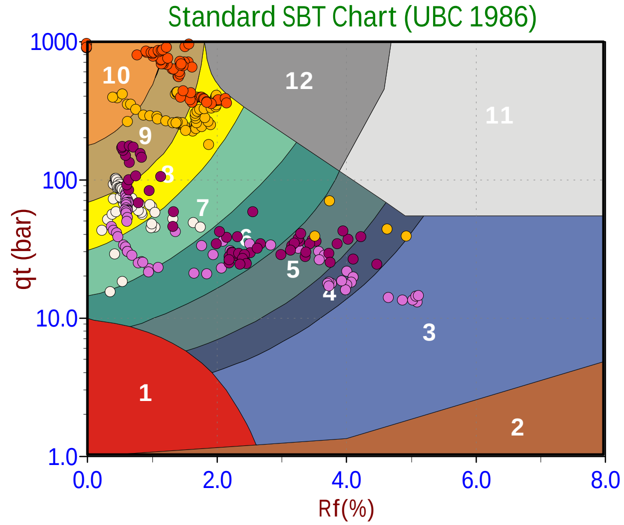
CONETEC

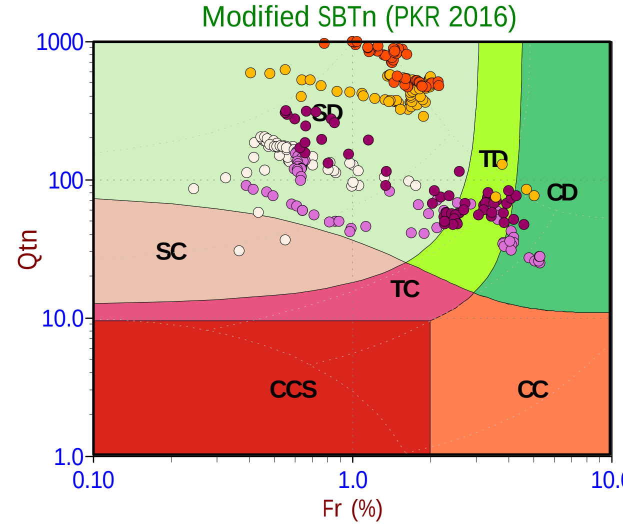
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 11:28
Site: Grand Street Commons

Sounding: AC-CPT-05E
Cone: 661: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

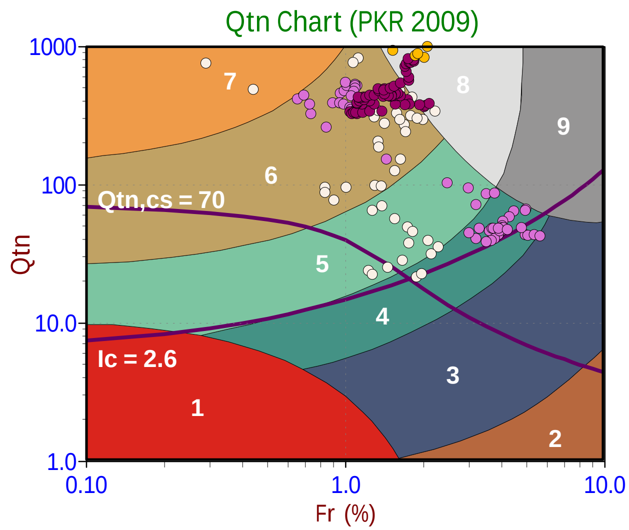
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

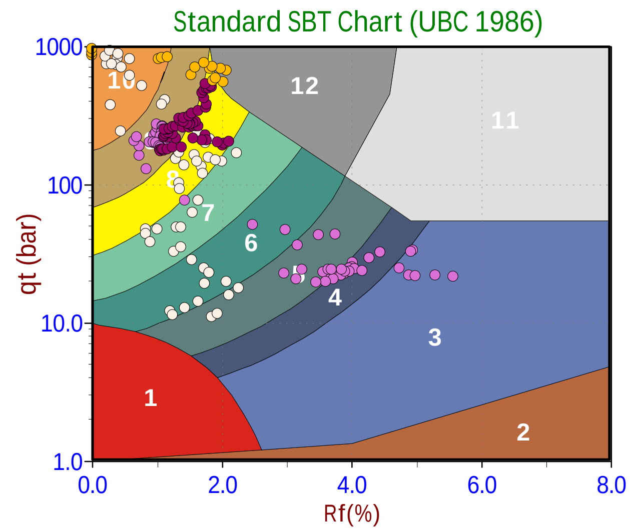
CONETEC

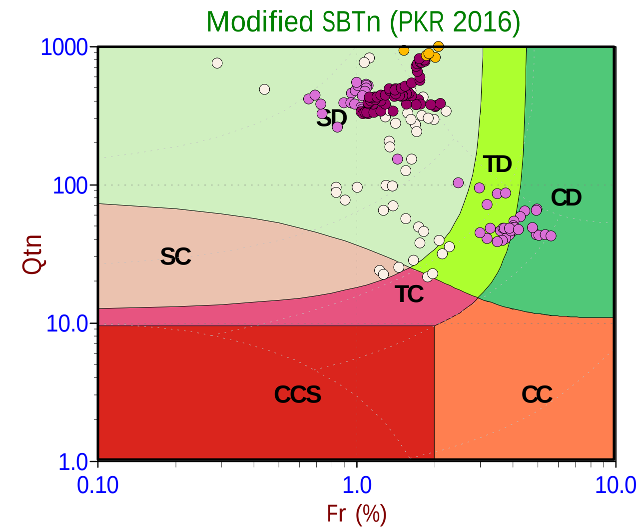
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 10:31
Site: Grand Street Commons

Sounding: AC-CPT-05S
Cone: 661: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)

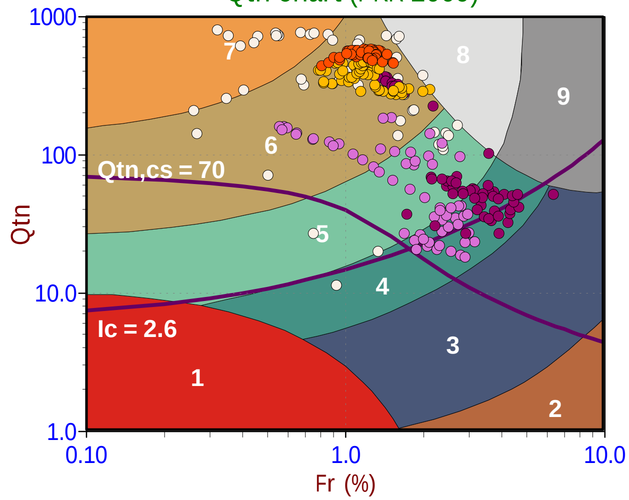
CONETEC

Aspect Consulting

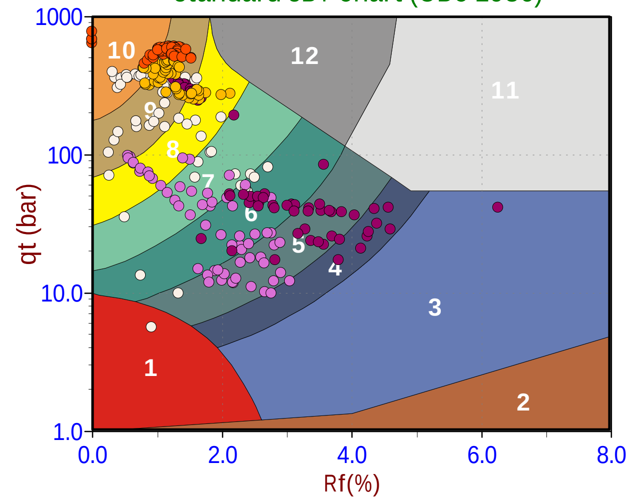
Job No: 20-59-21343
Date: 2020-09-14 10:47
Site: Grand Street Commons

Sounding: AC-CPT-06E
Cone: 661:T1500F15U35

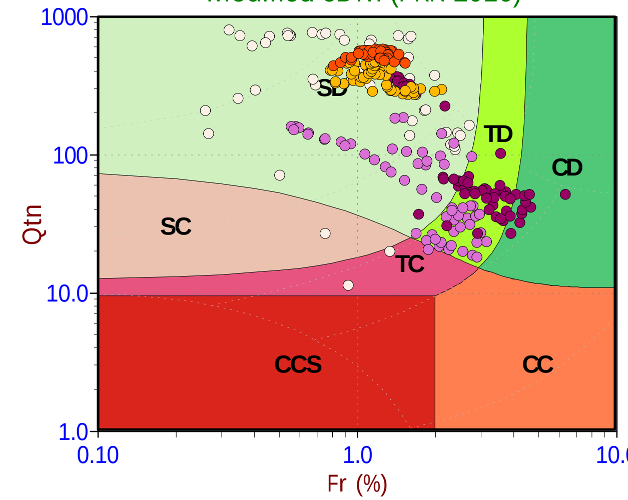
Qtn Chart (PKR 2009)



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

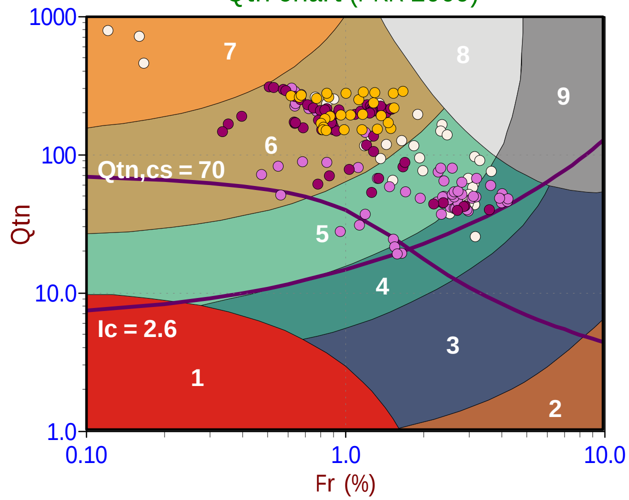
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Aspect Consulting

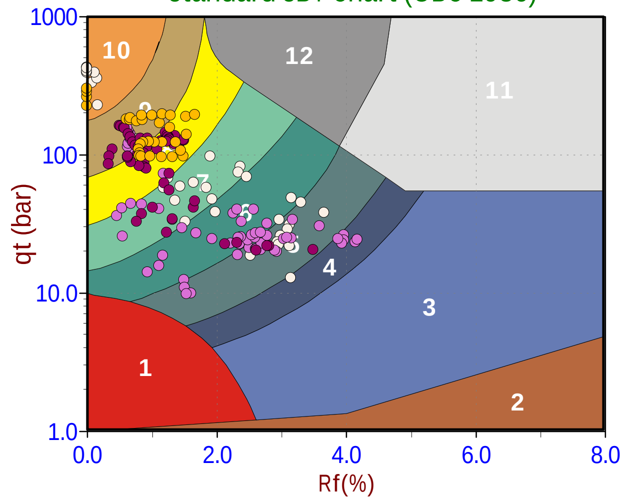
Job No: 20-59-21343
Date: 2019-09-23 10:31
Site: Grand Street Commons

Sounding: AC-CPT-06S
Cone: 536:T1500F15U500

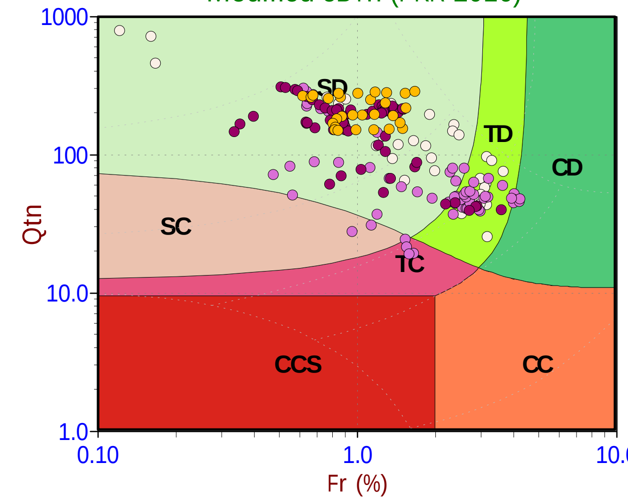
Qtn Chart (PKR 2009)



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

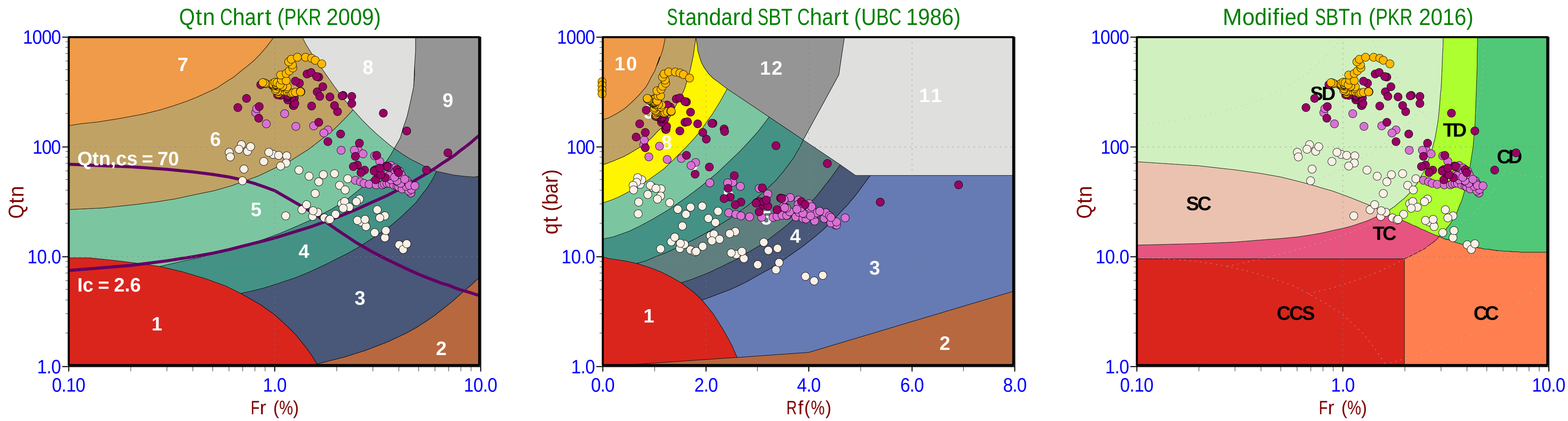
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

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)



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)

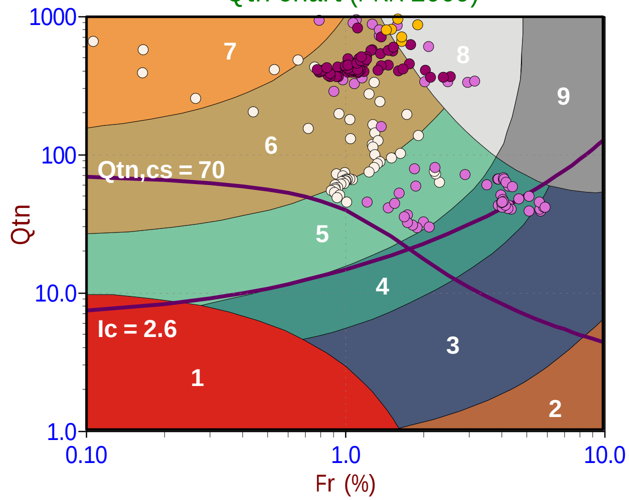
CONETEC

Aspect Consulting

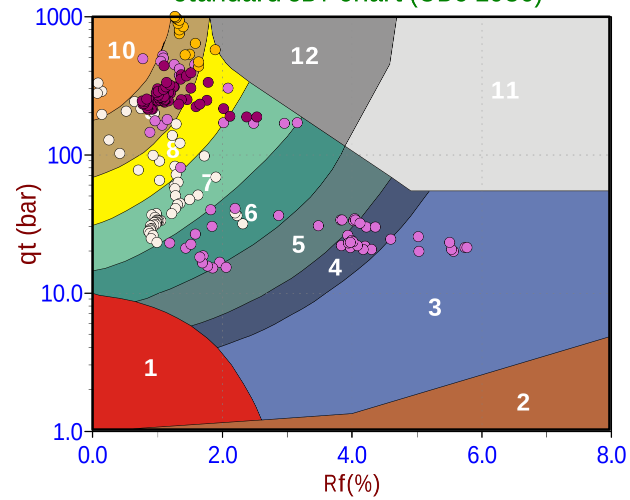
Job No: 20-59-21343
Date: 2020-09-11 12:32
Site: Grand Street Commons

Sounding: AC-CPT-07S
Cone: 661:T1500F15U35

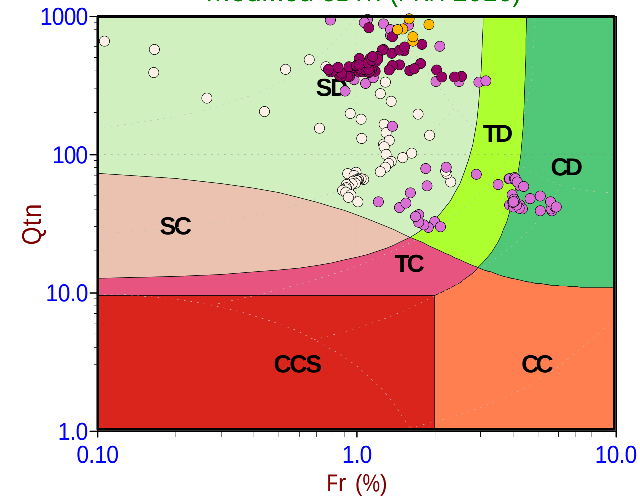
Qtn Chart (PKR 2009)



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)

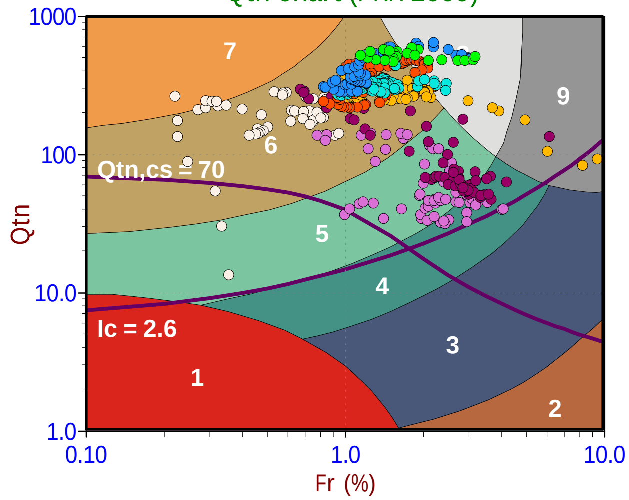
CONETEC

Aspect Consulting

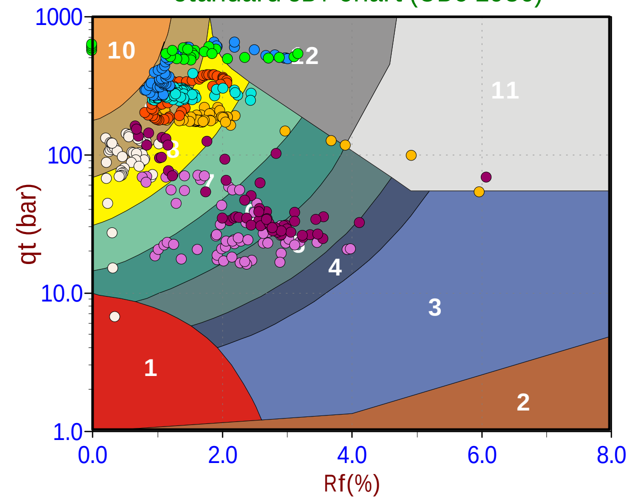
Job No: 20-59-21343
Date: 2020-09-14 07:46
Site: Grand Street Commons

Sounding: AC-CPT-08E
Cone: 661:T1500F15U35

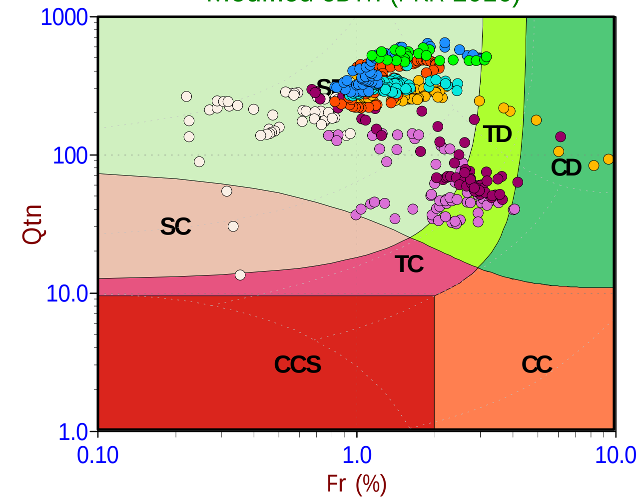
Qtn Chart (PKR 2009)



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)

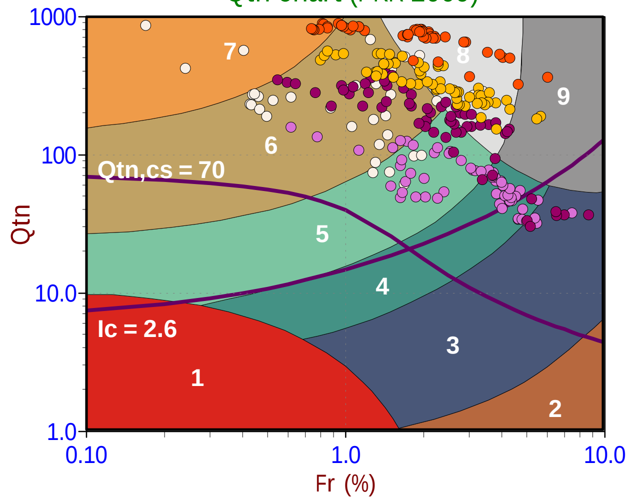
CONETEC

Aspect Consulting

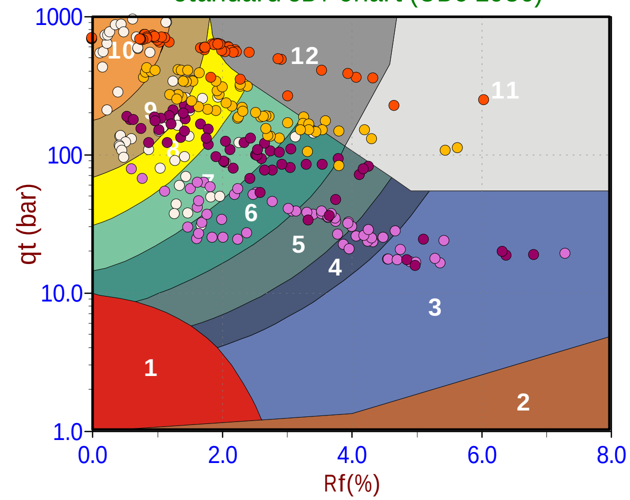
Job No: 20-59-21343
Date: 2020-09-11 09:15
Site: Grand Street Commons

Sounding: AC-CPT-08S
Cone: 661:T1500F15U35

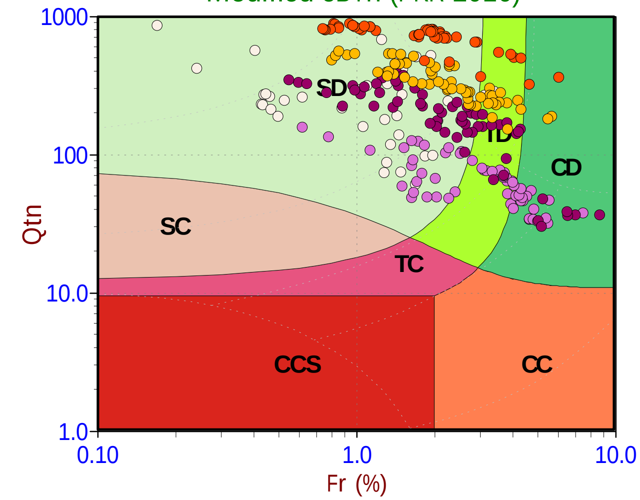
Qtn Chart (PKR 2009)



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

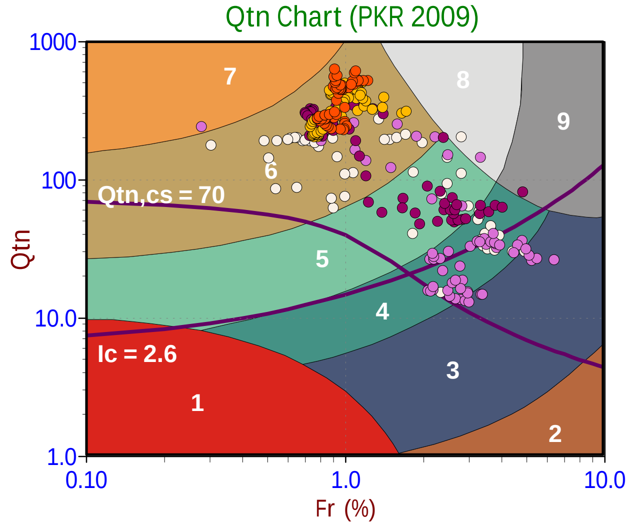
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

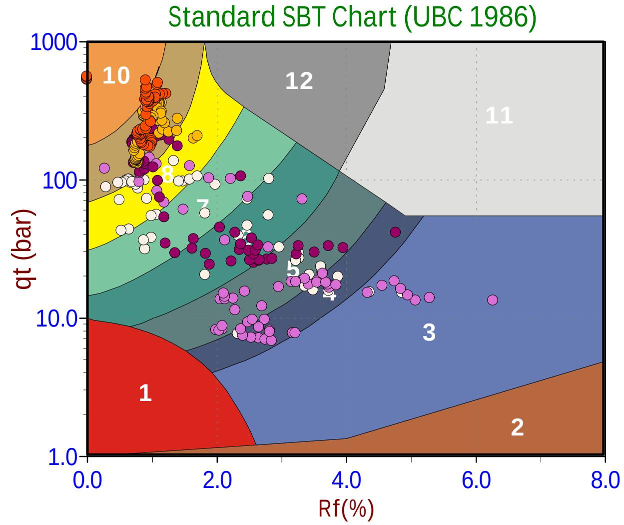
Legend

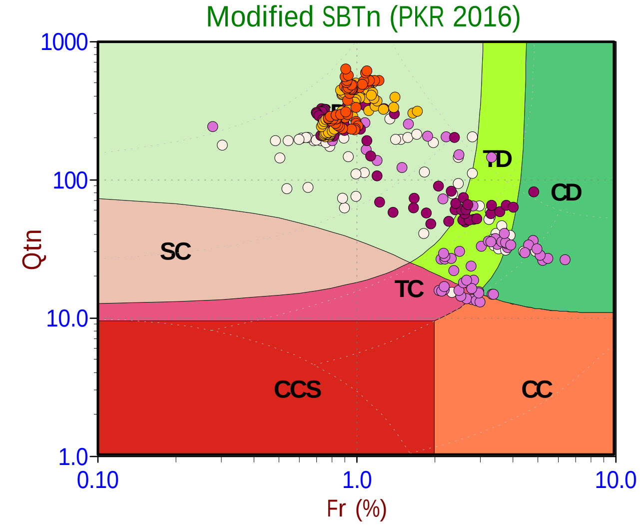
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

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)







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

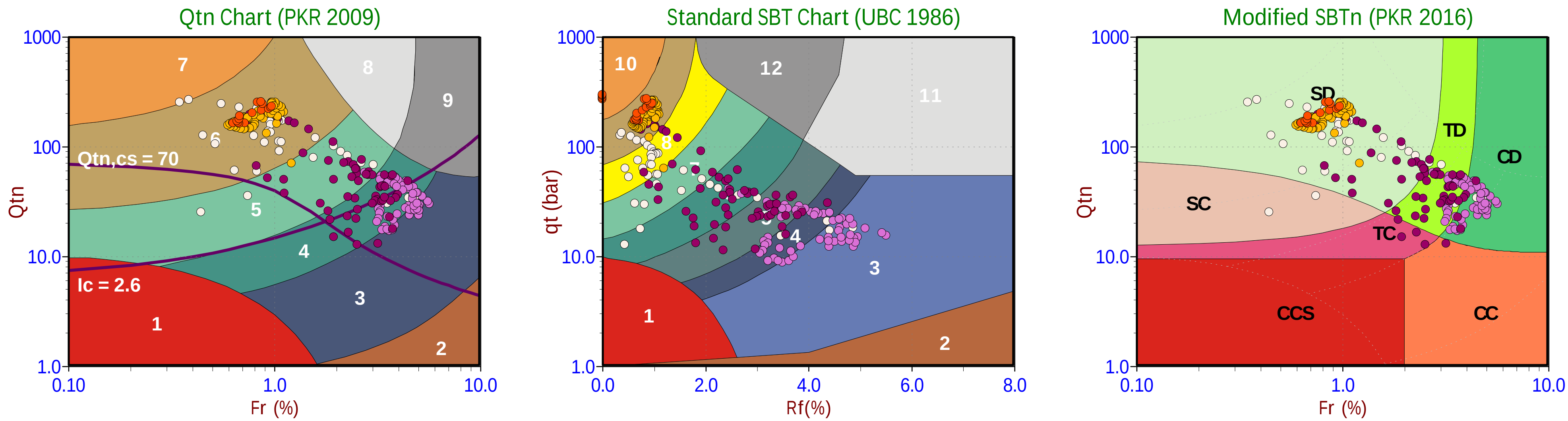
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 11:20
Site: Grand Street Commons

Sounding: AC-CPT-09S
Cone: 536:T1500F15U500



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

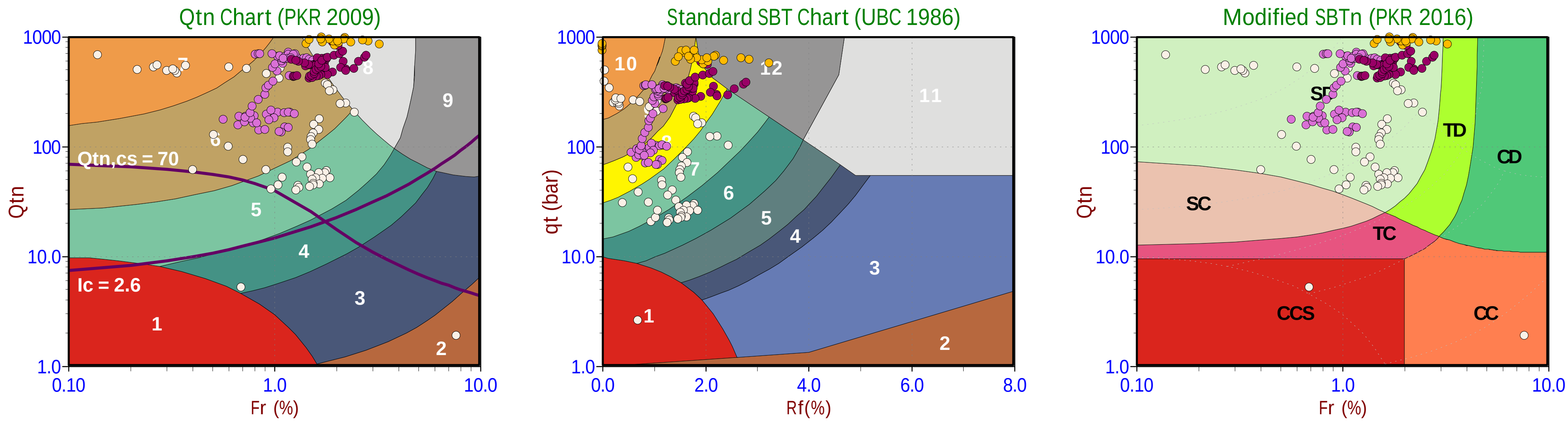
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 16:33
Site: Grand Street Commons

Sounding: AC-CPT-10E
Cone: 661: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)

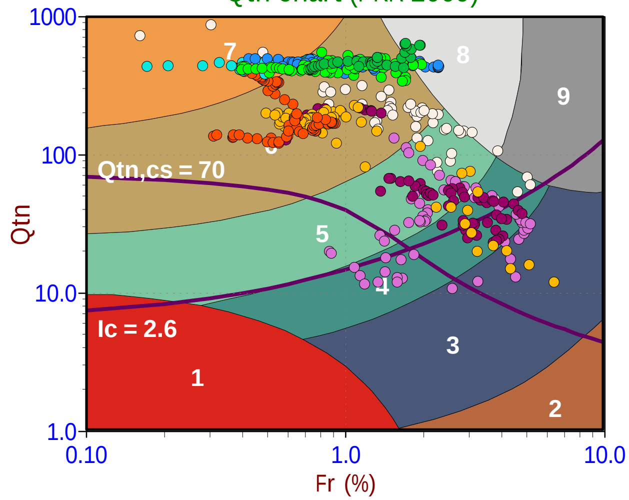
CONETEC

Aspect Consulting

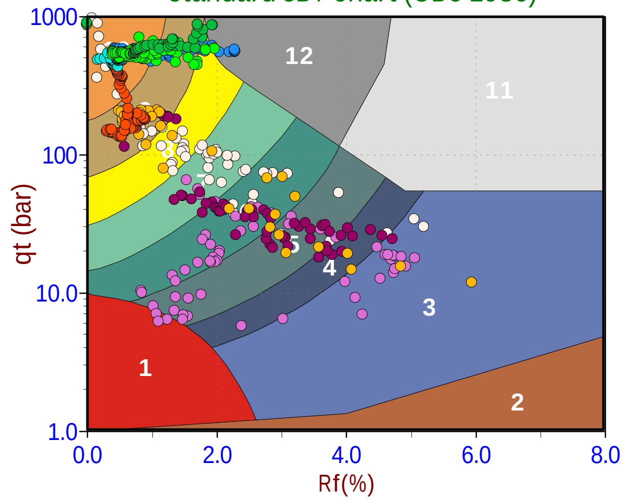
Job No: 20-59-21343
Date: 2020-09-11 13:53
Site: Grand Street Commons

Sounding: AC-CPT-10S
Cone: 661:T1500F15U35

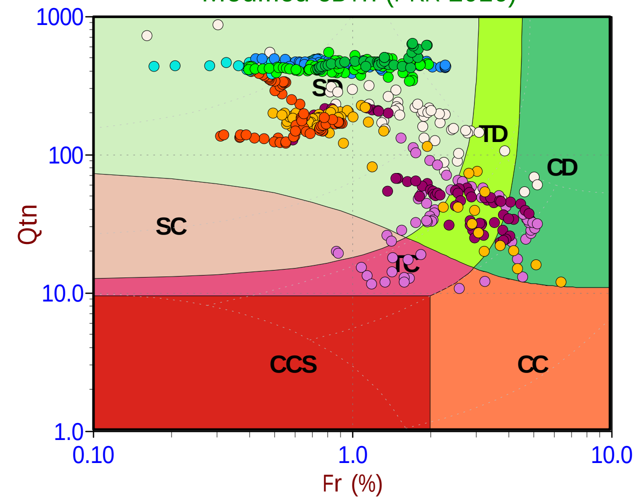
Qtn Chart (PKR 2009)



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)

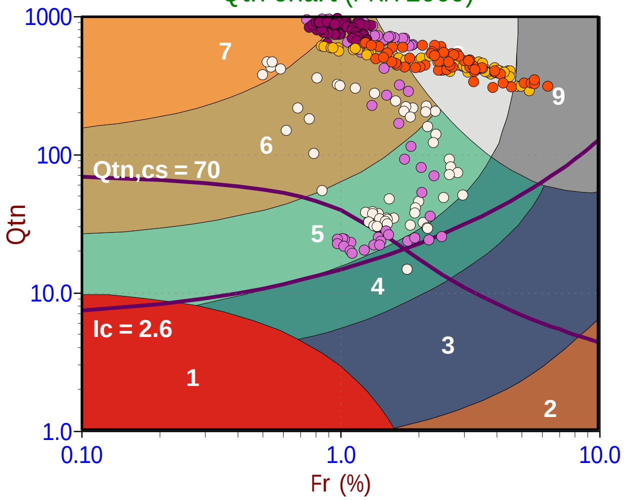
CONETEC

Aspect Consulting

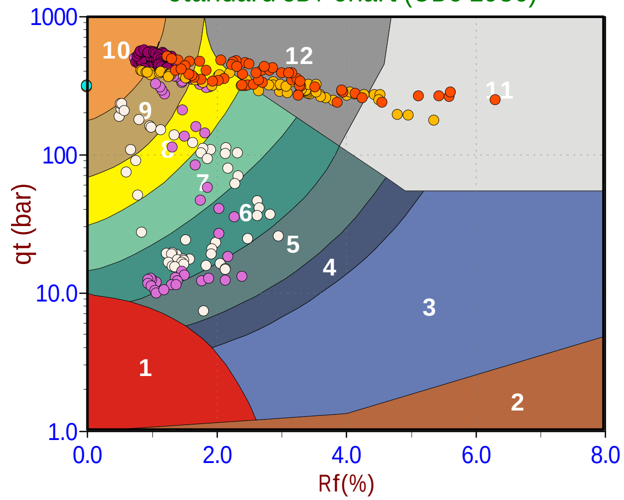
Job No: 20-59-21343
Date: 2020-09-14 08:45
Site: Grand Street Commons

Sounding: AC-CPT-11E
Cone: 661:T1500F15U35

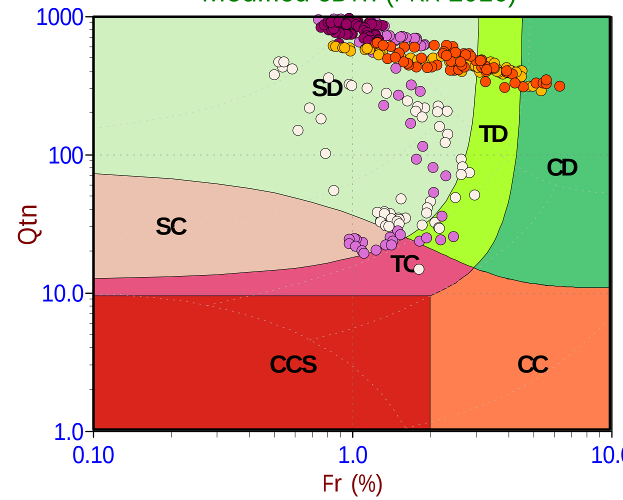
Qtn Chart (PKR 2009)



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

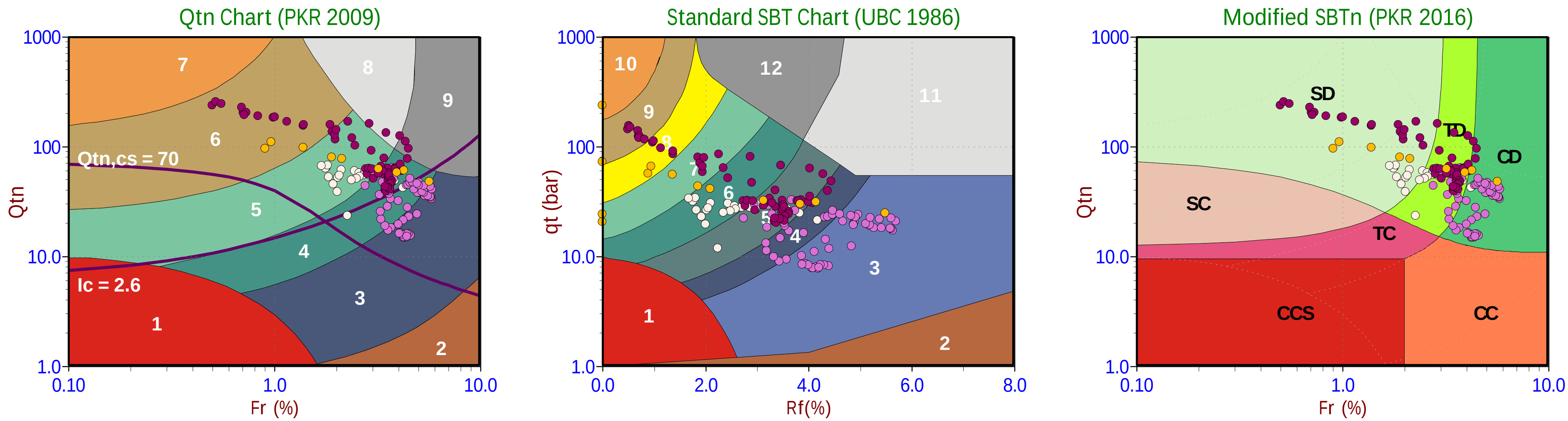
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 14:56
Site: Grand Street Commons

Sounding: AC-CPT-11S
Cone: 536:T1500F15U500



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

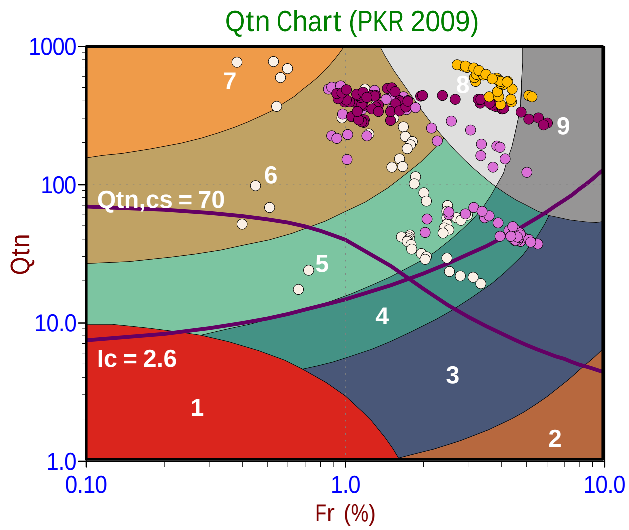
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

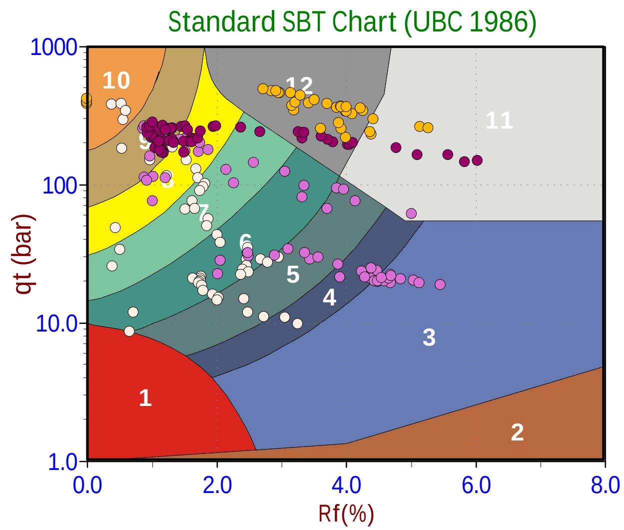
CONETEC

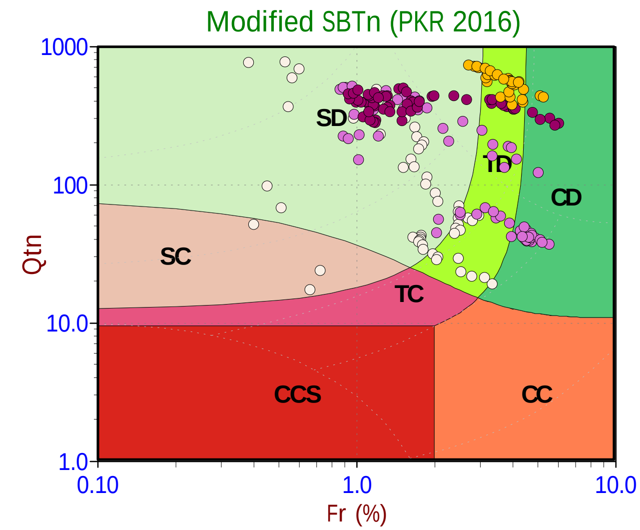
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 09:55
Site: Grand Street Commons

Sounding: AC-CPT-12E
Cone: 661: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

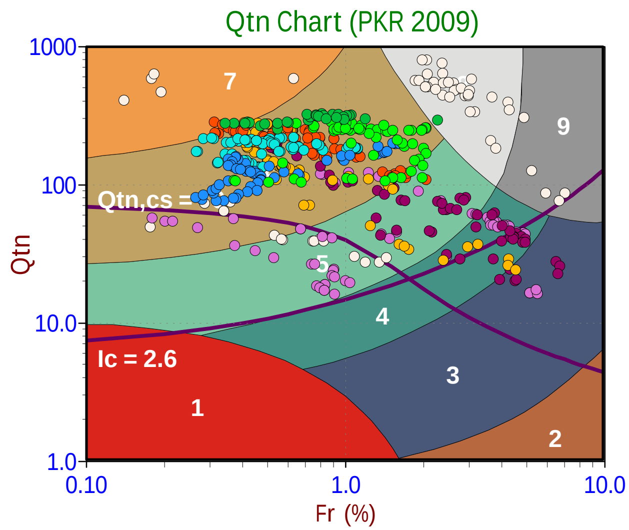
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

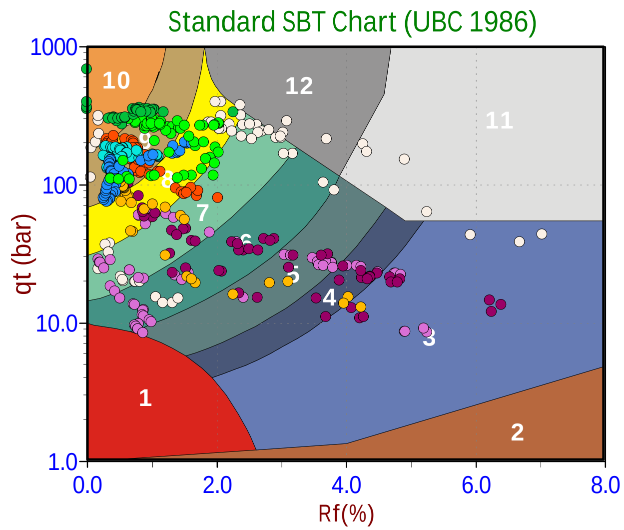
CONETEC

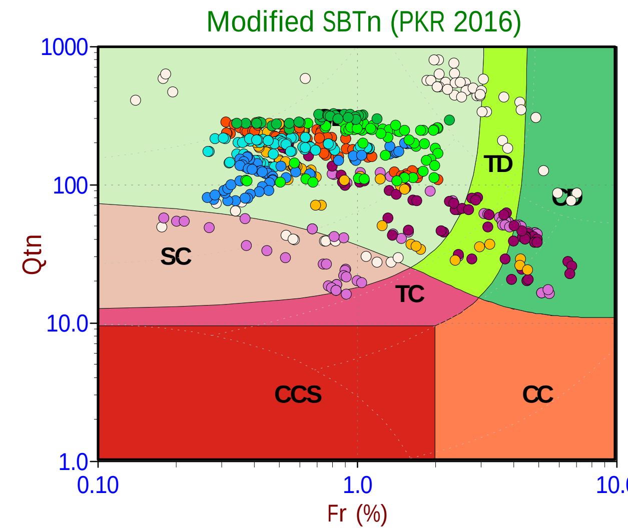
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 13:46
Site: Grand Street Commons

Sounding: AC-CPT-12S
Cone: 661: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)

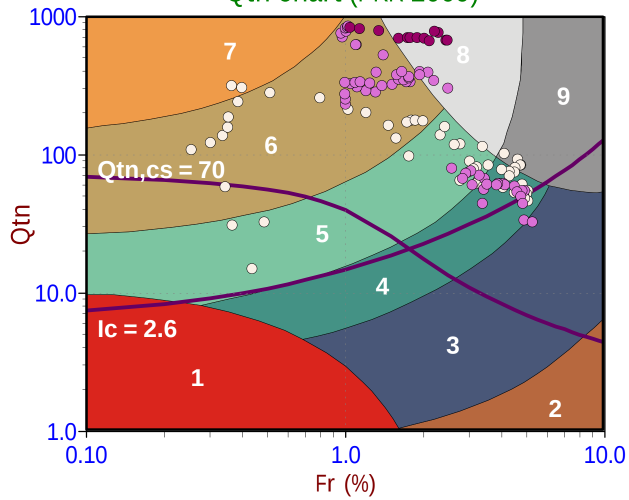
CONETEC

Aspect Consulting

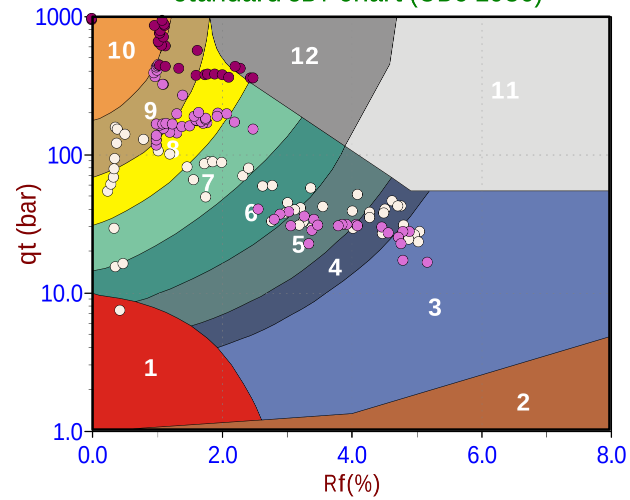
Job No: 20-59-21343
Date: 2020-09-14 09:29
Site: Grand Street Commons

Sounding: AC-CPT-13E
Cone: 661:T1500F15U35

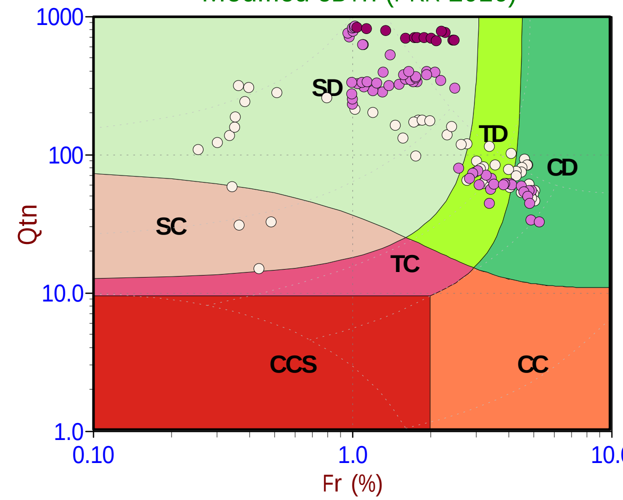
Qtn Chart (PKR 2009)



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

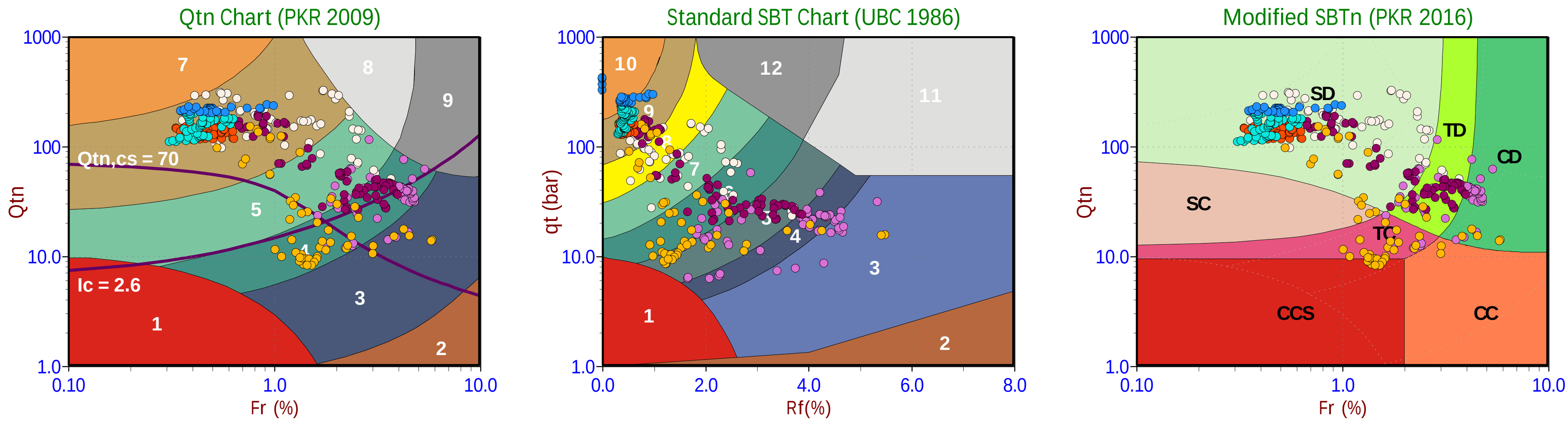
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 15:17
Site: Grand Street Commons

Sounding: AC-CPT-13S
Cone: 595:T1500F15U500



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)

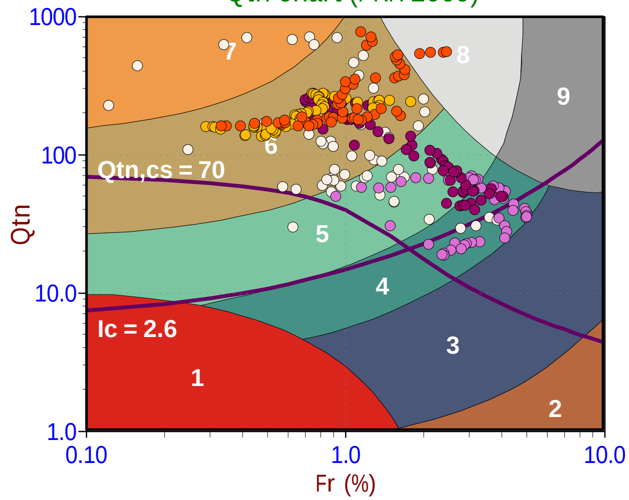
CONETEC

Aspect Consulting

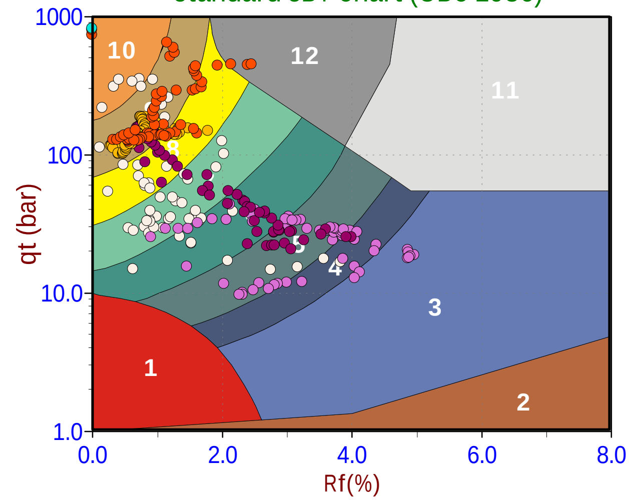
Job No: 20-59-21343
Date: 2020-09-11 16:06
Site: Grand Street Commons

Sounding: AC-CPT-14S
Cone: 661:T1500F15U35

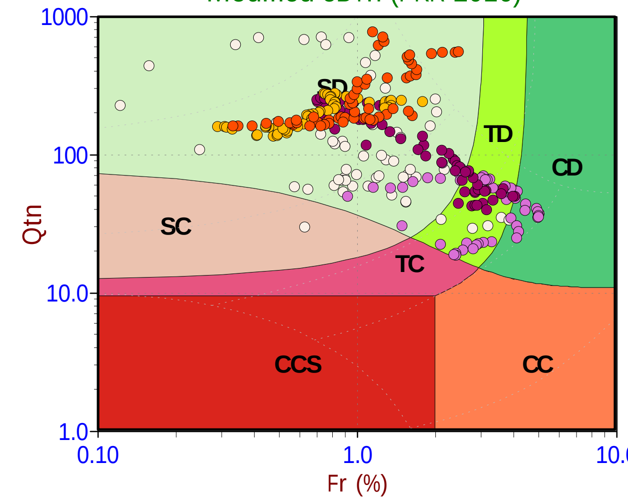
Qtn Chart (PKR 2009)



Standard SBT Chart (UBC 1986)



Modified SBTn (PKR 2016)

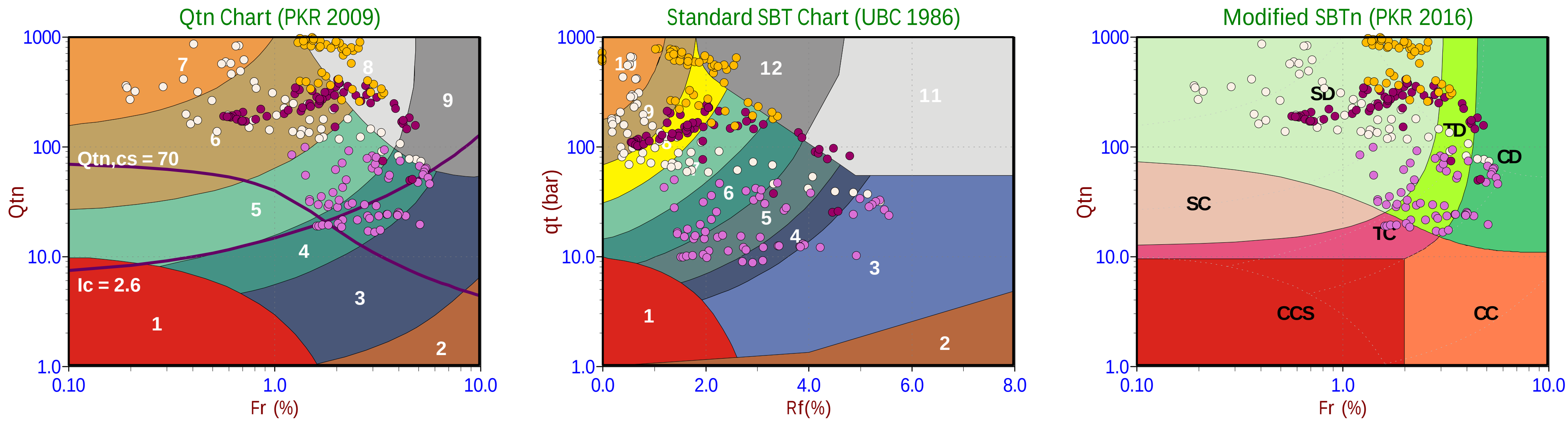


Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

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)



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

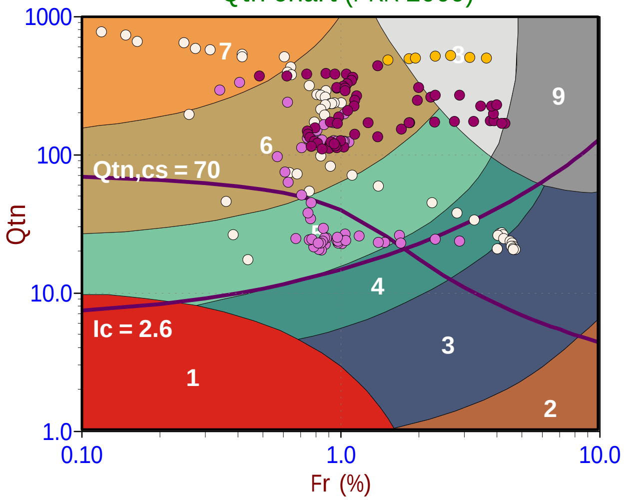
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

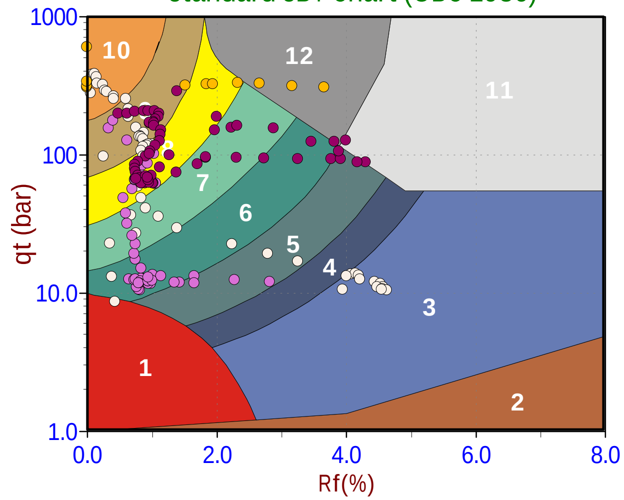
Aspect Consulting

Job No: 20-59-21343	Sounding: AC-CPT-16S
Date: 2020-09-10 15:04	Cone: 661:T1500F15U35
Site: Grand Street Commons	

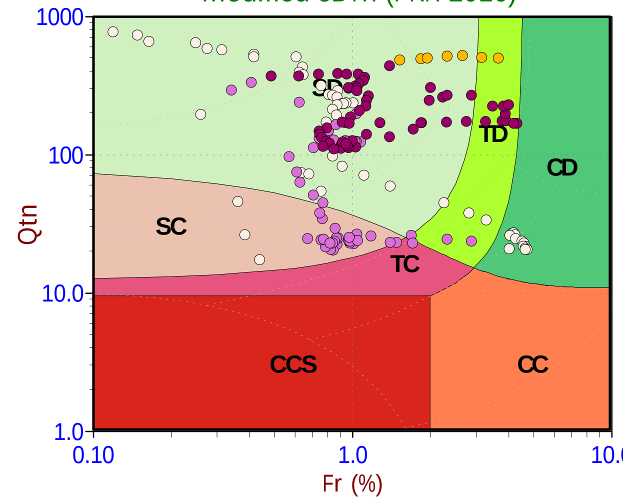
Qtn Chart (PKR 2009)



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

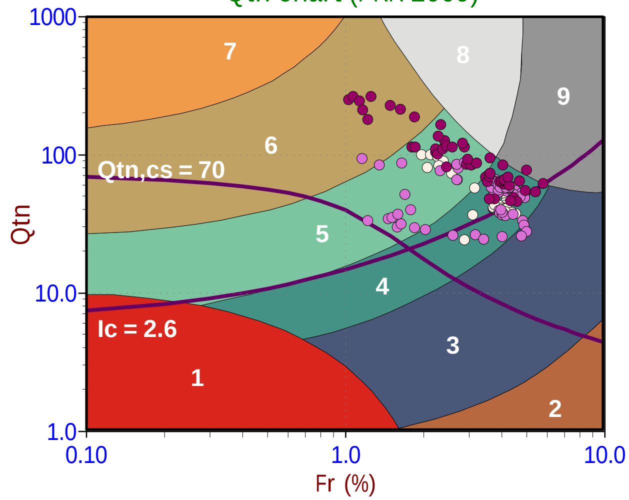
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

Legend

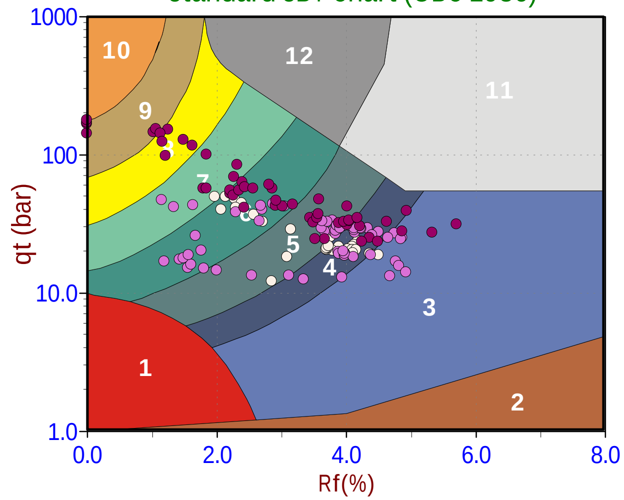
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Aspect Consulting	Job No: 20-59-21343 Date: 2019-09-23 13:11 Site: Grand Street Commons	Sounding: AC-CPT-17S Cone: 536:T1500F15U500

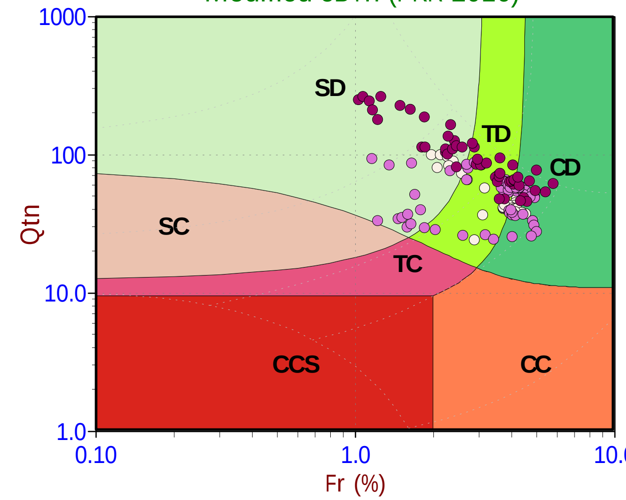
Qtn Chart (PKR 2009)



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

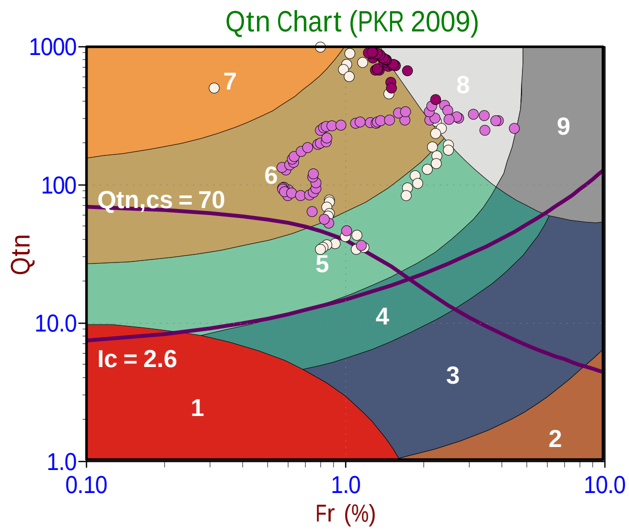
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

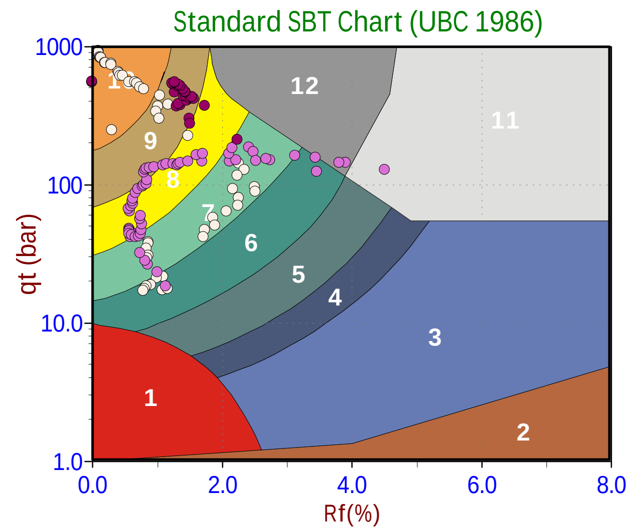
CONETEC

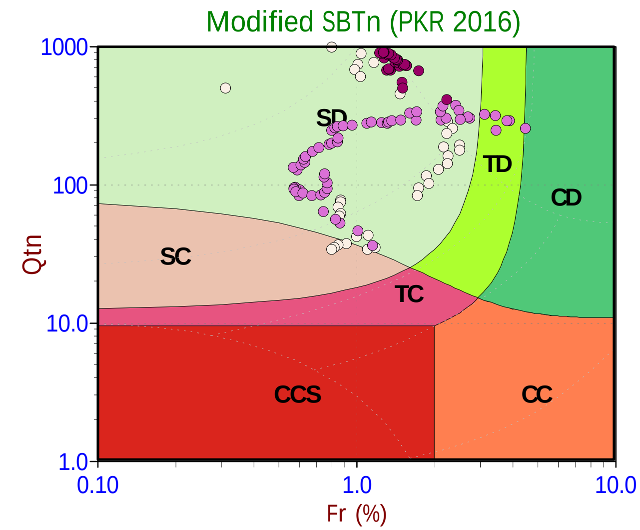
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 08:14
Site: Grand Street Commons

Sounding: AC-CPT-18S
Cone: 661:T1500F15U35







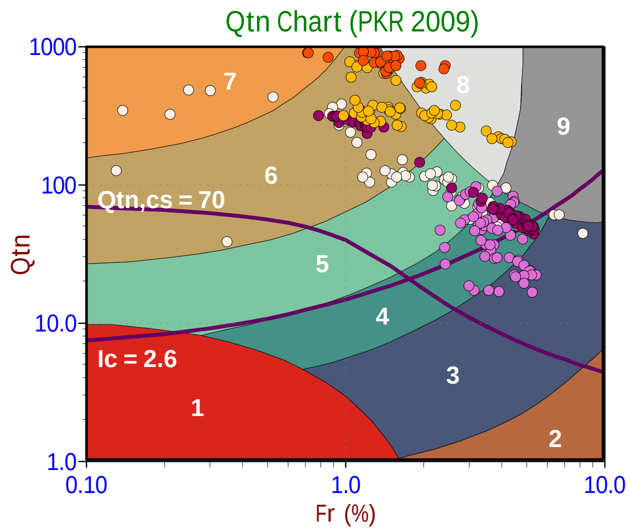
Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

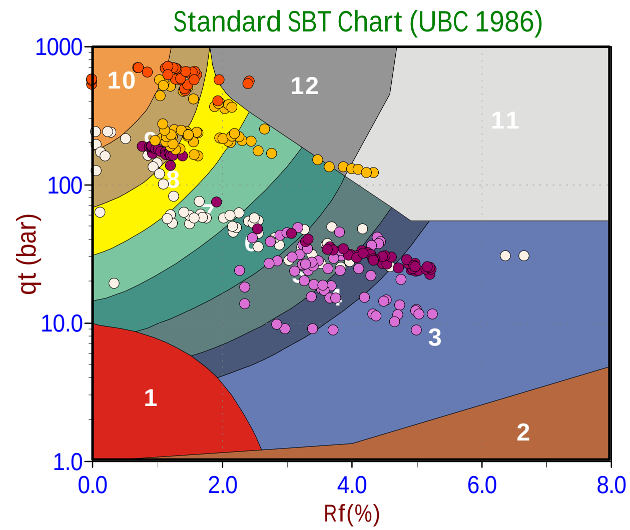
Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

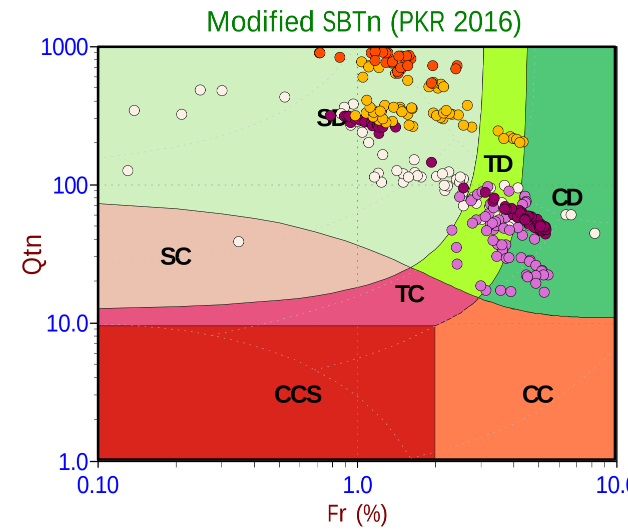
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

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	Aspect Consulting	Job No: 20-59-21343 Date: 2020-09-11 15:20 Site: Grand Street Commons	Sounding: AC-CPT-19S Cone: 661: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

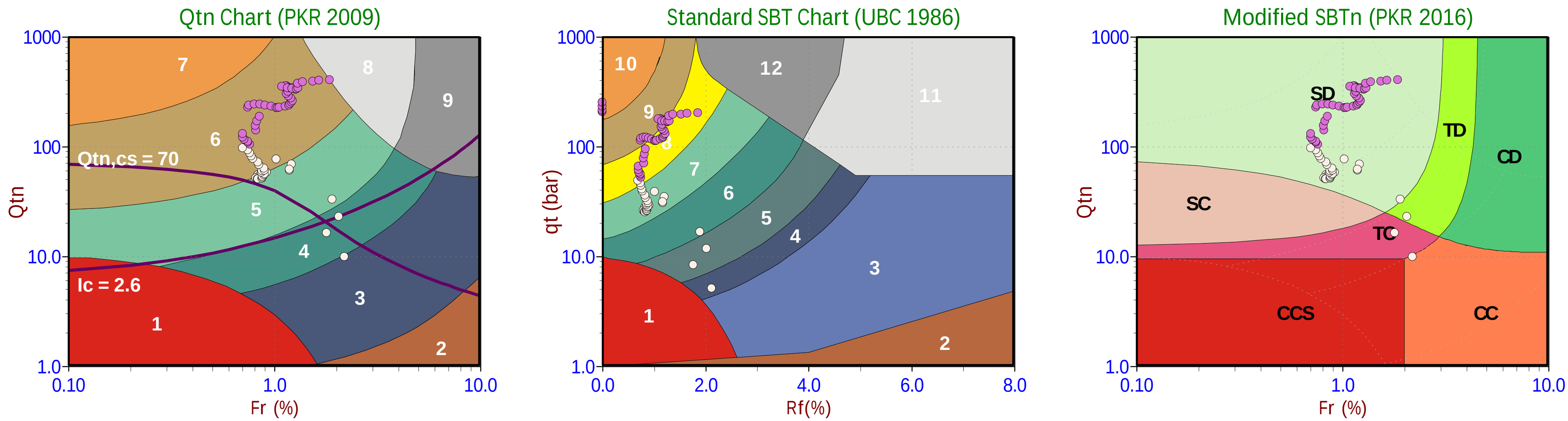
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

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)

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 12:10
Site: Grand Street Commons

Sounding: AC-CPT-20S
Cone: 536:T1500F15U500



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

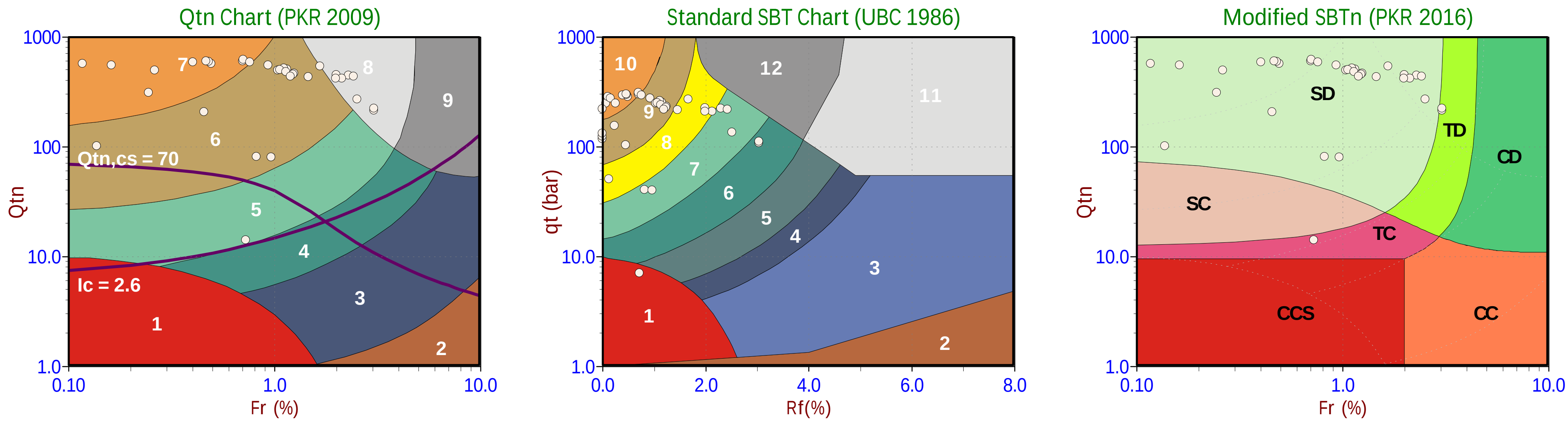
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 15:51
Site: Grand Street Commons

Sounding: AC-CPT-21S
Cone: 661: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

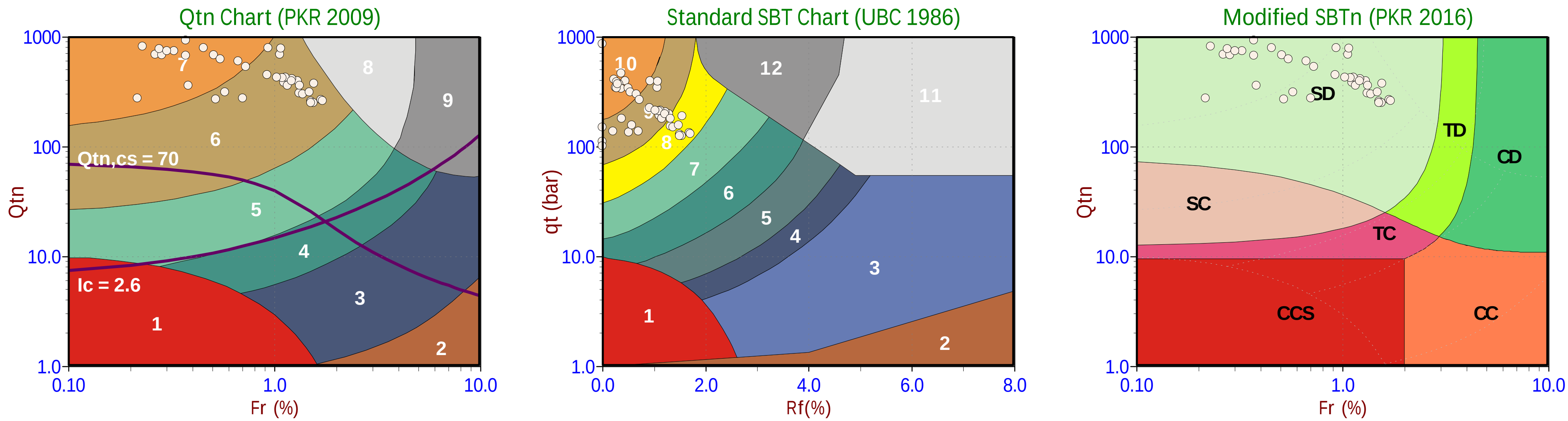
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 16:09
Site: Grand Street Commons

Sounding: AC-CPT-21BS
Cone: 661: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:	20-59-21343
	Client:	Aspect Consulting
	Project:	Grand Street Commons
	Start Date:	10-Sep-2020
	End Date:	14-Sep-2020

CPTu PORE PRESSURE DISSIPATION SUMMARY

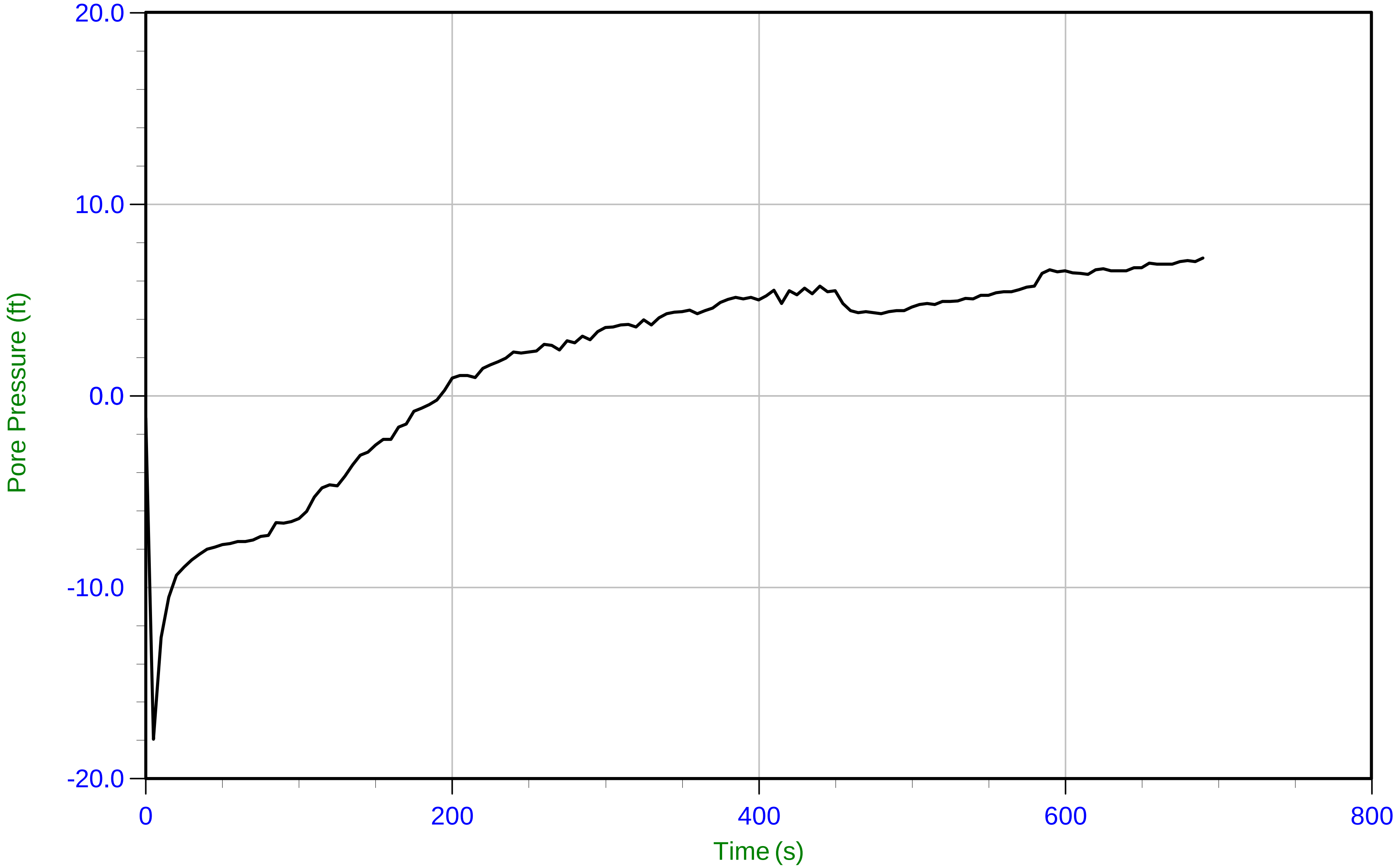
Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)
AC-CPT-01BS	20-59-21343_CP01BS.PPD	15	480	5.7		
AC-CPT-01E	20-59-21343_CP01E.PPD	15	690	33.5		
AC-CPT-06E	20-59-21343_CP06E.PPD	15	470	16.6		
AC-CPT-08E	20-59-21343_CP08E.PPD	15	300	14.9		
AC-CPT-08S	20-59-21343_CP08S.PPD	15	2000	24.6	5.9	18.7
AC-CPT-09S	20-59-21343_CP09S.PPD	15	385	21.5	3.1	18.4
AC-CPT-10S	20-59-21343_CP10S.PPD	15	1220	16.6		
AC-CPT-10S	20-59-21343_CP10S.PPD	15	1020	32.4	14.0	18.4
AC-CPT-11E	20-59-21343_CP11E.PPD	15	370	23.2		
AC-CPT-11S	20-59-21343_CP11S.PPD	15	370	16.0		
AC-CPT-12E	20-59-21343_CP12E.PPD	15	920	8.0		
AC-CPT-12E	20-59-21343_CP12E.PPD	15	335	13.1		
AC-CPT-12S	20-59-21343_CP12S.PPD	15	600	26.5	7.0	19.5
AC-CPT-12S	20-59-21343_CP12S.PPD	15	200	42.9	21.7	21.2
AC-CPT-13S	20-59-21343_CP13S.PPD	15	300	33.4	13.5	19.9
AC-CPT-14S	20-59-21343_CP14S.PPD	15	1490	23.5		
AC-CPT-17S	20-59-21343_CP17S.PPD	15	435	14.3		
AC-CPT-19S	20-59-21343_CP19S.PPD	15	295	22.0		
Total Duration			198.0 min			

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/14/2020 13:29
Site: Grand Street Commons

Sounding: AC-CPT-01E
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP01E.PPD
Depth: 10.200 m / 33.464 ft
Duration: 690.0 s

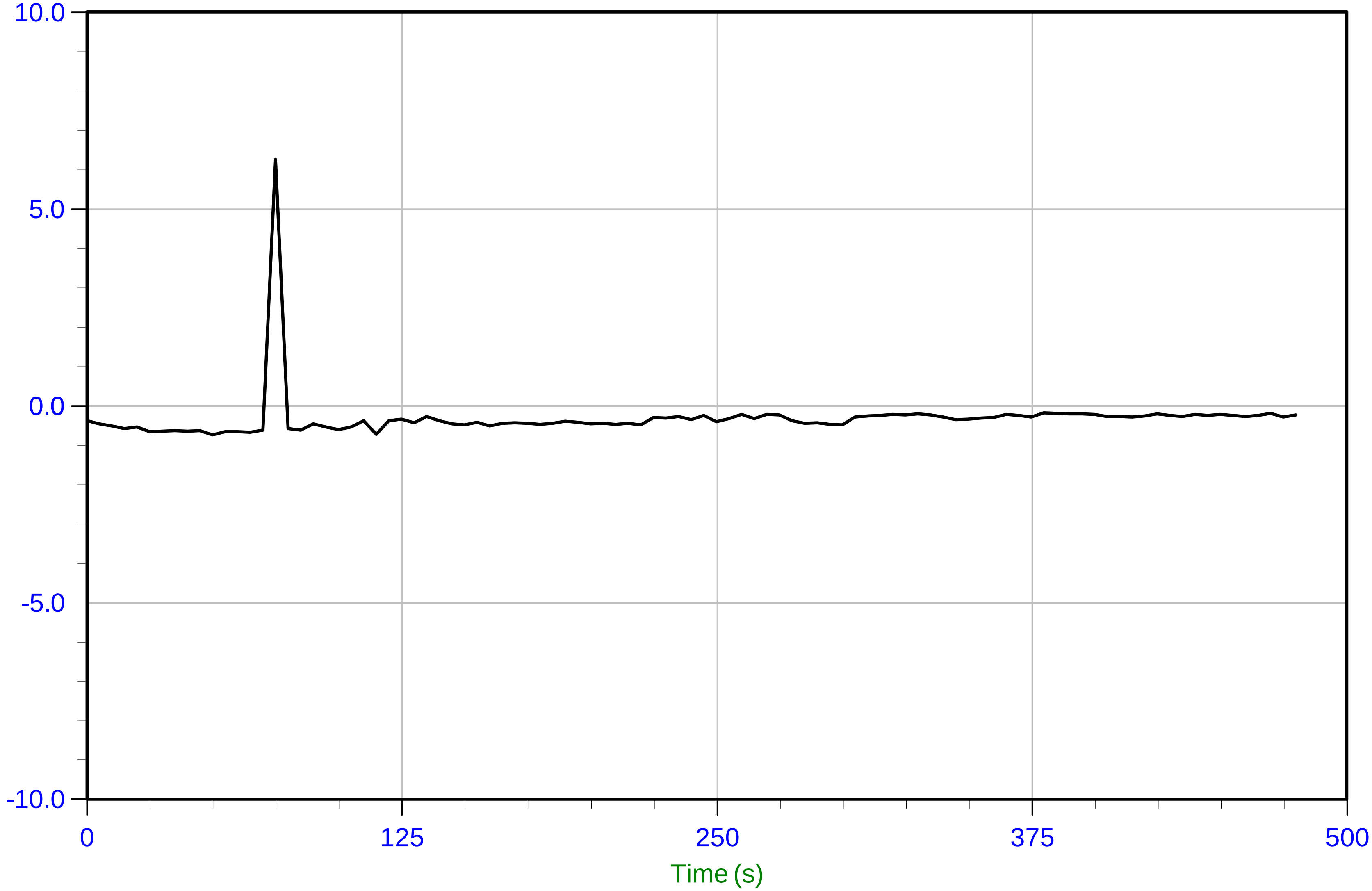
U Min: -17.9 ft
U Max: 7.2 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/23/2019 08:18
Site: Grand St. Commons

Sounding: AC-CPT-01BS
Cone: 536:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP01BS.PPD
Depth: 1.750 m / 5.741 ft
Duration: 480.0 s

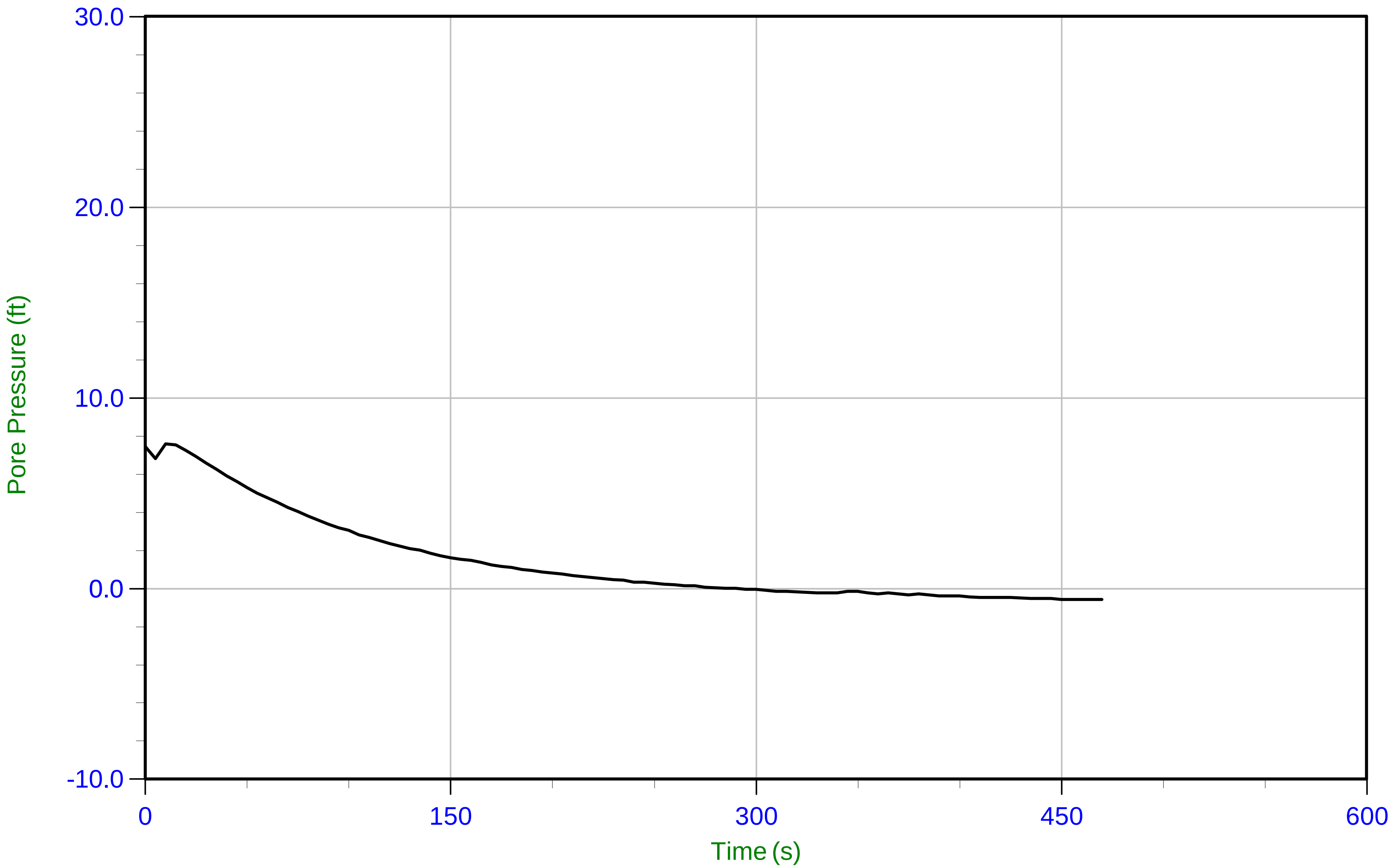
U Min: -0.7 ft
U Max: 6.3 ft

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 09/14/2020 10:47
Site: Grand Street Commons

Sounding: AC-CPT-06E
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP06E.PPD
Depth: 5.050 m / 16.568 ft
Duration: 470.0 s

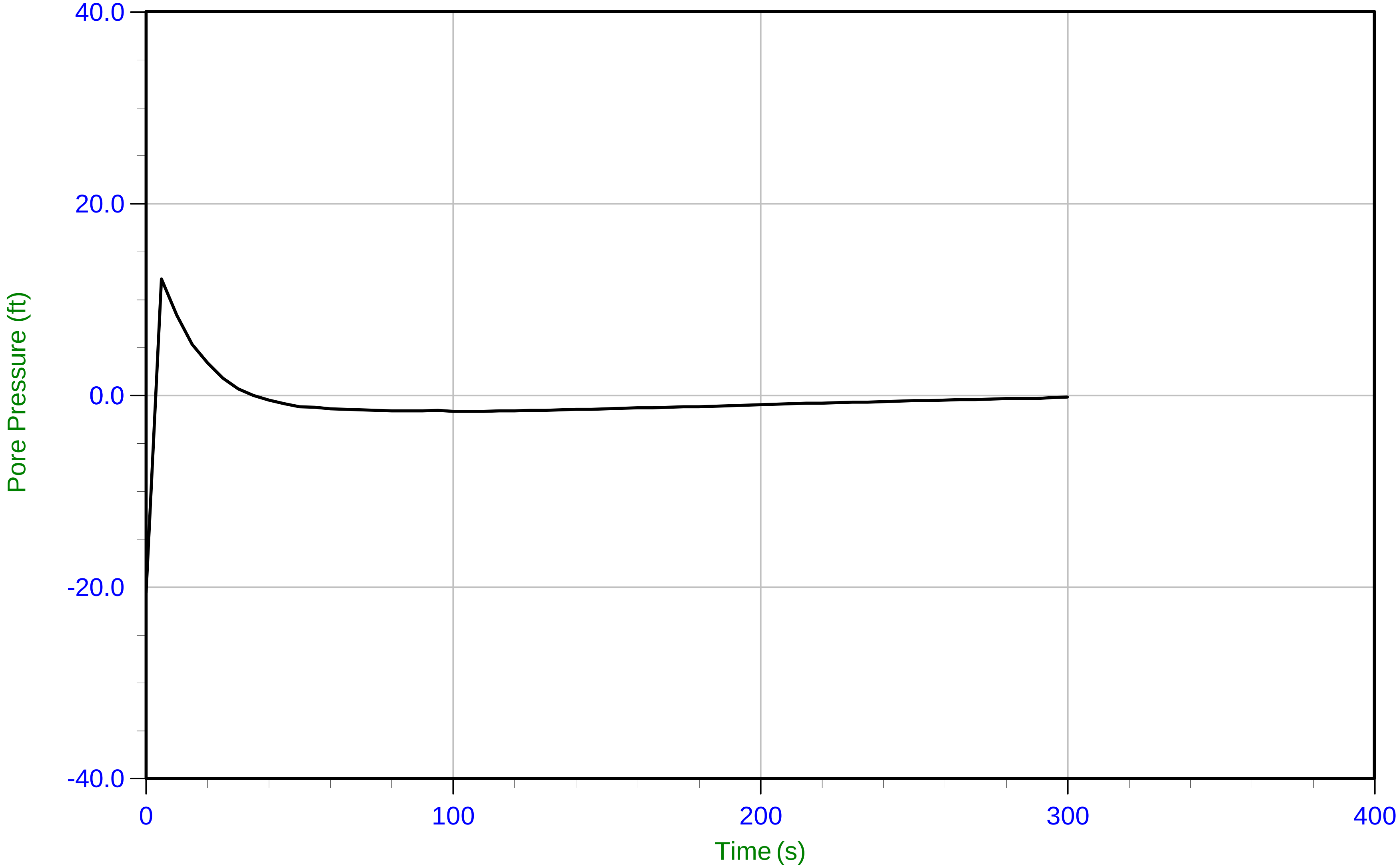
U Min: -0.6 ft
U Max: 7.6 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/14/2020 07:46
Site: Grand Street Commons

Sounding: AC-CPT-08E
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP08E.PPD
Depth: 4.550 m / 14.928 ft
Duration: 300.0 s

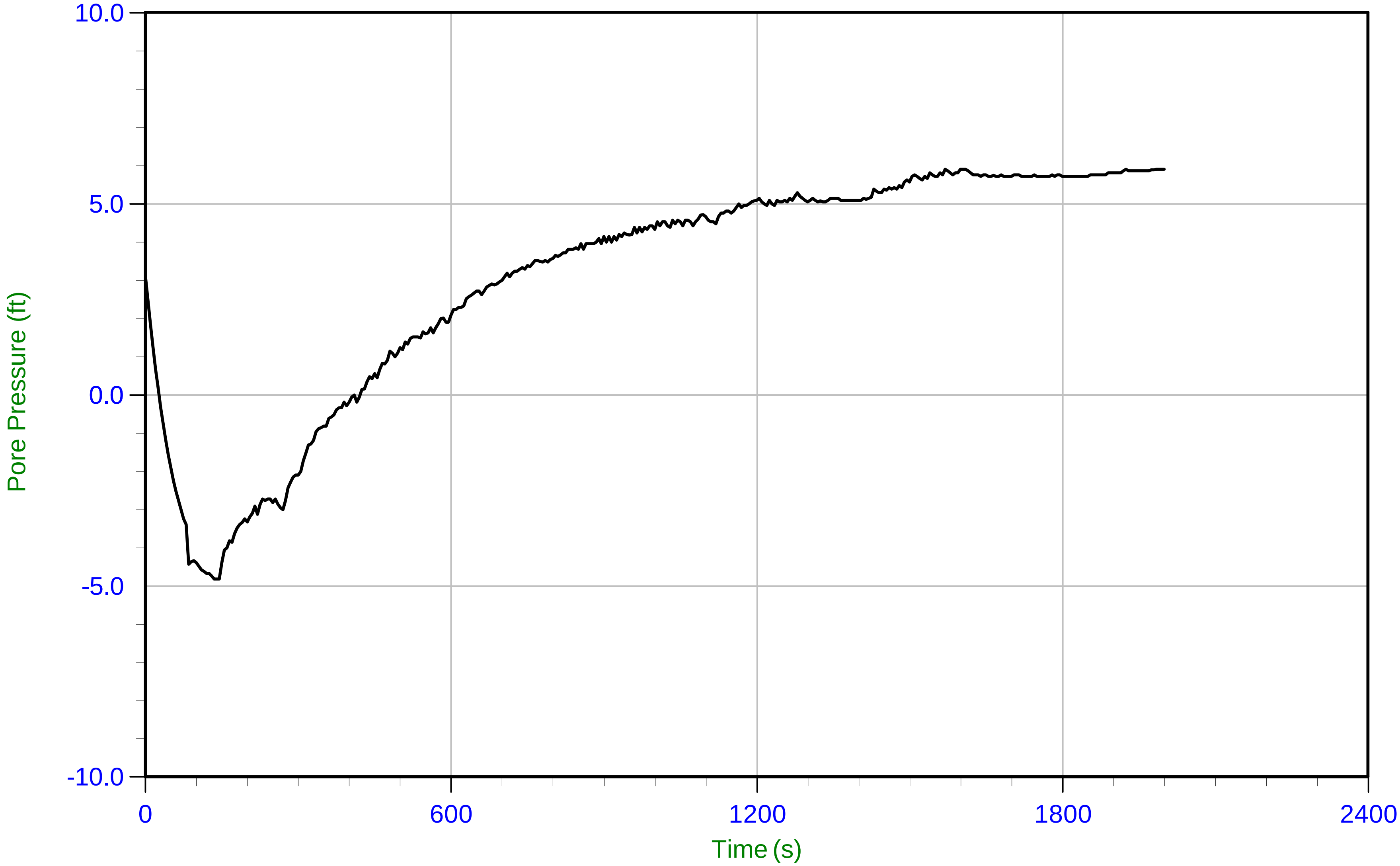
U Min: -20.6 ft
U Max: 12.1 ft

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 09/11/2020 09:15
Site: Grand Street Commons

Sounding: AC-CPT-08S
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP08S.PPD
Depth: 7.500 m / 24.606 ft
Duration: 2000.0 s

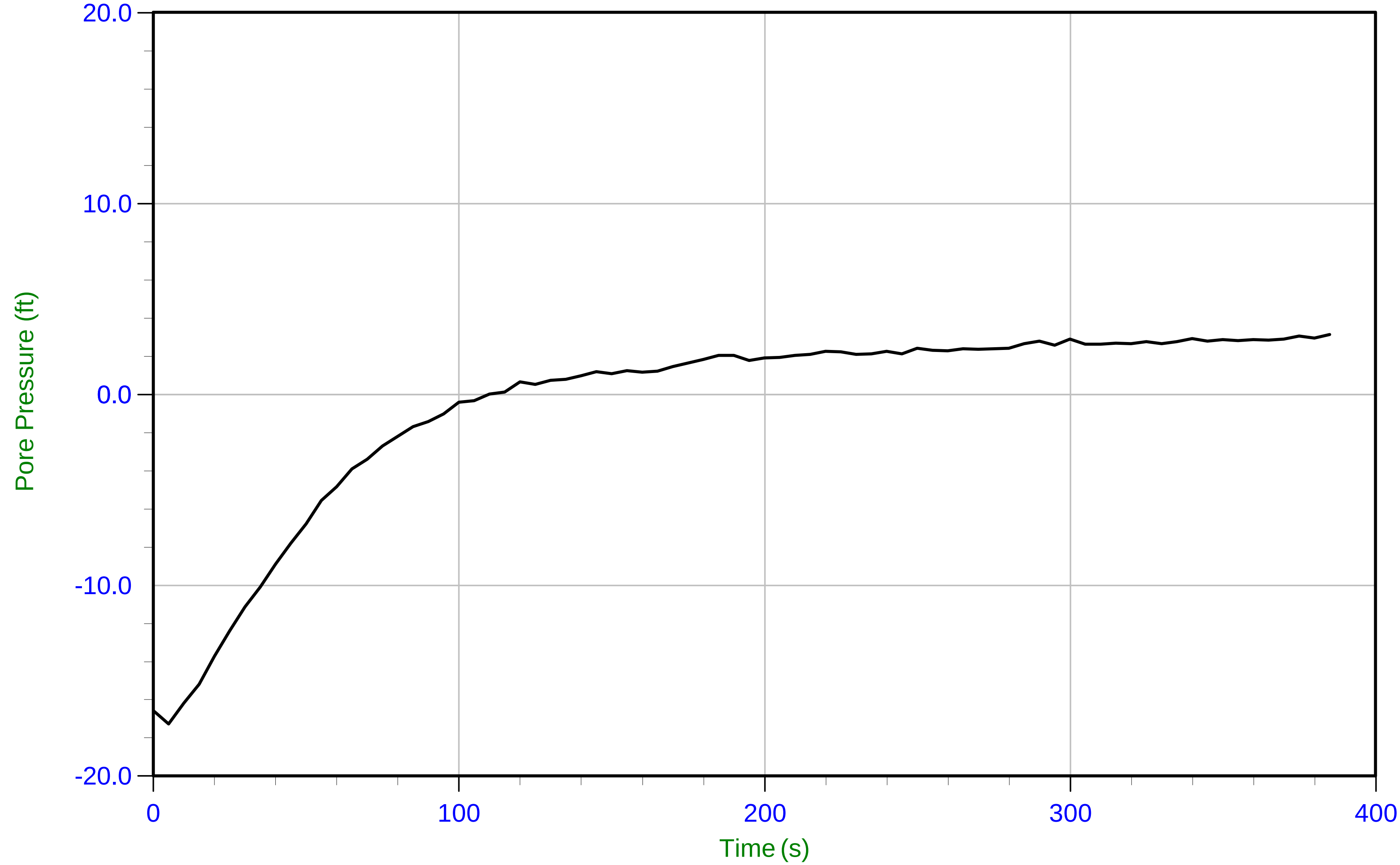
U Min: -4.8 ft
U Max: 5.9 ft

WT: 5.707 m / 18.725 ft
Ueq: 5.9 ft

Aspect Consulting

Job No: 20-59-21343
Date: 09/23/2019 11:20
Site: Grand St. Commons

Sounding: AC-CPT-09S
Cone: 536:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP09S.PPD
Depth: 6.550 m / 21.489 ft
Duration: 385.0 s

U Min: -17.3 ft
U Max: 3.1 ft

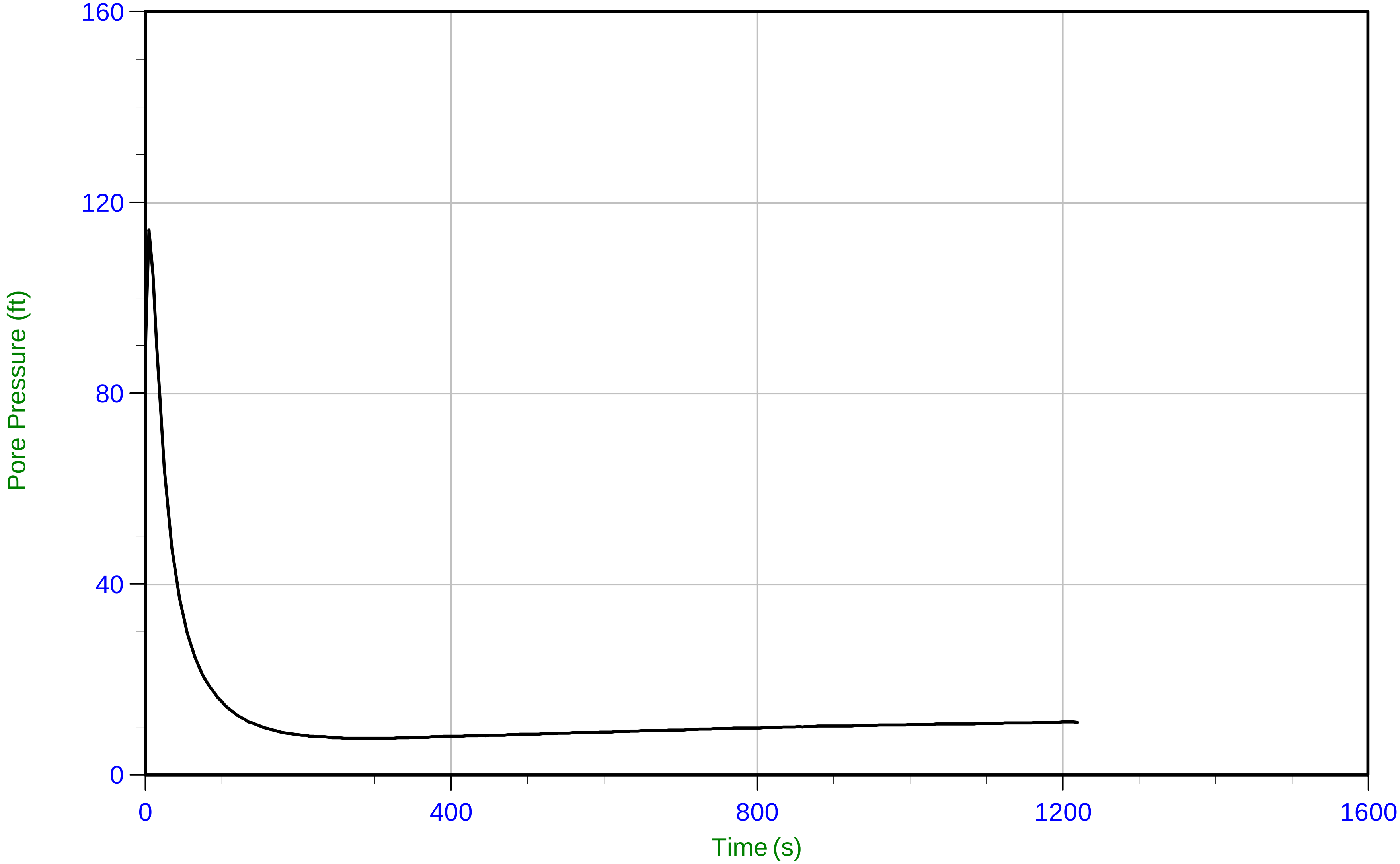
WT: 5.605 m / 18.389 ft
Ueq: 3.1 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/11/2020 13:53
Site: Grand Street Commons

Sounding: AC-CPT-10S
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

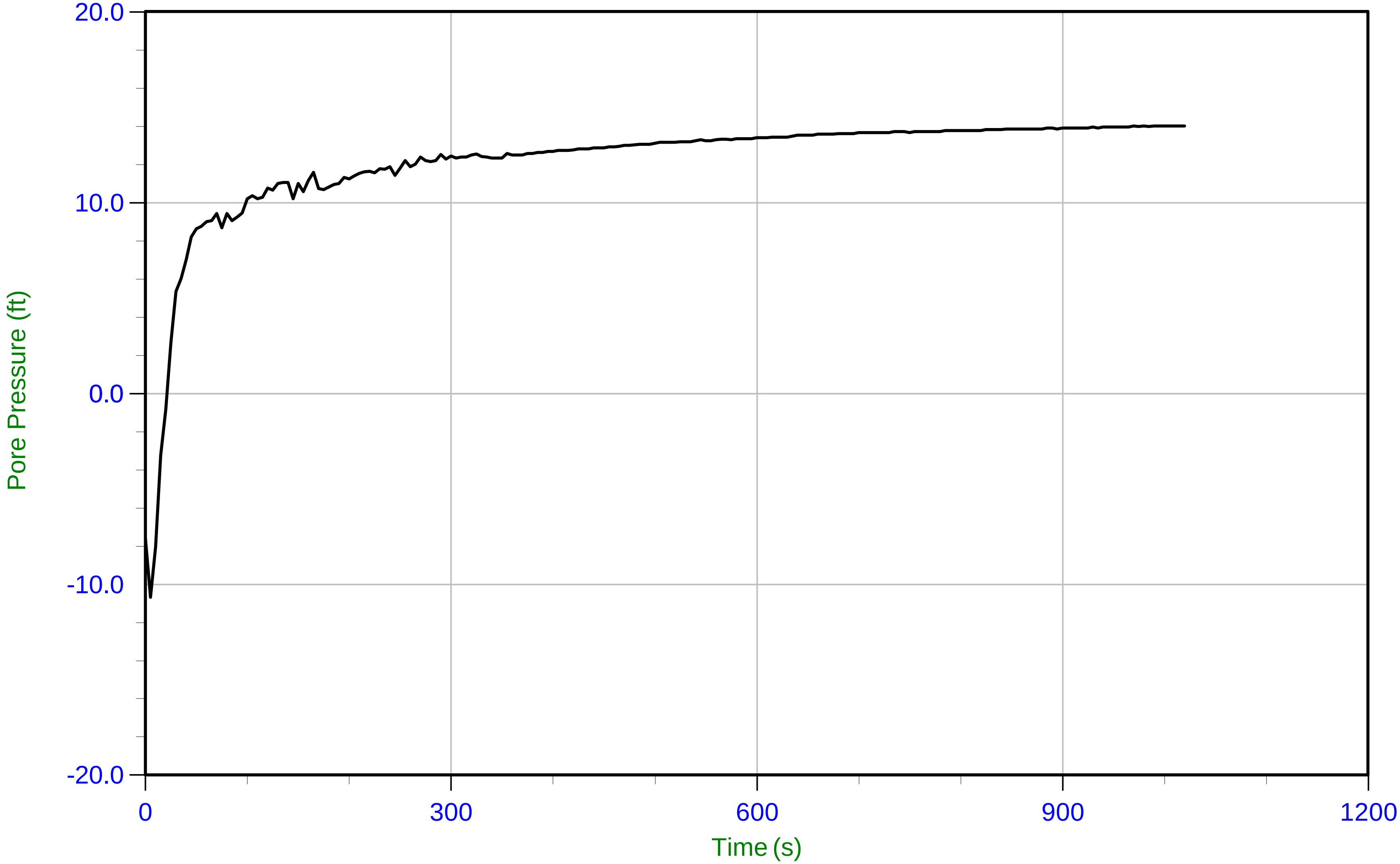
Filename: 20-59-21343_CP10S.PPD
Depth: 5.050 m / 16.568 ft
Duration: 1220.0 s

U Min: 7.7 ft
U Max: 114.3 ft

Aspect Consulting

Job No: 20-59-21343
Date: 09/11/2020 13:53
Site: Grand Street Commons

Sounding: AC-CPT-10S
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP10S.PPD
Depth: 9.875 m / 32.398 ft
Duration: 1020.0 s

U Min: -10.7 ft
U Max: 14.0 ft

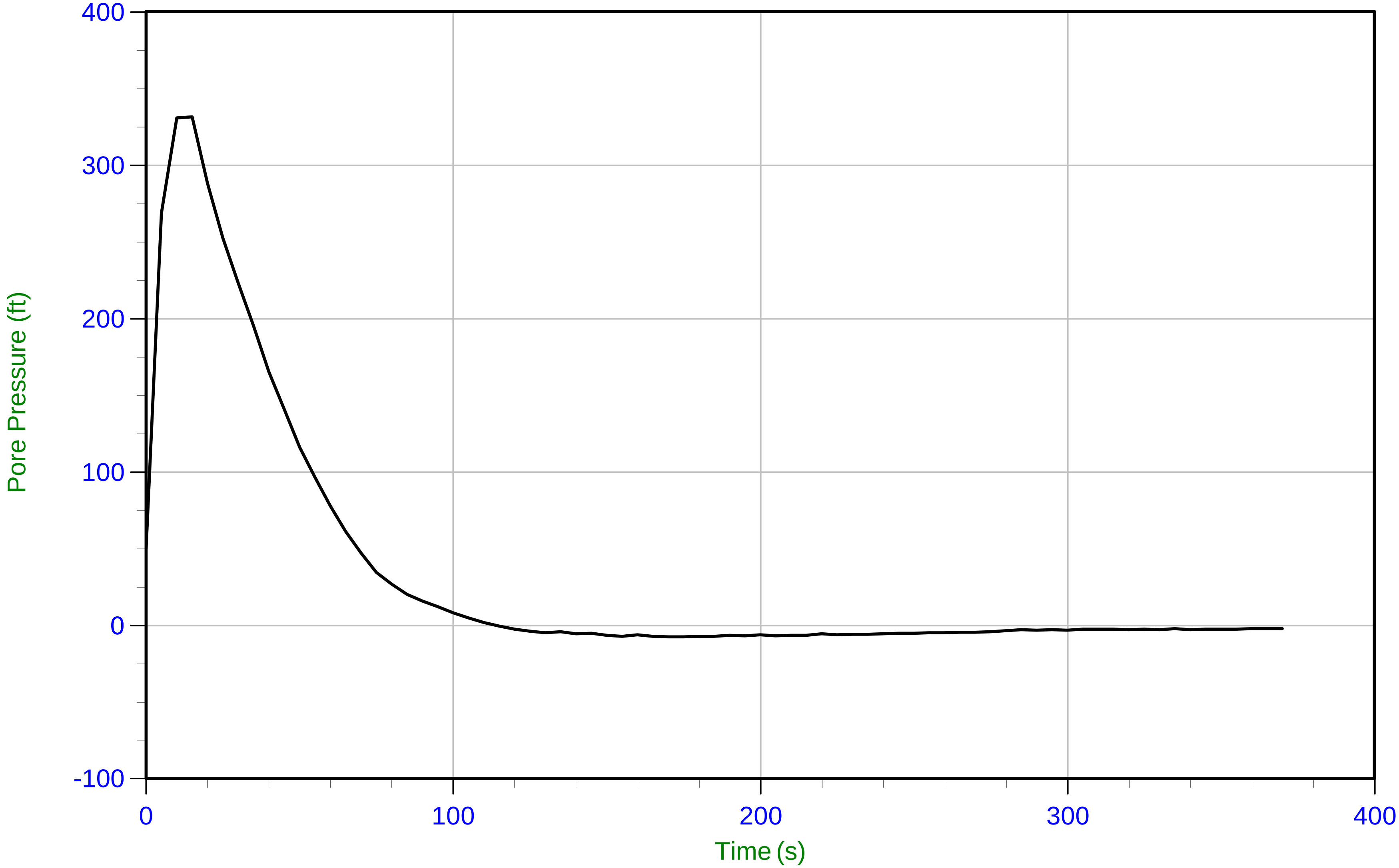
WT: 5.617 m / 18.428 ft
Ueq: 14.0 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/14/2020 08:45
Site: Grand Street Commons

Sounding: AC-CPT-11E
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP11E.PPD
Depth: 7.075 m / 23.212 ft
Duration: 370.0 s

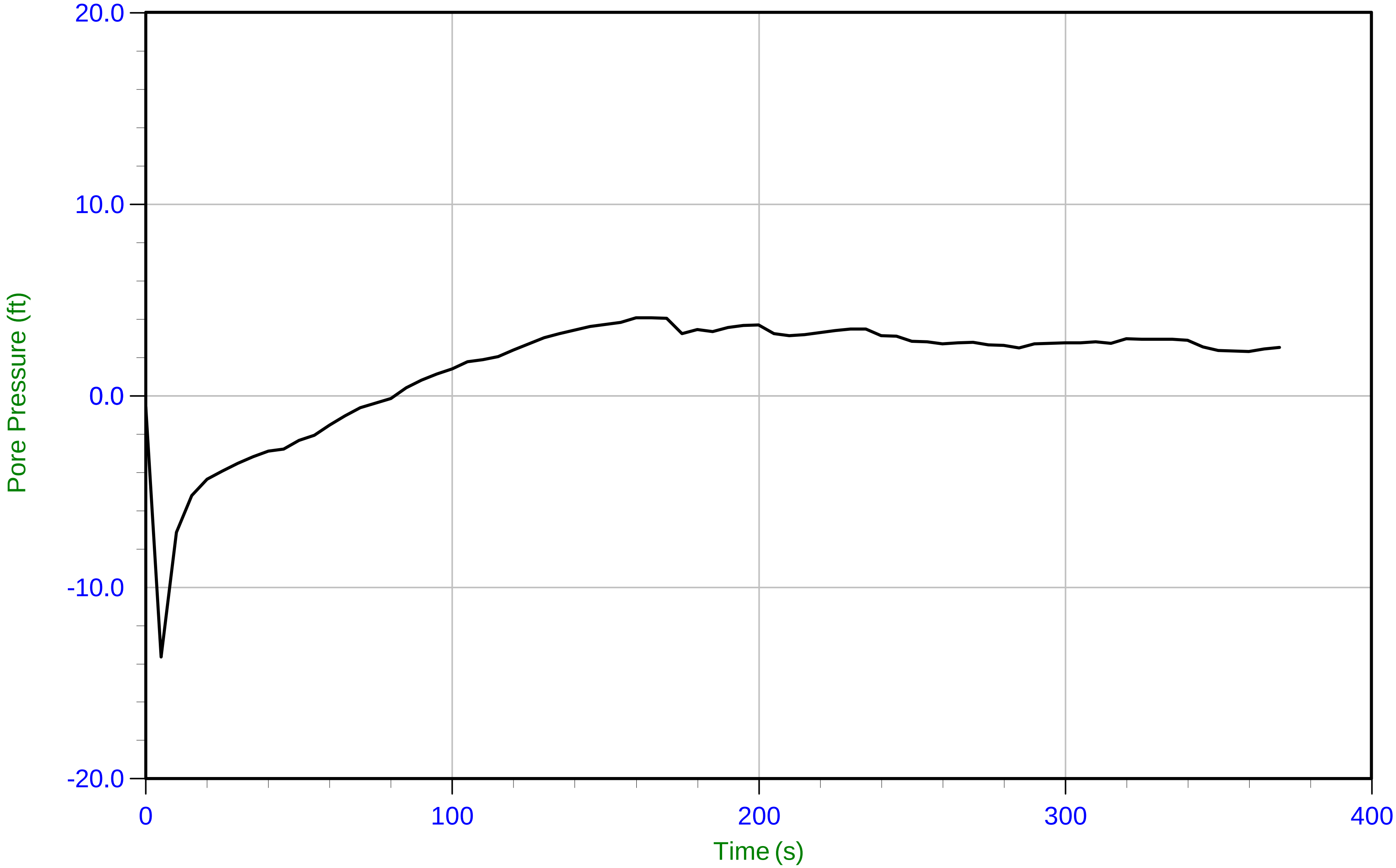
U Min: -7.4 ft
U Max: 331.5 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/23/2019 14:56
Site: Grand St. Commons

Sounding: AC-CPT-11S
Cone: 536:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP11S.PPD
Depth: 4.875 m / 15.994 ft
Duration: 370.0 s

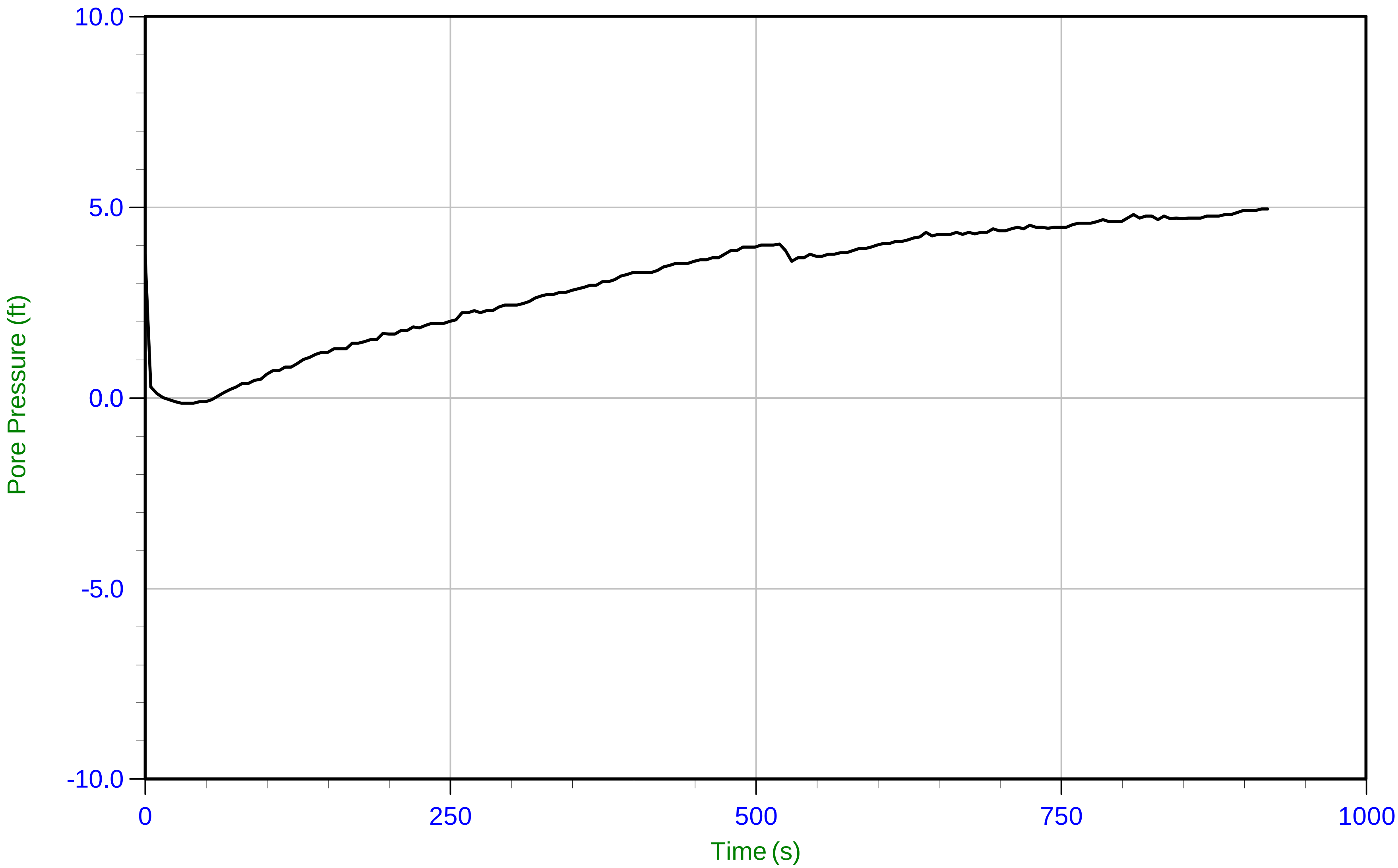
U Min: -13.6 ft
U Max: 4.1 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/14/2020 09:55
Site: Grand Street Commons

Sounding: AC-CPT-12E
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP12E.PPD
Depth: 2.450 m / 8.038 ft
Duration: 920.0 s

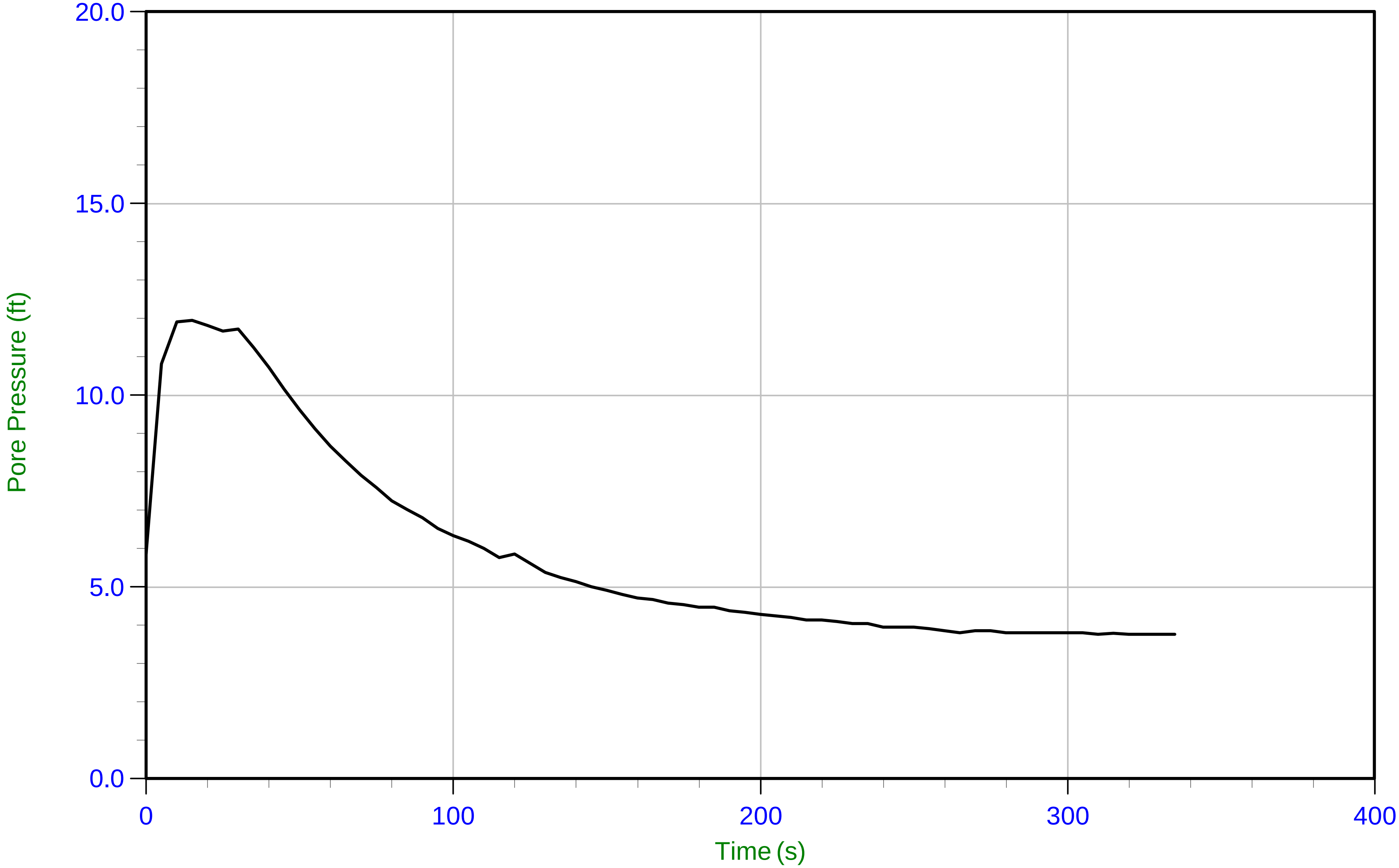
U Min: -0.1 ft
U Max: 5.0 ft

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 09/14/2020 09:55
Site: Grand Street Commons

Sounding: AC-CPT-12E
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP12E.PPD
Depth: 4.000 m / 13.123 ft
Duration: 335.0 s

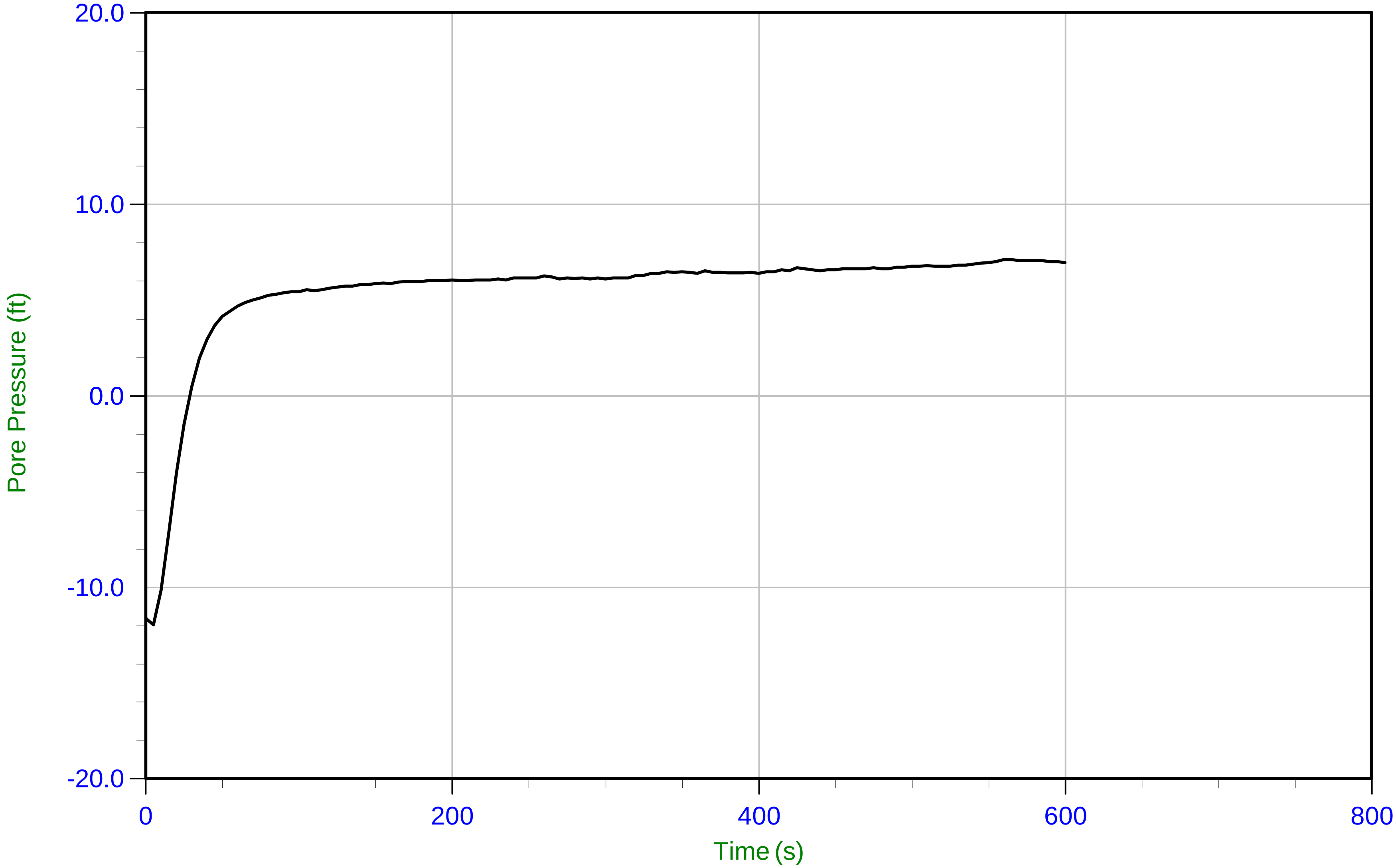
U Min: 3.8 ft
U Max: 12.0 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/10/2020 13:46
Site: Grand Street Commons

Sounding: AC-CPT-12S
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP12S.PPD
Depth: 8.075 m / 26.492 ft
Duration: 600.0 s

U Min: -12.0 ft
U Max: 7.1 ft

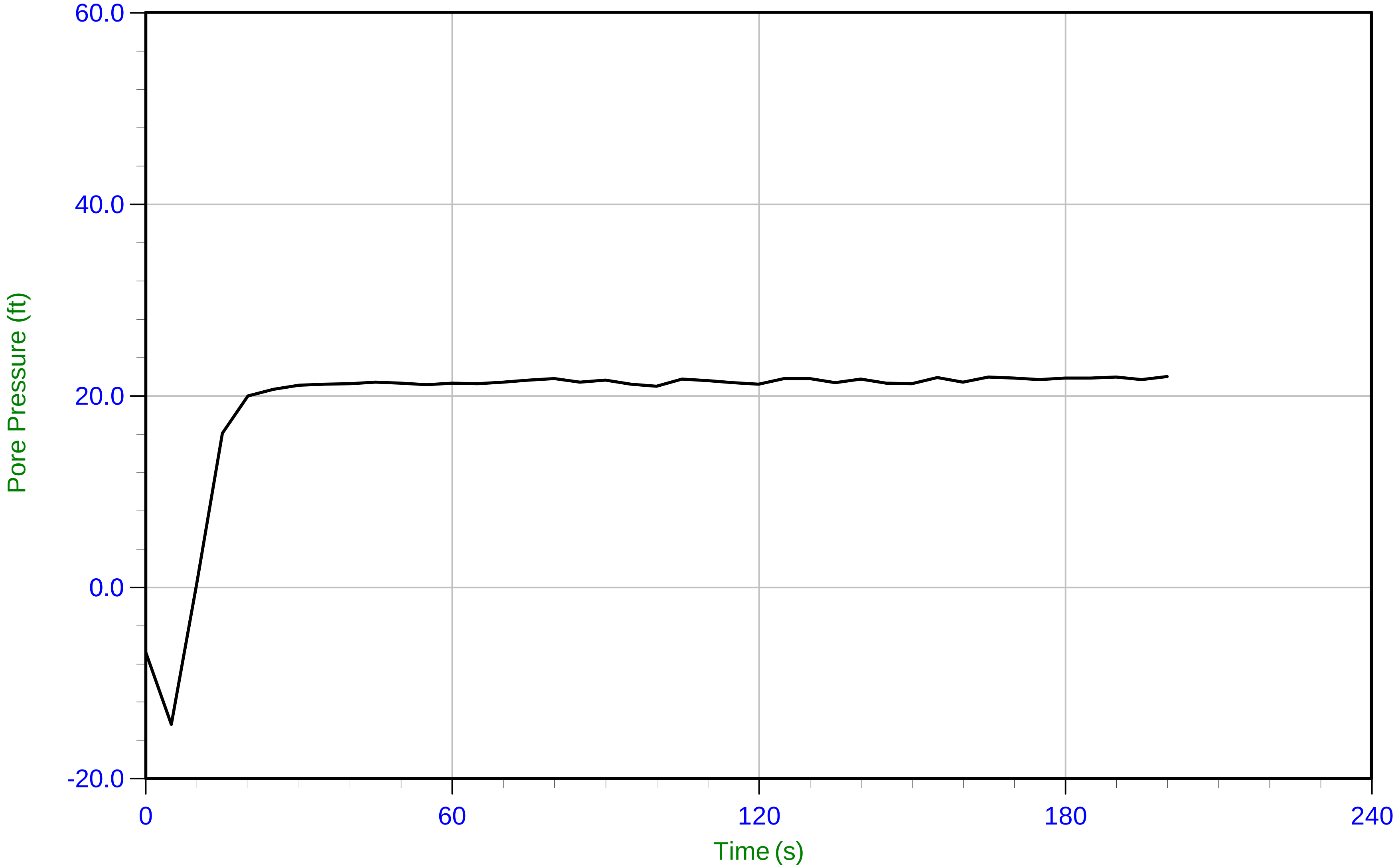
WT: 5.939 m / 19.486 ft
Ueq: 7.0 ft

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 09/10/2020 13:46
Site: Grand Street Commons

Sounding: AC-CPT-12S
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP12S.PPD
Depth: 13.075 m / 42.896 ft
Duration: 200.0 s

U Min: -14.3 ft
U Max: 22.0 ft

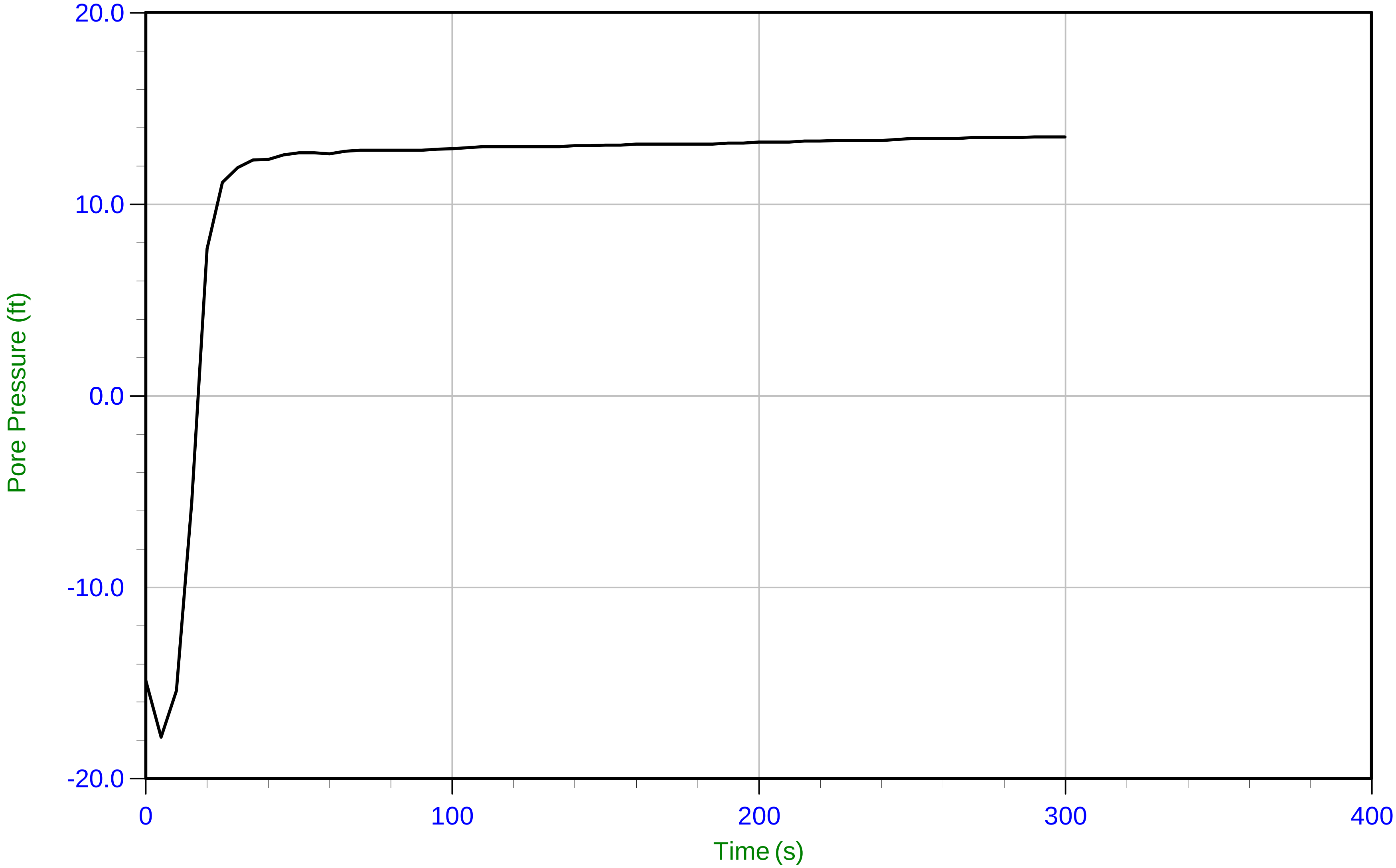
WT: 6.465 m / 21.209 ft
Ueq: 21.7 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/24/2019 15:17
Site: Grand Street Commons

Sounding: AC-CPT-13S
Cone: 595:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP13S.PPD
Depth: 10.175 m / 33.382 ft
Duration: 300.0 s

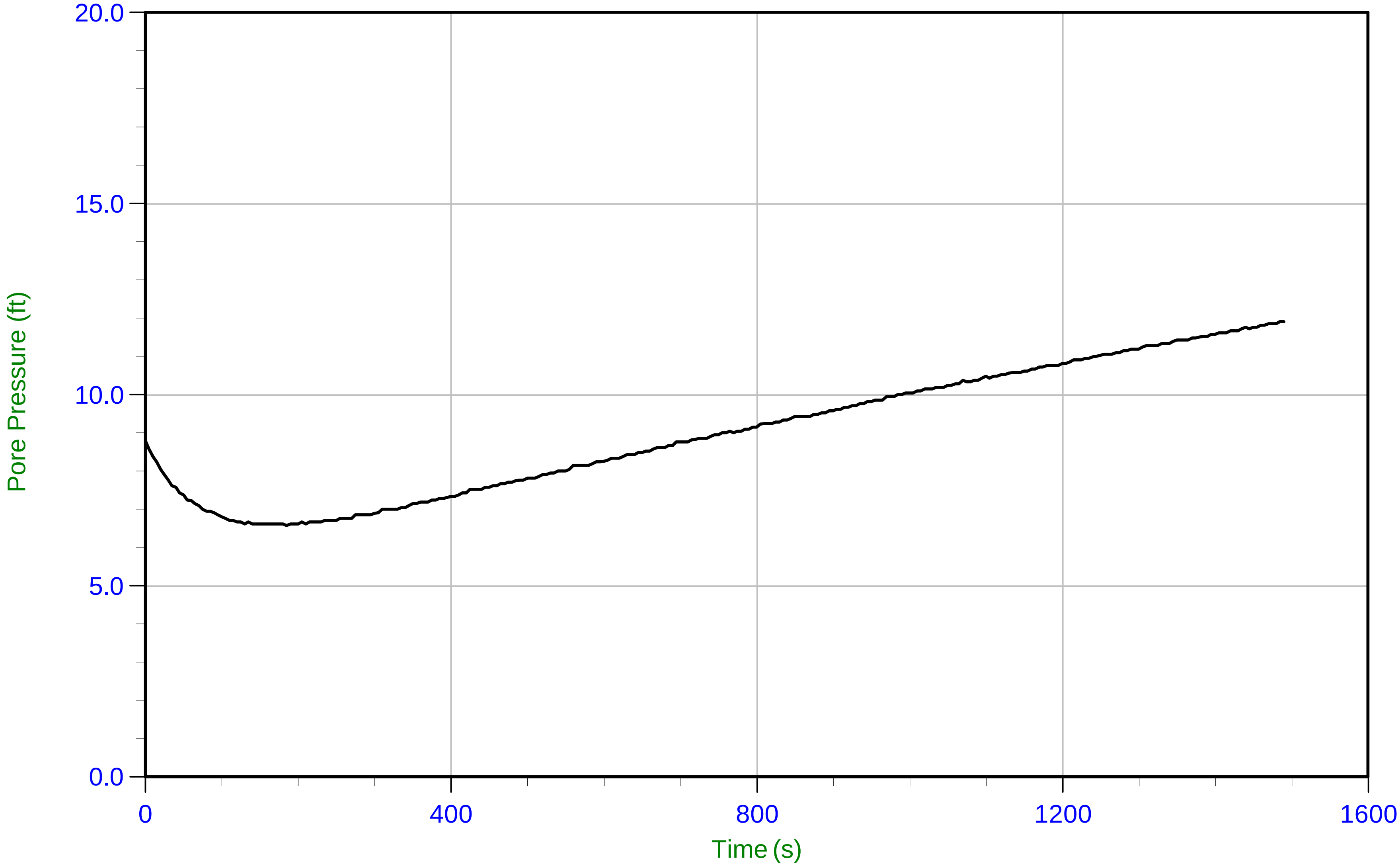
U Min: -17.8 ft
U Max: 13.5 ft

WT: 6.072 m / 19.922 ft
Ueq: 13.5 ft

Aspect Consulting

Job No: 20-59-21343
Date: 09/11/2020 16:06
Site: Grand Street Commons

Sounding: AC-CPT-14S
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

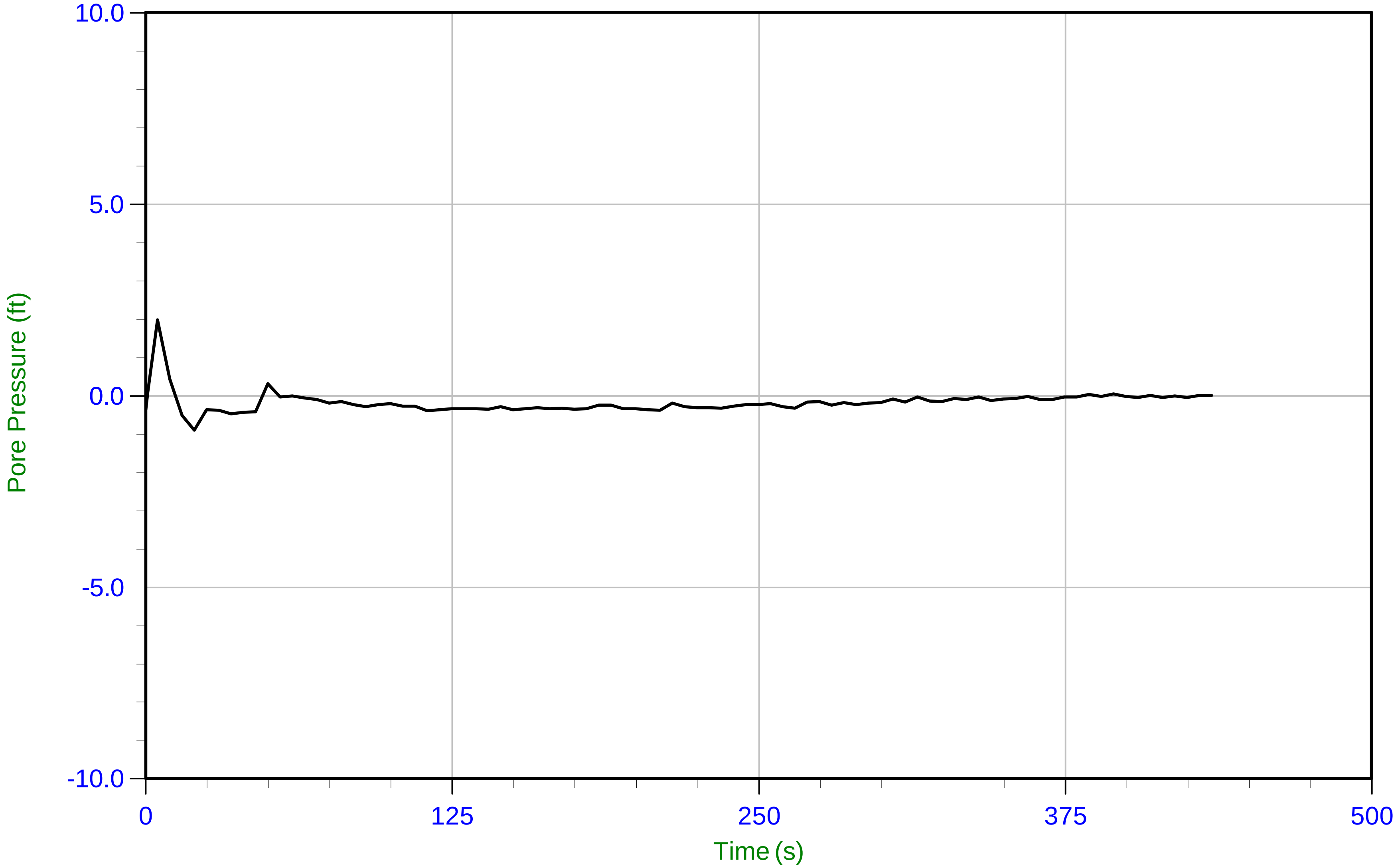
Filename: 20-59-21343_CP14S.PPD
Depth: 7.175 m / 23.540 ft
Duration: 1490.0 s

U Min: 6.6 ft
U Max: 11.9 ft

Aspect Consulting

Job No: 20-59-21343
Date: 09/23/2019 13:11
Site: Grand St. Commons

Sounding: AC-CPT-17S
Cone: 536:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP17S.PPD
Depth: 4.350 m / 14.271 ft
Duration: 435.0 s

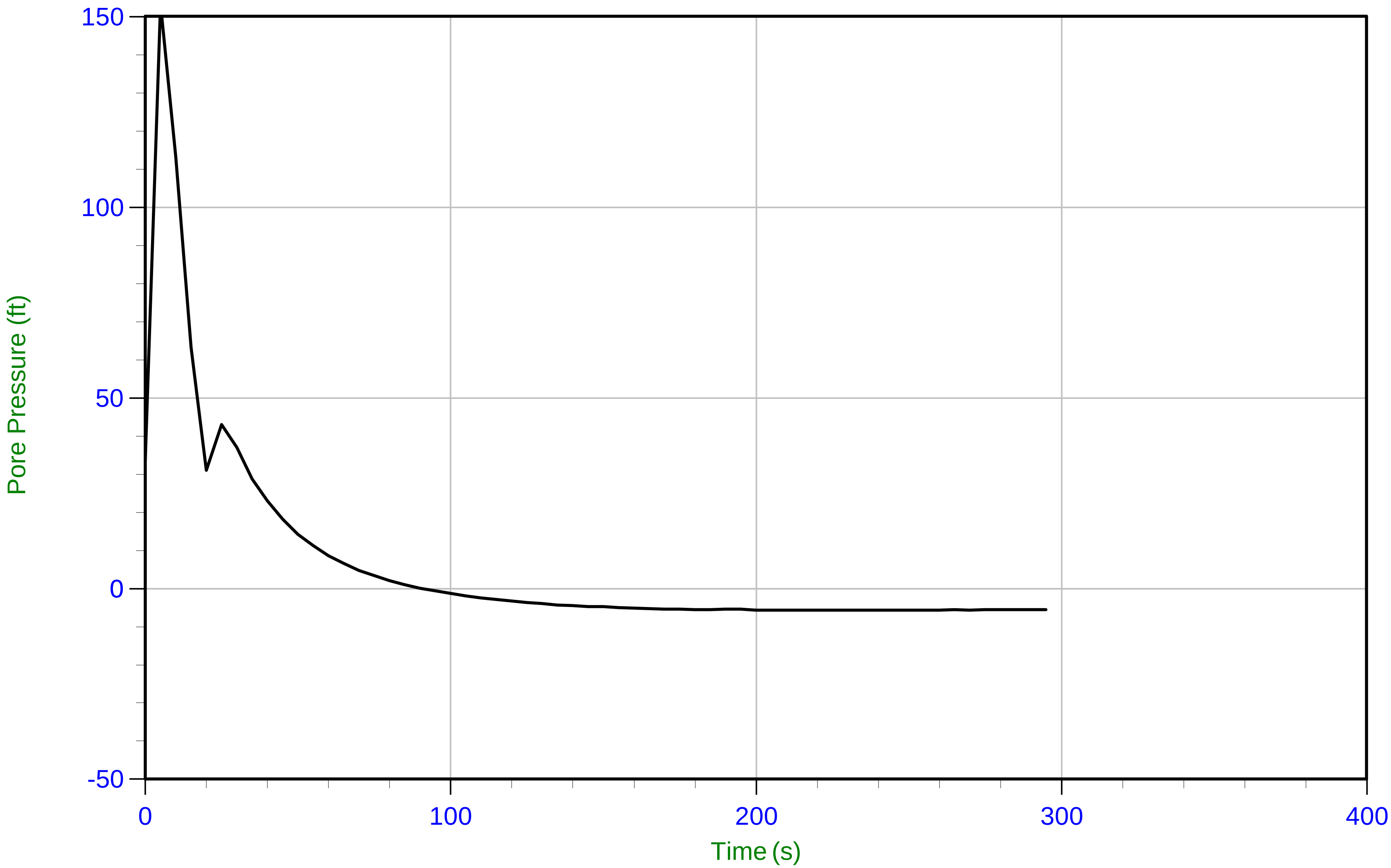
U Min: -0.9 ft
U Max: 2.0 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/11/2020 15:20
Site: Grand Street Commons

Sounding: AC-CPT-19S
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP19S.PPD
Depth: 6.700 m / 21.981 ft
Duration: 295.0 s

U Min: -5.7 ft
U Max: 153.2 ft

APPENDIX B

Groundwater Levels Measured in Monitoring Wells

Summary of Monitoring Wells Construction and Groundwater Elevations

Project No. 170304, Grand Street Commons Property, Seattle, Washington

Monitoring Well Location	Monitoring Well Identification	Total Well Depth	Depth to Top of Screen	Depth to Bottom of Screen	Top of Well Monument Elevation	Top of Well Casing Elevation	November 2017		November 2019		March 2020	
							Depth-to-Groundwater	Groundwater Elevation	Depth-to-Groundwater	Groundwater Elevation	Depth-to-Groundwater	Groundwater Elevation
		Feet bgs	Feet bgs	Feet bgs	Feet	Feet	Feet btoc	Feet	Feet btoc	Feet	Feet btoc	Feet
Shallow Groundwater Monitoring Wells (Screened Above Silt Aquitard)												
East Block	AC-SB-13	30	15	30	77.69	77.38	Not Installed	--	17.74	59.64	16.14	61.24
	AC-MW-4	35	20	35	77.78	77.29	24.29	53.00	23.56	53.73	22.37	54.92
	AC-MW-5	35	20	35	77.78	77.43	18.6	58.83	17.76	59.67	17.22	60.21
	AC-MW-6	30	20	30	77.90	77.39	21.61	55.78	17.84	59.55	12.89	64.50
	AC-MW-7	30	20	30	77.93	77.44	23.55	53.89	21.89	55.55	18.75	58.69
	AC-MW-8	35	20	35	77.92	77.55	Not Installed	--	23.56	53.99	22.29	55.26
	AC-MW-11	35	20	35	77.89	77.50	Not Installed	--	9.79	67.71	8.79	68.71
	AC-MW-12	35	20	35	77.90	77.52	Not Installed	--	20.21	57.31	17.55	59.97
	AC-MW-13	35	15	35	77.63	77.29	Not Installed	--	20.54	56.75	18.68	58.61
	AC-MW-14	35	20	35	77.85	77.45	Not Installed	--	23.4	54.05	22.19	55.26
	AC-MW-15	35	15	35	77.38	76.95	Not Installed	--	23.22	53.73	20	56.95
	URS-MW-12	30.5	20	30	74.41	73.98	9.42	64.56	9.85	64.13	Not accessible	--
	URS-MW-16	30	20	30	72.14	71.73	10.51	61.22	13.92	57.81	13.19	58.54
West Block	AC-MW-1	30	15	30	74.30	73.87	21.01	52.86	20.45	53.42	19.62	54.25
	AC-MW-3	30	15	30	69.01	68.48	14.97	53.51	14.2	54.28	11.34	57.14
	AC-MW-9	35	15	35	76.76	76.21	22.4	53.81	21.5	54.71	20.46	55.75
	AC-MW-10	35	15	35	73.40	72.63	19.18	53.45	18.81	53.82	17.55	55.08
	AC-MW-16	35	15	35	72.66	72.24	Not Installed	--	17.74	54.50	15.61	56.63
	AC-MW-17	35	15	35	74.40	74.01	Not Installed	--	20.38	53.63	19.34	54.67
	AC-MW-18	35	15	35	73.19	72.70	Not Installed	--	18.59	54.11	17.06	55.64
	AC-MW-19	35	15	35	72.37	71.83	Not Installed	--	17.06	54.77	14.7	57.13
	AC-MW-20	35	15	35	72.63	72.11	Not Installed	--	16.65	55.46	13.65	58.46
	AC-MW-21	32	22	32	68.8	68.41	Not Installed	--	Not Installed	--	13.83	54.58
	AC-MW-22	40	15	40	73.62	73.16	Not Installed	--	19.79	53.37	17.84	55.32
	AC-MW-23	35	15	35	73.88	73.48	Not Installed	--	20.21	53.27	15.63	57.85
	AC-MW-27	30	10	30	70.46	69.77	Not Installed	--	23.4	46.37	11.4	58.37
	AC-MW-28	35	10	30	70.09	69.66	Not Installed	--	23.22	46.44	11.27	58.39
	AC-MW-29	30	10	30	70.5	70.00	Not Installed	--	Not Installed	--	15.06	54.94
	AC-MW-30	36	16	36	69.3	68.98	Not Installed	--	Not Installed	--	14.02	54.96
	URS-MW-2	20	6	21	69.23	68.89	12.48	56.41	13.78	55.11	11.13	57.76
	URS-MW-3	30	20	30	71.75	71.48	15.11	56.37	14.75	56.73	12.3	59.18
	URS-MW-10	28	18	28	72.46	72.08	Not Installed	--	16.49	55.59	13.38	58.70
	URS-MW-13	30	20	30	74.46	74.05	20.74	53.31	20.12	53.93	18.85	55.20
	URS-MW-21S	30	14.5	29.5	71.47	71.02	Not Installed	--	15.85	55.17	14.66	56.36
	URS-MW-21D	40	35	40	71.28	70.90	Not Installed	--	15.96	54.94	15.13	55.77
	URS-MW-22	35	25	35	71.51	71.10	Not Installed	--	12.64	58.46	10.89	60.21
	URS-MW-27S	20	15	20	69.69	69.17	14.01	55.16	12.75	56.42	11.20	57.97
	URS-MW-27I	36	31	36	69.81	69.35	Not Installed	--	13.11	56.24	11.1	58.25
	URS-MW-28S	23	18	23	70.06	69.66	Not Installed	--	14.75	54.91	11.61	58.05
	URS-MW-28I	38	33	38	70.22	69.79	15.19	54.60	14.75	55.04	11.93	57.86
	PC-MW-17	30	20	30	69.82	69.49	Not Installed	--	14.81	54.68	13.56	55.93
	PC-MW-30S	24	19	24	69.78	69.51	15.11	54.40	14.85	54.66	14.79	54.72
	PC-MW-30I	45	40	45	69.75	69.46	Not Installed	--	14.92	54.54	14.98	54.48
	PC-MW-31S	19	15	20	70.10	69.78	Not Installed	--	14.25	55.53	12.42	57.36
	PC-MW-31I	40	35	40	70.14	69.76	Not Installed	--	14.66	55.10	13.26	56.50
	PC-MW-33S	21	15	20	70.09	69.68	Not Installed	--	15.64	54.04	14.25	55.43
	PC-MW-33I	46	40	45	70.04	69.61	Not Installed	--	15.58	54.03	14.43	55.18
	PC-MW-34S	21	15	20	70.95	70.56	Not Installed	--	16.26	54.30	15.02	55.54
	PC-MW-34I	40	34	39	70.97	70.58	Not Installed	--	16.28	54.30	15.05	55.53
	PC-MW-35S	35	30	35	73.53	73.09	Not Installed	--	19.04	54.05	17.7	55.39
	PC-MW-35I	50	45	50	73.76	73.27	Not Installed	--	19.25	54.02	17.52	55.75
	PC-SCC1	37.5	27.5	37.5	70.6	70.39	Not Installed	--	15.81	54.58	15.81	54.58
	PC-SCC3	29.5	24.5	29.5	70.6	70.24	Not Installed	--	Not accessible	--	14.68	55.56
South Block	AC-MW-2	25	10	25	69.70	69.32	15.87	53.45	16	53.32	14.9	54.42
	AC-MW-24	38	18	38	76.88	76.31	Not Installed	--	20.54	55.77	22.12	54.19
Deep Groundwater Monitoring Wells (Screened Below Silt Aquitard)												
West Block	AC-DMW-1	90	70	90	70.6	70.32	Not Installed	--	Not Installed	--	15.98	54.34
	AC-DMW-2	90	70	90	70.9	70.52	Not Installed	--	Not Installed	--	16.66	53.86
	URS-MW-28D	59	54	59	69.83	69.35	15.81	43.19	15.81	53.54	15.33	54.02
	PC-MW-30D	68	65	70	69.69	69.32	16.19	53.81	16.19	53.13	15.38	53.94
	PC-MW-31D	67	66	71	70.19	69.80	16.66	54.34	16.66	53.14	16.5	53.30
	PC-MW-33D	98	95	100	69.96	69.57	16.15	83.85	16.15	53.42	15.66	53.91
	PC-MW-34D	100	95	100	71.42	71.00	16.92	83.08	16.92	54.08	16.38	54.62
	PC-MW-35D	95	85	95	73.74	73.35	19.45	75.55	19.45	53.90	18.97	54.38

Notes:

bgs - below existing ground surface

btoc - below top of well casing

"--" - no data

* These wells were installed during the RI Stage III Explorations in February 2020.

All wells were surveyed relative to the North American Vertical Datum (NAVD 88) by PACE Engineers subcontracted to Aspect Consulting, except URS-MW-12 which was inaccessible during the PACE surveys in 2019 and 2020 as it is buried under concrete rubble (approximately 5 feet thick). This well was surveyed in 2017 by Aspect when it was accessible.

APPENDIX C

Results of Geotechnical Laboratory Testing

C.1 Geotechnical Laboratory Testing

Laboratory tests were conducted on selected soil samples to characterize certain engineering (physical) properties of the soils at the Site. Laboratory testing included determination of moisture content and Atterberg limits. The laboratory tests were conducted in general accordance with appropriate ASTM International (ASTM) test methods. Test procedures are discussed below.

The moisture content of selected samples was analyzed in general accordance with ASTM D2216, *Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass*. Atterberg Limits were analyzed in general accordance ASTM D4318, *Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.*

The results of the moisture content tests are presented in Appendix C and graphically on the boring logs in Appendix A.

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client:	Aspect Consulting	**Date:**	September 13, 2019
Address:	401 2nd Ave S	**Project:**	Q.C. - Grand Street Commons
	Seattle, WA 98104	**Project #:**	18B011-30
Attn:	Eric Schellenger	**Sample #:**	B19-0817-0819
Date Revised:		**Date Sampled:**	Various

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

B19-0817 AC-SB-11 @ 7.5ft; Brown Clay with Silt; Plasticity Index - 21.6% - sampled 5-15-19
B19-0818 AC-SB-19 @ 5ft; Brown Clay with Silt; Plasticity Index - 21.1% - sampled 3-26-19
B19-0819 AC-MW-24 @ 10ft; Brown Clay with Silt and Sand; Liquid Limit - 29.9% Non-plastic - sampled 5-16-19

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,
Meghan Blodgett-Carrillo
NW Region Laboratory Manager

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C. - Grand Street Commons
Project #: 18B011-30
Client: Aspect Consulting
Source: AC-SB-11 @ 7.5'
Sample #: B19-0817

Date Received: 6-Sep-19
Sampled By: Client
Date Tested: 12-Sep-19
Tested By: A. Eifrig

Visual Identification
Clay with Silt
Sample Color
brown

Liquid Limit Determination

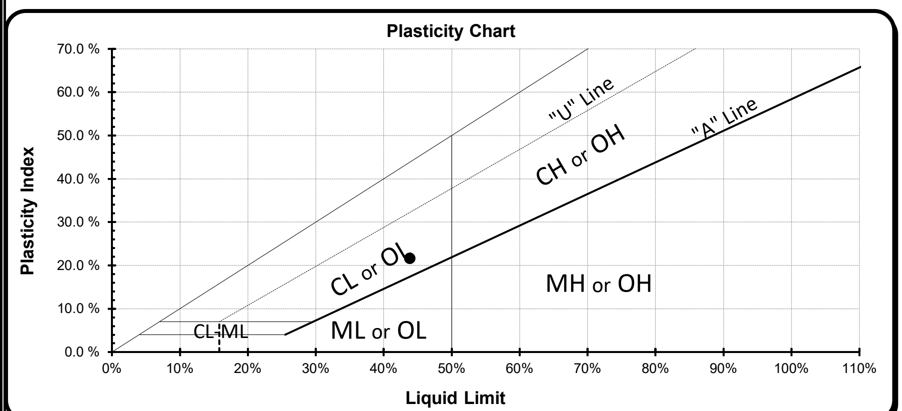
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	32.83	34.33	33.48			
Weight of Dry Soils + Pan:	28.86	29.70	29.01			
Weight of Pan:	19.56	19.35	19.33			
Weight of Dry Soils:	9.30	10.35	9.68			
Weight of Moisture:	3.97	4.63	4.47			
% Moisture:	42.7 %	44.7 %	46.2 %			
Number of Blows:	29	22	17			

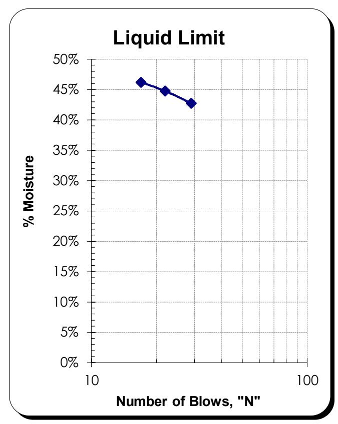
Liquid Limit @ 25 Blows: 43.9 %
Plastic Limit: 22.3 %
Plasticity Index, I_P: 21.6 %

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	36.37	38.10				
Weight of Dry Soils + Pan:	34.88	36.34				
Weight of Pan:	28.13	28.50				
Weight of Dry Soils:	6.75	7.84				
Weight of Moisture:	1.49	1.76				
% Moisture:	22.1 %	22.5 %				

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: 28.5

Reviewed by: Meghan Blodgett-Carrillo

Meghan Blodgett-Carrillo

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980

Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974

Visit our website: www.mtc-inc.net

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C. - Grand Street Commons
Project #: 18B011-30
Client: Aspect Consulting
Source: AC-SB-19 @ 5 ft
Sample #: B19-0818

Date Received: 6-Sep-19
Sampled By: Client
Date Tested: 12-Sep-19
Tested By: A. Eifrig

Visual Identification
Clay with Silt
Sample Color
brown

Liquid Limit Determination

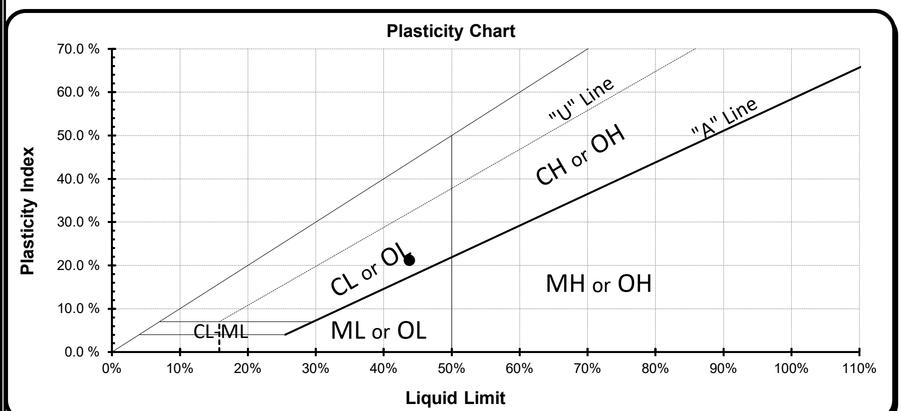
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	30.13	29.75	32.34			
Weight of Dry Soils + Pan:	25.65	25.21	26.96			
Weight of Pan:	14.90	14.71	14.87			
Weight of Dry Soils:	10.75	10.50	12.09			
Weight of Moisture:	4.48	4.54	5.38			
% Moisture:	41.7 %	43.2 %	44.5 %			
Number of Blows:	33	28	22			

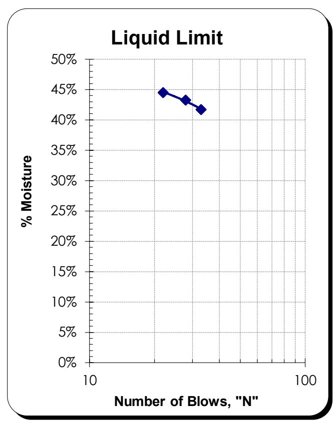
Liquid Limit @ 25 Blows: 43.8 %
Plastic Limit: 22.8 %
Plasticity Index, I_P: 21.1 %

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	37.79	39.08				
Weight of Dry Soils + Pan:	36.03	37.13				
Weight of Pan:	28.23	28.63				
Weight of Dry Soils:	7.80	8.50				
Weight of Moisture:	1.76	1.95				
% Moisture:	22.6 %	22.9 %				

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: 28.5

Reviewed by: Meghan Blodgett-Carrillo

Meghan Blodgett-Carrillo

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980

Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974

Visit our website: www.mtc-inc.net

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C. - Grand Street Commons
Project #: 18B011-30
Client: Aspect Consulting
Source: AC-MW-24 @ 10 ft
Sample #: B19-0819

Date Received: 6-Sep-19
Sampled By: Client
Date Tested: 12-Sep-19
Tested By: A. Eifrig

Visual Identification
Clay with Silt and Sand
Sample Color
brown

Liquid Limit Determination

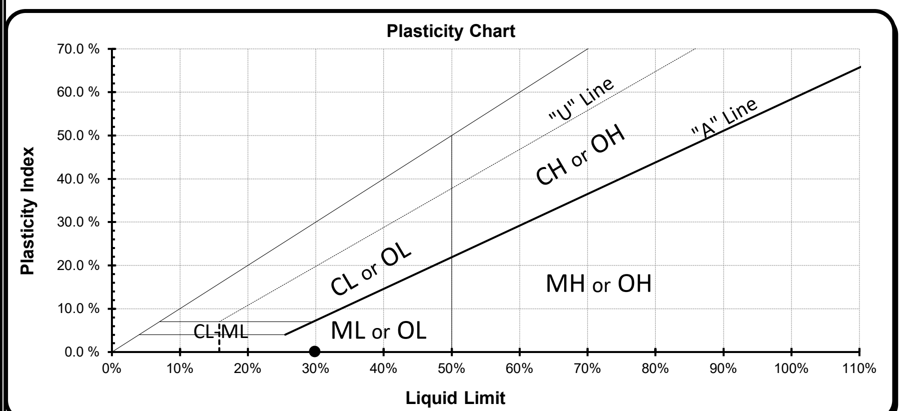
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	39.45	35.62	33.80			
Weight of Dry Soils + Pan:	35.05	31.95	30.45			
Weight of Pan:	19.65	19.67	19.63			
Weight of Dry Soils:	15.40	12.28	10.82			
Weight of Moisture:	4.40	3.67	3.35			
% Moisture:	28.6 %	29.9 %	31.0 %			
Number of Blows:	30	26	20			

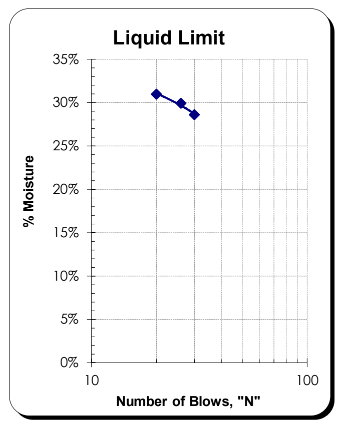
Liquid Limit @ 25 Blows:	29.9 %
Plastic Limit:	N/A
Plasticity Index, I_P:	N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:		Non-plastic				
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: Plastic limit cannot be determined as the material does not roll down to 1/8" threads. Material is non-plastic

Reviewed by: Meghan Blodgett-Carrillo

Meghan Blodgett-Carrillo

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980
Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974
Visit our website: www.mtc-inc.net

APPENDIX D

Ground Anchor Load Testing and Shoring Monitoring Program

D. Ground Anchor Load Testing Program and Shoring Monitoring Program

Ground anchor testing methods and equipment for the Project should meet the requirements detailed in Federal Highway Administration (FHWA) Geotechnical Circular No. 4, *Ground Anchors and Anchored Systems,*[1] and presented herein.

Verification Tests

The shoring contractor should be required to complete a minimum of two successful anchor verification tests per soil type and installation method to verify the design adhesion value or pullout resistance in general accordance with the following recommendations:

- The geotechnical engineer shall be responsible for selecting the test anchors.
- Verification testing should not exceed 80 percent of the ultimate tensile strength of the anchor steel.
- Verification testing should load the anchor up to 200 percent of the design load (DL) specified on the shoring drawings. The anchor should be loaded and unloaded in increments of 25 percent of the 200 percent design load in accordance with the schedule below:

Load	Hold Time (minutes)
Alignment Load (AL)	Until Stable
0.25 DL	10
0.50 DL	10
0.75 DL	10
1.00 DL	10
1.25 DL	10
1.50 DL	60
1.75 DL	10
2.00 DL (max test load)	10
1.75 DL	Until Stable
1.50 DL	Until Stable
1.25 DL	Until Stable

[1] Federal Highway Administration (FHWA), 1999, Geotechnical Circular No.4, Ground Anchors and Anchored Systems.

Load	Hold Time (minutes)
1.00 DL	Until Stable
0.75 DL	Until Stable
0.50 DL	Until Stable
0.25 DL	Until Stable
Alignment Load (AL)	Until Stable

Anchor deflections should be measured and recorded to the nearest 0.001 inches at each load increment. Deflections should be recorded at 1, 2, 3, 5, 6, 10, 20, 30, 40, 50, and 60 minutes at the 150 percent load increment, and at 1, 2, 3, 5, 6, and 10 minutes at the other load increments.

Proof Tests

The shoring contractor should be required to complete proof testing of every production tieback anchor, or 5 percent of soil nails in general accordance with the following:

- Proof testing should not exceed 80 percent of the ultimate tensile strength of the anchor steel.
- Proof testing should load the anchor up to 133 percent (for tieback anchors) or 150 percent (for soil nails) of the design load specified on the shoring drawings. The anchor should be incrementally loaded and unloaded in accordance with the schedule below:

Load	Hold Time (minutes)
Alignment Load (AL)	Until Stable
0.25 DL	Until Stable
0.50 DL	Until Stable
0.75 DL	Until Stable
1.00 DL	Until Stable
1.33 DL (Tieback anchors)	10
1.5 DL (Soil Nails)	10
Alignment Load (AL) (Optional)	Until Stable

Anchor deflections should be measured and recorded to the nearest 0.001 inch at each load increment. Each incremental load should be held long enough to obtain a stable deflection measurement. Deflections should be recorded at 1, 2, 3, 5, 6, and 10 minutes at the 1.33 DL (tieback anchors) and 1.5 DL (soil nails).

Test Anchor Acceptance Criteria

An anchor should be deemed acceptable if it meets the following criteria:

- The total elastic movement obtained from the verification tests and proof tests exceeds 80 percent of the theoretical elastic elongation of the unbounded anchor length.
- Total anchor movement (creep) between the 1- and 10-minute intervals should not exceed 0.04 inches, regardless of the tendon length or load. Total anchor movement between the 6- and 60-minute intervals (if required) should not exceed 0.08 inches.
- Pullout failure does not occur. Pullout failure occurs when attempts to increase the test load cause continued movement of the anchor.
- Ram-jack “lift-off measurement” testing (applicable to tieback anchors) indicates an anchor load within 5 percent of the design lock-off load.

Shoring Monitoring Program

The purpose of the shoring monitoring program is to establish baseline conditions at the Site and surrounding areas and to actively monitor deflections and settlement during construction.

Preconstruction Survey

A preconstruction survey should be completed to document preconstruction conditions at the Site and surrounding areas. At a minimum, the preconstruction survey should consist of video or photographic documentation of the adjacent streets, buildings, existing cracks, or other signs of distress.

Optical Survey

Optical survey of the Site and surrounding areas should be completed before and during construction to continually observe and evaluate the performance of the shoring walls. The optical survey should be accurate to at least 0.01 feet, and made available to the design team and geotechnical engineer within 24 hours for immediate review.

Optical survey points should be located around the perimeter of the shored excavation, either at the top of every other soldier pile or at monitoring points established in the adjacent curb, sidewalk, or street and spaced every 25 feet. Construction of the shoring walls should be temporarily stopped if the shoring wall is observed to deflect more than 1inch total, or successive readings show deflection of more than 0.5 inches, in which case remedial action may be required.

The optical survey program should be completed twice a week during excavation and shoring wall construction and should continue until the shoring walls are complete and optical survey deflections have stabilized. After stabilization, the optical survey frequency can be reduced to occur once every other week.

If optical survey readings indicate shoring wall deflections exceed 1 inch, excavation and construction of the shoring walls should be temporarily stopped until the cause is determined and remedial actions are completed, if required. If this occurs, the optical survey frequency should be increased to daily readings until optical survey deflects have stabilized.

Inclinometers

We recommend supplementing the optical survey with inclinometer readings to measure shoring wall deflections. We recommend installing two inclinometer casings on the west shoring wall adjacent to Rainier Avenue S. The inclinometer casings can be affixed to the back of a soldier pile or they could be drilled into place a few feet behind the wall. The inclinometer casings should extend at least 10 feet beyond the final excavation depth to achieve relative fixity. The specific location of each inclinometer casing should be coordinated with the shoring designer and contractor to avoid conflicts with construction features. The contractor should be responsible for protecting the inclinometer casings over the duration of construction. Inclinometer readings should be taken once a week during temporary shoring wall construction, and once a month after the temporary shoring is completed and deflections have stabilized. The inclinometer casings will require decommissioning by a licensed driller after the inclinometer casings are no longer required.

APPENDIX E

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND GUIDELINES FOR USE

This Report and Project-Specific Factors

Aspect Consulting, LLC (Aspect) considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual limitations. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with our Agreement with the Client and recognized geoscience practices in the same locality and involving similar conditions at the time this report was prepared.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope instability, or groundwater fluctuations. If any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques, and personnel used to perform a geotechnical or geologic study differ significantly from those used to perform an environmental study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions, or recommendations (e.g., about the likelihood of encountering underground storage tanks or regulated contaminants). Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

We appreciate the opportunity to perform these services. If you have any questions please contact the Aspect Project Manager for this project.

GEOTECHNICAL ENGINEERING REPORT
GRAND STREET COMMONS EAST

South Grand Street and 22nd Avenue South
Seattle, Washington

Prepared for: Grand Street Commons, LLC

Project No. 170304 • October 12, 2020 • FINAL

earth + water

Aspect CONSULTING

Aspect CONSULTING

GEOTECHNICAL ENGINEERING REPORT
GRAND STREET COMMONS EAST

South Grand Street and 22nd Avenue South
Seattle, Washington

Prepared for: Grand Street Commons, LLC

Project No. 170304 • October 12, 2020 • FINAL

Aspect Consulting, LLC

10/12/2020

Eric Schellenger, PE
Geotechnical Engineer
eschellenger@aspectconsulting.com

Erik O. Andersen
Principal Geotechnical Engineer
eandersen@aspectconsulting.com

V:\170304 Mt Baker Housing and Lake Union Partners – Belshaw Site - Rainier Ave S\Deliverables\Geotech Eng Rpt\Final Geotechnical Engineering Reports\East Block\Geotech Eng Report_Grand Street Commons_East.doc

Contents

1 Introduction 1
1.1 Project Description 1

2 Site Conditions 2
2.1 Surface Conditions 2
2.2 Subsurface Conditions 2
2.2.1 Geology 2
2.2.2 Stratigraphy 2
2.2.3 Groundwater 3

3 Geotechnical Engineering Conclusions and Recommendations 4
3.1 Earthquake Engineering 4
3.1.1 Ground Response 4
3.1.2 Liquefaction Susceptibility 5
3.2 Temporary Shoring 5
3.2.1 Soil Nail Design 6
3.2.2 Shotcrete Facing 7
3.2.3 Vertical Elements 7
3.2.4 Shoring Design Considerations 7
3.3 Groundwater Inflow 7
3.4 Building Foundations 8
3.4.1 Ground Improvement 8
3.4.2 Allowable Bearing Pressure 9
3.4.3 Settlement 9
3.4.4 Footing Size and Embedment 9
3.4.5 Lateral Resistance 9
3.5 Slab-on-Grade Floors 10
3.6 Permanent Below-Grade Walls 10
3.6.1 Walls Constructed Against Temporary Shoring 10
3.6.2 Backfilled Walls 11
3.6.3 Seismic Lateral Earth Pressures 11
3.6.4 Surcharge Loads 11
3.6.5 Lateral Resistance 11
3.7 Subsurface Drainage 11
3.7.1 Walls Constructed Against Temporary Shoring 11
3.7.2 Backfilled Walls 12
3.7.3 Perimeter Foundations 12
3.7.4 Underslab Drainage 12
3.7.5 Other Drainage Recommendations 13

4 Earthwork Considerations and Recommendations....14
4.1 Soil Nail and Shotcrete Shoring Wall Construction.... 14
4.1.1 Excavation and Soil Nail Installation.... 14
4.1.2 Shotcrete Facing.... 15
4.1.3 Soil Nail Testing.... 15
4.1.4 Shoring Wall Performance and Monitoring.... 15
4.2 Temporary Excavation Slopes.... 15
4.3 Subgrade Preparation.... 16
4.3.1 Foundations.... 16
4.3.2 Slabs-on-Grade and Pavements.... 16
4.4 Structural Fill.... 16
4.4.1 Utility Bedding and Backfill.... 17
4.5 Temporary Erosion and Sedimentation Control.... 18
4.6 Wet Weather Construction.... 18
5 References....19
6 Limitations....20

List of Tables

1 Seismic Design Parameters....................5
2 Soil Nail Design Parameters....................6
3 Lateral Resistance for Shallow Foundations....................10

List of Figures

1 Vicinity Map
2 Aspect Explorations Map
3 Temporary Shoring Design Sections
4 Foundation Subgrade Conditions
5 Lateral Earth Pressures for Permanent Walls
6 Recommended Surcharge Pressures

List of Appendices

A Subsurface Explorations
B Groundwater Levels Measured in Monitoring Wells
C Results of Geotechnical Laboratory Testing
D Ground Anchor Load Testing and Shoring Monitoring Program
E Report Limitations and Guidelines for Use

1 Introduction

This report presents the results of a geotechnical engineering study completed by Aspect Consulting, LLC (Aspect) for the Grand Street Commons Project (GSC; Project) East Block redevelopment (GSC East) located at S Grand St. and 22nd Ave. S in Seattle, Washington (Site; Figure 1).

GSC East is part of the Grand Street Commons Project, which consists of the redevelopment of 16 parcels within three adjacent blocks (designated the West, East, and South Blocks) with three new mixed-use buildings (one on each block). This report presents the geotechnical data collected to date and our geotechnical engineering conclusions and recommendations for design and construction of GSC East. Aspect is currently preparing geotechnical engineering reports for the West Block redevelopment (GSC West) and the South Block redevelopment (GSC South) under separate covers.

1.1 Project Description

The Project consists of the redevelopment of three contiguous parcels with a new eight-story mixed-used building. The parcels occupy approximately 1.3 acres within a city block located northeast of the intersection of S Grand St. and 22nd Ave. S.

The lowest level of the planned eight-story building at GSC East will be daylighted to the west and south. Localized excavations within the building footprint are planned to remediate historic soil and groundwater contamination at the Site.

The GSC Project has an environmental cleanup component that is being performed under Prospective Purchaser Consent Decrees (PPCD Nos. 18-2-14708-5 SEA and 18-2-147414-0). A PPCD is a legal agreement between the applicant and the Washington State Department of Ecology (Ecology) and the Attorney General’s office, whereby all environmental activities associated with the project are formally overseen by Ecology. The GSC project is identified in Ecology's Cleanup Sites database as Facility Site ID #97763114 and Cleanup Site ID #3018. As required by the PPCDs, a Remedial Investigation and Feasibility Study (RI/FS) report and a Cleanup Action Plan (CAP) will be prepared and submitted to Ecology by October 2020.

Also, a Contaminated Media Management Plan (CMMP) will be prepared, prior to the construction in 2021. The CMMP will be available via public records after Ecology’s approval like the RI/FS and CAP documents.

2 Site Conditions

2.1 Surface Conditions

The East Block is bordered by apartment homes at 1711 23rd Ave. S. to the north, S. Grand St. to the south, 23rd Ave. S. to the east, and 22nd Ave. S. to the west. Ground cover across most of the block consists of a remnant concrete slab at Elevation 77 to 78 (Goldsmith, 2020) of the warehouse building that formerly occupied the block. A small grassy field is also present in the northwest corner of the block, north of the concrete slab. The concrete foundation wall of the former building is present along the entire east property line and along a portion of the north and south property lines. The wall ranges between about 3.5 to 9 feet in height and is inset from the property lines by about 10 to 15 feet.

2.2 Subsurface Conditions

Our understanding of the Site subsurface conditions is based on our review of geologic maps and the results of our environmental and geotechnical explorations between August 2017 and September 2020. Our explorations included direct push probes, dual environmental/geotechnical borings (some of which were completed as monitoring wells), and cone penetration test (CPT) soundings advanced at the locations shown on Figure 2. A description of the exploration methods is provided in Appendix A.

2.2.1 Geology

The *Geologic Map of Seattle – a Progress Report* (Troost et al., 2005) maps the Site as underlain by Vashon recessional lacustrine deposits (Qvrl). These are described as laminated silt and clay, low to high plasticity, with local sand layers, peat, and other organic sediments deposited in stagnant water behind the receding glacier during the most recent glaciation of Puget Sound between 15,000 and 20,000 years ago. Nearby, Vashon recessional outwash (Qvr), Vashon ice-contact deposits (Qvi), Vashon advance outwash (Qva), and Vashon till (Qvt) are also mapped.

Stratigraphically, the Vashon recessional lacustrine and ice contact units overlie the till and advance outwash units. The recessional lacustrine deposits were not glacially overridden and are unconsolidated deposits typically in a medium dense/medium stiff state. The ice-contact unit may or may not have been glacially overridden and can vary from a loose to dense state. The Vashon till and advance outwash units were glacially overridden/glacially consolidated and are typically in a dense to very dense/hard state.

2.2.2 Stratigraphy

Based on the results of our subsurface explorations, we grouped the Site soils into three units: fill, glacial recessional deposits, and glacially consolidated soil. Our explorations reveal that the Site is located within a former topographically low area during the most recent glaciation that was filled in with glacial recessional deposits as the glacier receded.

The infilled glacial recessional deposits overly glacially consolidated soil. Fill from previous site grading and development is also present.

The composition and distribution of these units observed in our explorations are described below, ordered from shallowest to deepest. The logs of the explorations and the CPT soundings data report are presented in Appendix A.

Fill

We observed up to about 6 feet of fill at the ground surface in our explorations. The fill typically consists of loose, moist, gray/brown silty sand (SM).

Glacial Recessional Deposits

Below the fill, we observed glacial recessional deposits that extended to a maximum depth of about 16 feet below the ground surface (bgs). Our explorations reveal these deposits vary in thickness across the Site from less than about 5 feet thick in the eastern third of the Site to about 15 feet thick in the western third of the Site. The thickness of these deposits increases from east to west and from north to south across the Site.

The glacial recessional deposits typically consist of medium stiff to stiff, moist, brown to gray-brown, silt (ML) and clay (CL) with varying amounts of sand, and loose to medium dense, moist to very moist, silty sand (SM).

Glacially Consolidated Soil

We observed glacially consolidated soil below the fill or glacial recessional deposits. The glacially consolidated soil typically consists of dense to very dense/hard, moist to very moist, gray, silty sand (SM) and sandy silt (ML). The top of glacially consolidated soil varies from elevation 75 to 62 across the Site.

2.2.3 Groundwater

Groundwater levels measured in the monitoring wells at the Site are presented in Appendix B. Groundwater levels measured in 13 monitoring wells in November 2019 revealed the average groundwater elevation at the Site was 58 feet, with the high measured at 67.7 feet and the low measured at 53.7 feet. Groundwater levels measured in those same wells in March 2020 after a period of heavy, extended precipitation revealed the average groundwater elevation at the Site was 59.4 feet, with the high measured at 68.7 feet and the low at 54.9 feet.

3 Geotechnical Engineering Conclusions and Recommendations

A summary of key Project geotechnical conclusions and recommendations are listed below and described in more detail in the following sections.

- The excavation for the lowest level of the building will expose dense, glacially consolidated soil across the eastern portion of the building and compressible glacial recessional deposits across the western and central portions of the building. The glacially consolidated soil is suitable for foundation support but the glacial recessional deposits are not. These varying foundation subgrade conditions below the building will require different foundation systems to mitigate differential settlement. In our opinion, the building can be supported on shallow foundations that bear on 1) glacially consolidated soil; 2) structural fill that replaces unsuitable soil; or 3) improved ground.
- Temporary shoring will be necessary to support excavation cuts along the perimeter of the building. Soil nails with vertical elements and shotcrete fascia will be suitable temporary shoring at the Site.
- Isolated remedial excavations to depths of up to about 15 feet below existing grades are planned adjacent to the western and southern property boundaries. The remedial excavations can be completed using a combination of localized deepened shoring along or interior to the property lines and sloped excavations for the other sides of the remedial excavations.
- Excavations for shoring, foundations, and remedial excavations could encounter perched groundwater and zones of seepage that can be managed with sumps and pumps. Contaminated soil and groundwater derived from the excavations will need to comply with environmental management protocols in accordance with a future Contaminated Media Management Plan (CMMP) that will be prepared and submitted to Ecology, prior to construction.

Earthquake Engineering

The Site is located within a region of active tectonic forces associated with the interaction of the offshore Juan de Fuca Plate, the Pacific Plate, and the onshore North American Plate. Seismic hazards include strong ground shaking from earthquakes associated with the Seattle Fault Zone (SFZ), the Cascadia Subduction Zone (CSZ), and deep intraslab earthquakes. The Site will experience strong ground shaking during earthquakes that the building will be designed to withstand in accordance with the applicable building codes.

3.1.1 Ground Response

Seismic design for the building will be in accordance with the 2015 Seattle Building Code (SBC) which references the 2015 International Building Code (IBC; ICC, 2015) and the American Society of Civil Engineers (ASCE) Standard ASCE/SEI 7-10, *Minimum Design Loads for Buildings and Other Structures* (ASCE, 2010). In accordance with these codes, seismic design for the building will consider a “Maximum Considered Earthquake” (MCE) ground motion with a 2 percent probability of exceedance in 50 years, or a return period of 2,475 years.

The effects of Site-specific subsurface conditions on the earthquake ground motion at the ground surface are determined based on the “Site Class.” The Site Class is correlated to the average standard penetration resistance (N-value) or average shear wave velocity in the upper 100 feet of the soil profile. Based on the subsurface explorations completed at the Site, the soil profile below the building would classify as Site Class D (Stiff Soil Profile). The seismic design parameters in accordance with these codes, and adjusted for Site Class D, are presented in Table 1.

Table 1. Seismic Design Parameters

Parameter	Recommended Value
Site Class	D– “Stiff Soil”
Short Period Spectral Acceleration, S_s (g)	1.402
1-Second Period Spectral Acceleration, S_1 (g)	0.541
Site Coefficient (F_a)	1.0
Site Coefficient (F_v)	1.5
Design Short Period Spectral Acceleration, S_{DS} (g)	0.935
Design 1-Second Period Spectral Acceleration, S_{D1} (g)	0.541

Note: Parameters based on the latitude and longitude of the Site: 47.58691°N, 122.30422°W

3.1.2 Liquefaction Susceptibility

Liquefaction occurs when loose, saturated, and relatively cohesionless soil deposits temporarily lose strength and stiffness as a result of earthquake ground shaking. Potential effects of soil liquefaction at the Site include temporary loss of shallow foundation bearing capacity and vertical ground settlement. Primary factors controlling the triggering of liquefaction include intensity and duration of strong ground motion, characteristics of subsurface soils, *in situ* stress conditions, and the depth to groundwater.

Our explorations reveal that the soils below groundwater are glacially consolidated and therefore are non-liquefiable. Therefore, we conclude that liquefaction is not a design consideration at the Site.

3.2 Temporary Shoring

The finished floor for the lowest level of the building is planned at Elevation 72 across most of the building with a few areas where the floor is a few feet higher. The building will be inset from the property lines and will extend as close as approximately 2 feet from the northern property line, 10 feet from the southern property line, 8 feet from the eastern property line, and 7 feet from the western property line. Isolated remedial excavations are planned adjacent to the western and southern property lines that will extend as deep as 15 feet below existing grades. Over-excavation below perimeter footings to reach suitable foundation bearing soil is also planned. Based on existing grades along the property lines, the proposed excavations will extend as deep as about 16 feet along the building perimeter, and temporary shoring will be necessary.

In our opinion, the subsurface conditions at the Site are appropriate for a soil nail and shotcrete shoring wall system, supplemented with vertical elements for excavation face stability where excavations will extend through thicker, sandier zones within the glacial recessional deposits. A description of this system is provided below, followed by our recommendations for design. Construction and testing recommendations for soil nail and shotcrete shoring walls are presented in Section 4 of this report.

Soil nail and shotcrete walls consist of ground anchors (soil nails) that are drilled and grouted into the face of the excavation on close horizontal and vertical spacing (typically 5 to 6 feet) and structurally connected with sprayed-on-concrete (shotcrete) and mesh fascia. The soil nails are installed at a slight declination from horizontal, typically 10 to 20 degrees.

In conditions where soils are prone to sloughing in vertical cuts, or where cantilevered sections are required to avoid impacts to utilities, a composite method of soil nailing, referred to as soil nails with vertical elements, can be used to provide increased additional support and stand-up time. Vertical elements consist of slender steel beams placed vertically into augered shafts and backfilled with lean concrete. Vertical elements are typically installed on horizontal spacings of one-half the soil nail horizontal spacing and are staggered to avoid the soil nails. Depending on soil conditions, the vertical elements sometimes terminate above the base of excavation, and sometimes they extend the full depth of the excavation.

3.2.1 Soil Nail Design

Soil nails should be designed in accordance with the Federal Highway Administration (FHWA) Geotechnical Engineering Circular No. 7 (FHWA, 2015). The soil nail design should meet the minimum factors of safety for global stability, sliding, soil nail pullout, and bar tensile strength.

We recommend designing the soil nails using the soil parameters presented in Table 2.

Table 2. Soil Nail Design Parameters

Soil Unit	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)	Allowable Pullout Resistance (klf)[1]
Fill	115	30	0	1.5
Glacial Recessional Deposits	115	32	100	2
Glacially Consolidated Soil	130	40	100	3.5

3.2.2 Shotcrete Facing

The shotcrete wall facing should be designed in accordance with the FHWA Geotechnical Engineering Circular No. 7. The mesh reinforcement and shotcrete thickness must be designed to meet the minimum factors of safety for facing flexure, punching shear, and nut-and-washer plate failure.

3.2.3 Vertical Elements

The relatively loose, sandy zones within the glacial recessional deposits are prone to sloughing in vertical cuts and may exhibit short stand-up times. Loose backfill behind the existing retaining wall may also be present and would also exhibit short stand-up times. We recommend vertical elements along portions of the northern, eastern, and southern shoring walls to increase cut face stability and prolong stand-up time. In our opinion, vertical elements are not necessary for the remaining lengths of the soil nail and shotcrete walls because the glacial recessional deposits in those areas are primarily silt and clay that are expected to reasonably stand when exposed by vertical cuts. Our recommended locations and minimum tip elevations for vertical elements to be incorporated into the shoring plans are presented on Figure 3. The vertical elements should be considered as part of the means and methods for soil nail and shotcrete shoring wall construction; therefore, more or fewer vertical elements may be deemed necessary by the shoring contractor or Aspect based on soil conditions exposed in the excavation.

Vertical elements can be designed using an equivalent fluid density of 35 pcf within the fill and glacial recessional deposits. Allowable passive resistance over embedded portions of the vertical elements can be assumed to be 250 pcf within the fill and glacial recessional deposits and 400 pcf within the glacially consolidated soils. These passive values are allowable values and include a factor of safety of 1.5. The allowable passive resistance can be assumed to act over two times the concreted vertical element diameter or the horizontal vertical element spacing, whichever is less.

3.2.4 Shoring Design Considerations

The soil nail layout should be carefully checked to avoid impacting utilities and maintain City of Seattle (City) minimum clearances. Soil nails extending into adjacent private properties will require easement agreements and soil nails extending into adjacent rights-of-way will require indemnity agreements with the Seattle Department of Transportation.

3.3 Groundwater Inflow

Excavations for shoring, foundations, and remedial excavations could encounter isolated and discontinuous zones of perched groundwater that will need to be managed during construction. We expect that groundwater inflow from these zones can be managed using sumps and pumps and active construction dewatering will not be required. Contaminated groundwater that flows into the excavations will need to be managed and treated prior to discharge, as permitted by the applicable agency.

3.4 Building Foundations

The finished floor for the lowest level of the building is planned at Elevation 72 across most of the building, with a few areas where the finished floor ramps or steps up a few feet higher than this. Our explorations indicate dense, glacially consolidated soil is present as shallow as Elevation 73 below the eastern half of the building and as deep as Elevation 59 below the western half. The glacially consolidated soils are overlain by relatively compressible fill and glacial recessional deposits. Assuming the building foundations will extend approximately 2 feet below the finished floor, up to about 11 feet of compressible soils would still exist below some of the foundations in the western half of the building in some locations. A grade-supported building over these soils would have a high potential for differential settlement due to the variable soils that would exist below the foundations. This is considered geotechnically and structurally unacceptable.

To mitigate this, we recommend the following:

1. Deepening the footings to bear directly on glacially consolidated soils
2. Removing and replacing the compressible/unsuitable soil below foundations with structural fill, or
3. *In-situ* ground improvement below foundations

From our collaboration with the design team, options (2) and (3) will be implemented.

Based on our explorations and foundation elevations provided by the structural engineer, we have determined where foundations will be supported on glacially consolidated soil and where over-excavation and/or ground improvement below foundations will be necessary, as shown on Figure 4.

3.4.1 Ground Improvement

Ground improvement consists of modifying weak or marginal *in-situ* soils to create a stiffer soil mass with improved engineering characteristics—specifically, higher bearing capacity and lower compressibility. Ground improvement is typically achieved through densification and replacement of a portion of the *in-situ* soils with stiffer materials. Based on the subsurface conditions and coordination with the Project team, rammed aggregate piers (D-RAPs) are preferred for ground improvement.

3.4.1.1 Rammed Aggregate Piers

Rammed Aggregate Piers (RAPs) consist of columns of compacted angular crushed rock installed within a soil mass. The RAPs are typically 20 to 30 inches in diameter and can be installed by drilled shaft excavation methods or by using displacement methods. The displacement method utilizes a vibrating a mandrel/tamper head through the *in-situ* soil profile to create a shaft extending vertically to the desired depth. The vibration and displacement densifies and improves the surrounding soil. Once the desired shaft depth is reached, the mandrel/tamper head is retracted as crushed rock is injected and compacted in lifts.

When the RAPs are installed below foundations, their high stiffness relative to the surrounding soil attract more of the applied foundation loads, thereby reducing the load imposed on the surrounding soil, resulting in increased bearing capacity and reduced compressibility.

Aspect is completing the ground improvement design. The ground improvement will be designed to meet these performance requirements:

- Less than 1 inch of total settlement
- Less than 0.5 inches of differential settlement over a horizontal distance of 50 feet
- Allowable bearing pressure of 5 kips per square foot (ksf)

The ground improvement narrative, design calculations, drawings, and specifications will be submitted under a separate cover.

3.4.2 Allowable Bearing Pressure

We understand from the Project structural engineer that all foundations will be designed for the same allowable bearing pressure regardless of subgrade conditions. With this, shallow foundations bearing directly on (1) undisturbed glacially consolidated soil, (2) structural fill that replaces unsuitable soil or is used to backfill remedial excavations), or (3) improved ground may be designed for an allowable bearing pressure of 5 ksf. The allowable bearing pressure may be increased by one third for short-duration loading, such as wind and seismic loading.

3.4.3 Settlement

We estimate foundations designed and constructed in accordance with our recommendations will experience average total settlements of 1 inch or less. Differential settlements between adjacent column footings will be less than about 0.5 inch. Differential settlement along continuous strip footings can be assumed to be approximately 0.5 inches per 50 feet of footing length. Total and differential settlement will occur rapidly as building loads are applied during construction and no long-term settlement is expected.

3.4.4 Footing Size and Embedment

Continuous wall footings and isolated spread footings should have minimum widths of 24 inches. Exterior footings should be embedded at least 18 inches below the lowest adjacent grade and interior footings should be embedded at least 12 inches below the top of the adjacent floor slab. All footings should be located outside of a 1:1 prism projected upward and outward from the bottom of adjacent footings and utility trenches.

3.4.5 Lateral Resistance

Lateral loads will be resisted through passive soil resistance against embedded portions of foundations and frictional resistance along the base of the foundations. We recommend using the allowable passive equivalent fluid densities and base friction coefficients presented in Table 3 to calculate resistance to lateral loads.

Table 3. Lateral Resistance for Shallow Foundations

<table>
<tr><th>Foundation Subgrade Condition</th><th>Allowable Equivalent Fluid Pressure (pcf)</th><th>Allowable Base Friction Coefficient</th></tr>
<tr><td>Undisturbed Glacially Consolidated Soil</td><td>400</td><td rowspan="3">0.36</td></tr>
<tr><td>Structural Fill</td><td>350[1]</td></tr>
<tr><td>Improved Ground</td><td>250[2]</td></tr>
</table>

Notes:
1. Assumes foundations are surrounded with structural fill.
2. Assumes foundation excavations are neat within the fill and recessional glacial deposits and are not surrounded by structural fill.

The values presented above are allowable and include a factor of safety of 1.5.

3.5 Slab-on-Grade Floors

The existing fill, glacial recessional deposits, and glacially consolidated soils—if prepared in accordance with our recommendations in Section 4.3.2—will provide suitable support for slabs-on-grade. Concrete slabs-on-grade should be designed in accordance with the American Concrete Institute (ACI) Committee 360 Guide to Design of Slabs-on-Ground (ACI, 2010). We recommend the floor slab be underlain with 6 inches of free-draining, crushed rock or well-graded sand and gravel to provide a capillary break and uniform support. The capillary break material should have a maximum particle size of 3/4 inch, with no more than 80 percent passing the No. 4 sieve and less than 5 percent fines (material passing the U.S. Standard No. 200 sieve). In areas where moisture will be detrimental to floor coverings or equipment inside the proposed structures, a 10-mil polyethylene vapor barrier should be placed directly over the capillary break. The vapor barrier should be installed in accordance with the manufacturer’s recommendations.

For slabs that are designed as beam-on-elastic foundation, a modulus of subgrade reaction of 200 pounds per cubic inch (pci) may be assumed for design for slabs underlain by a capillary break placed directly over glacially consolidated soils. For slabs underlain by a capillary break placed over structural fill or glacial recessional deposits, a subgrade modulus of 100 pci may be assumed for design. Considering the variable subgrade conditions across the building footprint, it may be structurally convenient to use the lower value, 100 pci for design of slabs-on-grade.

3.6 Permanent Below-Grade Walls

3.6.1 Walls Constructed Against Temporary Shoring

Permanent below-grade walls that are formed and constructed against temporary shoring walls should be designed using the lateral earth pressures presented on Figure 5. The lateral earth pressures assume level ground conditions exist behind the walls and adequate drainage is provided behind the walls to prevent the buildup of unbalanced hydrostatic pressures.

3.6.2 Backfilled Walls

Permanent below-grade walls that are backfilled (i.e., not constructed against temporary shoring) should be designed using the lateral earth pressures presented on Figure 5. Walls allowed to yield 0.1 to 0.2 percent of the retained height may should be designed for active earth-pressures using an equivalent fluid density of 35 pcf (triangular distribution against the back of the wall). Restrained or nonyielding walls may be designed using an equivalent fluid density of 55 pcf.

3.6.3 Seismic Lateral Earth Pressures

Permanent below-grade walls will be subject to a temporary additional lateral earth pressure during earthquake shaking. To account for this, a uniformly distributed seismic lateral earth pressure equal to 13H should be added to the earth pressure distribution, where H is the height of the wall. This seismic lateral earth pressure is included on Figure 5.

3.6.4 Surcharge Loads

For permanent below-grade walls that will be subjected to light vehicular loading, a traffic surcharge load of 70 psf should be added to the earth pressure distribution as shown on Figure 5. The traffic surcharge load should be distributed uniformly over the upper 15 feet of the wall. The seismic lateral earth pressure and traffic surcharge should not be applied simultaneously.

Surcharge pressures acting on the permanent below-grade walls from foundations, limited sloping backfill, or other loads should be calculated using the methods shown on Figure 6.

3.6.5 Lateral Resistance

For permanent below-grade walls with foundations embedded in undisturbed glacially consolidated soil, lateral resistance can be calculated using allowable values presented in Section 3.4.5.

3.7 Subsurface Drainage

3.7.1 Walls Constructed Against Temporary Shoring

Drainage behind permanent below-grade walls that are constructed against temporary shoring should consist of drainage composite strips placed behind the soil nail and shotcrete shoring wall that connect to an interior tightline pipe. Our recommendations for this system are as follows:

- The drainage composite should be installed in 18- to 24-inch-wide vertical strips with shingled overlap on the excavation face prior to the application of shotcrete during shoring wall construction. The drainage composite should be placed between soil nails on horizontal spacing equal to that of the soil nails.
- The drainage composite should start from about 3 feet below finished grade behind the wall (to prevent surface water from entering the system), extend down

to the weephole pipes located slightly above the top of the adjacent perimeter wall footing.

- The drainage composite should be connected to the interior tightline pipe using 2-inch-minimum-diameter, solid, Schedule 40 PVC weephole pipes that exit through the shotcrete facing and penetrate the basement wall above the top of the footing. The weephole pipes should have a maximum horizontally spacing of 20 feet, be connected to the centerline of the drainage composite vertical strips, and should be sloped for positive drainage to the interior tightline pipe.
- The tightline pipe should consist of a 4-inch-minimum-diameter, solid, Schedule 40 PVC pipe that runs alongside the interior edge of the perimeter and below the finished floor. A separate footing drainpipe should be placed next to the tightline pipe (see section 3.7.3).

The recommendations presented above should generally be adequate to prevent the buildup of hydrostatic pressures behind permanent below-grade walls constructed against temporary shoring. The coverage recommendations should be modified as necessary based on conditions observed during construction. A building waterproofing expert should be consulted to recommend additional waterproofing elements if wet wall areas are not acceptable.

3.7.2 Backfilled Walls

Drainage behind backfilled walls should consist of a 24-inch-wide (minimum) zone of free-draining sand and gravel meeting the requirements for City of Seattle Mineral Aggregate Type 17 (City of Seattle, 2020). A 4-inch diameter (minimum), perforated or slotted, Schedule 40 PVC drainpipe should be placed at footing elevation to collect seepage carried downward by the sand and gravel zone and routed to an approved outlet. The drainpipe should be surrounded by at least 6 inches of washed gravel meeting the requirements for City of Seattle Mineral Aggregate Type 5, Type 9, Type 28, or WSDOT Standard Specification 9-03.12(4) for Gravel Backfill for Drains.

3.7.3 Perimeter Foundations

All perimeter foundations, including basement walls constructed against temporary shoring, should be provided with drainage system consisting of a 4-inch-diameter (minimum), perforated or slotted, Schedule 40 PVC drainpipe surrounded by at least 6 inches of washed gravel meeting the requirements for City of Seattle Mineral Aggregate Type 5, Type 9, Type 28, or WSDOT Standard Specification 9-03.12(4) for Gravel Backfill for Drains. The perimeter foundation drainpipes should include cleanouts for periodic maintenance and should be routed to an approved outlet in a tightline pipe.

3.7.4 Underslab Drainage

The lowest level of the building east of gridline F should be provided with underslab drainage to collect water that will have the tendency to perch on the relatively impermeable glacially consolidated soils. The underslab drainage should consist of cross drains placed on about 20- to 30-foot centers between the perimeter footing drains. The cross drains should consist of 4-inch-diameter (minimum), perforated or slotted, Schedule 40 PVC pipes surrounded by at least 6 inches of washed gravel meeting the requirements of City of Seattle Mineral Aggregate Type 5, Type 9, Type 28, or WSDOT Standard Specification 9-03.12(4) for Gravel Backfill for Drains. All pipe inverts should be at least 12 inches below the finished top of slab elevation. The underslab drainage system should be routed to an approved outlet in a tightline pipe.

The slabs should be underlain by a 6-inch-minimum-thickness capillary break, which will also serve as an underslab drainage layer (refer to Section 3.5).

3.7.5 Other Drainage Recommendations

Final grades around the building should be sloped such that surface water drains away from the buildings. We recommend that each drainage system (perimeter foundation drains, backfilled wall drains, underslab drains, and roof downspout lines) operate independently (i.e. the drainage systems are not connected) to reduce the potential for flooding and clogging.

4 Earthwork Considerations and Recommendations

We expect that excavation can be accomplished with standard construction equipment suited to working in very dense and hard soils, such as large tracked excavations equipped with toothed buckets. The contractor should be prepared to encounter and deal with rubble and debris in the surficial fill, or oversized particles, such as cobbles, in the native soil during excavation activities and drilling of temporary shoring elements. As stated earlier, contaminated soil and groundwater will need to be managed during construction in accordance with the environmental management protocols that will be outlined in a future CMMP document. Aspect will prepare and submit the CMMP to Ecology, prior to construction.

The following sections present earthwork considerations and recommendations relevant to temporary shoring construction, subgrade preparation, and structural fill.

4.1 Soil Nail and Shotcrete Shoring Wall Construction

Proper construction sequencing is especially important for soil nail and shotcrete shoring walls because they are constructed from the top down in stages with temporary unsupported vertical cuts. We provide the following recommendations for excavation cuts, soil nail installation, and shotcrete application. Ultimately, it is the responsibility of the contractor to assess ground conditions during construction and to determine appropriate methods and procedures for installing the shoring wall and achieving the design soil nail adhesion.

4.1.1 Excavation and Soil Nail Installation

- Prior to excavation, surface water controls should be implemented to prevent surface water from flowing into the excavation.
- Cut face height should not exceed 6 feet and the exposed length of excavation should be limited to the length that can be nailed and covered with shotcrete in a single shift.
- The contractor should complete excavation test sections in each soil type to evaluate the stability and adjust the allowable stand-up time, as necessary, to maintain safe working conditions and prevent sloughing and soil loss.
- The contractor should actively monitor the cut face for signs of instability. If significant instability is observed or is imminent, the cut face should be stabilized as necessary. Depending on conditions, we expect this can be accomplished by constructing a soil berm in front of the cut face, applying a flashcoat of shotcrete, or installing vertical elements.
- Cut faces or soil nail drill holes should not be left open overnight.

- The soil nails should be drilled using a method that will minimize caving and soil loss. Temporary casing should be considered in soils prone to caving.
- Drill holes should be thoroughly cleaned of loose drill cuttings and slough prior to soil nail bar installation and grouting. The soil nail bars should include centralizers to keep the bar centered in the drill hole.

4.1.2 Shotcrete Facing

- Shotcrete application test panels should be completed by each nozzleman using the proposed means and methods under field conditions.
- Drainage composite placed on the cut face should be properly overlapped and protected so that its drainage characteristics are not altered by shotcrete placement.
- If sloughing occurs after soil nail installation but prior to shotcrete application, a flashcoat of shotcrete can be applied to the cut face.

4.1.3 Soil Nail Testing

Soil nails should be load tested to verify that the design adhesion value assumed for soil nail design is achieved by the contractor's means and methods of installation. Test soil nails should include a short unbonded zone near the face established using a temporary sleeve or casing. A large-area, stiff reaction plate to bear against the soil face should be provided by the contractor for verification testing. Refer to Appendix D for soil nail verification and proof load testing requirements.

4.1.4 Shoring Wall Performance and Monitoring

We recommend temporary shoring walls be designed such that wall deflections and ground surface settlements behind the walls are 1 inch or less. Where structures or sensitive utilities are located within about 10 feet of the shoring walls, the walls should be designed to limit deflections to less than 0.5 inches. Based on our experience with temporary-shoring construction methods and practices, we conclude that a shoring wall designed in accordance with our recommendations, with properly sequenced excavation and prompt installation of ground anchors, would effectively mitigate excessive deformations of the shoring wall and adverse impacts to adjacent structures and utilities.

A monitoring program for the shoring walls should be implemented for the Project, as described in Appendix D.

4.2 Temporary Excavation Slopes

In addition to temporary shoring, temporary excavation slopes could be required elsewhere during construction. Temporary excavation and slopes should not exceed the limits specified in the local, state, and federal regulations. The stability of temporary excavations and slopes shall be the responsibility of the contractor. The fill and glacial recessional deposits (typically within the upper 10 to 15 feet of the Site) would classify as Type C soil, and the glacially consolidated soils (typically below depths of about 10 to 15 feet) would classify as Type A soil in accordance with the Washington Administrative

Code (WAC) 296-155 Part N (WAC, 2016). Temporary excavation slopes in Type A and C soils are anticipated to stand as steep as 0.75H:1V (horizontal:vertical) and 1.5H:1V, respectively. The presence of seepage may require that temporary excavation slopes be flattened to remain stable.

We also recommend the following:

- Surface water should be diverted away from slopes.
- Slopes should be protected using plastic sheet, flash coating, or tarps to control erosion and stability, as necessary.
- The duration that excavations or slopes are open should be minimized.
- Traffic, equipment, and material stockpiles should not be allowed near the top of excavations or slopes.
- The conditions of the excavations and slopes should be periodically observed by a competent person who is a representative of the contractor to evaluate safety and stability.

4.3 Subgrade Preparation

4.3.1 Foundations

Foundation subgrades should be observed by Aspect prior to placing steel and pouring concrete to verify they have been prepared in conformance with our recommendations. Foundation subgrades should be firm and unyielding and clear of all construction debris, loose or disturbed soil, and standing water prior to foundation construction. Soft or disturbed foundation subgrade areas identified during evaluation should be removed to expose undisturbed glacially consolidated soils and replaced with appropriate structural fill material.

Where overexcavation below foundations will occur, the width of the overexcavation should encompass a 1:1 prism projected downward and outward from the edges of the foundations.

4.3.2 Slabs-on-Grade and Pavements

Slab-on-grade and pavement subgrade preparation should be observed and evaluated by a representative of Aspect prior to placement of the capillary break or pavement section. All subgrades should be firm and unyielding under the proof-rolling load of heavy rubber-tired equipment where accessible and should be clear of any loose or disturbed soil or standing water. Disturbed or soft subgrade areas identified during evaluation should be removed and replaced with appropriate structural fill material.

4.4 Structural Fill

Soils placed beneath or around foundations, walls, utilities, slabs-on-grade, or below pavements should be considered structural fill. For these fill areas, we provide the following recommendations:

- Site-derived soils are not suitable for reuse as structural fill due to their high fines (material passing the U.S. No. 200 sieve) content and moisture sensitivity. All materials derived from Site excavations should be exported to a suitable disposal site.
- Structural fill to be used below and around foundations should consist of material meeting the requirements for City of Seattle Gravel Backfill for Foundations, Class A.
- Structural fill to be used for drainage directly behind cast-in-place walls should consist of free-draining sand and gravel meeting the requirements for City of Seattle Mineral Aggregate Type 17.
- Structural fill to be used as crushed surfacing base course below new pavements should consist of material meeting the requirements for City of Seattle Mineral Aggregate Type 2.
- Structural fill should only be placed on a relatively firm and unyielding subgrade.
- Structural fill should be compacted to a relatively firm and unyielding condition to a minimum density of 95 percent of the maximum dry density as determined by ASTM International (ASTM) D1557 (ASTM, 2018). Structural fill placed behind walls should be compacted to between 90 to 92 percent of the maximum dry density to avoid overstressing the walls.
- Structural fill should be placed in lifts with a loose thickness no greater than 12 inches when using relatively large compaction equipment, such as a vibrating plate attached to an excavator (hoe pack) or a vibratory smooth drum roller. If small, hand-operated compaction equipment is used to compact structural fill, lifts should not exceed 6 inches in loose thickness.
- Moisture content of the structural fill should be controlled to within 2 to 3 percent of the optimum moisture. Optimum moisture is the moisture content corresponding to the maximum modified proctor dry density.
- Fill placed in softscape, general grading, landscape, or common areas that are not beneath or around structures, utilities, slabs-on-grade, or below paved areas that can accommodate some settlement should be compacted to a relatively firm and unyielding condition.

4.4.1 Utility Bedding and Backfill

General recommendations for bedding of utilities and backfill of utility trenches include:

- Materials to be used for utility bedding should meet the requirements for City of Seattle Mineral Aggregate Type 22, or as specified in the Standard Specification section applicable to the type of pipe being installed.
- Prior to installation of the pipe, the bedding material should be shaped to fit the lower portion of the pipe exterior with reasonable closeness to provide continuous support along the pipe.

- Bedding placed around the pipe should be placed in layers and tamped around the pipe to obtain complete contact. Pipe bedding material should be used as trench backfill to at least 6 inches above the crown of the pipe, for the full width of the trench. In areas where a trench box is used, the bedding material should be placed before the trench box is advanced.

- Trench backfill should meet the requirements for Structural Fill as described in Section 4.3 of this report. During placement of the initial lifts, the trench backfill material should not be bulldozed into the trench or dropped directly on the pipe. Furthermore, heavy vibratory equipment should not be permitted to operate over the pipe until at least 2 feet of backfill has been placed.

4.5 Temporary Erosion and Sedimentation Control

Temporary erosion control measures should be implemented to prevent the migration of soil, dust, and turbid water off-Site or into stormwater systems. Such measures should include silt fences and straw wattles at the Site boundary, silt socks in nearby catch basins, wetting exposed soil during dry periods, and quarry spalls and wheel wash stations at truck and equipment exits.

4.6 Wet Weather Construction

The soils at the Site are moisture sensitive and may be difficult to handle, prepare, or compact with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions, we provide the following recommendations:

- Earthwork should be performed in small areas to minimize exposure to wet weather. The size and type of construction equipment used may have to be limited to prevent soil disturbance.

- Excavations for foundations, floor slabs, and pavements should be covered or protected (with concrete or Seattle Type 2 Aggregate) following approval of the subgrade by Aspect and should not be left open and exposed.

- Material used as structural fill should consist of clean, granular soil containing less than 7 percent fines.

- The ground surface within the construction area should be sealed by a smooth drum vibratory roller (or equivalent) and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials.

- Excavation and placement of fill should be observed by Aspect to verify that all unsuitable materials are removed, and suitable compaction is achieved.

- Local best management practices (BMPs) for erosion protection should be strictly followed.

5 References

American Concrete Institute (ACI) Committee 360, 2010, Guide to Design of Slabs-on-Ground.

American Society of Civil Engineers (ASCE), 2010, ASCE Standard ASCE/SEI 7-10, Minimum Design Loads for Buildings and Other Structures.

ASTM International (ASTM), 2018, 2018 Annual Book of ASTM Standards, West Conshohocken, Pennsylvania.

City of Seattle, 2020, Standard Specifications for Road, Bridge, and Municipal Construction.

Federal Highway Administration (FHWA), 2015, Geotechnical Engineering Circular No. 7, Soil Nail Walls – Reference Manual, FHWA-NHI-14-007, February 2015.

Goldsmith Land Development Services (Goldsmith), 2020, Topography and S.I.P Survey for Grand Street Commons, Sheets 1 through 7, April 2020.

Troost, K.G., D.B. Booth, A.P. Wisher, S.A. Shimel, 2005, The Geologic Map of Seattle – a Progress Report, U.S. Geological Survey, Open-File Report 2005-1252.

Washington State Legislature, 2016, Washington Administrative Code (WAC), May 20, 2016.

6 Limitations

Work for this project was performed for Grand Street Commons, LLC (Client), and this report was prepared consistent with recognized standards of professionals in the same locality and involving similar conditions, at the time the work was performed. No other warranty, expressed or implied, is made by Aspect Consulting, LLC (Aspect).

Recommendations presented herein are based on our interpretation of site conditions, geotechnical engineering calculations, and judgment in accordance with our mutually agreed-upon scope of work. Our recommendations are unique and specific to the project, site, and Client. Application of this report for any purpose other than the project should be done only after consultation with Aspect.

Variations may exist between the soil and groundwater conditions reported and those actually underlying the site. The nature and extent of such soil variations may change over time and may not be evident before construction begins. If any soil conditions are encountered at the site that are different from those described in this report, Aspect should be notified immediately to review the applicability of our recommendations.

Risks are inherent with any site involving slopes and no recommendations, geologic analysis, or engineering design can assure slope stability. Our observations, findings, and opinions are a means to identify and reduce the inherent risks to the Client.

It is the Client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, and agents, are made aware of this report in its entirety. At the time of this report, design plans and construction methods have not been finalized, and the recommendations presented herein are based on preliminary project information. If project developments result in changes from the preliminary project information, Aspect should be contacted to determine if our recommendations contained in this report should be revised and/or expanded upon.

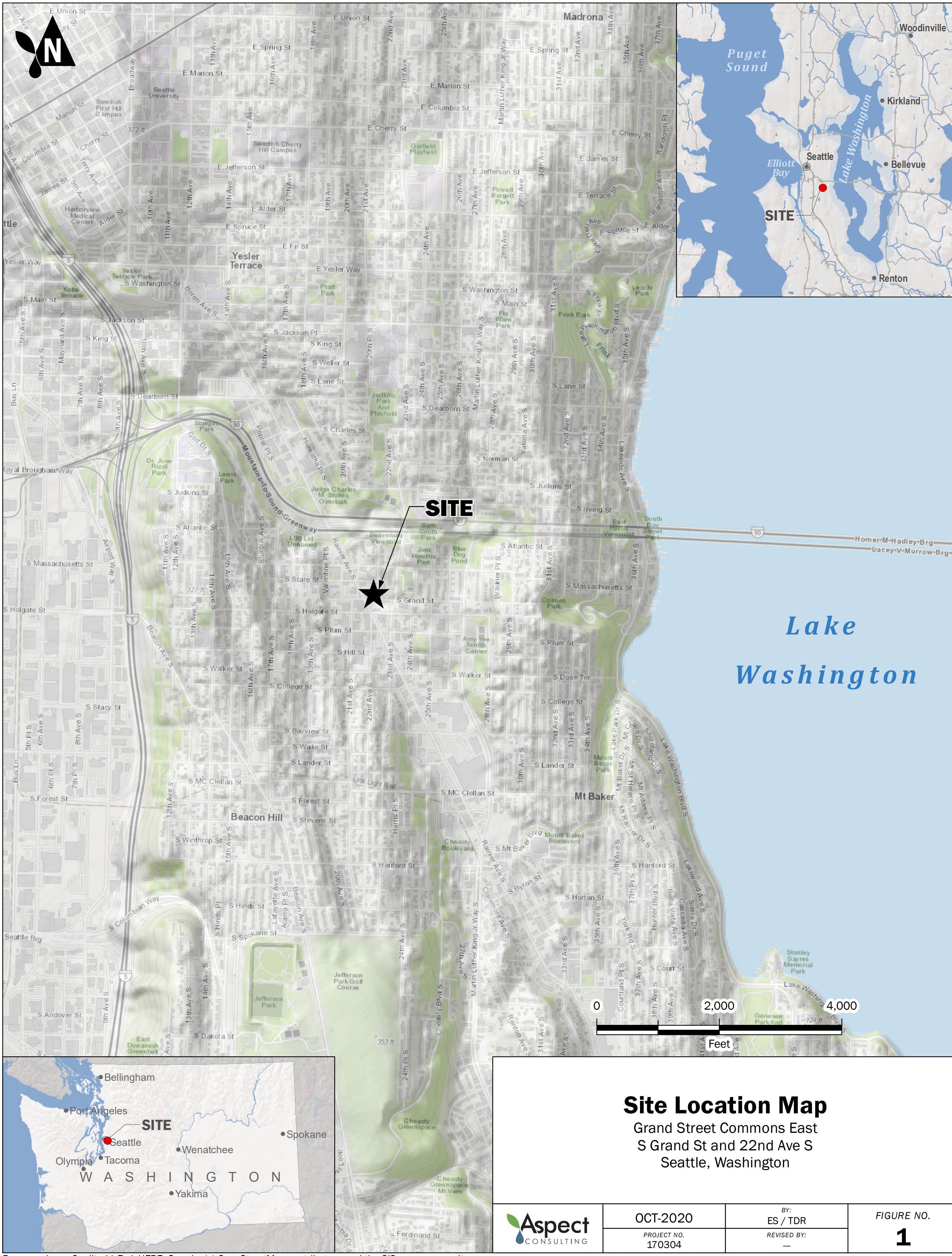
The scope of work does not include services related to construction safety precautions. Site safety is typically the responsibility of the contractor, and our recommendations are not intended to direct the contractor’s site safety methods, techniques, sequences, or procedures. The scope of our work also does not include the assessment of environmental characteristics, particularly those involving potentially hazardous substances in soil or groundwater.

All reports prepared by Aspect for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect. Aspect’s original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix E titled “Report Limitations and Guidelines for Use” for additional information governing the use of this report.

We appreciate the opportunity to perform these services. If you have any questions, please call Eric Schellenger PE, Geotechnical Engineer, at 206-780-7745.

FIGURES



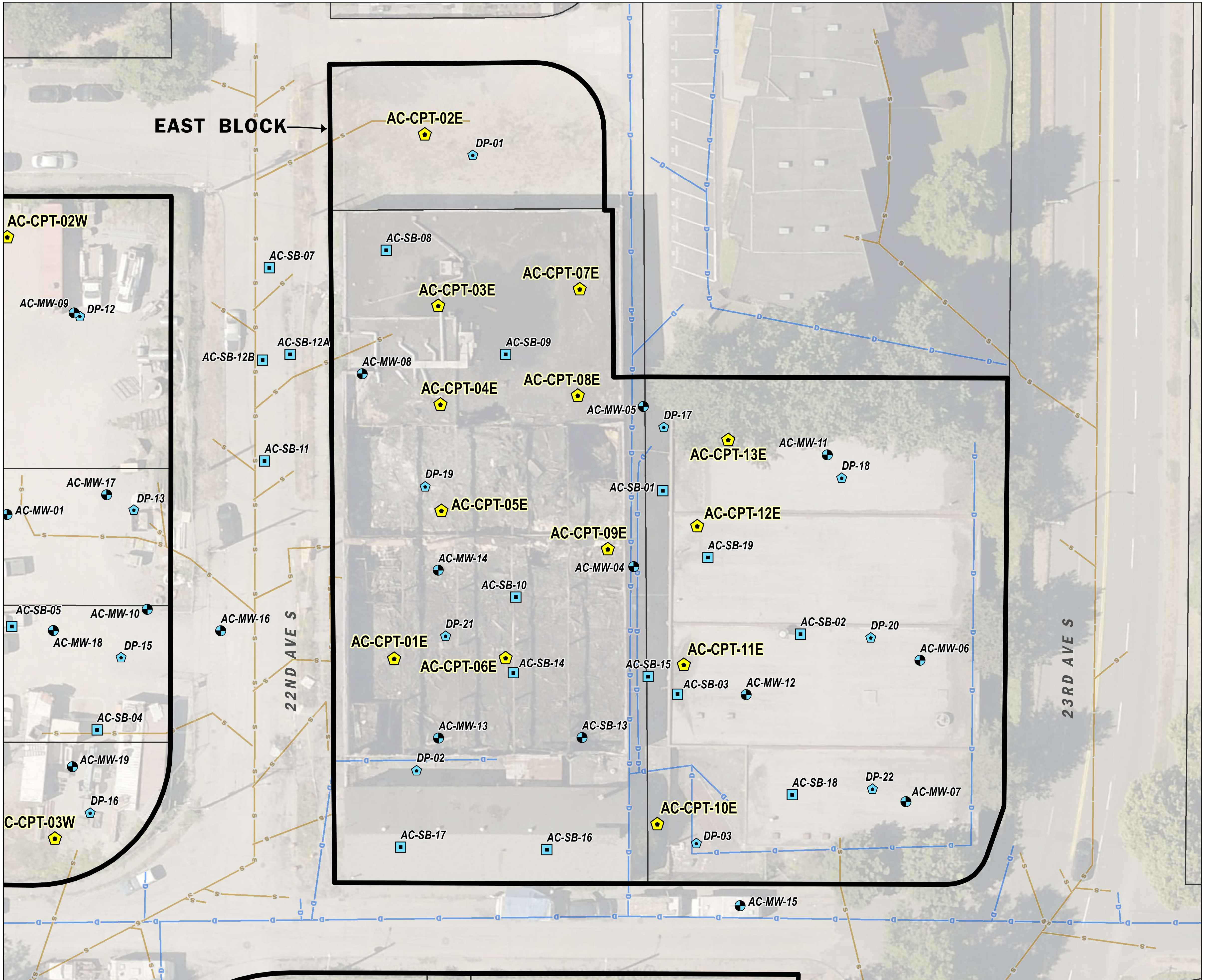
Site Location Map

Grand Street Commons East
S Grand St and 22nd Ave S
Seattle, Washington

Aspect CONSULTING	OCT-2020	BY: ES / TDR	FIGURE NO. 1
	PROJECT NO. 170304	REVISED BY: ---	

GIS Path: T:\projects_8\MBHA_Belshaw_170304\Delivered\GeotechReports_2020\EastBlock\01 Site Location Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 2020-10-08 || User: trullen || Print Date: 2020-10-08

Basemap Layer Credits || Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



Cone Penetration Test (Aspect)

Shallow Monitoring Well (Aspect)

Soil Boring (Aspect)

Direct-Push Soil Boring (Aspect)

Subject Property

King County Tax Parcel

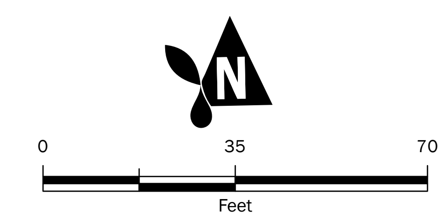
Utility Lines

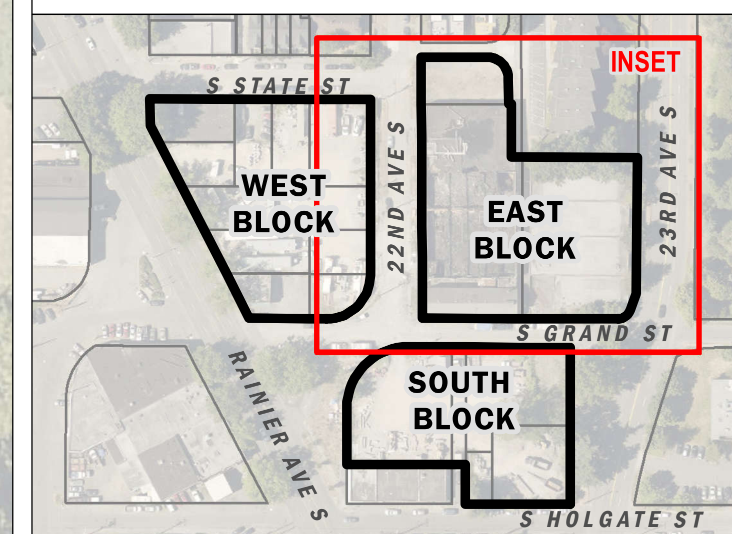
Sanitary Sewer

Storm Drain

Notes:

- Aerial from King County, 2017.
- Site features are approximate.

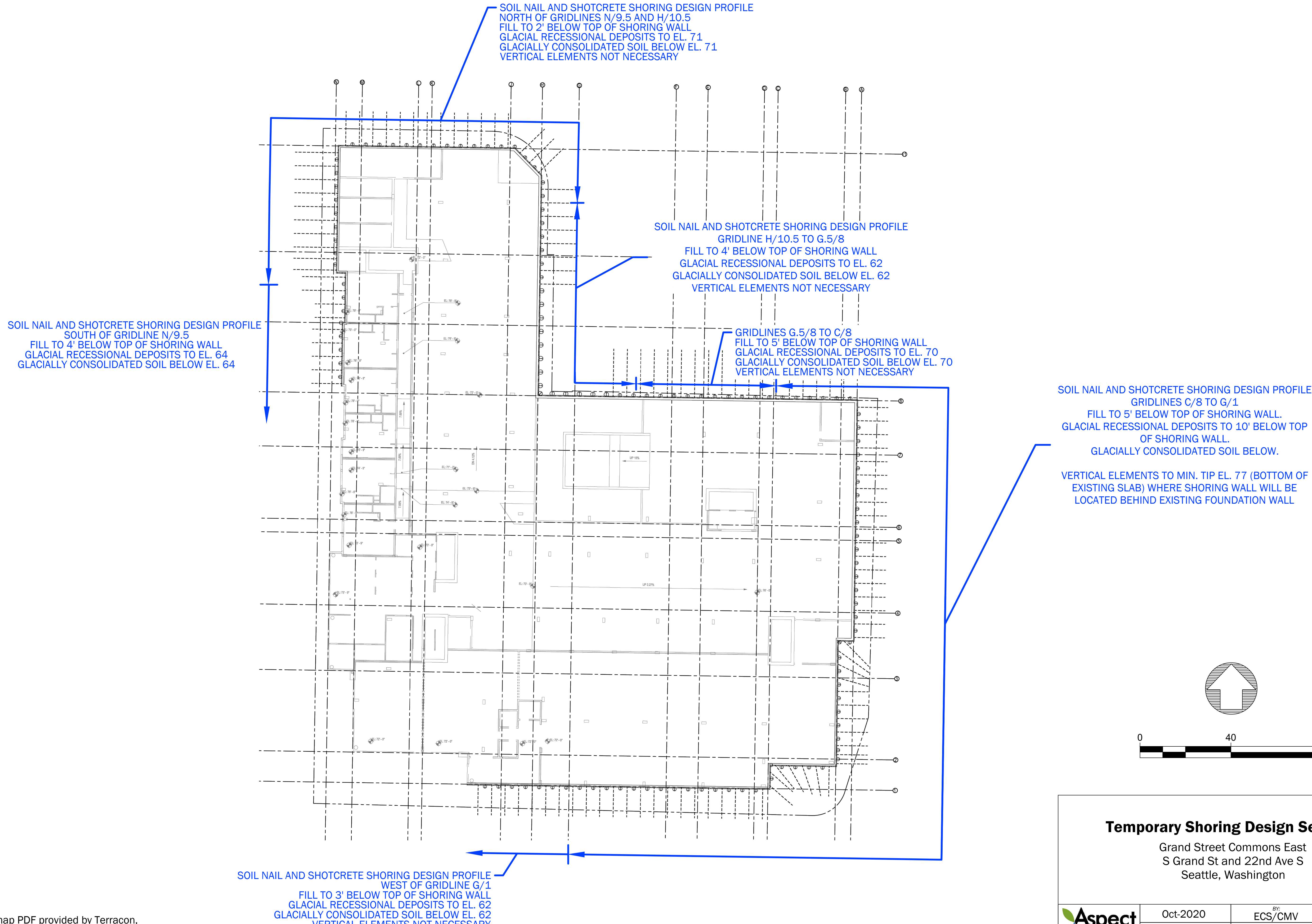




Site Plan

Grand Street Commons East
S Grand St and 22nd Ave S
Seattle, Washington

Aspect CONSULTING	OCT-2020	BY: ES / TDR	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: - - -	2



Source: Base map PDF provided by Terracon, Mountlake Terrace, Washington, dated Sep. 2020.

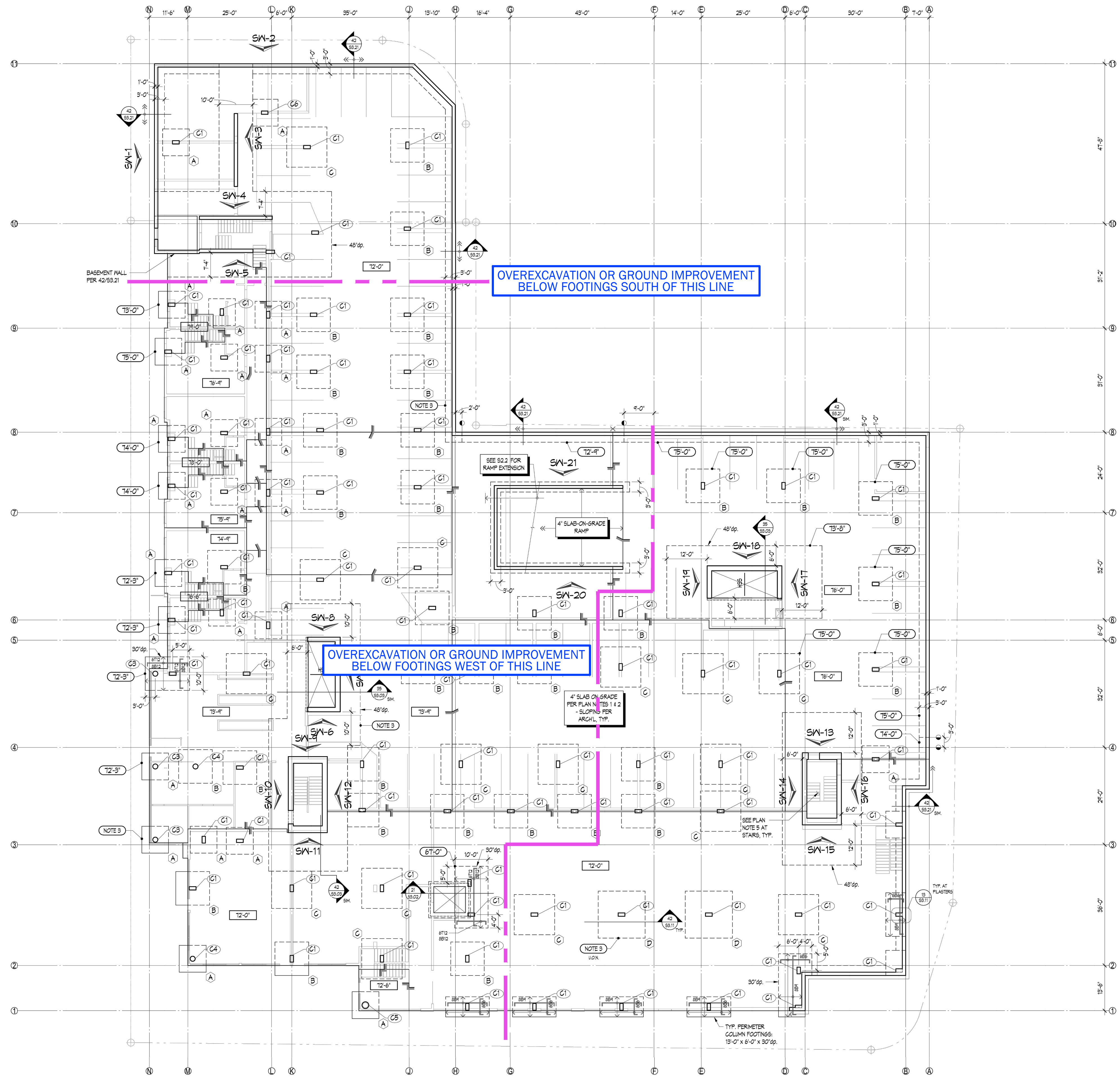
Temporary Shoring Design Sections

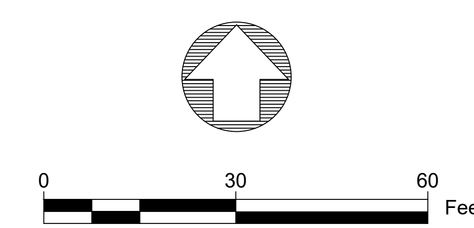
Grand Street Commons East
S Grand St and 22nd Ave S
Seattle, Washington

Aspect CONSULTING

Oct-2020	BY: ECS/CMV	FIGURE NO.
PROJECT NO. 170304-23	REVISED BY: -	3

CAD Path: Q:\MBHA Development\170304 Grand Street Commons\2020-09 Shoring Design\170304-East-03.dwg Fig 3 || Date Saved: Oct 12, 2020 10:19am || User: cvanslyke





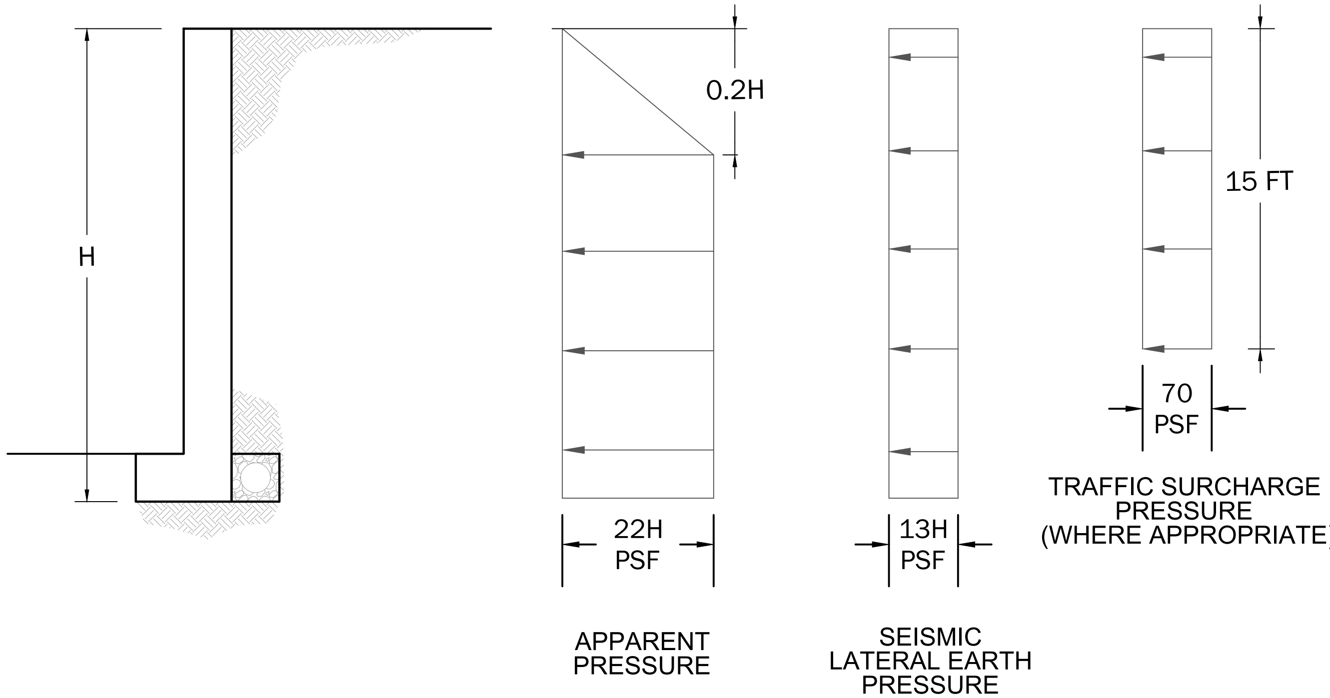
Source: Base map PDF provided by Runberg Architecture Group, Seattle, Washington, dated September, 2020.

Foundation Subgrade Conditions

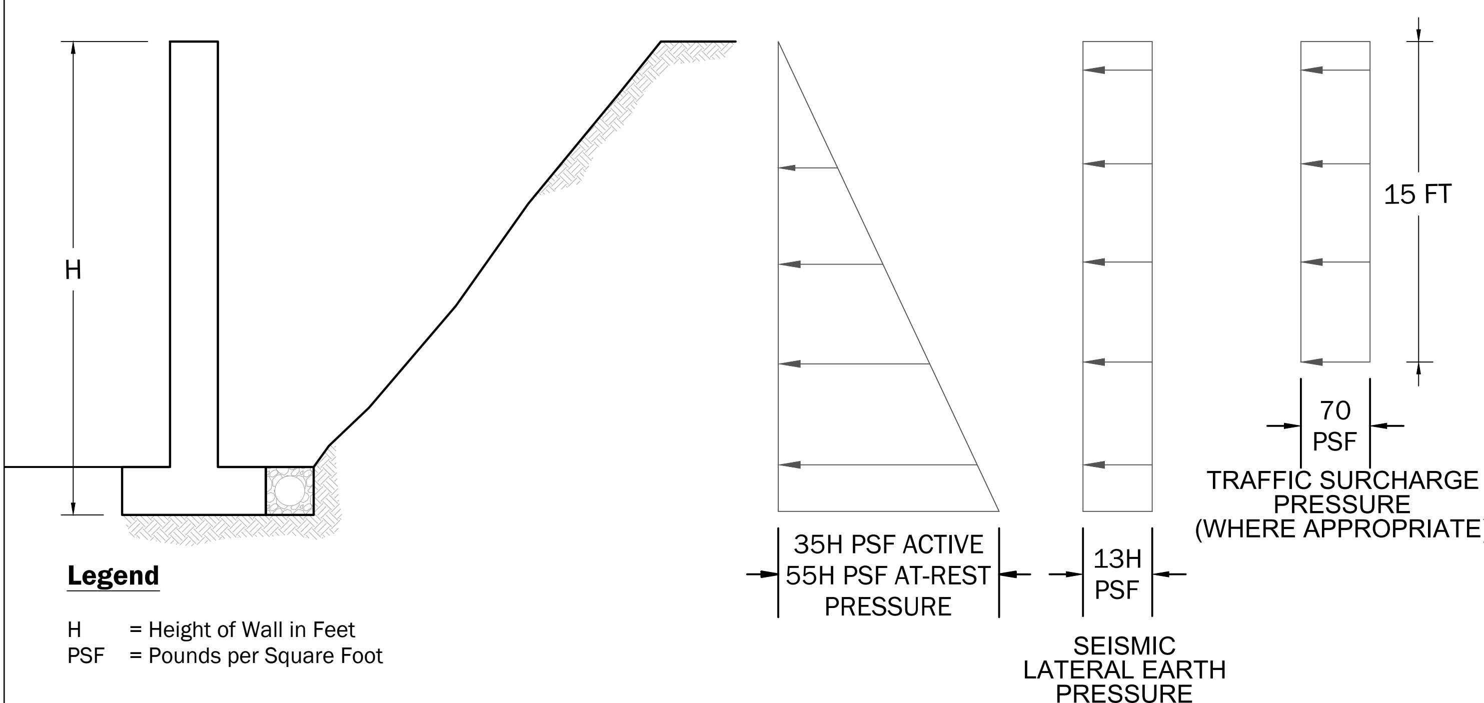
Grand Street Commons East
S Grand St and 22nd Ave S
Seattle, Washington

Aspect CONSULTING	Oct-2020	BY: ECS/CMV	FIGURE NO.
	PROJECT NO. 170304-23	REVISED BY: -	4

Lateral Earth Pressures for Walls Constructed Against Temporary Shoring



Lateral Earth Pressures for Backfilled Walls



Legend

H = Height of Wall in Feet
PSF = Pounds per Square Foot

Notes:

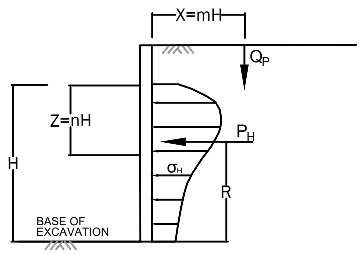
1. Diagrams are not to scale.
2. All dimensions are in units of feet and pressures are in units of pounds per square foot.
3. Lateral earth pressures presented assume the ground surface behind the walls is level and the walls are provided with adequate drainage and build up of unbalanced hydrostatic pressures do not occur.
4. Seismic earth pressure and traffic surcharge pressure should not be applied simultaneously.
5. To calculate surcharge pressures from loads other than light traffic, refer to Figure 5.

Lateral Earth Pressures for Permanent Walls

Grand Street Commons East
S Grand St and 22nd Ave S
Seattle, Washington

Aspect CONSULTING	SEP-2020	BY: ECS / MO	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: -	5

LATERAL EARTH PRESSURE FROM POINT LOAD, Q_P (SPREAD FOOTING)



FOR m ≤ 0.4

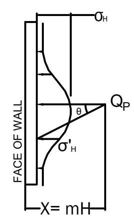
$$\sigma_H = \frac{0.28\, Q_P\, n^2}{H^2\, (0.16 + n^2)^3}$$

FOR m > 0.4

$$\sigma_H = \frac{1.77\, Q_P\, m^2\, n^2}{H^2\, (m^2 + n^2)^3}$$

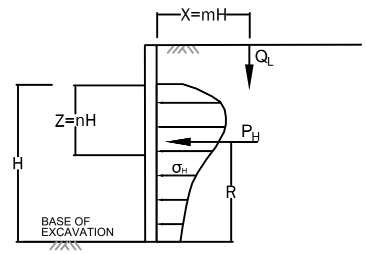
$$\sigma'_H = \sigma_H\, \mathrm{COS}^2(1.1\,\theta)$$

M	$P_H\left(\frac{H}{Q_P}\right)$	R
0.2	0.78	0.59H
0.4	0.78	0.59H
0.6	0.45	0.48H



Pressures from Point Load Q_P

LATERAL EARTH PRESSURE FROM LINE LOAD, Q_L (CONTINUOUS WALL FOOTING)



FOR m ≤ 0.4

$$\sigma_H = \frac{0.2\, Q_L\, n}{H\, (0.16 + n^2)^2}$$

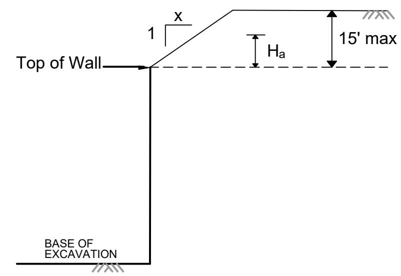
FOR m > 0.4

$$\sigma_H = \frac{1.28\, Q_L\, m^2\, n}{H\, (m^2 + n^2)^2}$$

$$\text{RESULTANT } P_H = \frac{0.64\, Q_L}{(m^2 + 1)}$$

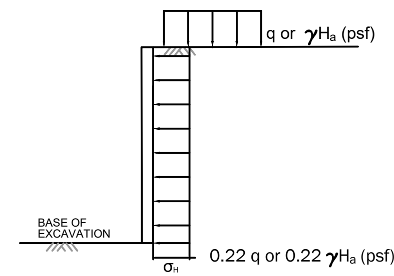
M	R
0.1	0.60H
0.3	0.60H
0.5	0.56H
0.7	0.48H

EFFECTIVE HEIGHT, H_a, FOR SLOPED CUTS ABOVE TEMPORARY SHORING



x	Slope Height, ft 5	10	15	
1	5	9	12	Values of H_a
1 1/2	4	7	9	

UNIFORM SURCHARGES, q (FLOOR LOADS, LARGE FOUNDATION ELEMENTS)



σ_H = LATERAL SURCHARGE PRESSURE FROM UNIFORM SURCHARGE

NOTES

1. Procedures for estimating surcharge pressures shown above are based on Manual 7.02 Naval Facilities Engineering Command, September 1986 (NAVFAC DM 7.02).

2. Lateral earth pressures from surcharge should be added to temporary earth pressures recommended in Figure 5 on a case-by-case basis.

3. See report text for where surcharge pressures are appropriate.

~~Temporary Shoring:~~

Recommended Surcharge Pressures

Grand Street Commons East

S Grand St and 22nd Ave S

Seattle, Washington

Aspect CONSULTING

SEP-2020	BY: ECS / MO	FIGURE NO.
PROJECT NO. 170304	REVISED BY: -	6

APPENDIX A

Subsurface Explorations

A.1 Field Exploration Program

A.1.1 Hollow-Stem Auger Borings

Between August 2017 and February 2020, Aspect Consulting, LLC (Aspect) completed 26 machine-drilled borings (designated with prefixes AC-MW and AC-SB) at the Site. The machine-drilled borings were advanced with hollow-stem auger drilling methods using CME-55 and CME-75 truck-mounted drill rigs operated by Cascade Drilling under subcontract to Aspect.

In the machine-drilled borings, disturbed soil samples were obtained at 5-foot intervals by driving a 3-inch split-barrel sampler (Dames & Moore sampler) a distance of 18 inches into the soil with a 300-pound hammer free-falling a distance of 30 inches. The number of blows required to drive the sampler 18 inches is recorded in three 6-inch intervals. The number of blows required to drive the sampler the last two intervals is known as the blow count. The blow count provides a measure of relative density or consistency of granular and cohesive soils, respectively. The blow counts obtained from driving a 3-inch split barrel sampler a distance of 18 inches with a 300-pound hammer is roughly equivalent to the blow count or "N-value" obtained from driving a 2-inch split barrel sampler a distance of 18 inches with a 140-pound hammer in accordance with ASTM D1586, *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils.*

An Aspect staff geologist was present throughout the exploration program to observe the drilling procedures, assist in sampling, and to prepare descriptive logs of the explorations. Soils were identified in general accordance with ASTM D2488, *Standard Practice for Description and Identification of Soils* (*Visual-Manual Procedure)* (ASTM, 2018). The summary exploration logs represent our interpretation of the contents of the field logs. The stratigraphic contacts shown on the individual summary logs represent the approximate boundaries between soil types; actual transitions may be more gradual. The subsurface conditions depicted are only for the specific date and locations reported, and therefore, are not necessarily representative of other locations and times.

Upon completion, the machine-drilled borings were either completed as 2-inch monitoring wells or backfilled with 3/8-inch bentonite chips in accordance with requirements of the Washington State Department of Ecology.

A.1.2 Cone Penetration Test Soundings

In September 2019 and September 2020, Aspect completed thirteen cone penetration test (CPT) soundings (designated AC-CPT-01E through AC-CPT-13E) at the Site. The CPT soundings were completed using truck-mounted CPT rigs operated by ConeTec under subcontract to Aspect.

The CPT soundings were completed in accordance with ASTM D5778, *Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils*. The CPT is conducted by pushing steel rods with an instrumented tip that collects continuous data as the tip is advanced through the subsurface. The data collected includes a measure of soil resistance to penetration of by the tip, a measure of frictional resistance of the soil developed along the friction sleeve, and pore water pressure. The data provides information by which soil type and relative density/consistency may be correlated, as well as groundwater information. A detailed CPT investigation data report with CPT logs and raw data obtained from the soundings is presented in this appendix.

Major Division	Subdivision	Fines	Symbol	Group Name
Coarse-Grained Soils - More than 50%[1] Retained on No. 200 Sieve	Gravels - More than 50%[1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines	**GW**	Well-graded GRAVEL Well-graded GRAVEL WITH SAND
			GP	Poorly-graded GRAVEL Poorly-graded GRAVEL WITH SAND
		≥15% Fines	**GM**	SILTY GRAVEL SILTY GRAVEL WITH SAND
			GC	CLAYEY GRAVEL CLAYEY GRAVEL WITH SAND
	Sands - 50%[1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines	**SW**	Well-graded SAND Well-graded SAND WITH GRAVEL
			SP	Poorly-graded SAND Poorly-graded SAND WITH GRAVEL
		≥15% Fines	**SM**	SILTY SAND SILTY SAND WITH GRAVEL
			SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL
Fine-Grained Soils - 50%[1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50%		**ML**	SILT SANDY or GRAVELLY SILT SILT WITH SAND SILT WITH GRAVEL
			CL	LEAN CLAY SANDY or GRAVELLY LEAN CLAY LEAN CLAY WITH SAND LEAN CLAY WITH GRAVEL
			OL	ORGANIC SILT SANDY or GRAVELLY ORGANIC SILT ORGANIC SILT WITH SAND ORGANIC SILT WITH GRAVEL
	Silts and Clays Liquid Limit 50% or More		**MH**	ELASTIC SILT SANDY or GRAVELLY ELASTIC SILT ELASTIC SILT WITH SAND ELASTIC SILT WITH GRAVEL
			CH	FAT CLAY SANDY or GRAVELLY FAT CLAY FAT CLAY WITH SAND FAT CLAY WITH GRAVEL
			OH	ORGANIC CLAY SANDY or GRAVELLY ORGANIC CLAY ORGANIC CLAY WITH SAND ORGANIC CLAY WITH GRAVEL
Highly Organic Soils			**PT**	PEAT and other mostly organic soils

"WITH SILT" or "WITH CLAY" means 5 to 15% silt and clay, denoted by a "-" in the group name; e.g., SP-SM • "SILTY" or "CLAYEY" means >15% silt and clay • "WITH SAND" or "WITH GRAVEL" means 15 to 30% sand and gravel. • "SANDY" or "GRAVELLY" means >30% sand and gravel. • "Well-graded" means approximately equal amounts of fine to coarse grain sizes • "Poorly graded" means unequal amounts of grain sizes • Group names separated by "/" means soil contains layers of the two soil types; e.g., SM/ML.

Soils were described and identified in the field in general accordance with the methods described in ASTM D2488. Where indicated in the log, soils were classified using ASTM D2487 or other laboratory tests as appropriate. Refer to the report accompanying these exploration logs for details.

1. Estimated or measured percentage by dry weight
2. (SPT) Standard Penetration Test (ASTM D1586)
3. Determined by SPT, DCPT (ASTM STP399) or other field methods. See report text for details.

GEOTECHNICAL LAB TESTS

MC	=	Natural Moisture Content
PS	=	Particle Size Distribution
FC	=	Fines Content (% < 0.075 mm)
GH	=	Hydrometer Test
AL	=	Atterberg Limits
C	=	Consolidation Test
Str	=	Strength Test
OC	=	Organic Content (% Loss by Ignition)
Comp	=	Proctor Test
K	=	Hydraulic Conductivity Test
SG	=	Specific Gravity Test

CHEMICAL LAB TESTS

Organic Chemicals

BTEX	=	Benzene, Toluene, Ethylbenzene, Xylenes
TPH-Dx	=	Diesel and Oil-Range Petroleum Hydrocarbons
TPH-G	=	Gasoline-Range Petroleum Hydrocarbons
VOCs	=	Volatile Organic Compounds
SVOCs	=	Semi-Volatile Organic Compounds
PAHs	=	Polycyclic Aromatic Hydrocarbon Compounds
PCBs	=	Polychlorinated Biphenyls

Metals

RCRA8	=	As, Ba, Cd, Cr, Pb, Hg, Se, Ag, (d = dissolved, t = total)
MTCA5	=	As, Cd, Cr, Hg, Pb (d = dissolved, t = total)
PP-13	=	Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, Zn (d=dissolved, t=total)

FIELD TESTS

PID	=	Photoionization Detector
Sheen	=	Oil Sheen Test
SPT[2]	=	Standard Penetration Test
NSPT	=	Non-Standard Penetration Test
DCPT	=	Dynamic Cone Penetration Test

COMPONENT DEFINITIONS

Descriptive Term		*Size Range and Sieve Number*
Boulders	=	Larger than 12 inches
Cobbles	=	3 inches to 12 inches
Coarse Gravel	=	3 inches to 3/4 inches
Fine Gravel	=	3/4 inches to No. 4 (4.75 mm)
Coarse Sand	=	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	=	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	=	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	=	Smaller than No. 200 (0.075 mm)

ESTIMATED[1] PERCENTAGE

% by Weight		*Modifier*	*% by Weight*		*Modifier*
<1	=	Subtrace	15 to 25	=	Little
1 to <5	=	Trace	30 to 45	=	Some
5 to 10	=	Few	>50	=	Mostly

MOISTURE CONTENT

Dry	=	Absence of moisture, dusty, dry to the touch
Slightly Moist	=	Perceptible moisture
Moist	=	Damp but no visible water
Very Moist	=	Water visible but not free draining
Wet	=	Visible free water, usually from below water table

RELATIVE DENSITY

Non-Cohesive or Coarse-Grained Soils

Density[3]		*SPT[2] Blows/Foot*	*Penetration with 1/2" Diameter Rod*
Very Loose	=	0 to 4	≥ 2'
Loose	=	5 to 10	1' to 2'
Medium Dense	=	11 to 30	3" to 1'
Dense	=	31 to 50	1" to 3"
Very Dense	=	> 50	< 1"

CONSISTENCY

Cohesive or Fine-Grained Soils

Consistency[3]		*SPT[2] Blows/Foot*	*Manual Test*
Very Soft	=	0 to 1	Penetrated >1" easily by thumb. Extrudes between thumb & fingers.
Soft	=	2 to 4	Penetrated 1/4" to 1" easily by thumb. Easily molded.
Medium Stiff	=	5 to 8	Penetrated >1/4" with effort by thumb. Molded with strong pressure.
Stiff	=	9 to 15	Indented ~1/4" with effort by thumb.
Very Stiff	=	16 to 30	Indented easily by thumbnail.
Hard	=	> 30	Indented with difficulty by thumbnail.

GEOLOGIC CONTACTS

Observed and Distinct	Observed and Gradual	Inferred

Aspect CONSULTING

Exploration Log Key

Aspect CONSULTING

Grand Street Commons - 170304

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, East Block	E:1277690 N:217686	**AC-MW-04**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Cascade	CME 75 truck rig	300-lb autohammer w/ Dames & Moore sampler	78'	BKA 327

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Curtis	Hollow Stem Auger	8/29/2017	77.4'	22.37' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	78	Flush 8-inch-diameter monument				Asphalt (3 inches thick)
		2-inch-diamter PVC casing in concrete				**FILL** Loose, moist, brown, silty SAND (SM); fine to medium sand, trace fine to coarse subrounded gravel.
5		2-inch-diameter PVC casing in bentonite chips	Split barrel	Chemically Analyzed	Blows/ft (non-SPT)= 10; Sheen= Slight; Odor= None; PID= <1 ppm	
7						**GLACIAL RECESSIONAL DEPOSITS** Medium stiff, moist, brown, CLAY (CL); low plasticity; thin interbeds of silty sand; sand-size organic fragments.
10			Split barrel		Blows/ft (non-SPT)= 7; Sheen= None; Odor= None; PID= <1 ppm	
15			Split barrel	Chemically Analyzed	Blows/ft (non-SPT)= 15; Sheen= None; Odor= None; PID= <1 ppm	
17						**GLACIALLY CONSOLIDATED SOIL** Medium dense, moist, gray-brown, silty to very silty SAND (SM); fine to medium sand, trace gravel.
20		slotted screen in sand	Split barrel		Blows/ft (non-SPT)= 36; Sheen= None; Odor= None; PID= <1 ppm	Becomes dense and slightly gravelly
		3/1/2020; 6/25/2019; 11/15/2017 (static water levels)				
25			Split barrel		Blows/ft (non-SPT)= 75; Sheen= None; Odor= None; PID= <1 ppm	Becomes very dense, very moist
30			Split barrel		Blows/ft (non-SPT)= 50; Sheen= None; Odor= None; PID= <1 ppm	
34			Split barrel		Blows/ft (non-SPT)= 56; Sheen= None; Odor= None; PID= <1 ppm	Hard, slightly moist, gray, sandy SILT (ML); low plasticity, fine to medium sand.
35						Bottom of exploration at 35 ft. bgs.

Elevation scale: 75, 70, 65, 60, 55, 50, 45, 40. Depth scale: 5, 10, 15, 20, 25, 30, 35, 40.

Legend

Sample Method: No Soil Sample Recovery; Split Barrel 3.25" X 2.375" (D&M)

Water Level: Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log AC-MW-04

Sheet 1 of 1

Aspect CONSULTING

Grand Street Commons - 170304			Monitoring Well Log	
Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
S Grand St and 22nd Ave S - Seattle, WA, East Block			E:1277693 N:217751	**AC-MW-05**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	Ecology Well Tag No. BKA 458
Cascade	CME 55	300-lb autohammer w/ Dames & Moore sampler	78'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis	Hollow Stem Auger	11/8/2017	77.5'	17.22' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	78	Flush 8-inch-diameter monument					Asphalt (2 inches thick)	
		2-inch-diamter PVC casing in concrete					**FILL** Loose, moist, brown, gravelly, silty SAND (SM); fine to medium sand, trace roots and organics.	
	75							
5		2-inch-diameter PVC casing in bentonite chips		Chemically Analyzed	Blows (non-SPT)= 4,5,5 Sheen= None Odor= None PID= <1 ppm		**GLACIAL RECESSIONAL DEPOSITS** Stiff, moist, brown, CLAY (CL); low plasticity.	5
	70							
10					Blows (non-SPT)= 4,5,4 Sheen= None Odor= None PID= <1 ppm			10
	65							
15				Chemically Analyzed	Blows (non-SPT)= 11,13,13 Sheen= None Odor= None PID= <1 ppm		**GLACIALLY CONSOLIDATED SOIL** Medium dense, moist, gray, gravelly, silty to very silty SAND (SM); fine to medium sand.	15
		▼ 3/1/2020						
	60	▼ 6/25/2019						
		▼ 11/15/2017						
20		slotted screen in sand			Blows (non-SPT)= 6,26,25 Sheen= None Odor= None PID= <1 ppm		Becomes very dense	20
	55							
25					Blows (non-SPT)= 11,19,26 Sheen= None Odor= None PID= <1 ppm		Becomes very moist	25
	50							
30		▽ 11/8/2017			Blows (non-SPT)= 48,50/6 Sheen= None Odor= None PID= <1 ppm		Becomes wet	30
	45							
35				Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Hard, moist, gray, slightly sandy to sandy SILT (ML); low plasticity, fine to medium sand, trace coarse sand and fine gravel. Bottom of exploration at 34.5 ft. bgs.	35
	40							
40								40

Legend

Sample Method
- ○ No Soil Sample Recovery
- ▮ Split Barrel 3.25" X 2.375" (D&M)

Water Level
- ▼ Static Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log AC-MW-05

Sheet 1 of 1

Aspect CONSULTING

Grand Street Commons - 170304			Monitoring Well Log	
Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
S Grand St and 22nd Ave S - Seattle, WA, East Block			E:1277793 N:217652	**AC-MW-06**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	Ecology Well Tag No. BKA 459
Cascade	CME 55	300-lb autohammer w/ Dames & Moore sampler	78'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis	Hollow Stem Auger	11/9/2017	77.5'	12.89' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	78	Flush 8-inch-diameter monument					Concrete (5 inches thick)	
		2-inch-diamter PVC casing in concrete					**FILL** Loose, moist, gray-brown, silty SAND (SM); fine to medium sand.	
	75						**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, brown and gray, slightly gravelly, silty to very silty SAND (SM); fine to medium sand, fine subrounded gravel.	
5		2-inch-diameter PVC casing in bentonite chips		Chemically Analyzed	Blows (non-SPT)= 26,50/6 Sheen= None Odor= None PID= <1 ppm			5
	70							
10					Blows (non-SPT)= 40,50/6 Sheen= None Odor= None PID= <1 ppm			10
	65	3/1/2020						
15				Chemically Analyzed	Blows (non-SPT)= 50/5 Sheen= None Odor= None PID= <1 ppm			15
	60	6/25/2019						
20		slotted screen in sand			Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Becomes very moist	20
		11/15/2017						
	55							
25					Blows (non-SPT)= 50,50/6 Sheen= None Odor= None PID= <1 ppm			25
	50							
				Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Hard, moist, gray, slightly sandy SILT (ML); low plasticity, fine to medium sand.	
30							Bottom of exploration at 30 ft. bgs.	30
	45							
35								35
	40							
40								40

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log AC-MW-06

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304		Monitoring Well Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block		E:1277785 N:217596	**AC-MW-07**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	Ecology Well Tag No. BKA 460
Cascade	CME 55	300-lb autohammer w/ Dames & Moore sampler	78'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis	Hollow Stem Auger	11/10/2017	77.5'	18.75' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0		Flush 8-inch-diameter monument					Concrete (6 inches thick)	
		2-inch-diamter PVC casing in concrete					**FILL** Loose, moist, gray-brown, silty SAND (SM); fine to medium sand.	
	75						**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, gray, slightly gravelly, silty to very silty SAND (SM); fine to medium sand, fine subrounded gravel.	
5		2-inch-diameter PVC casing in bentonite chips		Chemically Analyzed	Blows (non-SPT)= 35,50/6 Sheen= None Odor= None PID= <1 ppm			5
	70							
10				Chemically Analyzed	Blows (non-SPT)= 30,50/5 Sheen= None Odor= None PID= <1 ppm			10
	65							
15				Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm			15
	60	3/1/2020						
20		6/25/2019			Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm			20
	55	11/15/2017					Becomes very moist	
25		slotted screen in sand			Blows (non-SPT)= 45,50/6 Sheen= None Odor= None PID= <1 ppm			25
	50						Hard, moist, gray, slightly sandy SILT (ML); low plasticity, fine to medium sand.	
30					Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 30 ft. bgs.	30
	45							
35								35
	40							
40								40

Legend

Sample Method: No Soil Sample Recovery; Split Barrel 3.25" X 2.375" (D&M)

Water Level: Static Water Level

See Exploration Log Key for explanation of symbols

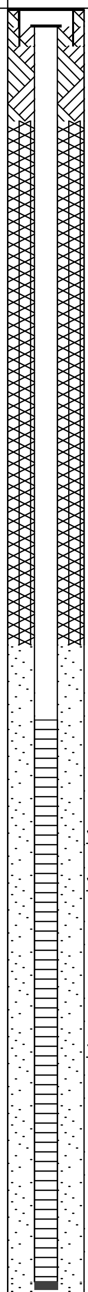
Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log AC-MW-07

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304	Monitoring Well Log	
	Project Address & Site Specific Location	*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block	E:1277592 N:217765	**AC-MW-08**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	77.92'	Ecology Well Tag No. BKA 457
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis Askew	Hollow Stem Auger	3/27/2019	77.55'	22.29' (Static)



Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		Expansion plug Flush-mount well box in concrete					Concrete	
	75						**FILL** Loose, wet, dark brown, silty SAND (SM); fine to medium sand; trace gravel; trace organics.	
5		2 inch diam Sch 40 PVC casing		Chemically Analyzed	Blows (non-SPT)= 4,4,4 Sheen= None Odor= None PID= <1 ppm		**GLACIAL RECESSIONAL DEPOSITS** Medium stiff, moist, gray brown, CLAY (CL); medium plasticity; interbeds of silty sand; sand-sized organic fragments.	5
	70	Hydrated bentonite chips						
10				Chemically Analyzed	Blows (non-SPT)= 6,7,7 Sheen= Moderate Odor= Moderate PID= 30.2		Medium dense, moist, gray, silty SAND (SM); fine to medium sand, trace gravel; pockets of clay; massive fabric.	10
	65							
15				Chemically Analyzed	Blows (non-SPT)= 11,19,12 Sheen= Slight Odor= None PID= 1		**GLACIALLY CONSOLIDATED SOIL** Hard, moist, gray brown, sandy SILT (ML); low to medium plasticity; fine sand; trace fine to coarse gravel.	15
	60	12x20 sand						
20				Chemically Analyzed	Blows (non-SPT)= 30,50/6 Sheen= None Odor= None PID= 3.2			20
	55	▼ 3/1/2020 ▼ 6/25/2019						
25					Blows (non-SPT)= 26,50/6 Sheen= None Odor= None PID= 3.7			25
	50	∇ 3/27/2019						
30		2 inch diam Sch 40 PVC screen 0.010 inch slot			Blows (non-SPT)= 31,50/6 Sheen= None Odor= None PID= 1.5		Very dense, wet, gray brown, silty SAND (SM); fine to medium sand, rapid dilatancy.	30
	45							
35					Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Becomes moist Bottom of exploration at 34.5 ft. bgs.	35
	40							
40								40

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- ▼ Static Water Level
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

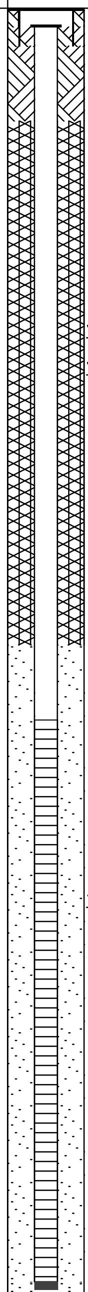
Exploration Log AC-MW-08

Sheet 1 of 1

Aspect CONSULTING

Grand Street Commons - 170304		Monitoring Well Log	
Project Address & Site Specific Location		Coordinates (SPN NAD83 ft)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, East Block		E:1277761 N:217728	AC-MW-11

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	77.89'	BKA 457
Operator	**Exploration Method(s)**	**Work Start/Completion Dates**	**Top of Casing Elev. (NAVD88)**	**Depth to Water (Below GS)**
Curtis Askew	Hollow Stem Auger	3/28/2019	77.5'	8.79' (Static)



Depth (feet)	Elev. (feet)	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	77.89			Concrete
				FILL Loose, moist, brown, silty SAND (SM); fine sand.
5			Blows (non-SPT)= 14,13,15 Sheen= None Odor= None PID= <1 ppm	**GLACIALLY CONSOLIDATED SOIL** Medium dense, moist, gray-brown, silty SAND (SM); fine sand; faint stratification.
10			Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	Becomes dense, moist, gray, gravelly ; fine to coarse sand; fine gravel.
15		Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	Becomes very moist; with trace gravel; diamict fabric
20			Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	
25			Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	Becomes wet
30			Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	Becomes brown, gravelly, fine to coarse sand, fine to coarse gravel
35			Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	Becomes wet, with sand-sized organic fragments
				Bottom of exploration at 34.5 ft. bgs.

Elevation scale: 75, 70, 65, 60, 55, 50, 45, 40. Depth scale: 5, 10, 15, 20, 25, 30, 35, 40.

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- ▼ Static Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-MW-11

Sheet 1 of 1

Aspect CONSULTING

Grand Street Commons - 170304			Monitoring Well Log	
Project Address & Site Specific Location			Coordinates (SPN NAD83 ft)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, East Block			E:1277729 N:217638	AC-MW-12
Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No. BKA 457
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	77.9'	
Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Curtis Askew	Hollow Stem Auger	3/28/2019	77.52'	17.55' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		Expansion plug; Flush-mount well box in concrete					Concrete	
							FILL Loose, moist, gray-brown, silty SAND (SM); fine to medium sand.	
	75						**GLACIALLY CONSOLIDATED SOIL** Dense, moist, brown and gray, silty SAND (SM); fine to medium sand, trace gravel.	
5		2 inch diam Sch 40 PVC casing	I	Chemically Analyzed	Blows (non-SPT)= 10,13,19 Sheen= None Odor= None PID= <1 ppm			5
	70	Hydrated bentonite chips						
10			I		Blows (non-SPT)= 32,50/6 Sheen= None Odor= None PID= <1 ppm		Becomes very dense, gray	10
	65							
15			I		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm			15
	60	▼ 3/1/2020						
20		▼ 6/25/2019	I		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm			20
	55	▽ 3/28/2019						
25		12x20 sand	I		Blows (non-SPT)= 34,50/6 Sheen= None Odor= None PID= <1 ppm		Becomes wet	25
	50							
30		2 inch diam Sch 40 PVC screen 0.01 inch slot	I		Blows (non-SPT)= 36,50/6 Sheen= None Odor= None PID= <1 ppm			30
	45							
35			I		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Becomes moist; Bottom of exploration at 34.5 ft. bgs.	35
	40							
40								40

Legend

Sample Method: Split Barrel 3.25" X 2.375" (D&M)

Water Level: ▼ Static Water Level; ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-MW-12

Sheet 1 of 1

Monitoring Well Log

Aspect CONSULTING	Grand Street Commons - 170304		Monitoring Well Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block		E:1277615 N:217624	**AC-MW-13**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	Ecology Well Tag No. BKA 457
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	77.63'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis Askew	Hollow Stem Auger	4/2/2019	77.29'	18.68' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0		Expansion plug Flush-mount well box in concrete				Concrete
						FILL Very loose, moist, dark brown, silty SAND (SM); fine to medium sand, fine gravel; trace organics.
	75					
5		2 inch diam Sch 40 PVC casing	Split Barrel; No Soil Sample Recovery	Chemically Analyzed	Blows (non-SPT)= 2,2,2 Sheen= None Odor= None PID= 1.1	
	70	Hydrated bentonite chips				**GLACIAL RECESSIONAL DEPOSITS** Stiff, moist, blue gray, CLAY (CL); medium plasticity, mottled brown.
10			Split Barrel; No Soil Sample Recovery	Chemically Analyzed	Blows (non-SPT)= 5,6,7 Sheen= Slight Odor= None PID= 3.9	
	65					
15		12x20 sand	Split Barrel	Chemically Analyzed	Blows (non-SPT)= 36,50/6 Sheen= None Odor= None PID= 3.1	**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, gray, gravelly, silty SAND (SM); fine to medium sand, trace coarse sand, fine to coarse gravel.
	60	▼ 3/1/2020				
20		▼ 6/25/2019	Split Barrel		Blows (non-SPT)= 31,50/6 Sheen= None Odor= None PID= 3.1	Massive fabric
	55					
25		2 inch diam Sch 40 PVC screen 0.01 inch slot	Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 3.6	Hard, slightly moist, brown, sandy SILT (ML); non-plastic; mostly fine sand, trace medium and coarse sand; trace fine gravel.
	50					
30			Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 5.1	Very dense, very moist, gray brown, silty SAND (SM) with gravel ; fine to coarse sand; fine gravel.
	45					Becomes moist, stratified
35			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 21,50/6 Sheen= None Odor= None PID= 4.7	Hard, moist, gray, sandy SILT (ML); non-plastic; fine to coarse sand.
						Bottom of exploration at 35 ft. bgs.
	40					
40						

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ▮ Split Barrel 3.25" X 2.375" (D&M)

Water Level
- ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: IV
Approved by: MvA 4/28/2020

Exploration Log AC-MW-13

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block			E:1277616 N:217691	AC-MW-14
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	Ecology Well Tag No. BKA 457
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop		77.85'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis Askew	Hollow Stem Auger	3/26/2019		77.45'	22.19' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0		Expansion plug Flush-mount well box in concrete					Concrete	
	75						**FILL** Loose, moist, brown, silty SAND (SM); fine to medium sand.	
5		2 inch diam Sch 40 PVC casing		Chemically Analyzed	Blows (non-SPT)= 10,8,10 Sheen= None Odor= None PID= <1 ppm		**GLACIAL RECESSIONAL DEPOSITS** Medium dense, moist, brown and gray, slightly silty SAND (SP-SM); fine to medium sand, trace coarse sand; trace fine gravel.	5
	70	Hydrated bentonite chips						
10				Chemically Analyzed	Blows (non-SPT)= 11,20,10 Sheen= None Odor= None PID= <1 ppm		Very stiff, moist, mottled gray and brown, CLAY (CL) interbedded withsilty SAND (SM); low to medium plasticity, fine to medium sand.	10
	65							
15					Blows (non-SPT)= 21,50/6 Sheen= None Odor= None PID= <1 ppm		**GLACIALLY CONSOLIDATED SOIL** Dense, moist, gray, silty SAND (SM); fine to medium sand, trace coarse sand; trace fine gravel.	15
	60							
20				Chemically Analyzed	Blows (non-SPT)= 19,21,23 Sheen= None Odor= None PID= <1 ppm			20
	55	▼ 3/1/2020 ▼ 6/25/2019 ▽ 3/26/2019						
25		12x20 sand			Blows (non-SPT)= 11,13,13 Sheen= None Odor= None PID= <1 ppm		Becomes fine to coarse sand	25
	50	2 inch diam Sch 40 PVC screen 0.01 inch slot						
30					Blows (non-SPT)= 50/5 Sheen= None Odor= None PID= <1 ppm		Becomes very dense	30
	45							
35					Blows (non-SPT)= 50/5 Sheen= None Odor= None PID= <1 ppm		Hard, wet, gray brown, SILT (ML) with sand ; non-plastic to low plasticity; fine sand. Bottom of exploration at 34.5 ft. bgs.	35
	40							
40								40

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ▮ Split Barrel 3.25" X 2.375" (D&M)

Water Level
- ▼ Static Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-MW-14

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block			E:1277727 N:217564	**AC-MW-15**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop		77.38'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
James Goble	Hollow Stem Auger	5/14/2019		NA	20' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0		Expansion plug Flush-mount well box in concrete				Concrete **FILL** Loose, slightly moist, brown, silty SAND (SM); fine to medium sand.	
	75						
5		2 inch diam Sch 40 PVC casing	Split Barrel; No Soil Sample Recovery	Chemically Analyzed	Blows (non-SPT)= 6, 11, 15 Sheen= Moderate Odor= None PID= 2.4	**GLACIALLY CONSOLIDATED SOIL** Medium dense, slightly moist, gray-brown, silty SAND (SM); fine to coarse sand; trace fine gravel.	5
	70	Hydrated bentonite chips					
10			Split Barrel		Blows (non-SPT)= 19, 23, 20 Sheen= Moderate Odor= None PID= 2.4	Becomes dense	10
	65						
15			Split Barrel; No Soil Sample Recovery	Chemically Analyzed	Blows (non-SPT)= 20, 21, 23 Sheen= Slight Odor= None PID= 5		15
	60						
20		▼ 3/1/2020	Split Barrel		Blows (non-SPT)= 31, 50/6 Sheen= Slight Odor= None PID= 3.1	Hard, slightly moist, brown gray, sandy SILT (ML); low plasticity; fine sand interbeds; trace coarse sand; diamict fabric with pockets of silty sand.	20
	55	12x20 sand ▼ 6/25/2019 ▽ 5/14/2019					
25			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= Slight Odor= None PID= 3.2	Very dense, wet, mottled gray-brown and orange-brown, silty SAND (SM); fine to medium sand; trace gravel; diamict fabric.	25
	50	2 inch diam Sch 40 PVC screen 0.01 inch slot					
30			Split Barrel		Blows (non-SPT)= 50/6 Sheen= Slight Odor= None PID= 6.5	Becomes slightly moist; with fine to coarse sand	30
	45						
35			Split Barrel		Blows (non-SPT)= 50/6 Sheen= Moderate Odor= None PID= 7.6	Very dense, slightly moist, gray-brown, sandy SILT (ML); low plasticity; fine to medium sand. Bottom of exploration at 34.5 ft. bgs.	35
	40						
40							40

Legend

Sample Method
- ◯ No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- ▼ Static Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: IV
Approved by: MvA 4/28/2020

Exploration Log AC-MW-15

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304		Environmental Exploration Log	
	Project Address & Site Specific Location: S Grand St and 22nd Ave S - Seattle, WA, East Block		Coordinates (SPN NAD83 ft): E:1277694 N:217717 (est)	Exploration Number: **AC-SB-01**
Contractor: Cascade	Equipment: CME 55	Sampling Method: Downhole jars, 300 lb hammer, 30-inch drop	Ground Surface (GS) Elev. (NAVD88): 78'(est)	
Operator: Curtis	Exploration Method(s): Hollow Stem Auger	Work Start/Completion Dates: 11/8/2017	Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): 35' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0	78	Borehole backfilled with bentonite chips and capped with asphalt.			Asphalt (2 inches thick)	
					FILL Loose, moist, brown, gravelly, silty SAND (SM); fine to medium sand; fine gravel.	
	75					
5			Chemically Analyzed	Blows (non-SPT)= 2,1,2 Sheen= None Odor= None PID= <1 ppm	**GLACIAL RECESSIONAL DEPOSITS** Medium stiff, moist, brown, CLAY (CL); low plasticity.	5
	70					
10			Chemically Analyzed	Blows (non-SPT)= 2,3,3 Sheen= None Odor= None PID= <1 ppm		10
	65					
15				Blows (non-SPT)= 8,10,10 Sheen= None Odor= None PID= <1 ppm	Medium dense, moist, gray, silty SAND (SM); fine to medium sand.	15
	60				**GLACIALLY CONSOLIDATED SOIL** Dense, moist, gray silty SAND (SM); fine to medium sand.	
20			Chemically Analyzed	Blows (non-SPT)= 12,22,26 Sheen= None Odor= None PID= <1 ppm		20
	55					
25				Blows (non-SPT)= 18,26,38 Sheen= None Odor= None PID= <1 ppm	Becomes very dense and very moist	25
	50					
30				Blows (non-SPT)= 32,50/6 Sheen= None Odor= None PID= <1 ppm		30
	45					
35		∇ 11/8/2017		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	Becomes wet	35
	40					
40				Blows (non-SPT)= 50/4 Sheen= None Odor= None PID= <1 ppm	Hard, moist, gray, sandy SILT (ML); low plasticity; fine to medium sand.	40
					Bottom of exploration at 39.5 ft. bgs.	

Legend

Sample Method:
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level:
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log AC-SB-01

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location: S Grand St and 22nd Ave S - Seattle, WA, East Block			Coordinates (SPN NAD83 ft): E:1277743 N:217663 (est)	Exploration Number: AC-SB-02
Contractor: Cascade	Equipment: CME 55	Sampling Method: Downhole jars, 300 lb hammer, 30-inch drop		Ground Surface (GS) Elev. (NAVD88): 81'(est)	
Operator: Curtis	Exploration Method(s): Hollow Stem Auger	Work Start/Completion Dates: 11/9/2017		Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
							Concrete (6 inches thick)	
	80	Borehole backfilled with bentonite chips and capped with concrete.					**FILL** Loose, moist, brown, silty SAND (SM); fine to medium sand.	
5	75			Chemically Analyzed	Blows (non-SPT)= 10,18,20 Sheen= None Odor= None PID= <1 ppm		**GLACIALLY CONSOLIDATED SOIL** Dense, moist, brown-gray, gravelly, silty SAND (SM); fine to medium sand; fine gravel.	5
10	70			Chemically Analyzed	Blows (non-SPT)= 30,30,50 Sheen= None Odor= None PID= <1 ppm		Becomes very dense and gray with occasional cobbles	10
15	65				Blows (non-SPT)= 30,50/6 Sheen= None Odor= None PID= <1 ppm			15
20	60			Chemically Analyzed	Blows (non-SPT)= 20,50/5 Sheen= None Odor= None PID= <1 ppm			20
25	55				Blows (non-SPT)= 28,50/6 Sheen= None Odor= None PID= <1 ppm		Becomes very moist	25
30	50				Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Hard, moist, gray, slightly sandy SILT (ML); low plasticity, fine to medium sand. Bottom of exploration at 29.5 ft. bgs.	30
35	45							35
40								40

Legend

Sample Method:
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log AC-SB-02

Sheet 1 of 1

Aspect Consulting	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			Coordinates (SPN NAD83 ft)	Exploration Number
	S Grand St and 22nd Ave S - Seattle, WA, East Block			E:1277693 N:217640 (est)	AC-SB-03
Contractor	Equipment	Sampling Method		Ground Surface (GS) Elev. (NAVD88)	
Cascade	CME 55	Downhole jars, 300 lb hammer, 30-inch drop		78'(est)	
Operator	Exploration Method(s)	Work Start/Completion Dates		Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Curtis	Hollow Stem Auger	11/7/2017		NA	30' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	78	Borehole backfilled with bentonite chips and capped with asphalt.				Asphalt (2 inches thick) **FILL** Very loose, moist, brown, gravelly, silty to very silty SAND (SM); fine to medium sand; fine gravel.
5	73		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 1,1,1 Sheen= None Odor= None PID= <1 ppm	
10	68		Split Barrel		Blows (non-SPT)= 4,10,10 Sheen= None Odor= None PID= <1 ppm	**GLACIALLY CONSOLIDATED SOIL** Medium dense, moist, brown-gray, gravelly, silty SAND (SM); fine to medium sand; fine gravel.
15	63		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 10,11,15 Sheen= None Odor= None PID= <1 ppm	
20	58		Split Barrel		Blows (non-SPT)= 13,32,50/4 Sheen= None Odor= None PID= <1 ppm	Becomes very dense
25	53		Split Barrel		Blows (non-SPT)= 30,50/6 Sheen= None Odor= None PID= <1 ppm	
30	48	∇ 11/7/2017	Split Barrel		Blows (non-SPT)= 18,50/5 Sheen= None Odor= None PID= <1 ppm	Becomes wet
35	43		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	
40	38		Split Barrel		Blows (non-SPT)= 50 Sheen= None Odor= None PID= <1 ppm	Hard, moist, gray, slightly sandy SILT (ML); low plasticity, fine to medium sand. Bottom of exploration at 39.5 ft. bgs.

Legend

Sample Method:
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level:
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log AC-SB-03

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block			E:217799.2 N:1277560 (est)	**AC-SB-07**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop		77'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
James Goble	Hollow Stem Auger	5/15/2019		NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	77	Concrete surface seal					Concrete (4 inches thick)	
	75						**FILL** Loose, moist, brown, silty SAND (SM); fine to medium sand.	
5				Chemically Analyzed	Blows (non-SPT)= 5,5,6 Sheen= None Odor= None PID= <1 ppm		**GLACIAL RECESSIONAL DEPOSITS** Stiff, moist, gray, sandy SILT (ML); low to medium plasticity; fine sand.	5
	70			Chemically Analyzed	Blows (non-SPT)= 6,7,10 Sheen= None Odor= None PID= <1 ppm		Stiff, moist, brown, sandy CLAY (CL); medium to high plasticity; fine sand.	
10		Borehole backfilled with hydrated bentonite chips		Chemically Analyzed	Blows (non-SPT)= 16,17,15 Sheen= None Odor= None PID= <1 ppm		**GLACIALLY CONSOLIDATED SOIL** Dense, moist, brown, slightly silty SAND (SP-SM); fine to medium sand; trace fine to coarse gravel.	10
	65							
15					Blows (non-SPT)= 12,21,30 Sheen= None Odor= None PID= <1 ppm			15
	60						Bottom of exploration at 15.5 ft. bgs.	
20	55							20
25	50							25
30	45							30
35	40							35
40								40

Legend

Sample Method: Split Barrel 3.25" X 2.375" (D&M)

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-07

Sheet 1 of 1

Aspect CONSULTING	**Grand Street Commons - 170304**		**Environmental Exploration Log**	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block		E:217804.7 N:1277600 (est)	**AC-SB-08**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	79'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis Askew	Hollow Stem Auger	3/27/2019	NA	24' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	79	Concrete surface seal					Concrete	
							FILL Loose, moist, brown, silty SAND (SM); fine to medium sand; with organics.	
5	75	Borehole backfilled with hydrated bentonite chips	Split Barrel	Chemically Analyzed	Blows (non-SPT)= 7,9,9 Sheen= None Odor= None PID= <1 ppm		**GLACIAL RECESSIONAL DEPOSITS** Stiff, moist, mottled gray, brown, and orange, CLAY (CL); low to medium plasticity; trace fine to medium sand.	5
10	70		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 19,50/6 Sheen= None Odor= None PID= <1 ppm		**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, gray, silty SAND (SM); fine to medium sand, trace coarse sand; trace gravel.	10
15	65		Split Barrel / No Soil Sample Recovery		Blows (non-SPT)= 24,50/6 Sheen= None Odor= None PID= <1 ppm		Becomes diamict texture	15
20	60		Split Barrel / No Soil Sample Recovery		Blows (non-SPT)= 28,50/6 Sheen= None Odor= None PID= <1 ppm			20
25	55	∇ 3/27/2019	Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Becomes wet	25
30	50		Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 29.5 ft. bgs.	30
35	45							35
40	40							40

Legend

Sample Method: No Soil Sample Recovery; Split Barrel 3.25" X 2.375" (D&M)

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-08

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304	Environmental Exploration Log	
	Project Address & Site Specific Location	*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block	E:217765.7 N:1277640 (est)	**AC-SB-09**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*
Cascade	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	78'(est)

Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis Askew	Hollow Stem Auger	3/27/2019	NA	24' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0	78	Concrete surface seal				Concrete	
						FILL Loose, moist, brown, silty SAND (SM); fine to medium sand, occasional gravel, trace organics.	
	75						
5		Borehole backfilled with hydrated bentonite chips	▮	Chemically Analyzed	Blows (non-SPT)= 4,4,4 Sheen= None Odor= None PID= <1 ppm	**GLACIAL RECESSIONAL DEPOSITS** Medium stiff, gray, CLAY (CL); low to medium plasticity; trace sand-sized organics; thin beds of silty sand.	5
	70						
10			▮	Chemically Analyzed	Blows (non-SPT)= 10,9,10 Sheen= None Odor= None PID= <1 ppm	Medium dense, moist, gray brown, silty SAND (SM); fine to medium sand; trace fine gravel; pockets of clay; massive texture.	10
	65						
15			▮		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	**GLACIALLY CONSOLIDATED SOIL** Hard, moist, gray brown, SILT (ML); medium plasticity; trace fine sand.	15
	60						
20			▮	Chemically Analyzed	Blows (non-SPT)= 15,29,32 Sheen= None Odor= None PID= <1 ppm	Very dense, moist, gray, silty SAND (SM); fine to medium sand; massive texture.	20
	55	∇ 3/27/2019					
25			▮		Blows (non-SPT)= None Sheen= None Odor= 10,10,12 PID= <1 ppm	Medium dense, wet, gray, silty SAND (SM); fine to medium sand; thin beds of sandy silt.	25
	50						
			▮		Blows (non-SPT)= 33,50/6 Sheen= None Odor= None PID= <1 ppm	Becomes very dense	
30						Bottom of exploration at 30 ft. bgs.	30
	45						
35							35
	40						
40							40

Legend

Sample Method: ▮ Split Barrel 3.25" X 2.375" (D&M)

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-09

Sheet 1 of 1

Aspect CONSULTING

Grand Street Commons - 170304

Environmental Exploration Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, East Block	E:217677.1 N:1277640 (est)	**AC-SB-10**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)
Cascade	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	77'(est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Curtis Askew	Hollow Stem Auger	3/26/2019	NA	24' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	77	Concrete surface seal			Concrete
	75				**FILL** Loose, moist, brown, silty SAND (SM); fine to medium sand.
5	72	Borehole backfilled with hydrated bentonite chips	Chemically Analyzed	Blows (non-SPT)= 3,3,4 Sheen= Slight Odor= Slight PID= 2	**GLACIAL RECESSIONAL DEPOSITS** Medium stiff, moist, brown, CLAY (CL); low plasticity.
10	67		Chemically Analyzed	Blows (non-SPT)= 5,6,6 Sheen= Heavy Odor= Strong PID= 320	Medium dense, moist, gray brown, silty SAND (SM); fine to medium sand, trace coarse sand; trace fine gravel.
15	62		Chemically Analyzed	Blows (non-SPT)= 10,9,9 Sheen= None Odor= None PID= 11	
20	57		Chemically Analyzed	Blows (non-SPT)= 29,50/6 Sheen= None Odor= None PID= 5	**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, gray, silty SAND (SM) with gravel ; fine to coarse sand; fine gravel.
25	52	∇ 3/26/2019		Blows (non-SPT)= 20,22,22 Sheen= None Odor= None PID= <1 ppm	Becomes diamict fabric
30	47		Chemically Analyzed	Blows (non-SPT)= 23,50/6 Sheen= None Odor= None PID= <1 ppm	Becomes wet; fine to medium sand
					Bottom of exploration at 30 ft. bgs.
35	42				
40	37				

Legend

Sample Method
- ○ No Soil Sample Recovery
- ▮ Split Barrel 3.25" X 2.375" (D&M)

Water Level
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-10

Sheet 1 of 1

OLD STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\GRAND STREET COMMONS - 170304.GPJ October 12, 2020

Grand Street Commons - 170304	Environmental Exploration Log	
Project Address & Site Specific Location S Grand St and 22nd Ave S - Seattle, WA, East Block	*Coordinates (SPN NAD83 ft)* E:217728.7 N:1277550 (est)	*Exploration Number* **AC-SB-11**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	75'(est)

Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
James Goble	Hollow Stem Auger	5/15/2019	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	75	Concrete surface seal			Concrete (4 inches thick)
					FILL Loose, moist, brown, silty SAND (SM); fine to medium sand.
5	70		Chemically Analyzed	Blows (non-SPT)= 5,8,9 Sheen= None Odor= None PID= <1 ppm	**GLACIAL RECESSIONAL DEPOSITS** Medium stiff, moist, gray, SILT (ML); low plasticity; trace sand-sized organics; thin beds of silty sand.
			Chemically Analyzed	Blows (non-SPT)= 4,3,3 Sheen= None Odor= None PID= <1 ppm	
10	65	Borehole backfilled with hydrated bentonite chips	Chemically Analyzed	Blows (non-SPT)= 12,13,15 Sheen= None Odor= None PID= <1 ppm	Medium stiff, moist, brown, CLAY (CL); low to medium plasticity; trace sand-sized organics; thin beds of silty sand.
15	60			Blows (non-SPT)= 15,14,18 Odor= None Sheen= None PID= <1 ppm	**GLACIALLY CONSOLIDATED SOIL** Dense, moist, gray, silty SAND (SM) with gravel ; fine to medium sand; fine gravel; thin beds of sandy silt.
				Blows (non-SPT)= 14,50/6 Sheen= None Odor= None PID= <1 ppm	Becomes very dense, fine to coarse sand
20	55				Bottom of exploration at 19.5 ft. bgs.
25	50				
30	45				
35	40				
40	35				

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-11
Sheet 1 of 1

Aspect Consulting	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location S Grand St and 22nd Ave S - Seattle, WA, 23rd Ave between East and West Block			*Coordinates (SPN NAD83 ft)* E:217767.4 N:1277560 (est)	*Exploration Number* AC-SB-12A
Contractor Cascade Drilling	*Equipment* CME 75 truck rig	*Sampling Method* Downhole jars, 300 lb hammer, 30-inch drop		*Ground Surface (GS) Elev. (NAVD88)* 77'(est)	
Operator James Goble	*Exploration Method(s)* Hollow Stem Auger	*Work Start/Completion Dates* 5/15/2019		*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		Concrete surface seal					**FILL** Moist, dark brown, silty SAND (SM); fine sand; trace organics.	
	75							
5		Borehole backfilled with hydrated bentonite chips		Chemically Analyzed	Blows (non-SPT)= 5,6,8 Sheen= None Odor= None PID= <1 ppm		**GLACIAL RECESSIONAL DEPOSITS** Stiff, moist, gray, SILT (ML); medium plasticity; trace sand.	5
	70			Chemically Analyzed	Blows (non-SPT)= 9,6,4 Sheen= Moderate Odor= Moderate PID= 212		Loose, very moist, gray, silty SAND (SM); fine sand.	
10				Chemically Analyzed	Blows (non-SPT)= 6,3,4 Sheen= None Odor= None PID= 7		Medium stiff, moist, brown, CLAY (CL); medium plasticity.	10
							Bottom of exploration at 10.5 ft. bgs.	
	65							
15								15
	60							
20								20
	55							
25								25
	50							
30								30
	45							
35								35
	40							
40								40

Legend

Sample Method:
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-12A

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location: S Grand St and 22nd Ave S - Seattle, WA, 23rd Ave between East and West Block			Coordinates (SPN NAD83 ft): E:217765.5 N:1277550 (est)	Exploration Number: AC-SB-12B
Contractor: Cascade Drilling	Equipment: CME 75 truck rig	Sampling Method: Downhole jars, 300 lb hammer, 30-inch drop		Ground Surface (GS) Elev. (NAVD88): 76'(est)	
Operator: James Goble	Exploration Method(s): Hollow Stem Auger	Work Start/Completion Dates: 5/15/2019		Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
	75	Concrete surface seal					Concrete(6 inches)	
							FILL Loose, moist, dark brown, silty SAND (SM); fine sand; trace gravel.	
5	70			Chemically Analyzed	Blows (non-SPT)= 4,5,8 Sheen= None Odor= None PID= <1 ppm		**GLACIAL RECESSIONAL DEPOSITS** Stiff, moist, gray, SILT (ML); medium plasticity; trace sand.	5
				Chemically Analyzed	Blows (non-SPT)= 10,14,7 Sheen= Slight Odor= None PID= 62			
10	65	Borehole backfilled with hydrated bentonite chips		Chemically Analyzed	Blows (non-SPT)= 10,7,7 Sheen= None Odor= None PID= <1 ppm		Medium stiff, moist, brown, CLAY (CL); medium plasticity.	10
15	60			Chemically Analyzed	Blows (non-SPT)= 13,50/6 Sheen= None Odor= None PID= <1 ppm		**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, gray, silty SAND (SM); fine to medium sand; trace fine to coarse gravel.	15
20	55				Blows (non-SPT)= 13,50/6 Sheen= None Odor= None PID= <1 ppm			20
25	50				Blows (non-SPT)= 14,50/5 Sheen= None Odor= None PID= <1 ppm			25
30	45				Blows (non-SPT)= 22,50/4 Sheen= None Odor= None PID= <1 ppm		Hard, moist, gray, SILT (ML); low to medium plasticity; trace sand. Bottom of exploration at 30 ft. bgs.	30
35	40							35
40								40

Legend

Sample Method:
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-12B

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block			E:1277667 N:217622 (est)	**AC-SB-13**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop		77.69'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis Askew	Hollow Stem Auger	3/29/2019		NA	16.14' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0		Expansion plug Flush-mount well box in concrete					Concrete	
							FILL Loose, moist, dark brown, silty SAND (SM); fine to medium sand; abundant organics; trace metal debris.	
	75							
5		2 inch diam Sch 40 PVC casing		Chemically Analyzed	Blows (non-SPT)= 2,2,3 Sheen= Slight Odor= None PID= <1 ppm			5
	70	Hydrated bentonite chips		Chemically Analyzed	Blows (non-SPT)= 2,4,6 Sheen= Heavy Odor= Moderate PID= 106		**GLACIAL RECESSIONAL DEPOSITS** Loose, moist, gray, silty SAND (SM); fine to medium sand, trace gravel; pockets of sandy clay.	
10					Blows (non-SPT)= 7,12,9 Sheen= Moderate Odor= Moderate PID= 81		Becomes medium dense	10
	65	12x20 sand						
15		3/1/2020		Chemically Analyzed	Blows (non-SPT)= 10,9,10 Sheen= Slight Odor= Faint PID= 3.8		Stiff, moist, gray, CLAY (CL); low to medium plasticity; thin beds of silty sand.	15
	60	6/25/2019						
20					Blows (non-SPT)= 31,50/6 Sheen= None Odor= None PID= 1		**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, gray silty SAND (SM); fine to medium sand, trace coarse sand.	20
	55	3/29/2019						
25		2 inch diam Sch 40 PVC screen 0.01 inch slot			Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 1.2		Becomes wet	25
	50							
30				Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 1.6		Hard, moist, gray, sandy SILT (ML); non-plastic to low plasticity; fine sand, trace medium and coarse sand. Bottom of exploration at 30 ft. bgs.	30
	45							
35								35
	40							
40								40

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- Static Water Level
- Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-13

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block			E:217649.4 N:1277640 (est)	**AC-SB-14**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop		75'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis Askew	Hollow Stem Auger	3/25/2019		NA	24' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0	75	Concrete surface seal				Concrete	
						FILL Medium dense, moist, dark brown, silty SAND (SM); fine to medium sand; trace gravel; trace organics; occasional wood chips.	
5	70			Chemically Analyzed	Blows (non-SPT)= 4,9,11 Sheen= Slight Odor= None PID= <1 ppm		5
						GLACIAL RECESSIONAL DEPOSITS Stiff, moist, blue-gray, CLAY (CL); medium plasticity; with thin beds of silty sand.	
10	65	Borehole backfilled with hydrated bentonite chips		Chemically Analyzed	Blows (non-SPT)= 5,6,7 Sheen= Slight Odor= None PID= <1 ppm		10
						GLACIALLY CONSOLIDATED SOIL Dense, moist, gray, silty SAND (SM) with gravel ; fine to medium sand, trace coarse sand; fine gravel; some orange brown mottling.	
15	60				Blows (non-SPT)= 13,20,20 Sheen= None Odor= None PID= <1 ppm		15
20	55				Blows (non-SPT)= 19,22,22 Sheen= None Odor= None PID= <1 ppm		20
		∇ 3/25/2019					
25	50				Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	Becomes very dense silty SAND (SM)	25
30	45				Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	Bottom of exploration at 29.5 ft. bgs.	30
35	40						35
40	35						40

Legend

Sample Method:
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level:
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-14

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304		Environmental Exploration Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block		E:217647.0 N:1277690 (est)	**AC-SB-15**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	78'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis Askew	Hollow Stem Auger	3/25/2019	NA	24' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	78	Concrete surface seal				**FILL** Loose, moist, brown, silty SAND (SM); fine to medium sand; trace gravel; abundant plant debris.
4	74		Split Barrel		Blows (non-SPT)= 3,3,3 Sheen= None Odor= None PID= <1 ppm	**GLACIAL RECESSIONAL DEPOSITS** Loose, moist, gray brown, silty SAND (SM); fine to medium sand; trace fine gravel; trace sand-sized organic fragments.
9	69	Borehole backfilled with hydrated bentonite chips	Split Barrel	Chemically Analyzed	Blows (non-SPT)= 9,8,7 Sheen= None Odor= None PID= <1 ppm	Becomes medium dense
14	64		Split Barrel		Blows (non-SPT)= 11,17,17 Sheen= None Odor= None PID= <1 ppm	**GLACIALLY CONSOLIDATED SOIL** Dense, moist, gray brown, silty SAND (SM); fine to coarse sand.
19	59		Split Barrel / No Soil Sample Recovery	Chemically Analyzed	Blows (non-SPT)= 23,50/6 Sheen= None Odor= None PID= <1 ppm	Hard, moist, gray brown, sandy SILT (ML); non-plastic; fine to coarse sand.
24	54	∇ 3/25/2019	Split Barrel		Blows (non-SPT)= 21,27,31 Sheen= None Odor= None PID= <1 ppm	Very dense, wet, gray brown, silty SAND (SM); fine to medium sand; diamict fabric.
29	49		Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	
29.5						Bottom of exploration at 29.5 ft. bgs.

Depth scale (feet): 5, 10, 15, 20, 25, 30, 35, 40
Elev. scale (feet): 75, 70, 65, 60, 55, 50, 45, 40

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log
AC-SB-15
Sheet 1 of 1

Environmental Exploration Log

Grand Street Commons - 170304

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, East Block	E:217584.5 N:1277650 (est)	AC-SB-16

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	75'(est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Curtis Askew	Hollow Stem Auger	4/1/2019	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0	75	Concrete surface seal				Concrete (4 inches thick)	
						FILL Loose, moist, gray-brown silty SAND (SM); fine to medium sand.	
5	70		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 5,5,5 Sheen= None Odor= None PID= 4	**GLACIAL RECESSIONAL DEPOSITS** Stiff, moist, gray, SILT (ML); low plasticity; trace fine sand; trace sand-sized organic fragments; thin interbeds of silty sand.	5
10	65	Borehole backfilled with hydrated bentonite chips	Split Barrel	Chemically Analyzed	Blows (non-SPT)= 9,13,13 Sheen= None Odor= None PID= 2.5	Medium dense, moist, gray, silty SAND (SM) with gravel ; fine to coarse sand; fine gravel; trace sand-sized organics.	10
15	60		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 29,31,30 Sheen= None Odor= None PID= 2	**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, gray, silty SAND (SM); fine to coarse sand; pockets of sandy silt.	15
20	55		Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 4	Becomes very silty; diamict fabric	20
25	50		Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 1	Bottom of exploration at 24.5 ft. bgs.	25
30	45						30
35	40						35
40	35						40

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-16

Sheet 1 of 1

Environmental Exploration Log

Aspect CONSULTING	Grand Street Commons - 170304			Exploration Number
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	AC-SB-17
	S Grand St and 22nd Ave S - Seattle, WA, East Block		E:217586.6 N:1277600 (est)	
Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	72'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis Askew	Hollow Stem Auger	4/1/2019	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0	72	Concrete surface seal				**GLACIAL RECESSIONAL DEPOSITS** Stiff, moist, gray, sandy SILT (ML); low to medium plasticity; fine sand.	
	70						
5			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 4,5,6 Sheen= None Odor= None PID= 1.6		5
	65						
10		Borehole backfilled with hydrated bentonite chips	Split Barrel	Chemically Analyzed	Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 1.2	**GLACIALLY CONSOLIDATED SOIL** Very dense, slightly moist, gray brown, silty SAND (SM) with gravel ; fine to coarse sand; fine to coarse gravel; diamict fabric.	10
	60						
15			Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 1	Hard, slightly moist, gray, sandy SILT (ML); low plasticity; fine to medium sand.	15
	55						
20			Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= 1.1	Becomes with trace fine to coarse gravel Bottom of exploration at 19.5 ft. bgs.	20
	50						
25	45						25
30	40						30
35	35						35
40							40

Legend

Sample Method: Split Barrel 3.25" X 2.375" (D&M)

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-17

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block			E:217602.7 N:1277740 (est)	**AC-SB-18**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop		78'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis Askew	Hollow Stem Auger	3/25/2019		NA	24' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description
0	78	Concrete surface seal					Concrete (4 inches thick)
0.3–4		Borehole backfilled with hydrated bentonite chips					**FILL** Loose, moist, brown, silty SAND (SM); fine to medium sand.
4–5.5			Split Barrel		Blows (non-SPT)= 13,15,18 Sheen= None Odor= None PID= <1 ppm		**GLACIALLY CONSOLIDATED SOIL** Dense, moist, gray brown, silty SAND (SM); fine to medium sand; trace gravel; diamict fabric.
9–10.5			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 17,22,29 Sheen= None Odor= None PID= <1 ppm		
14–14.5			Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Hard, moist, gray brown, sandy SILT (ML); low to medium plasticity; trace sand; trace gravel; diamict fabric.
19–19.5			Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		
24		▽ 3/25/2019	Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Becomes wet
29–29.5			Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Dense, moist, brown, silty SAND (SM); fine sand.
29.5							Bottom of exploration at 29.5 ft. bgs.

Depth scale: 5, 10, 15, 20, 25, 30, 35, 40. Elevation scale: 75, 70, 65, 60, 55, 50, 45, 40.

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-18

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location: S Grand St and 22nd Ave S - Seattle, WA, East Block			Coordinates (SPN NAD83 ft): E:217690.0 N:1277710 (est)	Exploration Number: **AC-SB-19**
Contractor: Cascade Drilling	Equipment: CME 75 truck rig	Sampling Method: Downhole jars, 300 lb hammer, 30-inch drop		Ground Surface (GS) Elev. (NAVD88): 79'(est)	
Operator: Curtis Askew	Exploration Method(s): Hollow Stem Auger	Work Start/Completion Dates: 3/26/2019		Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): 28' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	79	Concrete surface seal					Concrete (4 inches thick)	
							FILL Loose, moist, brown, silty SAND (SM); fine to medium sand.	
5	75		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 6,7,7 Sheen= None Odor= None PID= <1 ppm		**GLACIAL RECESSIONAL DEPOSITS** Stiff, moist, mottled gray and yellow brown, CLAY (CL); low to medium plasticity; trace fine sand; trace sand-sized organic fragments.	5
10	70	Borehole backfilled with hydrated bentonite chips	Split Barrel		Blows (non-SPT)= 10,9,9 Sheen= None Odor= None PID= <1 ppm		Medium dense, moist, gray, silty SAND (SM) with gravel ; fine to coarse sand; fine gravel; diamict fabric.	10
15	65		Split Barrel	Chemically Analyzed	Blows (non-SPT)= 26,50/6 Sheen= None Odor= None PID= <1 ppm		**GLACIALLY CONSOLIDATED SOIL** Very dense, moist, gray, silty SAND (SM); fine to coarse sand; fine gravel.	15
20	60		Split Barrel		Blows (non-SPT)= 5/6 Sheen= None Odor= None PID= <1 ppm		Becomes slightly moist; becomes with coarse gravel	20
25	55		Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Becomes moist	25
		∇ 3/26/2019						
30	50		Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		Becomes wet Bottom of exploration at 29.5 ft. bgs.	30
35	45							35
40	40							40

Legend

Sample Method:
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level:
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log
AC-SB-19
Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304		Environmental Exploration Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block		E:1277602 N:217617 (est)	**DP-02**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	Direct push rig	Percussion hammer	73'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/5/2017	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	73	Borehole backfilled with bentonite chips and capped with asphalt.					Moist, gray, Asphalt(3 inches)	
							FILL Moist, brown SAND (SP); fine to medium sand.	
3	70						Moist, gray, silty SAND (SM); fine to medium sand, trace gravel.	
5				Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			5
	65							
10				Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm		**GLACIALLY CONSOLIDATED SOILS** Moist, gray, gravelly, silty to very silty SAND (SM); fine to medium sand.	10
	60							
15					Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 15 ft. bgs.	15
	55							

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-02

Sheet 1 of 1

Aspect CONSULTING	**Grand Street Commons - 170304**	**Environmental Exploration Log**

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, East Block	E:1277704 N:217588 (est)	**DP-03**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)
Cascade	Direct push rig	Percussion hammer	75'(est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Tim	Direct push	9/5/2017	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	75						Moist, gray, Concrete12 inches thick.	
		Borehole backfilled with bentonite chips and capped with concrete.					**FILL** Moist, gray, gravelly, silty SAND (SM); fine to medium sand.	
5	70			Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			5
10	65				Sheen= None Odor= None PID= <1 ppm			10
15	60			Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 15 ft. bgs.	15

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-03

Sheet 1 of 1

OLD STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\GRAND STREET COMMONS - 170304.GPJ October 12, 2020

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block			E:1277695 N:217740 (est)	**DP-17**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	Direct push rig	Geoprobe 6600		78'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/6/2017		NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		Borehole backfilled with bentonite chips and capped with concrete.					Asphalt(3 inches)	
							FILL Moist, brown, slightly gravelly, silty SAND (SM); fine to medium sand; trace burnt wood debris.	
	75			Chemically Analyzed	Sheen= Slight Odor= None PID= <1 ppm			
5					Sheen= None Odor= None PID= < 1 ppm		**GLACIAL RECESSIONAL SOILS** Very moist, brown, CLAY (CL); low plasticity.	5
	70						**GLACIALLY CONSOLIDATED SOILS** Moist, gray and brown, silty SAND (SM); fine to medium sand.	
10				Chemically Analyzed	Sheen= None Odor= None PID= < 1 ppm			10
							Becomes very moist.	
	65						Becomes slightly gravelly and moist.	
15					Sheen= None Odor= None PID= < 1 ppm		Bottom of exploration at 15 ft. bgs.	15
	60							

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-17

Sheet 1 of 1

Aspect Consulting	Grand Street Commons - 170304	Environmental Exploration Log	
	Project Address & Site Specific Location	*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block	E:1277760 N:217720 (est)	**DP-18**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	Direct push rig	Geoprobe (54LT)	84'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/6/2017	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
							Concrete(6 inches)	
		Borehole backfilled with bentonite chips and capped with asphalt.					**GLACIALLY CONSOLIDATED SOILS** Moist, brown, slightly gravelly, silty SAND (SM); fine to medium sand.	
				Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			
	80							
5					Sheen= None Odor= None PID= <1 ppm			5
				Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 7 ft. bgs. Note: Refusal encountered at 7 ft bgs.	
	75							
10								10
	70							
15								15
	65							

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-18

Sheet 1 of 1

OLD STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\GRAND STREET COMMONS - 170304.GPJ October 12, 2020

Aspect Consulting	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block			E:1277608 N:217720 (est)	**DP-19**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	Direct push rig	Geoprobe (54LT)		76'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/6/2017		NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
							Concrete(6 inches)	
	75	Borehole backfilled with bentonite chips and capped with concrete.					**GLACIAL DEPOSITS (GLACIALLY OVERRIDDEN)** Moist, brown and gray, gravelly, silty SAND (SM); fine to medium sand.	
				Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 2 ft. bgs. Note: Refusal encountered at 2 ft bgs.	
5								5
	70							
10								10
	65							
15								15
	60							

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-19

Sheet 1 of 1

Aspect Consulting	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block			E:1277769 N:217662 (est)	**DP-20**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	Direct push rig	Geoprobe (54LT)		82'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/6/2017		NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
							Concrete(6 inches)	
							GLACIALLY CONSOLIDATED SOILS Moist, brown, slightly gravelly, silty SAND (SM); fine to medium sand.	
	80	Borehole backfilled with bentonite chips and capped with concrete.						
				Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			
5					Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 5 ft. bgs. Note: Refusal encountered at 5 ft bgs.	5
	75							
10								10
	70							
15								15
	65							

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-20

Sheet 1 of 1

OLD STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\GRAND STREET COMMONS - 170304.GPJ October 12, 2020

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, East Block			E:1277614 N:217666 (est)	**DP-21**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	Direct push rig	Geoprobe (54LT)		75'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/6/2017		NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		Borehole backfilled with bentonite chips and capped with concrete.		Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm		Concrete(6 inches) **GLACIALLY CONSOLIDATED SOILS** Moist, brown, slightly gravelly, silty SAND (SM); fine to medium sand. Bottom of exploration at 2 ft. bgs. Note: Refusal encountered at 2 ft bgs.	
5	70							5
10	65							10
15	60							15

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-21

Sheet 1 of 1

Environmental Exploration Log

Grand Street Commons - 170304

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, East Block	E:1277768 N:217606 (est)	**DP-22**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)
Cascade	Direct push rig	Geoprobe (54LT)	81'(est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Tim	Direct push	9/6/2017	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0–0.5		Borehole backfilled with bentonite chips and capped with concrete.					Concrete(6 inches)	
0.5–2.5	80						**FILL** Moist, brown, slightly gravelly, silty SAND (SM); fine to medium sand.	
2.5–6			Continuous core	Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm		**GLACIALLY CONSOLIDATED SOILS** Moist, gray, gravelly, silty SAND (SM); fine to medium sand.	5
6	75				Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 6 ft. bgs. Note: Refusal encountered at 6 ft bgs.	
10	70							10
15	65							15

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-22

Sheet 1 of 1

PRESENTATION OF SITE INVESTIGATION RESULTS

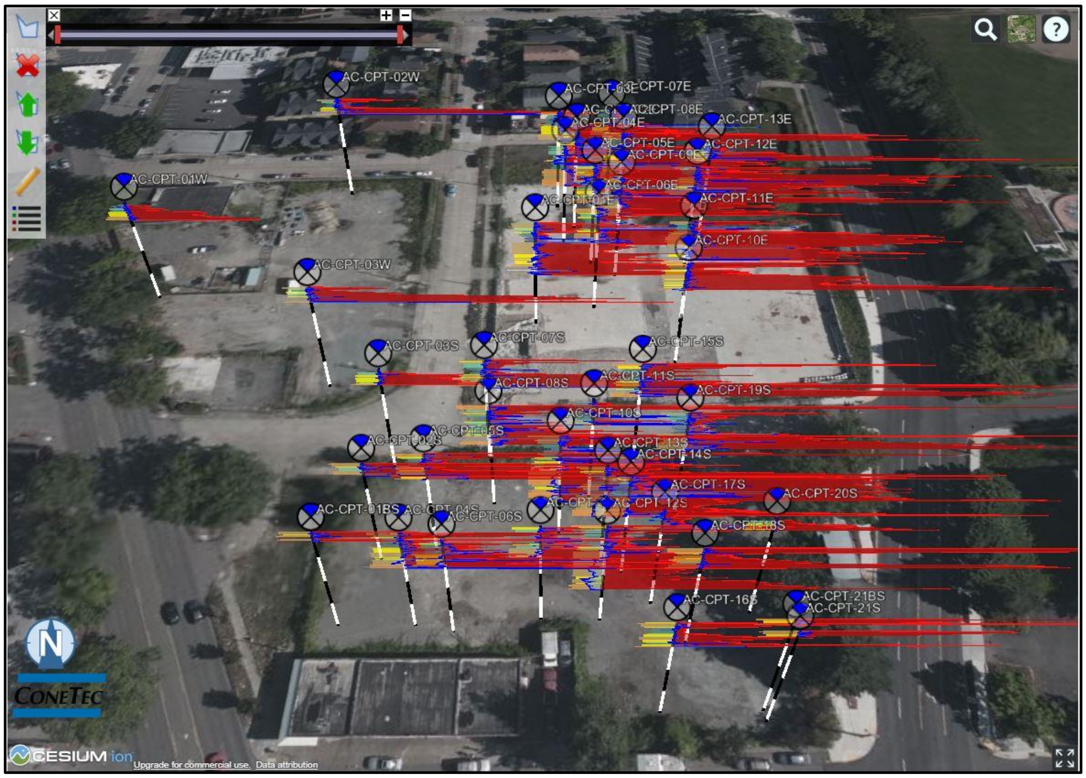
Grand Street Commons

Prepared for:

Aspect Consulting

ConeTec Job No: 20-59-21343

Project Start Date: 10-Sep-2020
Project End Date: 14-Sep-2020
Report Date: 25-Sep-2020



Prepared by:

ConeTec Inc.
1508 O Street SW, Unit 103-104
Auburn, WA 98001

Tel: (253) 397-4861

ConeTecWA@conetec.com
www.conetec.com
www.conetecdataservices.com

Introduction

The enclosed report presents the results of the site investigation program conducted by ConeTec Inc. for Aspect Consulting at 1818 Rainier Ave S, Seattle, WA, 98144. The program consisted of cone penetration tests.

Project Information

Project	
Client	Aspect Consulting
Project	Grand Street Commons
ConeTec project number	20-59-21343

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

Rig Description	Deployment System	Test Type
C20-30Ton Truck 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 (psi/bar)
661:T1500F15U35	661	15	225	1500	15	35bar
536:T1500F15U500	536	15	225	1500	15	500psi
595:T1500F15U500	595	15	225	1500	15	500psi
The CPTu summary indicates which cone was used for each sounding						

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 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.

Sampling	
Depth reference	Depths are referenced to the existing ground surface at the time of each sample collection.

Limitations

This report has been prepared for the exclusive use of Aspect Consulting (Client) for the project titled "Grand Street Commons". 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.

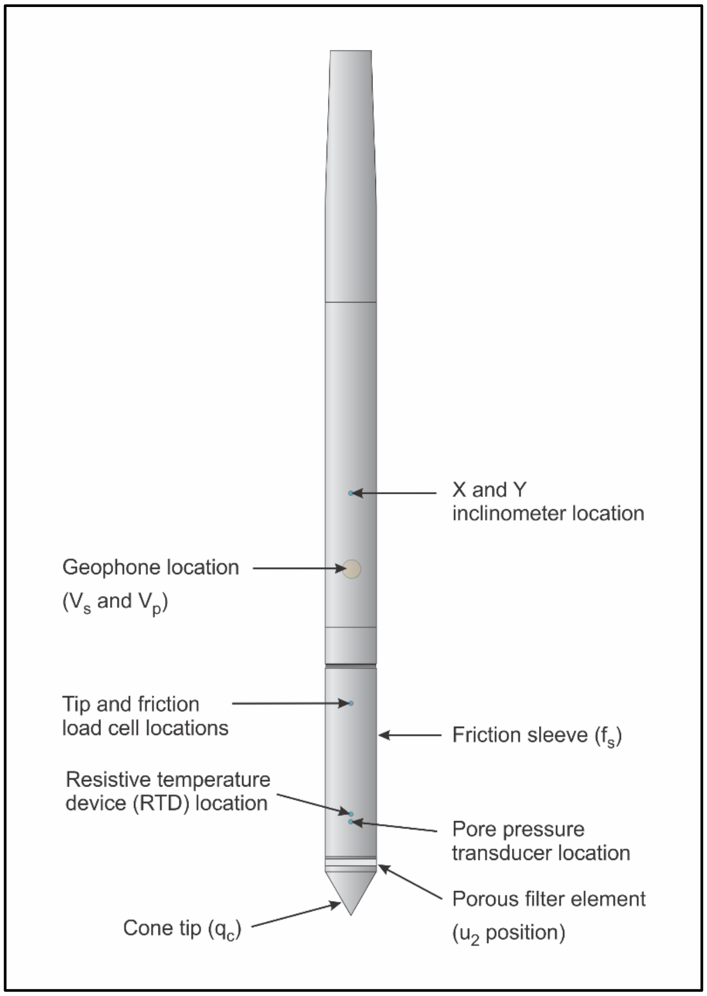


Figure CPTu. Piezocone Penetrometer (15 cm^2)

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).

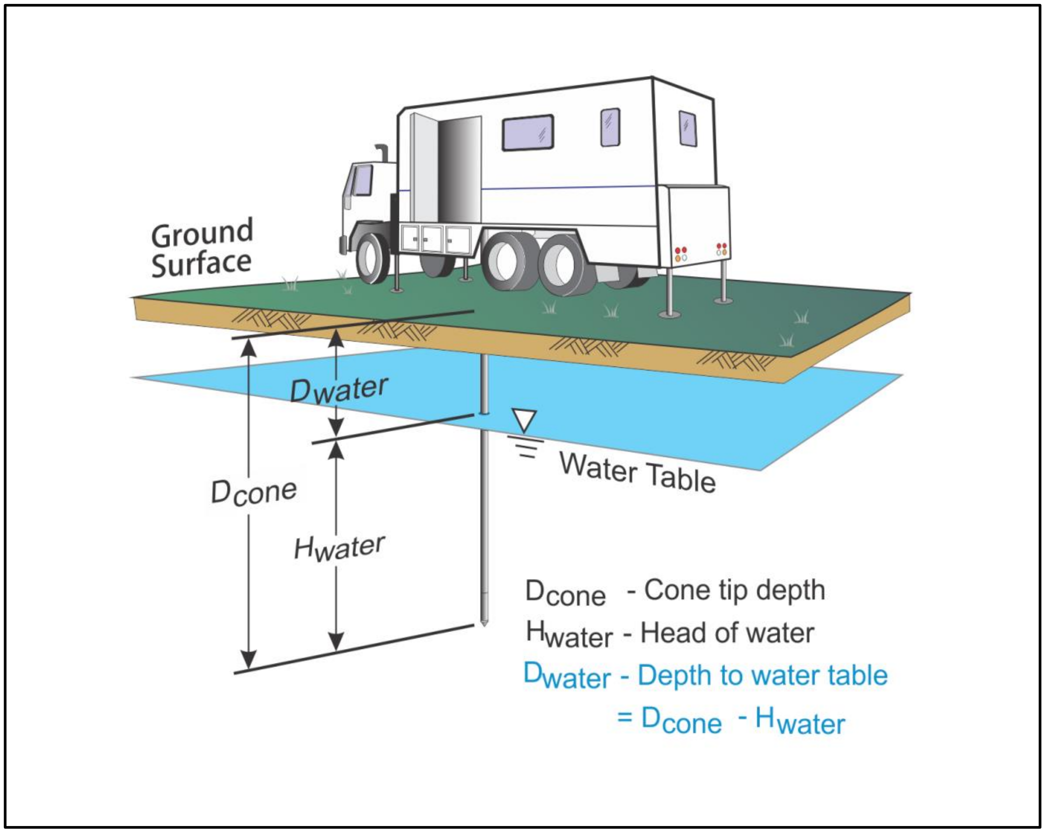


Figure PPD-1. Pore pressure dissipation test setup

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.

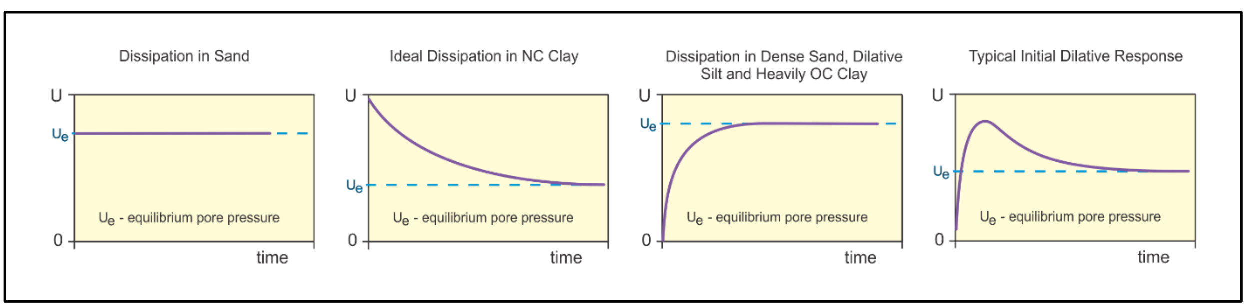


Figure PPD-2. Pore pressure dissipation curve examples

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: 20-59-21343
Client: Aspect Consulting
Project: Grand Street Commons
Start Date: 10-Sep-2020
End Date: 14-Sep-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface (ft)	Final Depth (ft)	Latitude[5] (deg)	Longitude[5] (deg)	Refer to Notation Number
AC-CPT-01E	20-59-21343_CP01E	14-Sep-2020	661:T1500F15U35		33.46	47.58718	-122.30365	4
AC-CPT-01S	20-59-21343_CP01S	23-Sep-2019	536:T1500F15U500		3.12	47.58656	-122.30405	4
AC-CPT-01BS	20-59-21343_CP01BS	23-Sep-2019	536:T1500F15U500		5.74	47.58656	-122.30405	4
AC-CPT-01W	20-59-21343_CP01W	23-Sep-2019	536:T1500F15U500		11.65	47.58728	-122.30473	4
AC-CPT-02E	20-59-21343_CP02E	24-Sep-2019	595:T1500F15U500		16.16	47.58747	-122.30353	4
AC-CPT-02S	20-59-21343_CP02S	11-Sep-2020	661:T1500F15U35		7.79	47.58667	-122.30398	4
AC-CPT-02W	20-59-21343_CP02W	14-Sep-2020	661:T1500F15U35		9.92	47.58762	-122.30424	4
AC-CPT-03E	20-59-21343_CP03E	14-Sep-2020	661:T1500F15U35		19.69	47.58755	-122.30358	4
AC-CPT-03S	20-59-21343_CP03S	23-Sep-2019	536:T1500F15U500		10.09	47.58685	-122.30398	4
AC-CPT-03W	20-59-21343_CP03W	14-Sep-2020	661:T1500F15U35		9.35	47.58702	-122.30418	4
AC-CPT-04E	20-59-21343_CP04E	14-Sep-2020	661:T1500F15U35		26.903	47.58743	-122.30356	4
AC-CPT-04S	20-59-21343_CP04S	11-Sep-2020	661:T1500F15U35	19.2	23.458	47.58656	-122.30389	2
AC-CPT-05E	20-59-21343_CP05E	14-Sep-2020	661:T1500F15U35		24.688	47.58736	-122.30348	4
AC-CPT-05S	20-59-21343_CP05S	11-Sep-2020	661:T1500F15U35		16.24	47.58669	-122.30386	4
AC-CPT-06E	20-59-21343_CP06E	14-Sep-2020	661:T1500F15U35		23.458	47.58722	-122.30348	4
AC-CPT-06S	20-59-21343_CP06S	23-Sep-2019	536:T1500F15U500		17.634	47.58655	-122.30381	4
AC-CPT-07E	20-59-21343_CP07E	14-Sep-2020	661:T1500F15U35		19.931	47.58756	-122.30343	4
AC-CPT-07S	20-59-21343_CP07S	11-Sep-2020	661:T1500F15U35		17.224	47.58687	-122.30375	4

Job No:	20-59-21343
Client:	Aspect Consulting
Project:	Grand Street Commons
Start Date:	10-Sep-2020
End Date:	14-Sep-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface (ft)	Final Depth (ft)	Latitude[5] (deg)	Longitude[5] (deg)	Refer to Notation Number
AC-CPT-08E	20-59-21343_CP08E	14-Sep-2020	661:T1500F15U35	25.0	37.155	47.58747	-122.30340	3
AC-CPT-08S	20-59-21343_CP08S	11-Sep-2020	661:T1500F15U35	18.7	24.606	47.58677	-122.30374	
AC-CPT-09E	20-59-21343_CP09E	24-Sep-2019	595:T1500F15U500		24.688	47.58732	-122.30342	4
AC-CPT-09S	20-59-21343_CP09S	23-Sep-2019	536:T1500F15U500	18.4	21.489	47.58657	-122.30363	
AC-CPT-10E	20-59-21343_CP10E	14-Sep-2020	661:T1500F15U35		16.896	47.58707	-122.30328	4
AC-CPT-10S	20-59-21343_CP10S	11-Sep-2020	661:T1500F15U35	18.4	43.307	47.58672	-122.30359	
AC-CPT-11E	20-59-21343_CP11E	14-Sep-2020	661:T1500F15U35		25.016	47.58718	-122.30325	4
AC-CPT-11S	20-59-21343_CP11S	23-Sep-2019	536:T1500F15U500		15.994	47.58678	-122.30352	4
AC-CPT-12E	20-59-21343_CP12E	14-Sep-2020	661:T1500F15U35		17.798	47.58735	-122.30321	4
AC-CPT-12S	20-59-21343_CP12S	10-Sep-2020	661:T1500F15U35	19.5	42.896	47.58657	-122.30351	
AC-CPT-13E	20-59-21343_CP13E	14-Sep-2020	661:T1500F15U35		12.303	47.58742	-122.30316	4
AC-CPT-13S	20-59-21343_CP13S	24-Sep-2019	595:T1500F15U500	19.9	33.382	47.58667	-122.30350	
AC-CPT-14S	20-59-21343_CP14S	11-Sep-2020	661:T1500F15U35	19.2	25.016	47.58665	-122.30346	2
AC-CPT-15S	20-59-21343_CP15S	11-Sep-2020	661:T1500F15U35	19.2	19.767	47.58684	-122.30341	2
AC-CPT-16S	20-59-21343_CP16S	10-Sep-2020	661:T1500F15U35		15.83	47.58643	-122.30340	4
AC-CPT-17S	20-59-21343_CP17S	23-Sep-2019	536:T1500F15U500		14.354	47.58659	-122.30340	4
AC-CPT-18S	20-59-21343_CP18S	11-Sep-2020	661:T1500F15U35		12.631	47.58653	-122.30334	4
AC-CPT-19S	20-59-21343_CP19S	11-Sep-2020	661:T1500F15U35	19.2	22.638	47.58675	-122.30333	2

Job No: 20-59-21343
Client: Aspect Consulting
Project: Grand Street Commons
Start Date: 10-Sep-2020
End Date: 14-Sep-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface (ft)	Final Depth (ft)	Latitude[5] (deg)	Longitude[5] (deg)	Refer to Notation Number
AC-CPT-20S	20-59-21343_CP20S	23-Sep-2019	536:T1500F15U500		8.858	47.58657	-122.30320	4
AC-CPT-21S	20-59-21343_CP21S	10-Sep-2020	661:T1500F15U35		3.36	47.58641	-122.30320	4
AC-CPT-21BS	20-59-21343_CP21BS	10-Sep-2020	661:T1500F15U35		3.61	47.58643	-122.30321	4
	39 soundings				738.10			

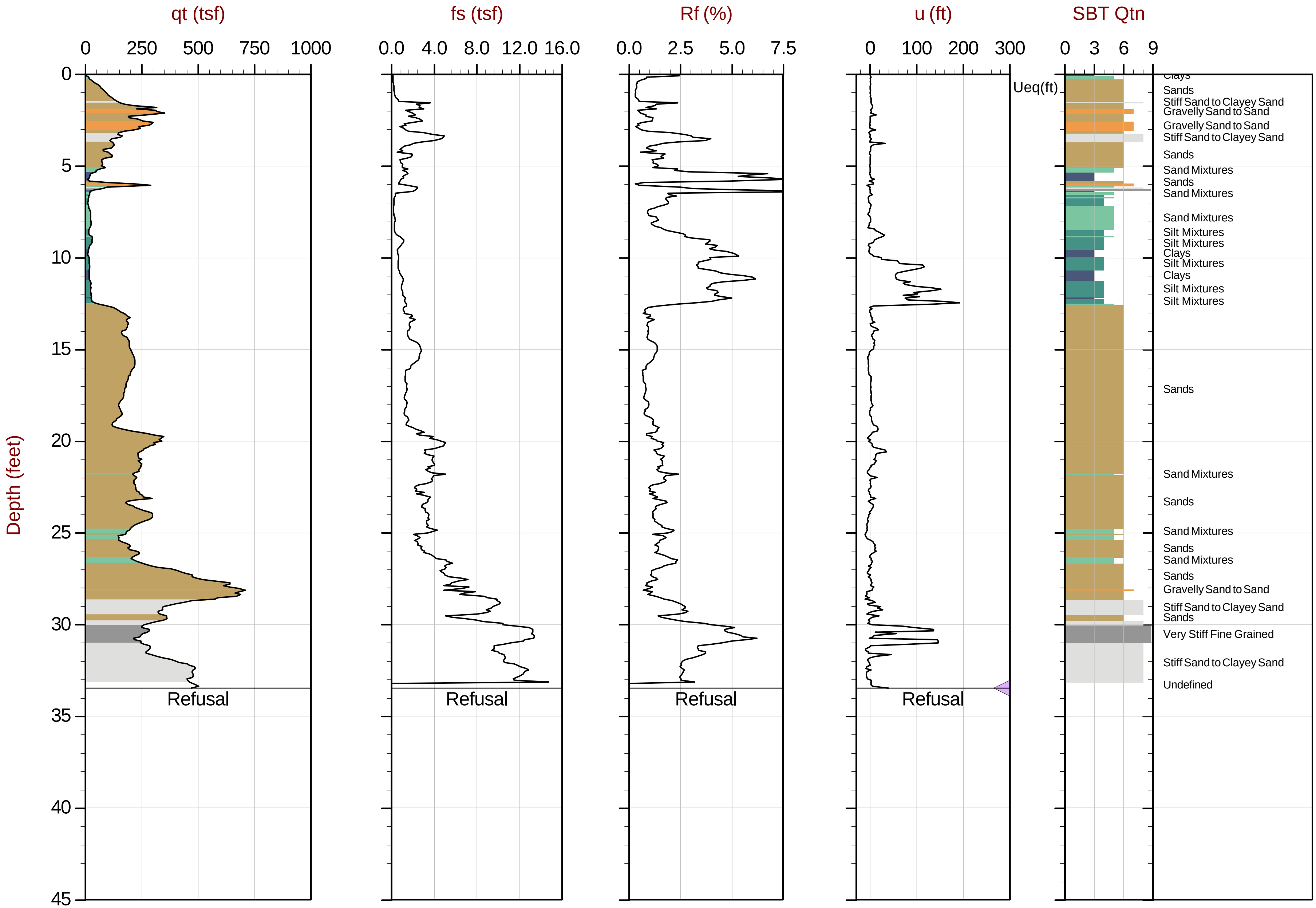
1. Phreatic surface based on pore pressure dissipation test unless otherwise noted. Hydrostatic profile applied to interpretation tables
2. Phreatic surface based on adjacent CPT dissipation test. Hydrostatic profile applied to interpretation tables
3. Phreatic surface based on CPT profile Hydrostatic profile applied to interpretation tables
4. Phreatic surface assumed to be beyond final test depth
5. Coordinates were collected using a handheld GPS - WGS 84 Lat/Long

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 13:29
Site: Grand Street Commons

Sounding: AC-CPT-01E
Cone: 661:T1500F15U35



Max Depth: 10.200 m / 33.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58718 Long: -122.30365

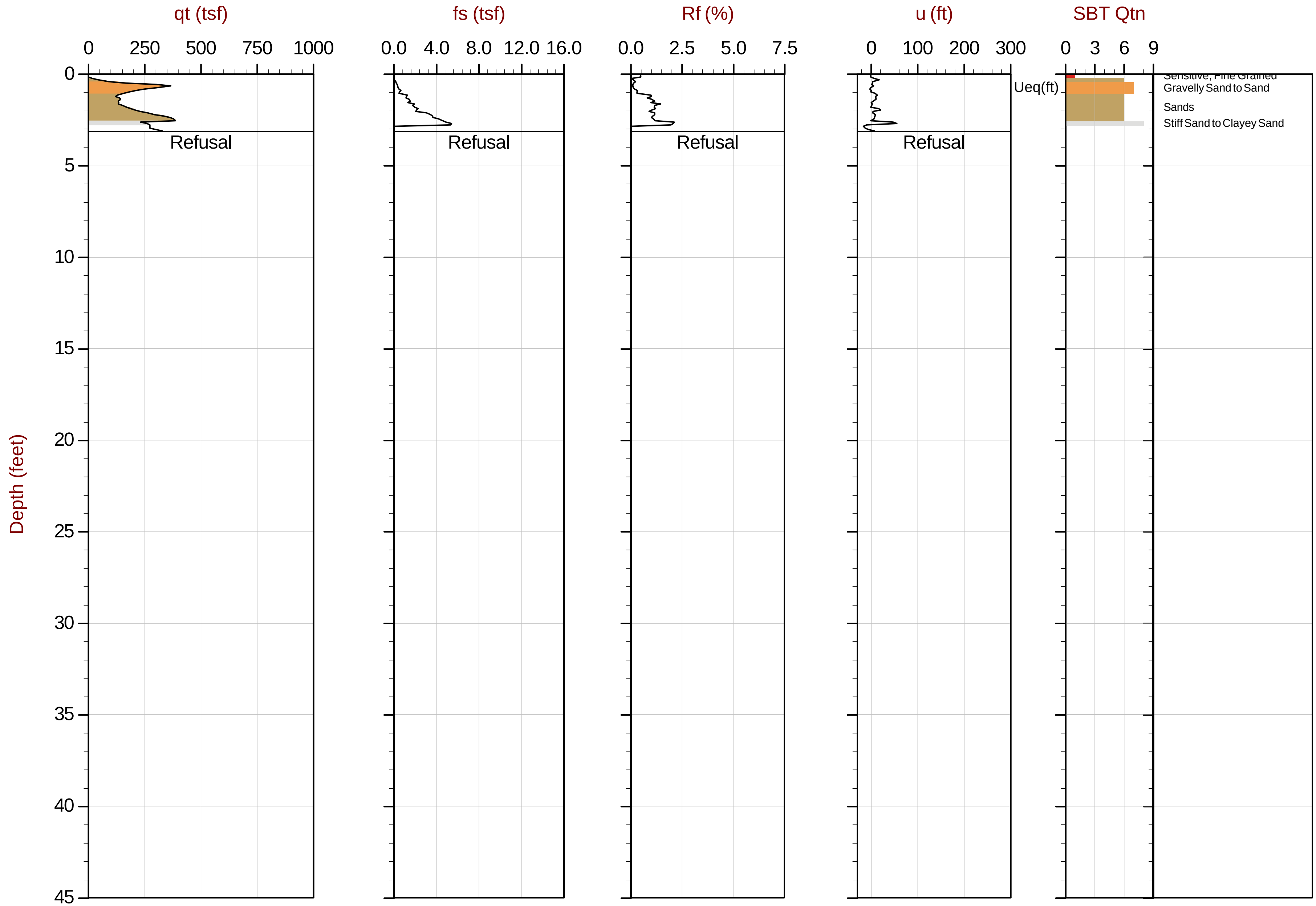
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 07:41
Site: Grand Street Commons

Sounding: AC-CPT-01S
Cone: 536:T1500F15U500



Max Depth: 0.950 m / 3.12 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30405

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

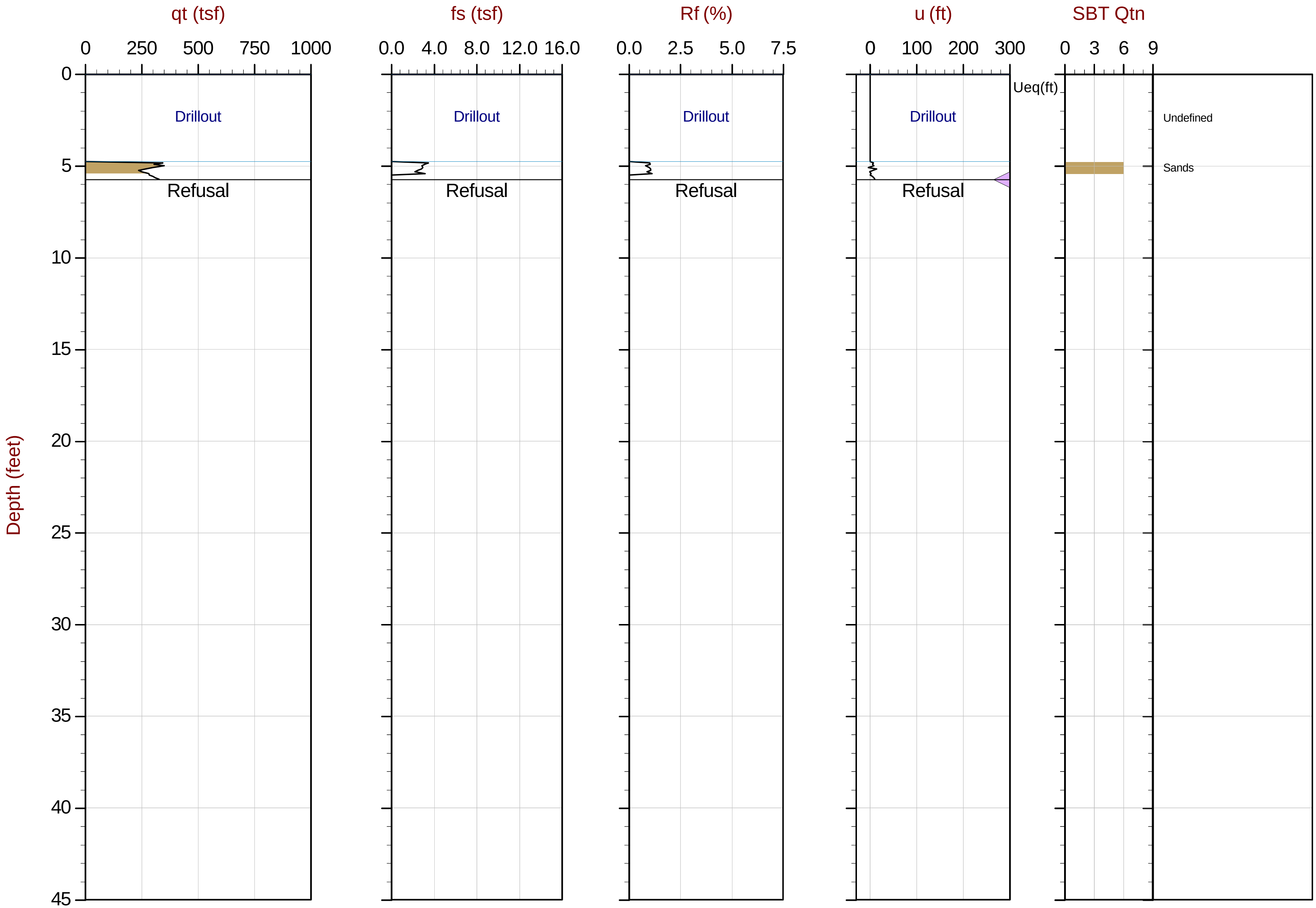
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 08:18
Site: Grand Street Commons

Sounding: AC-CPT-01BS
Cone: 536:T1500F15U500



Max Depth: 1.750 m / 5.74 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01BS.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30405

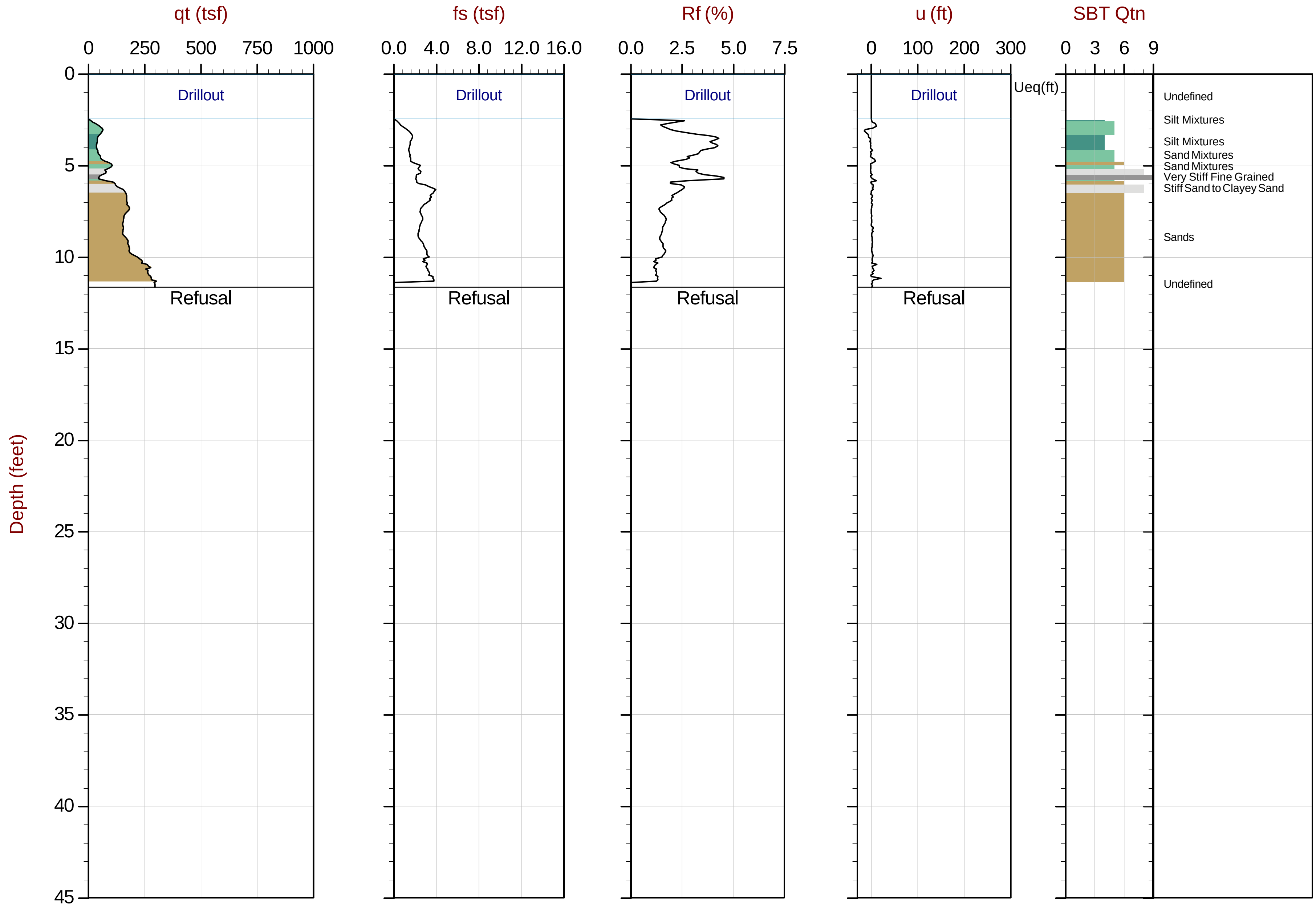
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 16:36
Site: Grand Street Commons
Sounding: AC-CPT-01W
Cone: 536:T1500F15U500



Max Depth: 3.550 m / 11.65 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01W.COR
Unit Wt: SBTQtn (PKR2009)

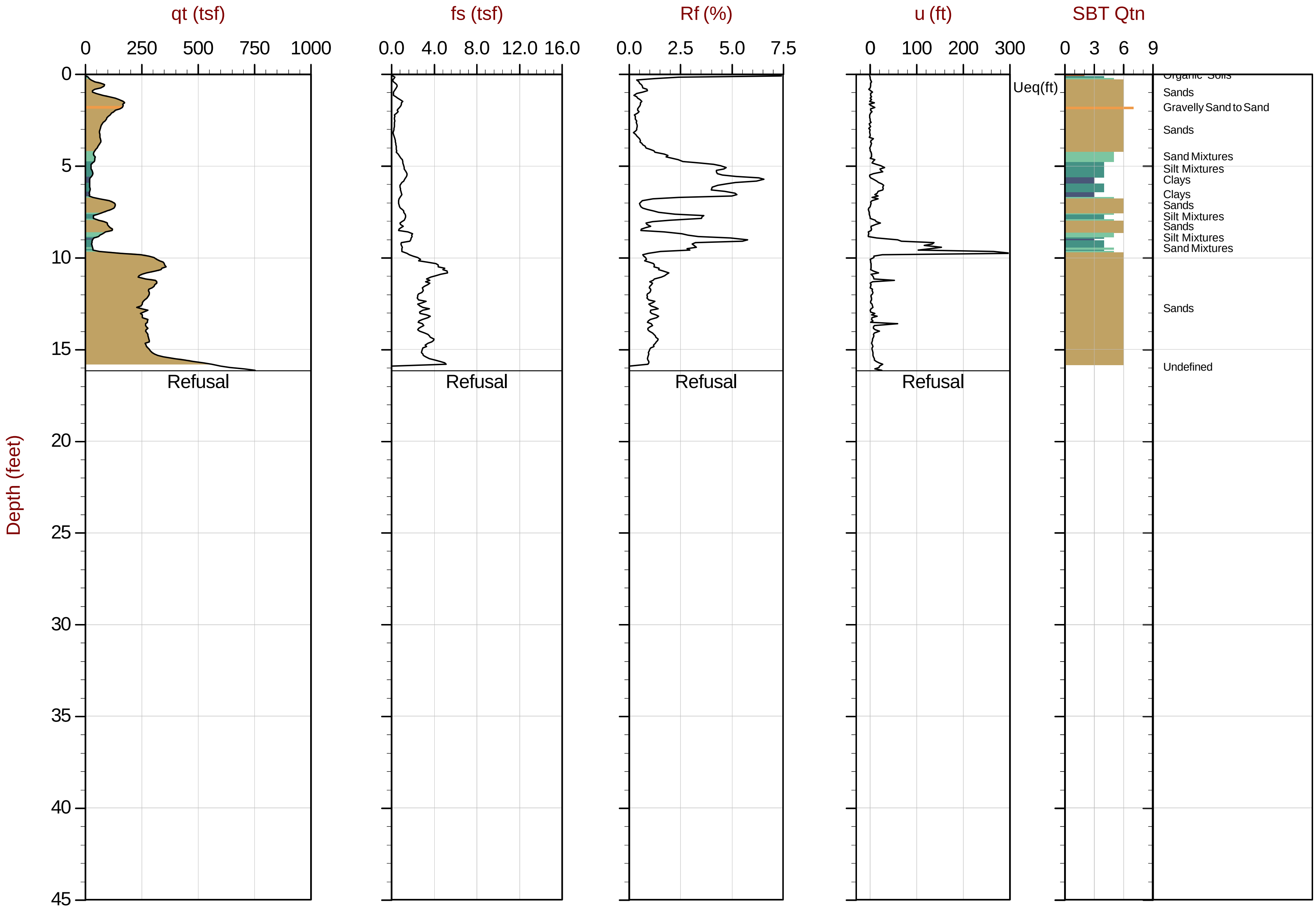
SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58728 Long: -122.30473

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.

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 14:10
Site: Grand Street Commons
Sounding: AC-CPT-02E
Cone: 595:T1500F15U500



Max Depth: 4.925 m / 16.16 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP02E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58747 Long: -122.30353

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

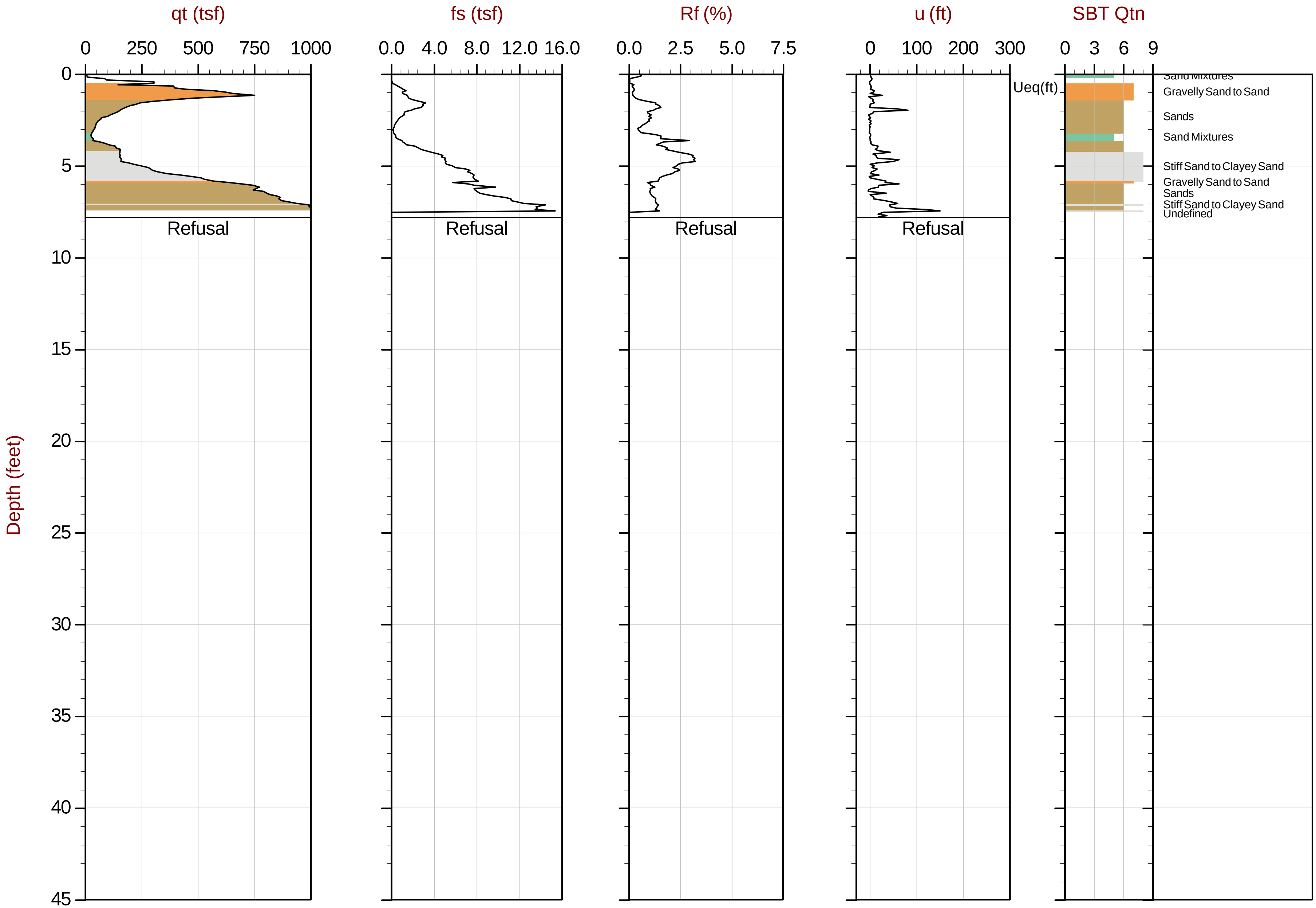
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 11:13
Site: Grand Street Commons

Sounding: AC-CPT-02S
Cone: 661:T1500F15U35



Max Depth: 2.375 m / 7.79 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP02S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58667 Long: -122.30398

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

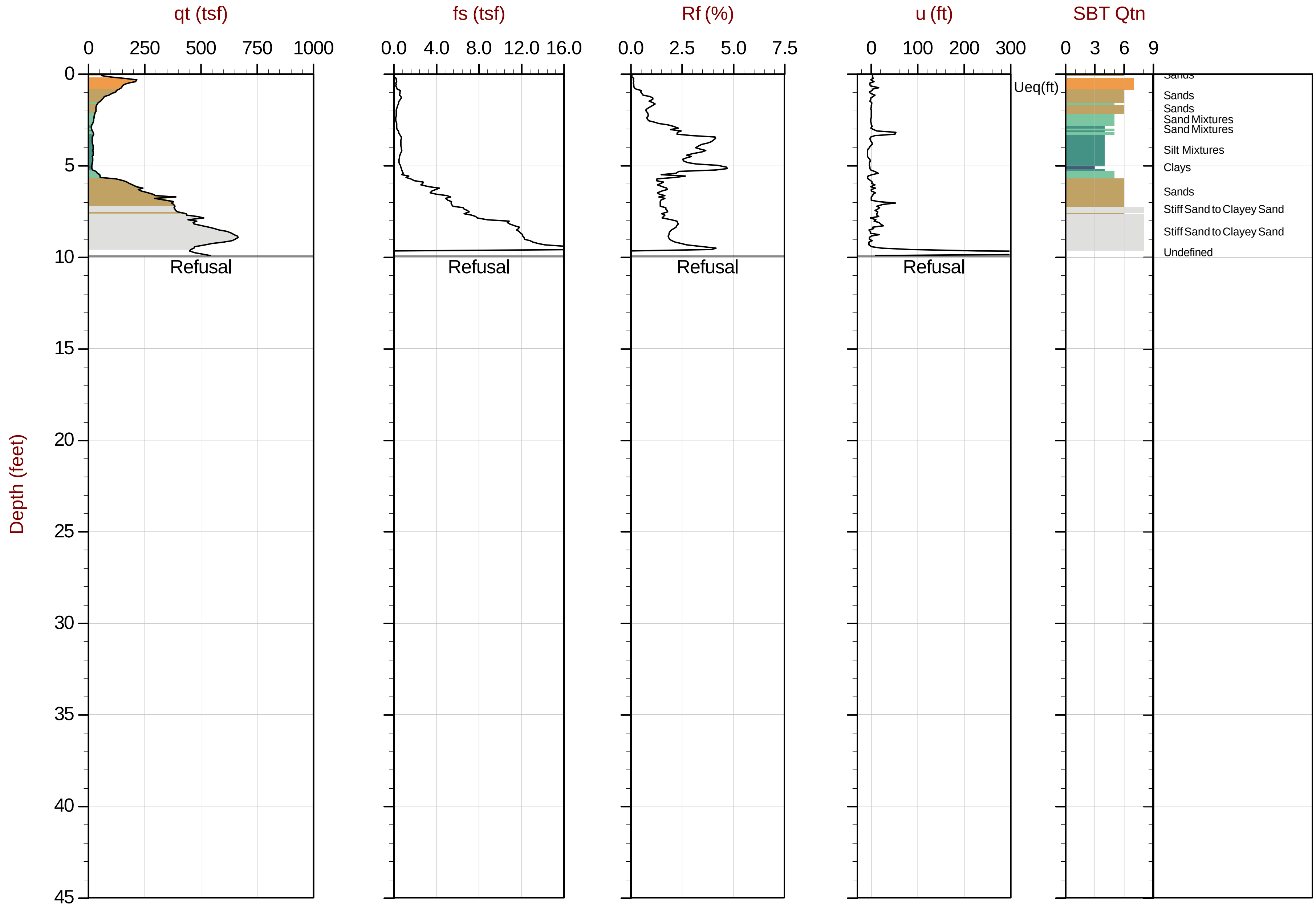
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 14:26
Site: Grand Street Commons

Sounding: AC-CPT-02W
Cone: 661:T1500F15U35



Max Depth: 3.025 m / 9.92 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP02W.COR
Unit Wt: SBTQtn (PKR2009)

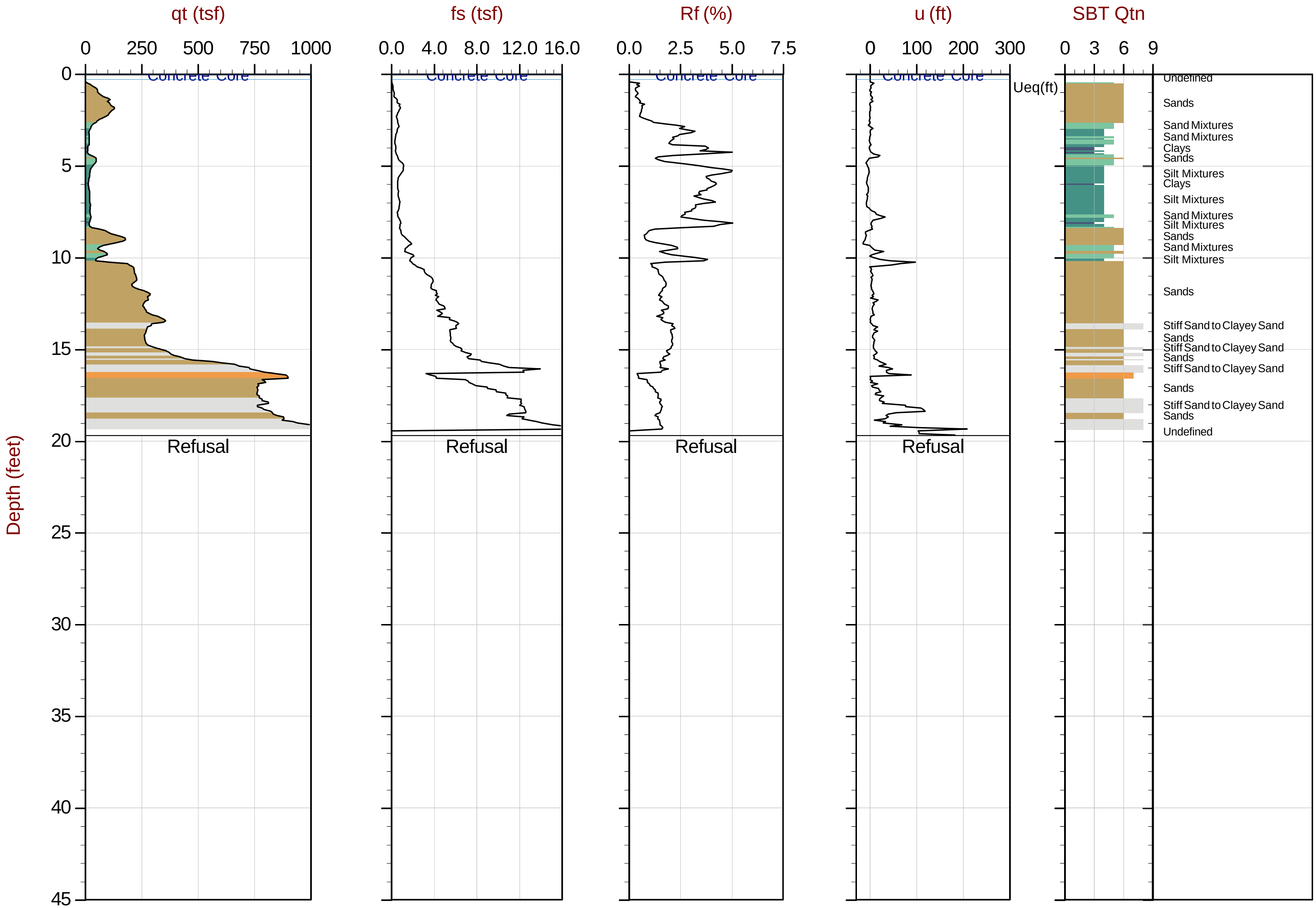
SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58761 Long: -122.30424

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.

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 12:52
Site: Grand Street Commons
Sounding: AC-CPT-03E
Cone: 661:T1500F15U35



Max Depth: 6.000 m / 19.68 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP03E.COR
Unit Wt: SBTQtn (PKR2009)

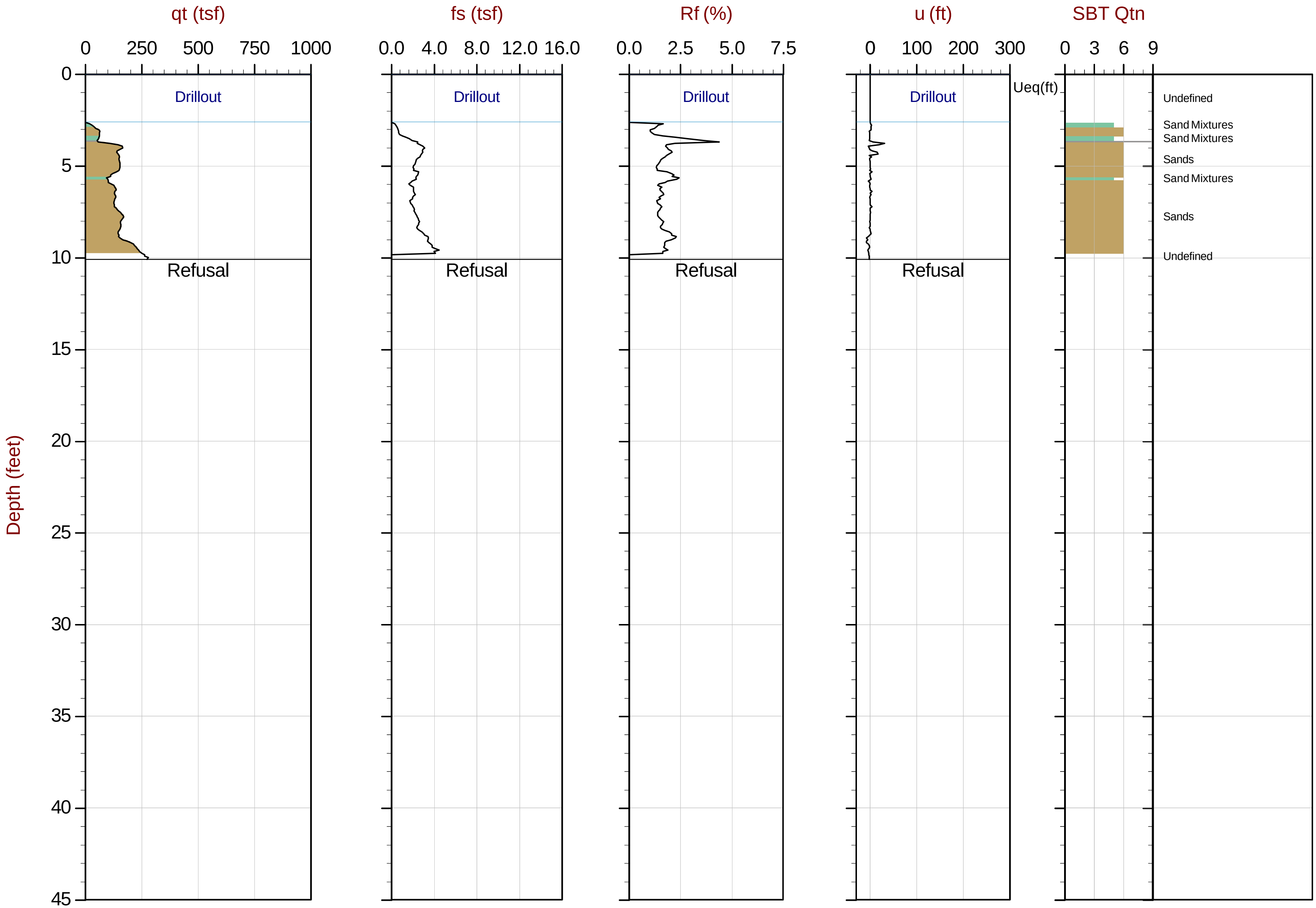
SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58755 Long: -122.30358

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.

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 15:37
Site: Grand Street Commons
Sounding: AC-CPT-03S
Cone: 536:T1500F15U500



Max Depth: 3.075 m / 10.09 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP03S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58685 Long: -122.30398

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

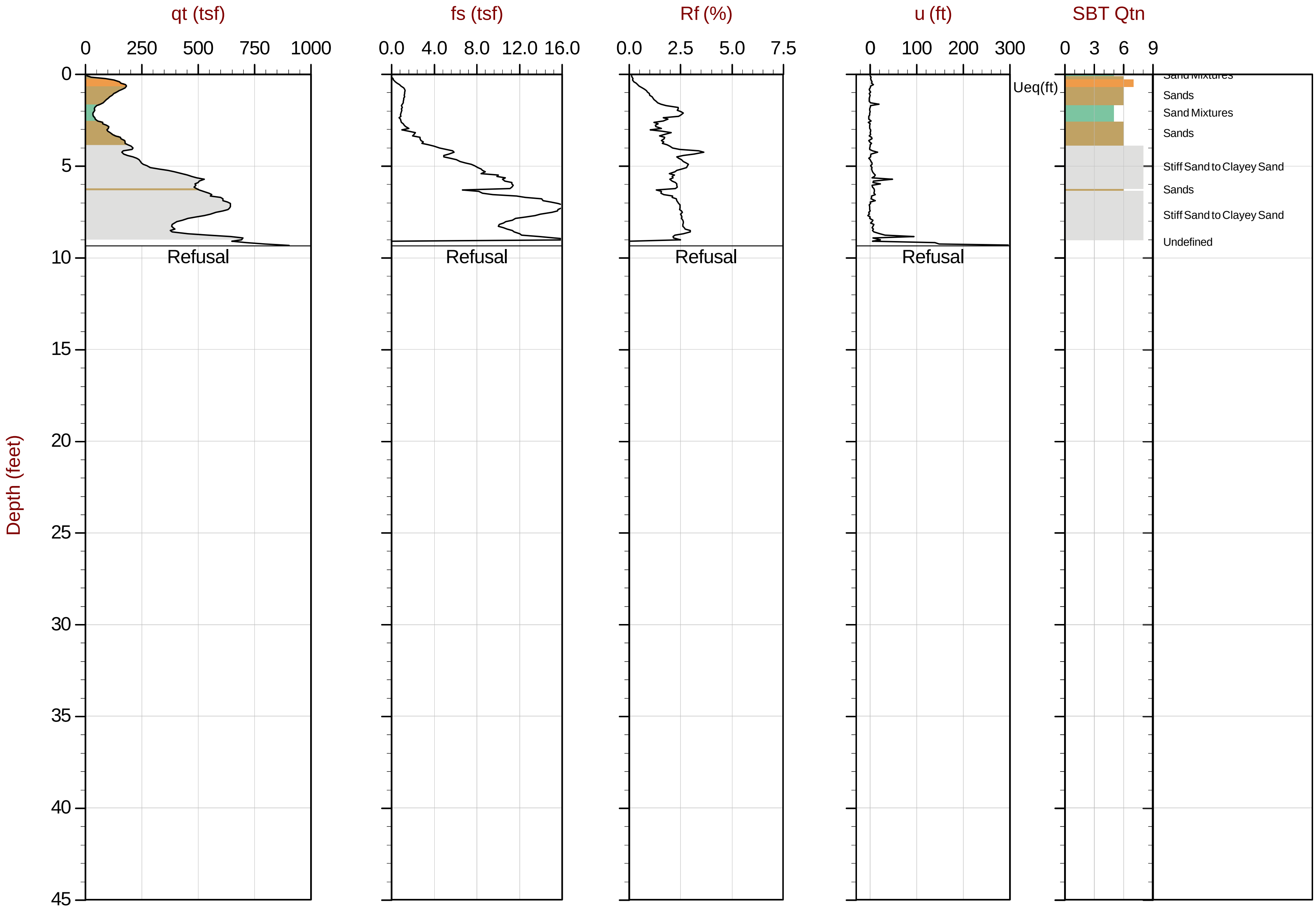
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 14:50
Site: Grand Street Commons

Sounding: AC-CPT-03W
Cone: 661:T1500F15U35



Max Depth: 2.850 m / 9.35 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP03W.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58702 Long: -122.30418

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

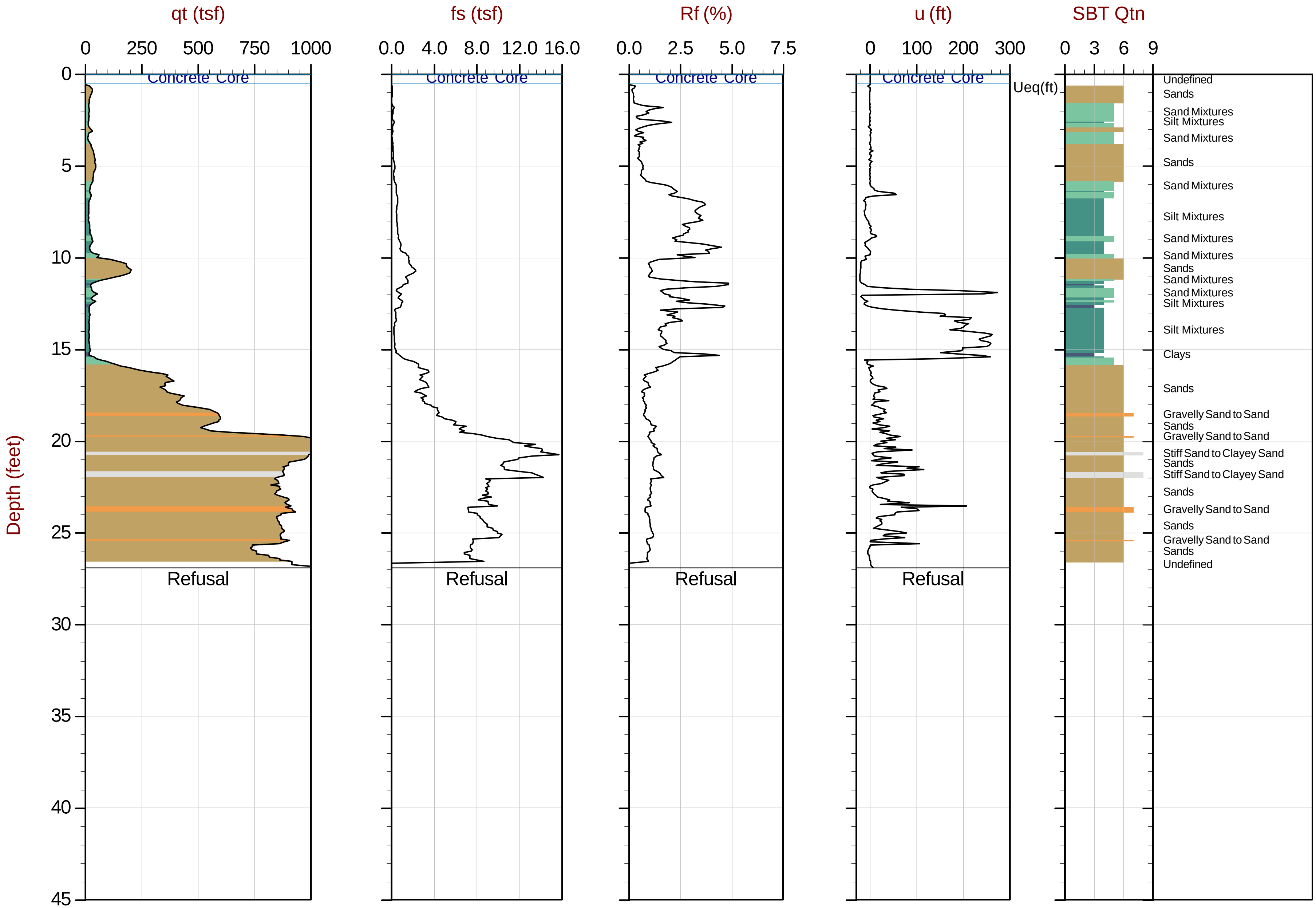
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 12:15
Site: Grand Street Commons

Sounding: AC-CPT-04E
Cone: 661:T1500F15U35



Max Depth: 8.200 m / 26.90 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP04E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58743 Long: -122.30356

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

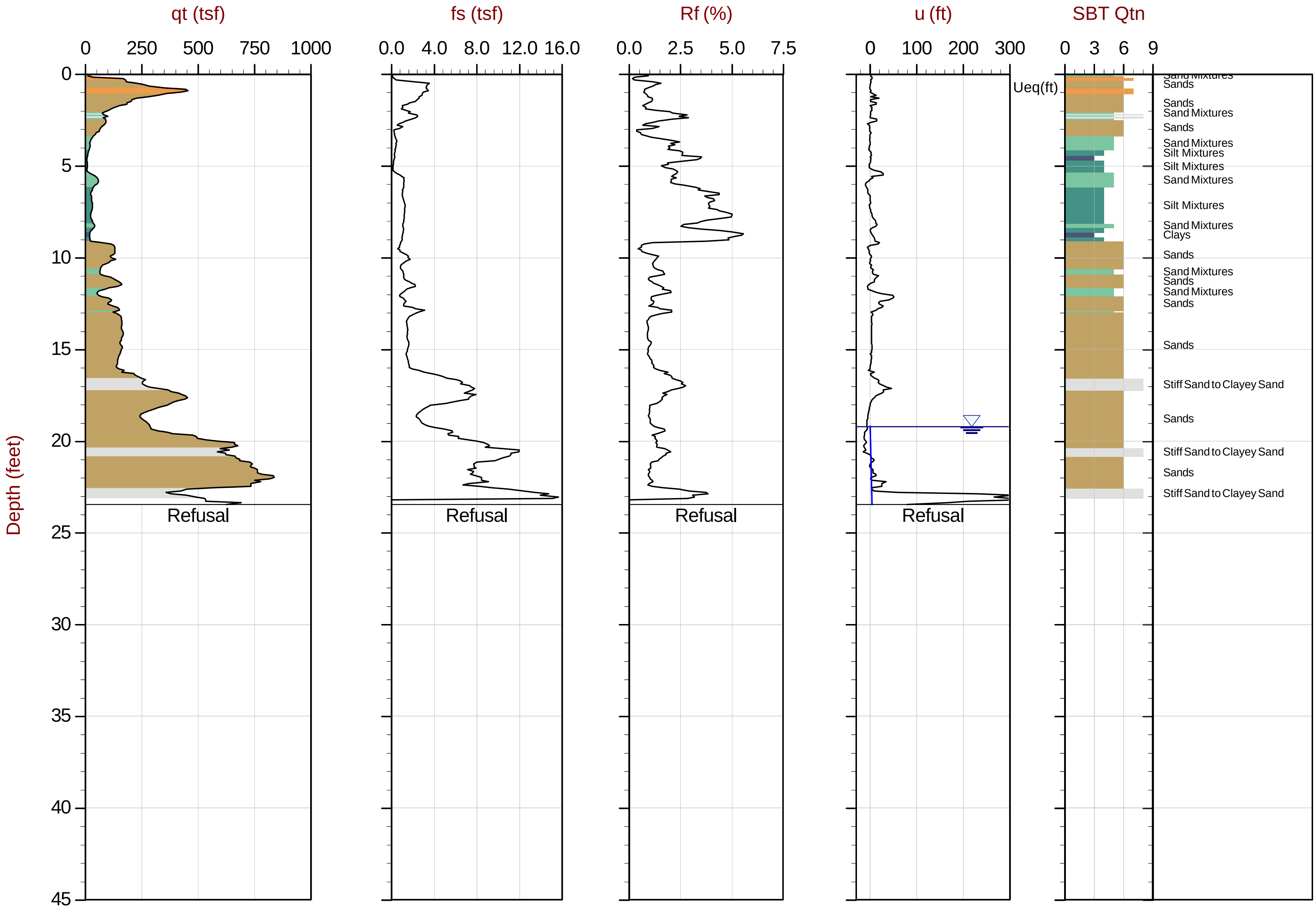
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 11:48
Site: Grand Street Commons

Sounding: AC-CPT-04S
Cone: 661:T1500F15U35



Max Depth: 7.150 m / 23.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP04S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30389

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

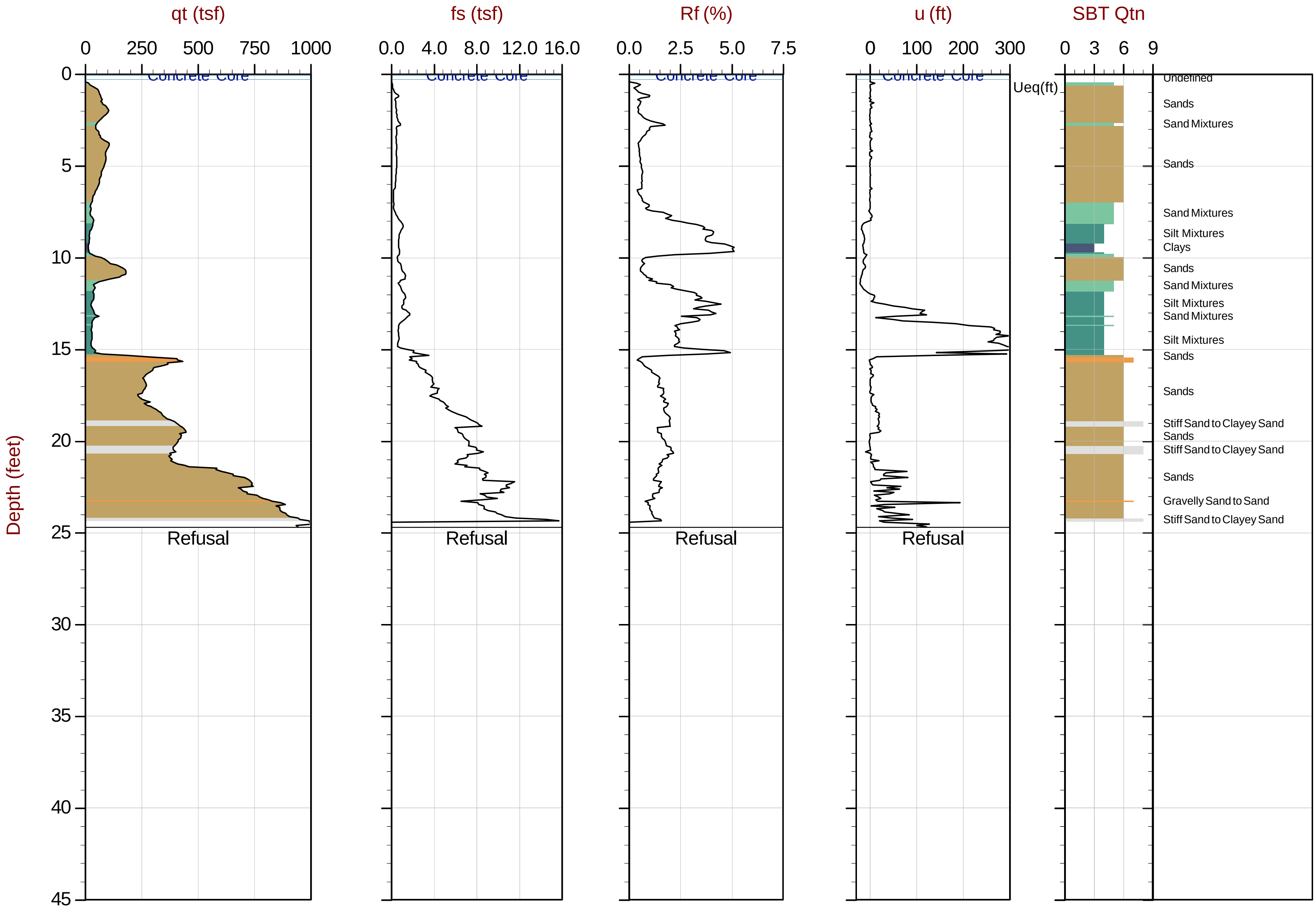
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 11:28
Site: Grand Street Commons

Sounding: AC-CPT-05E
Cone: 661:T1500F15U35



Max Depth: 7.525 m / 24.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP05E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58736 Long: -122.30348

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

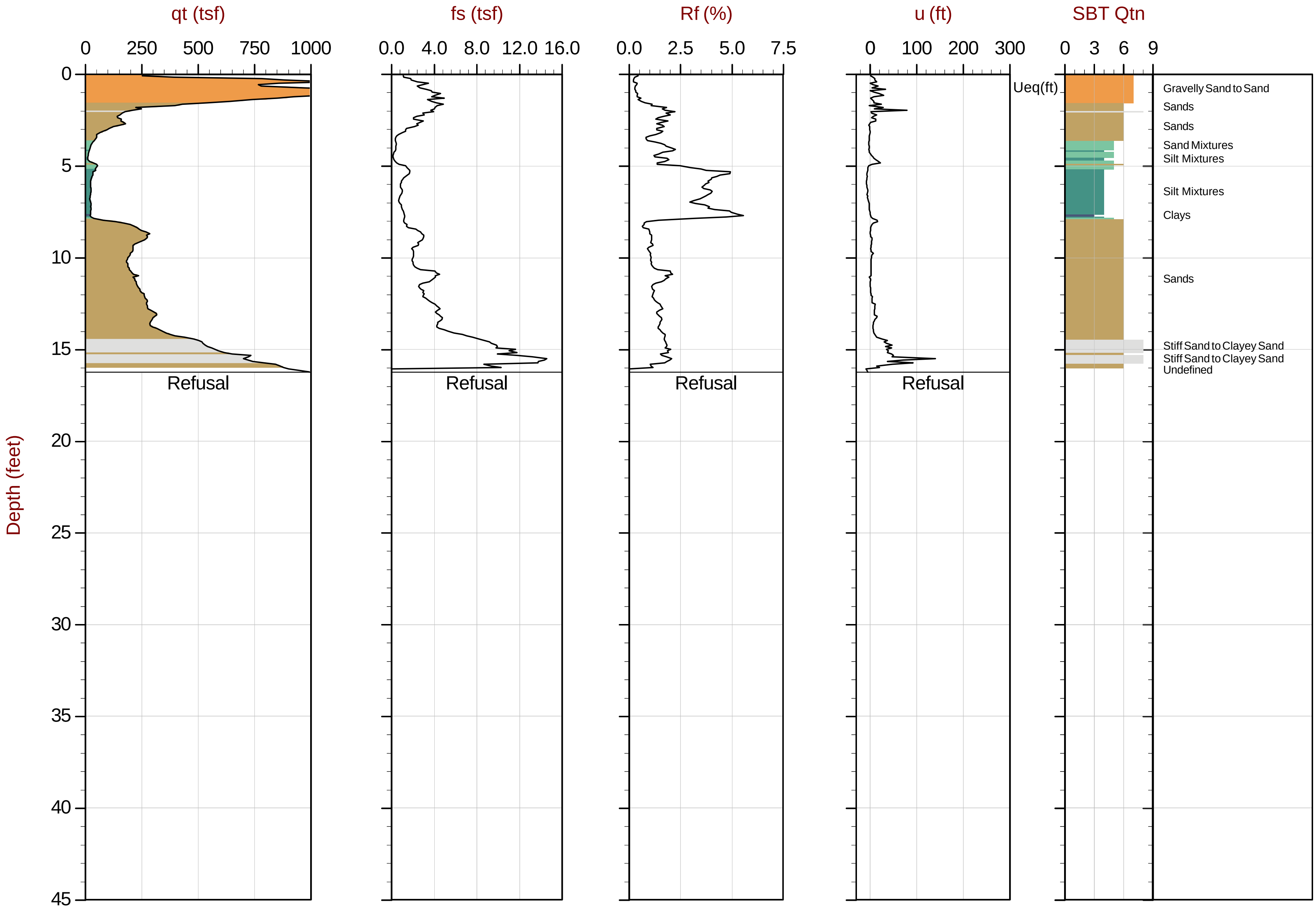
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 10:31
Site: Grand Street Commons

Sounding: AC-CPT-05S
Cone: 661:T1500F15U35



Max Depth: 4.950 m / 16.24 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP05S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58669 Long: -122.30386

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

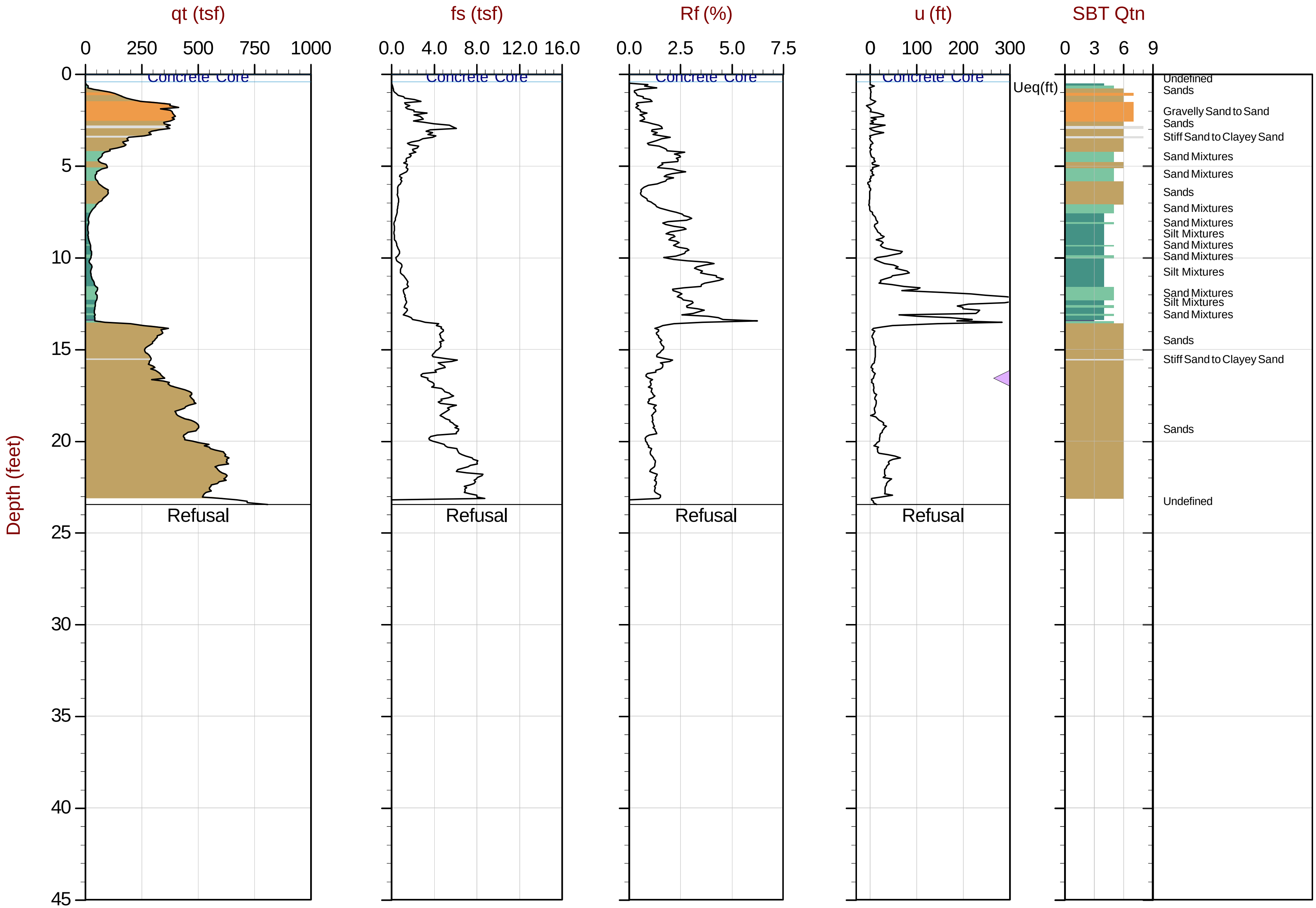
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 10:47
Site: Grand Street Commons

Sounding: AC-CPT-06E
Cone: 661:T1500F15U35



Max Depth: 7.150 m / 23.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP06E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58722 Long: -122.30348

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

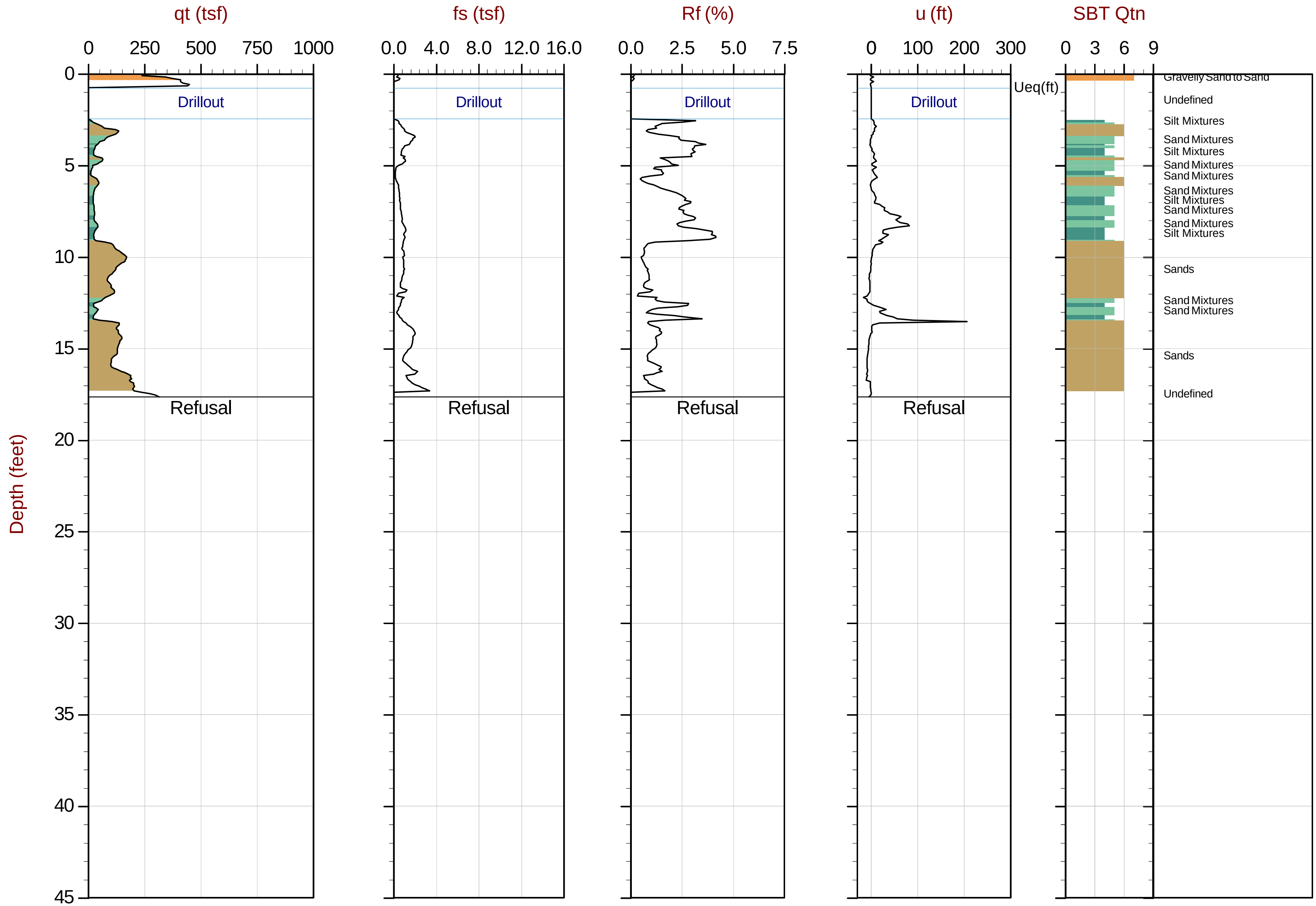
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 10:31
Site: Grand Street Commons

Sounding: AC-CPT-06S
Cone: 536:T1500F15U500



Max Depth: 5.375 m / 17.63 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP06S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58655 Long: -122.30381

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

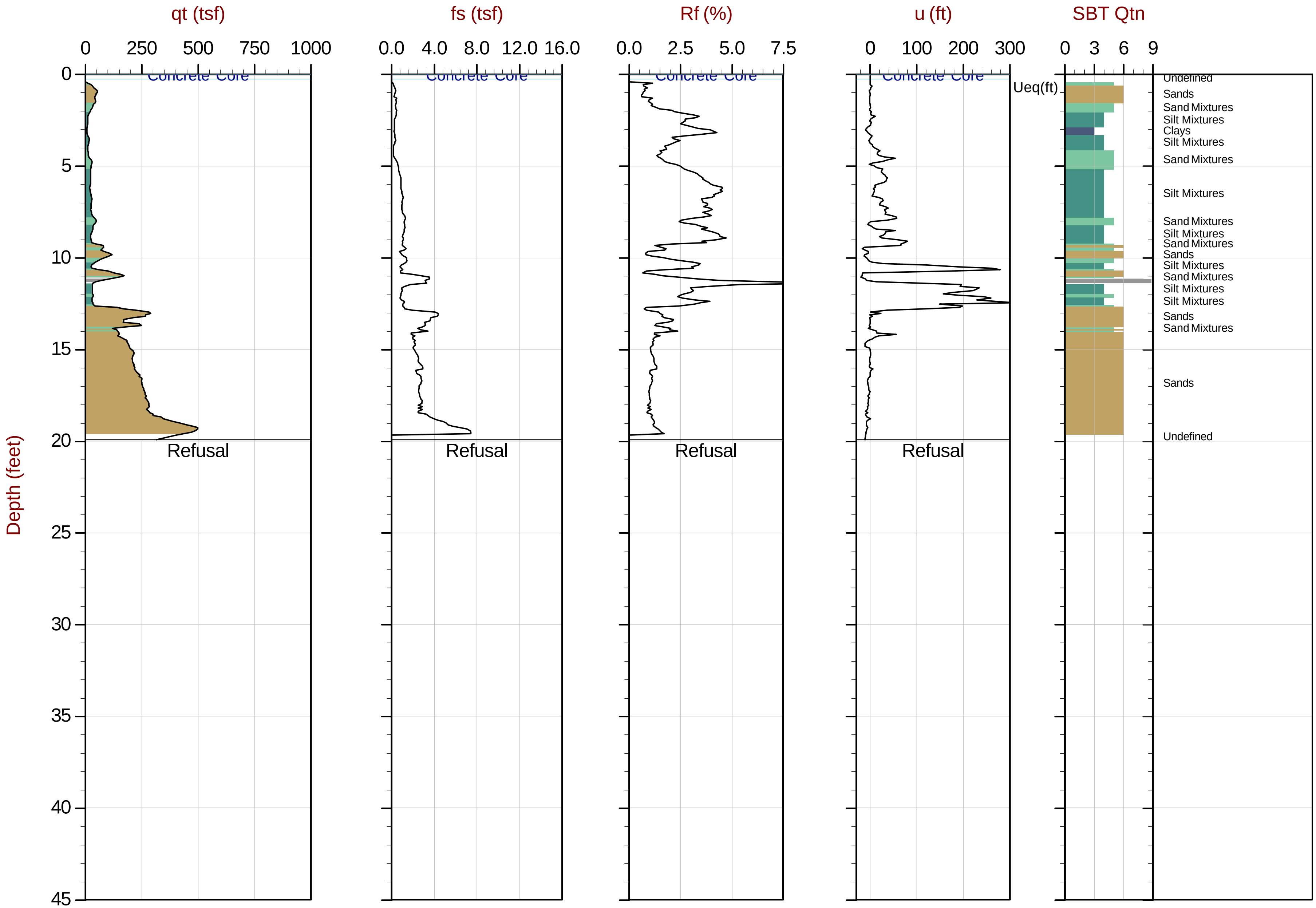
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 07:15
Site: Grand Street Commons

Sounding: AC-CPT-07E
Cone: 661:T1500F15U35



Max Depth: 6.075 m / 19.93 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP07E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58756 Long: -122.30343

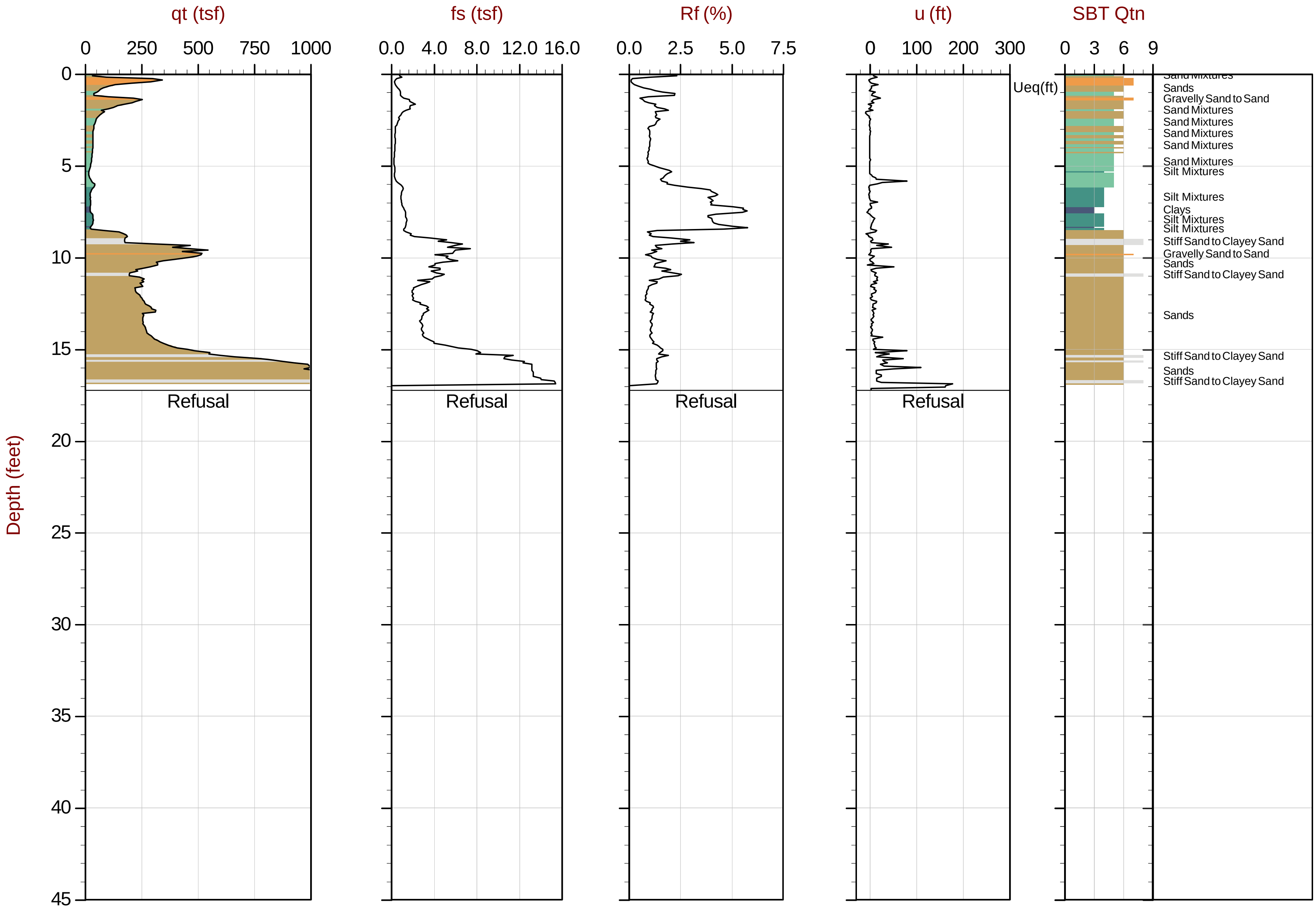
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 12:32
Site: Grand Street Commons
Sounding: AC-CPT-07S
Cone: 661:T1500F15U35



Max Depth: 5.250 m / 17.22 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP07S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58687 Long: -122.30375

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

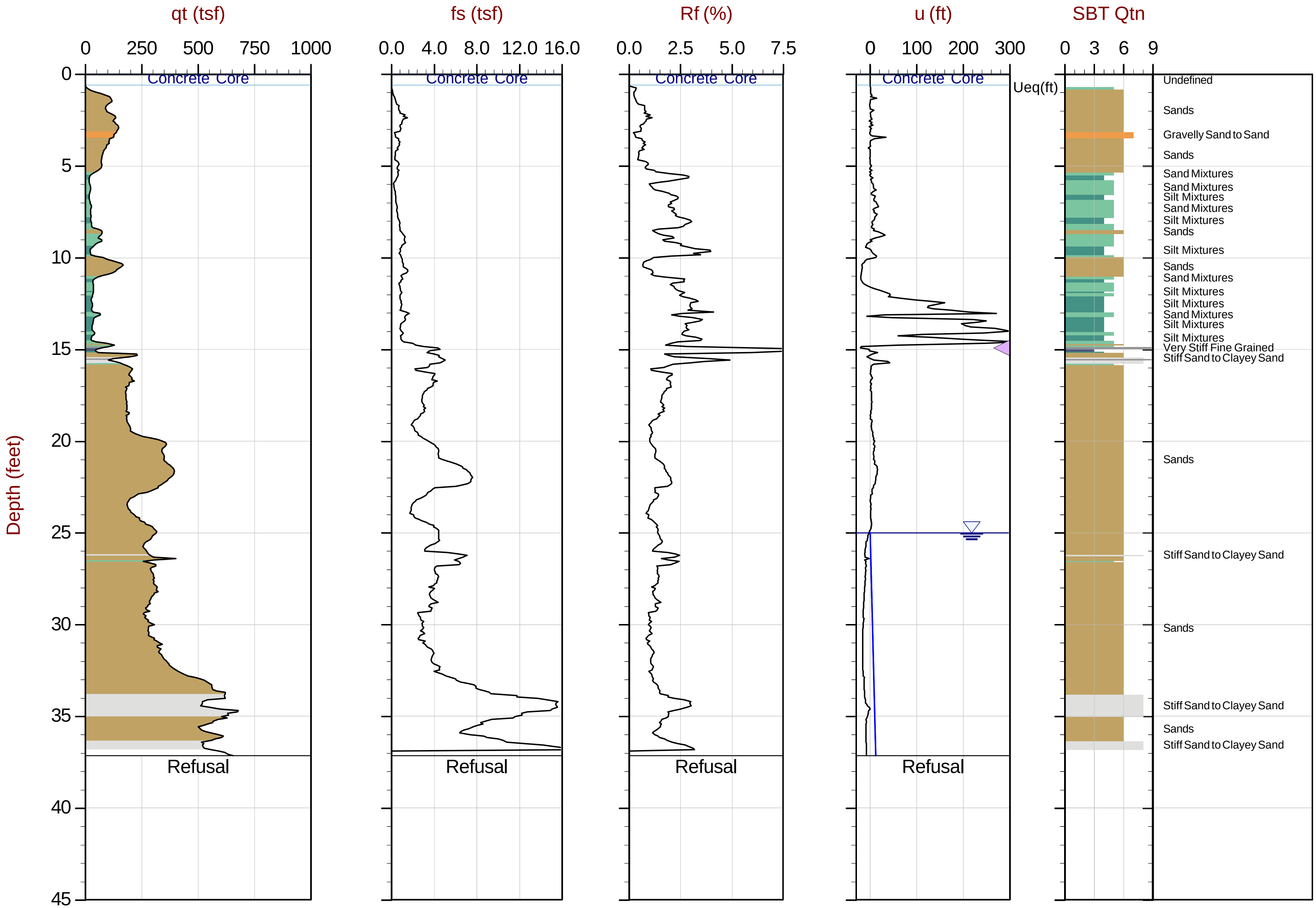
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 07:46
Site: Grand Street Commons

Sounding: AC-CPT-08E
Cone: 661:T1500F15U35



Max Depth: 11.325 m / 37.16 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP08E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58747 Long: -122.30340

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

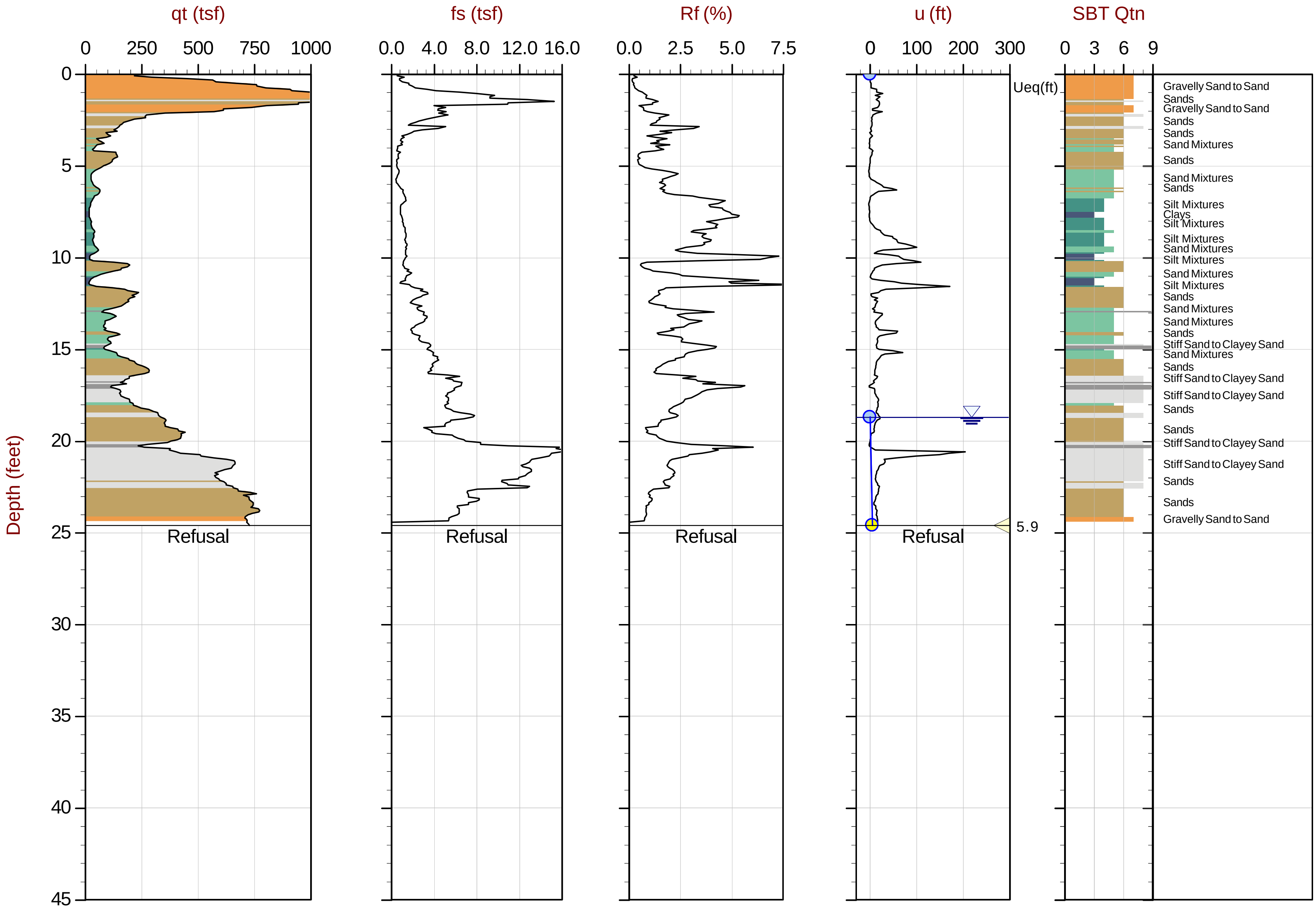
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 09:15
Site: Grand Street Commons

Sounding: AC-CPT-08S
Cone: 661:T1500F15U35



Max Depth: 7.500 m / 24.61 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP08S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58677 Long: -122.30374

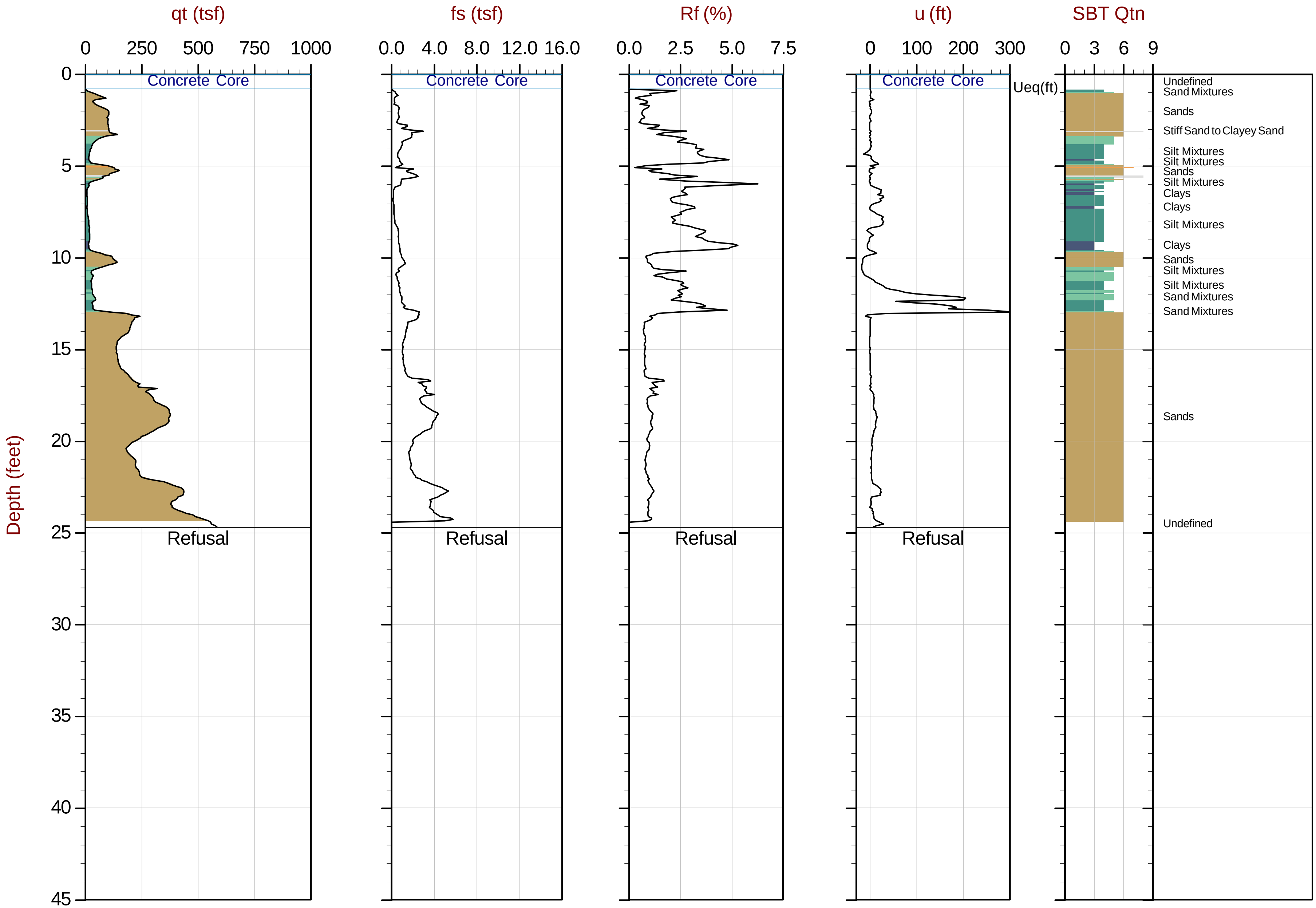
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Job No: 20-59-21343
Date: 2019-09-24 12:54
Site: Grand Street Commons

Sounding: AC-CPT-09E
Cone: 595:T1500F15U500

Aspect Consulting



Max Depth: 7.525 m / 24.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP09E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58732 Long: -122.30342

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

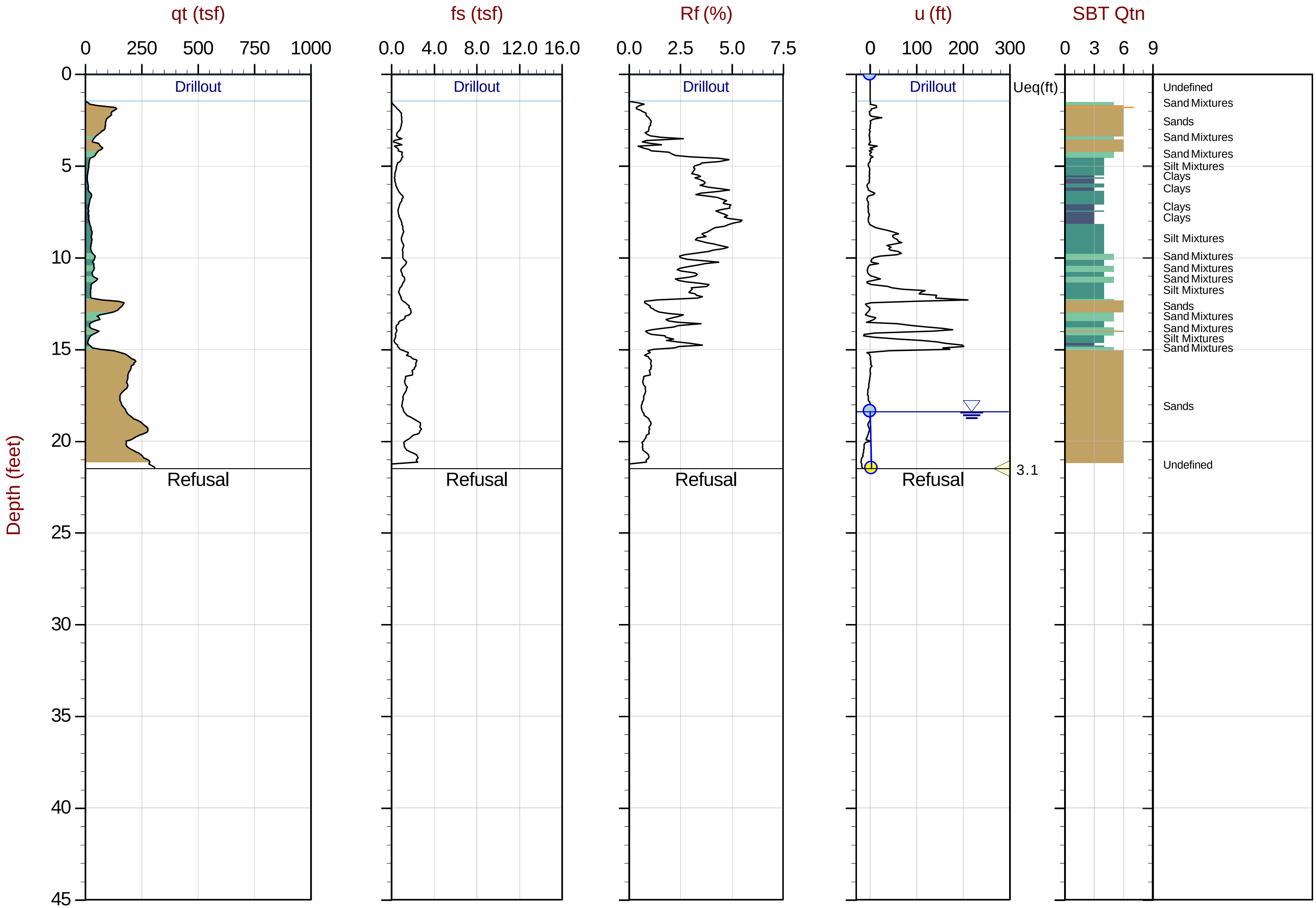
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 11:20
Site: Grand Street Commons

Sounding: AC-CPT-09S
Cone: 536:T1500F15U500



Max Depth: 6.550 m / 21.49 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP09S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30363

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

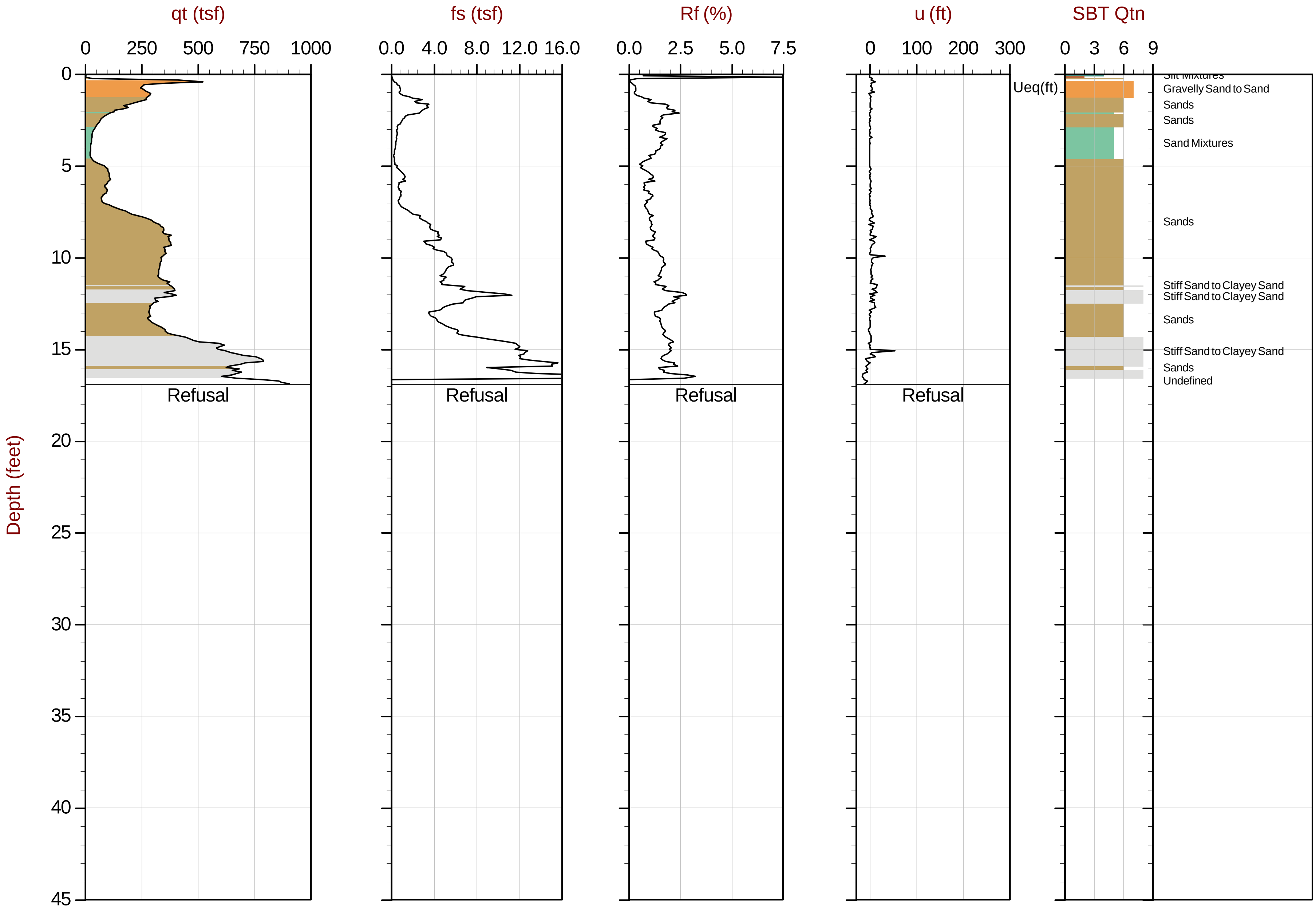
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 16:33
Site: Grand Street Commons

Sounding: AC-CPT-10E
Cone: 661:T1500F15U35



Max Depth: 5.150 m / 16.90 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP10E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58707 Long: -122.30328

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

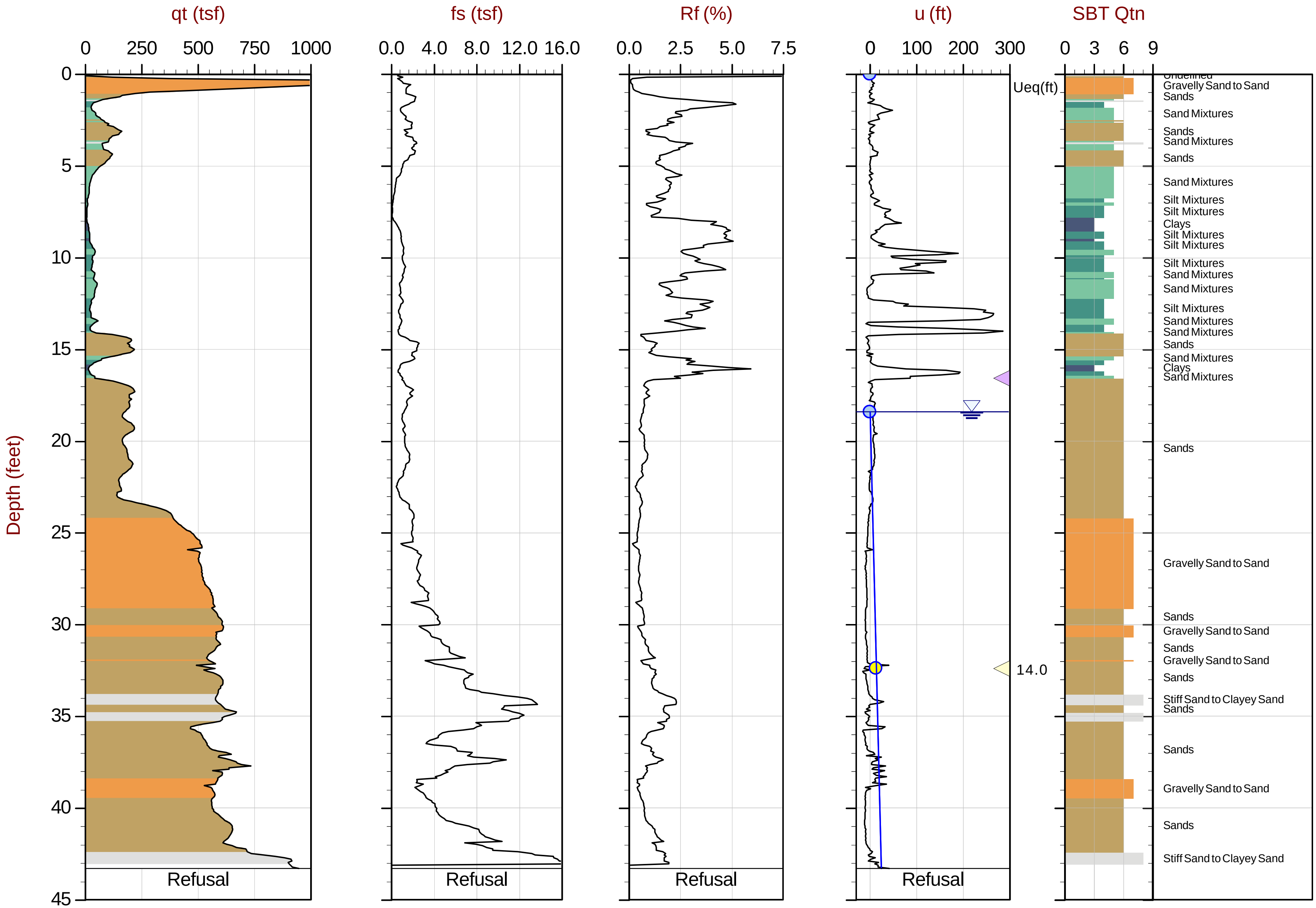
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 13:53
Site: Grand Street Commons

Sounding: AC-CPT-10S
Cone: 661:T1500F15U35



Max Depth: 13.200 m / 43.31 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP10S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58672 Long: -122.30359

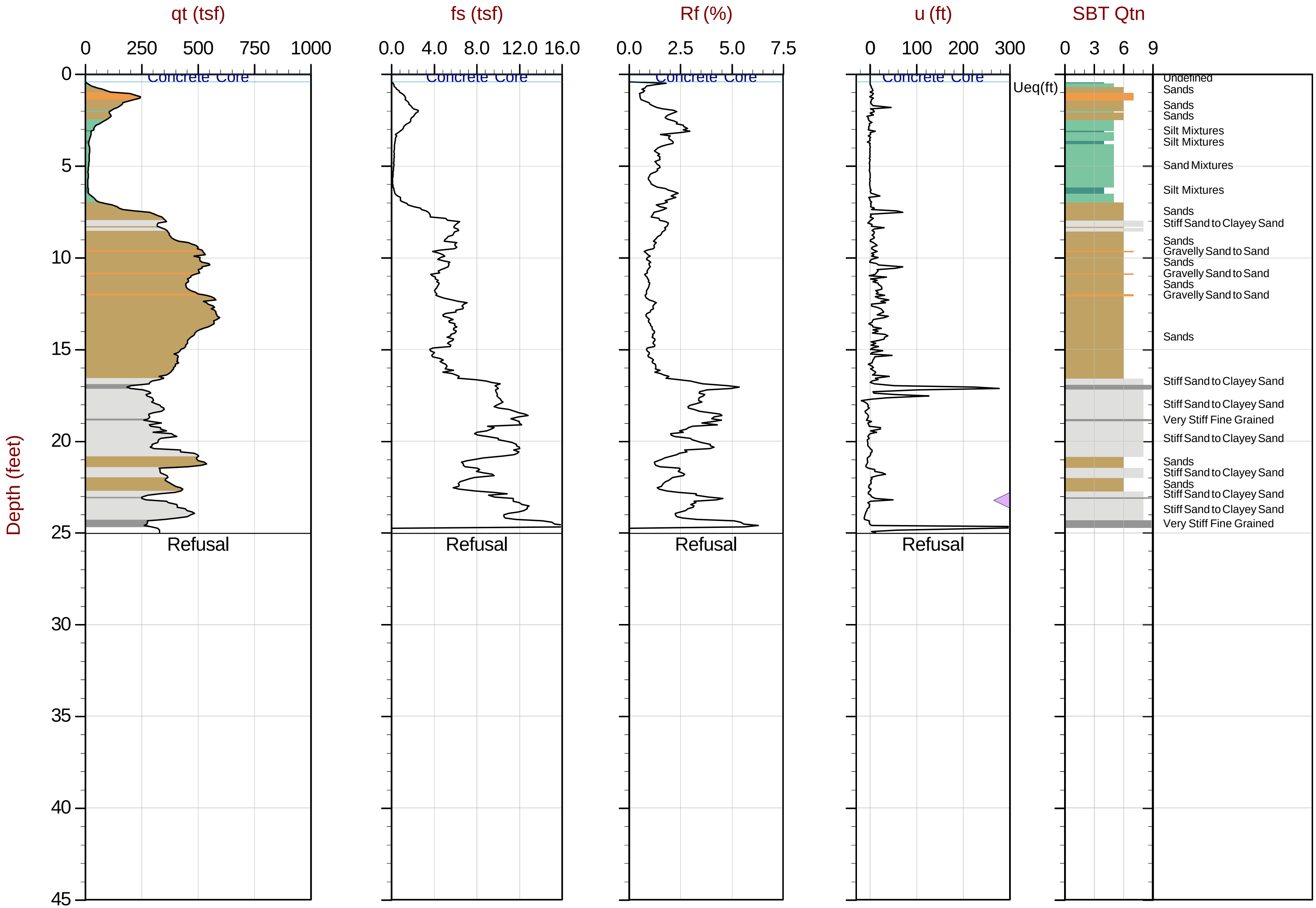
Equilibrium Pore Pressure (Ueq) · Assumed Ueq · Dissipation, Ueq achieved · Dissipation, Ueq not achieved · Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 08:45
Site: Grand Street Commons
Sounding: AC-CPT-11E
Cone: 661:T1500F15U35



Max Depth: 7.625 m / 25.02 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP11E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58718 Long: -122.30325

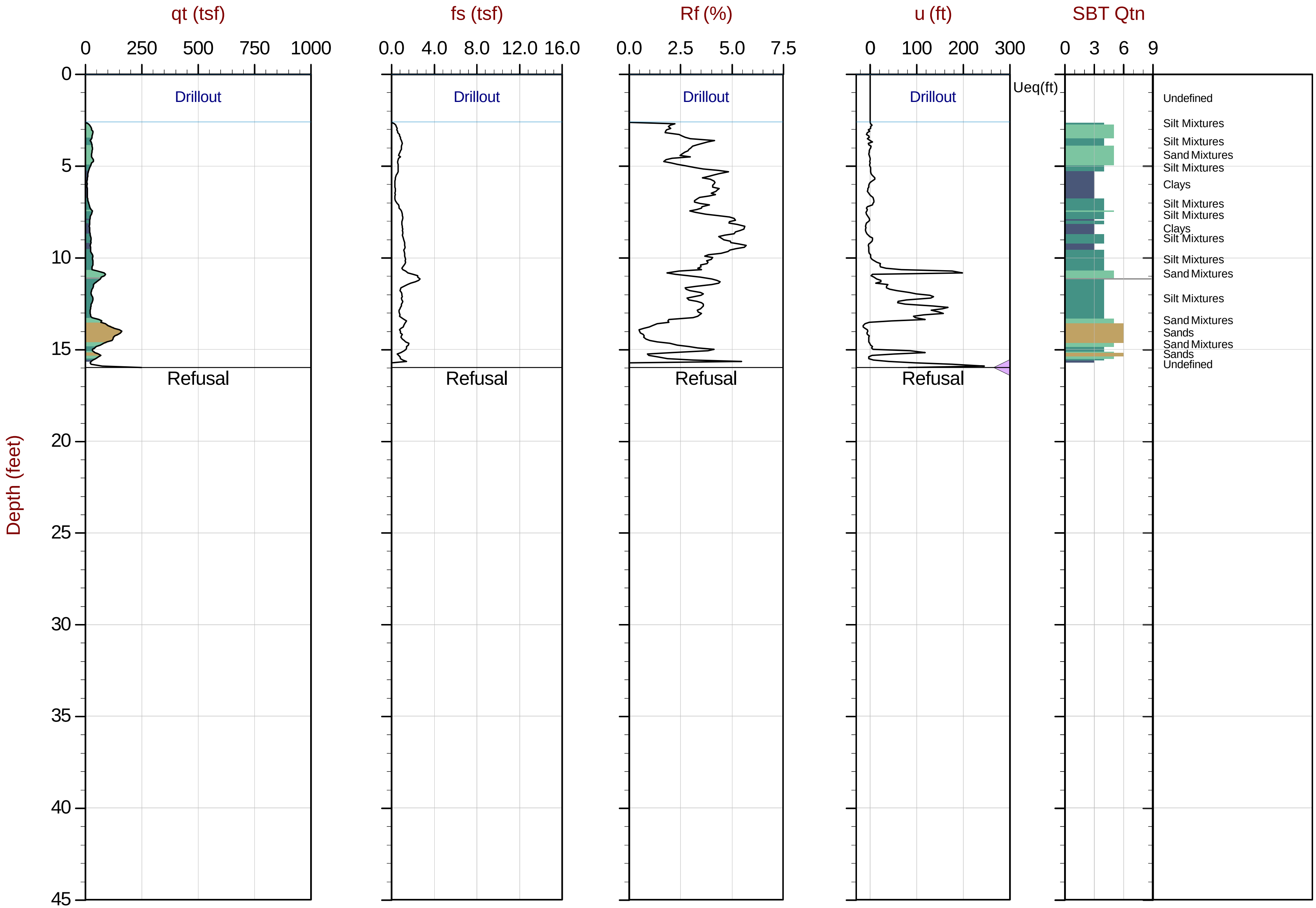
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 14:56
Site: Grand Street Commons
Sounding: AC-CPT-11S
Cone: 536:T1500F15U500



Max Depth: 4.875 m / 15.99 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP11S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58678 Long: -122.30352

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

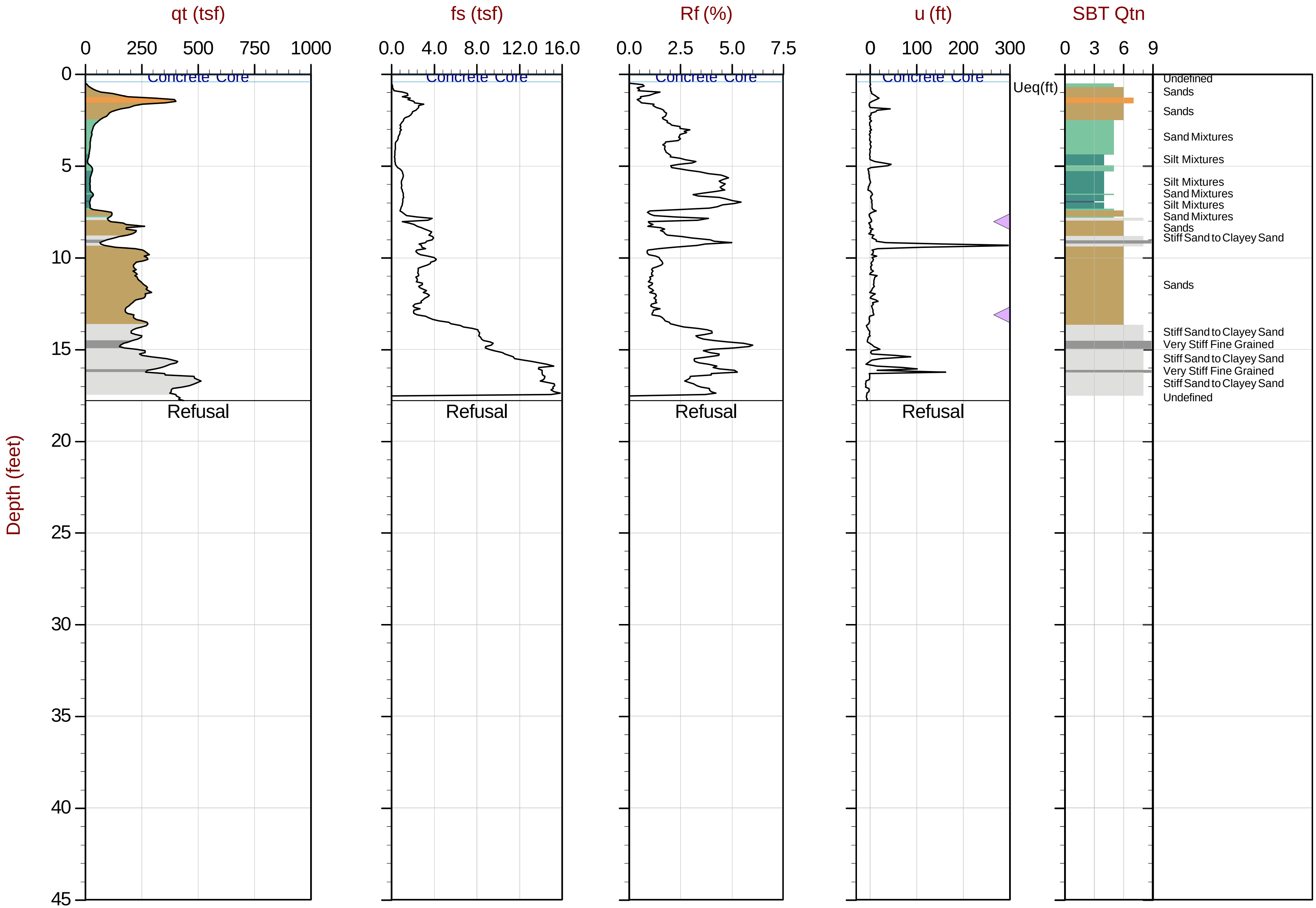
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 09:55
Site: Grand Street Commons

Sounding: AC-CPT-12E
Cone: 661:T1500F15U35



Max Depth: 5.425 m / 17.80 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP12E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58734 Long: -122.30321

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

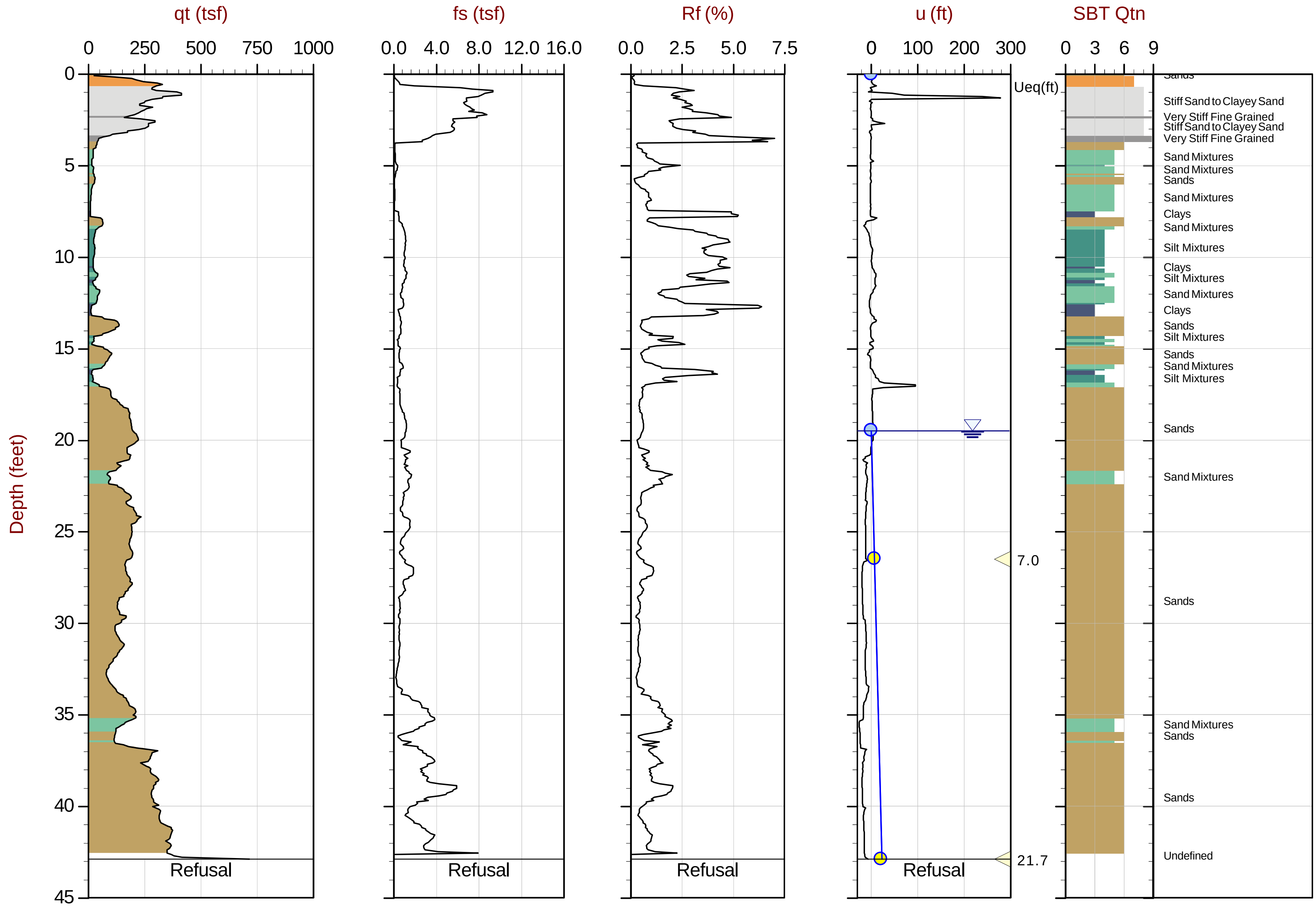
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 13:46
Site: Grand Street Commons

Sounding: AC-CPT-12S
Cone: 661:T1500F15U35



Max Depth: 13.075 m / 42.90 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP12S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30351

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

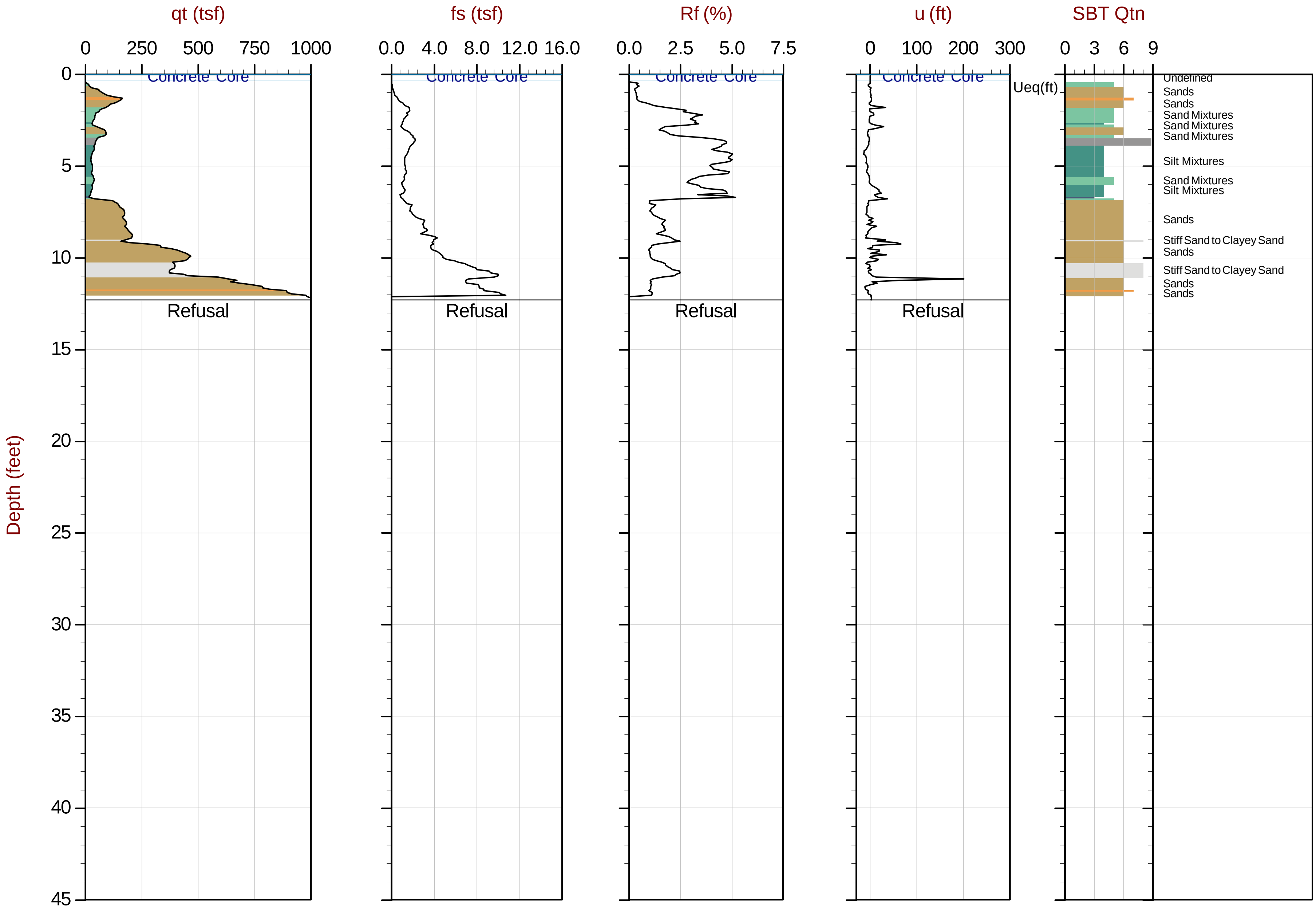
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 09:29
Site: Grand Street Commons

Sounding: AC-CPT-13E
Cone: 661:T1500F15U35



Max Depth: 3.750 m / 12.30 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP13E.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58742 Long: -122.30316

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

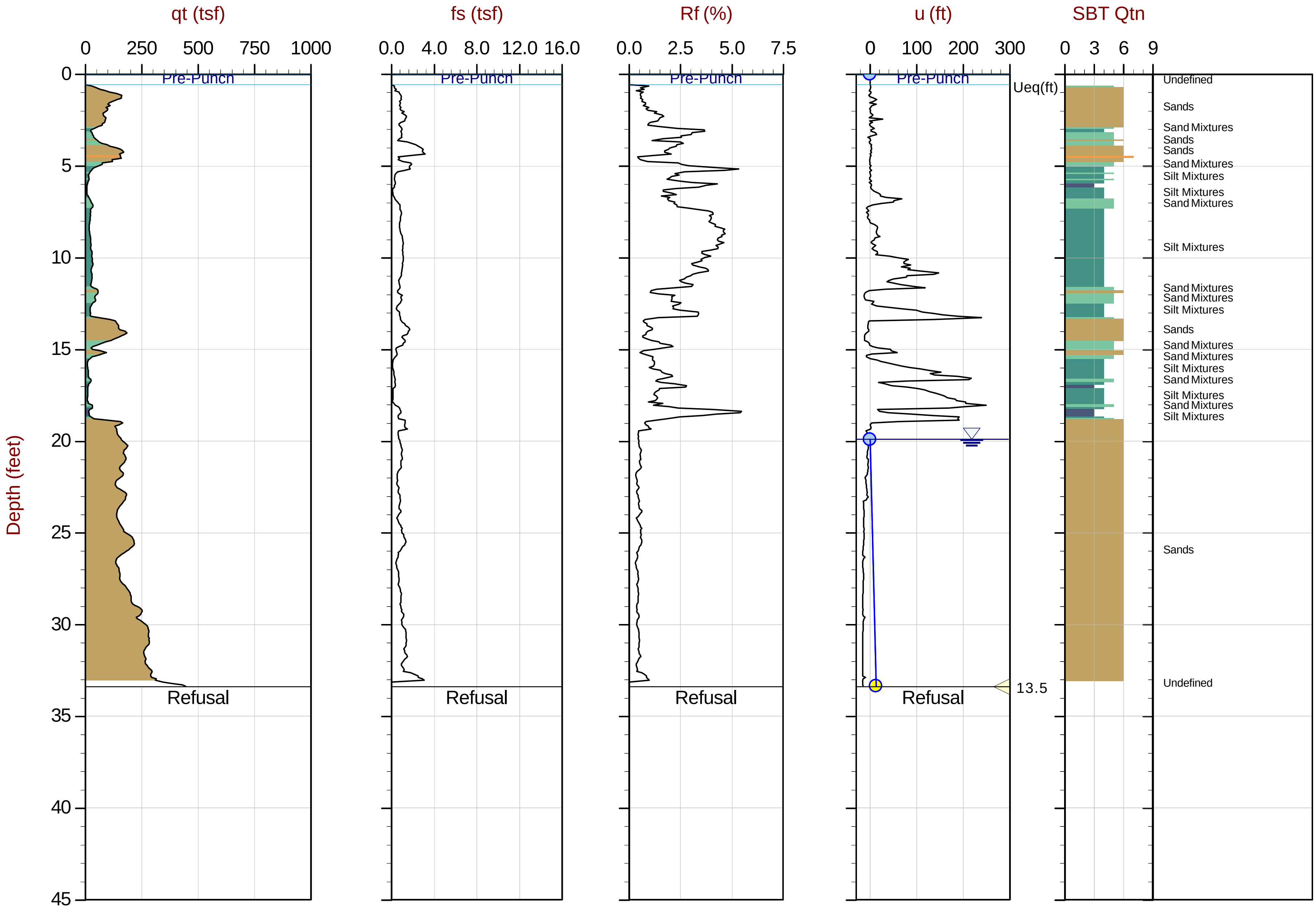
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 15:17
Site: Grand Street Commons

Sounding: AC-CPT-13S
Cone: 595:T1500F15U500



Max Depth: 10.175 m / 33.38 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP13S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58667 Long: -122.30350

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

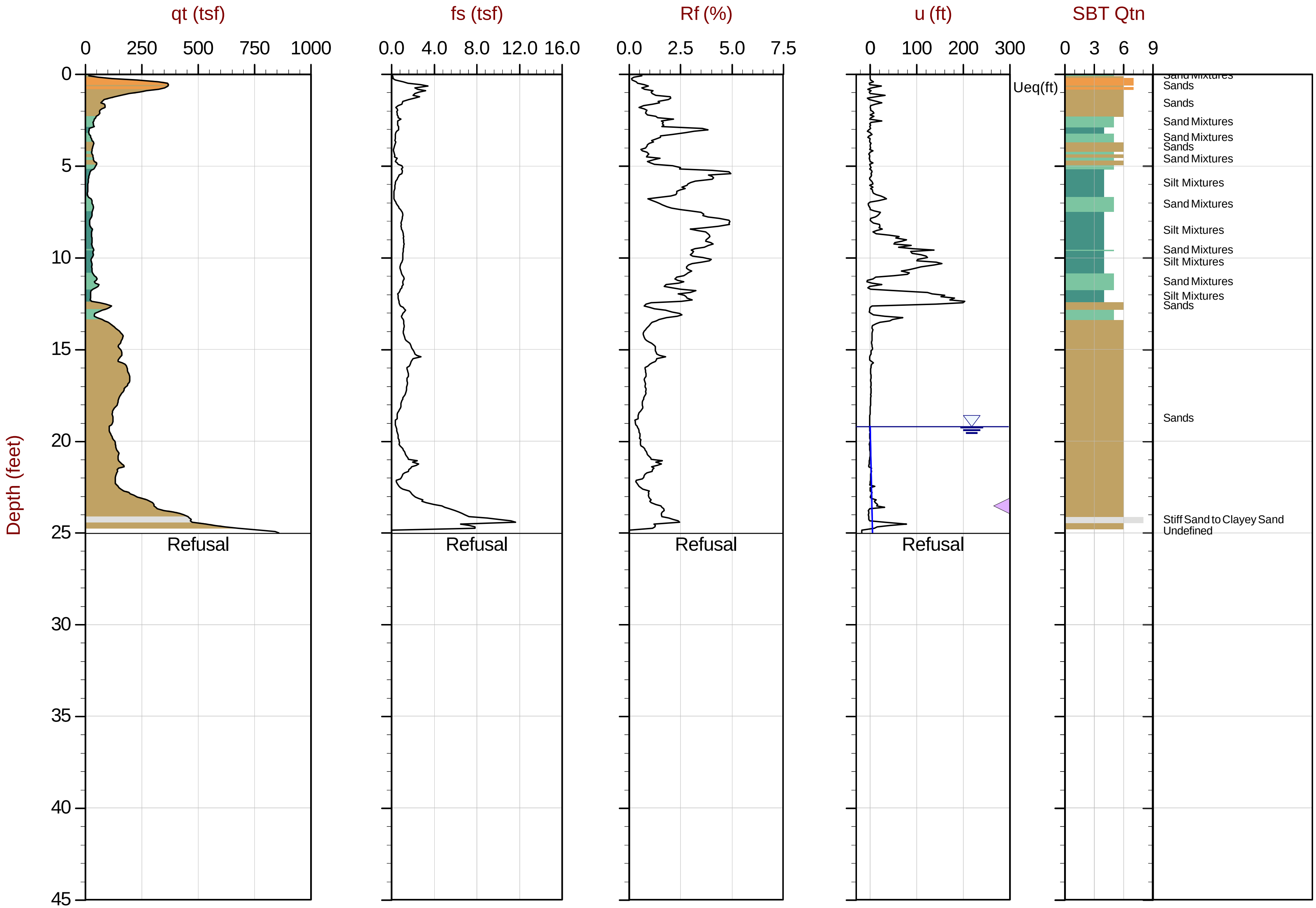
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 16:06
Site: Grand Street Commons

Sounding: AC-CPT-14S
Cone: 661:T1500F15U35



Max Depth: 7.625 m / 25.02 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP14S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58665 Long: -122.30346

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

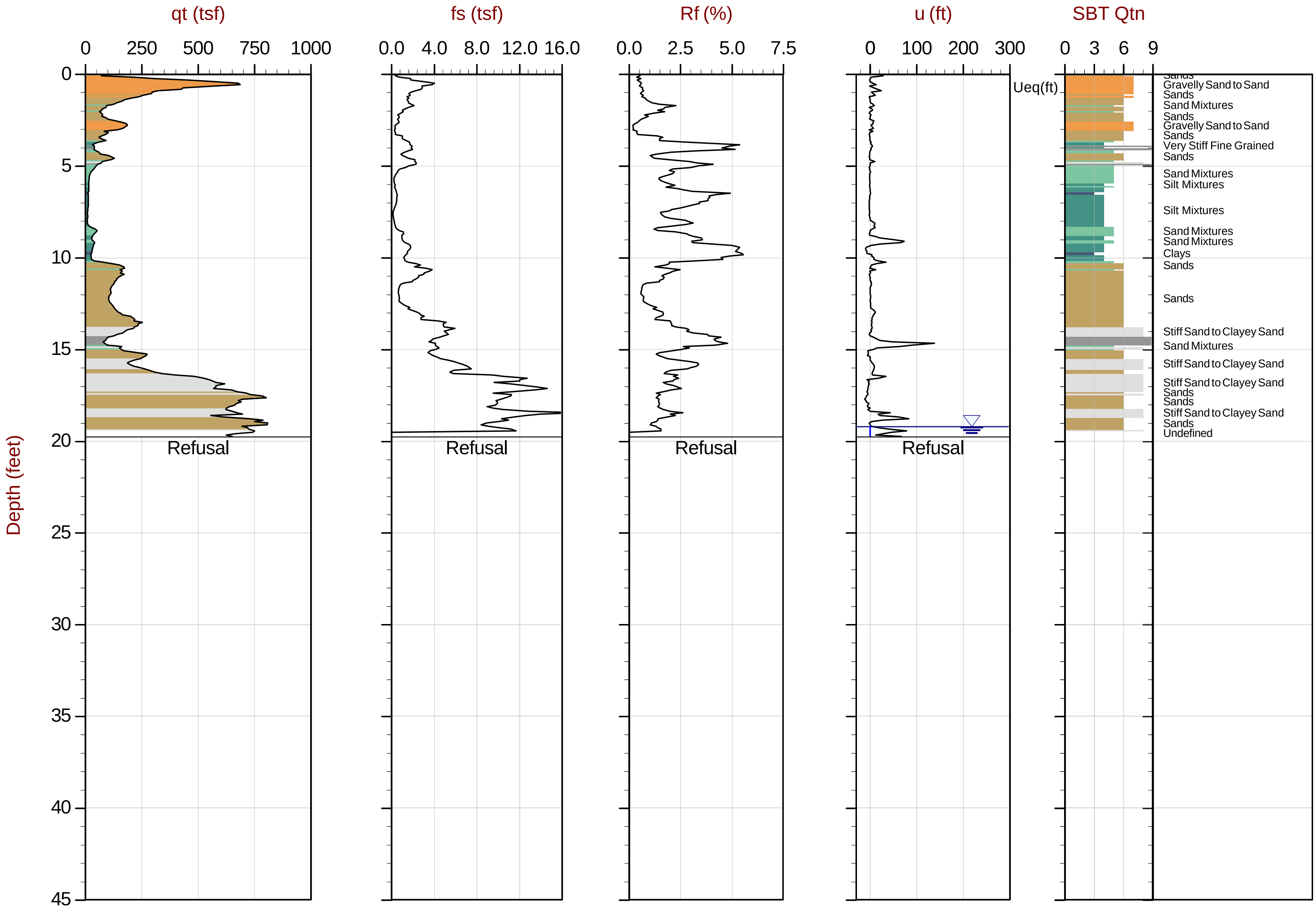
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 13:09
Site: Grand Street Commons

Sounding: AC-CPT-15S
Cone: 661:T1500F15U35



Max Depth: 6.025 m / 19.77 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP15S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58684 Long: -122.30341

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

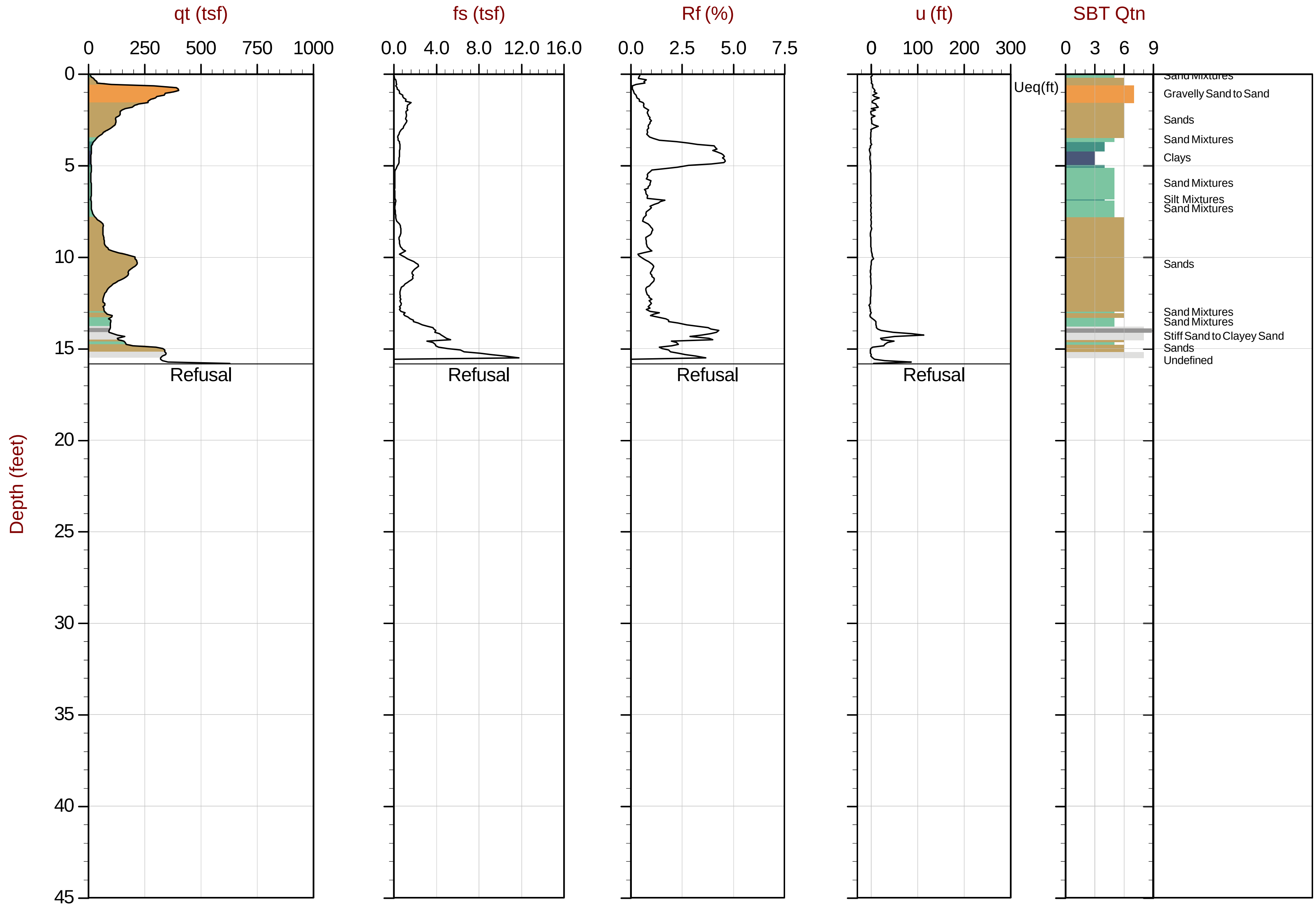
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 15:04
Site: Grand Street Commons

Sounding: AC-CPT-16S
Cone: 661:T1500F15U35



Max Depth: 4.825 m / 15.83 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP16S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58643 Long: -122.30340

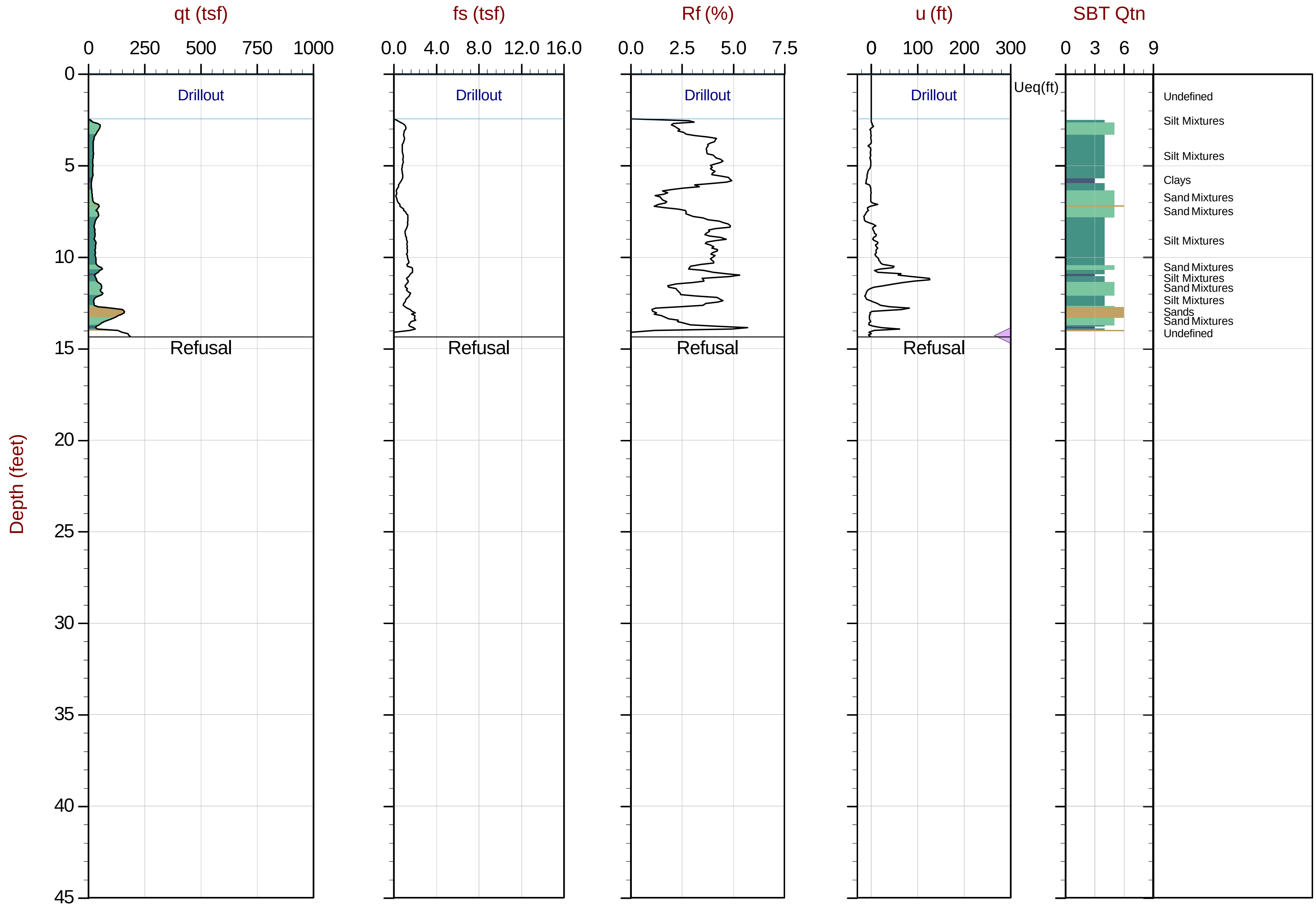
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 13:11
Site: Grand Street Commons
Sounding: AC-CPT-17S
Cone: 536:T1500F15U500



Max Depth: 4.375 m / 14.35 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP17S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58659 Long: -122.30340

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

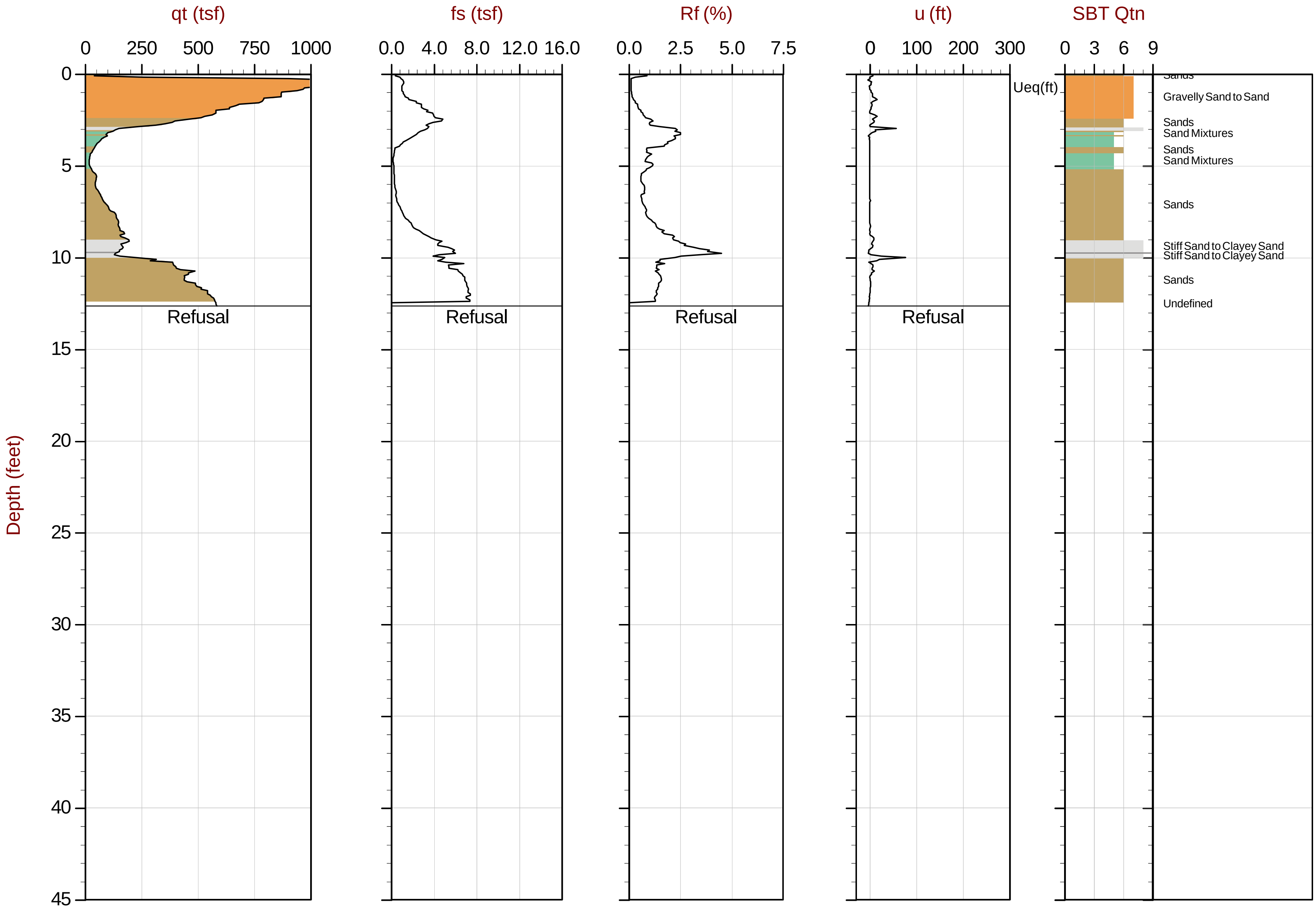
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 08:14
Site: Grand Street Commons

Sounding: AC-CPT-18S
Cone: 661:T1500F15U35



Max Depth: 3.850 m / 12.63 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP18S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58653 Long: -122.30334

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

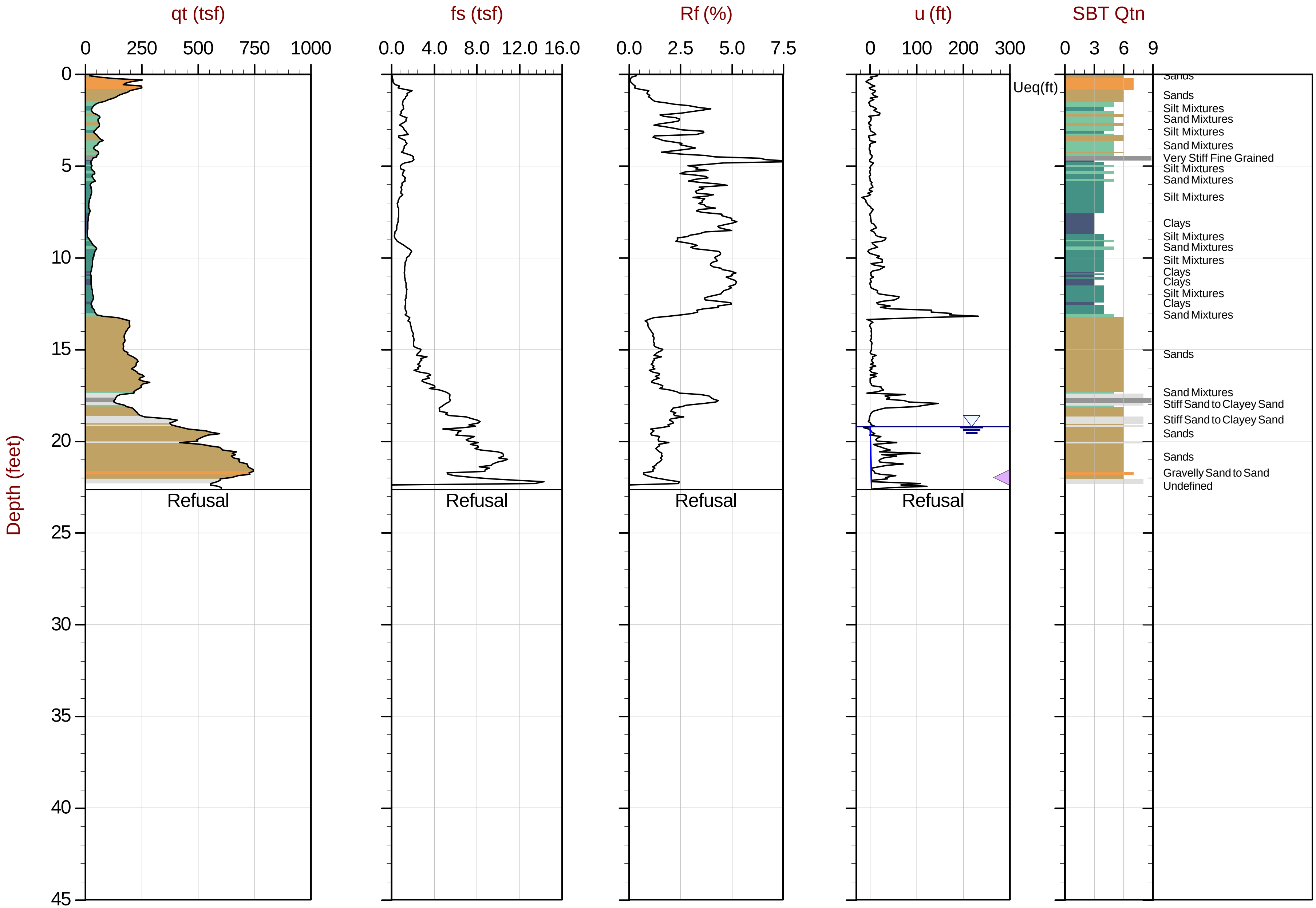
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 15:20
Site: Grand Street Commons

Sounding: AC-CPT-19S
Cone: 661:T1500F15U35



Max Depth: 6.900 m / 22.64 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP19S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58675 Long: -122.30333

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

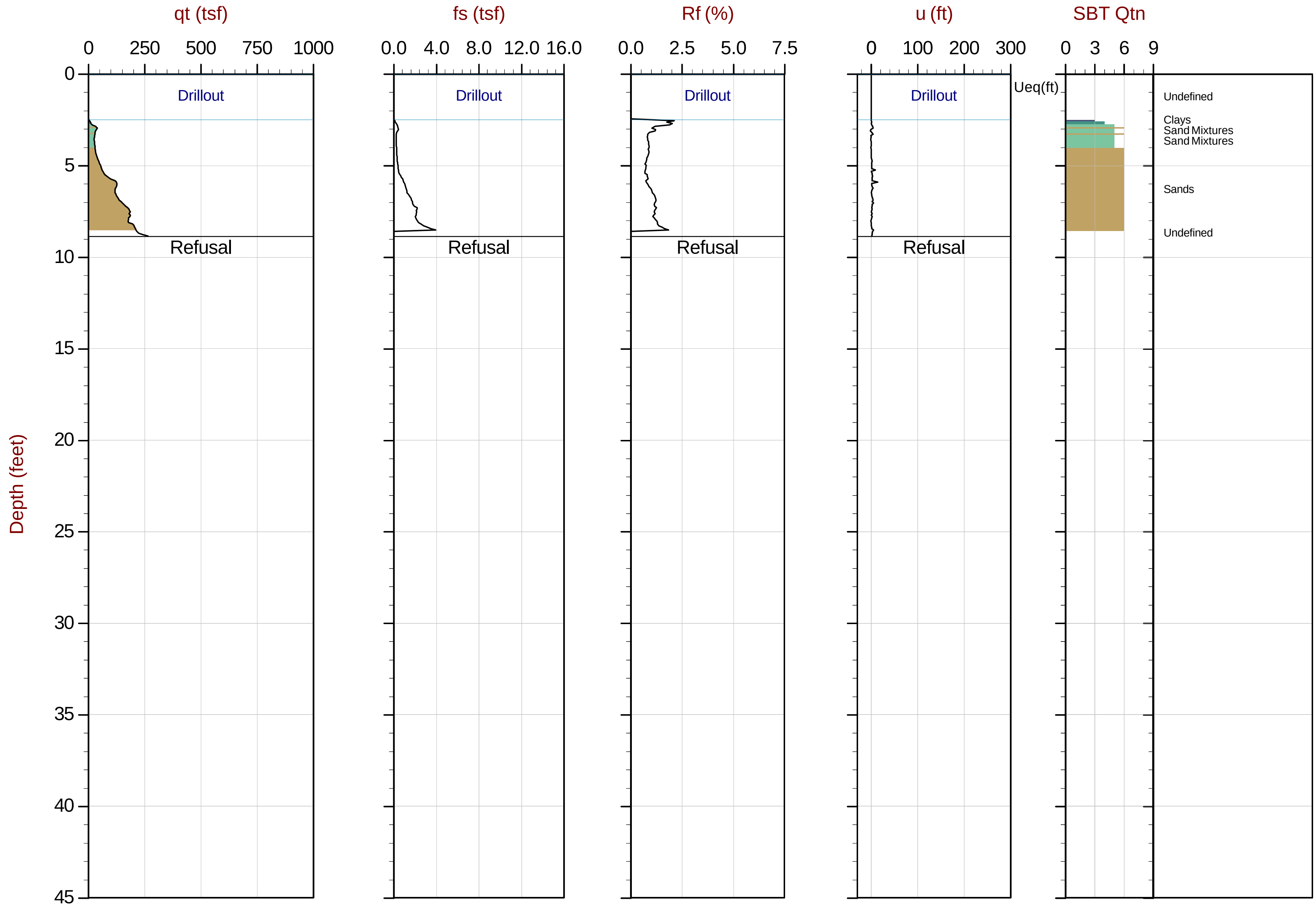
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 12:10
Site: Grand Street Commons

Sounding: AC-CPT-20S
Cone: 536:T1500F15U500



Max Depth: 2.700 m / 8.86 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP20S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30320

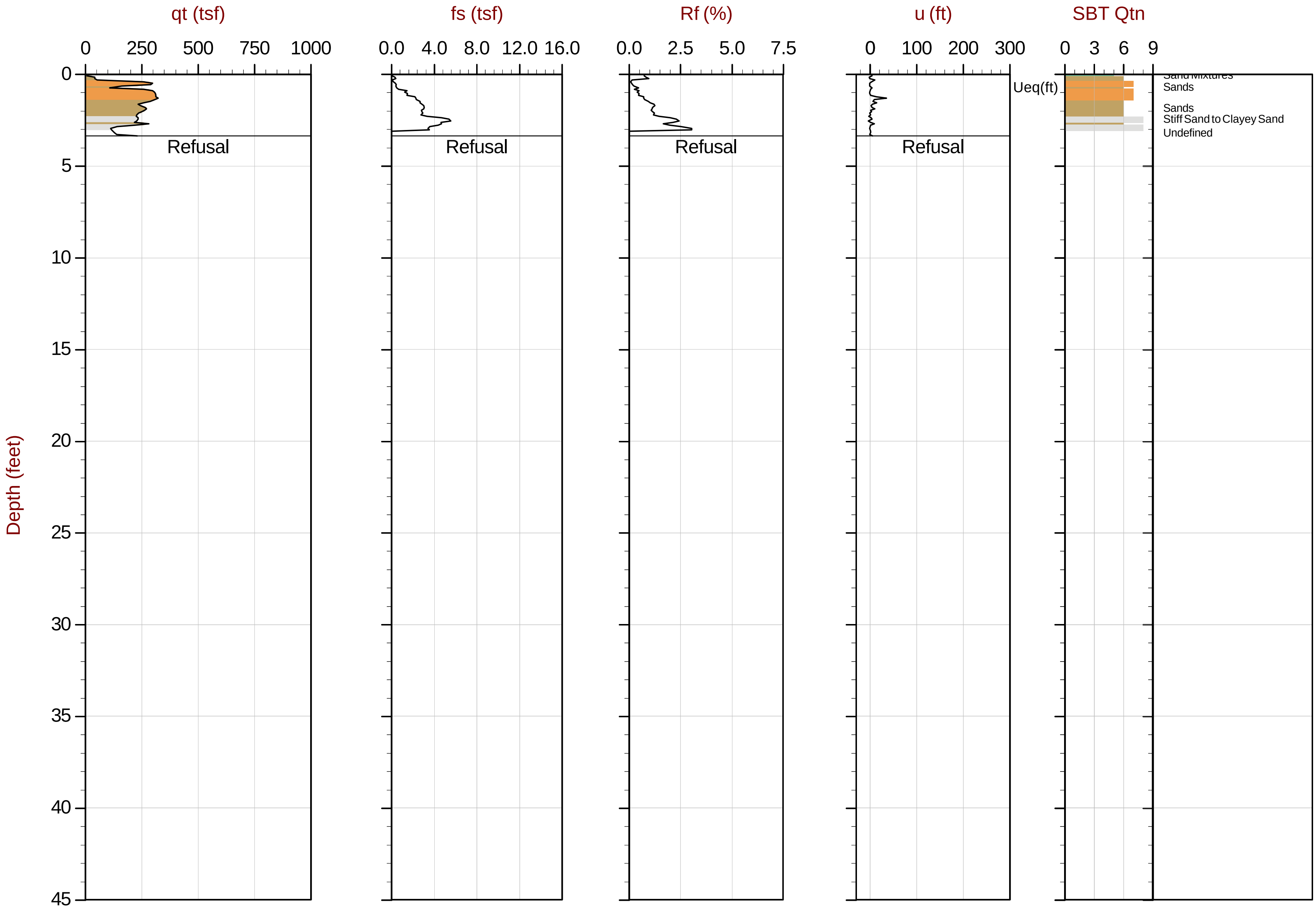
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 15:51
Site: Grand Street Commons

Sounding: AC-CPT-21S
Cone: 661:T1500F15U35



Max Depth: 1.025 m / 3.36 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP21S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58641 Long: -122.30320

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

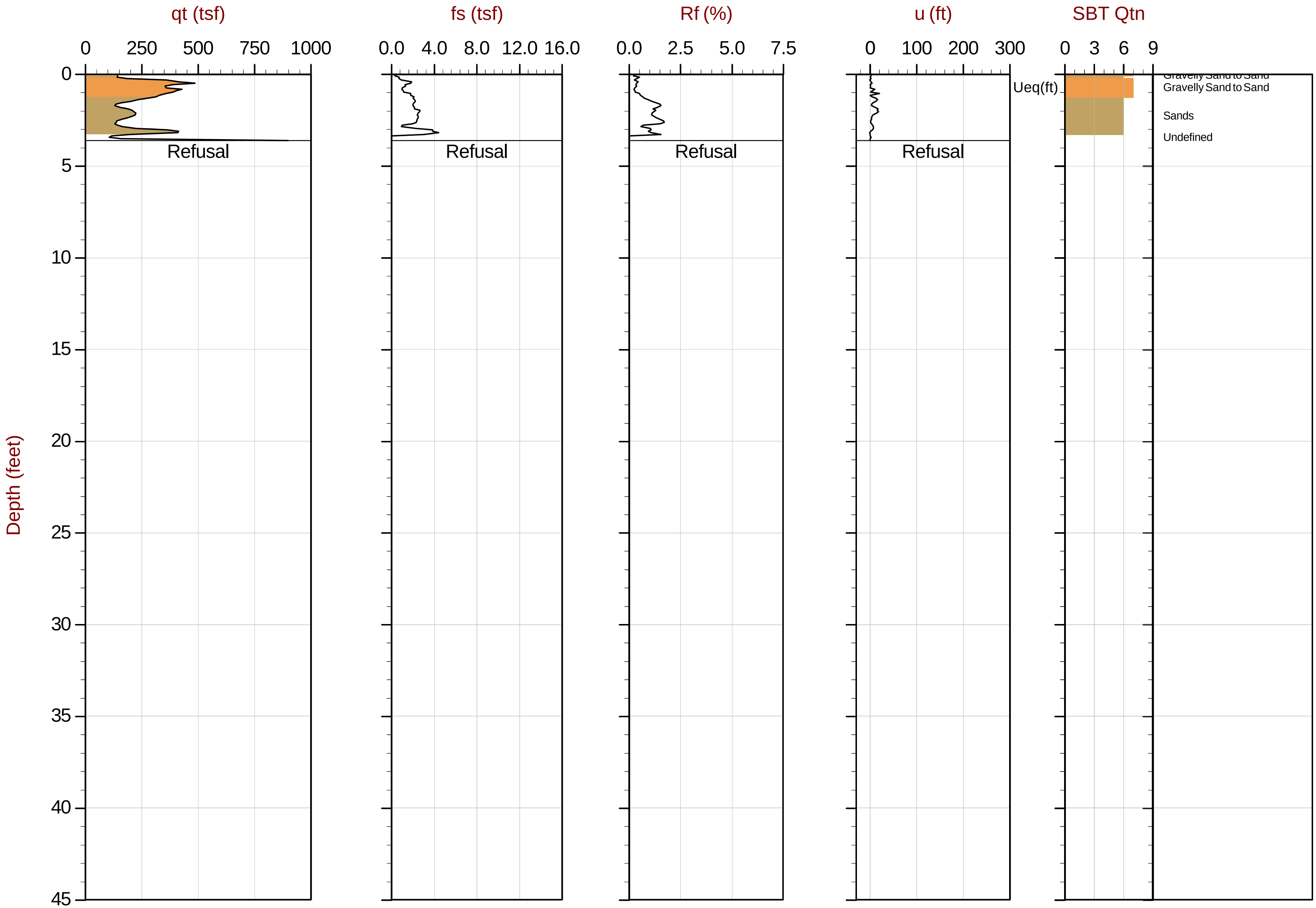
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 16:09
Site: Grand Street Commons

Sounding: AC-CPT-21BS
Cone: 661:T1500F15U35



Max Depth: 1.100 m / 3.61 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP21BS.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58643 Long: -122.30321

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.

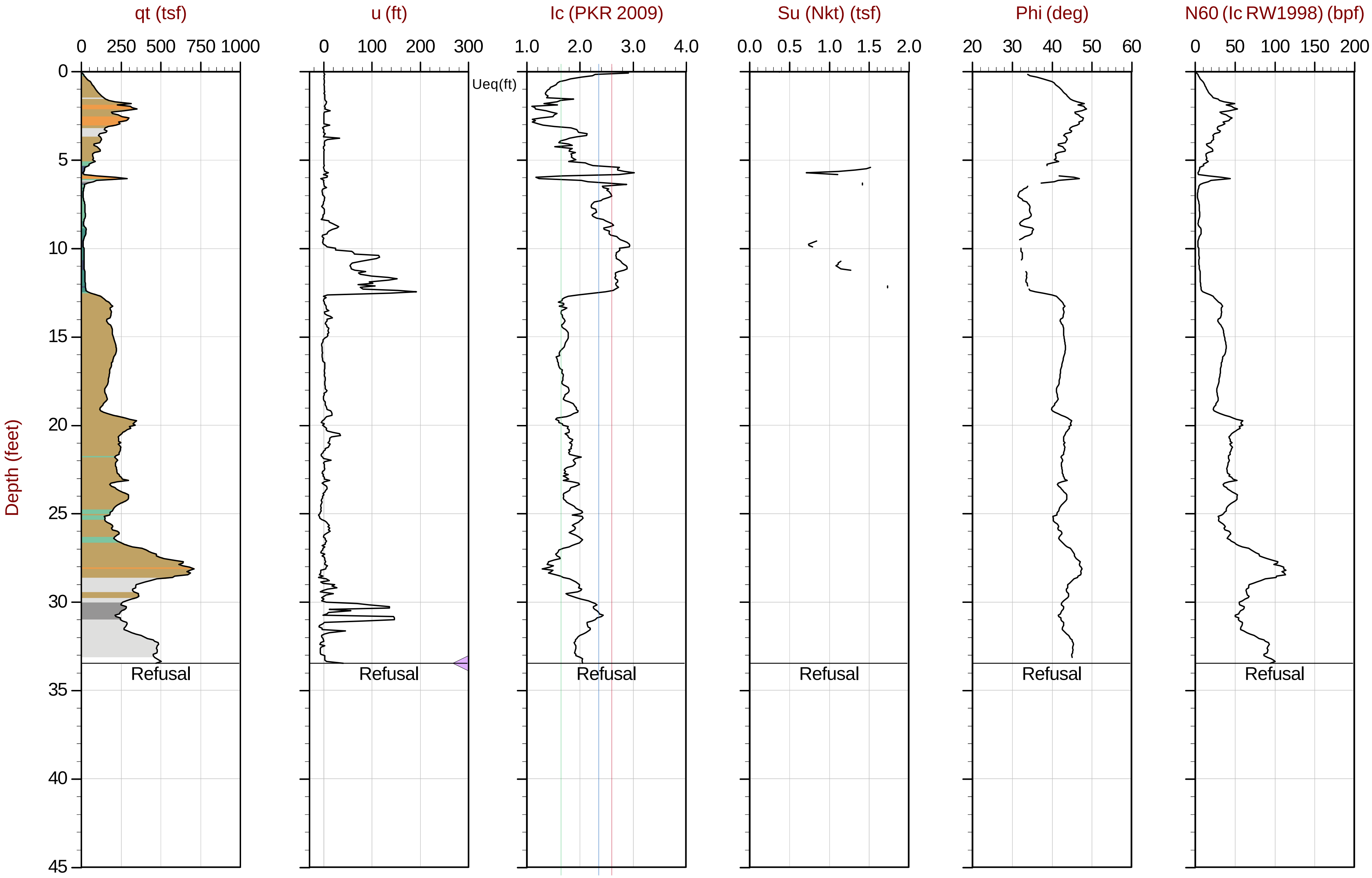
Advanced Cone Penetration Test Plots with Ic, Su, Phi and N(60)/N1(60)

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 13:29
Site: Grand Street Commons

Sounding: AC-CPT-01E
Cone: 661:T1500F15U35



Max Depth: 10.200 m / 33.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58718 Long: -122.30365

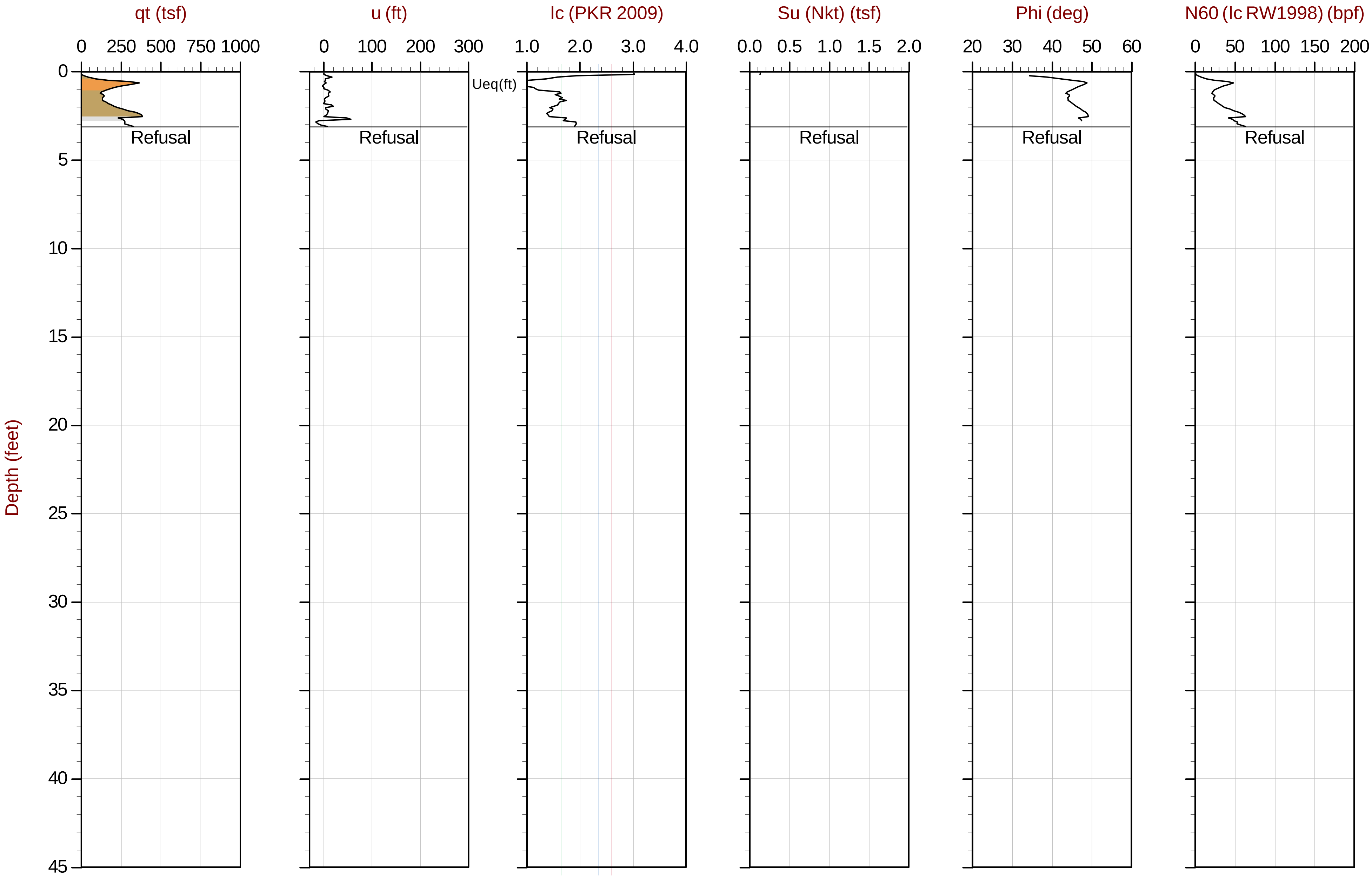
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 07:41
Site: Grand Street Commons

Sounding: AC-CPT-01S
Cone: 536:T1500F15U500



Max Depth: 0.950 m / 3.12 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30405

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

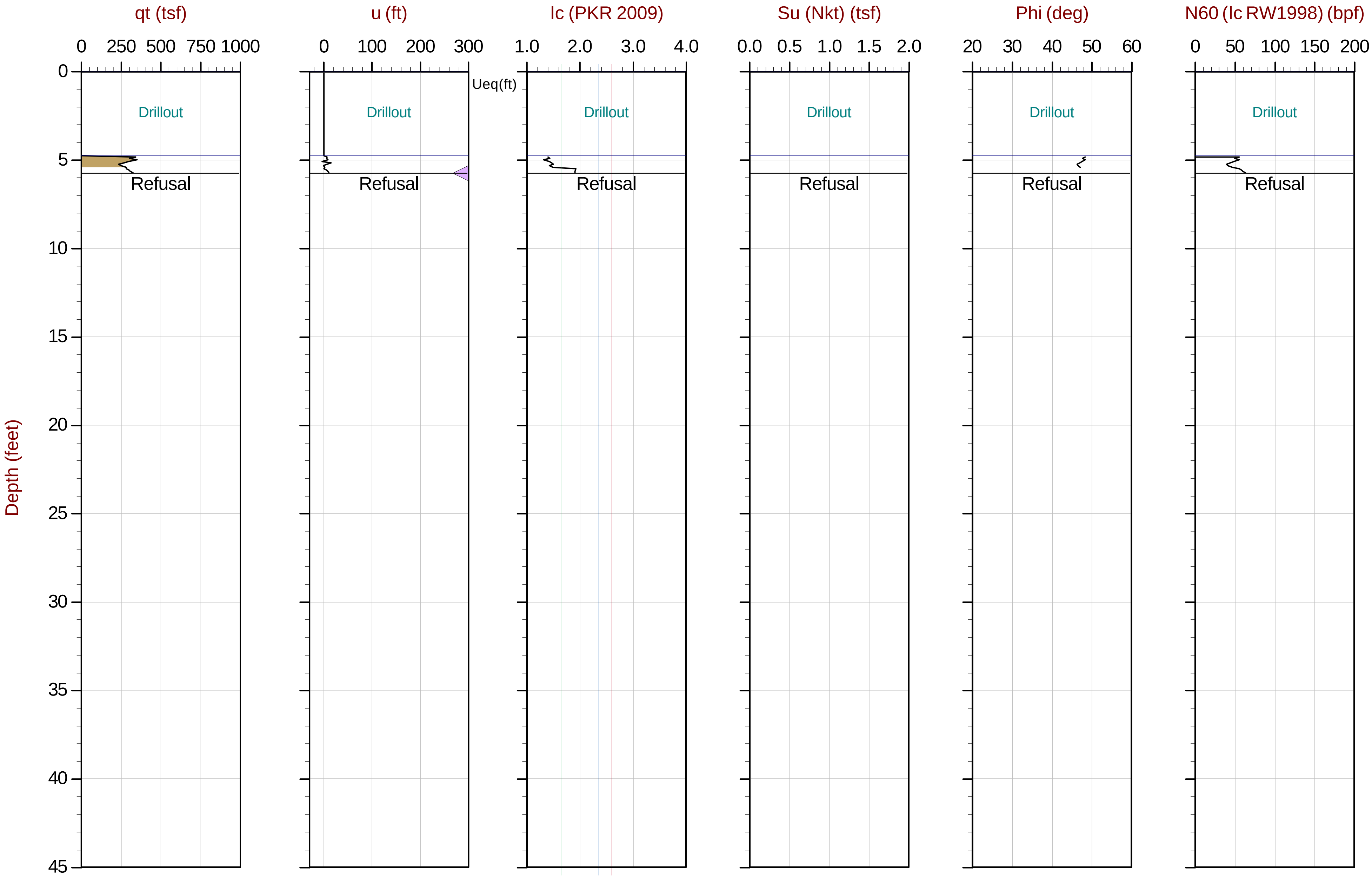
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 08:18
Site: Grand Street Commons

Sounding: AC-CPT-01BS
Cone: 536:T1500F15U500



Max Depth: 1.750 m / 5.74 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01BS.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30405

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

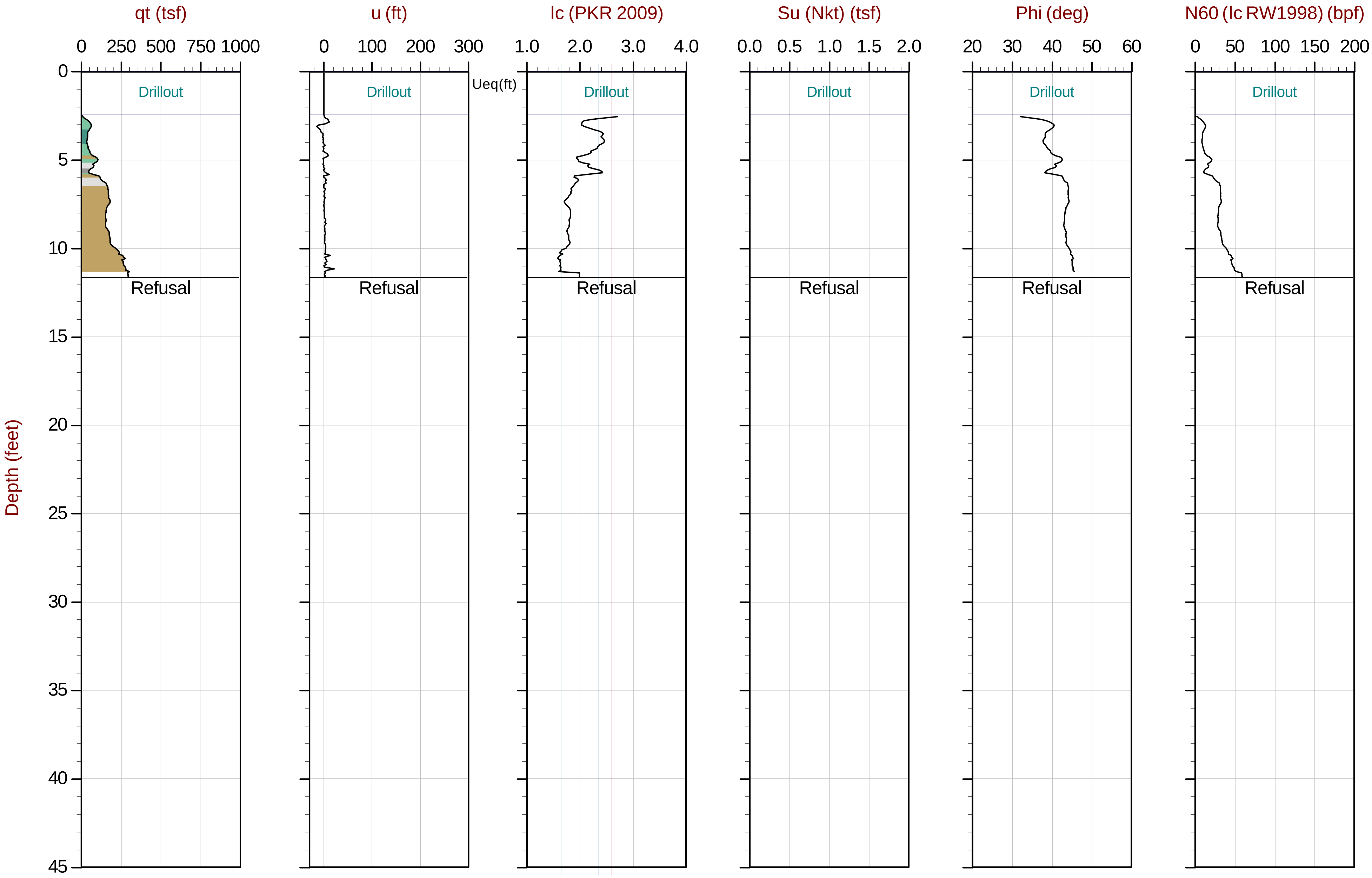
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 16:36
Site: Grand Street Commons

Sounding: AC-CPT-01W
Cone: 536:T1500F15U500



Max Depth: 3.550 m / 11.65 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP01W.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58728 Long: -122.30473

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

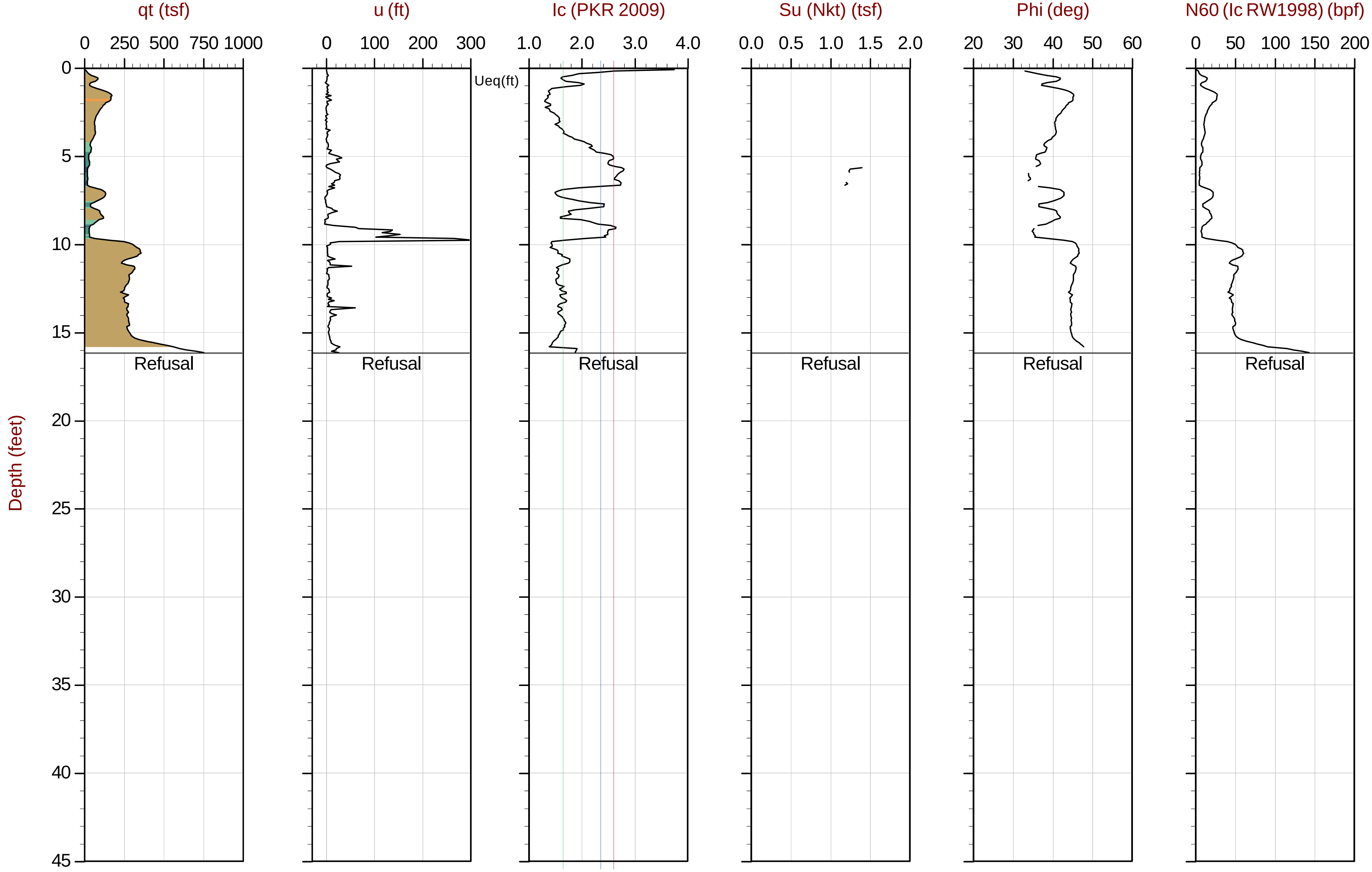
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 14:10
Site: Grand Street Commons

Sounding: AC-CPT-02E
Cone: 595:T1500F15U500



Max Depth: 4.925 m / 16.16 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP02E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58747 Long: -122.30353

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

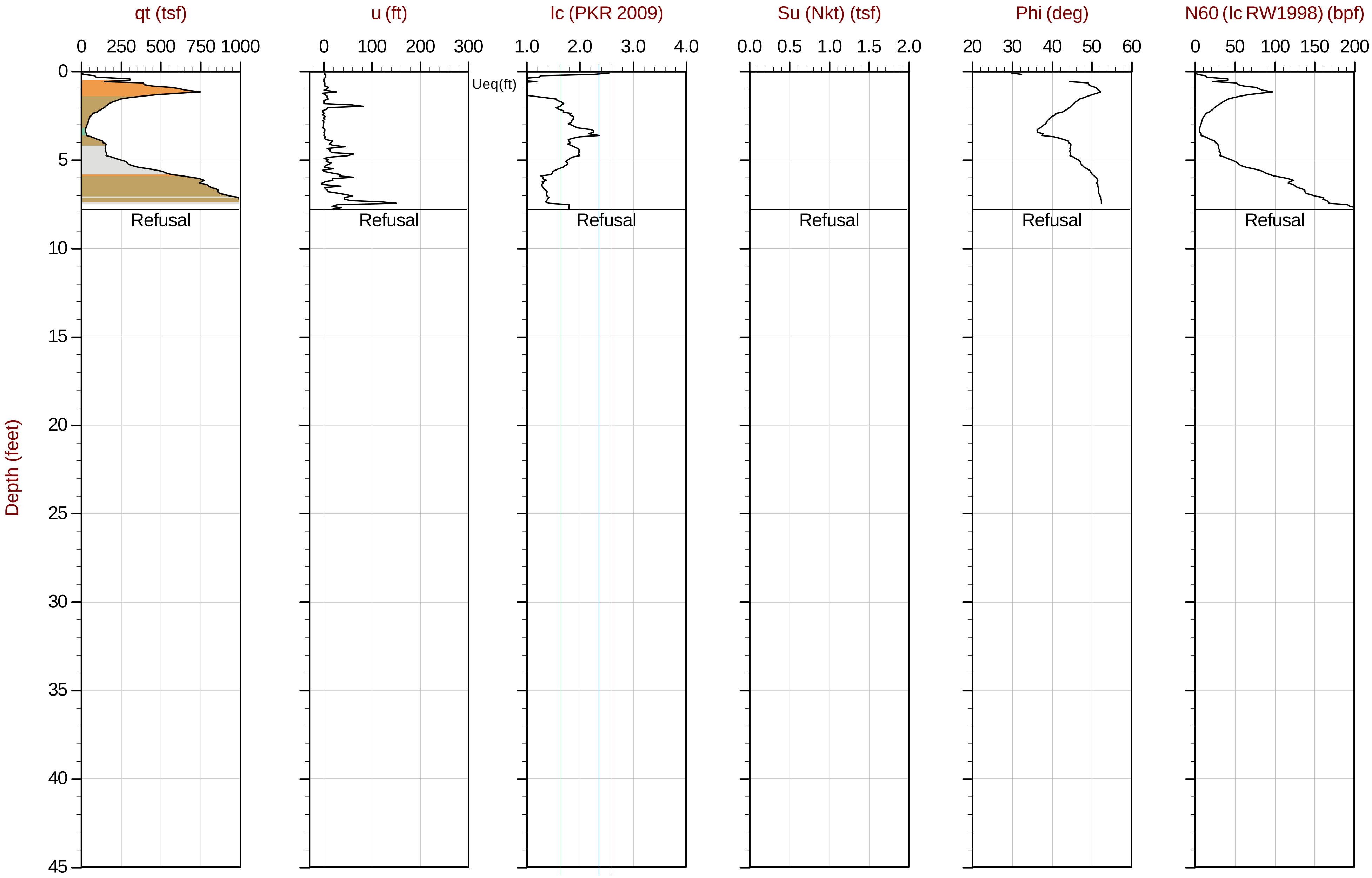
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 11:13
Site: Grand Street Commons

Sounding: AC-CPT-02S
Cone: 661:T1500F15U35



Max Depth: 2.375 m / 7.79 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP02S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58667 Long: -122.30398

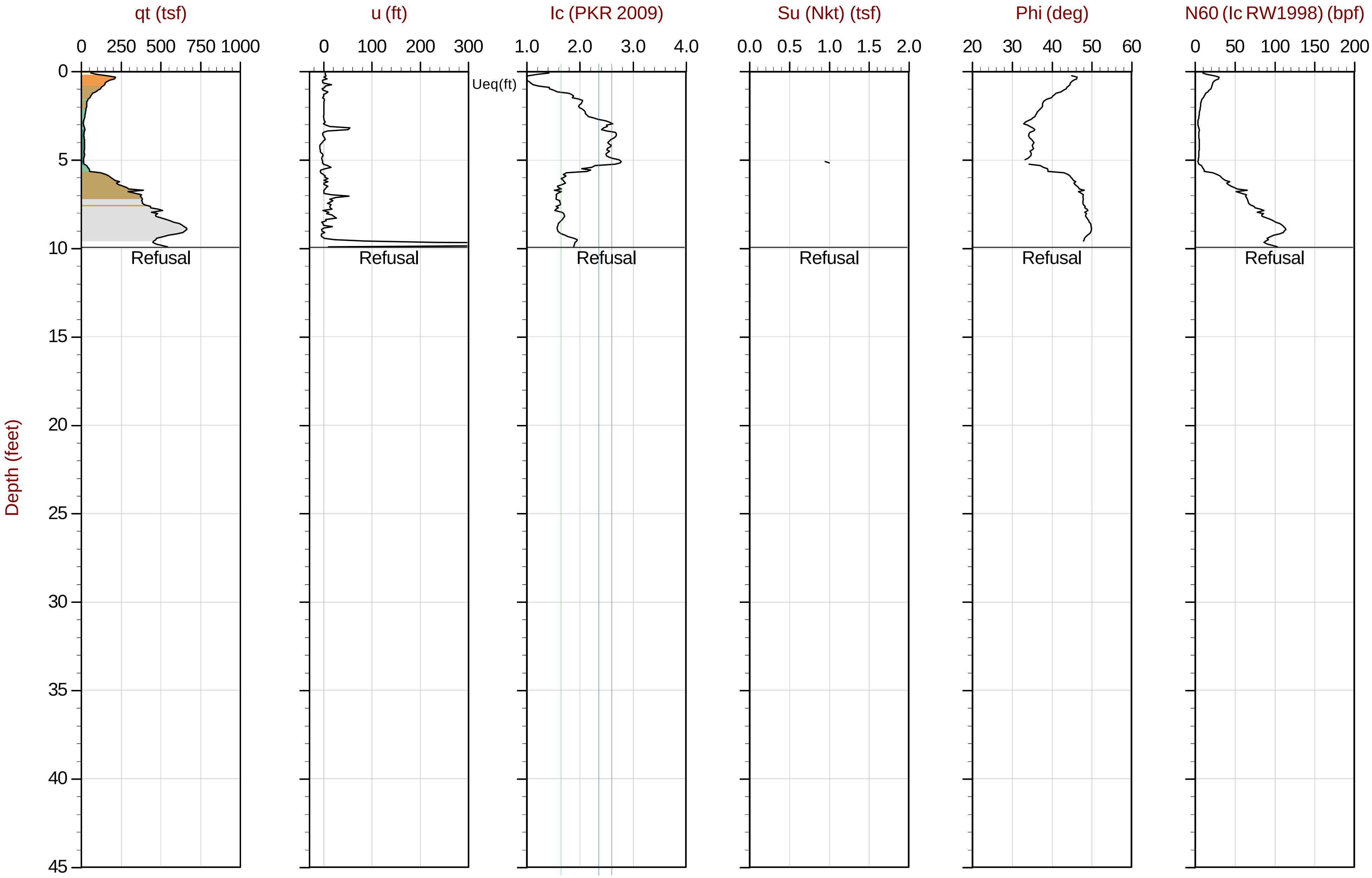
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 14:26
Site: Grand Street Commons
Sounding: AC-CPT-02W
Cone: 661:T1500F15U35



Max Depth: 3.025 m / 9.92 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP02W.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58761 Long: -122.30424

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

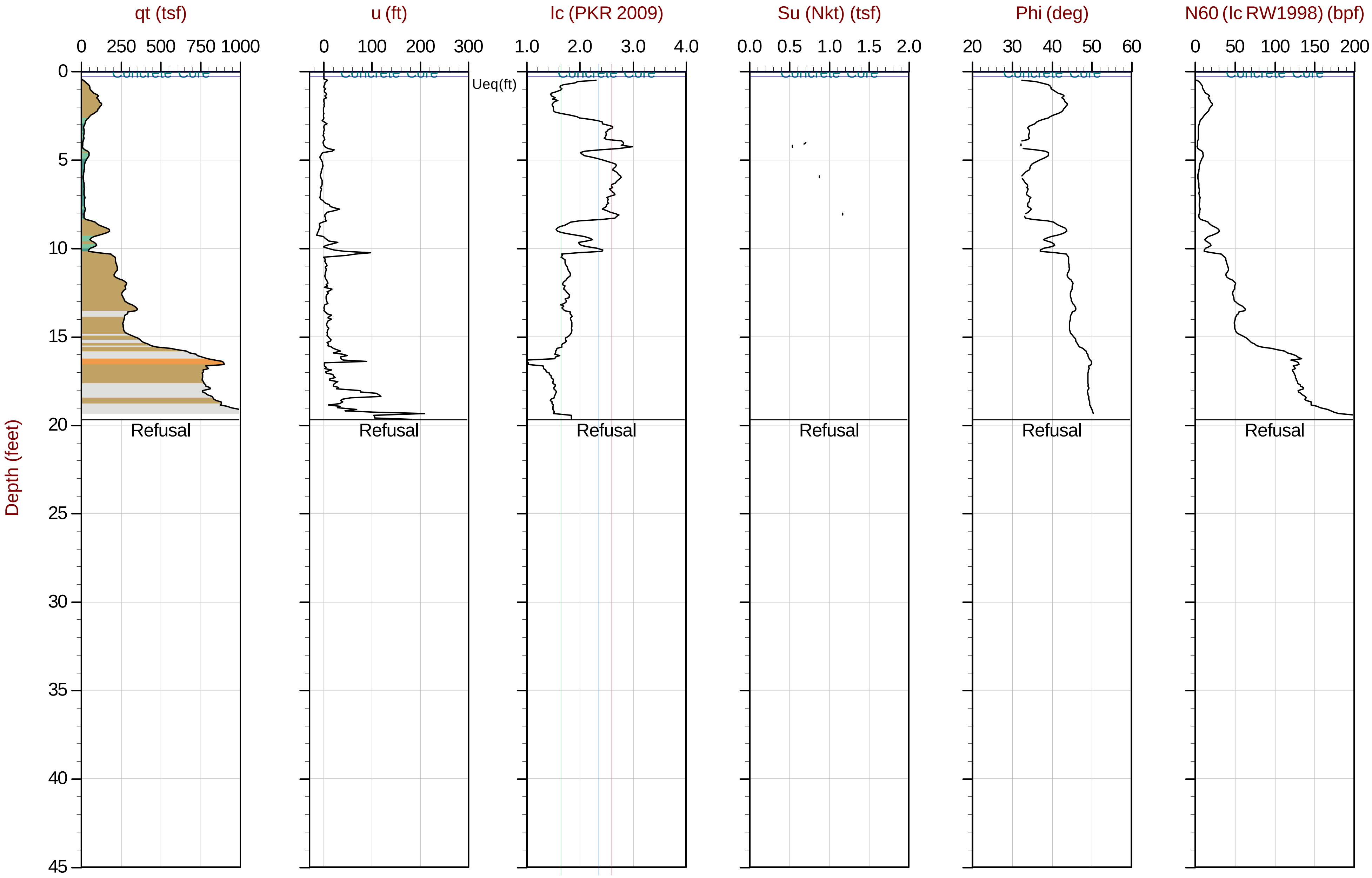
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 12:52
Site: Grand Street Commons

Sounding: AC-CPT-03E
Cone: 661:T1500F15U35



Max Depth: 6.000 m / 19.68 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP03E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58755 Long: -122.30358

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

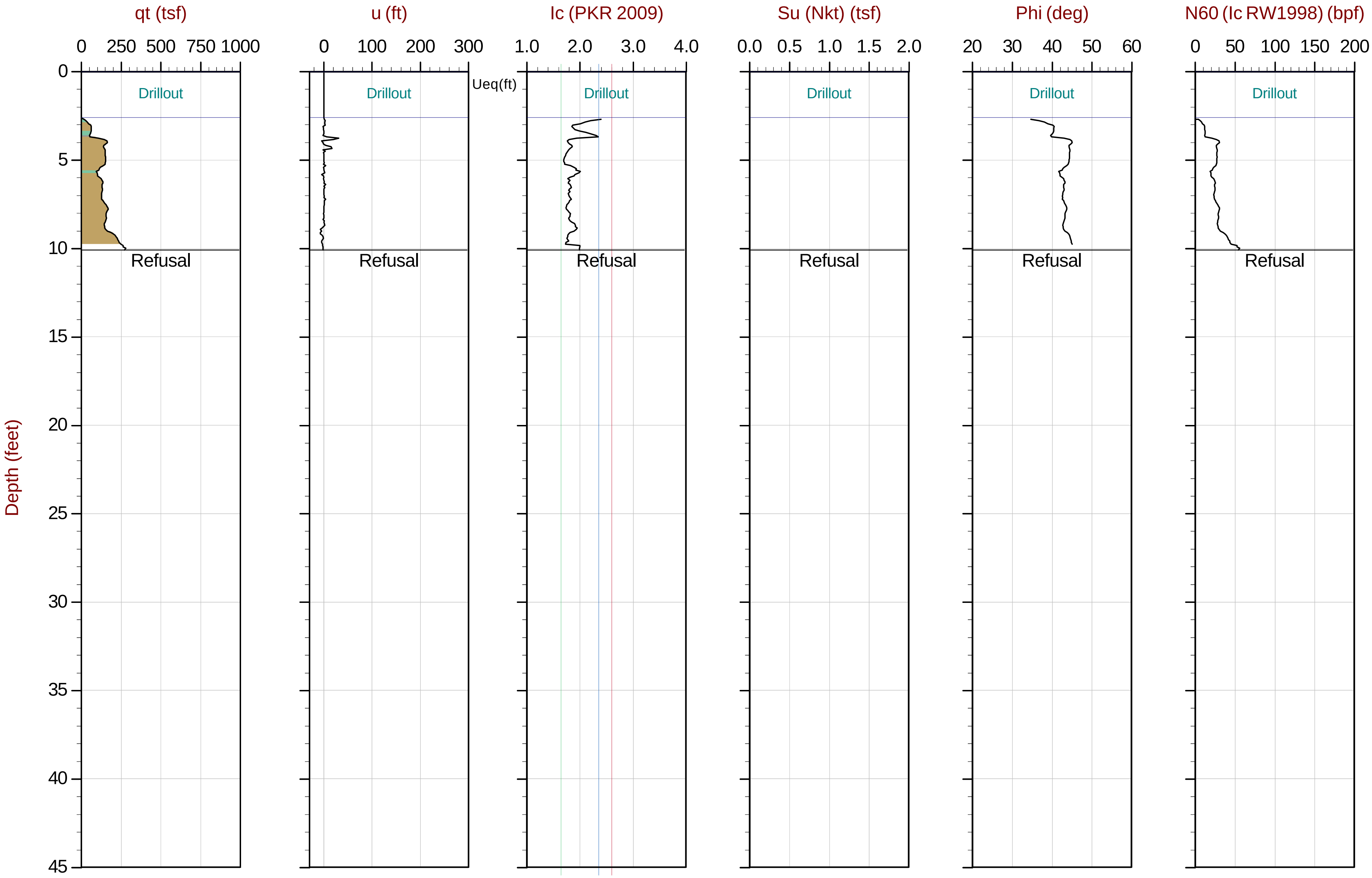
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 15:37
Site: Grand Street Commons

Sounding: AC-CPT-03S
Cone: 536:T1500F15U500



Max Depth: 3.075 m / 10.09 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP03S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58685 Long: -122.30398

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

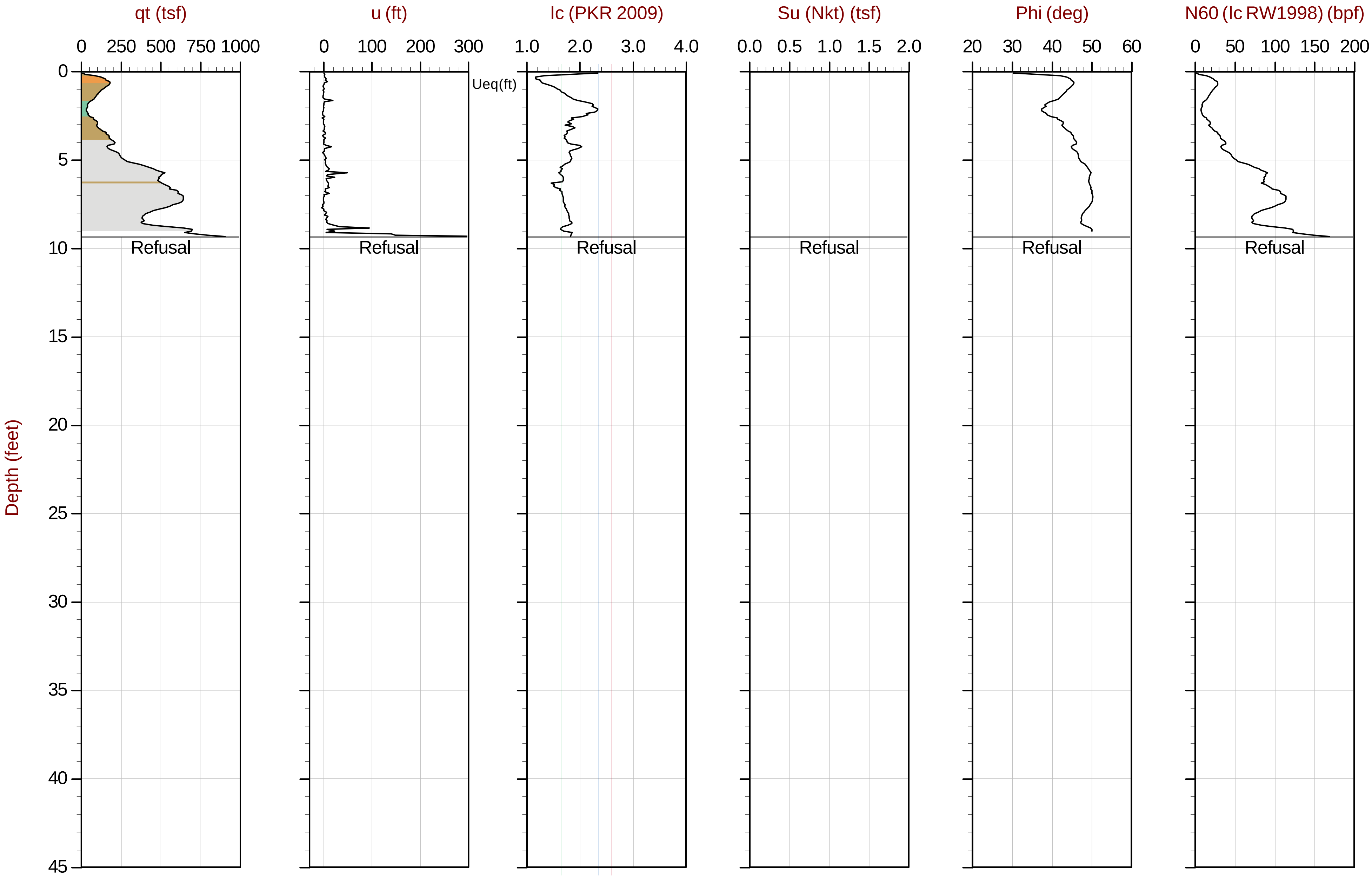
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 14:50
Site: Grand Street Commons

Sounding: AC-CPT-03W
Cone: 661:T1500F15U35



Max Depth: 2.850 m / 9.35 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP03W.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58702 Long: -122.30418

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

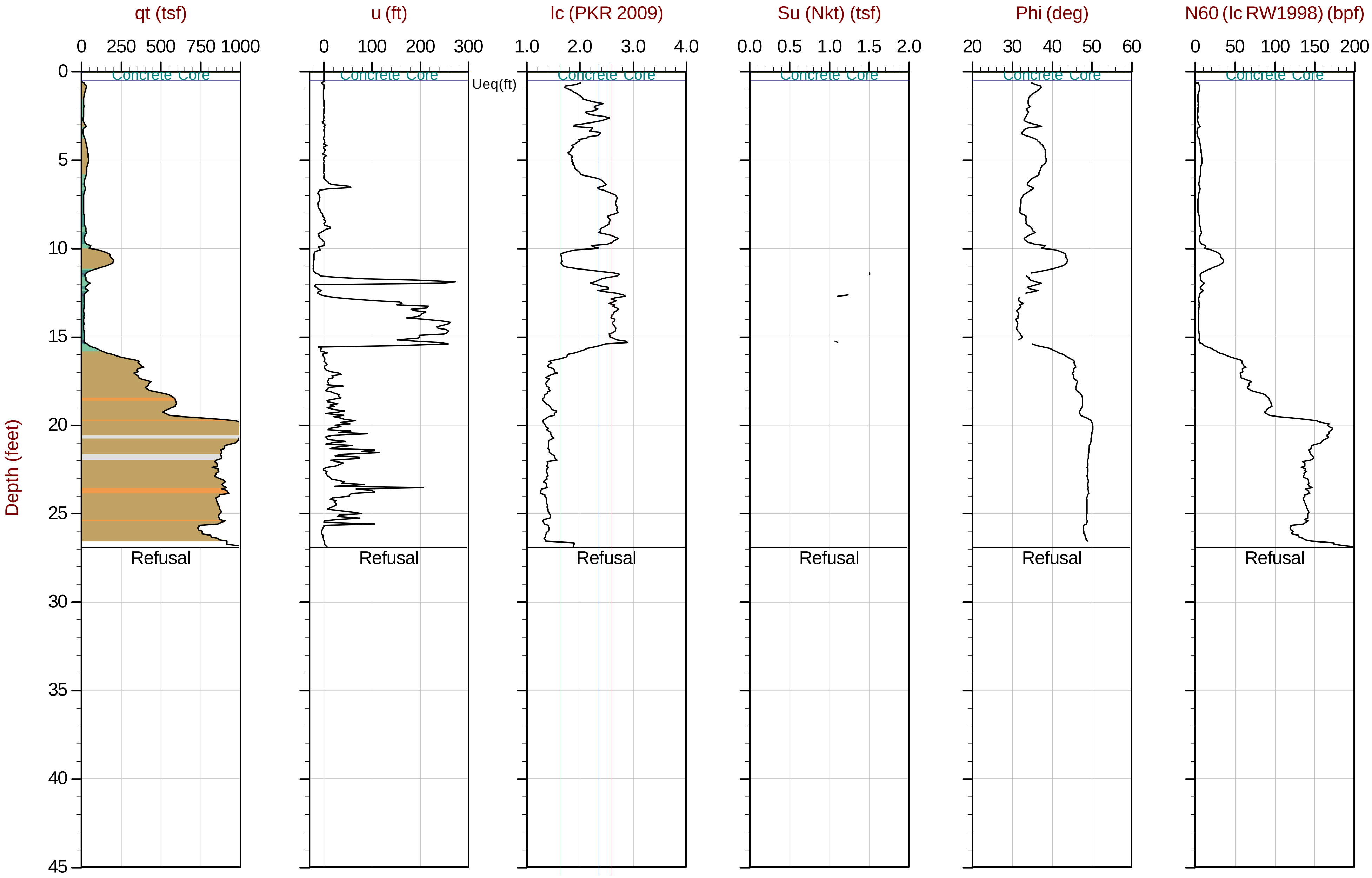
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 12:15
Site: Grand Street Commons

Sounding: AC-CPT-04E
Cone: 661:T1500F15U35



Max Depth: 8.200 m / 26.90 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP04E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58743 Long: -122.30356

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

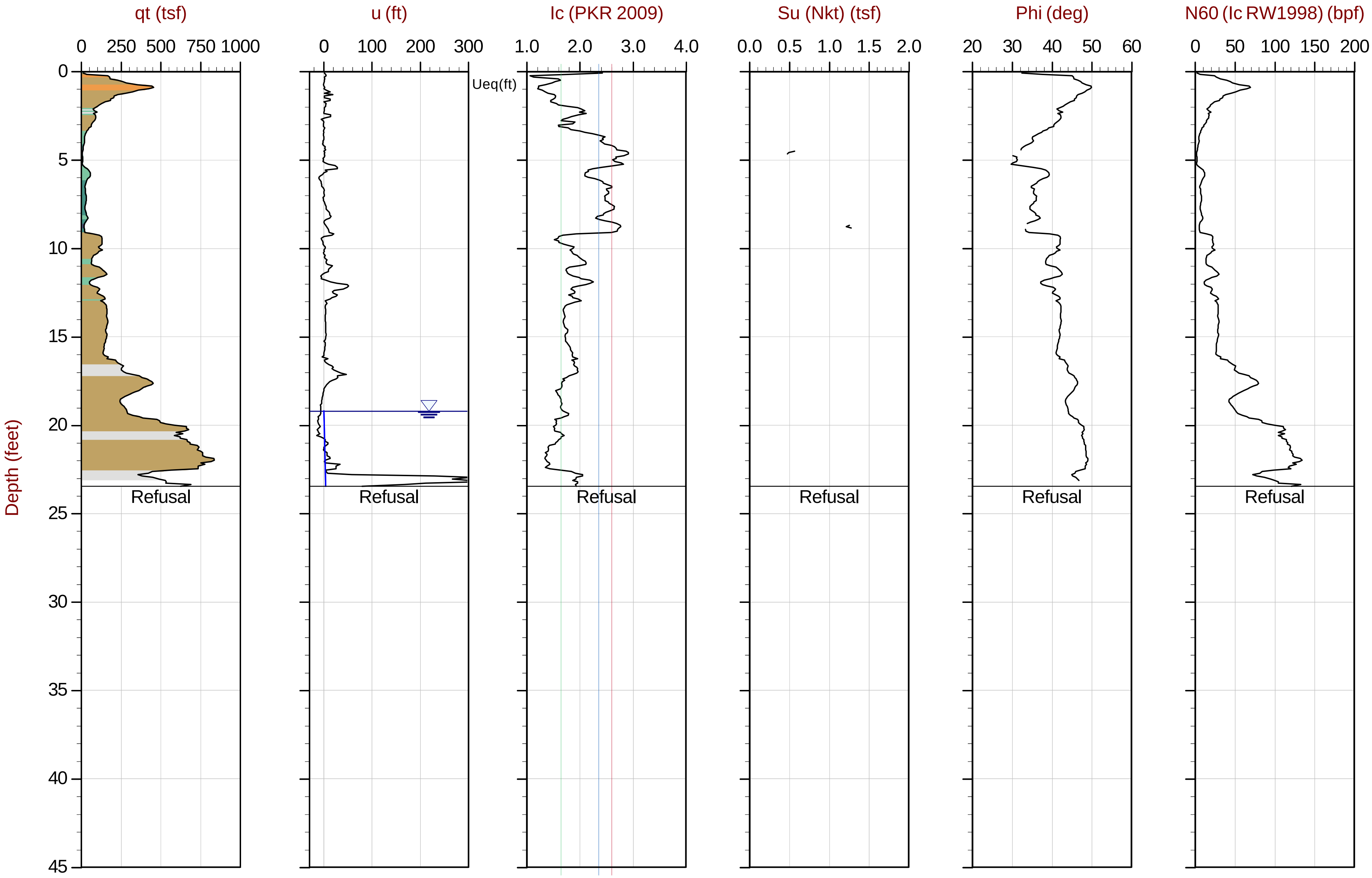
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 11:48
Site: Grand Street Commons

Sounding: AC-CPT-04S
Cone: 661:T1500F15U35



Max Depth: 7.150 m / 23.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP04S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30389

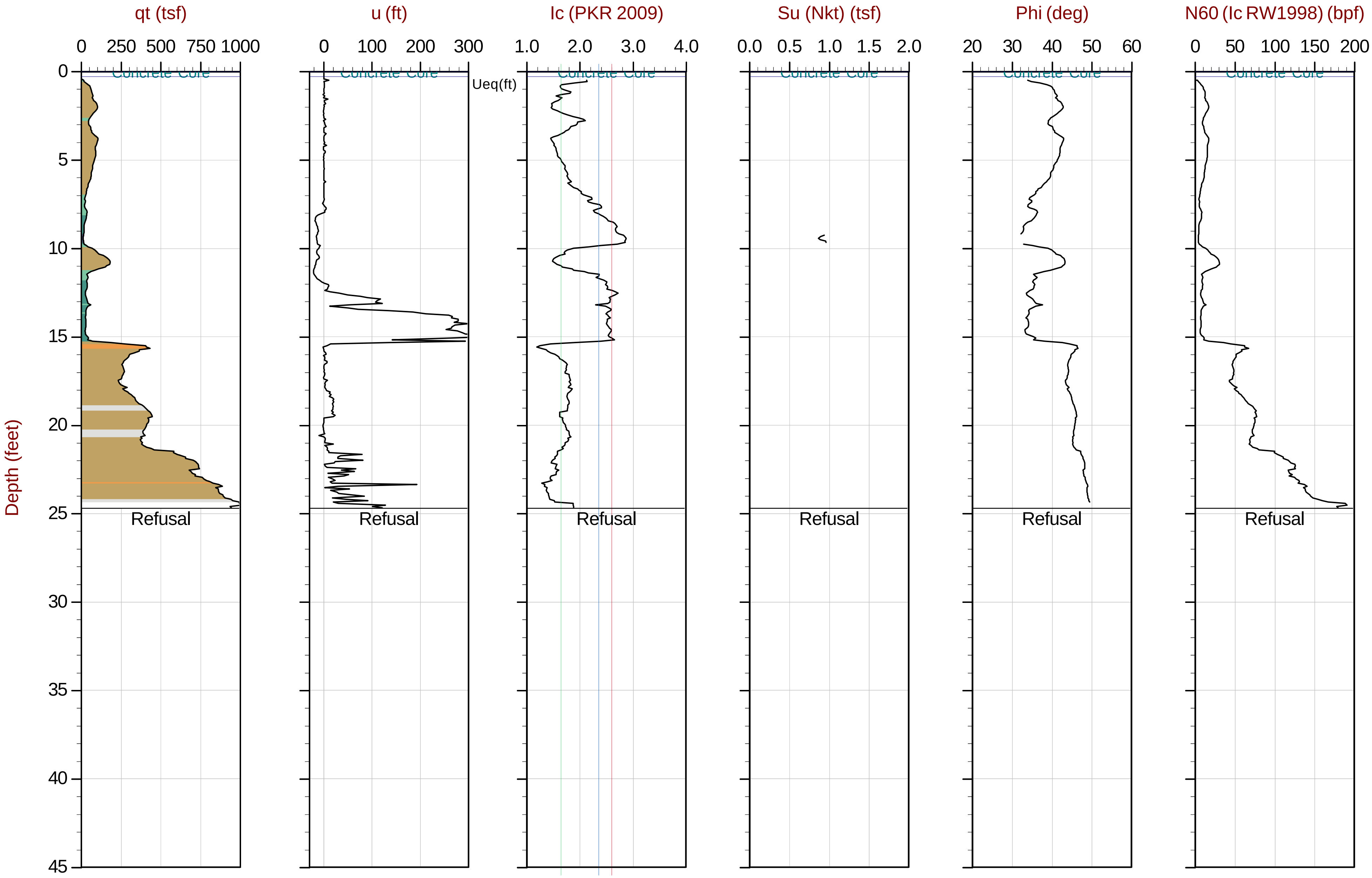
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 11:28
Site: Grand Street Commons

Sounding: AC-CPT-05E
Cone: 661:T1500F15U35



Max Depth: 7.525 m / 24.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP05E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

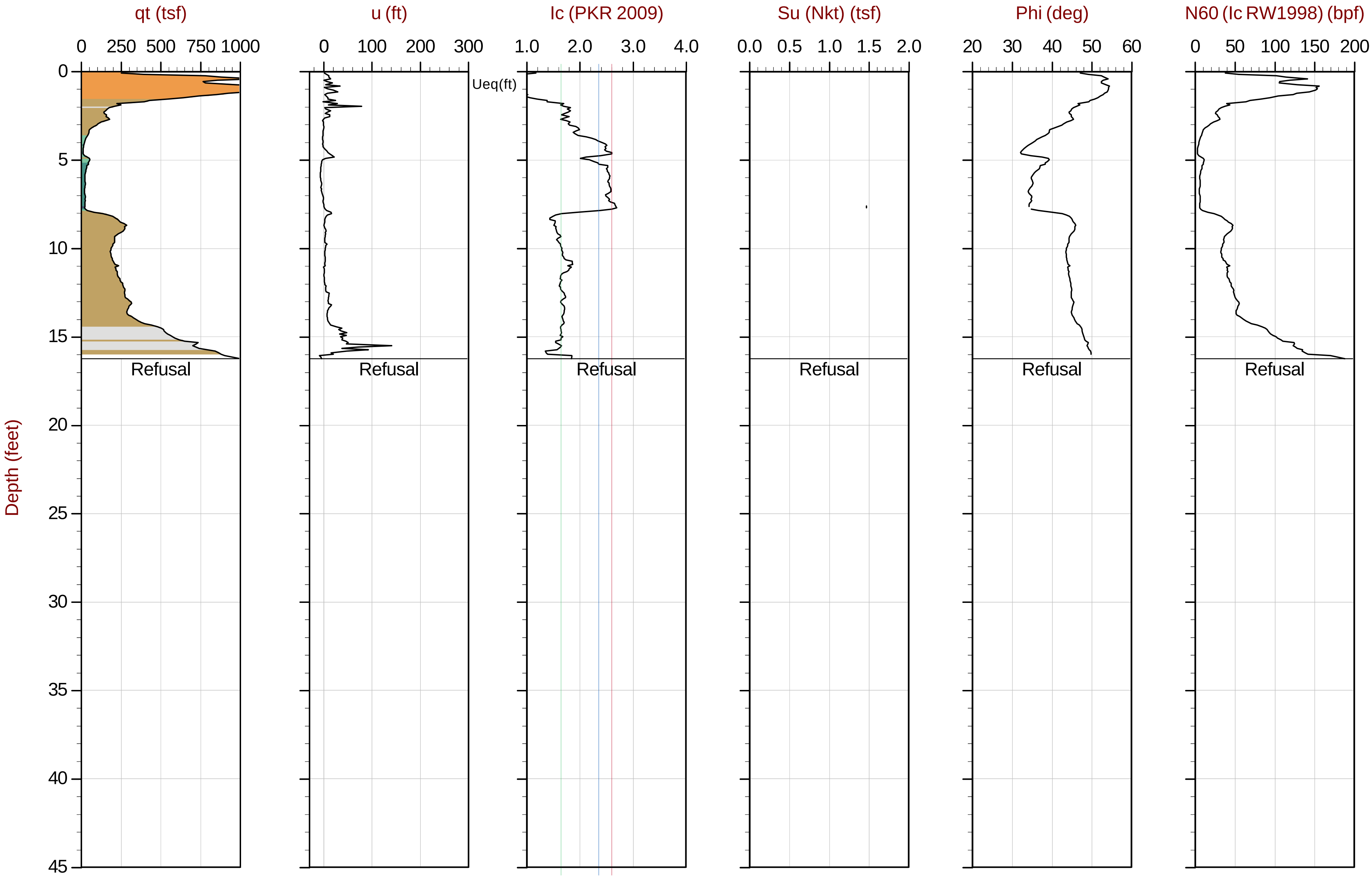
SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58736 Long: -122.30348

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.

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 10:31
Site: Grand Street Commons
Sounding: AC-CPT-05S
Cone: 661:T1500F15U35



Max Depth: 4.950 m / 16.24 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP05S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58669 Long: -122.30386

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

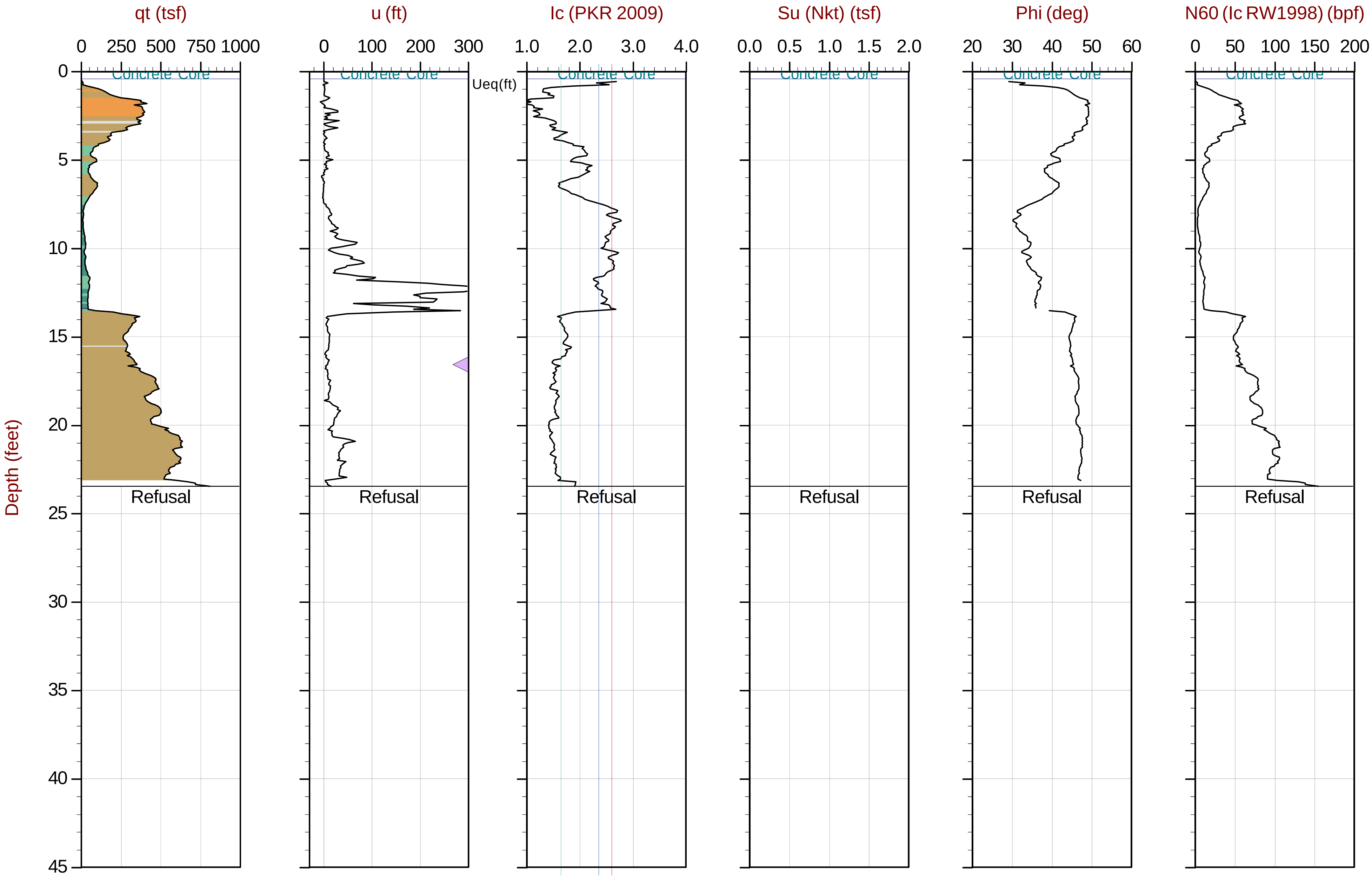
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 10:47
Site: Grand Street Commons

Sounding: AC-CPT-06E
Cone: 661:T1500F15U35



Max Depth: 7.150 m / 23.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP06E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58722 Long: -122.30348

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

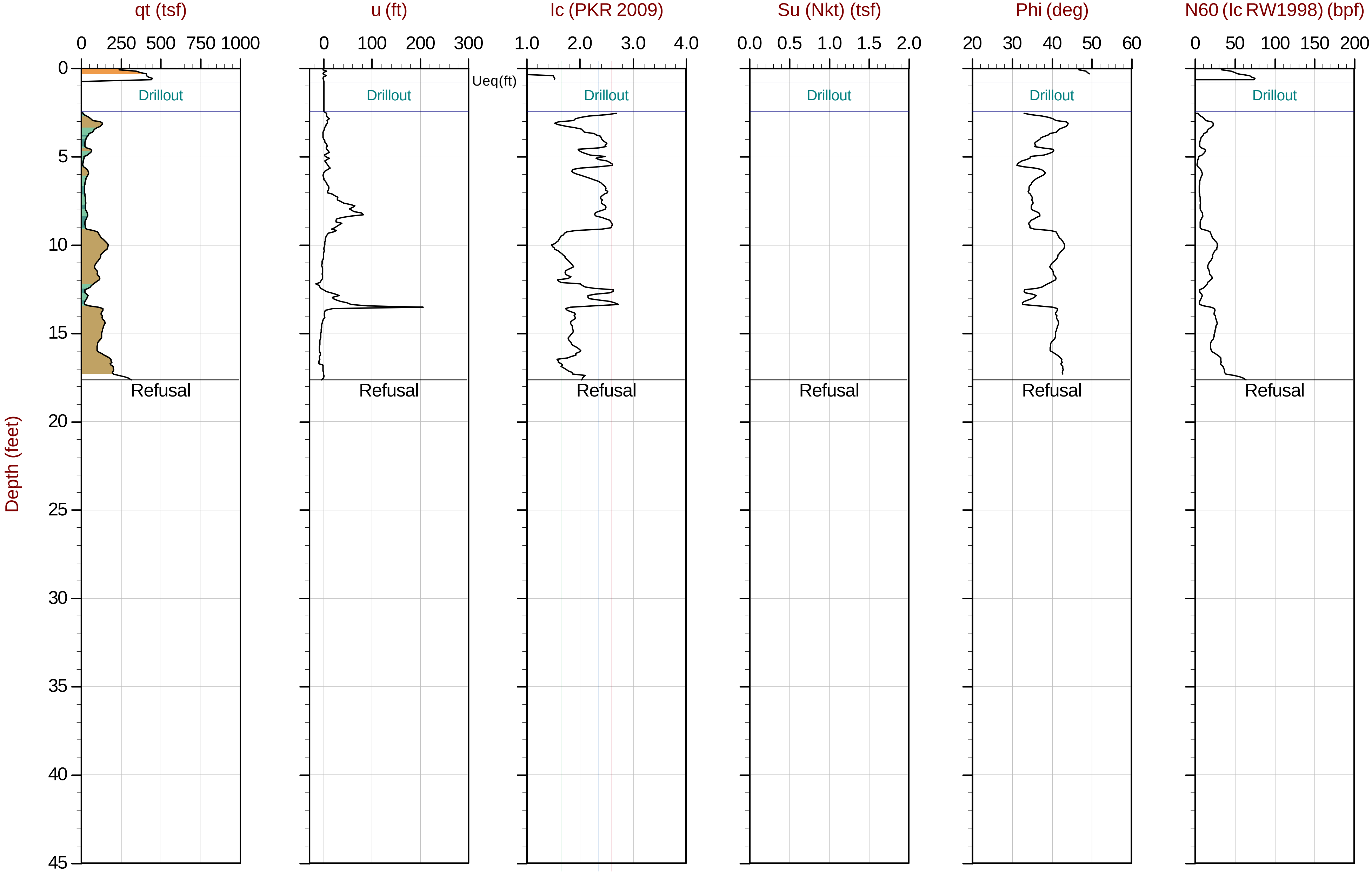
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 10:31
Site: Grand Street Commons

Sounding: AC-CPT-06S
Cone: 536:T1500F15U500



Max Depth: 5.375 m / 17.63 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP06S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58655 Long: -122.30381

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

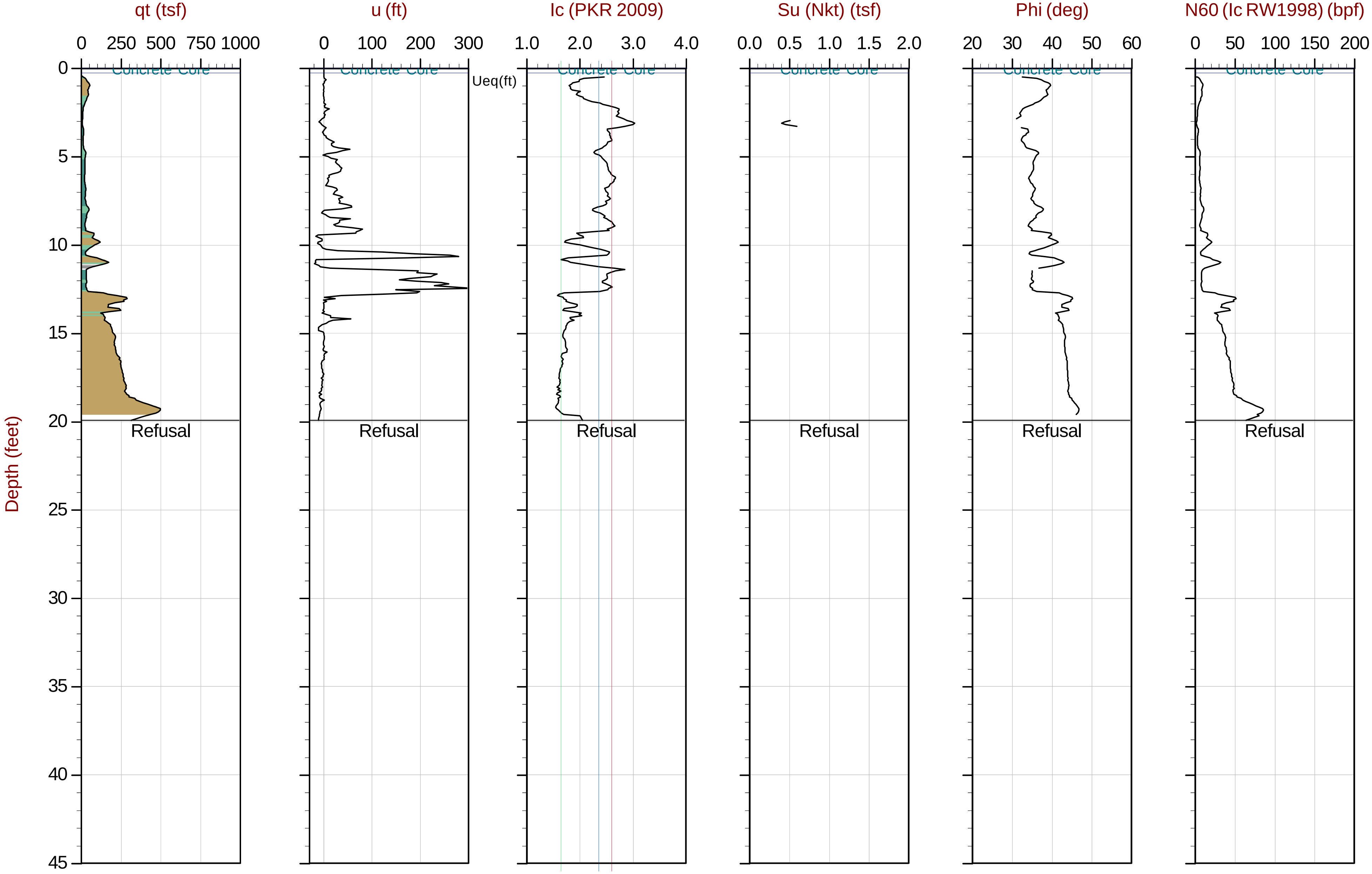
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 07:15
Site: Grand Street Commons

Sounding: AC-CPT-07E
Cone: 661:T1500F15U35



Max Depth: 6.075 m / 19.93 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP07E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

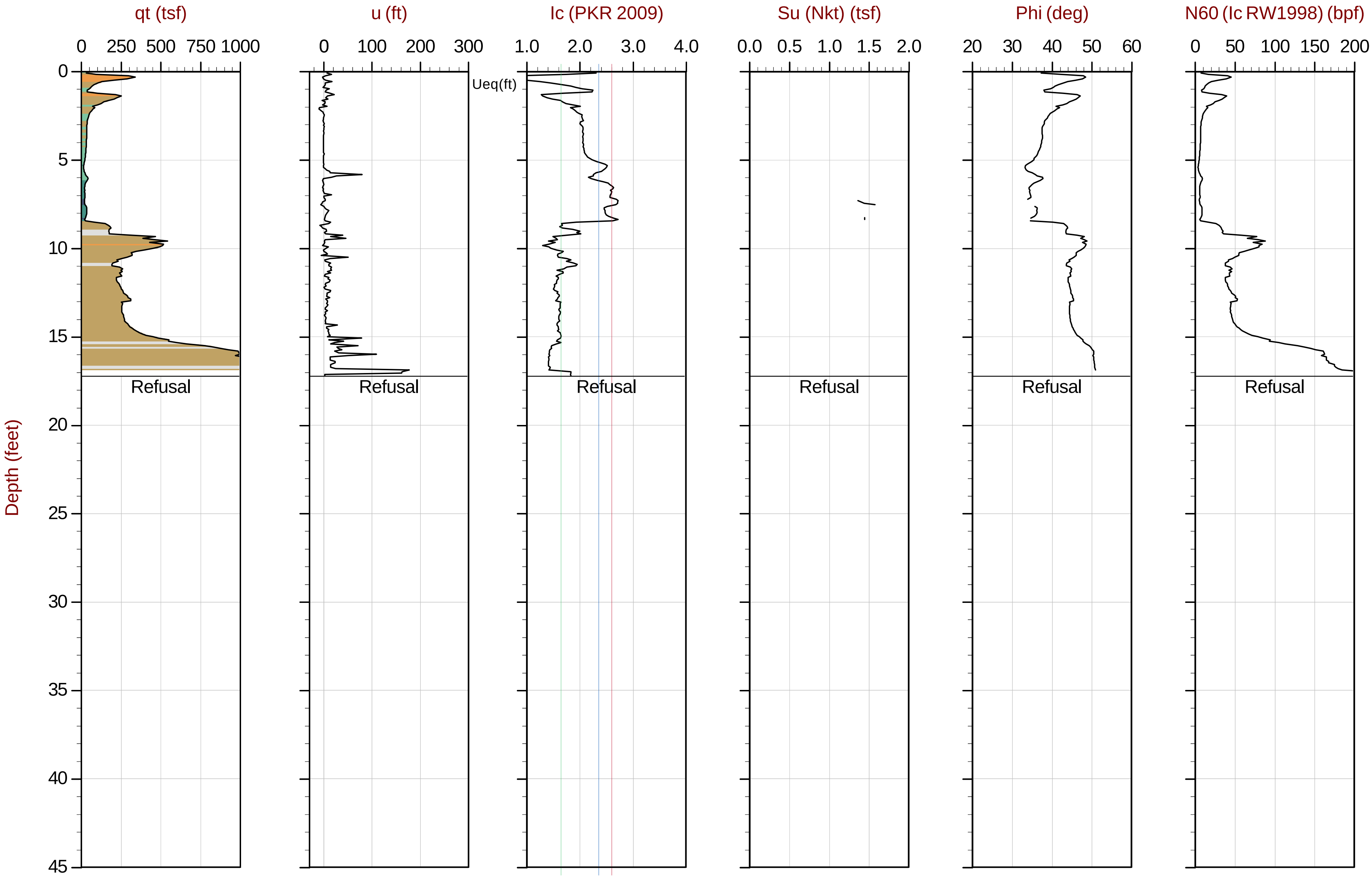
SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58756 Long: -122.30343

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.

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 12:32
Site: Grand Street Commons
Sounding: AC-CPT-07S
Cone: 661:T1500F15U35



Max Depth: 5.250 m / 17.22 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP07S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58687 Long: -122.30375

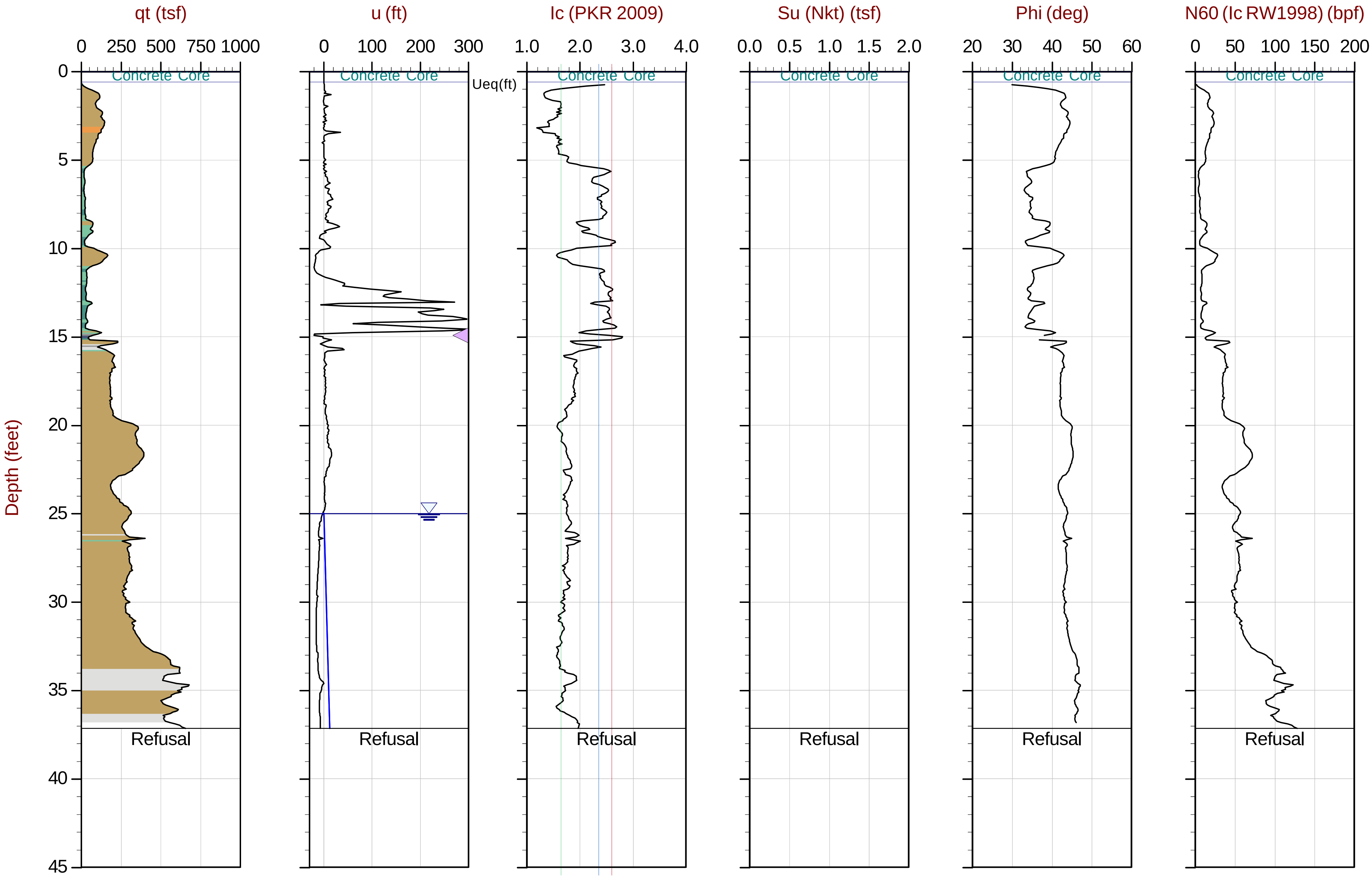
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 07:46
Site: Grand Street Commons

Sounding: AC-CPT-08E
Cone: 661:T1500F15U35



Max Depth: 11.325 m / 37.16 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP08E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58747 Long: -122.30340

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

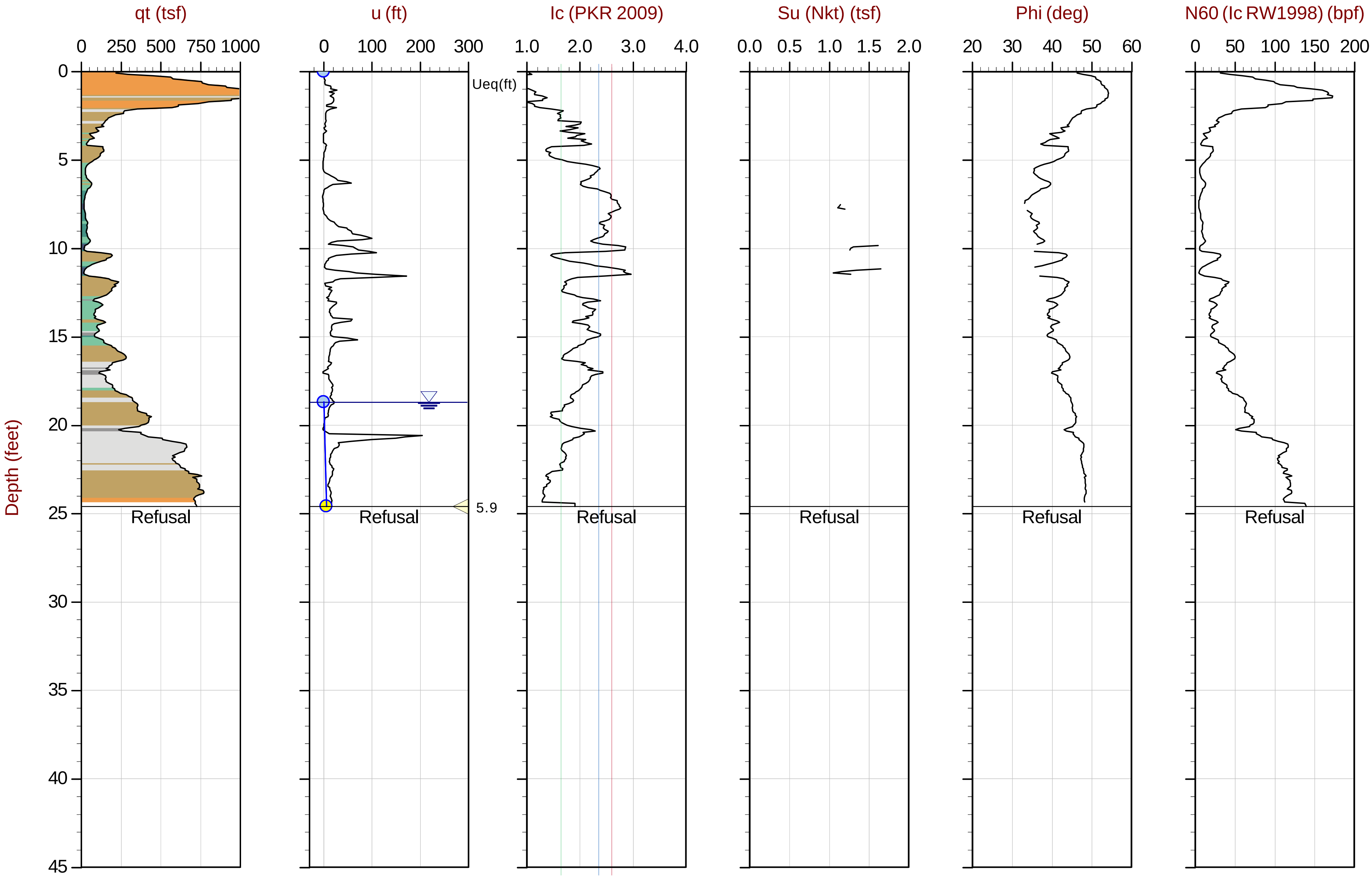
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 09:15
Site: Grand Street Commons

Sounding: AC-CPT-08S
Cone: 661:T1500F15U35



Max Depth: 7.500 m / 24.61 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP08S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

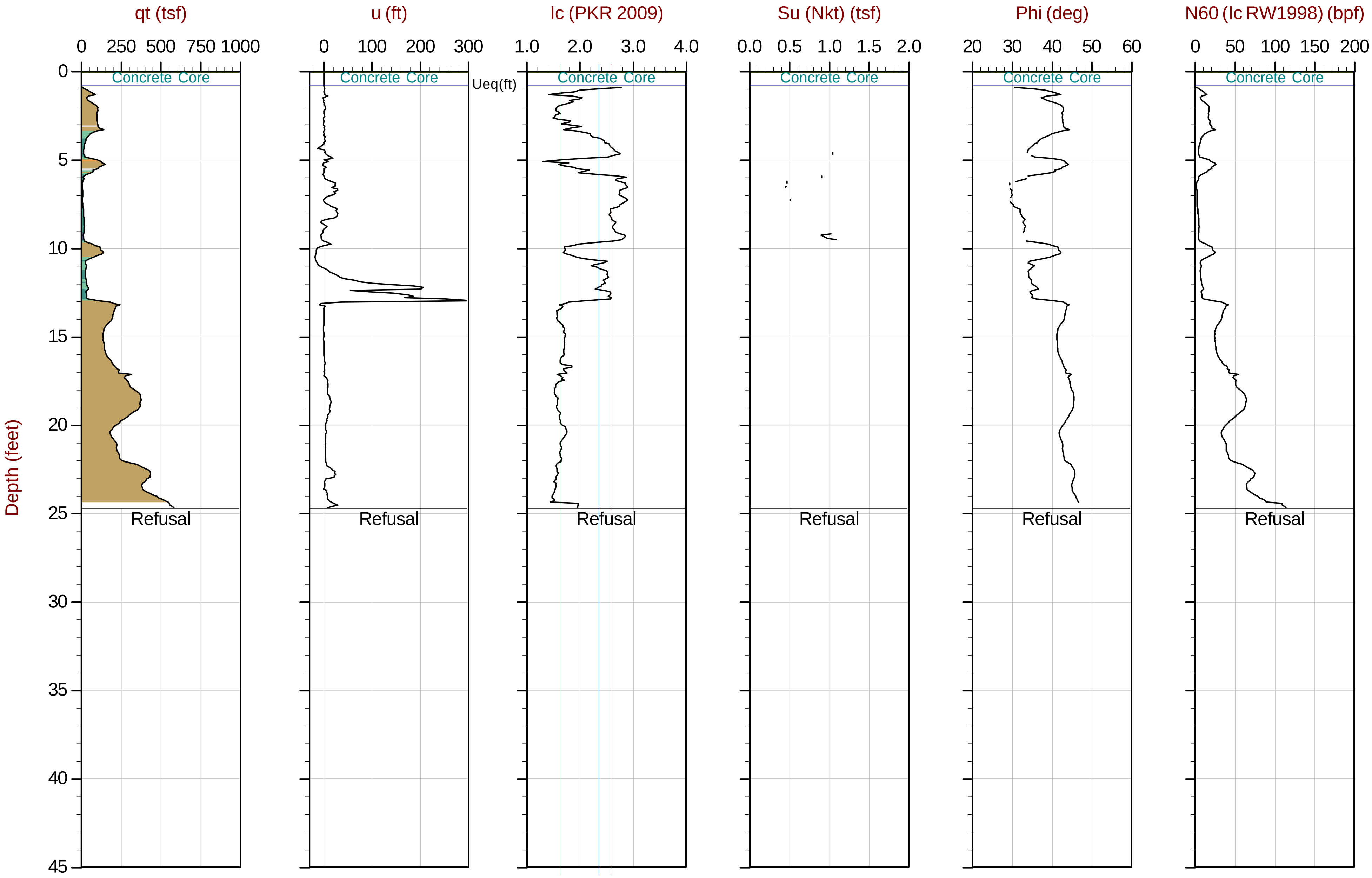
SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58677 Long: -122.30374

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.

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 12:54
Site: Grand Street Commons
Sounding: AC-CPT-09E
Cone: 595:T1500F15U500



Max Depth: 7.525 m / 24.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP09E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58732 Long: -122.30342

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

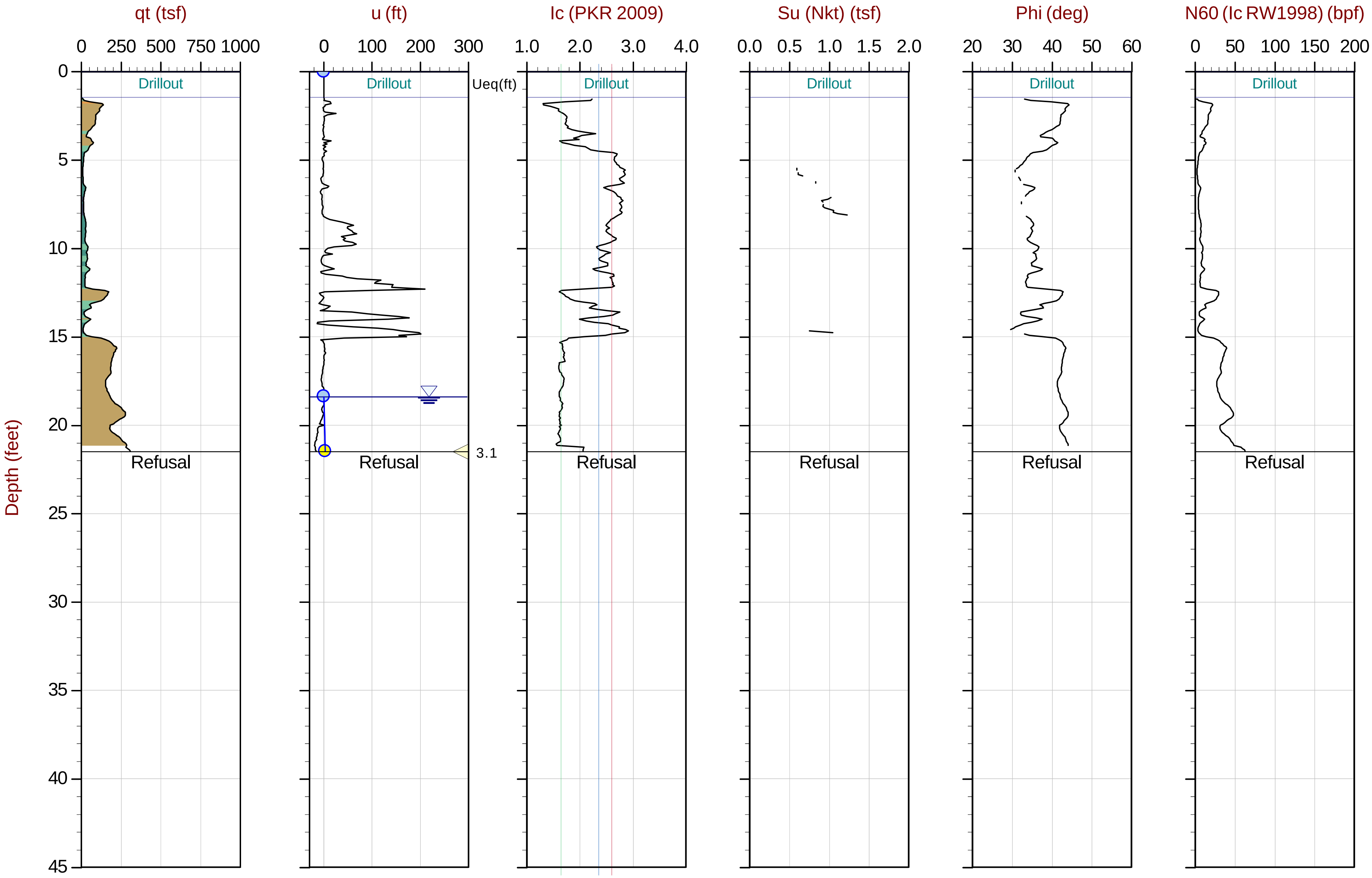
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 11:20
Site: Grand Street Commons

Sounding: AC-CPT-09S
Cone: 536:T1500F15U500



Max Depth: 6.550 m / 21.49 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP09S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30363

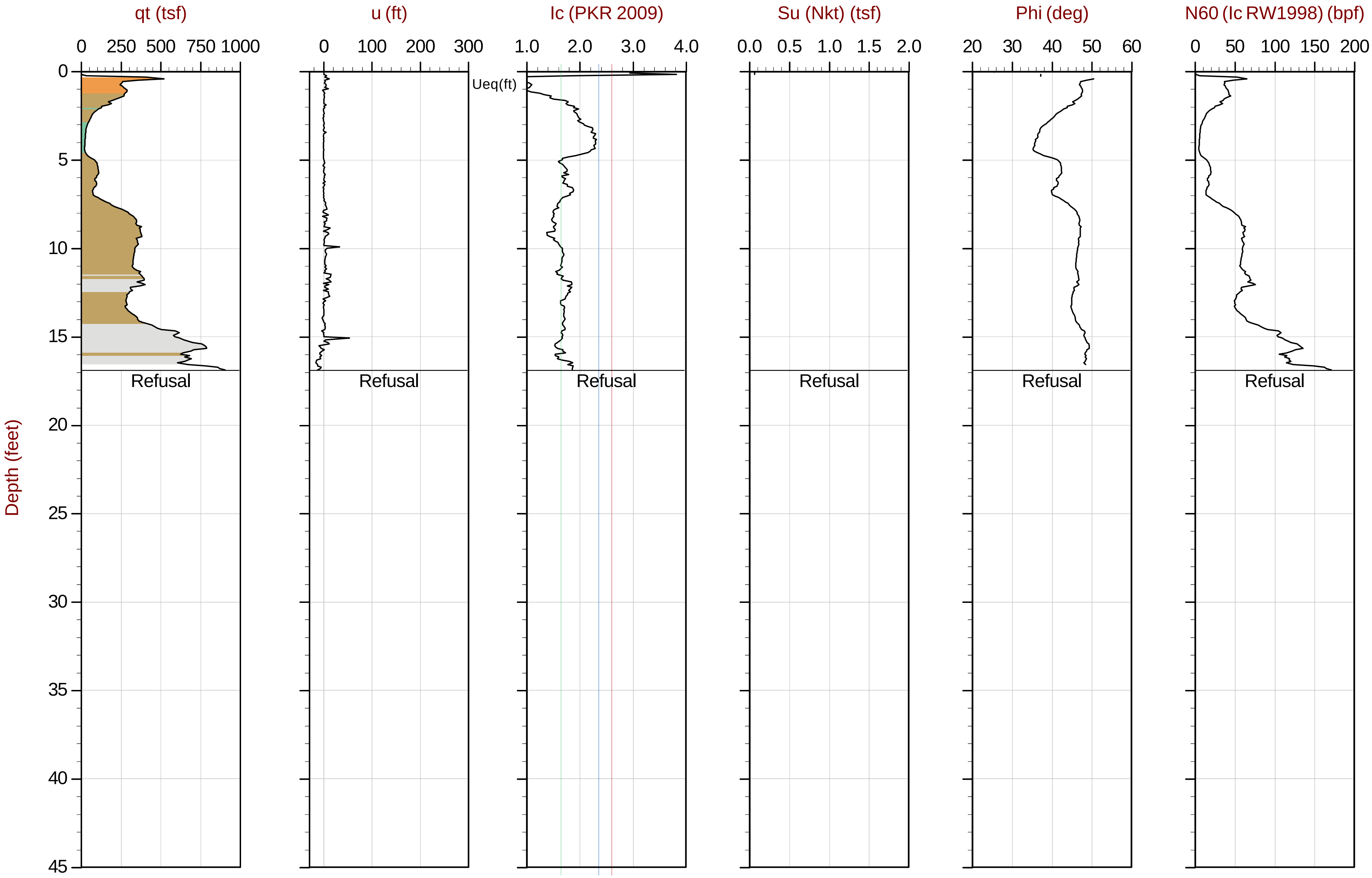
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 16:33
Site: Grand Street Commons

Sounding: AC-CPT-10E
Cone: 661:T1500F15U35



Max Depth: 5.150 m / 16.90 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP10E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58707 Long: -122.30328

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

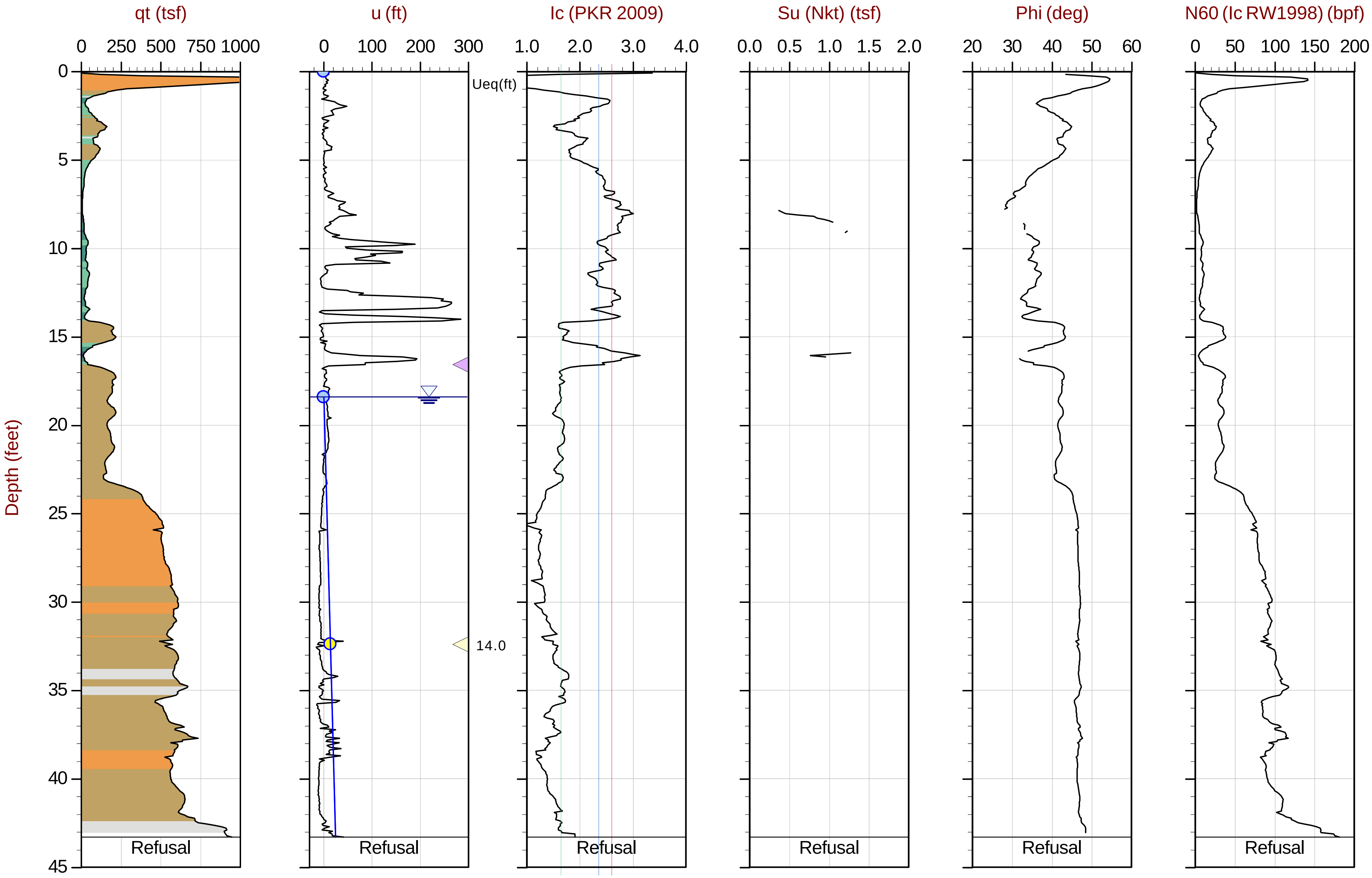
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 13:53
Site: Grand Street Commons

Sounding: AC-CPT-10S
Cone: 661:T1500F15U35



Max Depth: 13.200 m / 43.31 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP10S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58672 Long: -122.30359

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

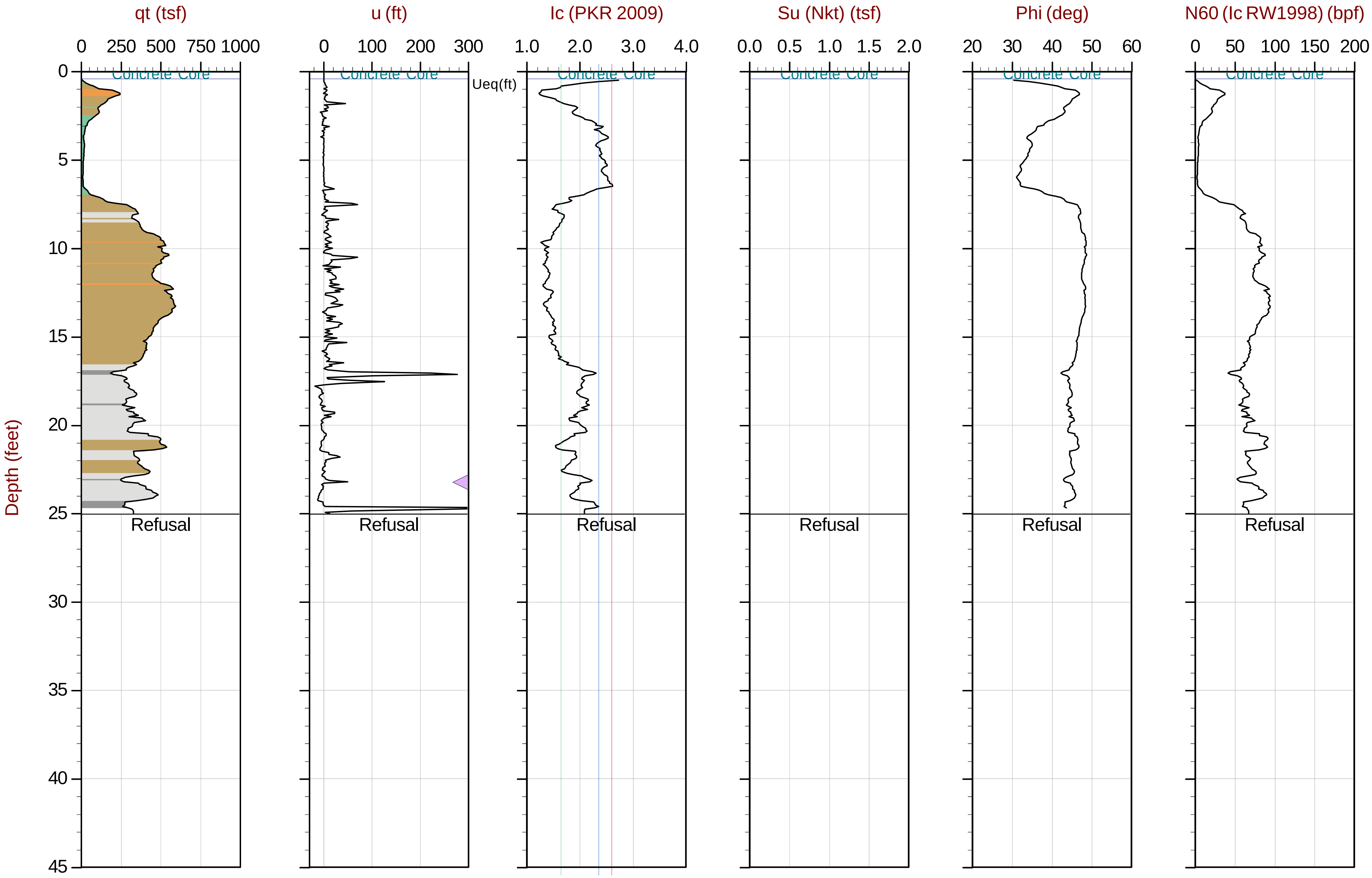
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 08:45
Site: Grand Street Commons

Sounding: AC-CPT-11E
Cone: 661:T1500F15U35



Max Depth: 7.625 m / 25.02 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP11E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58718 Long: -122.30325

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

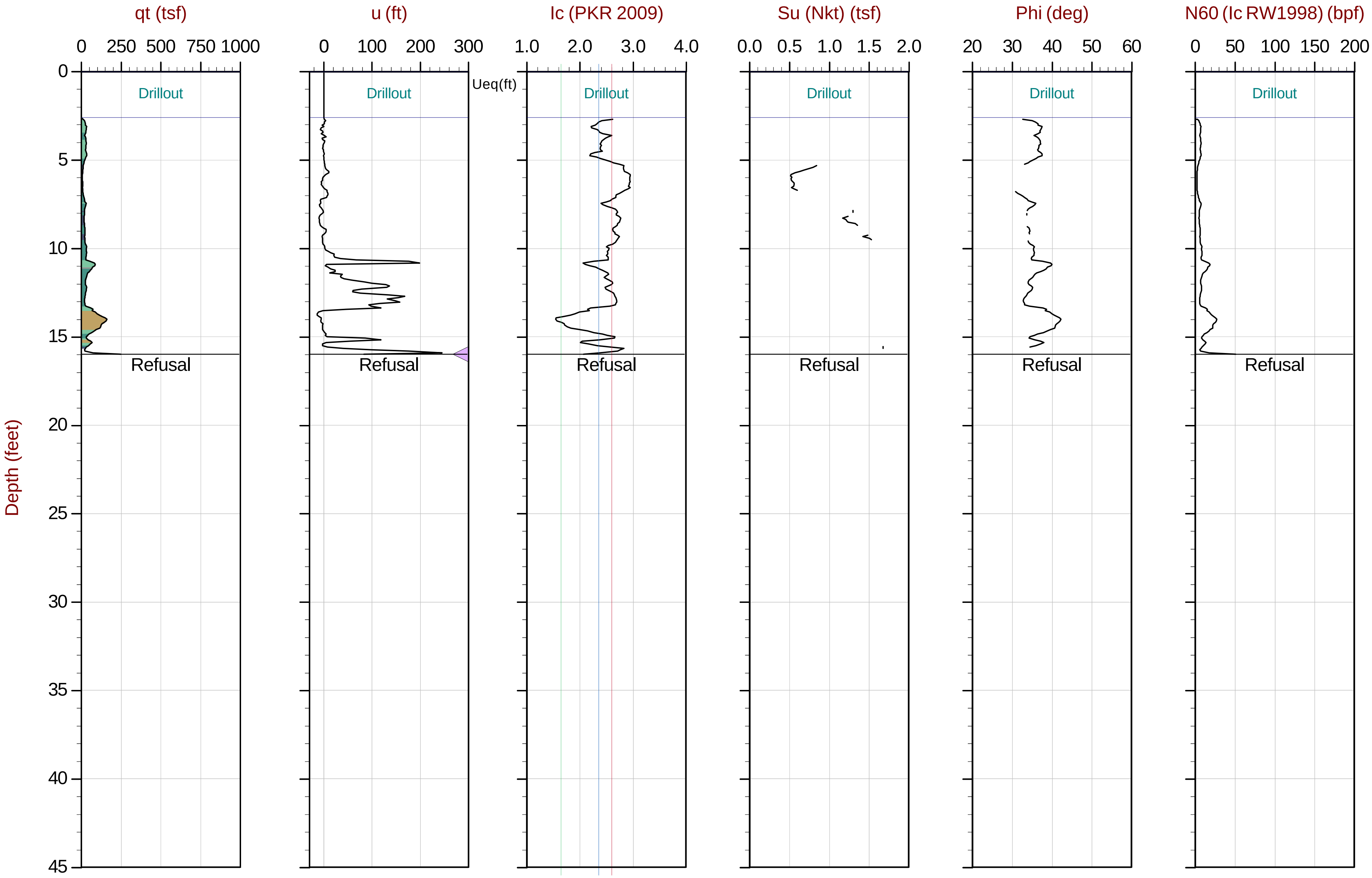
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 14:56
Site: Grand Street Commons

Sounding: AC-CPT-11S
Cone: 536:T1500F15U500



Max Depth: 4.875 m / 15.99 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP11S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58678 Long: -122.30352

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

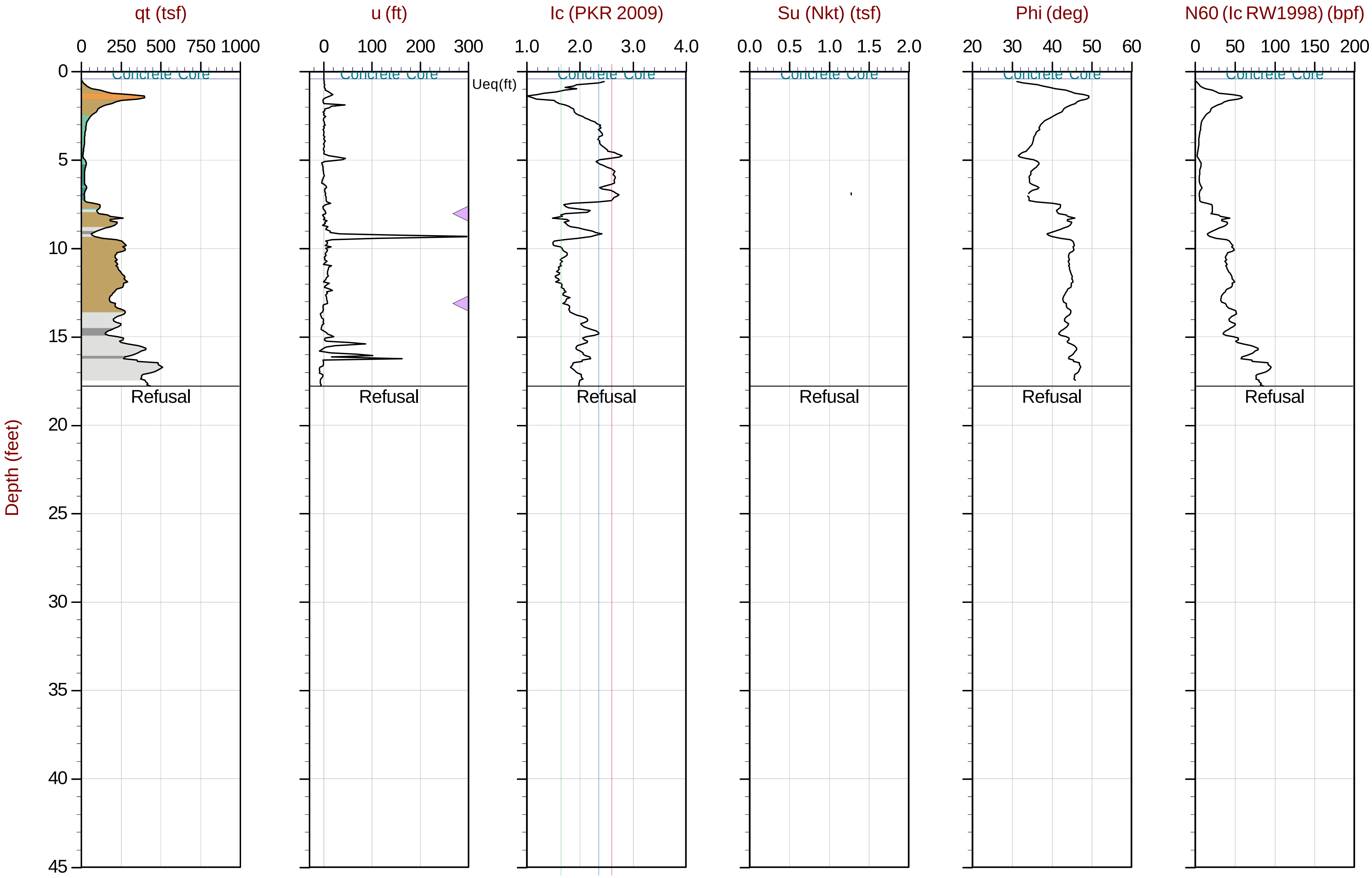
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 09:55
Site: Grand Street Commons

Sounding: AC-CPT-12E
Cone: 661:T1500F15U35



Max Depth: 5.425 m / 17.80 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP12E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58734 Long: -122.30321

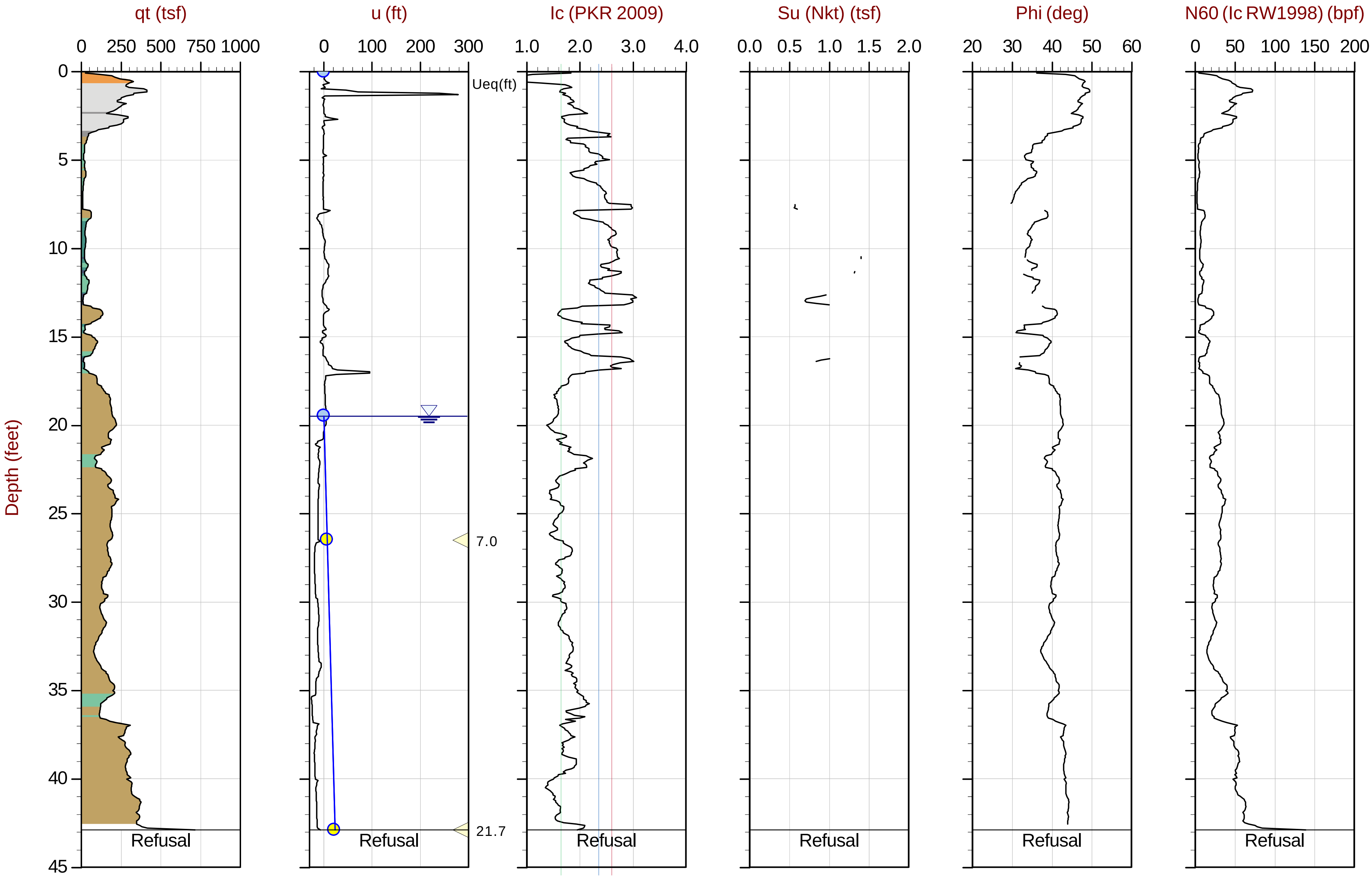
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 13:46
Site: Grand Street Commons
Sounding: AC-CPT-12S
Cone: 661:T1500F15U35



Max Depth: 13.075 m / 42.90 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP12S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30351

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

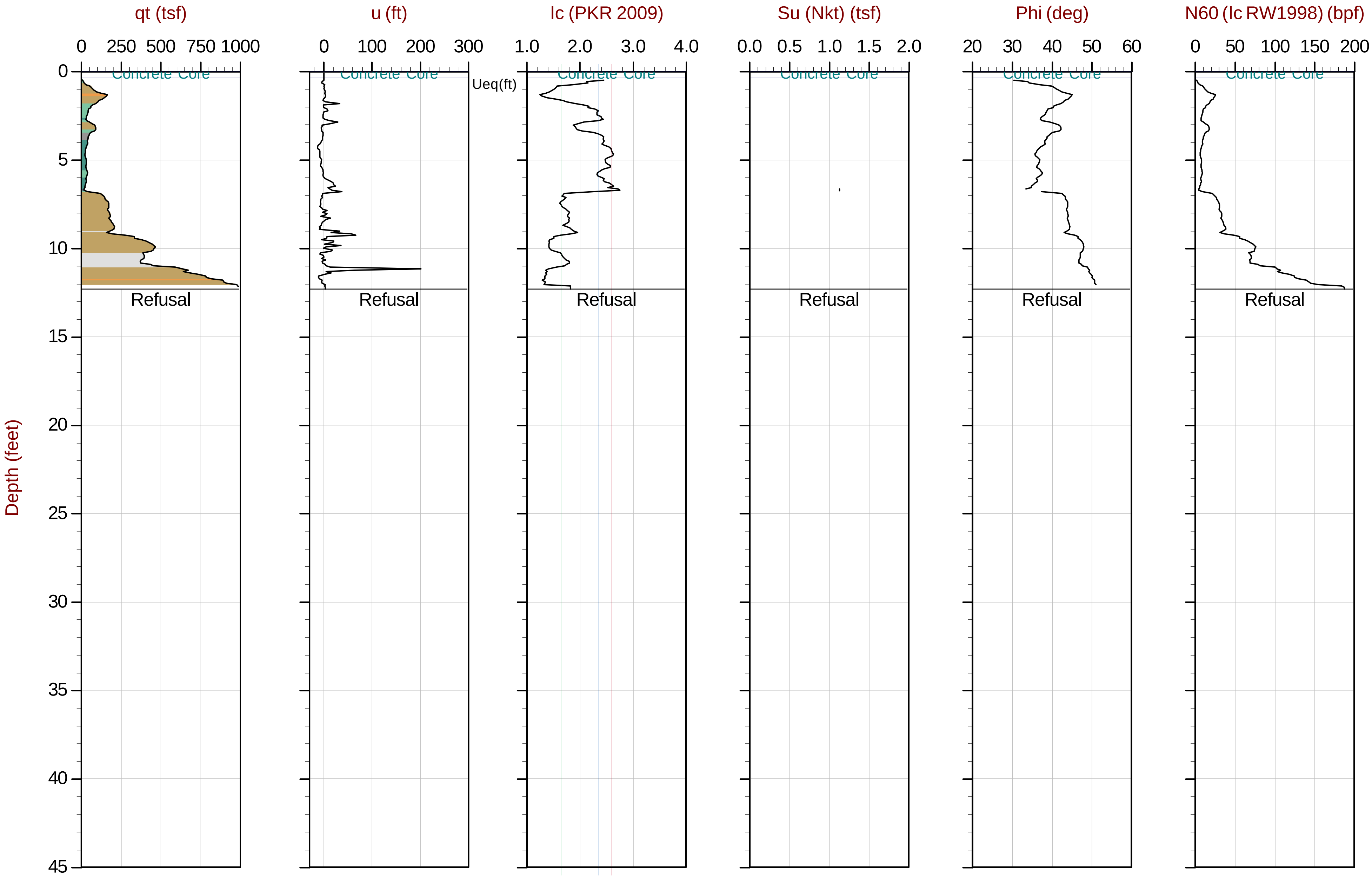
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 09:29
Site: Grand Street Commons

Sounding: AC-CPT-13E
Cone: 661:T1500F15U35



Max Depth: 3.750 m / 12.30 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP13E.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

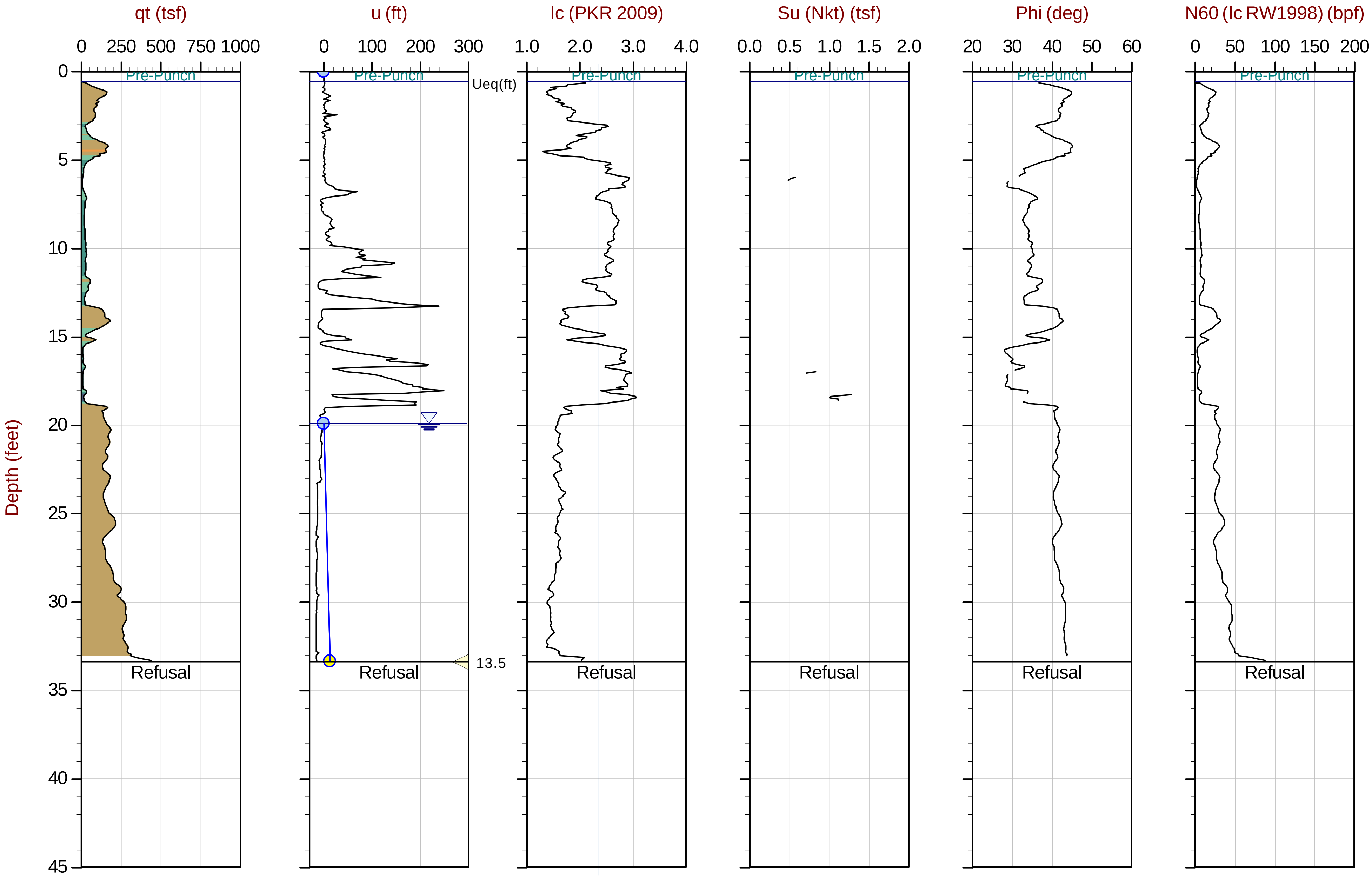
SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58742 Long: -122.30316

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.

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 15:17
Site: Grand Street Commons
Sounding: AC-CPT-13S
Cone: 595:T1500F15U500



Max Depth: 10.175 m / 33.38 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP13S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58667 Long: -122.30350

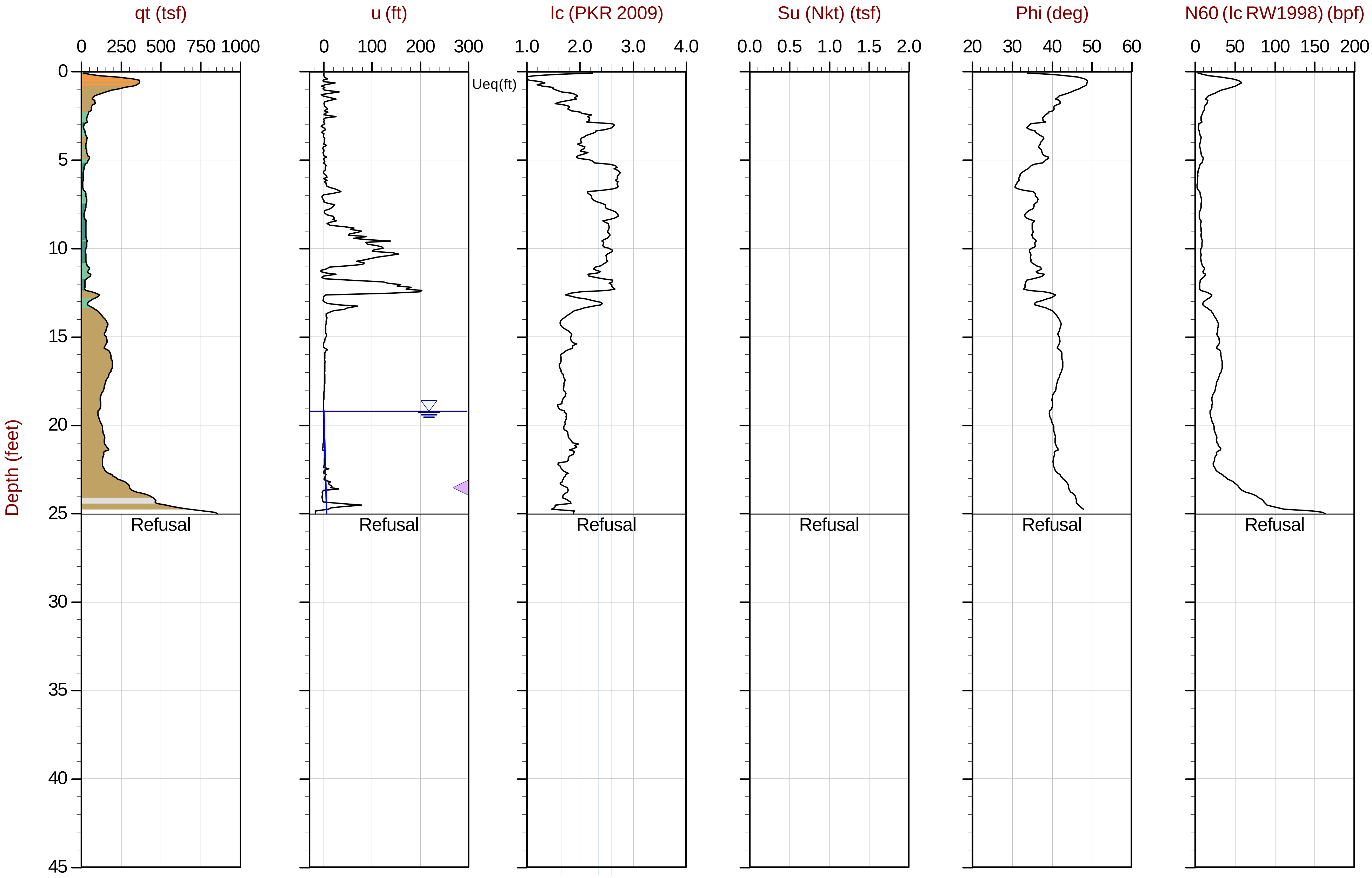
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Job No: 20-59-21343
Date: 2020-09-11 16:06
Site: Grand Street Commons

Sounding: AC-CPT-14S
Cone: 661:T1500F15U35

Aspect Consulting



Max Depth: 7.625 m / 25.02 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP14S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58665 Long: -122.30346

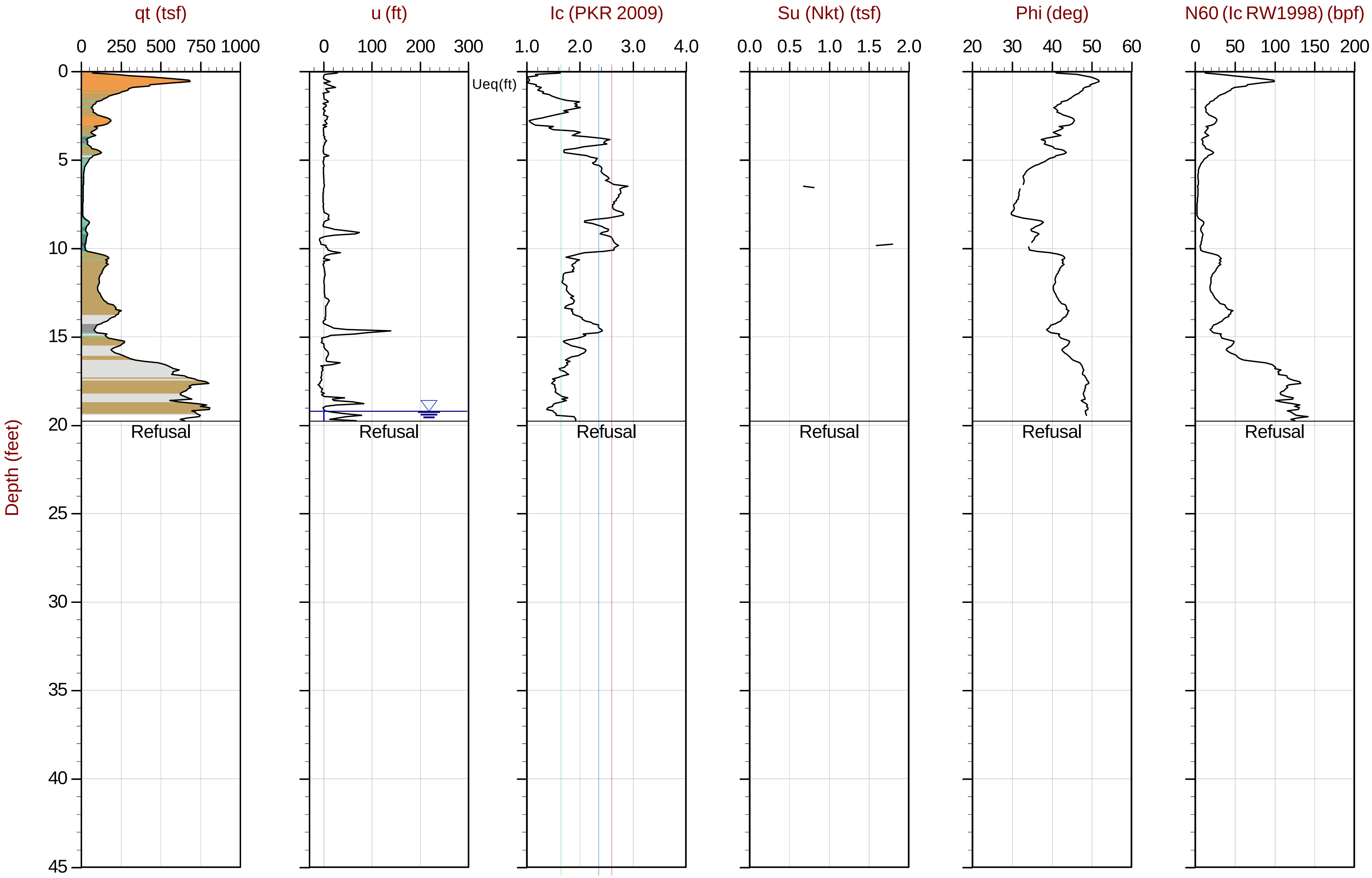
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 13:09
Site: Grand Street Commons

Sounding: AC-CPT-15S
Cone: 661:T1500F15U35



Max Depth: 6.025 m / 19.77 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP15S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58684 Long: -122.30341

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

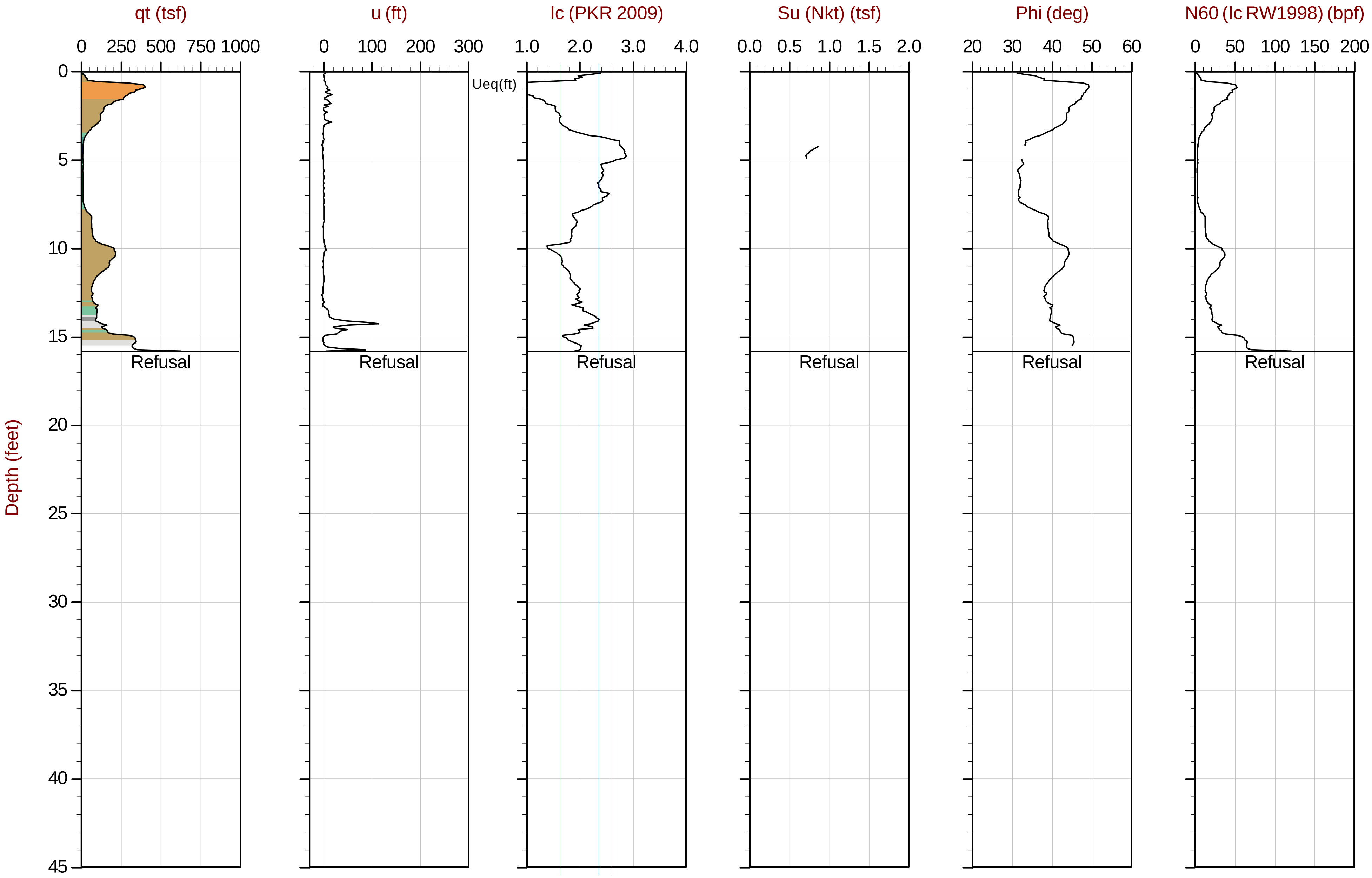
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 15:04
Site: Grand Street Commons

Sounding: AC-CPT-16S
Cone: 661:T1500F15U35



Max Depth: 4.825 m / 15.83 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP16S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58643 Long: -122.30340

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

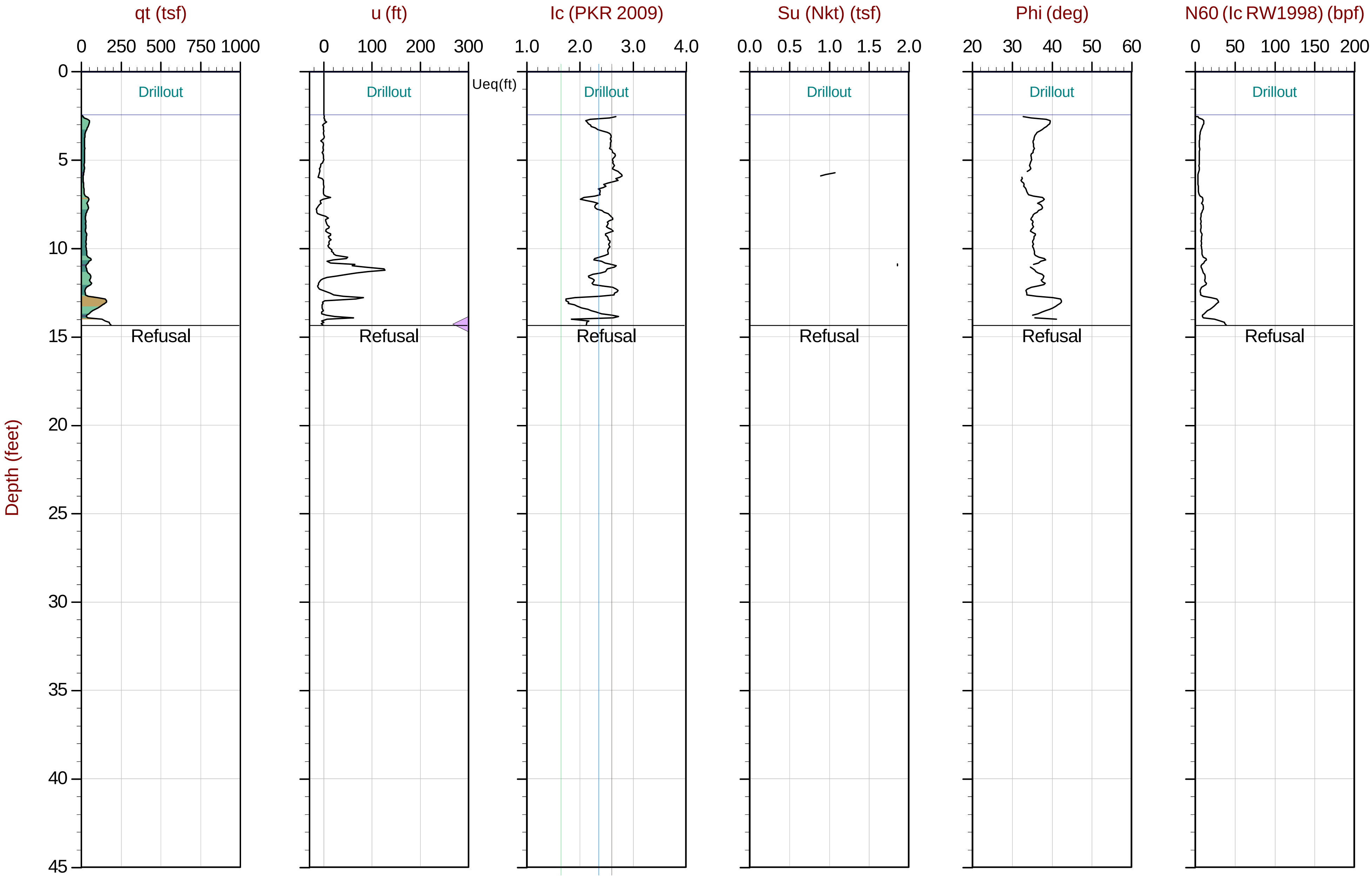
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 13:11
Site: Grand Street Commons

Sounding: AC-CPT-17S
Cone: 536:T1500F15U500



Max Depth: 4.375 m / 14.35 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP17S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

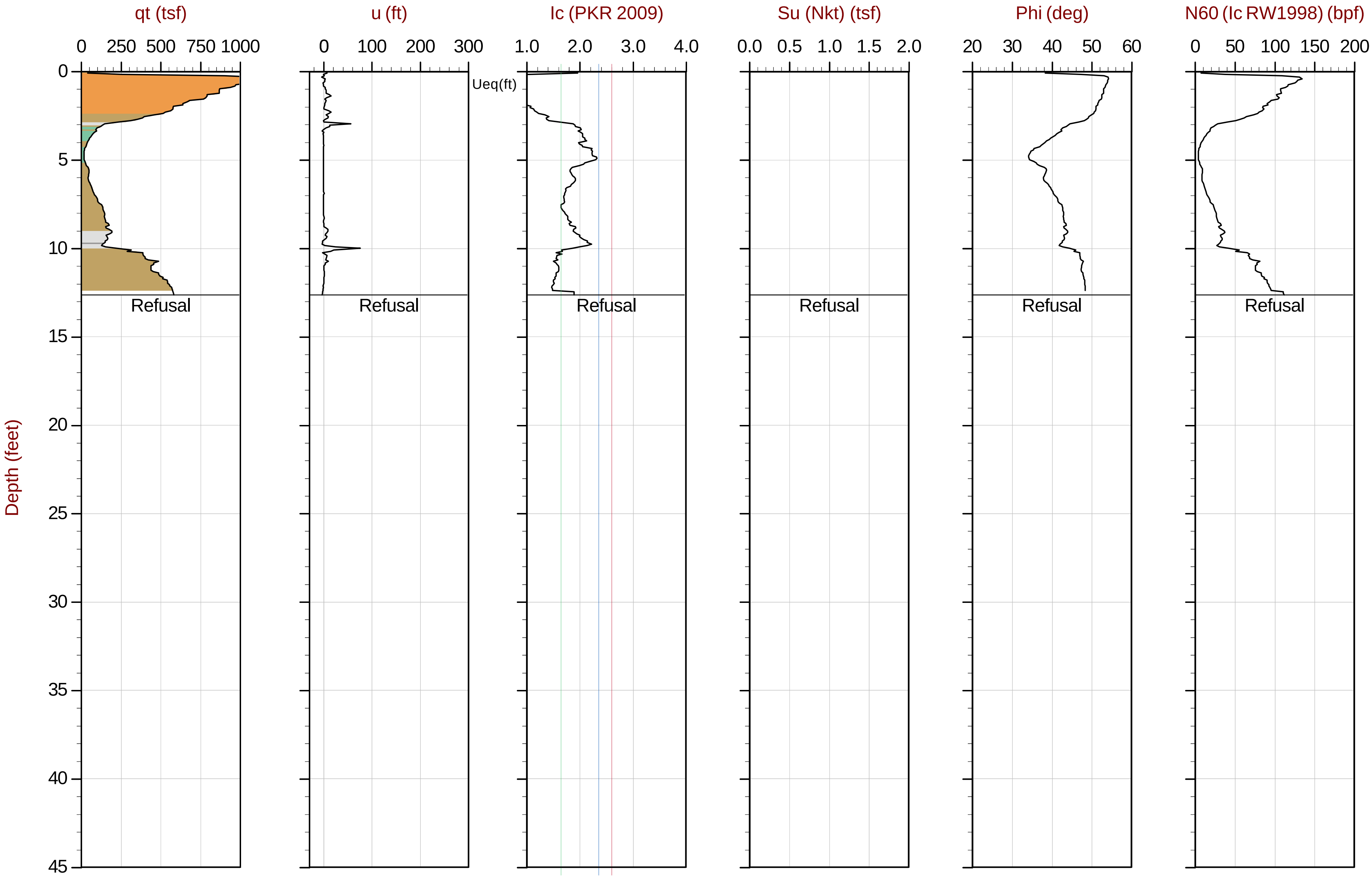
SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58659 Long: -122.30340

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 | *Aspect Consulting*

Job No: 20-59-21343
Date: 2020-09-11 08:14
Site: Grand Street Commons
Sounding: AC-CPT-18S
Cone: 661:T1500F15U35



Max Depth: 3.850 m / 12.63 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP18S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58653 Long: -122.30334

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

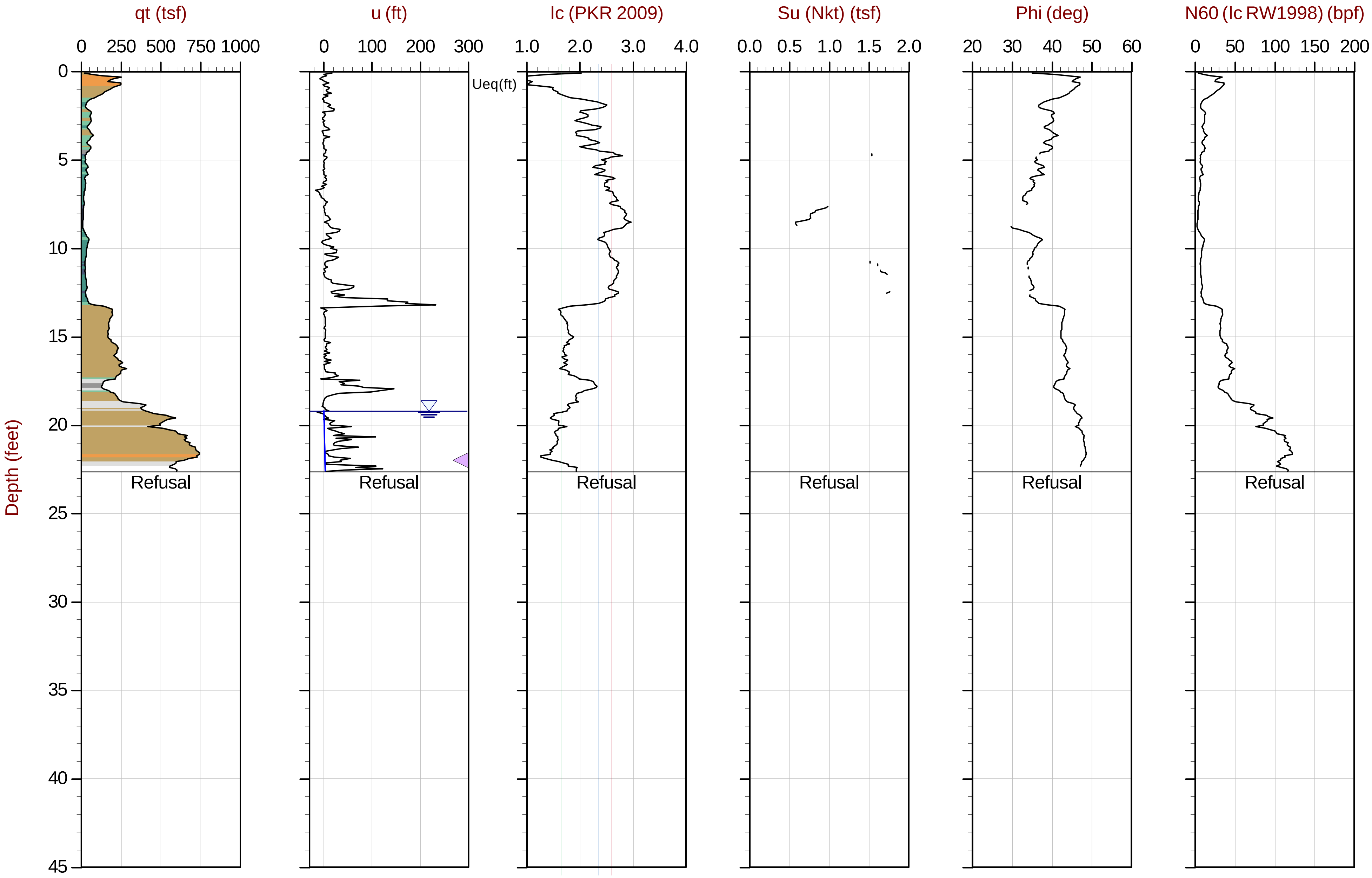
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 15:20
Site: Grand Street Commons

Sounding: AC-CPT-19S
Cone: 661:T1500F15U35



Max Depth: 6.900 m / 22.64 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP19S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58675 Long: -122.30333

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

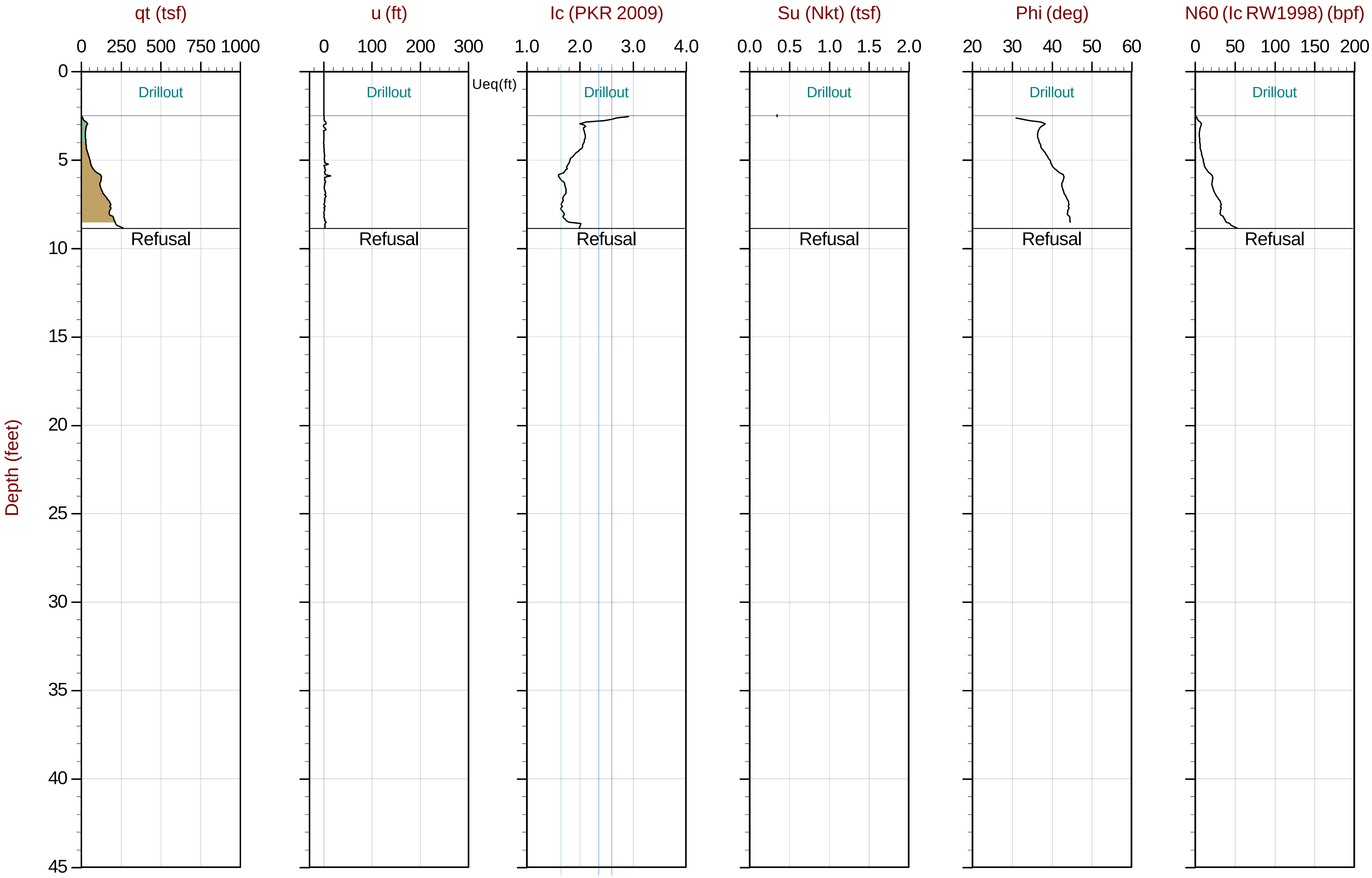
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 12:10
Site: Grand Street Commons

Sounding: AC-CPT-20S
Cone: 536:T1500F15U500



Max Depth: 2.700 m / 8.86 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP20S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30320

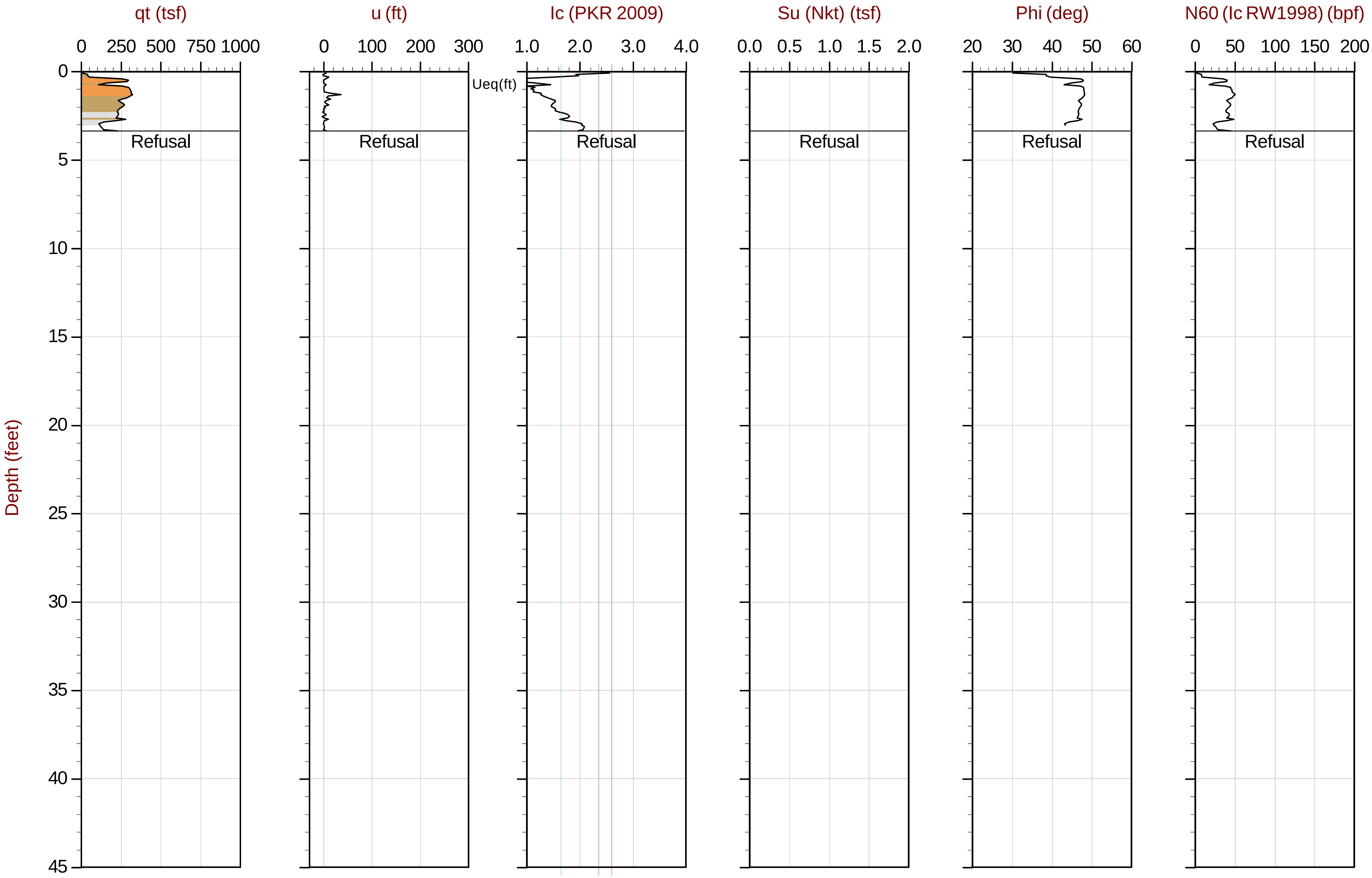
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 15:51
Site: Grand Street Commons

Sounding: AC-CPT-21S
Cone: 661:T1500F15U35



Max Depth: 1.025 m / 3.36 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP21S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58641 Long: -122.30320

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

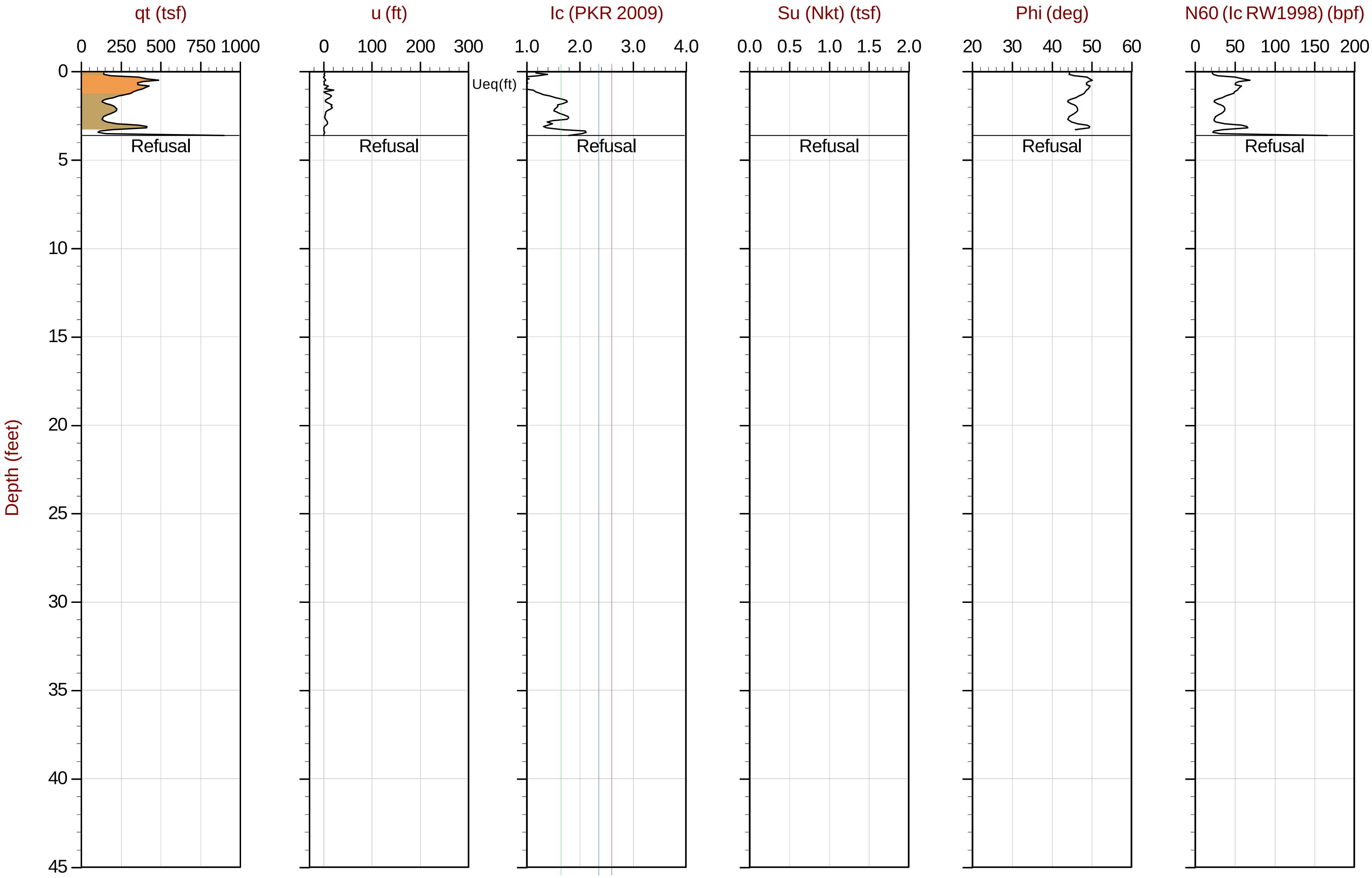
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 16:09
Site: Grand Street Commons

Sounding: AC-CPT-21BS
Cone: 661:T1500F15U35



Max Depth: 1.100 m / 3.61 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP21BS.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58643 Long: -122.30321

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.

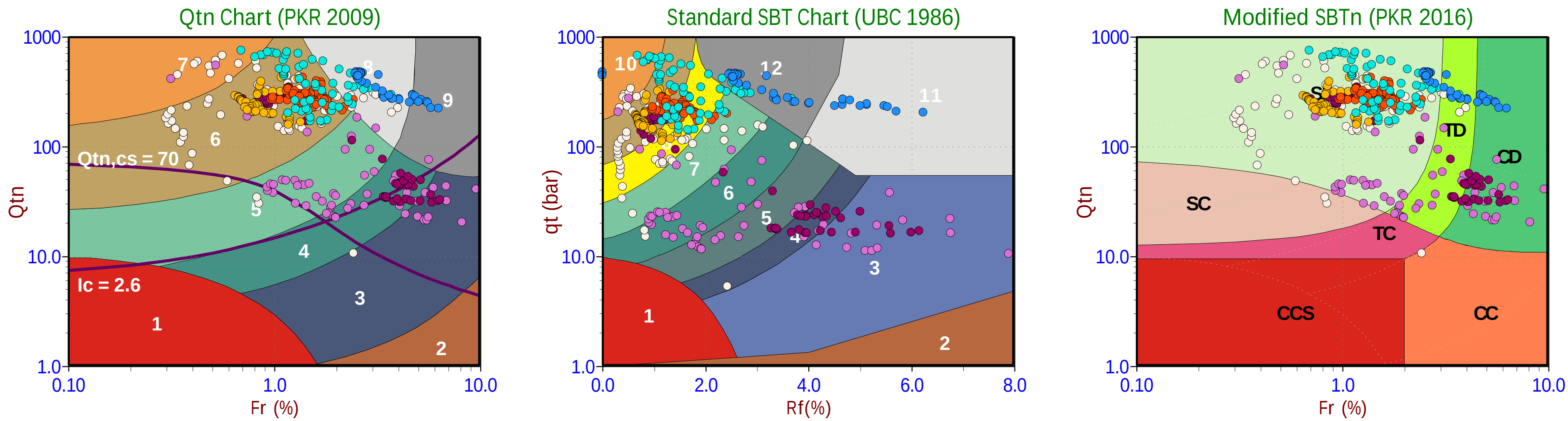
Soil Behavior Type (SBT) Scatter Plots

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 13:29
Site: Grand Street Commons

Sounding: AC-CPT-01E
Cone: 661: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

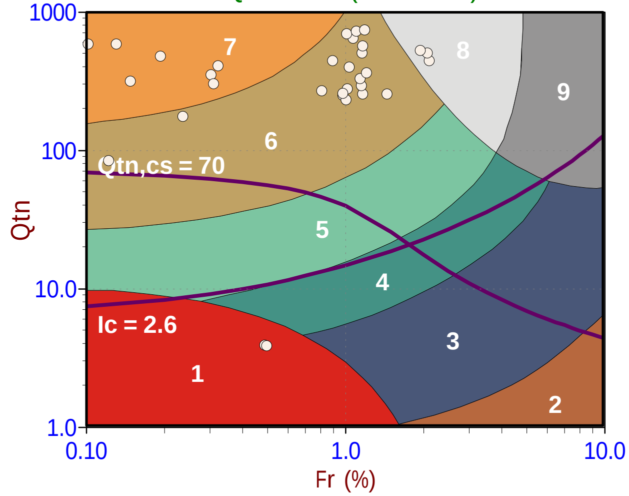
Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

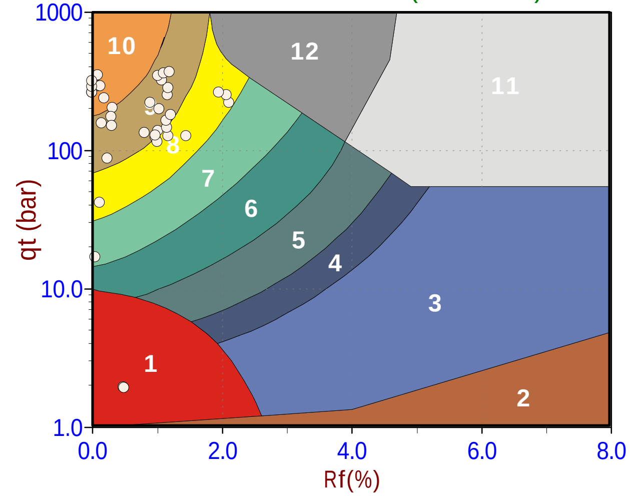
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

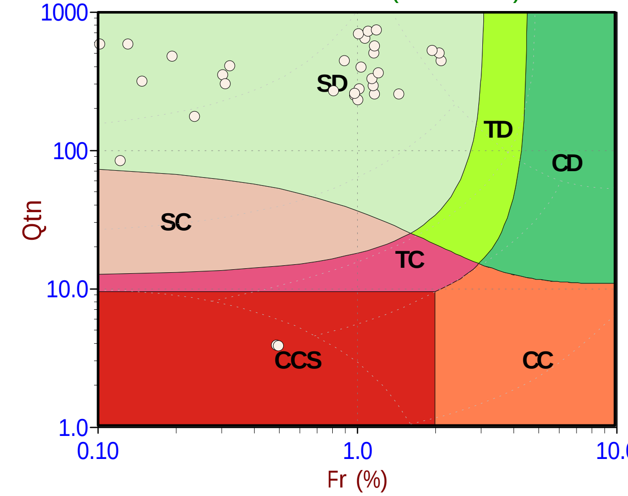
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Job No: 20-59-21343
Date: 2019-09-23 07:41
Site: Grand Street Commons
Sounding: AC-CPT-01S
Cone: 536:T1500F15U500

Aspect Consulting







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)

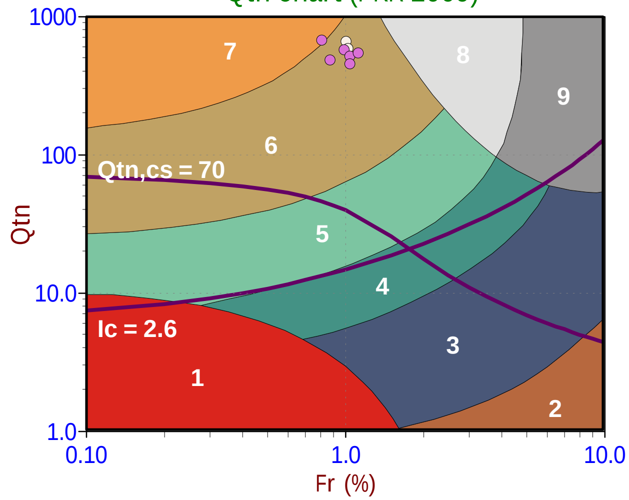
CONETEC

Aspect Consulting

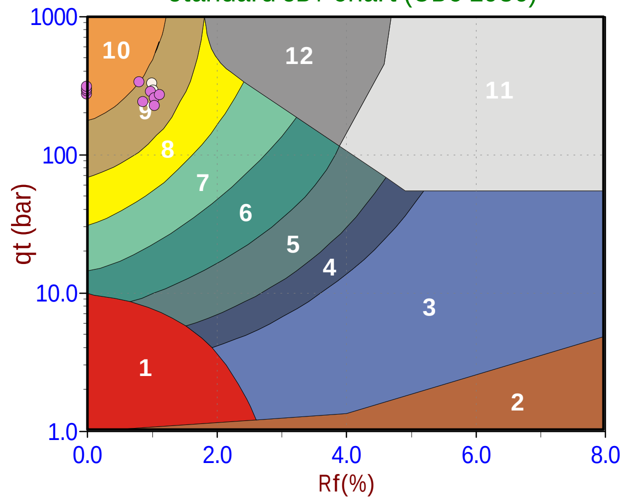
Job No: 20-59-21343
Date: 2019-09-23 08:18
Site: Grand Street Commons

Sounding: AC-CPT-01BS
Cone: 536:T1500F15U500

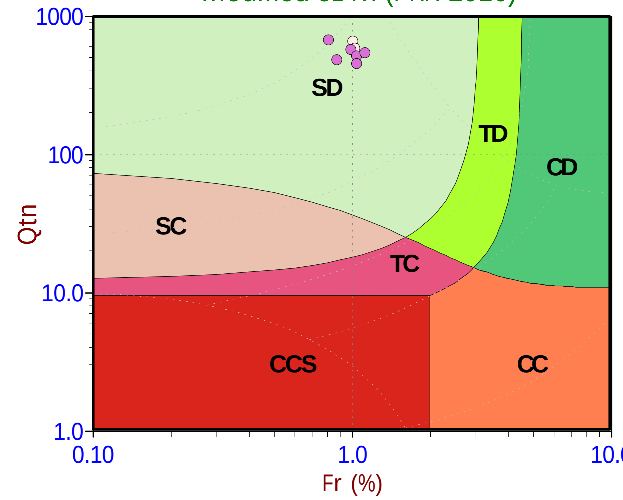
Qtn Chart (PKR 2009)



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)

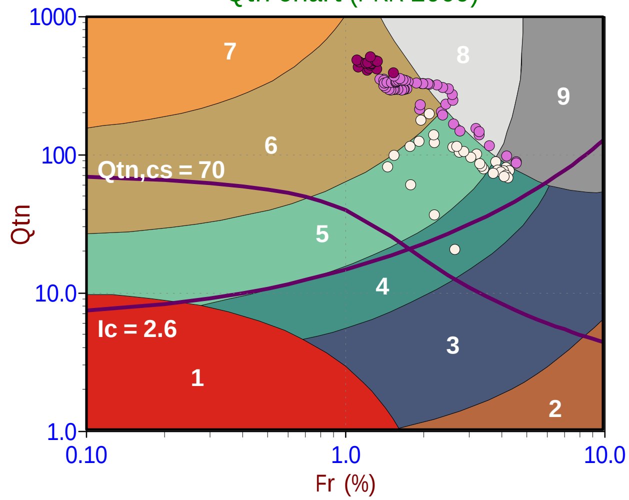
CONETEC

Aspect Consulting

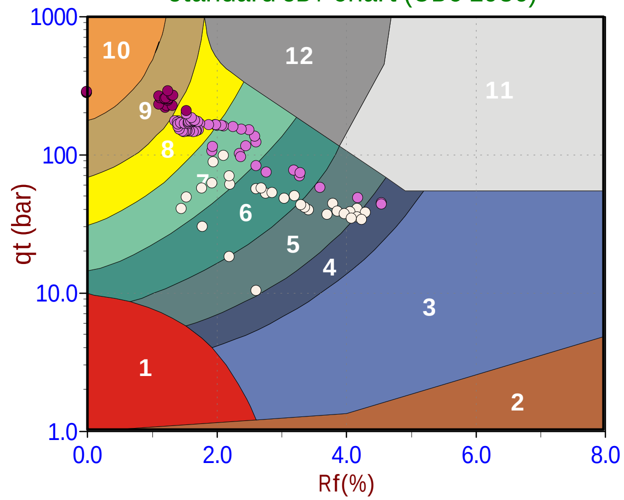
Job No: 20-59-21343
Date: 2019-09-23 16:36
Site: Grand Street Commons

Sounding: AC-CPT-01W
Cone: 536:T1500F15U500

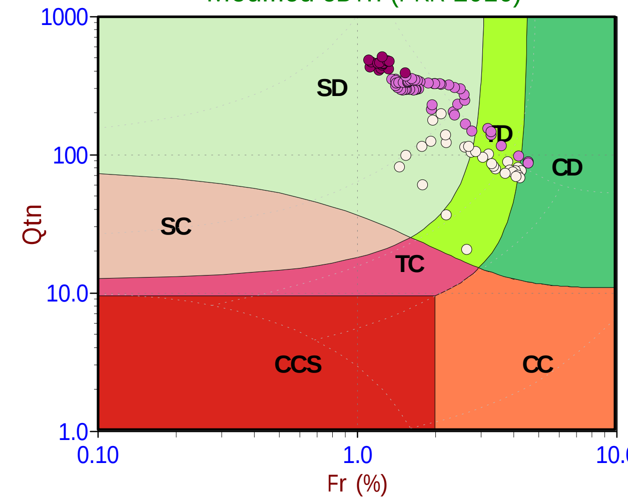
Qtn Chart (PKR 2009)



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

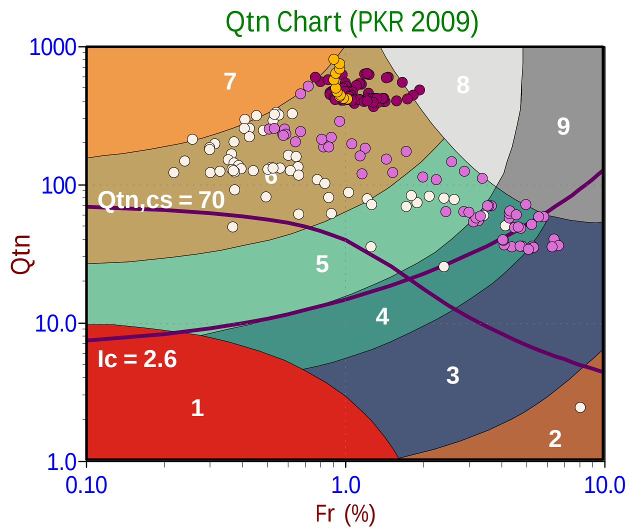
Legend

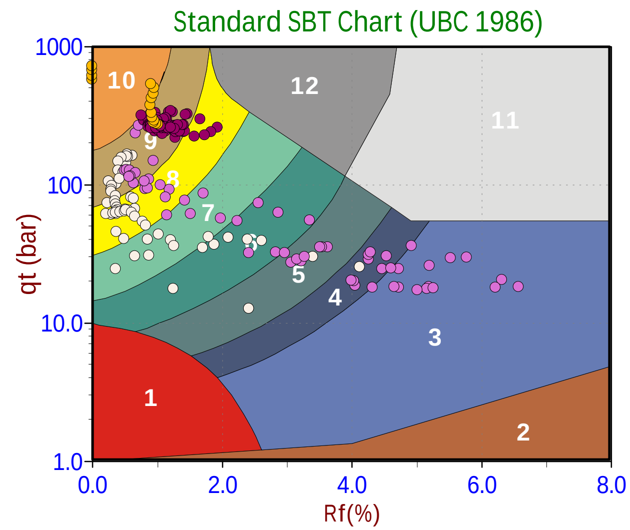
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

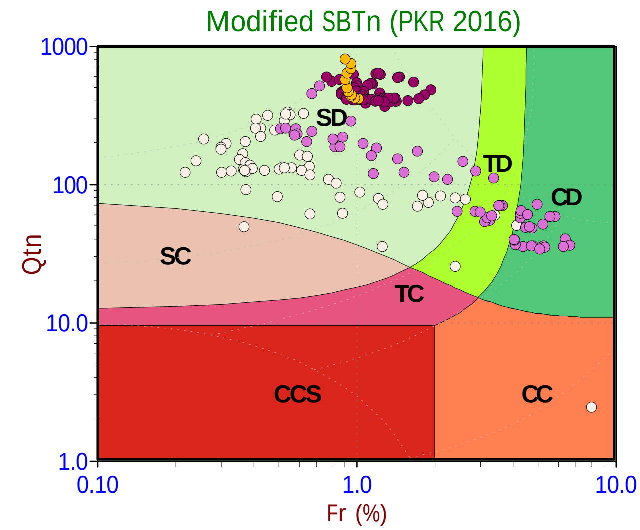
ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 14:10
Site: Grand Street Commons
Sounding: AC-CPT-02E
Cone: 595:T1500F15U500







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

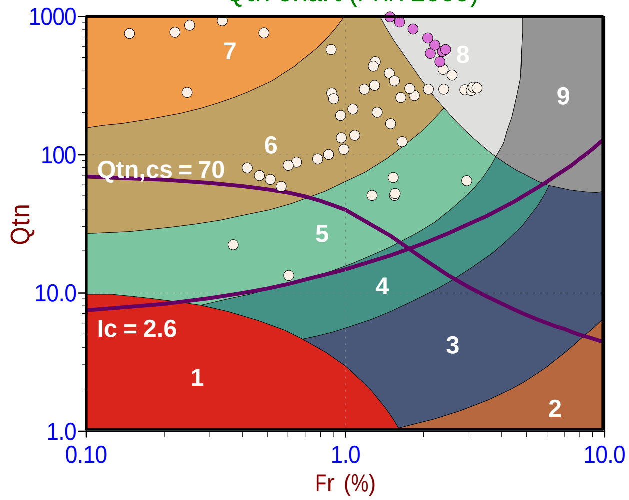
Legend

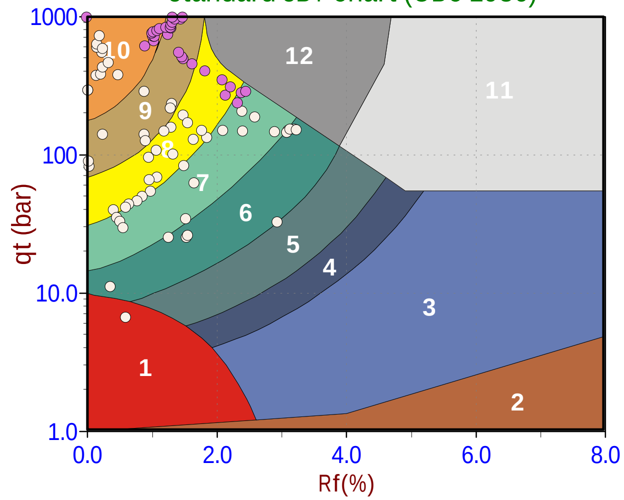
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

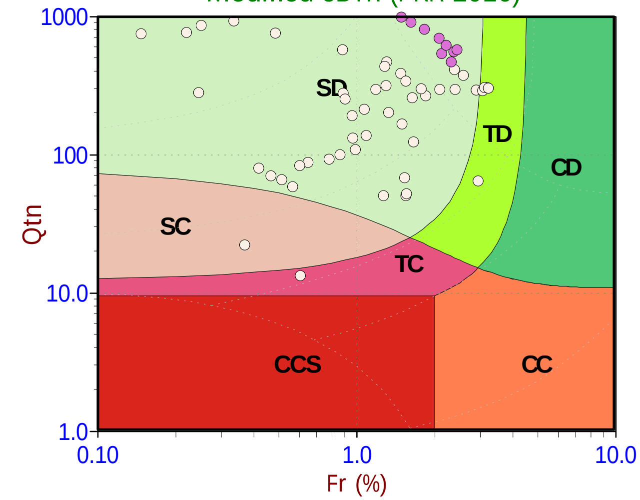
Legend

- 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)

Aspect Consulting	Job No: 20-59-21343 Date: 2020-09-11 11:13 Site: Grand Street Commons	Sounding: AC-CPT-02S Cone: 661: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)

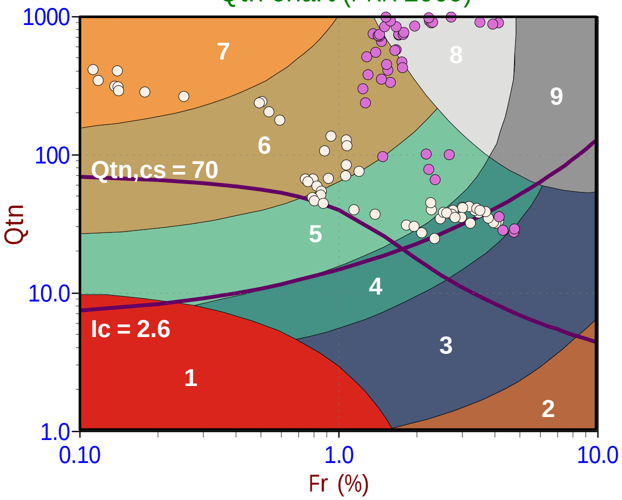
CONETEC

Aspect Consulting

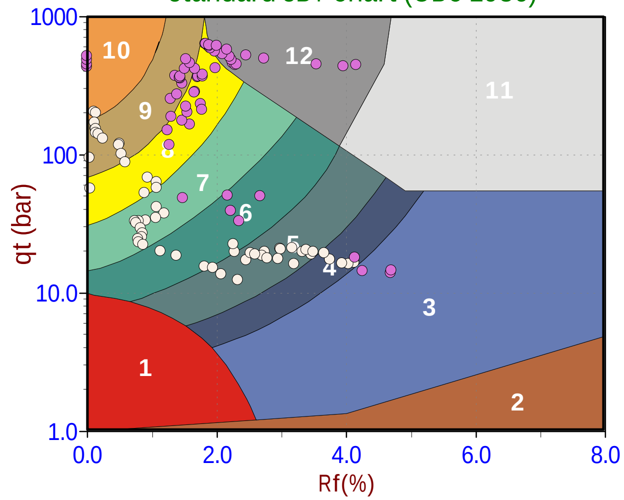
Job No: 20-59-21343
Date: 2020-09-14 14:26
Site: Grand Street Commons

Sounding: AC-CPT-02W
Cone: 661:T1500F15U35

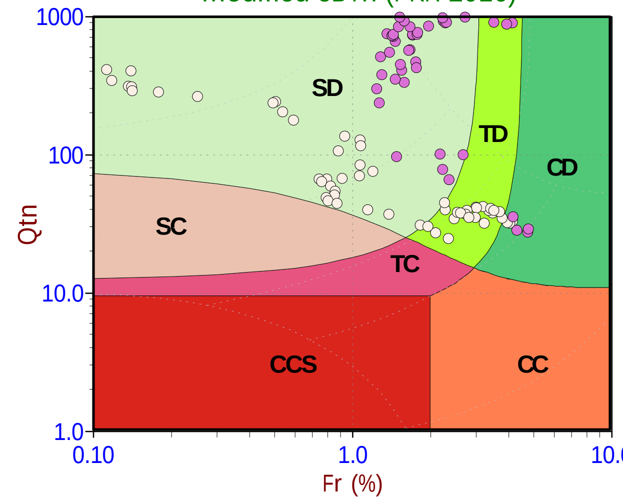
Qtn Chart (PKR 2009)



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)

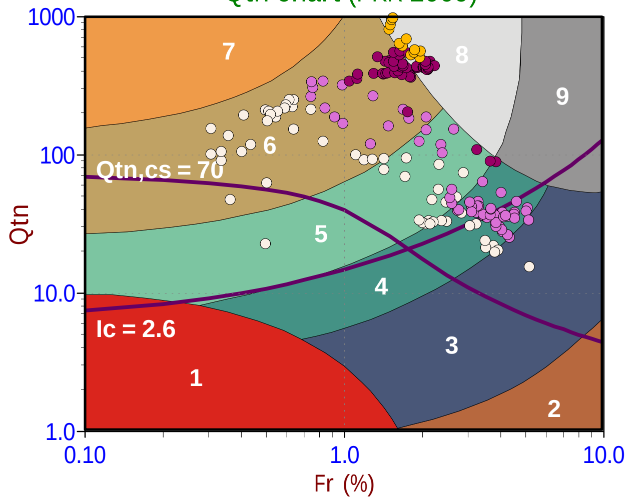
CONETEC

Aspect Consulting

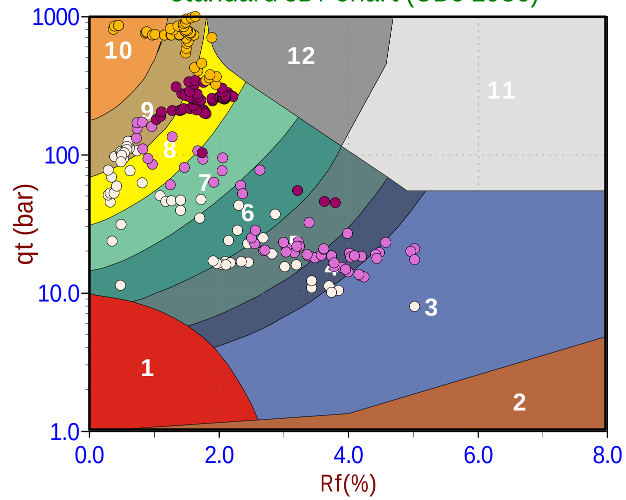
Job No: 20-59-21343
Date: 2020-09-14 12:52
Site: Grand Street Commons

Sounding: AC-CPT-03E
Cone: 661:T1500F15U35

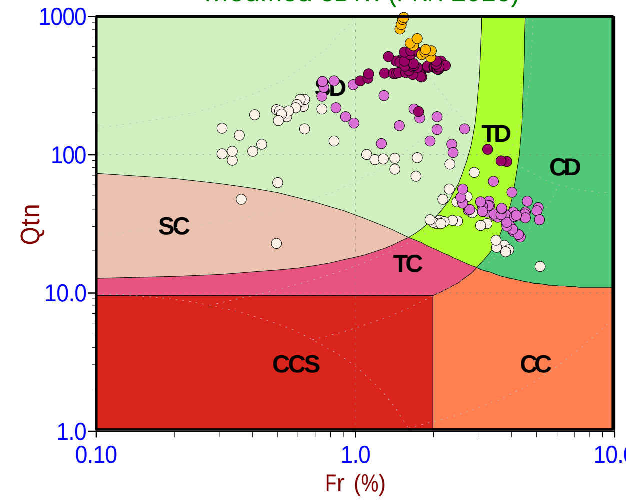
Qtn Chart (PKR 2009)



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

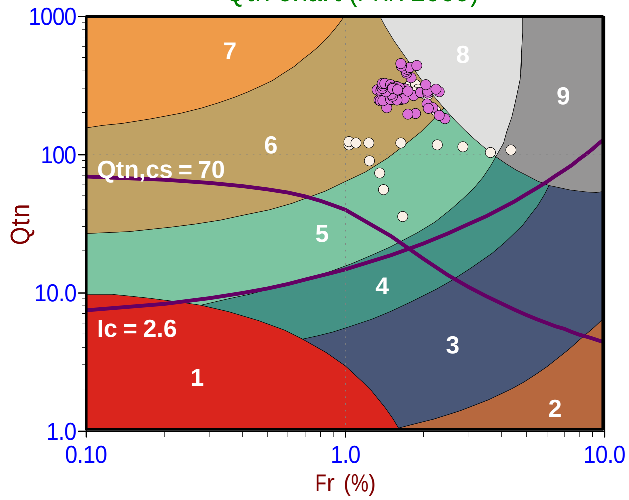
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Aspect Consulting

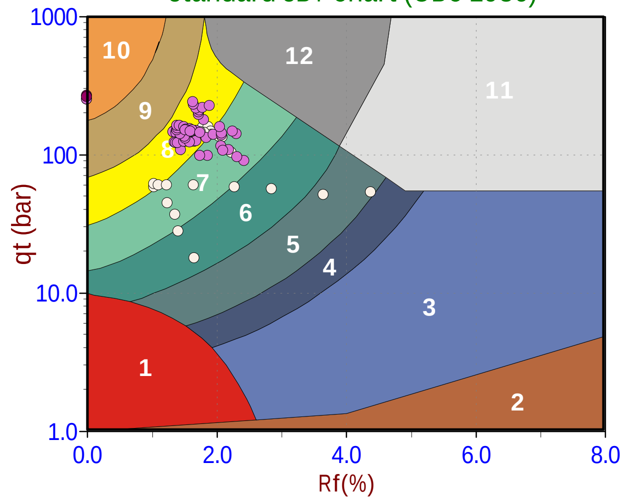
Job No: 20-59-21343
Date: 2019-09-23 15:37
Site: Grand Street Commons

Sounding: AC-CPT-03S
Cone: 536:T1500F15U500

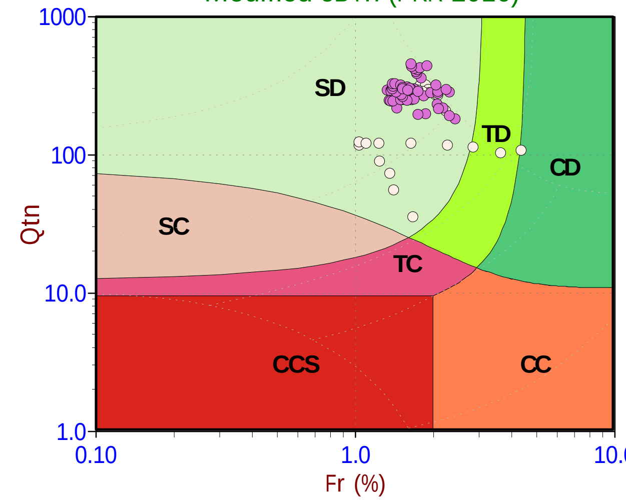
Qtn Chart (PKR 2009)



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

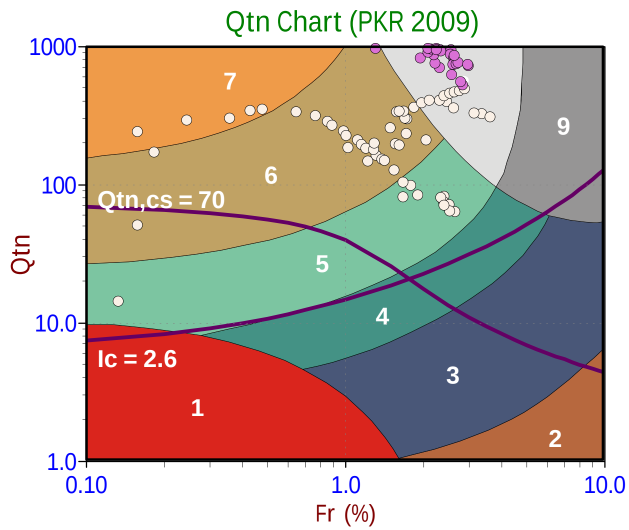
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

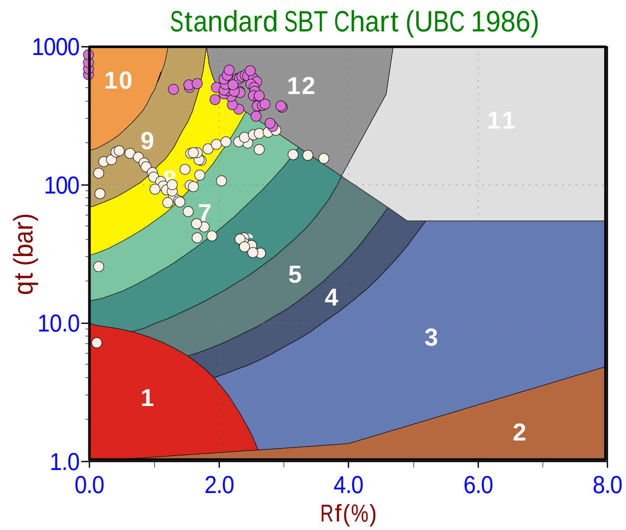
ConeTec

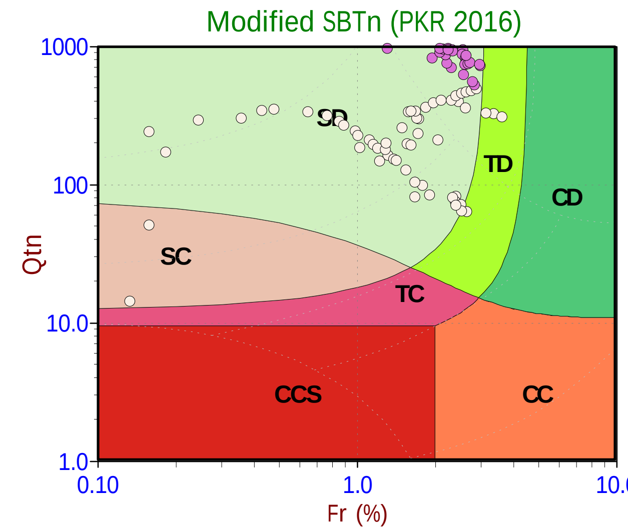
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 14:50
Site: Grand Street Commons

Sounding: AC-CPT-03W
Cone: 661:T1500F15U35







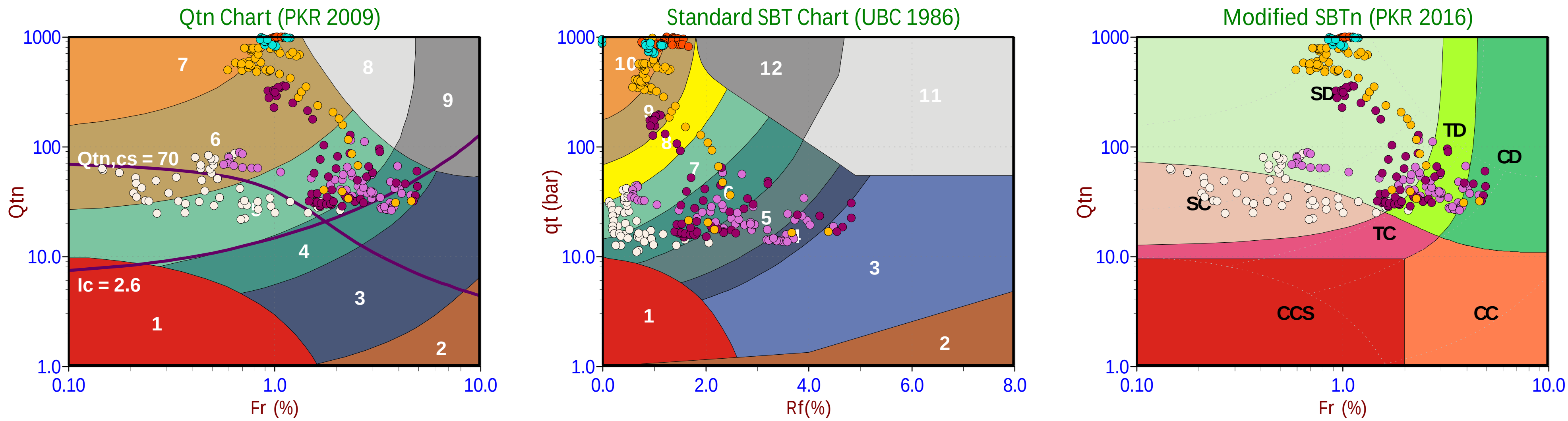
Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

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	*Aspect Consulting*	Job No: 20-59-21343 Date: 2020-09-14 12:15 Site: Grand Street Commons	Sounding: AC-CPT-04E Cone: 661: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)

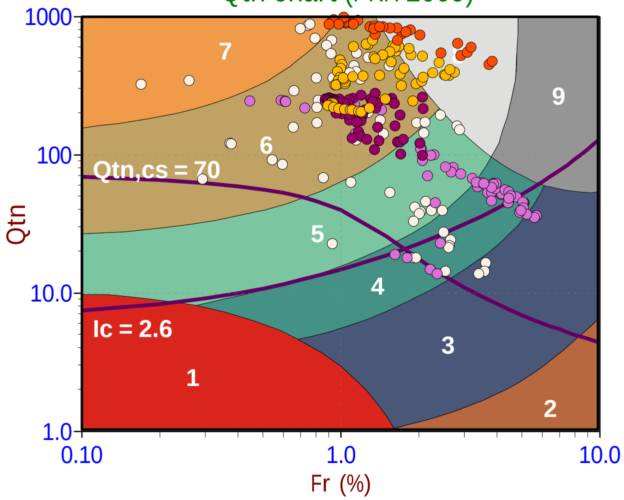
CONETEC

Aspect Consulting

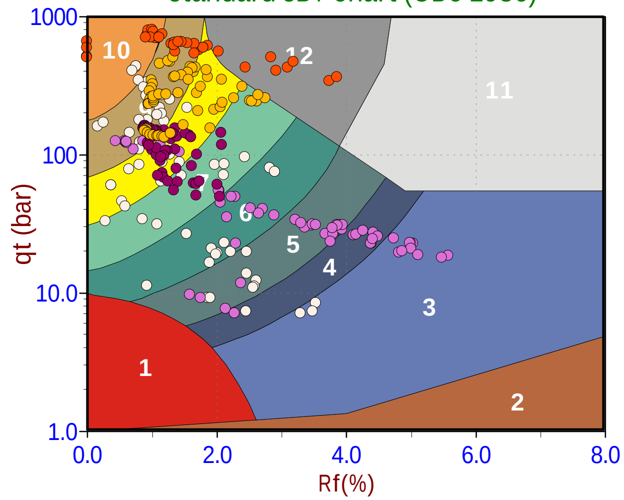
Job No: 20-59-21343
Date: 2020-09-11 11:48
Site: Grand Street Commons

Sounding: AC-CPT-04S
Cone: 661:T1500F15U35

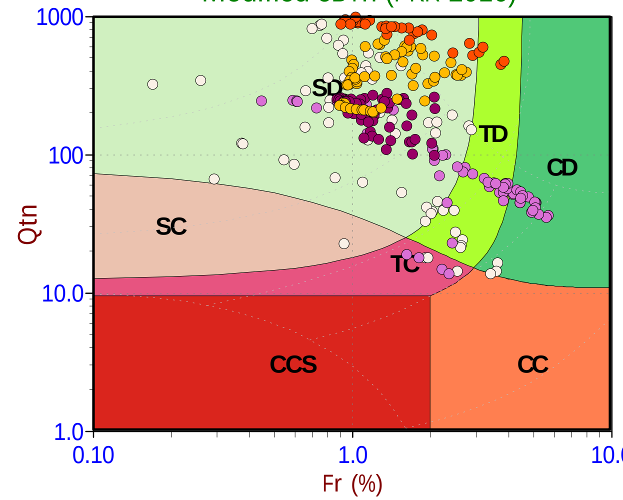
Qtn Chart (PKR 2009)



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)

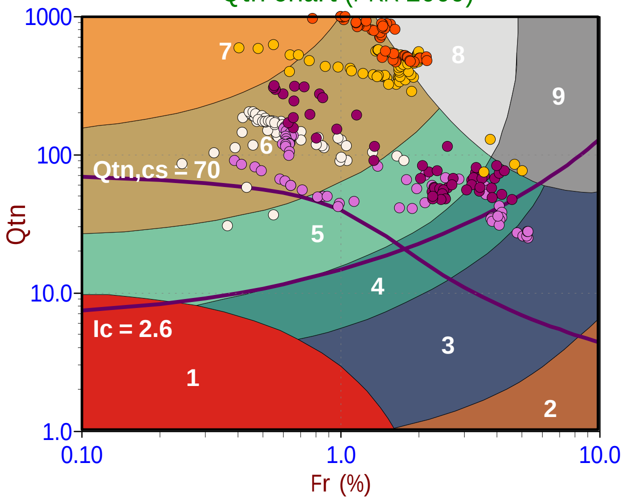
ConeTec

Aspect Consulting

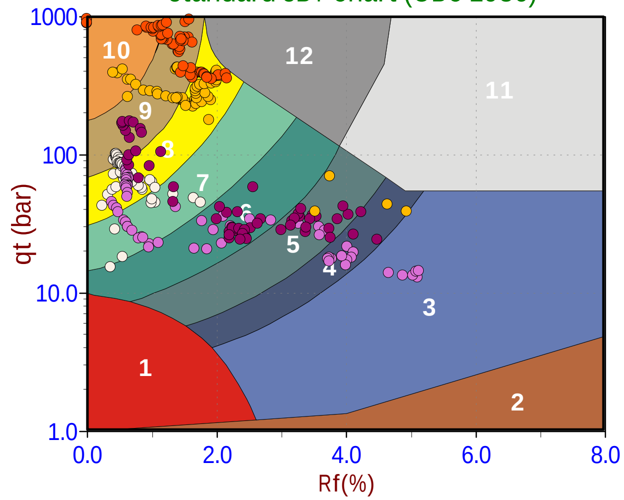
Job No: 20-59-21343
Date: 2020-09-14 11:28
Site: Grand Street Commons

Sounding: AC-CPT-05E
Cone: 661:T1500F15U35

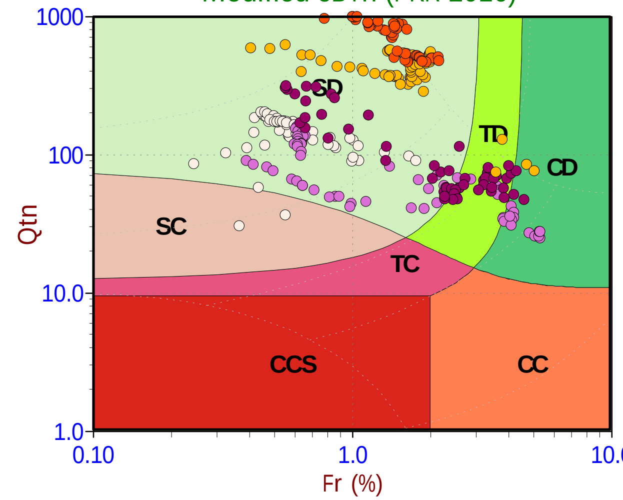
Qtn Chart (PKR 2009)



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)

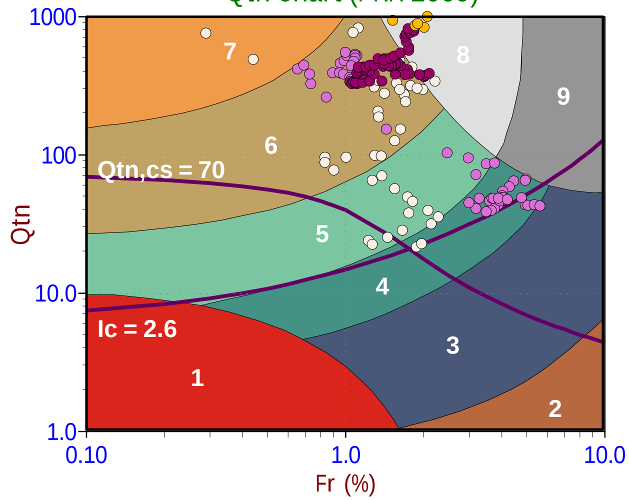
CONETEC

Aspect Consulting

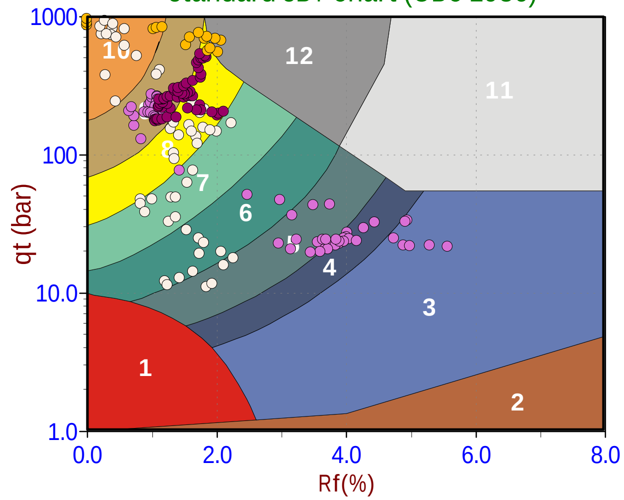
Job No: 20-59-21343
Date: 2020-09-11 10:31
Site: Grand Street Commons

Sounding: AC-CPT-05S
Cone: 661:T1500F15U35

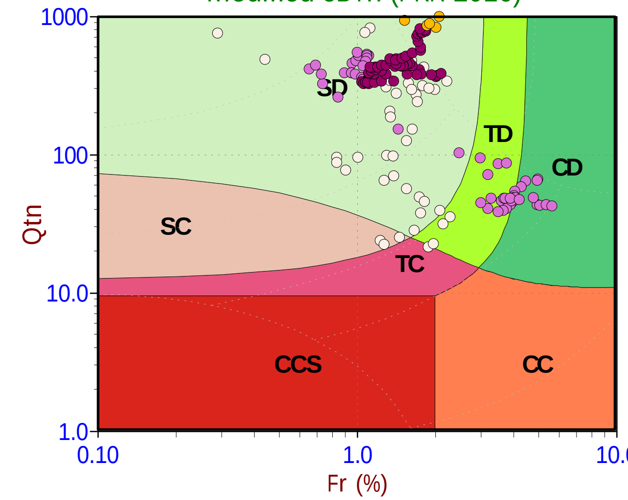
Qtn Chart (PKR 2009)



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)

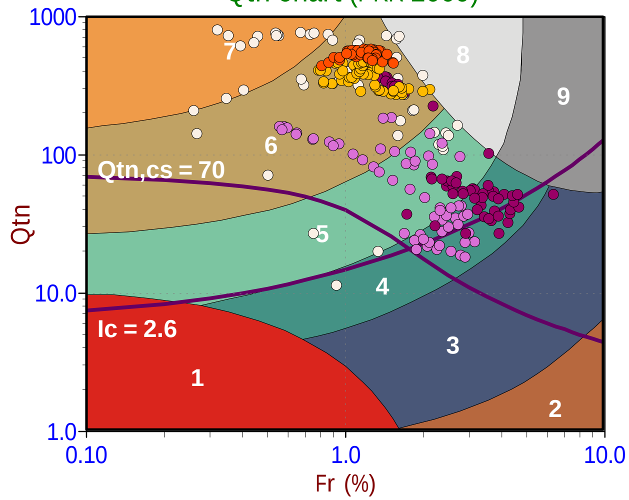
CONETEC

Aspect Consulting

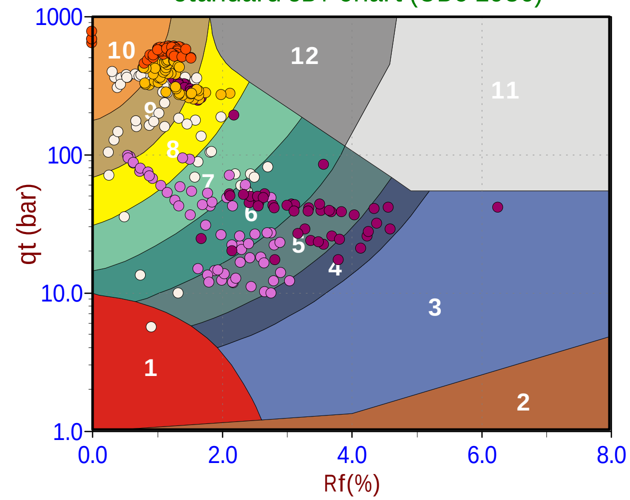
Job No: 20-59-21343
Date: 2020-09-14 10:47
Site: Grand Street Commons

Sounding: AC-CPT-06E
Cone: 661:T1500F15U35

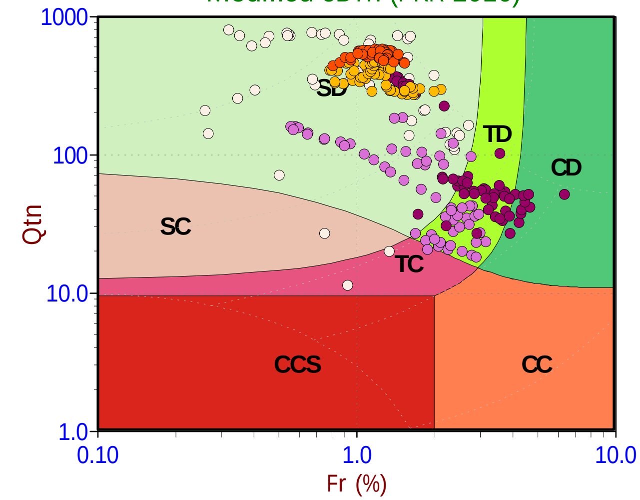
Qtn Chart (PKR 2009)



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)

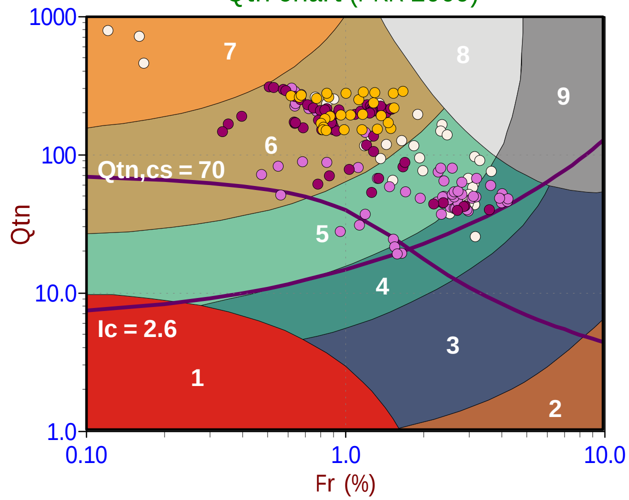
CONETEC

Aspect Consulting

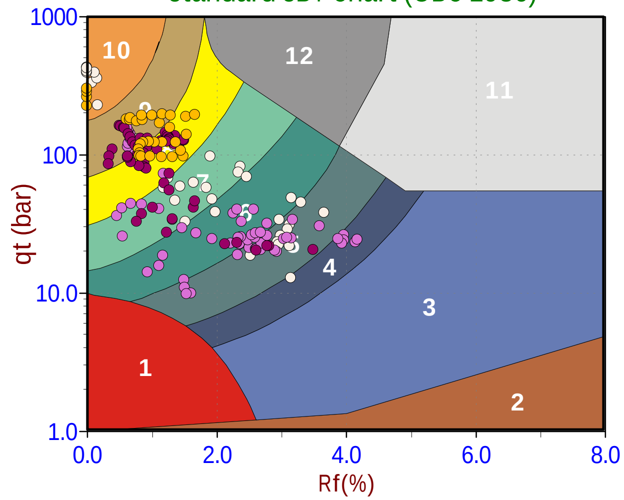
Job No: 20-59-21343
Date: 2019-09-23 10:31
Site: Grand Street Commons

Sounding: AC-CPT-06S
Cone: 536:T1500F15U500

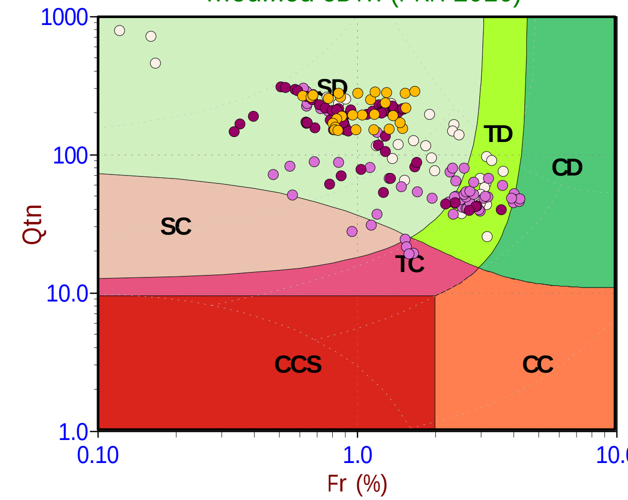
Qtn Chart (PKR 2009)



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

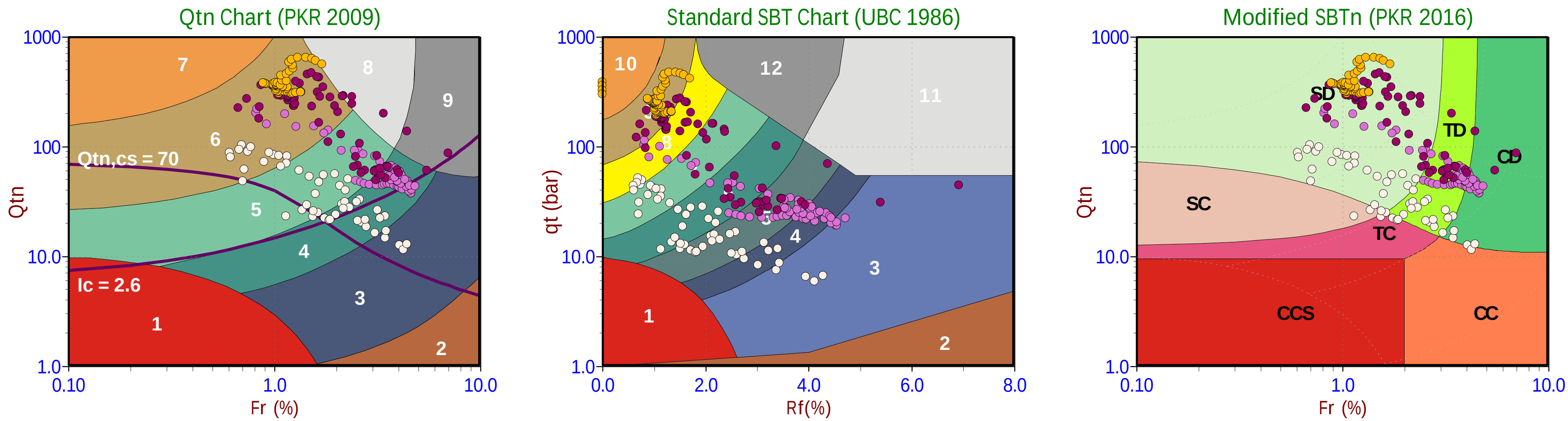
Legend

- 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)

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 07:15
Site: Grand Street Commons

Sounding: AC-CPT-07E
Cone: 661: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

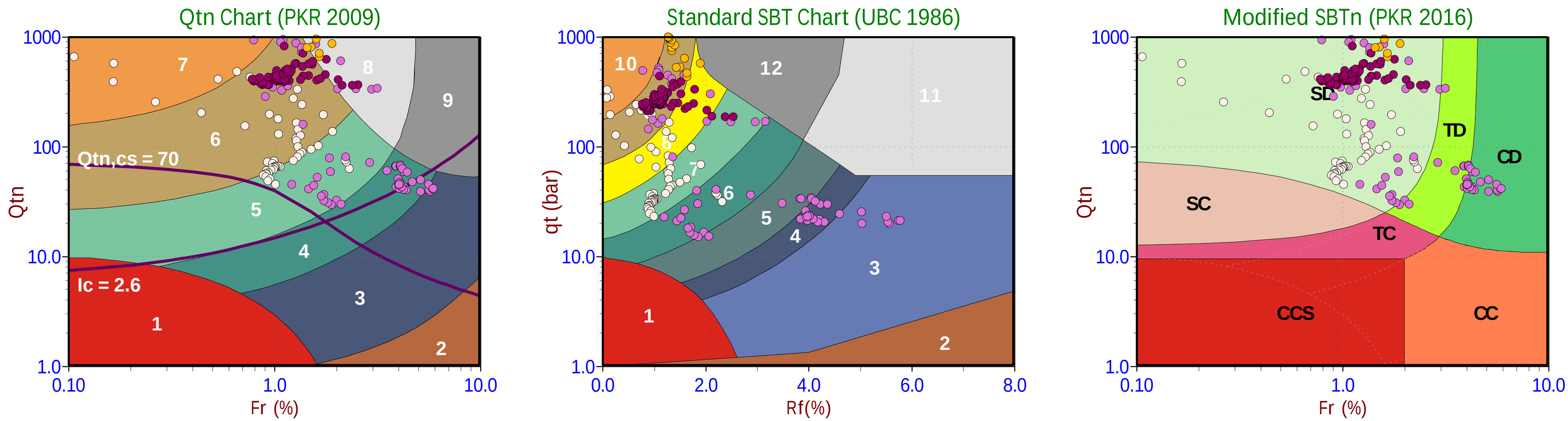
Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

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)

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 12:32
Site: Grand Street Commons
Sounding: AC-CPT-07S
Cone: 661: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)

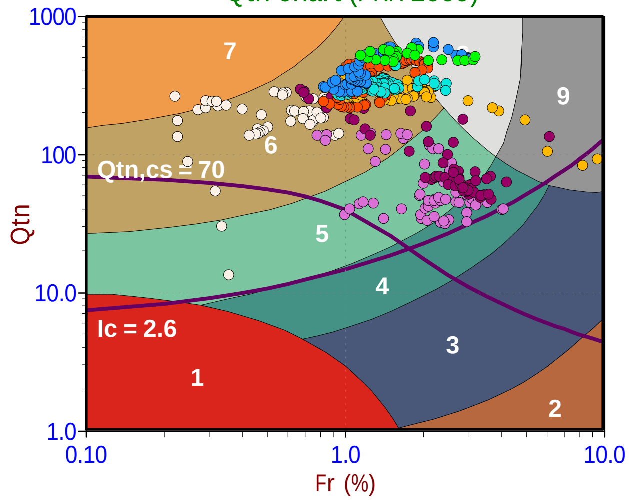
CONETEC

Aspect Consulting

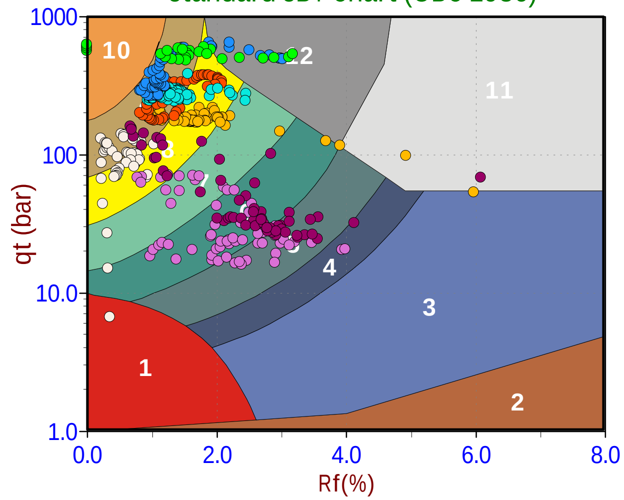
Job No: 20-59-21343
Date: 2020-09-14 07:46
Site: Grand Street Commons

Sounding: AC-CPT-08E
Cone: 661:T1500F15U35

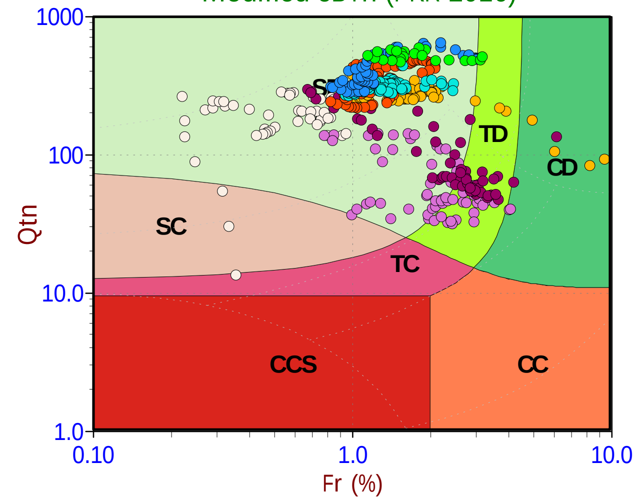
Qtn Chart (PKR 2009)



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)

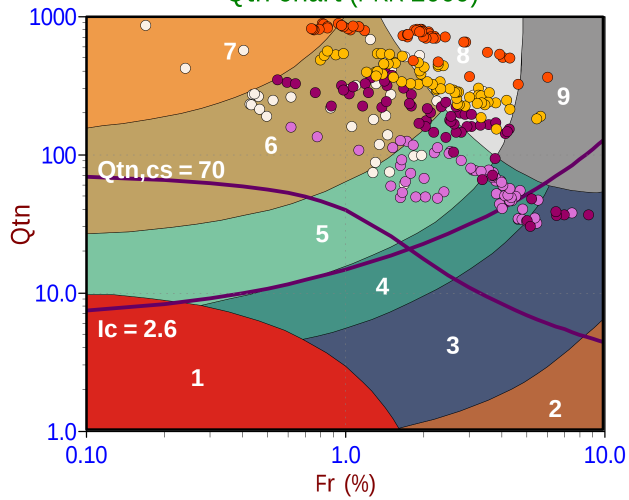
CONETEC

Aspect Consulting

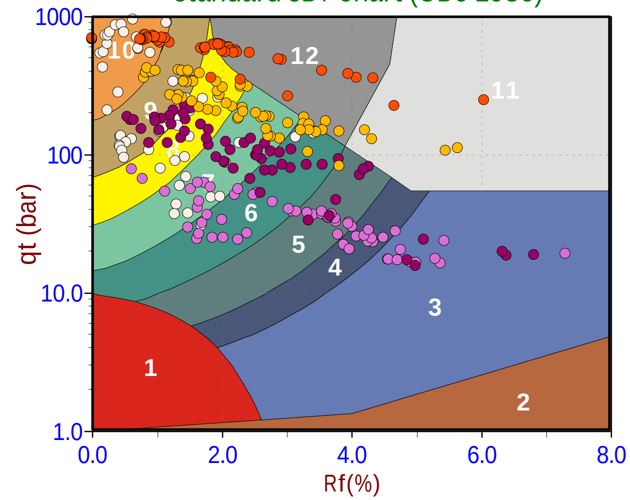
Job No: 20-59-21343
Date: 2020-09-11 09:15
Site: Grand Street Commons

Sounding: AC-CPT-08S
Cone: 661:T1500F15U35

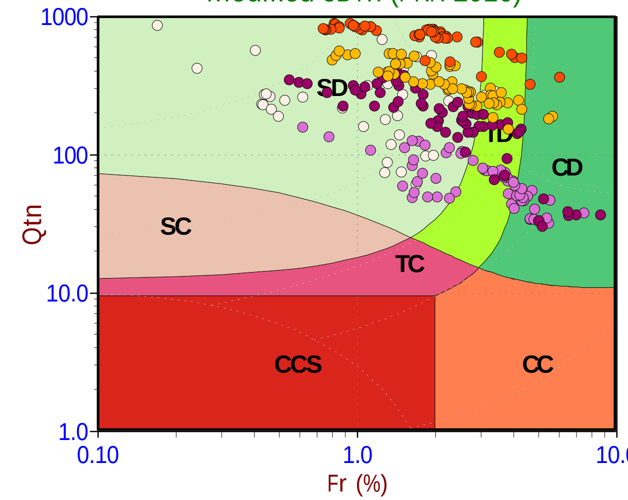
Qtn Chart (PKR 2009)



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)

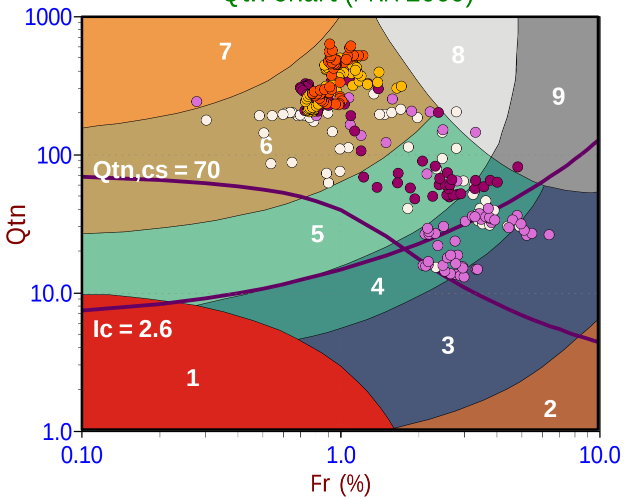
CONETEC

Aspect Consulting

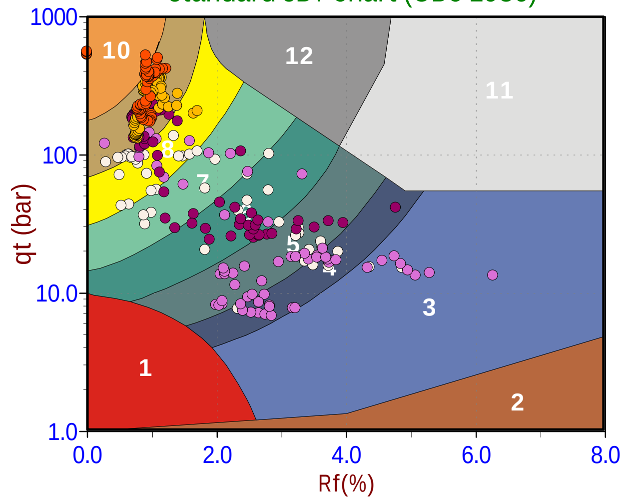
Job No: 20-59-21343
Date: 2019-09-24 12:54
Site: Grand Street Commons

Sounding: AC-CPT-09E
Cone: 595:T1500F15U500

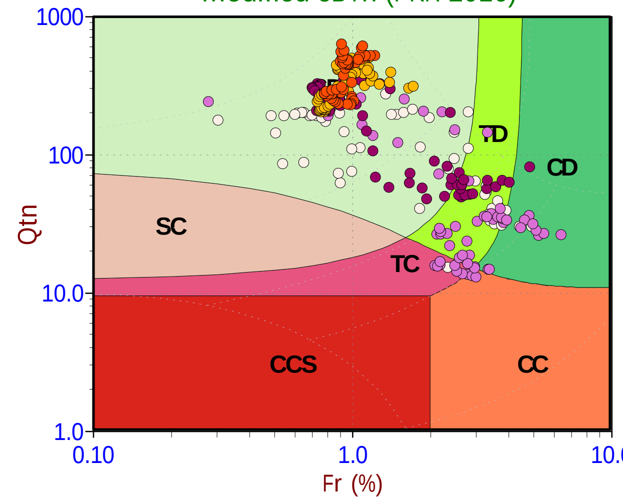
Qtn Chart (PKR 2009)



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)

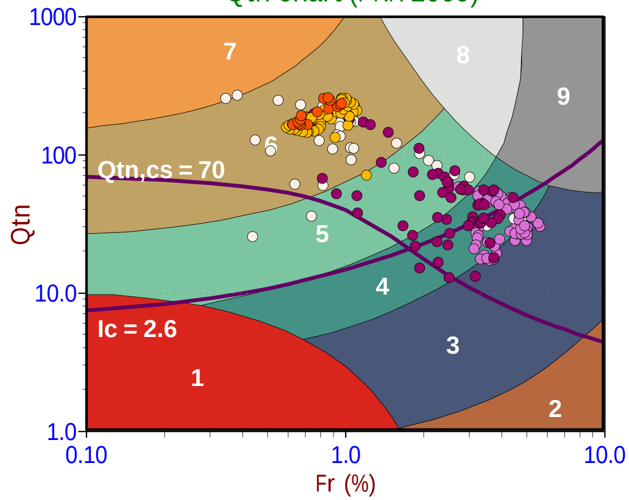
CONETEC

Aspect Consulting

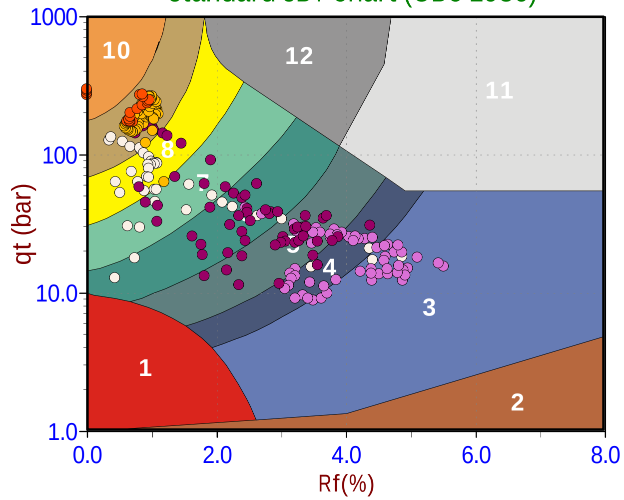
Job No: 20-59-21343
Date: 2019-09-23 11:20
Site: Grand Street Commons

Sounding: AC-CPT-09S
Cone: 536:T1500F15U500

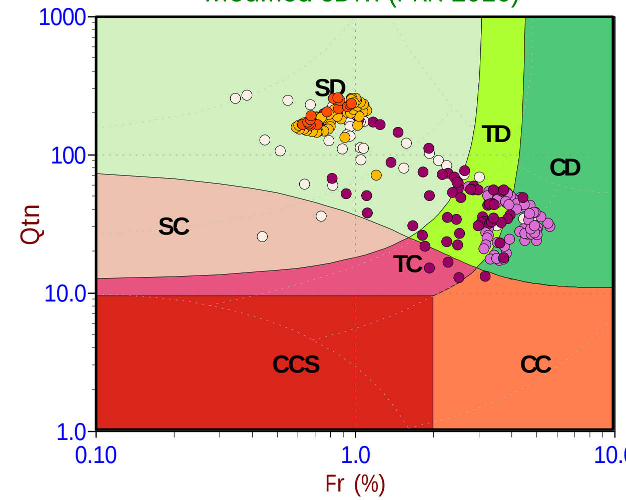
Qtn Chart (PKR 2009)



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

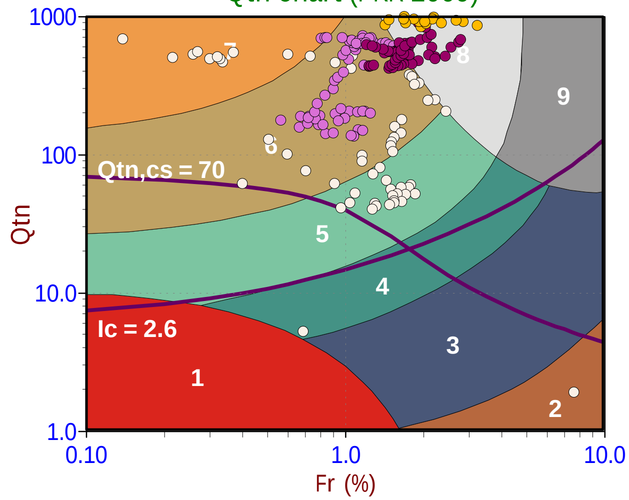
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

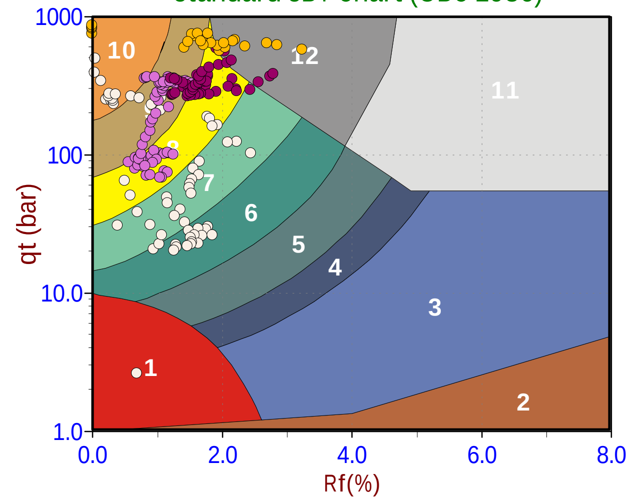
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 16:33
Site: Grand Street Commons
Sounding: AC-CPT-10E
Cone: 661:T1500F15U35

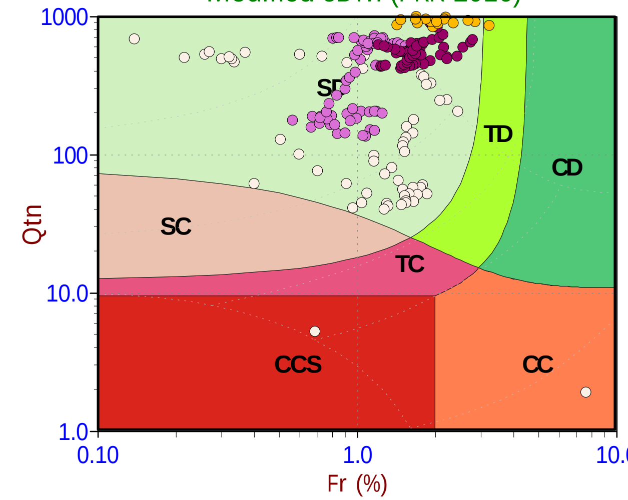
Qtn Chart (PKR 2009)



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)

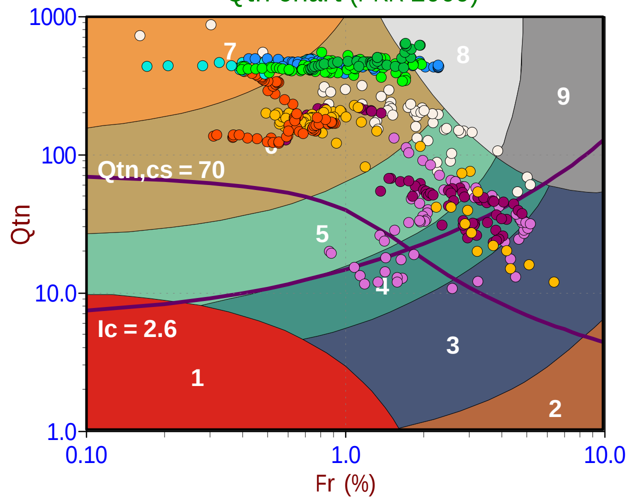
CONETEC

Aspect Consulting

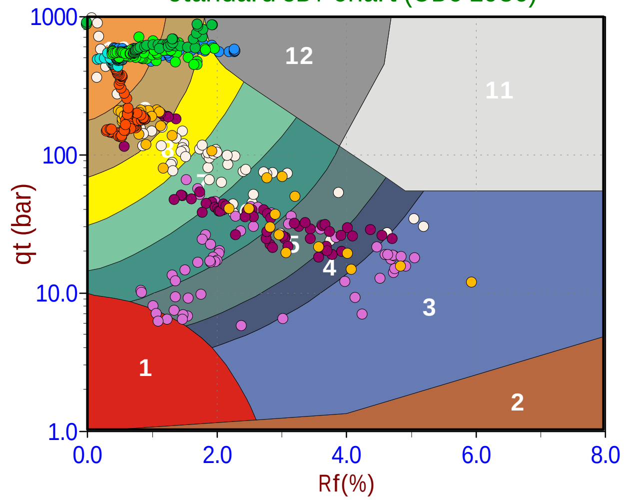
Job No: 20-59-21343
Date: 2020-09-11 13:53
Site: Grand Street Commons

Sounding: AC-CPT-10S
Cone: 661:T1500F15U35

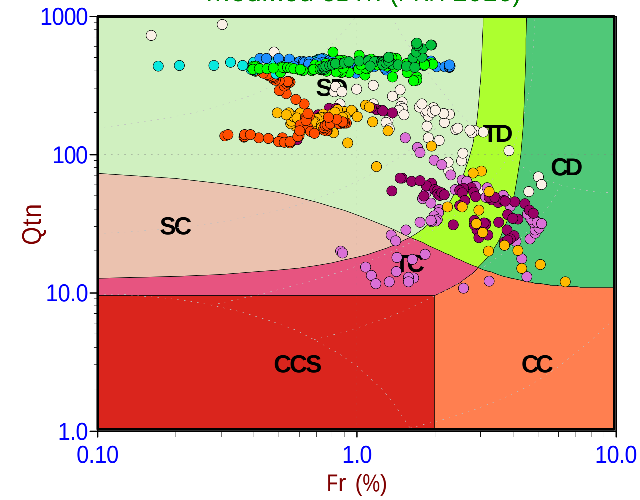
Qtn Chart (PKR 2009)



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

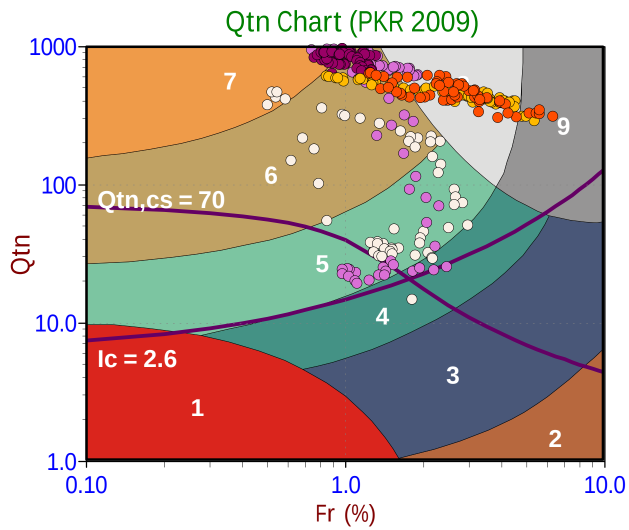
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

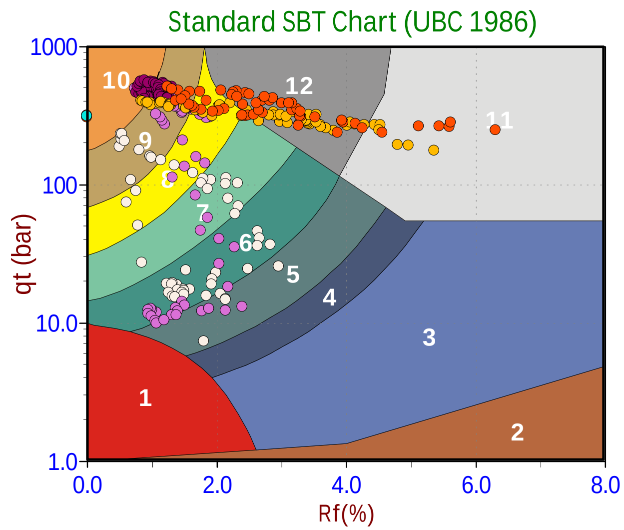
CONETEC

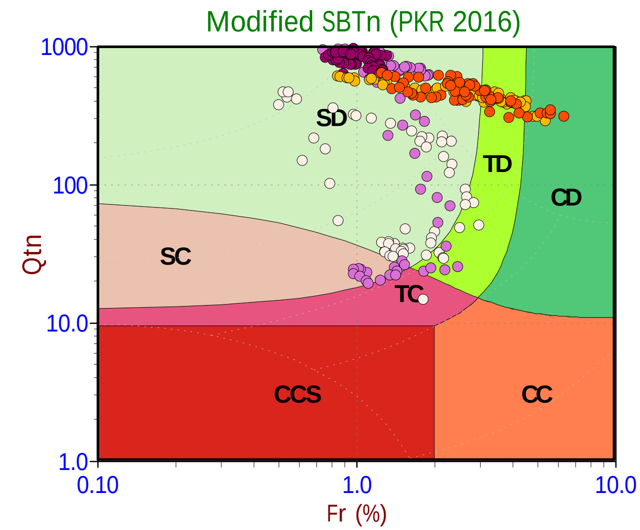
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 08:45
Site: Grand Street Commons

Sounding: AC-CPT-11E
Cone: 661: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

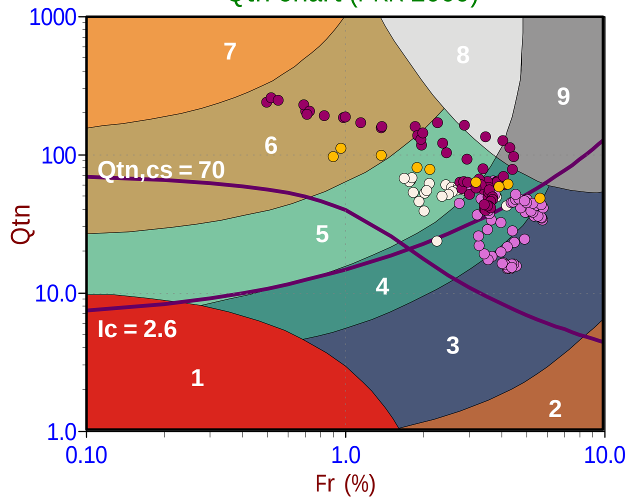
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Aspect Consulting

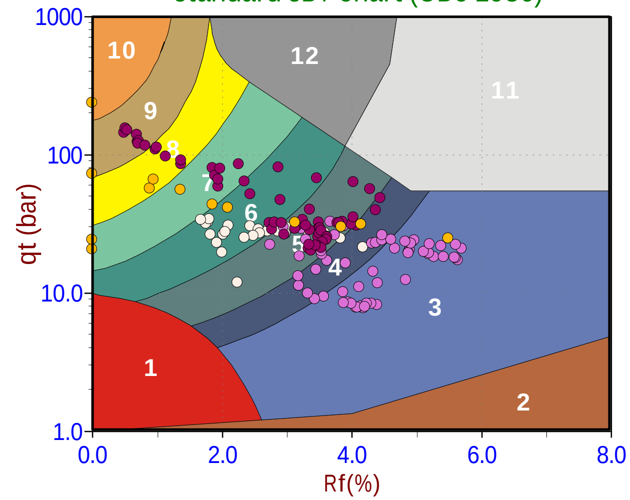
Job No: 20-59-21343
Date: 2019-09-23 14:56
Site: Grand Street Commons

Sounding: AC-CPT-11S
Cone: 536:T1500F15U500

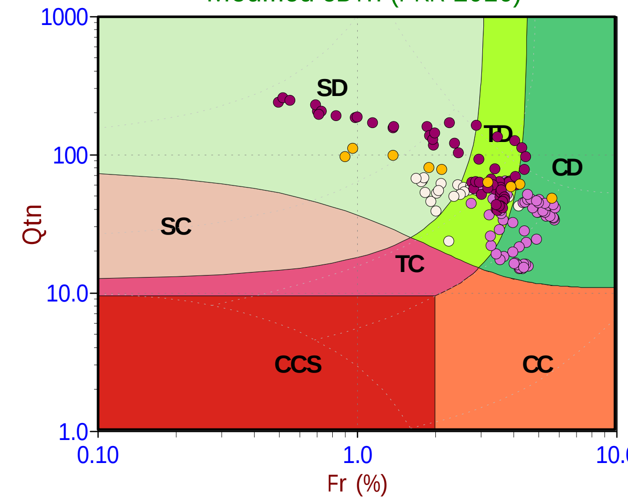
Qtn Chart (PKR 2009)



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

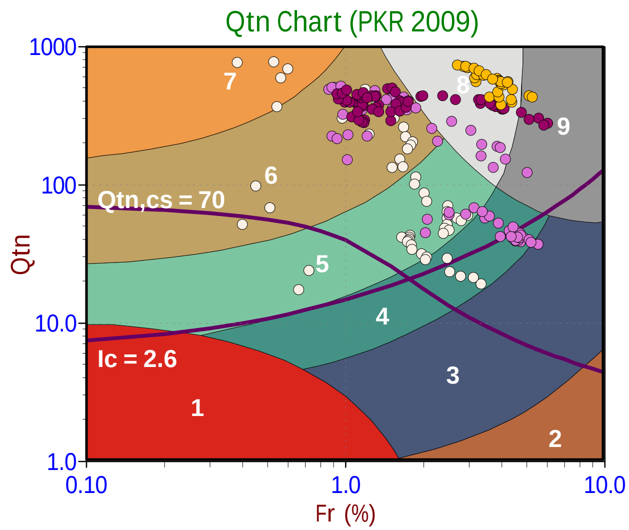
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

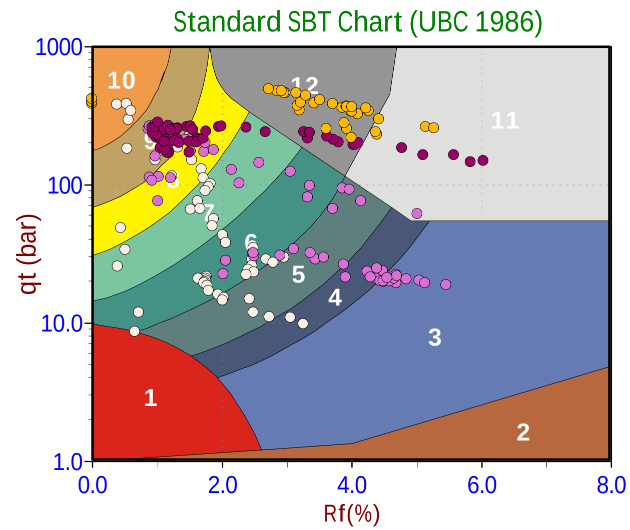
Legend

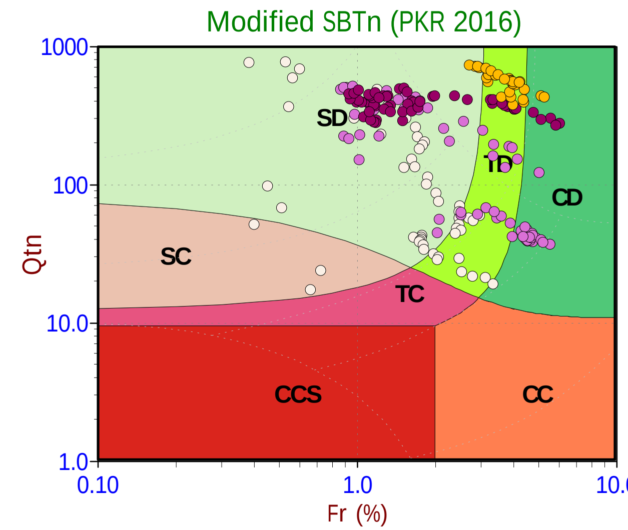
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 09:55
Site: Grand Street Commons
Sounding: AC-CPT-12E
Cone: 661: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)

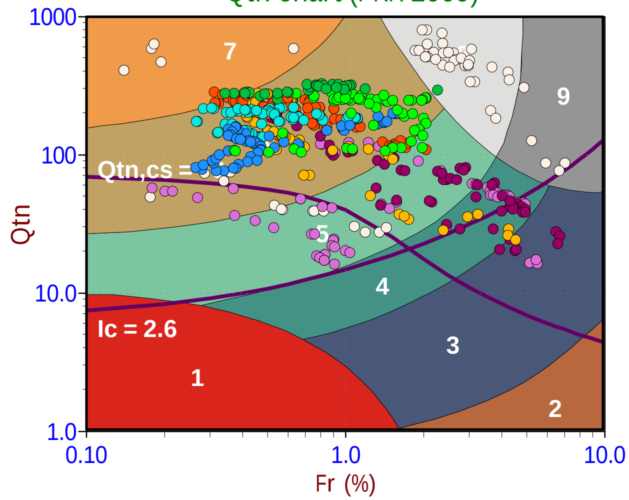
CONETEC

Aspect Consulting

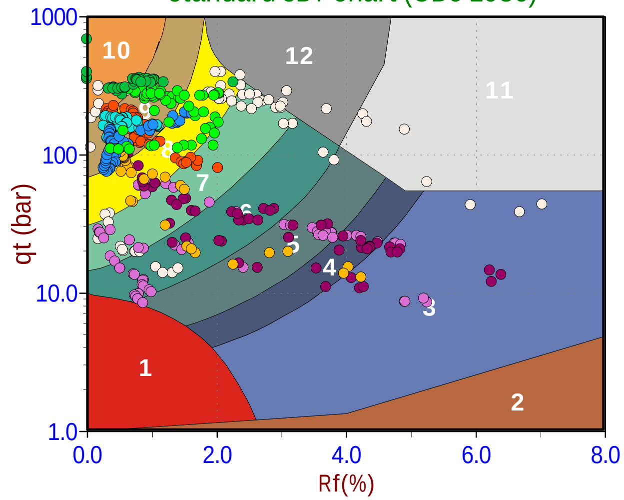
Job No: 20-59-21343
Date: 2020-09-10 13:46
Site: Grand Street Commons

Sounding: AC-CPT-12S
Cone: 661:T1500F15U35

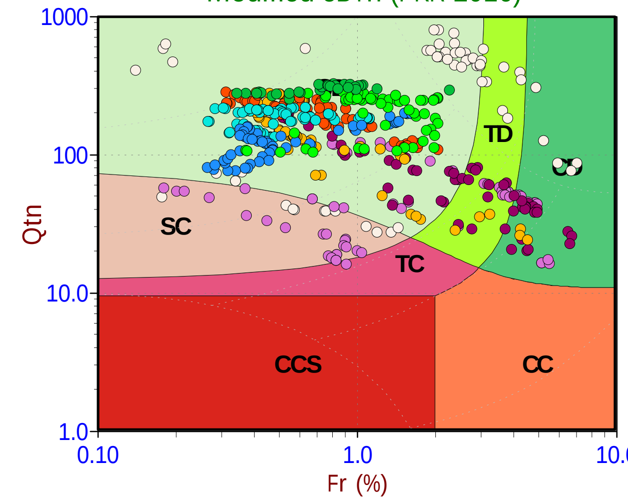
Qtn Chart (PKR 2009)



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

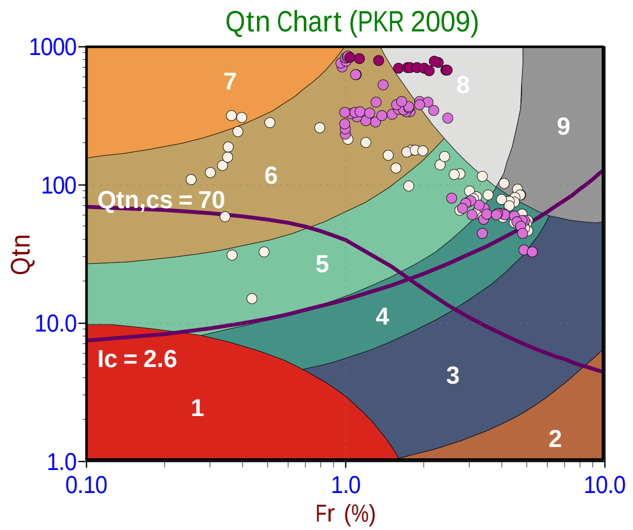
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

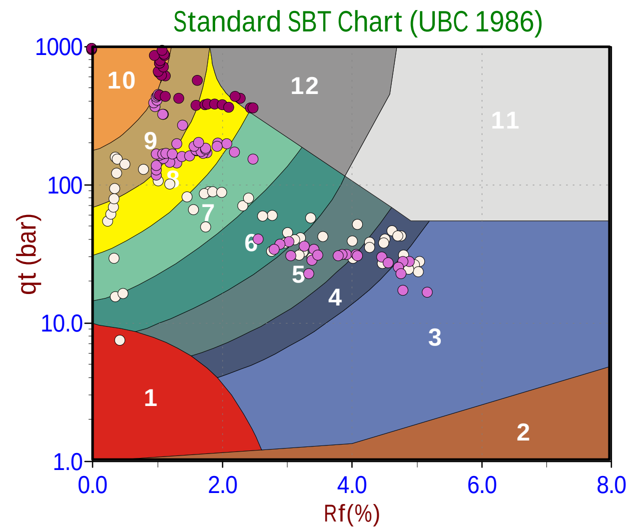
CONETEC

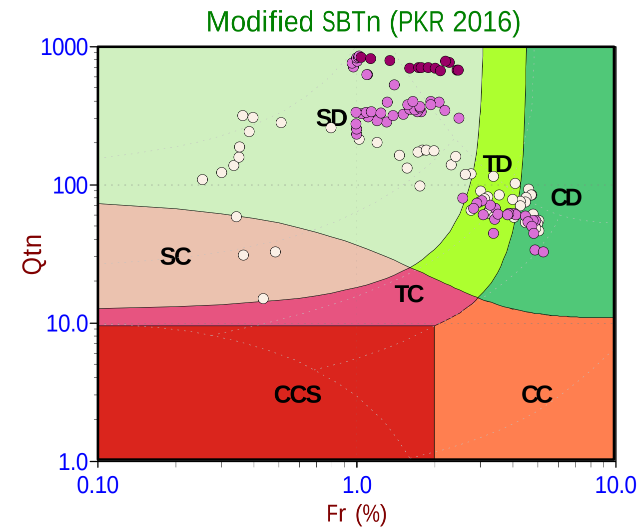
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-14 09:29
Site: Grand Street Commons

Sounding: AC-CPT-13E
Cone: 661: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

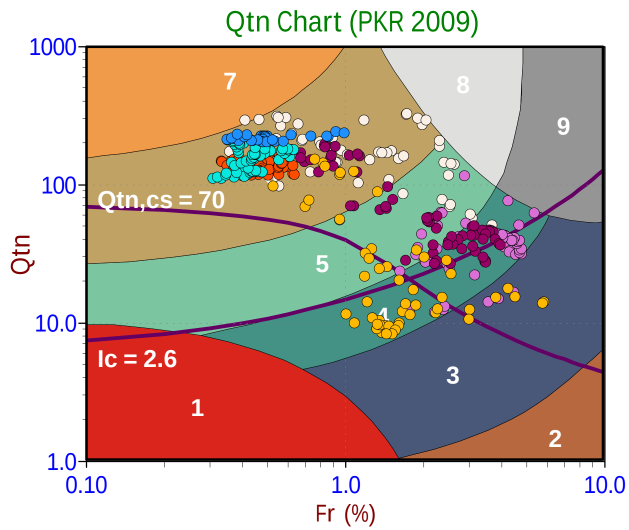
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

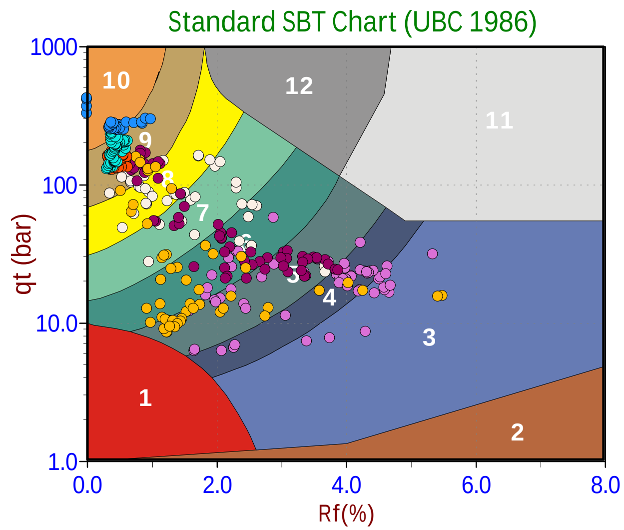
CONETEC

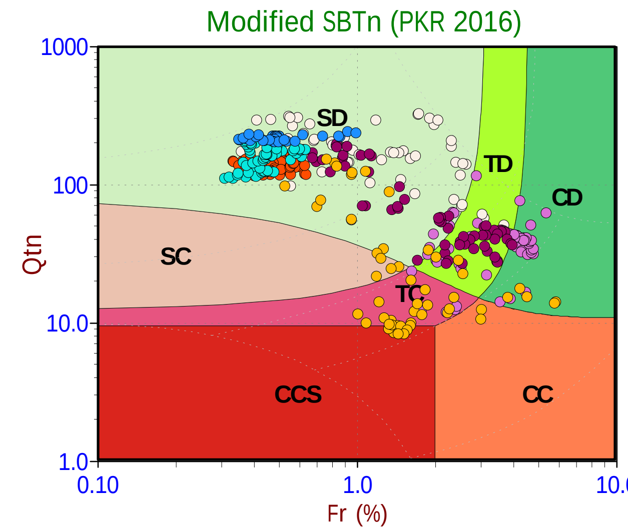
Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-24 15:17
Site: Grand Street Commons

Sounding: AC-CPT-13S
Cone: 595:T1500F15U500







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)

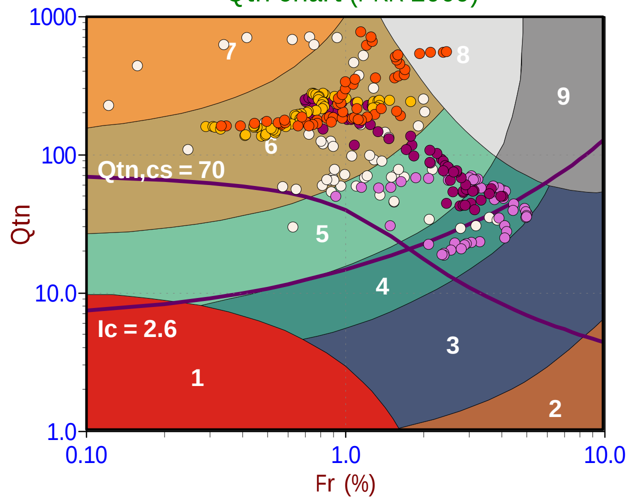
CONETEC

Aspect Consulting

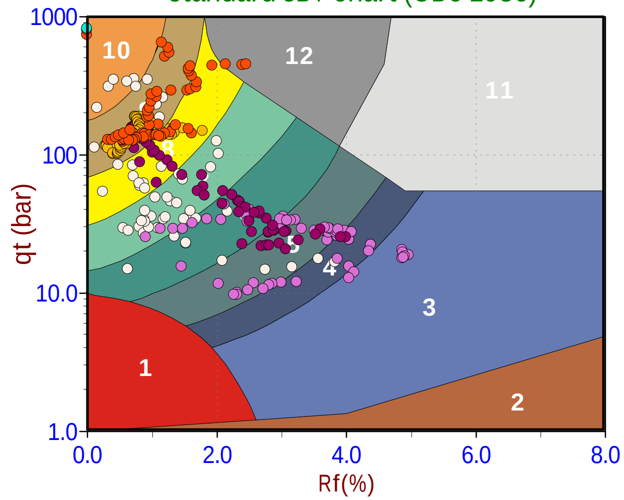
Job No: 20-59-21343
Date: 2020-09-11 16:06
Site: Grand Street Commons

Sounding: AC-CPT-14S
Cone: 661:T1500F15U35

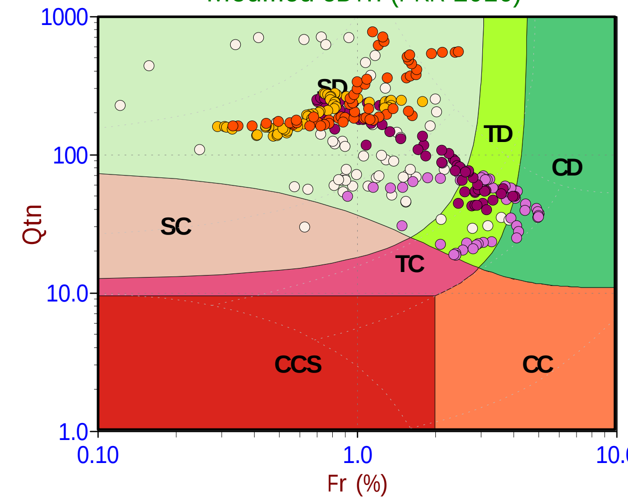
Qtn Chart (PKR 2009)



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

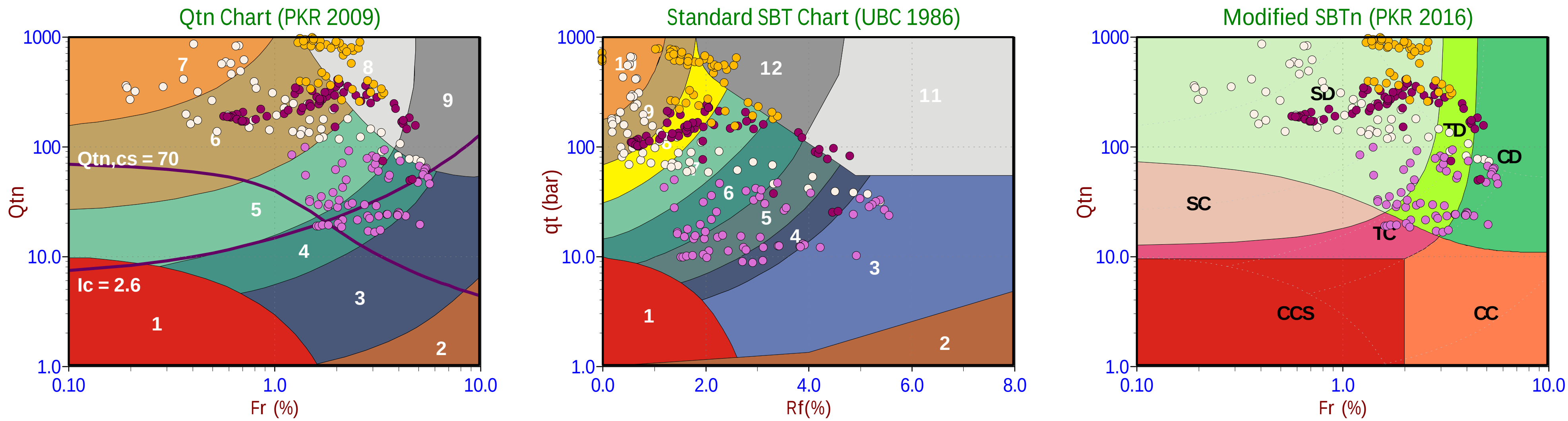
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 13:09
Site: Grand Street Commons

Sounding: AC-CPT-15S
Cone: 661: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)

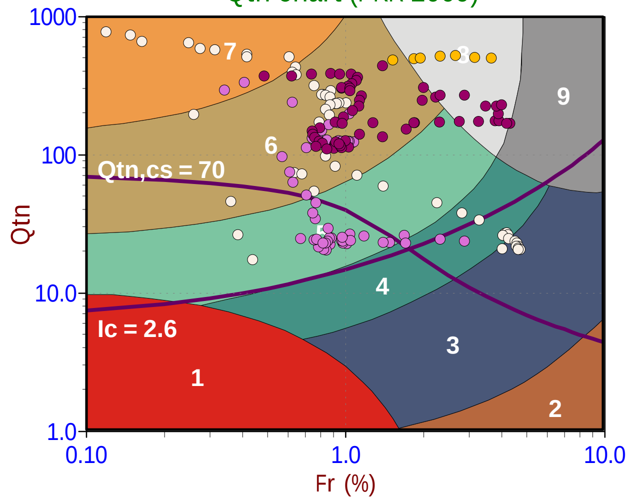
CONETEC

Aspect Consulting

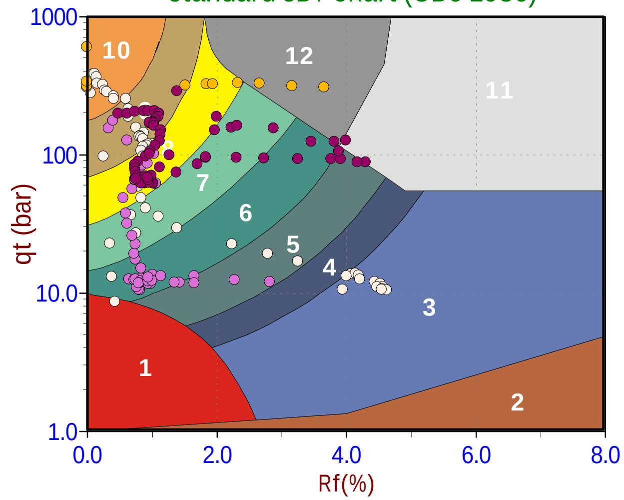
Job No: 20-59-21343
Date: 2020-09-10 15:04
Site: Grand Street Commons

Sounding: AC-CPT-16S
Cone: 661:T1500F15U35

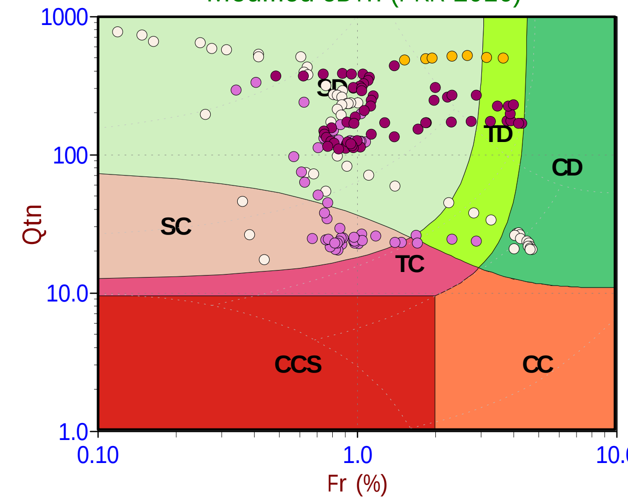
Qtn Chart (PKR 2009)



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

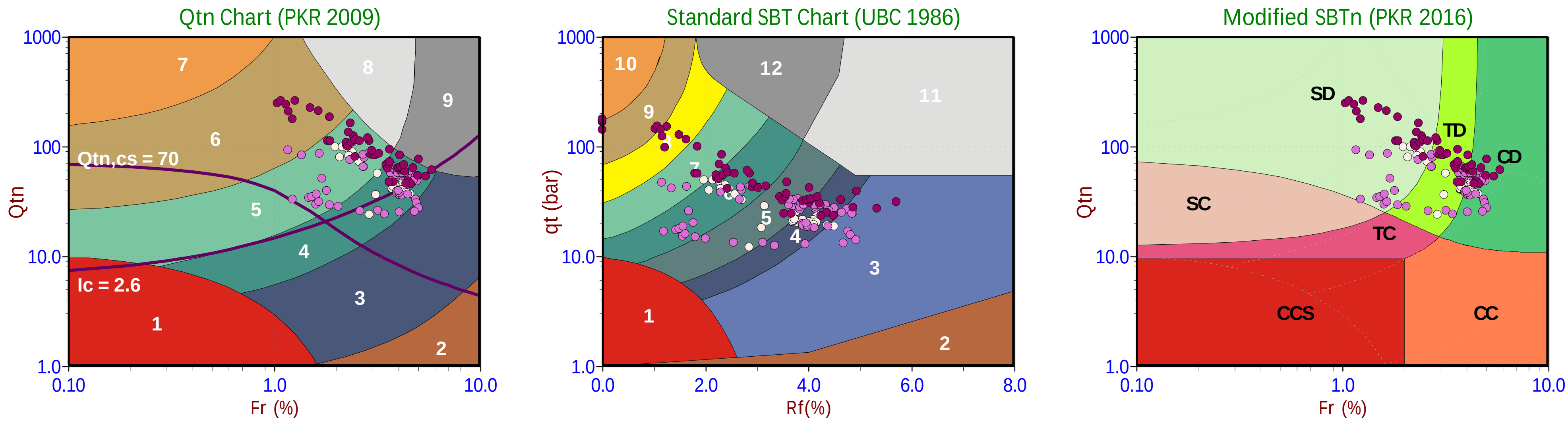
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 13:11
Site: Grand Street Commons

Sounding: AC-CPT-17S
Cone: 536:T1500F15U500



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

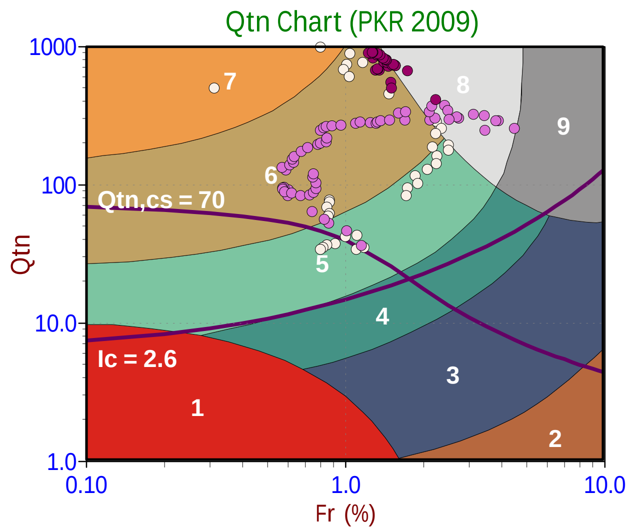
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

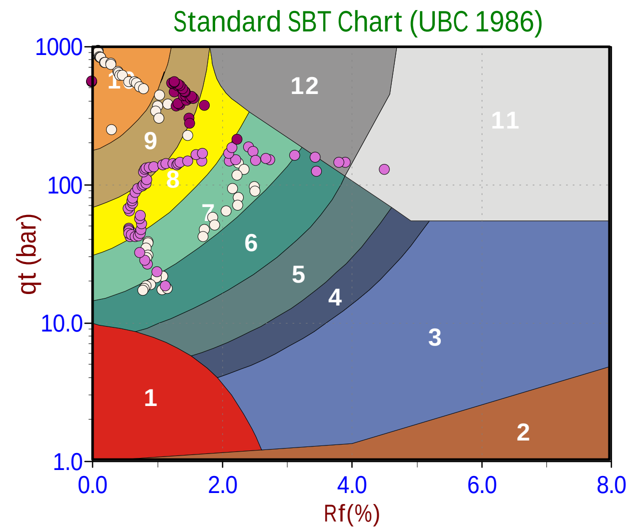
CONETEC

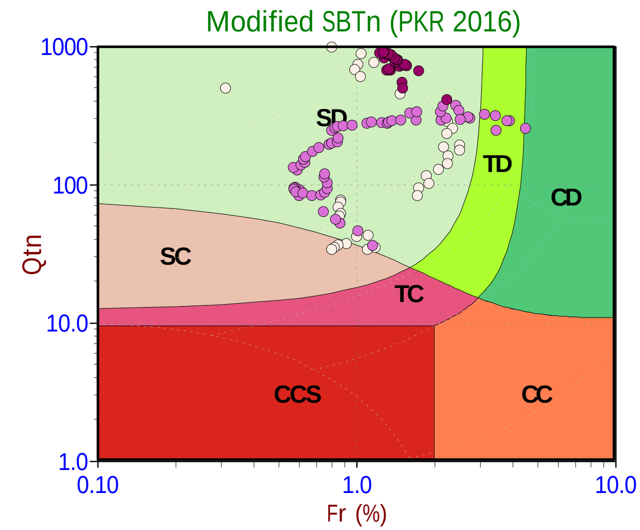
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-11 08:14
Site: Grand Street Commons

Sounding: AC-CPT-18S
Cone: 661: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)

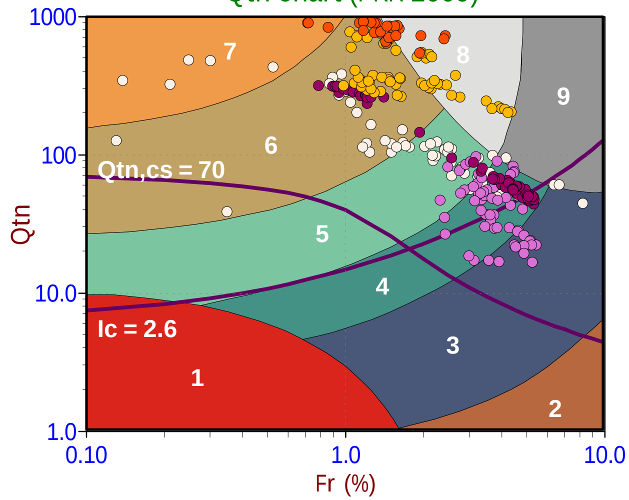
CONETEC

Aspect Consulting

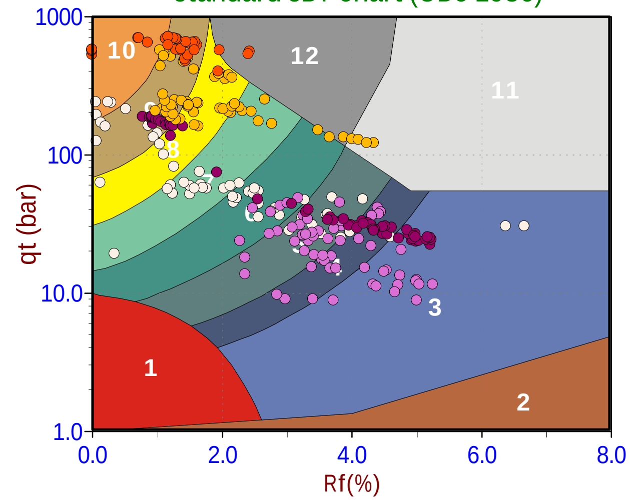
Job No: 20-59-21343
Date: 2020-09-11 15:20
Site: Grand Street Commons

Sounding: AC-CPT-19S
Cone: 661:T1500F15U35

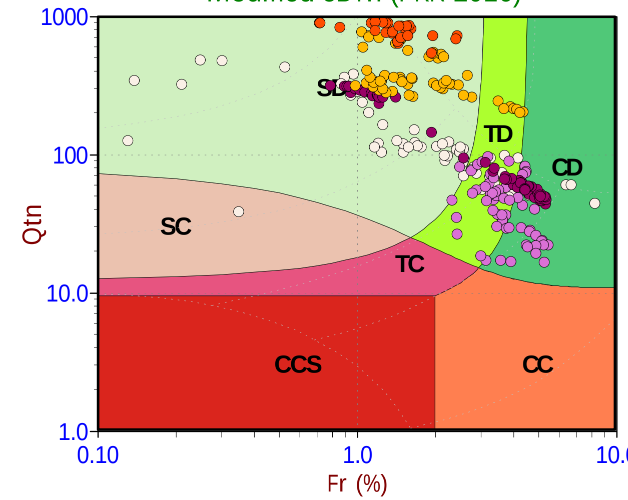
Qtn Chart (PKR 2009)



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

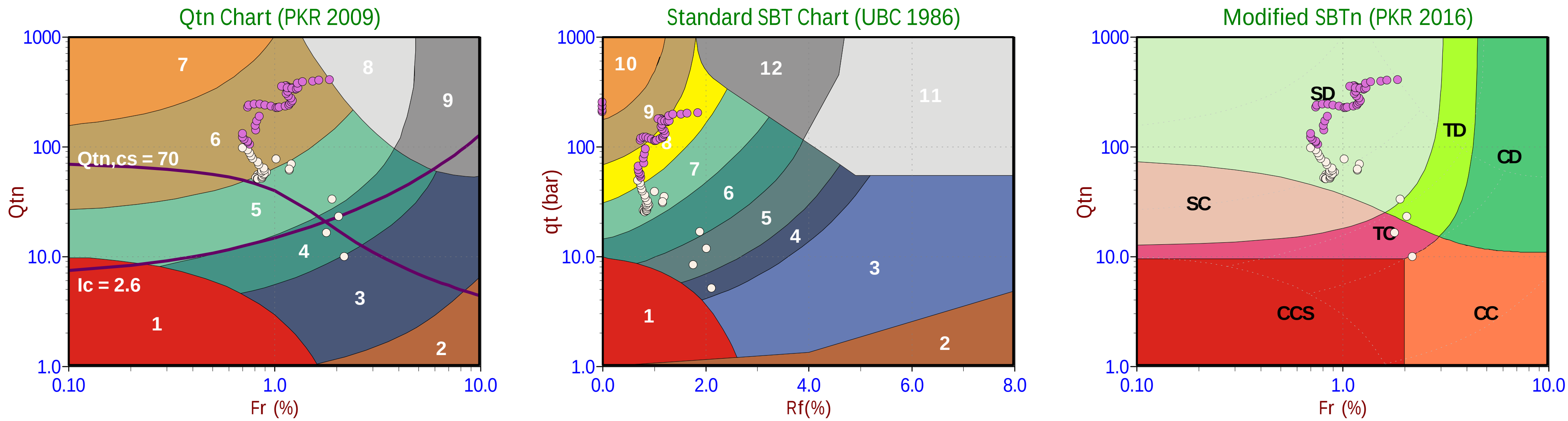
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2019-09-23 12:10
Site: Grand Street Commons

Sounding: AC-CPT-20S
Cone: 536:T1500F15U500



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

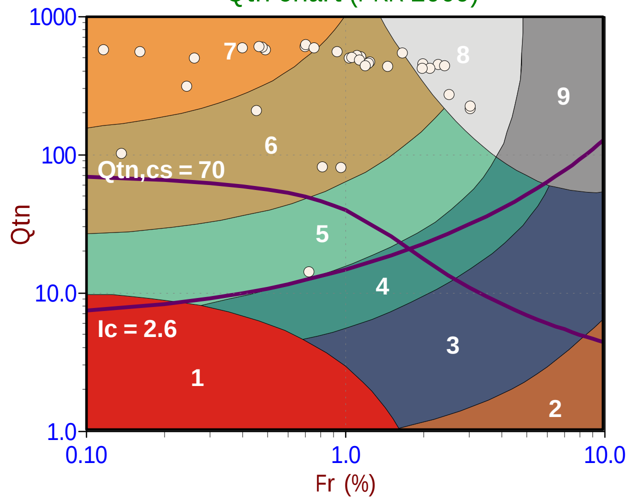
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

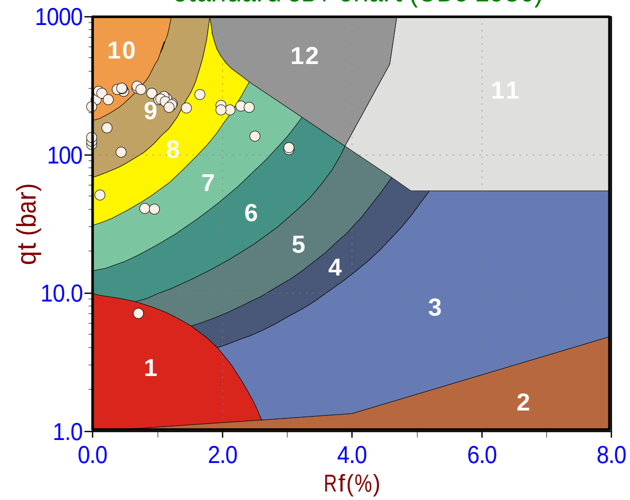
Aspect Consulting

Job No: 20-59-21343
Date: 2020-09-10 15:51
Site: Grand Street Commons
Sounding: AC-CPT-21S
Cone: 661:T1500F15U35

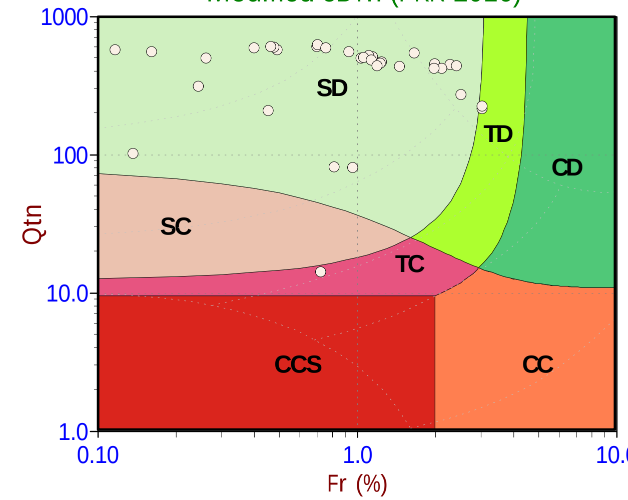
Qtn Chart (PKR 2009)



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

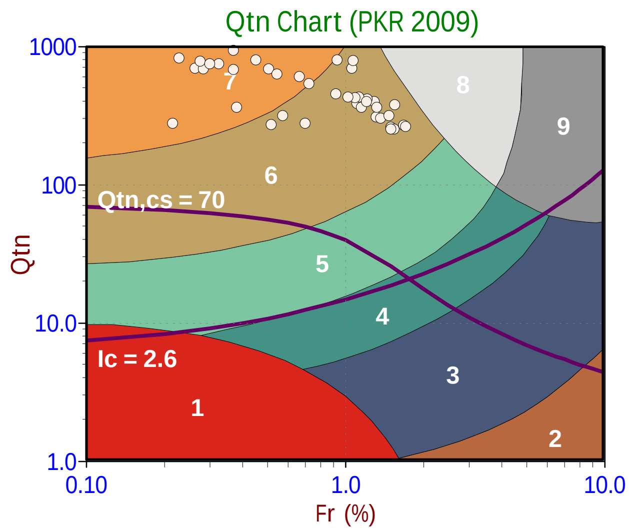
Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

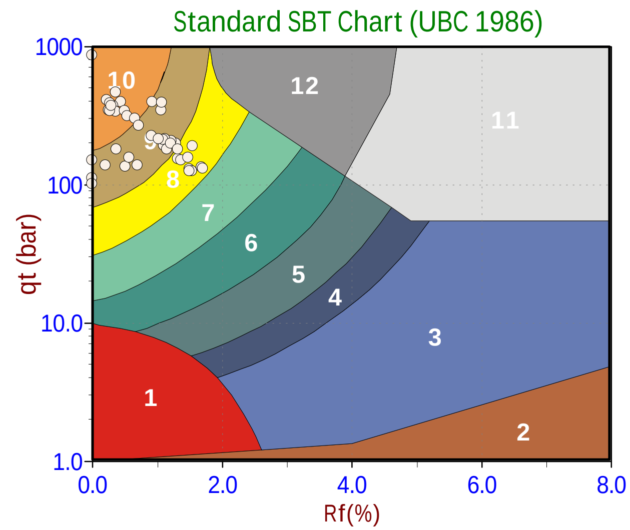
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

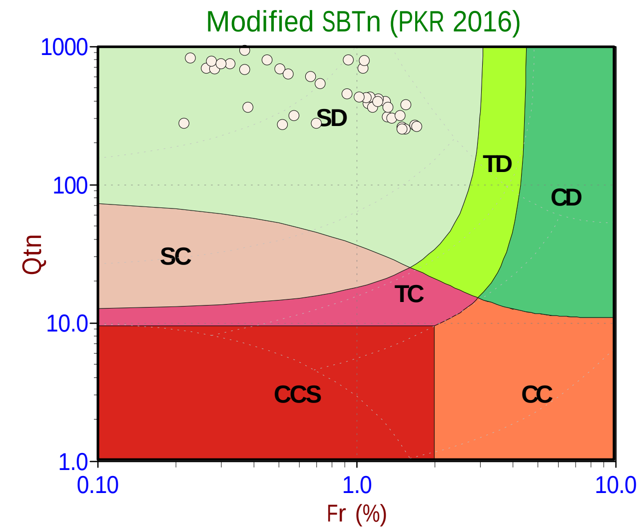
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Job No: 20-59-21343
Date: 2020-09-10 16:09
Site: Grand Street Commons
Sounding: AC-CPT-21BS
Cone: 661:T1500F15U35

Aspect Consulting







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:	20-59-21343
	Client:	Aspect Consulting
	Project:	Grand Street Commons
	Start Date:	10-Sep-2020
	End Date:	14-Sep-2020

CPTu PORE PRESSURE DISSIPATION SUMMARY

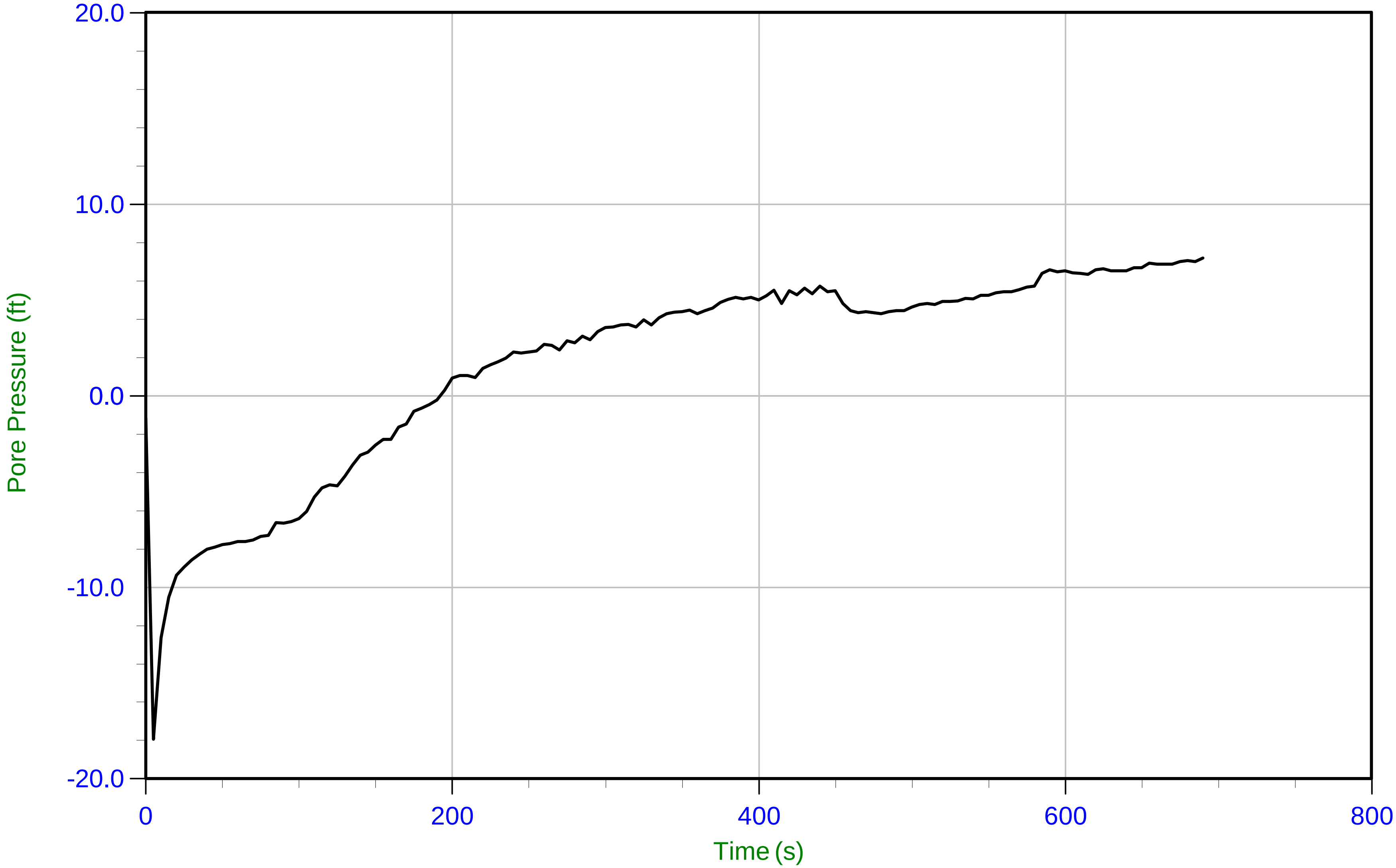
Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)
AC-CPT-01BS	20-59-21343_CP01BS.PPD	15	480	5.7		
AC-CPT-01E	20-59-21343_CP01E.PPD	15	690	33.5		
AC-CPT-06E	20-59-21343_CP06E.PPD	15	470	16.6		
AC-CPT-08E	20-59-21343_CP08E.PPD	15	300	14.9		
AC-CPT-08S	20-59-21343_CP08S.PPD	15	2000	24.6	5.9	18.7
AC-CPT-09S	20-59-21343_CP09S.PPD	15	385	21.5	3.1	18.4
AC-CPT-10S	20-59-21343_CP10S.PPD	15	1220	16.6		
AC-CPT-10S	20-59-21343_CP10S.PPD	15	1020	32.4	14.0	18.4
AC-CPT-11E	20-59-21343_CP11E.PPD	15	370	23.2		
AC-CPT-11S	20-59-21343_CP11S.PPD	15	370	16.0		
AC-CPT-12E	20-59-21343_CP12E.PPD	15	920	8.0		
AC-CPT-12E	20-59-21343_CP12E.PPD	15	335	13.1		
AC-CPT-12S	20-59-21343_CP12S.PPD	15	600	26.5	7.0	19.5
AC-CPT-12S	20-59-21343_CP12S.PPD	15	200	42.9	21.7	21.2
AC-CPT-13S	20-59-21343_CP13S.PPD	15	300	33.4	13.5	19.9
AC-CPT-14S	20-59-21343_CP14S.PPD	15	1490	23.5		
AC-CPT-17S	20-59-21343_CP17S.PPD	15	435	14.3		
AC-CPT-19S	20-59-21343_CP19S.PPD	15	295	22.0		
Total Duration			198.0 min			

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/14/2020 13:29
Site: Grand Street Commons

Sounding: AC-CPT-01E
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP01E.PPD
Depth: 10.200 m / 33.464 ft
Duration: 690.0 s

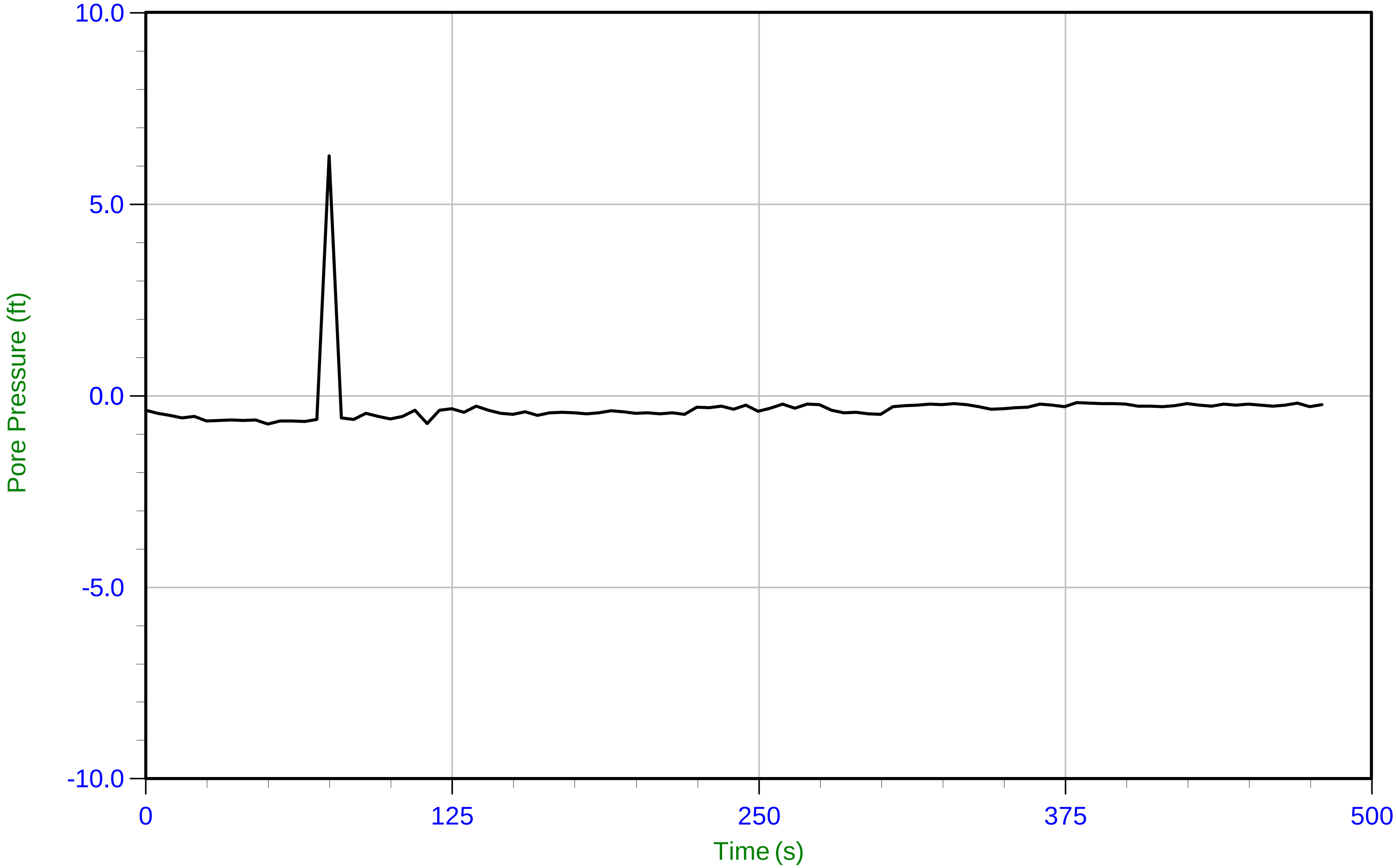
U Min: -17.9 ft
U Max: 7.2 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/23/2019 08:18
Site: Grand St. Commons

Sounding: AC-CPT-01BS
Cone: 536:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP01BS.PPD
Depth: 1.750 m / 5.741 ft
Duration: 480.0 s

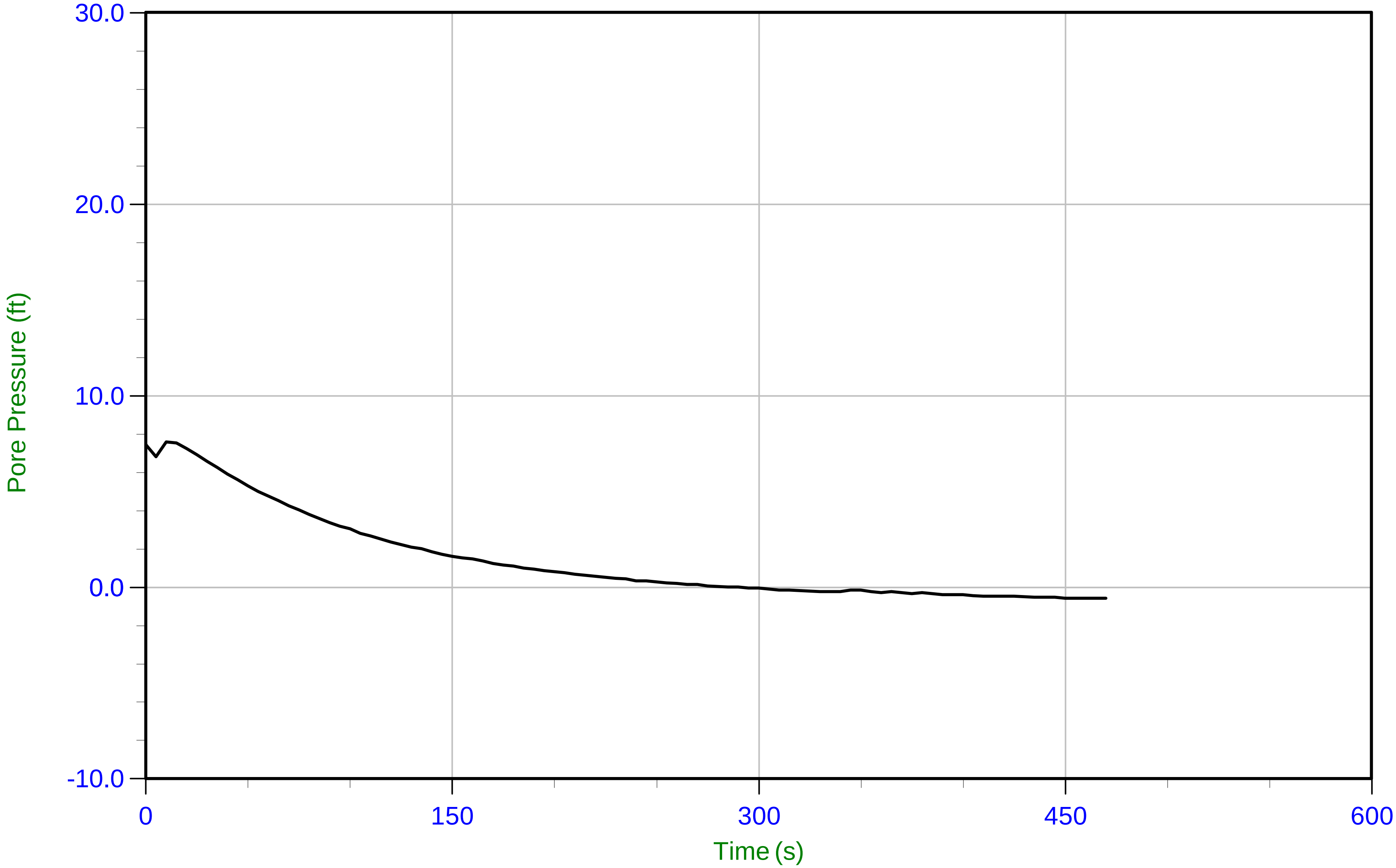
U Min: -0.7 ft
U Max: 6.3 ft

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 09/14/2020 10:47
Site: Grand Street Commons

Sounding: AC-CPT-06E
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP06E.PPD
Depth: 5.050 m / 16.568 ft
Duration: 470.0 s

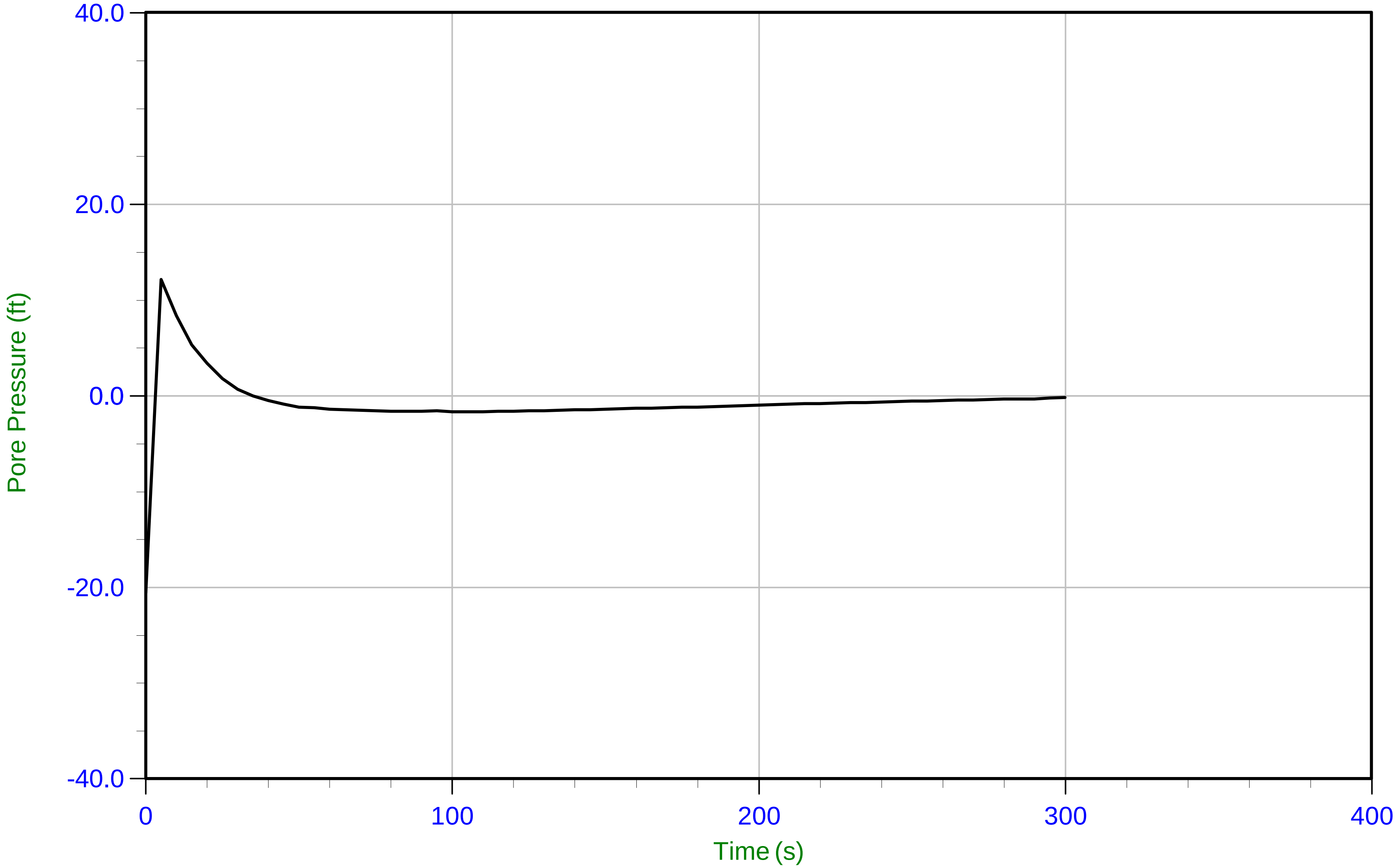
U Min: -0.6 ft
U Max: 7.6 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/14/2020 07:46
Site: Grand Street Commons

Sounding: AC-CPT-08E
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP08E.PPD
Depth: 4.550 m / 14.928 ft
Duration: 300.0 s

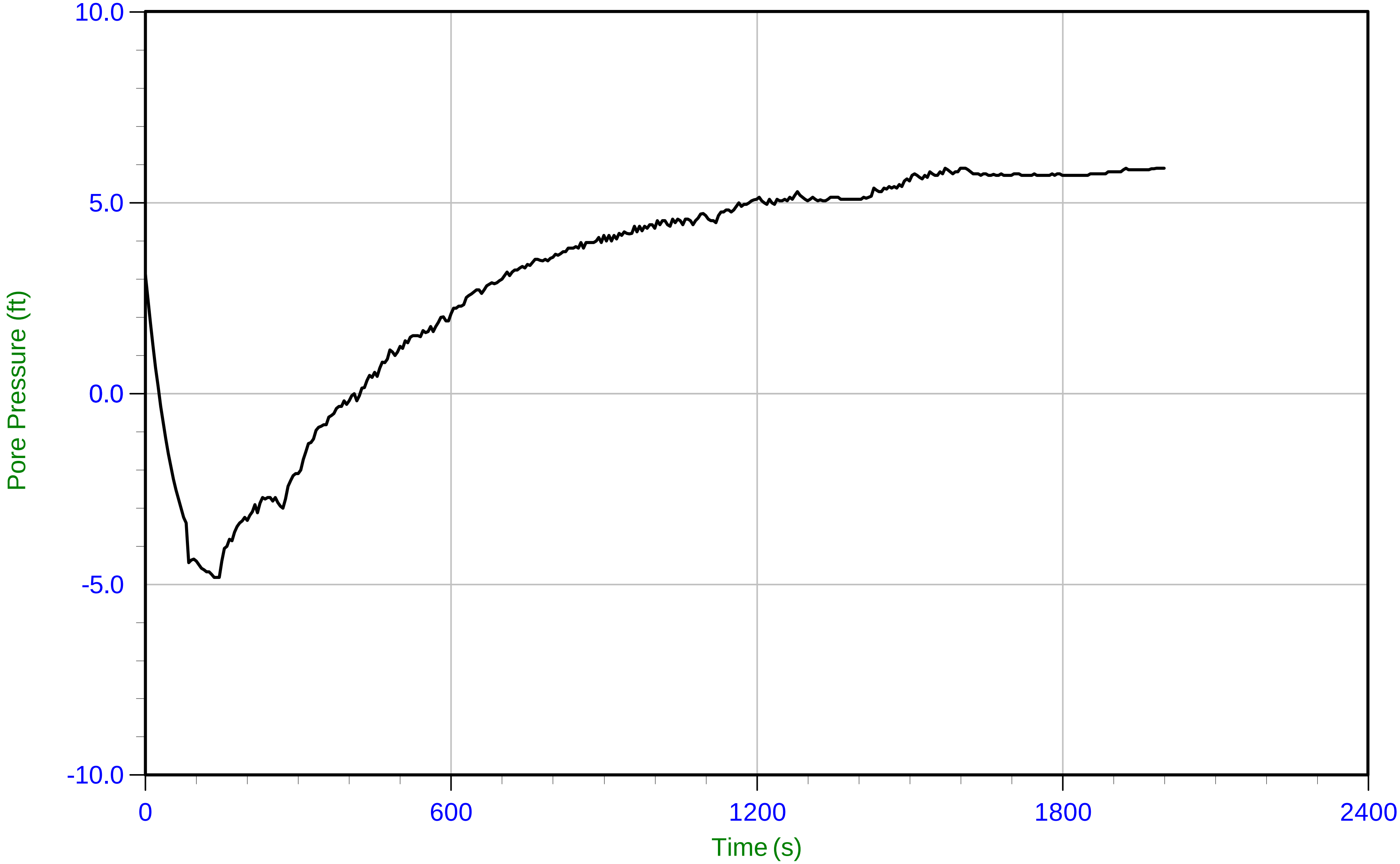
U Min: -20.6 ft
U Max: 12.1 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/11/2020 09:15
Site: Grand Street Commons

Sounding: AC-CPT-08S
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

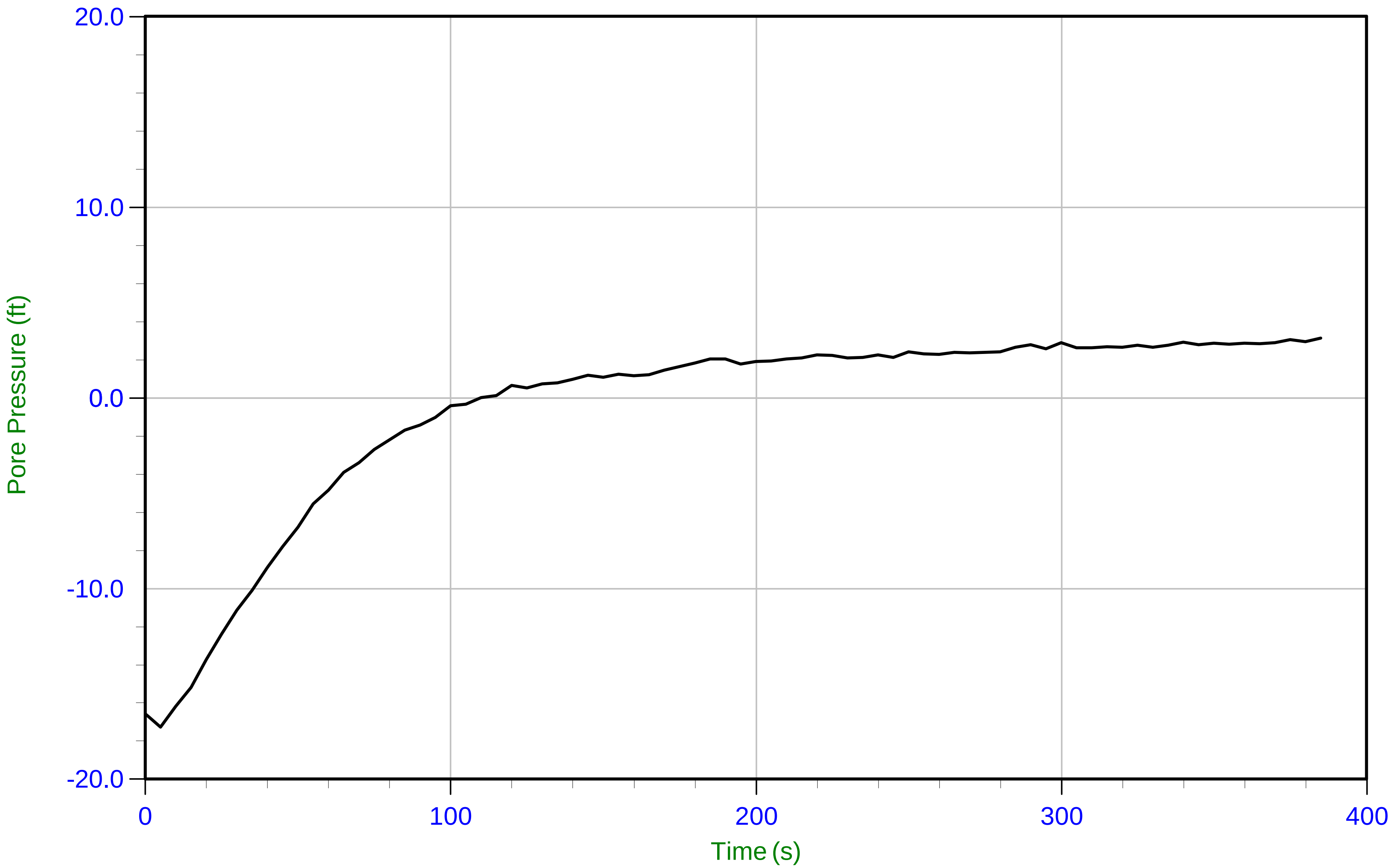
Filename: 20-59-21343_CP08S.PPD
Depth: 7.500 m / 24.606 ft
Duration: 2000.0 s

U Min: -4.8 ft
U Max: 5.9 ft

WT: 5.707 m / 18.725 ft
Ueq: 5.9 ft

Job No: 20-59-21343
Date: 09/23/2019 11:20
Site: Grand St. Commons

Sounding: AC-CPT-09S
Cone: 536:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP09S.PPD
Depth: 6.550 m / 21.489 ft
Duration: 385.0 s

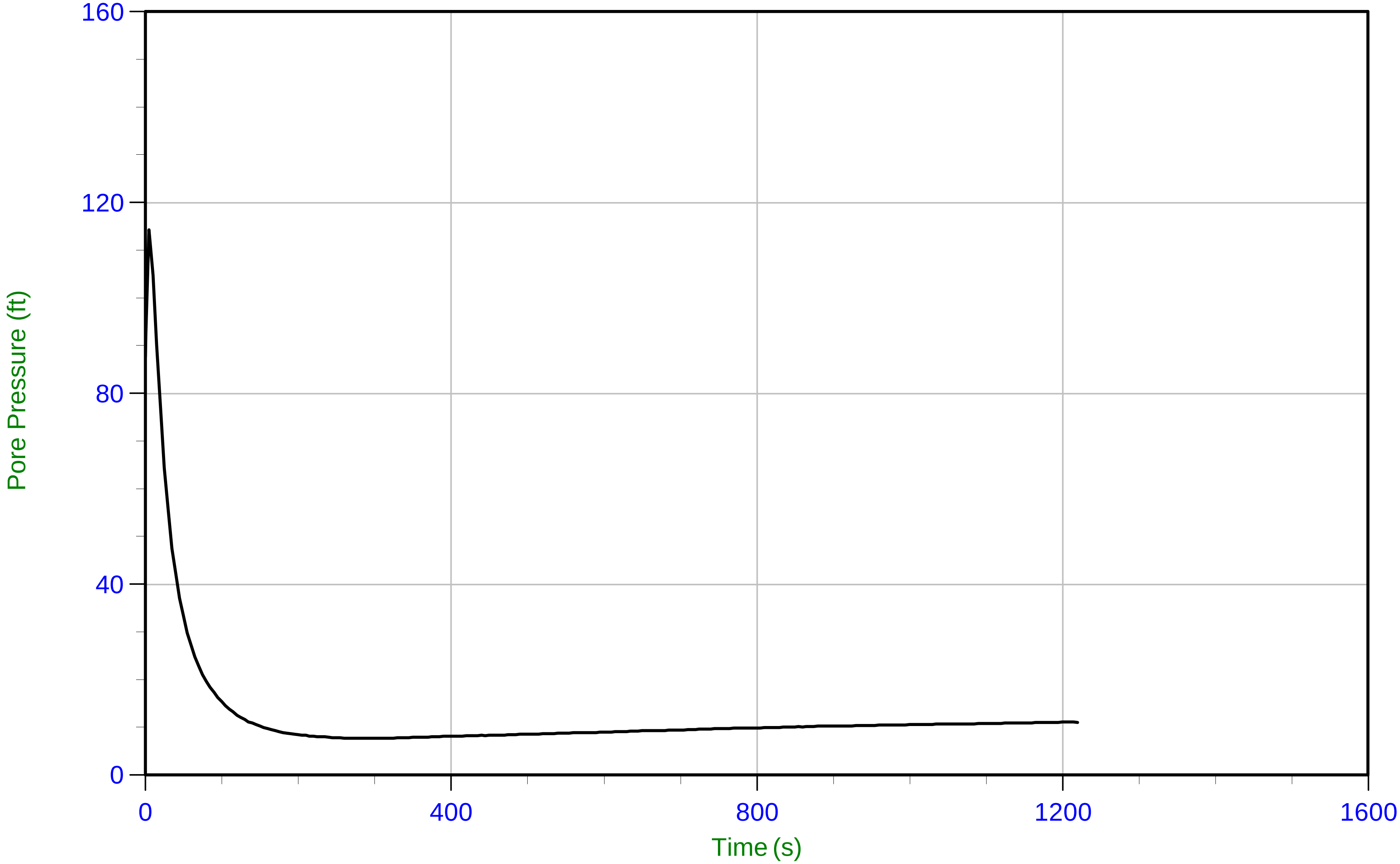
U Min: -17.3 ft
U Max: 3.1 ft

WT: 5.605 m / 18.389 ft
Ueq: 3.1 ft

Aspect Consulting

Job No: 20-59-21343
Date: 09/11/2020 13:53
Site: Grand Street Commons

Sounding: AC-CPT-10S
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP10S.PPD
Depth: 5.050 m / 16.568 ft
Duration: 1220.0 s

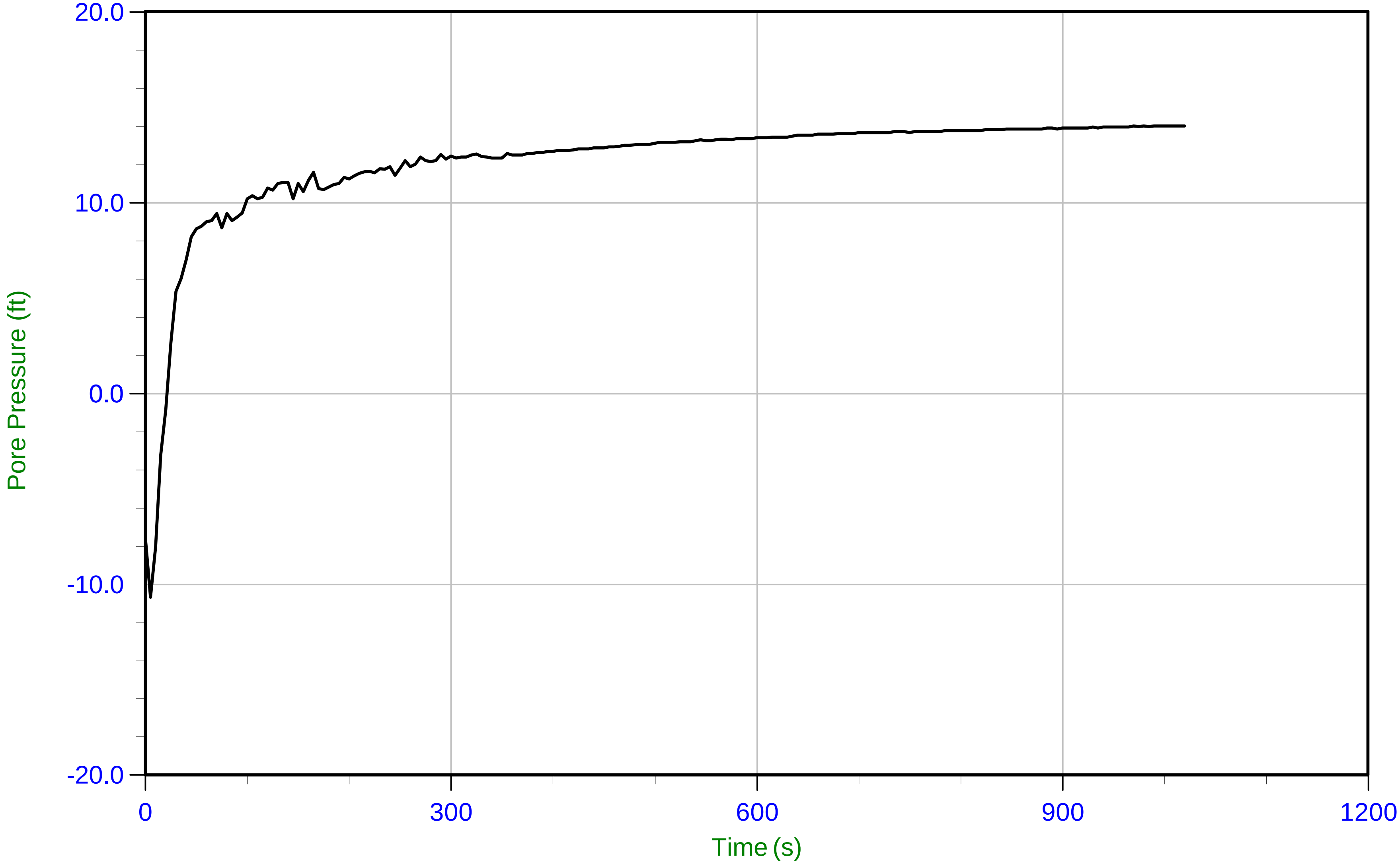
U Min: 7.7 ft
U Max: 114.3 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/11/2020 13:53
Site: Grand Street Commons

Sounding: AC-CPT-10S
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP10S.PPD
Depth: 9.875 m / 32.398 ft
Duration: 1020.0 s

U Min: -10.7 ft
U Max: 14.0 ft

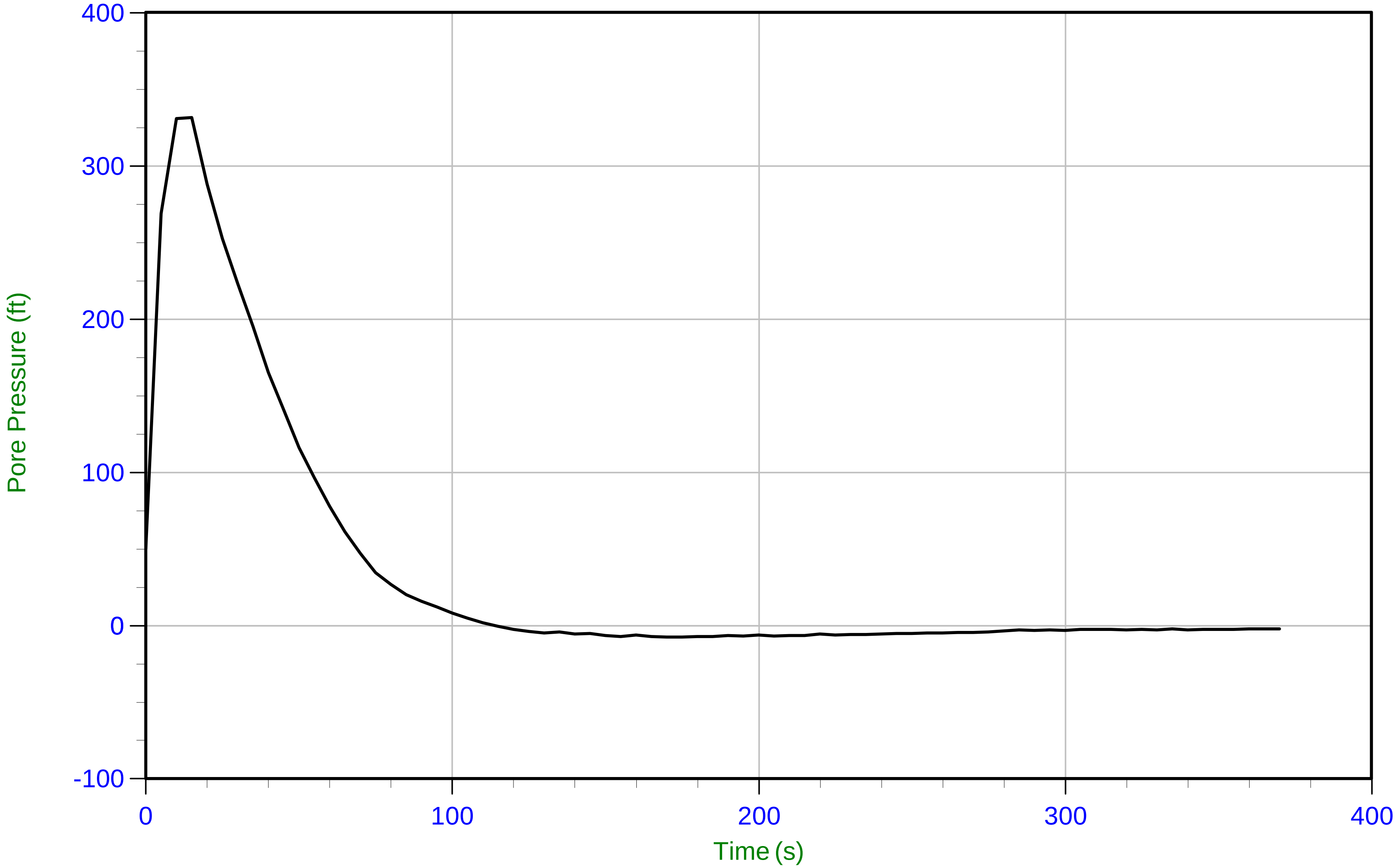
WT: 5.617 m / 18.428 ft
Ueq: 14.0 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/14/2020 08:45
Site: Grand Street Commons

Sounding: AC-CPT-11E
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP11E.PPD
Depth: 7.075 m / 23.212 ft
Duration: 370.0 s

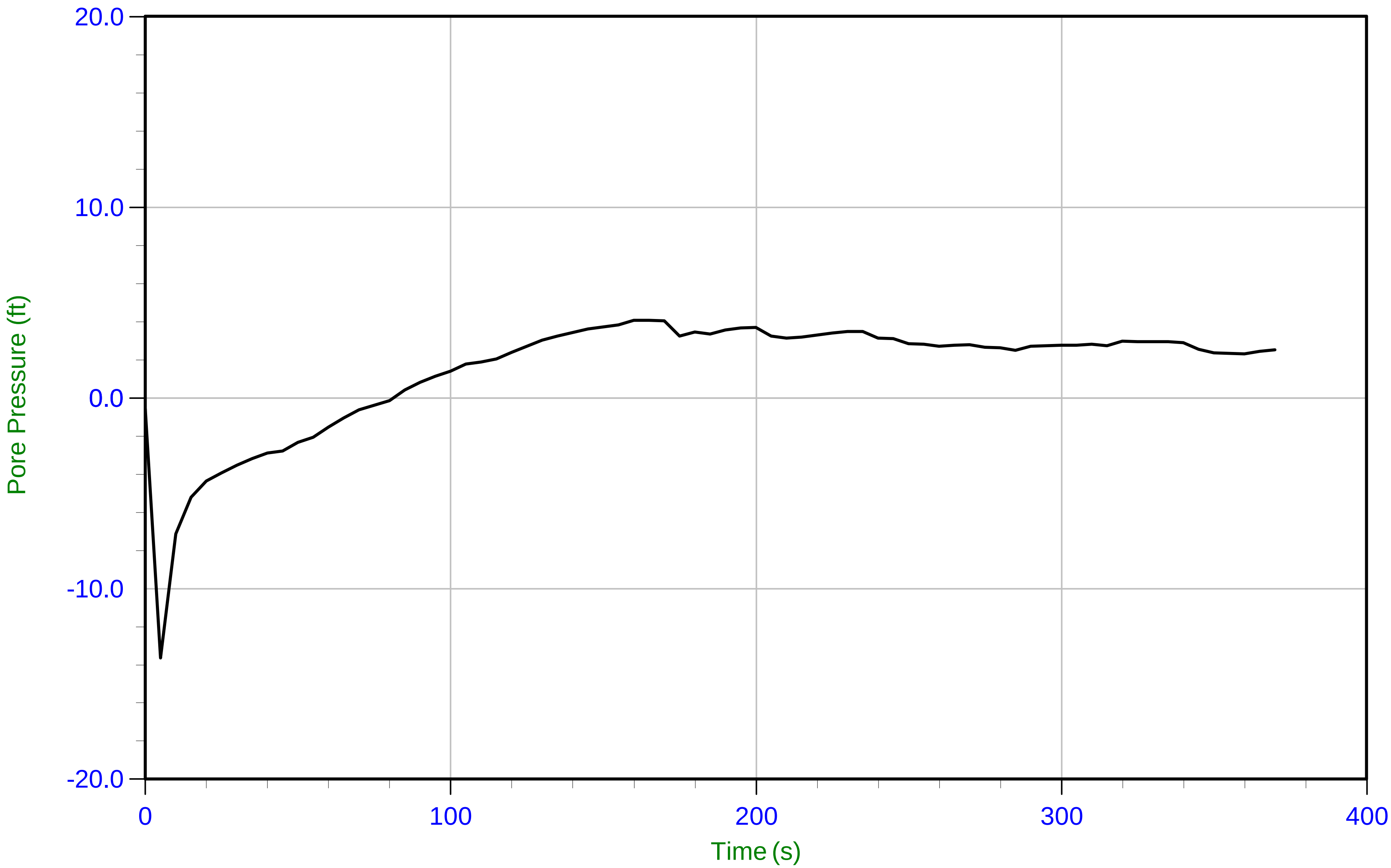
U Min: -7.4 ft
U Max: 331.5 ft

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 09/23/2019 14:56
Site: Grand St. Commons

Sounding: AC-CPT-11S
Cone: 536:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP11S.PPD
Depth: 4.875 m / 15.994 ft
Duration: 370.0 s

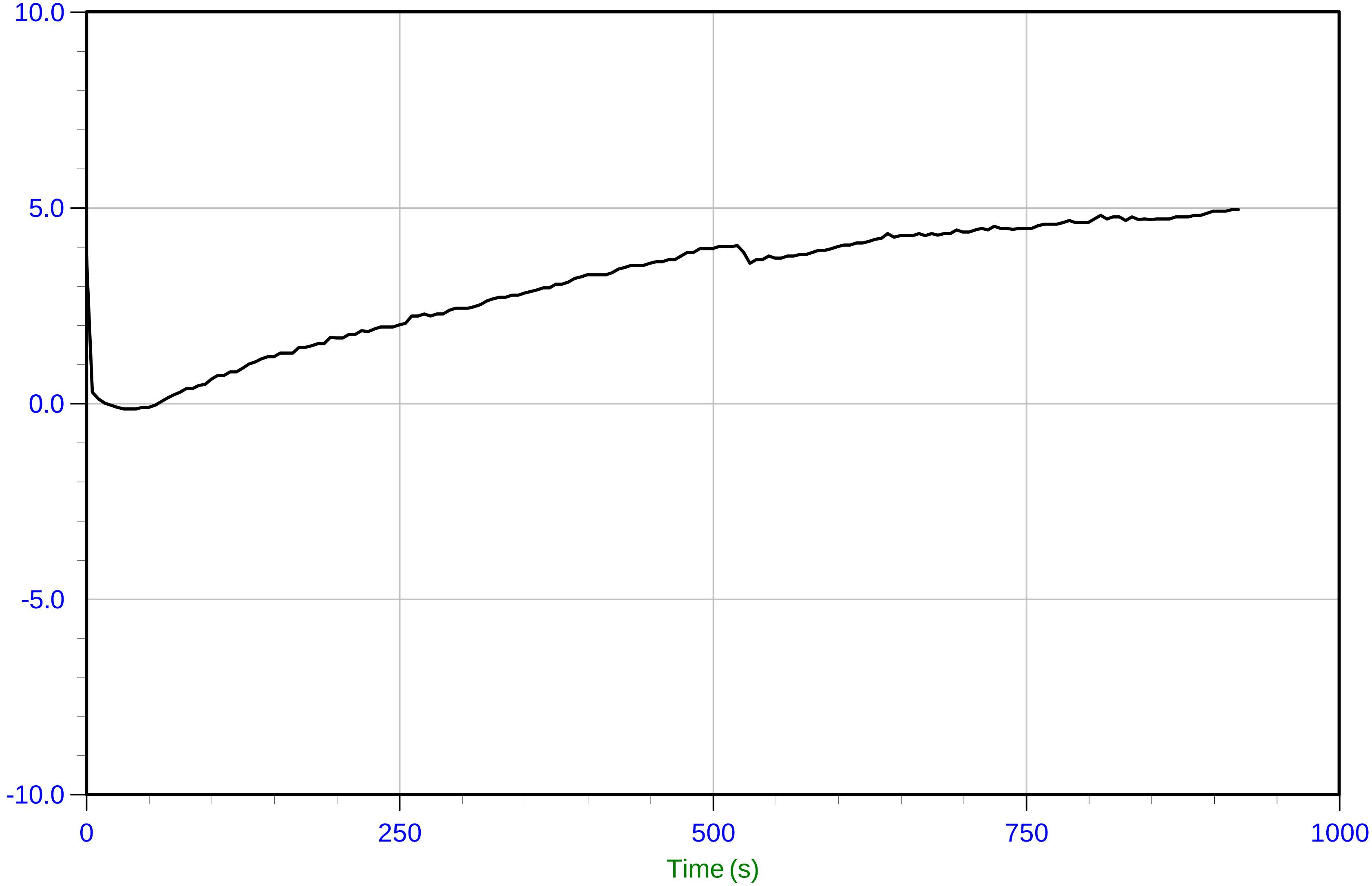
U Min: -13.6 ft
U Max: 4.1 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/14/2020 09:55
Site: Grand Street Commons

Sounding: AC-CPT-12E
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

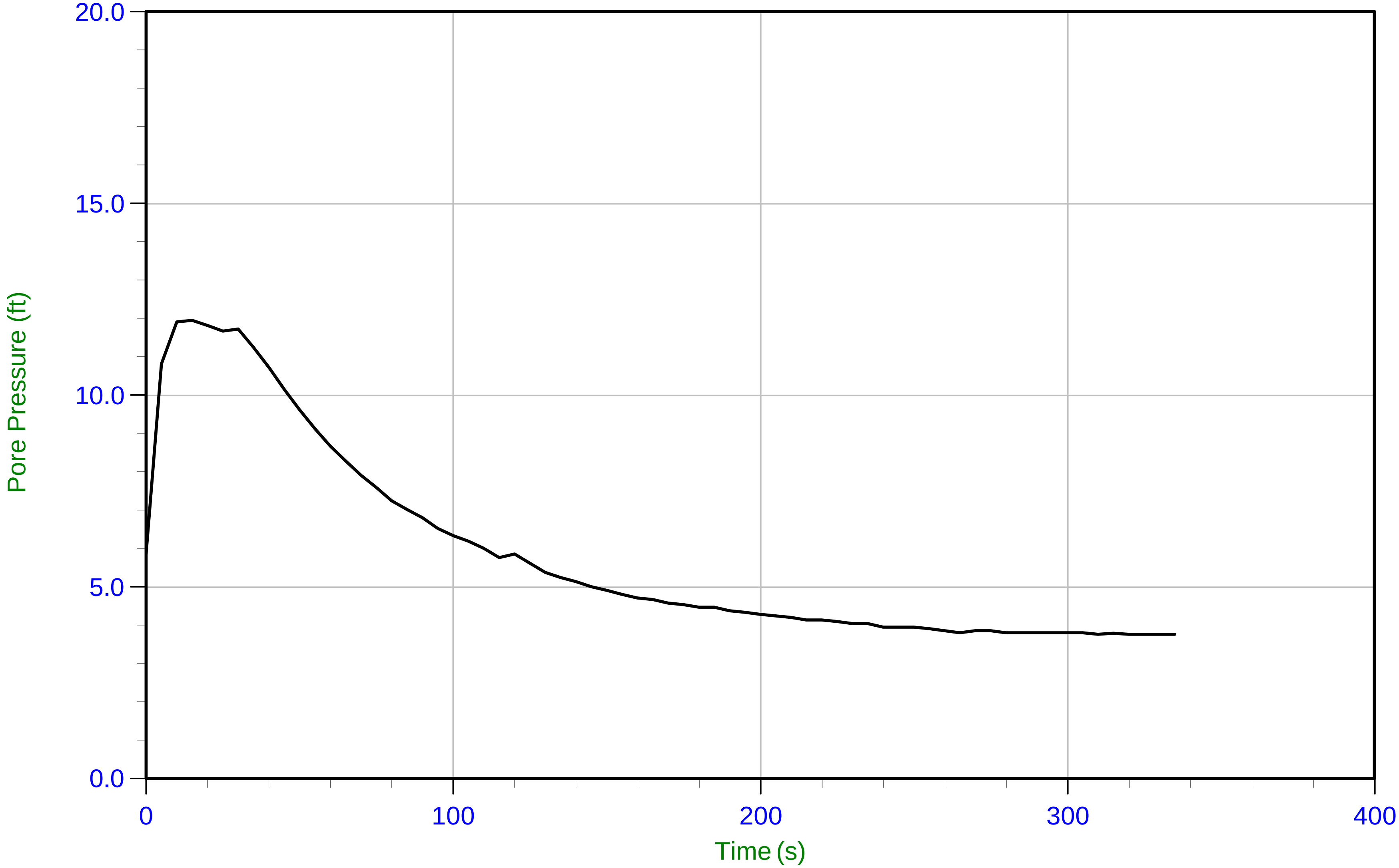
Filename: 20-59-21343_CP12E.PPD
Depth: 2.450 m / 8.038 ft
Duration: 920.0 s

U Min: -0.1 ft
U Max: 5.0 ft

Aspect Consulting

Job No: 20-59-21343
Date: 09/14/2020 09:55
Site: Grand Street Commons

Sounding: AC-CPT-12E
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

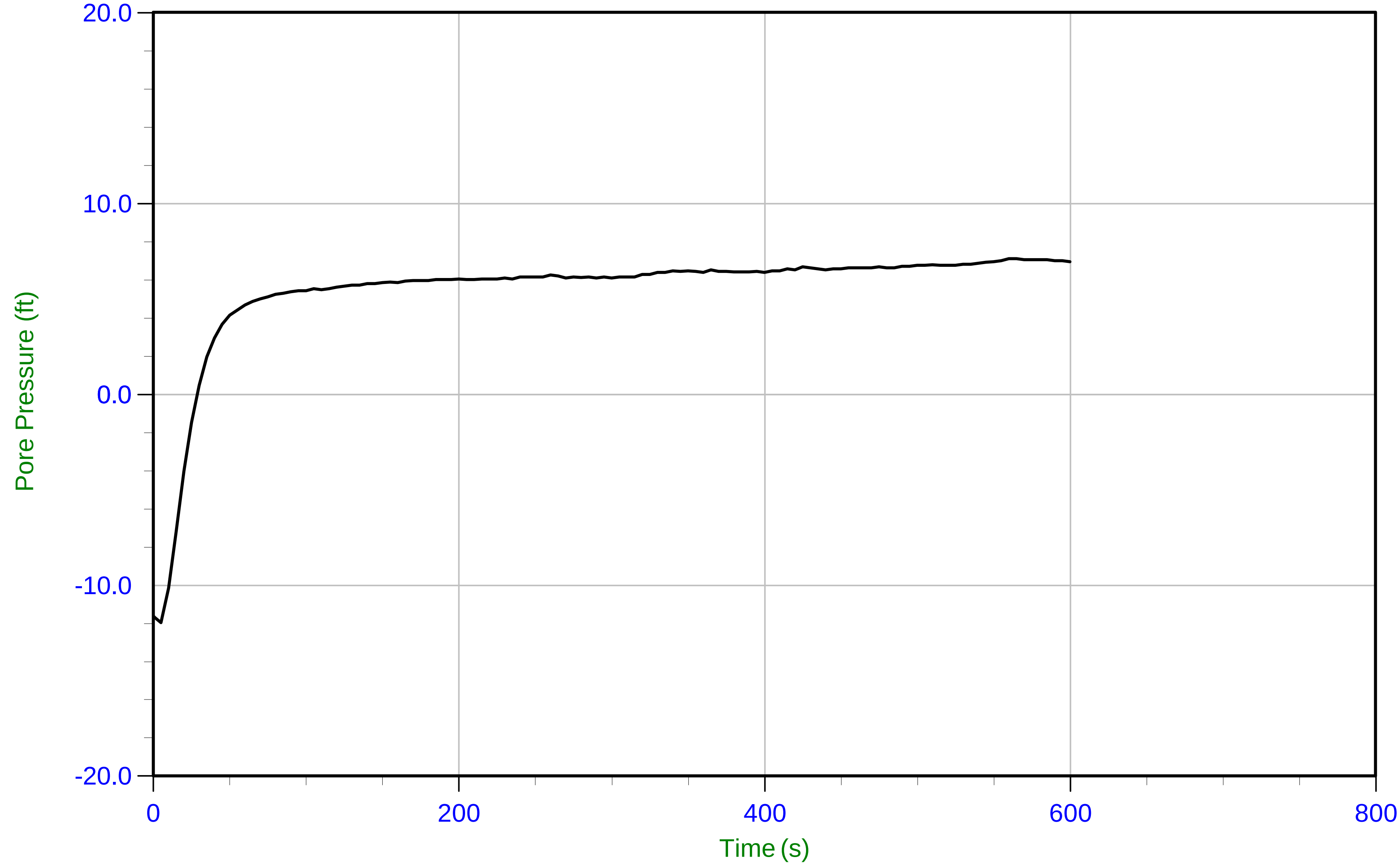
Filename: 20-59-21343_CP12E.PPD
Depth: 4.000 m / 13.123 ft
Duration: 335.0 s

U Min: 3.8 ft
U Max: 12.0 ft

Aspect Consulting

Job No: 20-59-21343
Date: 09/10/2020 13:46
Site: Grand Street Commons

Sounding: AC-CPT-12S
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP12S.PPD
Depth: 8.075 m / 26.492 ft
Duration: 600.0 s

U Min: -12.0 ft
U Max: 7.1 ft

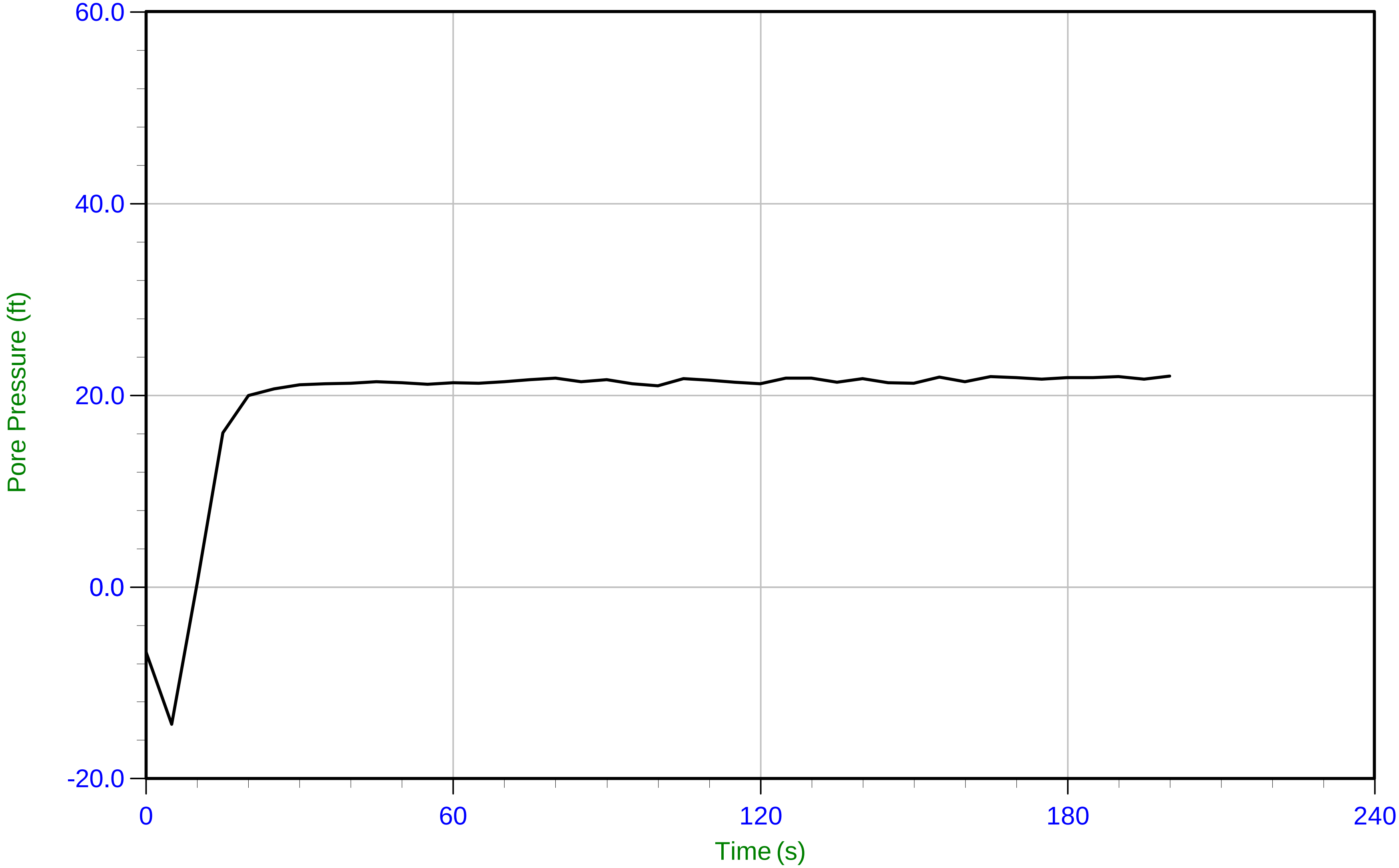
WT: 5.939 m / 19.486 ft
Ueq: 7.0 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/10/2020 13:46
Site: Grand Street Commons

Sounding: AC-CPT-12S
Cone: 661:T1500F15U35 Area=15 cm²



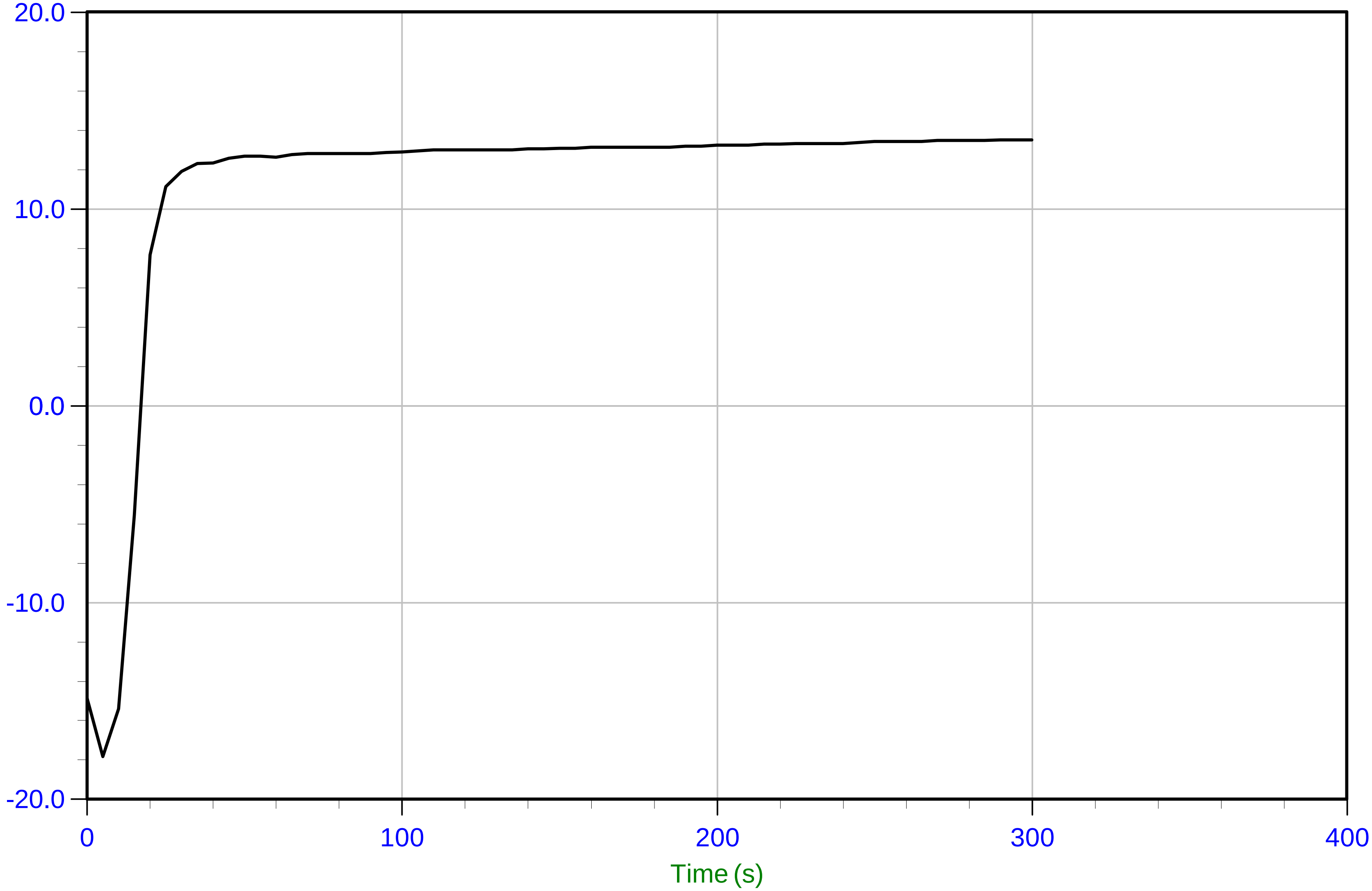
Trace Summary:

Filename: 20-59-21343_CP12S.PPD	U Min: -14.3 ft	WT: 6.465 m / 21.209 ft
Depth: 13.075 m / 42.896 ft	U Max: 22.0 ft	Ueq: 21.7 ft
Duration: 200.0 s		

Aspect Consulting

Job No: 20-59-21343
Date: 09/24/2019 15:17
Site: Grand Street Commons

Sounding: AC-CPT-13S
Cone: 595:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP13S.PPD
Depth: 10.175 m / 33.382 ft
Duration: 300.0 s

U Min: -17.8 ft
U Max: 13.5 ft

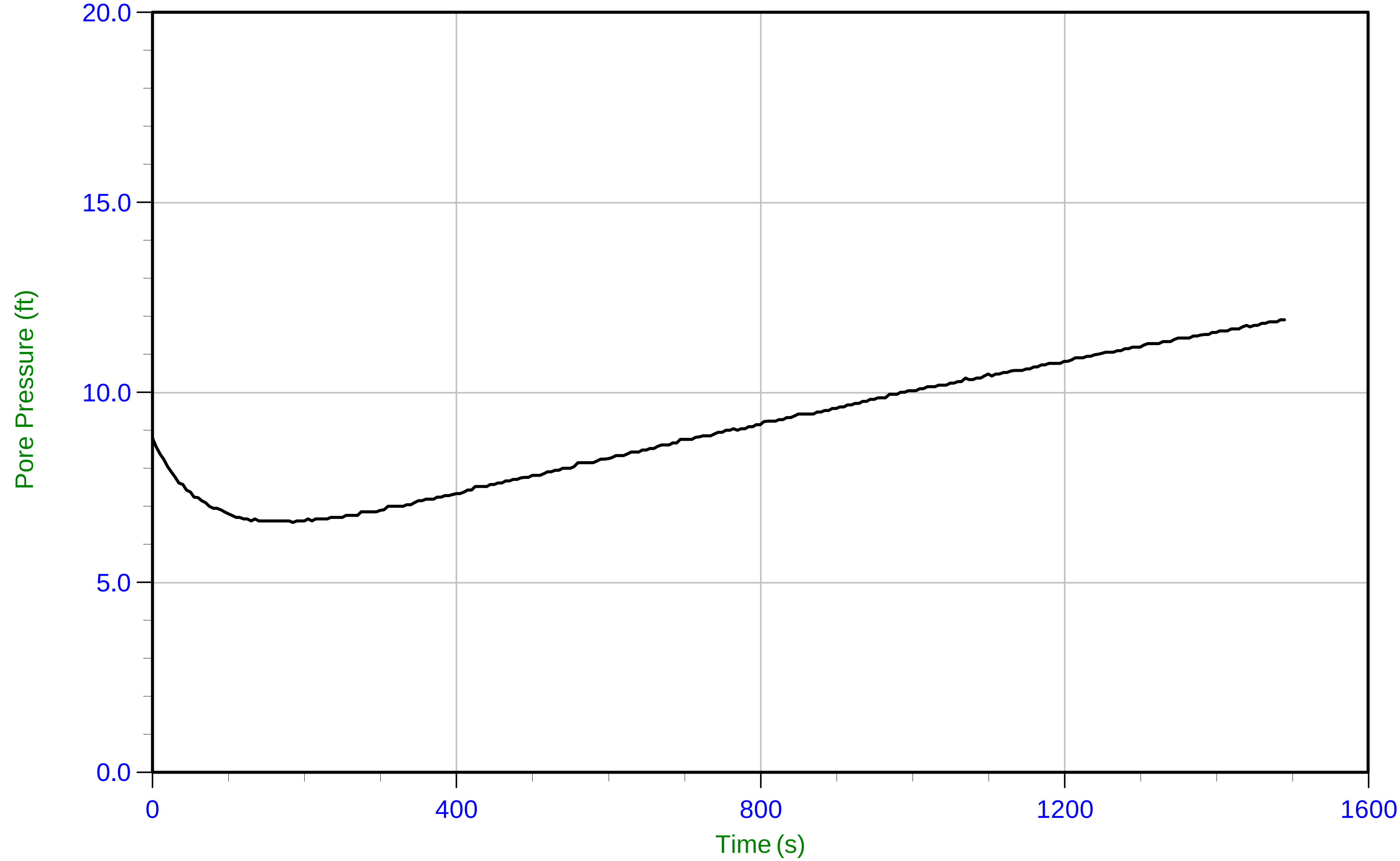
WT: 6.072 m / 19.922 ft
Ueq: 13.5 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/11/2020 16:06
Site: Grand Street Commons

Sounding: AC-CPT-14S
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP14S.PPD
Depth: 7.175 m / 23.540 ft
Duration: 1490.0 s

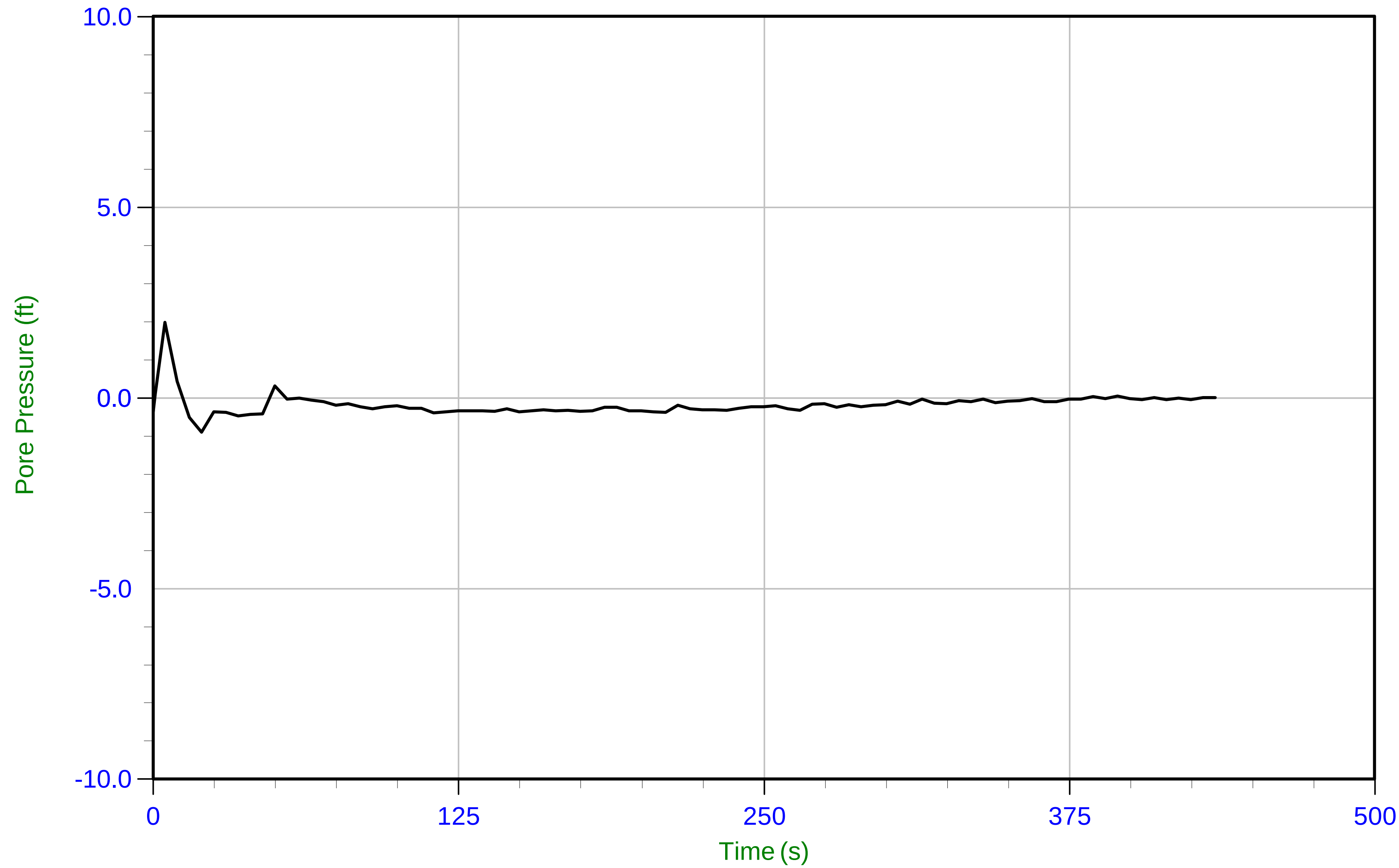
U Min: 6.6 ft
U Max: 11.9 ft

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 09/23/2019 13:11
Site: Grand St. Commons

Sounding: AC-CPT-17S
Cone: 536:T1500F15U500 Area=15 cm²



Trace Summary:

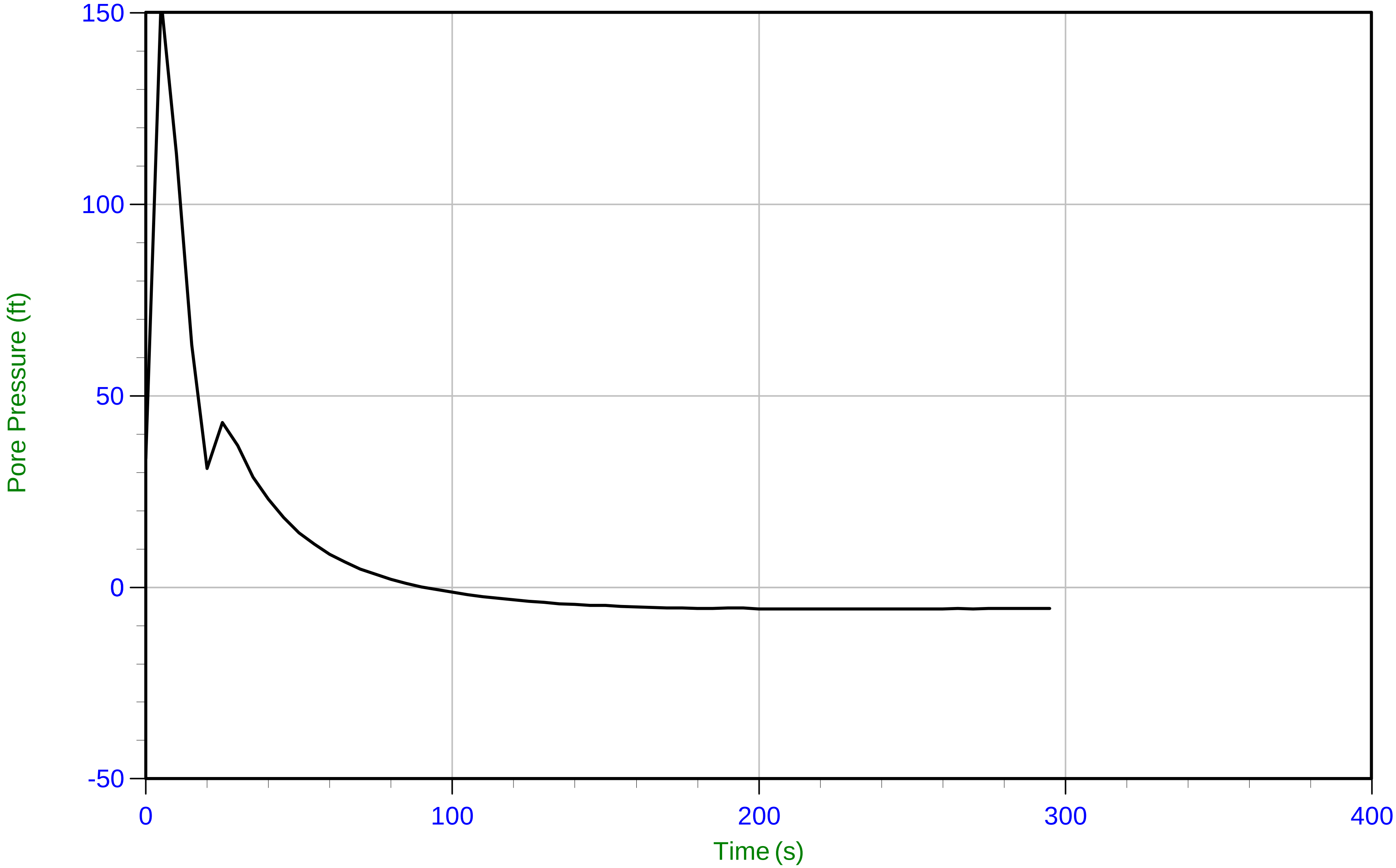
Filename: 20-59-21343_CP17S.PPD
Depth: 4.350 m / 14.271 ft
Duration: 435.0 s

U Min: -0.9 ft
U Max: 2.0 ft

Aspect Consulting

Job No: 20-59-21343
Date: 09/11/2020 15:20
Site: Grand Street Commons

Sounding: AC-CPT-19S
Cone: 661:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP19S.PPD
Depth: 6.700 m / 21.981 ft
Duration: 295.0 s

U Min: -5.7 ft
U Max: 153.2 ft

APPENDIX B

Groundwater Levels Measured in Monitoring Wells

Summary of Monitoring Wells Construction and Groundwater Elevations

Project No. 170304, Grand Street Commons Property, Seattle, Washington

Monitoring Well Location	Monitoring Well Identification	Total Well Depth Feet bgs	Depth to Top of Screen Feet bgs	Depth to Bottom of Screen Feet bgs	Top of Well Monument Elevation Feet	Top of Well Casing Elevation Feet	November 2017 Depth-to-Groundwater Feet btoc	November 2017 Groundwater Elevation Feet	November 2019 Depth-to-Groundwater Feet btoc	November 2019 Groundwater Elevation Feet	March 2020 Depth-to-Groundwater Feet btoc	March 2020 Groundwater Elevation Feet
Shallow Groundwater Monitoring Wells (Screened Above Silt Aquitard)												
East Block	AC-SB-13	30	15	30	77.69	77.38	Not Installed	--	17.74	59.64	16.14	61.24
	AC-MW-4	35	20	35	77.78	77.29	24.29	53.00	23.56	53.73	22.37	54.92
	AC-MW-5	35	20	35	77.78	77.43	18.6	58.83	17.76	59.67	17.22	60.21
	AC-MW-6	30	20	30	77.90	77.39	21.61	55.78	17.84	59.55	12.89	64.50
	AC-MW-7	30	20	30	77.93	77.44	23.55	53.89	21.89	55.55	18.75	58.69
	AC-MW-8	35	20	35	77.92	77.55	Not Installed	--	23.56	53.99	22.29	55.26
	AC-MW-11	35	20	35	77.89	77.50	Not Installed	--	9.79	67.71	8.79	68.71
	AC-MW-12	35	20	35	77.90	77.52	Not Installed	--	20.21	57.31	17.55	59.97
	AC-MW-13	35	15	35	77.63	77.29	Not Installed	--	20.54	56.75	18.68	58.61
	AC-MW-14	35	20	35	77.85	77.45	Not Installed	--	23.4	54.05	22.19	55.26
	AC-MW-15	35	15	35	77.38	76.95	Not Installed	--	23.22	53.73	20	56.95
	URS-MW-12	30.5	20	30	74.41	73.98	9.42	64.56	9.85	64.13	Not accessible	--
	URS-MW-16	30	20	30	72.14	71.73	10.51	61.22	13.92	57.81	13.19	58.54
West Block	AC-MW-1	30	15	30	74.30	73.87	21.01	52.86	20.45	53.42	19.62	54.25
	AC-MW-3	30	15	30	69.01	68.48	14.97	53.51	14.2	54.28	11.34	57.14
	AC-MW-9	35	15	35	76.76	76.21	22.4	53.81	21.5	54.71	20.46	55.75
	AC-MW-10	35	15	35	73.40	72.63	19.18	53.45	18.81	53.82	17.55	55.08
	AC-MW-16	35	15	35	72.66	72.24	Not Installed	--	17.74	54.50	15.61	56.63
	AC-MW-17	35	15	35	74.40	74.01	Not Installed	--	20.38	53.63	19.34	54.67
	AC-MW-18	35	15	35	73.19	72.70	Not Installed	--	18.59	54.11	17.06	55.64
	AC-MW-19	35	15	35	72.37	71.83	Not Installed	--	17.06	54.77	14.7	57.13
	AC-MW-20	35	15	35	72.63	72.11	Not Installed	--	16.65	55.46	13.65	58.46
	AC-MW-21	32	22	32	68.8	68.41	Not Installed	--	Not Installed	--	13.83	54.58
	AC-MW-22	40	15	40	73.62	73.16	Not Installed	--	19.79	53.37	17.84	55.32
	AC-MW-23	35	15	35	73.88	73.48	Not Installed	--	20.21	53.27	15.63	57.85
	AC-MW-27	30	10	30	70.46	69.77	Not Installed	--	23.4	46.37	11.4	58.37
	AC-MW-28	35	10	30	70.09	69.66	Not Installed	--	23.22	46.44	11.27	58.39
	AC-MW-29	30	10	30	70.5	70.00	Not Installed	--	Not Installed	--	15.06	54.94
	AC-MW-30	36	16	36	69.3	68.98	Not Installed	--	Not Installed	--	14.02	54.96
	URS-MW-2	20	6	21	69.23	68.89	12.48	56.41	13.78	55.11	11.13	57.76
	URS-MW-3	30	20	30	71.75	71.48	15.11	56.37	14.75	56.73	12.3	59.18
	URS-MW-10	28	18	28	72.46	72.08	Not Installed	--	16.49	55.59	13.38	58.70
	URS-MW-13	30	20	30	74.46	74.05	20.74	53.31	20.12	53.93	18.85	55.20
	URS-MW-21S	30	14.5	29.5	71.47	71.02	Not Installed	--	15.85	55.17	14.66	56.36
	URS-MW-21D	40	35	40	71.28	70.90	Not Installed	--	15.96	54.94	15.13	55.77
	URS-MW-22	35	25	35	71.51	71.10	Not Installed	--	12.64	58.46	10.89	60.21
	URS-MW-27S	20	15	20	69.69	69.17	14.01	55.16	12.75	56.42	11.20	57.97
	URS-MW-27I	36	31	36	69.81	69.35	Not Installed	--	13.11	56.24	11.1	58.25
	URS-MW-28S	23	18	23	70.06	69.66	Not Installed	--	14.75	54.91	11.61	58.05
	URS-MW-28I	38	33	38	70.22	69.79	15.19	54.60	14.75	55.04	11.93	57.86
	PC-MW-17	30	20	30	69.82	69.49	Not Installed	--	14.81	54.68	13.56	55.93
	PC-MW-30S	24	19	24	69.78	69.51	15.11	54.40	14.85	54.66	14.79	54.72
	PC-MW-30I	45	40	45	69.75	69.46	Not Installed	--	14.92	54.54	14.98	54.48
	PC-MW-31S	19	15	20	70.10	69.78	Not Installed	--	14.25	55.53	12.42	57.36
	PC-MW-31I	40	35	40	70.14	69.76	Not Installed	--	14.66	55.10	13.26	56.50
	PC-MW-33S	21	15	20	70.09	69.68	Not Installed	--	15.64	54.04	14.25	55.43
	PC-MW-33I	46	40	45	70.04	69.61	Not Installed	--	15.58	54.03	14.43	55.18
	PC-MW-34S	21	15	20	70.95	70.56	Not Installed	--	16.26	54.30	15.02	55.54
	PC-MW-34I	40	34	39	70.97	70.58	Not Installed	--	16.28	54.30	15.05	55.53
	PC-MW-35S	35	30	35	73.53	73.09	Not Installed	--	19.04	54.05	17.7	55.39
	PC-MW-35I	50	45	50	73.76	73.27	Not Installed	--	19.25	54.02	17.52	55.75
	PC-SCC1	37.5	27.5	37.5	70.6	70.39	Not Installed	--	15.81	54.58	15.81	54.58
	PC-SCC3	29.5	24.5	29.5	70.6	70.24	Not Installed	--	Not accessible	--	14.68	55.56
South Block	AC-MW-2	25	10	25	69.70	69.32	15.87	53.45	16	53.32	14.9	54.42
	AC-MW-24	38	18	38	76.88	76.31	Not Installed	--	20.54	55.77	22.12	54.19
Deep Groundwater Monitoring Wells (Screened Below Silt Aquitard)												
West Block	AC-DMW-1	90	70	90	70.6	70.32	Not Installed	--	Not Installed	--	15.98	54.34
	AC-DMW-2	90	70	90	70.9	70.52	Not Installed	--	Not Installed	--	16.66	53.86
	URS-MW-28D	59	54	59	69.83	69.35	15.81	43.19	15.81	53.54	15.33	54.02
	PC-MW-30D	68	65	70	69.69	69.32	16.19	53.81	16.19	53.13	15.38	53.94
	PC-MW-31D	67	66	71	70.19	69.80	16.66	54.34	16.66	53.14	16.5	53.30
	PC-MW-33D	98	95	100	69.96	69.57	16.15	83.85	16.15	53.42	15.66	53.91
	PC-MW-34D	100	95	100	71.42	71.00	16.92	83.08	16.92	54.08	16.38	54.62
	PC-MW-35D	95	85	95	73.74	73.35	19.45	75.55	19.45	53.90	18.97	54.38

Notes:

bgs - below existing ground surface

btoc - below top of well casing

"--" - no data

* These wells were installed during the RI Stage III Explorations in February 2020.

All wells were surveyed relative to the North American Vertical Datum (NAVD 88) by PACE Engineers subcontracted to Aspect Consulting, except URS-MW-12 which was inaccessible during the PACE surveys in 2019 and 2020 as it is buried under concrete rubble (approximately 5 feet thick). This well was surveyed in 2017 by Aspect when it was accessible.

APPENDIX C

Results of Geotechnical Laboratory Testing

C.1 Geotechnical Laboratory Testing

Laboratory tests were conducted on selected soil samples to characterize certain engineering (physical) properties of the soils at the Site. Laboratory testing included determination of moisture content and Atterberg limits. The laboratory tests were conducted in general accordance with appropriate ASTM International (ASTM) test methods. Test procedures are discussed below.

The moisture content of selected samples was analyzed in general accordance with ASTM D2216, *Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass*. Atterberg Limits were analyzed in general accordance ASTM D4318, *Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.*

The results of the moisture content tests are presented in Appendix C and graphically on the boring logs in Appendix A.

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client:	Aspect Consulting	**Date:**	September 13, 2019
Address:	401 2nd Ave S	**Project:**	Q.C. - Grand Street Commons
	Seattle, WA 98104	**Project #:**	18B011-30
Attn:	Eric Schellenger	**Sample #:**	B19-0817-0819
Date Revised:		**Date Sampled:**	Various

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

B19-0817 AC-SB-11 @ 7.5ft; Brown Clay with Silt; Plasticity Index - 21.6% - sampled 5-15-19
B19-0818 AC-SB-19 @ 5ft; Brown Clay with Silt; Plasticity Index - 21.1% - sampled 3-26-19
B19-0819 AC-MW-24 @ 10ft; Brown Clay with Silt and Sand; Liquid Limit - 29.9% Non-plastic - sampled 5-16-19

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,
Meghan Blodgett-Carrillo
NW Region Laboratory Manager

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project:	Q.C. - Grand Street Commons	**Date Received:**	6-Sep-19
Project #:	18B011-30	**Sampled By:**	Client
Client:	Aspect Consulting	**Date Tested:**	12-Sep-19
Source:	AC-SB-11 @ 7.5'	**Tested By:**	A. Eifrig
Sample #:	B19-0817		

Visual Identification
Clay with Silt
Sample Color
brown

Liquid Limit Determination

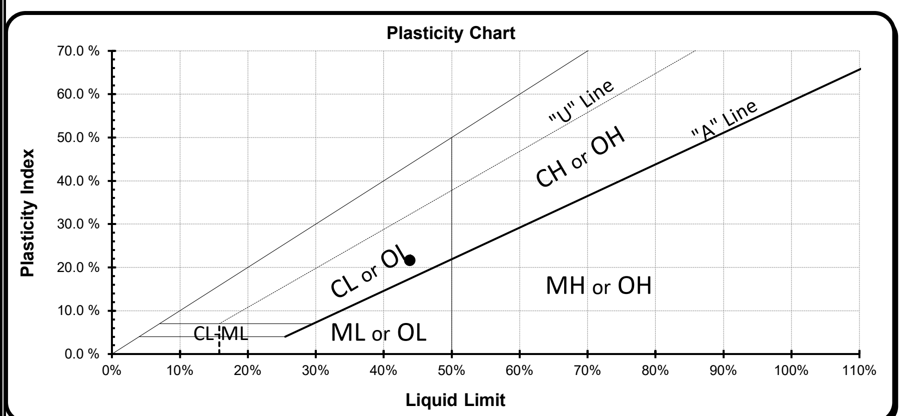
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	32.83	34.33	33.48			
Weight of Dry Soils + Pan:	28.86	29.70	29.01			
Weight of Pan:	19.56	19.35	19.33			
Weight of Dry Soils:	9.30	10.35	9.68			
Weight of Moisture:	3.97	4.63	4.47			
% Moisture:	42.7 %	44.7 %	46.2 %			
Number of Blows:	29	22	17			

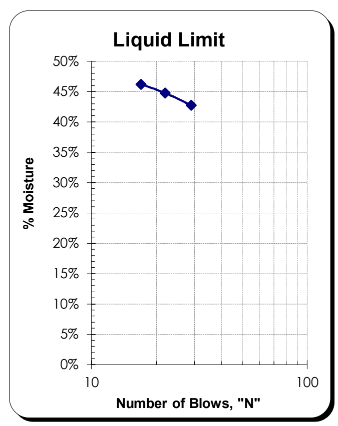
Liquid Limit @ 25 Blows:	43.9 %
Plastic Limit:	22.3 %
Plasticity Index, I_P:	21.6 %

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	36.37	38.10				
Weight of Dry Soils + Pan:	34.88	36.34				
Weight of Pan:	28.13	28.50				
Weight of Dry Soils:	6.75	7.84				
Weight of Moisture:	1.49	1.76				
% Moisture:	22.1 %	22.5 %				

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: 28.5

Reviewed by: Meghan Blodgett-Carrillo

Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C. - Grand Street Commons
Project #: 18B011-30
Client: Aspect Consulting
Source: AC-SB-19 @ 5 ft
Sample #: B19-0818

Date Received: 6-Sep-19
Sampled By: Client
Date Tested: 12-Sep-19
Tested By: A. Eifrig

Visual Identification
Clay with Silt
Sample Color
brown

Liquid Limit Determination

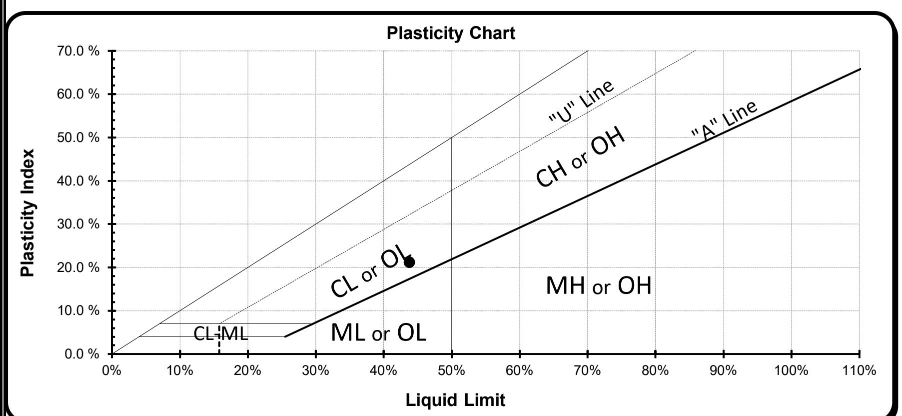
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	30.13	29.75	32.34			
Weight of Dry Soils + Pan:	25.65	25.21	26.96			
Weight of Pan:	14.90	14.71	14.87			
Weight of Dry Soils:	10.75	10.50	12.09			
Weight of Moisture:	4.48	4.54	5.38			
% Moisture:	41.7 %	43.2 %	44.5 %			
Number of Blows:	33	28	22			

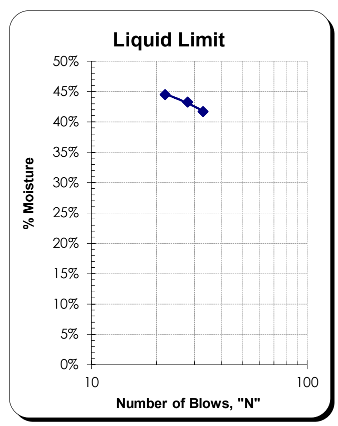
Liquid Limit @ 25 Blows:	43.8 %
Plastic Limit:	22.8 %
Plasticity Index, I_P:	21.1 %

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	37.79	39.08				
Weight of Dry Soils + Pan:	36.03	37.13				
Weight of Pan:	28.23	28.63				
Weight of Dry Soils:	7.80	8.50				
Weight of Moisture:	1.76	1.95				
% Moisture:	22.6 %	22.9 %				

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: 28.5

Reviewed by: Meghan Blodgett-Carrillo

Meghan Blodgett-Carrillo

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980

Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974

Visit our website: www.mtc-inc.net

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C. - Grand Street Commons
Project #: 18B011-30
Client: Aspect Consulting
Source: AC-MW-24 @ 10 ft
Sample #: B19-0819

Date Received: 6-Sep-19
Sampled By: Client
Date Tested: 12-Sep-19
Tested By: A. Eifrig

Visual Identification
Clay with Silt and Sand
Sample Color
brown

Liquid Limit Determination

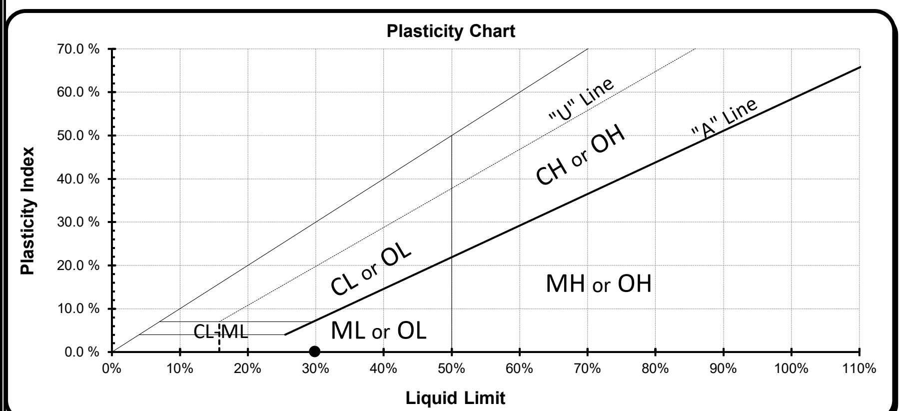
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	39.45	35.62	33.80			
Weight of Dry Soils + Pan:	35.05	31.95	30.45			
Weight of Pan:	19.65	19.67	19.63			
Weight of Dry Soils:	15.40	12.28	10.82			
Weight of Moisture:	4.40	3.67	3.35			
% Moisture:	28.6 %	29.9 %	31.0 %			
Number of Blows:	30	26	20			

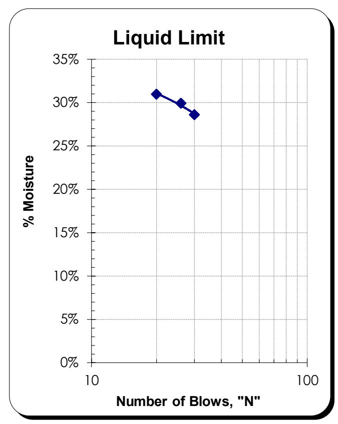
Liquid Limit @ 25 Blows:	29.9 %
Plastic Limit:	N/A
Plasticity Index, I_P:	N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:		Non-plastic				
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: Plastic limit cannot be determined as the material does not roll down to 1/8" threads. Material is non-plastic

Reviewed by: Meghan Blodgett-Carrillo

Meghan Blodgett-Carrillo

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980
Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974
Visit our website: www.mtc-inc.net

APPENDIX D

Ground Anchor Load Testing and Shoring Monitoring Program

D. Ground Anchor Load Testing Program and Shoring Monitoring Program

Ground anchor testing methods and equipment for the Project should meet the requirements detailed in Federal Highway Administration (FHWA) Geotechnical Circular No. 4, *Ground Anchors and Anchored Systems,*[1] and presented herein.

Verification Tests

The shoring contractor should be required to complete a minimum of two successful anchor verification tests per soil type and installation method to verify the design adhesion value or pullout resistance in general accordance with the following recommendations:

- The geotechnical engineer shall be responsible for selecting the test anchors.
- Verification testing should not exceed 80 percent of the ultimate tensile strength of the anchor steel.
- Verification testing should load the anchor up to 200 percent of the design load (DL) specified on the shoring drawings. The anchor should be loaded and unloaded in increments of 25 percent of the 200 percent design load in accordance with the schedule below:

Load	Hold Time (minutes)
Alignment Load (AL)	Until Stable
0.25 DL	10
0.50 DL	10
0.75 DL	10
1.00 DL	10
1.25 DL	10
1.50 DL	60
1.75 DL	10
2.00 DL (max test load)	10
1.75 DL	Until Stable
1.50 DL	Until Stable
1.25 DL	Until Stable

[1] Federal Highway Administration (FHWA), 1999, Geotechnical Circular No.4, Ground Anchors and Anchored Systems.

Load	Hold Time (minutes)
1.00 DL	Until Stable
0.75 DL	Until Stable
0.50 DL	Until Stable
0.25 DL	Until Stable
Alignment Load (AL)	Until Stable

Anchor deflections should be measured and recorded to the nearest 0.001 inches at each load increment. Deflections should be recorded at 1, 2, 3, 5, 6, 10, 20, 30, 40, 50, and 60 minutes at the 150 percent load increment, and at 1, 2, 3, 5, 6, and 10 minutes at the other load increments.

Proof Tests

The shoring contractor should be required to complete proof testing of every production tieback anchor, or 5 percent of soil nails in general accordance with the following:

- Proof testing should not exceed 80 percent of the ultimate tensile strength of the anchor steel.
- Proof testing should load the anchor up to 133 percent (for tieback anchors) or 150 percent (for soil nails) of the design load specified on the shoring drawings. The anchor should be incrementally loaded and unloaded in accordance with the schedule below:

Load	Hold Time (minutes)
Alignment Load (AL)	Until Stable
0.25 DL	Until Stable
0.50 DL	Until Stable
0.75 DL	Until Stable
1.00 DL	Until Stable
1.33 DL (Tieback anchors)	10
1.5 DL (Soil Nails)	10
Alignment Load (AL) (Optional)	Until Stable

Anchor deflections should be measured and recorded to the nearest 0.001 inch at each load increment. Each incremental load should be held long enough to obtain a stable deflection measurement. Deflections should be recorded at 1, 2, 3, 5, 6, and 10 minutes at the 1.33 DL (tieback anchors) and 1.5 DL (soil nails).

Test Anchor Acceptance Criteria

An anchor should be deemed acceptable if it meets the following criteria:

- The total elastic movement obtained from the verification tests and proof tests exceeds 80 percent of the theoretical elastic elongation of the unbounded anchor length.
- Total anchor movement (creep) between the 1- and 10-minute intervals should not exceed 0.04 inches, regardless of the tendon length or load. Total anchor movement between the 6- and 60-minute intervals (if required) should not exceed 0.08 inches.
- Pullout failure does not occur. Pullout failure occurs when attempts to increase the test load cause continued movement of the anchor.
- Ram-jack “lift-off measurement” testing (applicable to tieback anchors) indicates an anchor load within 5 percent of the design lock-off load.

Shoring Monitoring Program

The purpose of the shoring monitoring program is to establish baseline conditions at the Site and surrounding areas and to actively monitor deflections and settlement during construction.

Preconstruction Survey

A preconstruction survey should be completed to document preconstruction conditions at the Site and surrounding areas. At a minimum, the preconstruction survey should consist of video or photographic documentation of the adjacent streets, buildings, existing cracks, or other signs of distress.

Optical Survey

Optical survey of the Site and surrounding areas should be completed before and during construction to continually observe and evaluate the performance of the shoring walls. The optical survey should be accurate to at least 0.01 feet, and made available to the design team and geotechnical engineer within 24 hours for immediate review.

Optical survey points should be located around the perimeter of the shored excavation, either at the top of every other soldier pile or at monitoring points established in the adjacent curb, sidewalk, or street and spaced every 25 feet. Construction of the shoring walls should be temporarily stopped if the shoring wall is observed to deflect more than 1inch total, or successive readings show deflection of more than 0.5 inches, in which case remedial action may be required.

The optical survey program should be completed twice a week during excavation and shoring wall construction and should continue until the shoring walls are complete and optical survey deflections have stabilized. After stabilization, the optical survey frequency can be reduced to occur once every other week.

If optical survey readings indicate shoring wall deflections exceed 1 inch, excavation and construction of the shoring walls should be temporarily stopped until the cause is determined and remedial actions are completed, if required. If this occurs, the optical survey frequency should be increased to daily readings until optical survey deflects have stabilized.

APPENDIX E

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND GUIDELINES FOR USE

This Report and Project-Specific Factors

Aspect Consulting, LLC (Aspect) considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual limitations. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with our Agreement with the Client and recognized geoscience practices in the same locality and involving similar conditions at the time this report was prepared.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope instability, or groundwater fluctuations. If any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques, and personnel used to perform a geotechnical or geologic study differ significantly from those used to perform an environmental study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions, or recommendations (e.g., about the likelihood of encountering underground storage tanks or regulated contaminants). Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

We appreciate the opportunity to perform these services. If you have any questions please contact the Aspect Project Manager for this project.

GEOTECHNICAL ENGINEERING REPORT
GRAND STREET COMMONS SOUTH

South Grand Street and 22nd Avenue South
Seattle, Washington

Prepared for: Grand Street Commons, LLC

Project No. 170304 • November 17, 2020 • FINAL

earth + water

GEOTECHNICAL ENGINEERING REPORT
GRAND STREET COMMONS SOUTH

South Grand Street and 22nd Avenue South
Seattle, Washington

Prepared for: Grand Street Commons, LLC

Project No. 170304 • November 17, 2020 • FINAL

Aspect Consulting, LLC

11/17/2020

Eric Schellenger, PE
Geotechnical Engineer
eschellenger@aspectconsulting.com

Erik O. Andersen, PE
Principal Geotechnical Engineer
eandersen@aspectconsulting.com

V:\170304 Mt Baker Housing and Lake Union Partners – Belshaw Site - Rainier Ave S\Deliverables\Geotech Eng Rpt\Final Geotechnical Engineering Reports\South Block\Geotech Eng Report_Grand Street Commons_South_final.doc

Contents

1 Introduction 1
1.1 Project Description 1
2 Site Conditions 2
2.1 Surface Conditions 2
2.2 Subsurface Conditions 2
2.2.1 Geology 2
2.2.2 Stratigraphy 2
2.2.3 Groundwater 3
3 Geotechnical Engineering Conclusions and Recommendations 4
3.1 Earthquake Engineering 4
3.1.1 Ground Response 4
3.1.2 Liquefaction Susceptibility 5
3.2 Groundwater Inflow 6
3.3 Building Foundations 6
3.3.1 Ground Improvement 7
3.3.2 Allowable Bearing Pressure 8
3.3.3 Settlement 8
3.3.4 Footing Size and Embedment 8
3.3.5 Lateral Resistance 8
3.4 Slab-on-Grade Floors 9
3.5 Subsurface Drainage 9
3.5.1 Perimeter Foundations 9
3.5.2 Other Drainage Recommendations 9
4 Earthwork Considerations and Recommendations 10
4.1 Temporary Excavation Slopes 10
4.2 Subgrade Preparation 11
4.2.1 Foundations 11
4.2.2 Slabs-on-Grade and Pavements 11
4.3 Structural Fill 11
4.3.1 Utility Bedding and Backfill 12
4.4 Temporary Erosion and Sedimentation Control 12
4.5 Wet Weather Construction 13

5 References 14

6 Limitations 15

List of Tables

1 Seismic Design Parameters 5

2 Liquefaction Analysis Summary 6

3 Lateral Resistance for Shallow Foundations 8

List of Figures

1 Site Location Map

2 Site Plan

3 Ground Improvement Extents

List of Appendices

A Subsurface Explorations

B Results of Geotechnical Laboratory Testing

C Groundwater Levels Measured in Monitoring Wells

D Report Limitations and Guidelines for Use

1 Introduction

This report presents the results of a geotechnical engineering study completed by Aspect Consulting, LLC (Aspect) for the Grand Street Commons Project (GSC; Project) South Block redevelopment (GSC South) located at S Grand St. and 22nd Ave. S in Seattle, Washington (Site; Figure 1).

GSC South is part of the Grand Street Commons Project, which consists of the redevelopment of 16 parcels within three adjacent blocks (designated the West, East, and South Blocks) with three new mixed-use buildings (one on each block). This report presents the geotechnical data collected to date and our geotechnical engineering conclusions and recommendations for design and construction of GSC South. Aspect has prepared geotechnical engineering reports for the West Block redevelopment (GSC West) and the East Block redevelopment (GSC East) under separate covers.

1.1 Project Description

The Project consists of the redevelopment of four contiguous parcels and a portion of an alley with a new seven-story mixed-used building. The parcels and alleyway occupy approximately 0.9 acres within a city block located south of the intersection of S Grand St. and 22nd Ave. S.

The lowest level of the planned seven-story building at GSC South will be within a few feet of existing Site grades. Below-grade excavations will be limited to those that will be necessary for foundation construction; excavations that would otherwise require temporary shoring are not planned.

The GSC Project has an environmental cleanup component that is being performed under Prospective Purchaser Consent Decrees (PPCD Nos. 18-2-14708-5 SEA and 18-2-147414-0). A PPCD is a legal agreement between the applicant and the Washington State Department of Ecology (Ecology) and the Attorney General's office, whereby all environmental activities associated with the project are formally overseen by Ecology. The GSC project is identified in Ecology's Cleanup Sites database as Facility Site ID #97763114 and Cleanup Site ID #3018. As required by the PPCDs, a Remedial Investigation and Feasibility Study (RI/FS) report and a Cleanup Action Plan (CAP) will be prepared and submitted to Ecology by October 2020.

Also, a Contaminated Media Management Plan (CMMP) will be prepared, prior to the construction in 2021. The CMMP will be available via public records after Ecology's approval like the RI/FS and CAP documents.

2 Site Conditions

2.1 Surface Conditions

The South Block is bordered by South Grand Street to the north, South Holgate Street and an autobody shop at 1818 Rainier Ave S (Dere Auto) to the south, 23rd Avenue South to the east, and Rainier Avenue South to the west. The ground surface across most of the block is covered with gravel and scattered debris and slopes gently from about Elevation 78[1] at the northeast corner to about Elevation 68 at the southwest corner based on the most recent topographic survey at the Site (Goldsmith, 2020).

2.2 Subsurface Conditions

Our understanding of the Site subsurface conditions is based on our review of geologic maps and the results of our environmental and geotechnical explorations between August 2017 and September 2020. Our explorations included direct push probes, geotechnical borings (some of which were completed as monitoring wells), and cone penetration test (CPT) soundings advanced at the locations shown on Figure 2. A description of the exploration methods is provided in Appendix A. The results of laboratory testing on selected samples from the geotechnical borings are presented in Appendix B.

2.2.1 Geology

The *Geologic Map of Seattle – a Progress Report* (Troost et al., 2005) maps the Site as underlain by Vashon recessional lacustrine deposits (Qvrl). These are described as laminated silt and clay, low to high plasticity, with local sand layers, peat, and other organic sediments deposited in stagnant water behind the receding glacier during the most recent glaciation of Puget Sound between 15,000 and 20,000 years ago. Nearby, Vashon recessional outwash (Qvr), Vashon ice-contact deposits (Qvi), Vashon advance outwash (Qva), and Vashon till (Qvt) are also mapped.

Stratigraphically, the Vashon recessional lacustrine and ice contact units overlie the till and advance outwash units. The recessional lacustrine deposits were not glacially overridden and are unconsolidated deposits typically in a medium dense/medium stiff state. The ice-contact unit may or may not have been glacially overridden and can vary from a loose to dense state. The Vashon till and advance outwash units were glacially overridden/glacially consolidated and are typically in a dense to very dense/hard state.

2.2.2 Stratigraphy

Based on the results of our subsurface explorations, we grouped the Site soils into three units: fill, glacial recessional deposits, and glacially consolidated soil. Our explorations reveal that the Site is located within a former topographically low area during the most

[1] All elevations presented are in feet and reference the North American Vertical Datum of 1988 (NAVD88).

recent glaciation that was filled in with glacial recessional deposits as the glacier receded. The infilled glacial recessional deposits overlie glacially consolidated soil. Fill from previous grading activities is also present at the Site.

The composition and distribution of these units observed in our explorations are described below, ordered from shallowest to deepest. The logs of the explorations and the CPT soundings data report are presented in Appendix A.

Fill

We observed up to about 8 feet of fill at the ground surface in our explorations. The fill typically consists of loose, moist, gray-brown to dark brown silty sand (SM) and sandy silt (ML).

Glacial Recessional Deposits

Below the fill, we observed glacial recessional deposits that extended to a maximum depth of about 37 feet below the ground surface (bgs). Our explorations reveal these deposits vary in thickness across the Site from less than about 5 feet thick (or non-existent) along the western edge and in the southeast corner of the Site to about 30 feet thick in the center of the Site.

The glacial recessional deposits typically consist of soft to medium stiff, moist, brown to gray-brown, silt (ML) and clay (CL) with varying amounts of sand, and medium dense, moist to very moist, silty sand (SM).

Glacially Consolidated Soil

We observed glacially consolidated soil below the fill or glacial recessional deposits. The glacially consolidated soil typically consists of dense to very dense/hard, moist to very moist, gray, silty sand (SM) and sandy silt (ML). The top of glacially consolidated soil varies from Elevation 70 to 35 across the Site.

2.2.3 Groundwater

Groundwater levels measured in the monitoring wells at the Site are presented in Appendix C. Groundwater levels measured in two monitoring wells in November 2019 revealed the groundwater elevation at the Site was between 53.3 and 55.8 feet. Groundwater levels measured in those same wells in March 2020 after a period of heavy, extended precipitation revealed the average groundwater elevation at the Site was between 54.4 and 54.2 feet. At time of drilling (ATD) in September 2020, groundwater elevations in the borings varied between 53 and 49 feet.

3 Geotechnical Engineering Conclusions and Recommendations

A summary of key Project geotechnical conclusions and recommendations are listed below and described in more detail in the following sections.

- The excavations for foundations will expose dense glacially consolidated soil at the western edge and southeastern corner of the building and compressible glacial recessional deposits everywhere else. The glacially consolidated soil is suitable for foundation support, but the glacial recessional deposits are not. These varying foundation subgrade conditions below the building will require different foundation systems to mitigate differential settlement.
- In our opinion, the building can be supported on shallow foundations that bear on 1) glacially consolidated soil; 2) structural fill that replaces unsuitable soil; or 3) improved ground.
- Within a small area of the building footprint, there are zones of saturated glacial recessional deposits at depth that are susceptible to soil liquefaction during a design level earthquake. The liquefaction-susceptible area has been defined and bounded after multiple rounds of exploration and analysis. In this area, ground improvement will be necessary to mitigate (i.e. to eliminate) the potential for liquefaction triggering.
- Excavations could encounter perched groundwater and zones of seepage that can be managed with sumps and pumps. Contaminated soil and groundwater derived from the excavations will need to comply with environmental management protocols in accordance with a future Contaminated Media Management Plan (CMMP) that will be prepared and submitted to Ecology, prior to construction.

3.1 Earthquake Engineering

The Site is located within a region of active tectonic forces associated with the interaction of the offshore Juan de Fuca Plate, the Pacific Plate, and the onshore North American Plate. Seismic hazards include strong ground shaking from earthquakes associated with the Seattle Fault Zone (SFZ), the Cascadia Subduction Zone (CSZ), and deep intraslab earthquakes. The Site will experience strong ground shaking during earthquakes that the building will be designed to withstand in accordance with the applicable building codes.

3.1.1 Ground Response

Seismic design for the building will be in accordance with the 2015 Seattle Building Code (SBC) which references the 2015 International Building Code (IBC; ICC, 2015) and the American Society of Civil Engineers (ASCE) Standard ASCE/SEI 7-10, *Minimum Design Loads for Buildings and Other Structures* (ASCE, 2010). In accordance with these codes, seismic design for the building will consider a “Maximum Considered

Earthquake" (MCE) ground motion with a 2 percent probability of exceedance in 50 years, or a return period of 2,475 years.

The effects of Site-specific subsurface conditions on the earthquake ground motion at the ground surface are determined based on the "Site Class." The Site Class is correlated to the average standard penetration resistance (N-value) or average shear wave velocity in the upper 100 feet of the soil profile.

We have identified a small area of the Site below the building footprint that is susceptible to soil liquefaction (see Section 3.1.2). Ground improvement using rammed aggregate piers (see Section 3.3.1) will be used in this area to eliminate potential for liquefaction triggering. With this, the soil profile for the entire South Block Site can be classified as Seismic Site Class D (Stiff Soil Profile). The seismic design parameters in accordance with these codes, and adjusted for Site Class D, are presented in Table 1.

Table 1. Seismic Design Parameters

Parameter	Recommended Value
Site Class	D – "Stiff Soil"
Short Period Spectral Acceleration, S_s (g)	1.402
1-Second Period Spectral Acceleration, S_1 (g)	0.541
Site Coefficient (F_a)	1.0
Site Coefficient (F_v)	1.5
Design Short Period Spectral Acceleration, S_{DS} (g)	0.935
Design 1-Second Period Spectral Acceleration, S_{D1} (g)	0.541

Note: Parameters based on the latitude and longitude of the Site: 47.58691°N, 122.30422°W

3.1.2 Liquefaction Susceptibility

Soil liquefaction occurs when loose, saturated, and relatively cohesionless soil deposits temporarily lose strength and stiffness as a result of earthquake ground shaking. Potential effects of soil liquefaction at the Site include temporary loss of shallow foundation bearing capacity and vertical ground settlement. Primary factors controlling the triggering of soil liquefaction include intensity and duration of strong ground motion, characteristics of subsurface soils, *in situ* stress conditions, and the depth to groundwater.

We evaluated liquefaction susceptibility at the Site through an extensive subsurface exploration program consisting of multiple phases of CPT soundings and drilled borings. The explorations were advanced on relatively close spacings to aid in our evaluation and delineation areas of liquefiable and non-liquefiable soil at the Site.

We used the data from the explorations and CPT- and SPT-based liquefaction triggering procedures within the LiquefyPro computer software program (CivilTech, 2012) to evaluate the potential for liquefaction triggering during the MCE ground motion. To process the CPT data and remove anomalous high and low data points, we used a 3-foot moving average of corrected tip resistance values. For SPT-based liquefaction triggering procedures, the field-recorded N-values were corrected for overburden and hammer efficiency using hammer efficiency information provided by the drilling subcontractor (the hammer used was 96 percent efficient based on dynamic testing).

Our analyses identified relatively thin, discrete layers of saturated, granular glacial recessional deposits that are susceptible to soil liquefaction during the design level MCE ground motion. A summary of the explorations and depth ranges where soils with high liquefaction potential are present are shown in Table 2. We have defined the liquefaction susceptible area in plan view as shown on Figure 3.

Table 2. Liquefaction Analysis Summary

Exploration ID	Depth Range of Liquefiable Soils (feet)
AC-CPT-12S	29 to 34
AC-CPT-14S	19 to 20.5
AC-CPT-32S	18.5 to 22

3.2 Groundwater Inflow

Excavations for foundations could encounter isolated and discontinuous zones of perched groundwater that will need to be managed during construction. We expect that groundwater inflow from these zones can be managed using sumps and pumps and active construction dewatering will not be required. Contaminated groundwater that flows into the excavations will need to be managed and treated prior to discharge, as permitted by the applicable agency.

3.3 Building Foundations

Based on review of foundation plans provided by the project structural engineer, we have determined that the glacially consolidated soil unit exists at depths varying from 0 to 34 feet below the planned footing bottoms. The glacially consolidated soil is suitable for building support.

However, the glacially consolidated soil is overlain by relatively compressible recessional deposits which are not suitable for building support. Where these compressible soils will exist below the footings, one of the following options will be necessary:

1. Deepening the footings to bear directly on glacially consolidated soils
2. Removing and replacing the compressible/unsuitable soil below foundations with structural fill, or
3. *In situ* ground improvement below foundations

From our collaboration with the design team, options (2) and (3) will be implemented. We have determined where foundations will be supported on glacially consolidated soil and/or structural fill and where ground improvement below foundations will be necessary, as shown on Figure 3.

3.3.1 Ground Improvement

Ground improvement consists of modifying weak or marginal *in situ* soils to create a stiffer soil mass with improved engineering characteristics—specifically, higher bearing capacity, lower compressibility, and decreased resistance to liquefaction. Ground improvement is typically achieved through densification and/or replacement of a portion of the *in situ* soils with stiffer materials. Based on the subsurface conditions and coordination with the Project team, rammed aggregate piers (RAPs) are preferred for ground improvement.

3.3.1.1 Rammed Aggregate Piers

Rammed Aggregate Piers (RAPs) consist of columns of compacted angular crushed rock installed within a soil mass. The RAPs are typically 20 to 30 inches in diameter and can be installed by drilled shaft excavation methods or by using displacement methods. The displacement method utilizes a vibrating mandrel/tamper head that advances through the *in situ* soil profile to create a shaft extending vertically to the desired depth. The displacement and/or vibration densifies and improves the surrounding soil. Once the desired shaft depth is reached, the mandrel/tamper head is retracted as crushed rock is injected and compacted in lifts.

When the RAPs are installed below foundations, their high stiffness relative to the surrounding soil attract more of the applied foundation loads, thereby reducing the load imposed on the surrounding compressible soil and resulting in increased bearing capacity and reduced settlement. When used to mitigate liquefaction, the installation of the RAP elements densifies the surrounding soil and increases its resistance to liquefaction triggering. The RAP elements also serve as drains to aid in the dissipation of excess pore pressures that develop during earthquake shaking.

When RAPs are used to control foundation settlement, they are installed directly beneath the foundations and typically do not extend beyond the edges of the foundations. When RAPs are used to mitigate liquefaction, they are typically installed in a tightly spaced grid pattern and would extend outside of foundation areas (such as floor slabs) where liquefiable soils are present.

Aspect is completing the ground improvement design to meet these performance requirements:

- Less than 1 inch of total settlement
- Less than 0.5 inches of differential settlement over a horizontal distance of 50 feet
- Allowable bearing pressure of 5 kips per square foot (ksf)
- Elimination of liquefaction susceptibility through densification

The ground improvement narrative, design calculations, drawings, and specifications will be submitted under a separate cover.

3.3.2 Allowable Bearing Pressure

In collaboration with the project structural engineer, the building foundations will be designed for the same allowable bearing pressure regardless of subgrade conditions. This will be achieved with shallow foundations bearing directly on (1) undisturbed glacially consolidated soil, (2) structural fill that replaces unsuitable soil or is used to backfill remedial excavations), or (3) RAP-improved ground. For these conditions, the foundations can be designed for an allowable design bearing pressure of 5 kips per square foot (ksf). The allowable bearing pressure may be increased by one third for short-duration loading, such as wind and seismic loading.

3.3.3 Settlement

We estimate foundations designed and constructed in accordance with our recommendations will experience average total settlements of 1 inch or less. Differential settlements between adjacent column footings will be less than about 0.5 inch. Differential settlement along continuous strip footings can be assumed to be approximately 0.5 inches per 50 feet of footing length. Total and differential settlement will occur rapidly as building loads are applied during construction and no long-term settlement is expected.

3.3.4 Footing Size and Embedment

Continuous wall footings and isolated spread footings should have minimum widths of 24 inches. Exterior footings should be embedded at least 18 inches below the lowest adjacent grade and interior footings should be embedded at least 12 inches below the top of the adjacent floor slab. All footings should be located outside of a 1H:1V (horizontal:vertical) prism projected upward and outward from the bottom of adjacent footings and utility trenches.

3.3.5 Lateral Resistance

Lateral loads will be resisted through passive soil resistance against embedded portions of foundations and frictional resistance along the base of the foundations. We recommend using the allowable passive equivalent fluid densities and base friction coefficients presented in Table 3 to calculate resistance to lateral loads.

Table 3. Lateral Resistance for Shallow Foundations

Foundation Subgrade	Allowable Equivalent Fluid Pressure (pcf)	Allowable Base Friction Coefficient
Undisturbed Glacially Consolidated Soil, Structural Fill, or Improved Ground	250	0.36

The values presented above include a factor of safety of 1.5.

3.4 Slab-on-Grade Floors

The existing fill, glacial recessional deposits, and glacially consolidated soils—if prepared in accordance with our recommendations in Section 4.3.2—will provide suitable support for slabs-on-grade. Concrete slabs-on-grade should be designed in accordance with the American Concrete Institute (ACI) Committee 360 Guide to Design of Slabs-on-Ground (ACI, 2010). We recommend the floor slab be underlain with 6 inches of free-draining, crushed rock or well-graded sand and gravel to provide a capillary break and uniform support. The capillary break material should have a maximum particle size of 3/4 inch, with no more than 80 percent passing the No. 4 sieve and less than 5 percent fines (material passing the U.S. Standard No. 200 sieve). In areas where moisture will be detrimental to floor coverings or equipment inside the proposed structures, a 10-mil polyethylene vapor barrier should be placed directly over the capillary break. The vapor barrier should be installed in accordance with the manufacturer's recommendations.

For slabs that are designed as beam-on-elastic foundation, a modulus of subgrade reaction of 200 pounds per cubic inch (pci) may be assumed for design for slabs underlain by a capillary break placed directly over glacially consolidated soils. For slabs underlain by a capillary break placed over structural fill or glacial recessional deposits, a subgrade modulus of 100 pci may be assumed for design. Considering the variable subgrade conditions across the building footprint, it may be structurally convenient to use the lower value, 100 pci for design of slabs-on-grade.

3.5 Subsurface Drainage

3.5.1 Perimeter Foundations

All perimeter foundations should be provided with drainage system consisting of a 4-inch-diameter (minimum), perforated or slotted, Schedule 40 PVC drainpipe surrounded by at least 6 inches of washed gravel meeting the requirements for City of Seattle Mineral Aggregate Type 5, Type 9, Type 28, or WSDOT Standard Specification 9-03.12(4) for Gravel Backfill for Drains. The perimeter foundation drainpipes should include cleanouts for periodic maintenance and should be routed to an approved outlet in a tightline pipe.

3.5.2 Other Drainage Recommendations

Final grades around the building should be sloped such that surface water drains away from the buildings. We recommend that the perimeter foundation drains and the roof downspout lines operate independently (i.e., they are not connected) to reduce the potential for flooding and clogging.

4 Earthwork Considerations and Recommendations

We expect that excavation can be accomplished with standard construction equipment suited to working in very dense and hard soils, such as large tracked excavations equipped with toothed buckets. The contractor should be prepared to encounter and deal with rubble and debris in the surficial fill, or oversized particles such as cobbles, in the native soil during excavation activities. As stated earlier, contaminated soil and groundwater will need to be managed during construction in accordance with the environmental management protocols that will be outlined in a future CMMP document. Aspect will prepare and submit the CMMP to Ecology, prior to construction.

The following sections present earthwork considerations and recommendations relevant to subgrade preparation and structural fill.

4.1 Temporary Excavation Slopes

In addition to temporary shoring, temporary excavation slopes could be required elsewhere during construction. Temporary excavation and slopes should not exceed the limits specified in the local, state, and federal regulations. The stability of temporary excavations and slopes shall be the responsibility of the contractor. The fill and glacial recessional deposits (typically within the upper 10 to 15 feet of the Site) is classified as Type C Soil, and the underlying glacially consolidated soil (typically below depths of about 10 to 15 feet) is classified as Type A Soil in accordance with the Washington Administrative Code (WAC) 296-155 Part N (WAC, 2016). Temporary excavation slopes in Type A and C Soils are anticipated to stand as steep as 0.75H:1V (horizontal:vertical) and 1.5H:1V, respectively. The presence of seepage may require that temporary excavation slopes be flattened to remain stable.

We also recommend the following:

- Surface water should be diverted away from slopes.
- Slopes should be protected using plastic sheet, flash coating, or tarps to control erosion and stability, as necessary.
- The duration that excavations or slopes are open should be minimized.
- Traffic, equipment, and material stockpiles should not be allowed near the top of excavations or slopes.
- The conditions of the excavations and slopes should be periodically observed by a competent person who is a representative of the contractor to evaluate safety and stability.

4.2 Subgrade Preparation

4.2.1 Foundations

Foundation subgrades should be observed by Aspect prior to placing steel and pouring concrete to verify they have been prepared in conformance with our recommendations. Foundation subgrades should be firm and unyielding and clear of all construction debris, loose or disturbed soil, and standing water prior to foundation construction. Soft or disturbed foundation subgrade areas identified during evaluation should be removed to expose undisturbed soils and/or replaced with structural fill material appropriate for the design bearing pressures.

Where overexcavation and replacement with structural fill will occur below foundations, the width of the over-excavation should encompass a 1:1 prism projected downward and outward from the edges of the foundations if soil is used for structural fill. If lean mix is used as structural fill, the limits of the over-excavation need not extend beyond the edges of the foundations (i.e., over-excavations can be neat cut).

4.2.2 Slabs-on-Grade and Pavements

Slab-on-grade and pavement subgrade preparation should be observed and evaluated by a representative of Aspect prior to placement of the capillary break or pavement section. All subgrades should be firm and unyielding under the proof-rolling load of heavy rubber-tired equipment where accessible and should be clear of any loose or disturbed soil or standing water. Disturbed or soft subgrade areas identified during evaluation should be removed and replaced with appropriate structural fill material.

4.3 Structural Fill

Soils placed beneath or around foundations, walls, utilities, slabs-on-grade, or below pavements should be considered structural fill. For these fill areas, we provide the following recommendations:

- Site-derived soils are not suitable for reuse as structural fill due to their high fines (material passing the U.S. No. 200 sieve) content and moisture sensitivity. All materials derived from Site excavations should be exported to a suitable disposal site.
- Structural fill to be used below and around foundations should consist of material meeting the requirements for Gravel Backfill for Foundations, Class A (City of Seattle, 2020), or lean mix concrete.
- Structural fill to be used as base course below new pavements should consist of material meeting the requirements for Mineral Aggregate Type 2 (City of Seattle, 2020).
- Structural fill should only be placed on a relatively firm and unyielding subgrade.
- Structural fill should be compacted to a relatively firm and unyielding condition to a minimum density of 95 percent of the maximum dry density as determined by ASTM International (ASTM) D1557 (ASTM, 2018). Structural fill placed

behind walls should be compacted to between 90 to 92 percent of the maximum dry density to avoid overstressing the walls.

- Structural fill should be placed in lifts with a loose thickness no greater than 12 inches when using relatively large compaction equipment, such as a vibrating plate attached to an excavator (hoe pack) or a vibratory smooth drum roller. If small, hand-operated compaction equipment is used to compact structural fill, lifts should not exceed 6 inches in loose thickness.
- Moisture content of the structural fill should be controlled to within 2 to 3 percent of the optimum moisture. Optimum moisture is the moisture content corresponding to the maximum modified proctor dry density.
- Fill placed in softscape, general grading, landscape, or common areas that are not beneath or around structures, utilities, slabs-on-grade, or below paved areas that can accommodate some settlement should be compacted to a relatively firm and unyielding condition.

4.3.1 Utility Bedding and Backfill

General recommendations for bedding of utilities and backfill of utility trenches include:

- Materials to be used for utility bedding should meet the requirements for Mineral Aggregate Type 22 (City of Seattle, 2020), or as specified in the Standard Specification section applicable to the type of pipe being installed.
- Prior to installation of the pipe, the bedding material should be shaped to fit the lower portion of the pipe exterior with reasonable closeness to provide continuous support along the pipe.
- Bedding placed around the pipe should be placed in layers and tamped around the pipe to obtain complete contact. Pipe bedding material should be used as trench backfill to at least 6 inches above the crown of the pipe, for the full width of the trench. In areas where a trench box is used, the bedding material should be placed before the trench box is advanced.
- Trench backfill should meet the requirements for Structural Fill as described in Section 4.3 of this report. During placement of the initial lifts, the trench backfill material should not be bulldozed into the trench or dropped directly on the pipe. Furthermore, heavy vibratory equipment should not be permitted to operate over the pipe until at least 2 feet of backfill has been placed.

4.4 Temporary Erosion and Sedimentation Control

Temporary erosion control measures should be implemented to prevent the migration of soil, dust, and turbid water off-Site or into stormwater systems. Such measures should include silt fences and straw wattles at the Site boundary, silt socks in nearby catch basins, wetting exposed soil during dry periods, and quarry spalls and wheel wash stations at truck and equipment exits.

4.5 Wet Weather Construction

The soils at the Site are moisture sensitive and may be difficult to handle, prepare, or compact with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions, we provide the following recommendations:

- Earthwork should be performed in small areas to minimize exposure to wet weather. It may be necessary to limit the size and type of construction equipment used in order to prevent soil disturbance.
- Excavations for foundations, floor slabs, and pavements should be covered or protected (with concrete or structural fill) following approval of the subgrade by Aspect and should not be left open and exposed.
- Material used as structural fill during wet weather conditions should be clean, granular soil with less than 5 percent fines. This is an additional restriction on structural fill recommendations provided in Section 4.3.
- The ground surface within the construction area should be sealed by a smooth drum vibratory roller (or equivalent) and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials.
- Excavation and placement of fill should be observed by Aspect to verify that all unsuitable materials are removed, and suitable compaction is achieved.
- Local best management practices (BMPs) for erosion protection should be strictly followed.

5 References

American Concrete Institute (ACI) Committee 360, 2010, Guide to Design of Slabs-on-Ground.

American Society of Civil Engineers (ASCE), 2010, ASCE Standard ASCE/SEI 7-10, Minimum Design Loads for Buildings and Other Structures.

ASTM International (ASTM), 2018, 2018 Annual Book of ASTM Standards, West Conshohocken, Pennsylvania.

City of Seattle, 2020, Standard Specifications for Road, Bridge, and Municipal Construction.

CivilTech, 2012, LiquefyPro, version 5.8n

Goldsmith Land Development Services (Goldsmith), 2020, Topography and S.I.P Survey for Grand Street Commons, Sheets 1 through 7, April 2020.

Troost, K.G., D.B. Booth, A.P. Wisher, S.A. Shimel, 2005, The Geologic Map of Seattle – a Progress Report, U.S. Geological Survey, Open-File Report 2005-1252.

Washington State Legislature, 2016, Washington Administrative Code (WAC), May 20, 2016.

6 Limitations

Work for this project was performed for Grand Street Commons, LLC (Client), and this report was prepared consistent with recognized standards of professionals in the same locality and involving similar conditions, at the time the work was performed. No other warranty, expressed or implied, is made by Aspect Consulting, LLC (Aspect).

Recommendations presented herein are based on our interpretation of site conditions, geotechnical engineering calculations, and judgment in accordance with our mutually agreed-upon scope of work. Our recommendations are unique and specific to the project, site, and Client. Application of this report for any purpose other than the project should be done only after consultation with Aspect.

Variations may exist between the soil and groundwater conditions reported and those actually underlying the site. The nature and extent of such soil variations may change over time and may not be evident before construction begins. If any soil conditions are encountered at the site that are different from those described in this report, Aspect should be notified immediately to review the applicability of our recommendations.

Risks are inherent with any site involving slopes and no recommendations, geologic analysis, or engineering design can assure slope stability. Our observations, findings, and opinions are a means to identify and reduce the inherent risks to the Client.

It is the Client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, and agents, are made aware of this report in its entirety. At the time of this report, design plans and construction methods have not been finalized, and the recommendations presented herein are based on preliminary project information. If project developments result in changes from the preliminary project information, Aspect should be contacted to determine if our recommendations contained in this report should be revised and/or expanded upon.

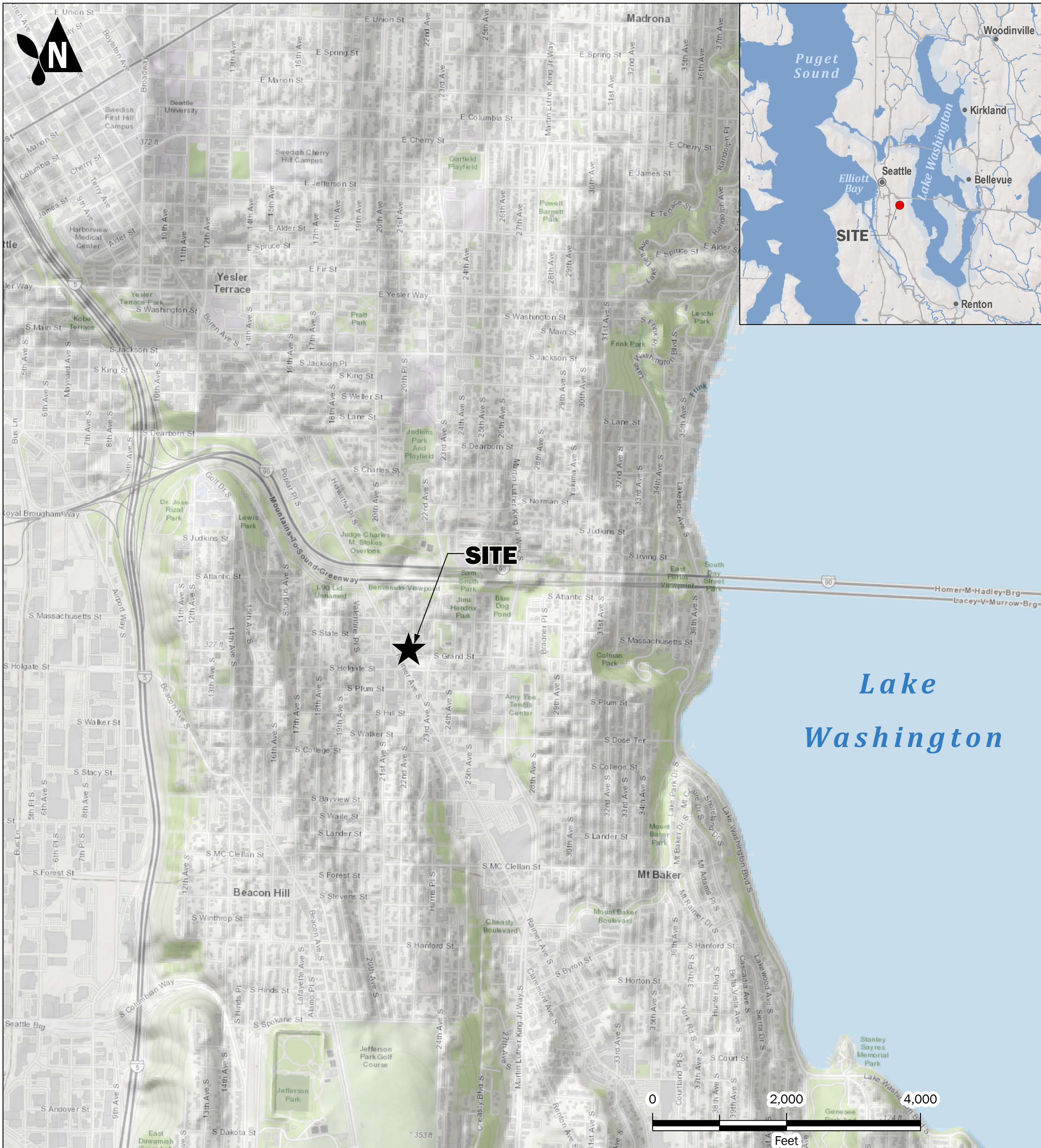
The scope of work does not include services related to construction safety precautions. Site safety is typically the responsibility of the contractor, and our recommendations are not intended to direct the contractor’s site safety methods, techniques, sequences, or procedures. The scope of our work also does not include the assessment of environmental characteristics, particularly those involving potentially hazardous substances in soil or groundwater.

All reports prepared by Aspect for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect. Aspect’s original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix D titled “Report Limitations and Guidelines for Use” for additional information governing the use of this report.

We appreciate the opportunity to perform these services. If you have any questions, please call Eric Schellenger, PE, Geotechnical Engineer, at 206-780-7745.

FIGURES



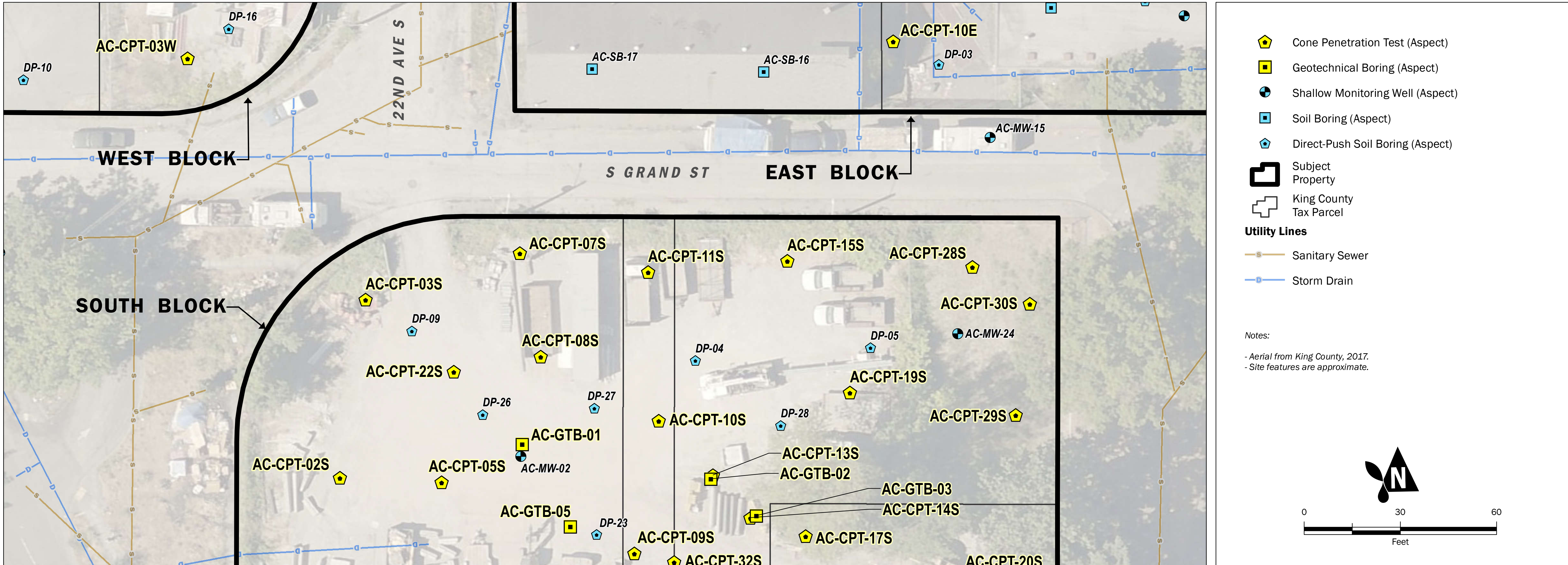
GIS Path: T:\projects_8\MBHA_Belshaw_170304\Delivered\GeotechReports_2020\SouthBlock\01 Site Location Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 2020-10-27 || User: trullen || Print Date: 2020-10-27

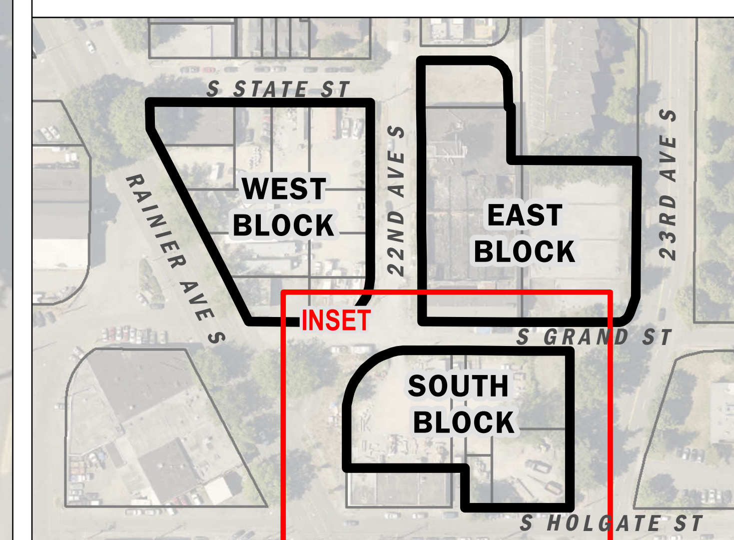
Site Location Map

Grand Street Commons South
S Grand St and 22nd Ave S
Seattle, Washington

Aspect CONSULTING	NOV-2020	BY: ES / TDR	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: ---	1

Basemap Layer Credits || Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

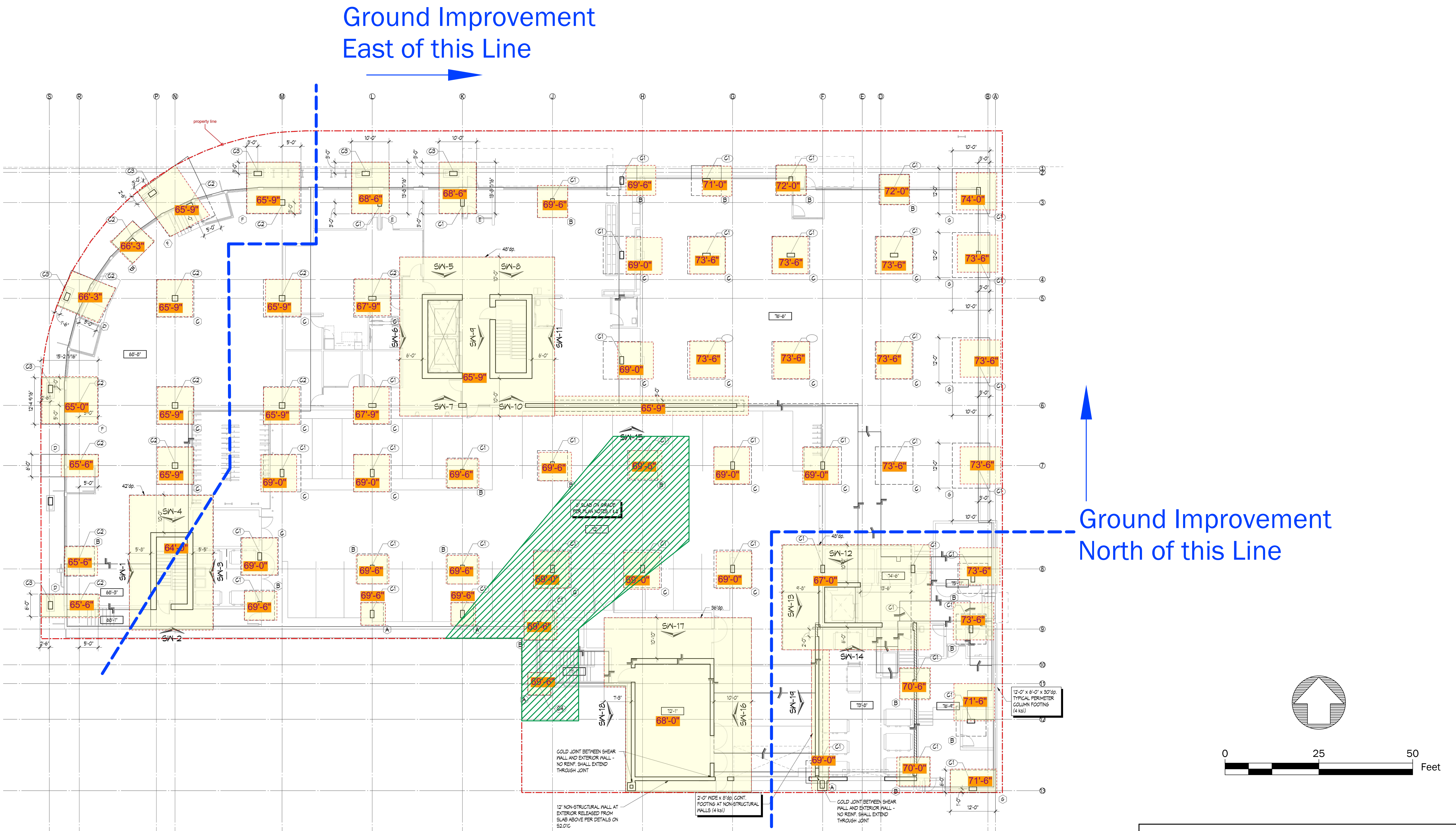




Site Plan

Grand Street Commons South
S Grand St and 22nd Ave S
Seattle, Washington

Aspect CONSULTING	NOV-2020	BY: ES / TDR	FIGURE NO.
	PROJECT NO. 170304	REVISED BY: - - -	2



Legend

Liquefaction Mitigation Area

Source: Base PDF provided by Coughlin Porter Lundeen, dated April 23, 2020.

Ground Improvement Extents

Grand Street Commons South
S Grand St and 22nd Ave S
Seattle, Washington

Aspect CONSULTING	Nov-2020	BY: ECS/CMV	FIGURE NO. 3
	PROJECT NO. 160324	REVISED BY: -	

CAD Path: Q:\MBHA Development\170304 Grand Street Commons\2020-09 Shoring Design\South Ground Improvements\170304-03.dwg Fig 3 || Date Saved: Nov 17, 2020 11:01am || User: cvanslyke

APPENDIX A

Subsurface Explorations

A.1 Field Exploration Program

A.1.1 Hollow-Stem Auger Borings

Between August 2017 and September 2020, Aspect Consulting, LLC (Aspect) completed eight machine-drilled borings (designated with prefixes AC-MW, AC-SB, and AC-GTB) at the Site. The machine-drilled borings were advanced with hollow-stem auger drilling methods using truck-mounted drill rigs operated by Cascade Drilling and Holocene Drilling, Inc under subcontract to Aspect.

In the machine-drilled borings, disturbed soil samples were obtained by driving either a 1) 2-inch split barrel sampler a distance of 18 inches into the soil with a 140-pound hammer free-falling a distance of 30 inches or 2) a 3-inch split-barrel sampler (Dames & Moore sampler) a distance of 18 inches into the soil with a 300-pound hammer free-falling a distance of 30 inches. The number of blows required to drive the sampler 18 inches is recorded in three 6-inch intervals. The number of blows required to drive the sampler the last two intervals is known as the blow count. The blow count provides a measure of relative density or consistency of granular and cohesive soils, respectively. The blow counts obtained from driving a 3-inch split barrel sampler a distance of 18 inches with a 300-pound hammer is roughly equivalent to the blow count or “N-value” obtained from driving a 2-inch split barrel sampler a distance of 18 inches with a 140-pound hammer in accordance with ASTM D1586, *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils.*

An Aspect staff geologist or engineer was present throughout the exploration program to observe the drilling procedures, assist in sampling, and to prepare descriptive logs of the explorations. Soils were identified in general accordance with ASTM D2488, *Standard Practice for Description and Identification of Soils* (*Visual-Manual Procedure)* (ASTM, 2018). The summary exploration logs represent our interpretation of the contents of the field logs. The stratigraphic contacts shown on the individual summary logs represent the approximate boundaries between soil types; actual transitions may be more gradual. The subsurface conditions depicted are only for the specific date and locations reported, and therefore, are not necessarily representative of other locations and times.

Upon completion, the machine-drilled borings were either completed as 2-inch monitoring wells or backfilled with 3/8-inch bentonite chips in accordance with requirements of the Washington State Department of Ecology.

A.1.2 Cone Penetration Test Soundings

In September 2019, September 2020, and November 2020, Aspect completed 32 cone penetration test (CPT) soundings (designated AC-CPT-01S through AC-CPT-32S) at the Site. The CPT soundings were completed using truck-mounted CPT rigs operated by ConeTec under subcontract to Aspect.

The CPT soundings were completed in accordance with ASTM D5778, *Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils*. The CPT is conducted by pushing steel rods with an instrumented tip that collects continuous data as the tip is advanced through the subsurface. The data collected includes a measure of soil resistance to penetration of by the tip, a measure of frictional resistance of the soil developed along the friction sleeve, and pore water pressure. The data provides information by which soil type and relative density/consistency may be correlated, as well as groundwater information. A detailed CPT investigation data report with CPT logs and raw data obtained from the soundings is presented in this appendix.

Major Division	Subdivision	Fines	Symbol	Group Name
Coarse-Grained Soils - More than 50%[1] Retained on No. 200 Sieve	Gravels - More than 50%[1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines	**GW**	Well-graded GRAVEL Well-graded GRAVEL WITH SAND
			GP	Poorly-graded GRAVEL Poorly-graded GRAVEL WITH SAND
		≥15% Fines	**GM**	SILTY GRAVEL SILTY GRAVEL WITH SAND
			GC	CLAYEY GRAVEL CLAYEY GRAVEL WITH SAND
	Sands - 50%[1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines	**SW**	Well-graded SAND Well-graded SAND WITH GRAVEL
			SP	Poorly-graded SAND Poorly-graded SAND WITH GRAVEL
		≥15% Fines	**SM**	SILTY SAND SILTY SAND WITH GRAVEL
			SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL
Fine-Grained Soils - 50%[1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50%		**ML**	SILT SANDY or GRAVELLY SILT SILT WITH SAND SILT WITH GRAVEL
			CL	LEAN CLAY SANDY or GRAVELLY LEAN CLAY LEAN CLAY WITH SAND LEAN CLAY WITH GRAVEL
			OL	ORGANIC SILT SANDY or GRAVELLY ORGANIC SILT ORGANIC SILT WITH SAND ORGANIC SILT WITH GRAVEL
	Silts and Clays Liquid Limit 50% or More		**MH**	ELASTIC SILT SANDY or GRAVELLY ELASTIC SILT ELASTIC SILT WITH SAND ELASTIC SILT WITH GRAVEL
			CH	FAT CLAY SANDY or GRAVELLY FAT CLAY FAT CLAY WITH SAND FAT CLAY WITH GRAVEL
			OH	ORGANIC CLAY SANDY or GRAVELLY ORGANIC CLAY ORGANIC CLAY WITH SAND ORGANIC CLAY WITH GRAVEL
Highly Organic Soils			**PT**	PEAT and other mostly organic soils

"WITH SILT" or "WITH CLAY" means 5 to 15% silt and clay, denoted by a "-" in the group name; e.g., SP-SM • "SILTY" or "CLAYEY" means >15% silt and clay • "WITH SAND" or "WITH GRAVEL" means 15 to 30% sand and gravel. • "SANDY" or "GRAVELLY" means >30% sand and gravel. • "Well-graded" means approximately equal amounts of fine to coarse grain sizes • "Poorly graded" means unequal amounts of grain sizes • Group names separated by "/" means soil contains layers of the two soil types; e.g., SM/ML.

Soils were described and identified in the field in general accordance with the methods described in ASTM D2488. Where indicated in the log, soils were classified using ASTM D2487 or other laboratory tests as appropriate. Refer to the report accompanying these exploration logs for details.

1. Estimated or measured percentage by dry weight
2. (SPT) Standard Penetration Test (ASTM D1586)
3. Determined by SPT, DCPT (ASTM STP399) or other field methods. See report text for details.

GEOTECHNICAL LAB TESTS

MC	=	Natural Moisture Content
PS	=	Particle Size Distribution
FC	=	Fines Content (% < 0.075 mm)
GH	=	Hydrometer Test
AL	=	Atterberg Limits
C	=	Consolidation Test
Str	=	Strength Test
OC	=	Organic Content (% Loss by Ignition)
Comp	=	Proctor Test
K	=	Hydraulic Conductivity Test
SG	=	Specific Gravity Test

CHEMICAL LAB TESTS

Organic Chemicals

BTEX	=	Benzene, Toluene, Ethylbenzene, Xylenes
TPH-Dx	=	Diesel and Oil-Range Petroleum Hydrocarbons
TPH-G	=	Gasoline-Range Petroleum Hydrocarbons
VOCs	=	Volatile Organic Compounds
SVOCs	=	Semi-Volatile Organic Compounds
PAHs	=	Polycyclic Aromatic Hydrocarbon Compounds
PCBs	=	Polychlorinated Biphenyls

Metals

RCRA8	=	As, Ba, Cd, Cr, Pb, Hg, Se, Ag, (d = dissolved, t = total)
MTCA5	=	As, Cd, Cr, Hg, Pb (d = dissolved, t = total)
PP-13	=	Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, Zn (d=dissolved, t=total)

FIELD TESTS

PID	=	Photoionization Detector
Sheen	=	Oil Sheen Test
SPT[2]	=	Standard Penetration Test
NSPT	=	Non-Standard Penetration Test
DCPT	=	Dynamic Cone Penetration Test

COMPONENT DEFINITIONS

Descriptive Term		***Size Range and Sieve Number***
Boulders	=	Larger than 12 inches
Cobbles	=	3 inches to 12 inches
Coarse Gravel	=	3 inches to 3/4 inches
Fine Gravel	=	3/4 inches to No. 4 (4.75 mm)
Coarse Sand	=	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	=	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	=	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	=	Smaller than No. 200 (0.075 mm)

ESTIMATED[1] PERCENTAGE

% by Weight		***Modifier***	***% by Weight***		***Modifier***
<1	=	Subtrace	15 to 25	=	Little
1 to <5	=	Trace	30 to 45	=	Some
5 to 10	=	Few	>50	=	Mostly

MOISTURE CONTENT

Dry	=	Absence of moisture, dusty, dry to the touch
Slightly Moist	=	Perceptible moisture
Moist	=	Damp but no visible water
Very Moist	=	Water visible but not free draining
Wet	=	Visible free water, usually from below water table

RELATIVE DENSITY

Non-Cohesive or Coarse-Grained Soils

Density[3]		***SPT[2] Blows/Foot***	***Penetration with 1/2" Diameter Rod***
Very Loose	=	0 to 4	≥ 2'
Loose	=	5 to 10	1' to 2'
Medium Dense	=	11 to 30	3" to 1'
Dense	=	31 to 50	1" to 3"
Very Dense	=	> 50	< 1"

CONSISTENCY

Cohesive or Fine-Grained Soils

Consistency[3]		***SPT[2] Blows/Foot***	***Manual Test***
Very Soft	=	0 to 1	Penetrated >1" easily by thumb. Extrudes between thumb & fingers.
Soft	=	2 to 4	Penetrated 1/4" to 1" easily by thumb. Easily molded.
Medium Stiff	=	5 to 8	Penetrated >1/4" with effort by thumb. Molded with strong pressure.
Stiff	=	9 to 15	Indented ~1/4" with effort by thumb.
Very Stiff	=	16 to 30	Indented easily by thumbnail.
Hard	=	> 30	Indented with difficulty by thumbnail.

GEOLOGIC CONTACTS

Observed and Distinct | Observed and Gradual | Inferred

Aspect CONSULTING

Exploration Log Key

AI Path: Q:_ACAD Standards\FIELD REFERENCE\MASTERS\Exploration Log Key-2018.ai // user: jinman // last saved: 12/31/2018

Aspect CONSULTING	GSC South Liquefaction Study - 200456			Geotechnical Exploration Log	
	Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2			47.5867, -122.3037	**AC-GTB-01**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface Elev. (NAVD88)*	
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop		70'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Matt	Hollow Stem Auger	9/25/2020		NA	19.8' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								FILL GRAVEL (GP); approximately 12 inches of surficial gravel.	
1	69							SANDY SILT (ML); soft, moist, mottled gray to dark brown; low plasticity; fine sand; trace fine, angular to subrounded gravel; trace charcoal and organics.	1
2	68	Boring backfilled with bentonite chips							2
3	67								3
4	66								4
5	65		S-1		2 1 2				5
6	64			▲ (3)					6
7	63								7
8	62							**GLACIAL RECESSIONAL DEPOSITS** CLAY (CL); stiff, moist, brown; medium plasticity.	8
9	61								9
10	60		S-2		3 6 5				10
11	59			▲ (11)				2-inch-thick interbed of very moist, silty sand.	11
12	58								12
13	57								13
14	56								14

Legend

Sample Type:
- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├──┤ Liquid Limit

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-01

GSC South Liquefaction Study - 200456		Geotechnical Exploration Log	
Project Address & Site Specific Location: S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2		Coordinates (Lat,Lon WGS84): 47.5867, -122.3037	Exploration Number: AC-GTB-01
Contractor: Holocene Drilling, Inc	Equipment: Mobile B-58	Sampling Method: Autohammer; 140 lb hammer; 30" drop	Ground Surface Elev. (NAVD88): 70'
Operator: Matt	Exploration Method(s): Hollow Stem Auger	Work Start/Completion Dates: 9/25/2020	Top of Casing Elev. (NAVD88): NA
			Depth to Water (Below GS): 19.8' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/6"	Tests	Description
			S-3	4 9 11		SILTY SAND (SM); medium dense, moist, gray brown; fine to medium sand; very faint, horizontal iron-oxide banding; pockets of sandy silt; subtrace small organic fragments.
16	54					Becomes very moist.
17	53		S-4	9 9 11		Becomes with trace, fine subrounded gravel; slow dilatancy.
18	52		S-5	11 12 16		Becomes with fine to coarse sand.
19	51					
20	50	9/25/2020 Measured through augers immediately after drilling	S-6	14 30 48		**GLACIALLY CONSOLIDATED SOIL** SILTY SAND (SM); very dense, very moist, brown; fine to coarse sand; few fine, subangular to subrounded gravel; pockets of sandy silt.
21	49		S-7	24 50/6"		
22	48		S-8	29 35 50/3"		Becomes wet.
23	47					
24	46					
25	45		S-9	22 35 50/5"		
26	44					Bottom of exploration at 26.5 ft. bgs.
27	43					
28	42					
29	41					

Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Plastic Limit ⊢⊣ Liquid Limit

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-01

GSC South Liquefaction Study - 200456

Geotechnical Exploration Log

Project Address & Site Specific Location	Coordinates (Lat,Lon WGS84)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2	47.5867, -122.3035	AC-GTB-02

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop	72'

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Matt	Hollow Stem Auger	9/25/2020	NA	19.5' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ●	Blows/6"	Tests	Material Type	Description
0–1	72–71						GP	**FILL** GRAVEL (GP); approximately 12 inches of surificial gravel.
1	71						ML	SANDY SILT WITH GRAVEL (ML); loose, wet, mottled dark brown with white spotting; low plasticity; fine to coarse sand; fine, angular to subrounded gravel; trace organics.
2	70	Boring backfilled with bentonite chips						
3	69							
4	68							
5	67		S-1 (SPT)		5, 2, 2			
6	66		No Soil Sample Recovery	▲				
7	65							
8	64						CL	**GLACIAL RECESSIONAL DEPOSITS** CLAY (CL); stiff, moist to very moist, brown with gray spotting and minor iron-oxide staining; medium plasticity; thin sand interbeds (<1-inch-thick).
9	63							
10	62		S-2 (SPT)		3, 4, 5			
11	61			▲				
12	60							
13	59							
14	58							

Plastic Limit ├──┤ Liquid Limit

Legend

Sample Type:
- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)

Water Level:
- Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-02

Project Address & Site Specific Location	Coordinates (Lat,Lon WGS84)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2	47.5867, -122.3035	AC-GTB-02

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop	72'

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Matt	Hollow Stem Auger	9/25/2020	NA	19.5' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/6"	Tests	Description
15–16.5	57–55.5		S-3	4, 1, 2		**GLACIAL RECESSIONAL DEPOSITS** CLAY (CL); stiff, moist to very moist, brown with gray spotting and minor iron-oxide staining; medium plasticity; thin sand interbeds (<1-inch-thick). (continued) Becomes soft with 1 to 2-inch thick interbeds of wet, gray brown silty sand.
16.5–18			S-4	1, 2, 2		
18–19.5			S-5	4, 8, 12		
19	53					SILTY SAND (SM); medium dense, very moist, gray brown; fine to coarse sand; slow dilatancy.
19.5–21		⊽ 9/25/2020 Inferred from sample moisture	S-6	7, 8, 9		
21–22.5			S-7	5, 9, 10		Becomes wet with subtrace small organic fragments.
22.5–24			S-8	5, 8, 9		Becomes with trace, fine, subangular to subrounded gravel and rapid dilatancy.
24–25.5			S-9	3, 7, 15		
25.5–27			S-10	10, 13, 16		
27–28.5			S-11	9, 12, 16		
28.5–30			S-12	9, 12, 15		

Depth/Elev. scale: 16 – 56; 17 – 55; 18 – 54; 19 – 53; 20 – 52; 21 – 51; 22 – 50; 23 – 49; 24 – 48; 25 – 47; 26 – 46; 27 – 45; 28 – 44; 29 – 43

Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50

Material Type

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├─┤ Liquid Limit

Water Level: ⊽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

GSC South Liquefaction Study - 200456

Geotechnical Exploration Log

Project Address & Site Specific Location	Coordinates (Lat,Lon WGS84)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2	47.5867, -122.3035	AC-GTB-02

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop	72'

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Matt	Hollow Stem Auger	9/25/2020	NA	19.5' (ATD)

Depth (feet)	Elev. (feet)	Sample Type/ID	Blows/6"	Description
30–31.5	42–40.5	S-13	5, 13, 28	**GLACIALLY CONSOLIDATED SOIL** SILTY SAND (SM); dense, wet, gray brown; fine to coarse sand; few fine, subangular to subrounded gravel.
31.5–35	40.5–37	S-14	14, 50/6"	SILTY GRAVEL WITH SAND (GM); very dense, wet, gray brown; fine to coarse, subangular to subrounded gravel; fractured gravels observed; fine to coarse sand.
35–36	37–36	S-15	17, 28, 50/5"	SILTY SAND (SM); dense, wet, gray brown; fine to coarse sand; few fine, subangular to subrounded gravel.
36–36.5	36–35.5			SANDY SILT (ML); very dense, very moist, gray; nonplastic; fine to coarse sand; few fine, subangular to subrounded gravel; diamict texture.
36.5				Bottom of exploration at 36.5 ft. bgs.

Depth scale: 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44 (Elev. 41, 40, 39, 38, 37, 36, 35, 34, 33, 32, 31, 30, 29, 28)

Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├─┤ Liquid Limit

Water Level: Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-02

GSC South Liquefaction Study - 200456

Geotechnical Exploration Log

Aspect CONSULTING

Project Address & Site Specific Location	Coordinates (Lat,Lon WGS84)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2	47.5866, -122.3035	AC-GTB-03

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop	72'

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Matt	Hollow Stem Auger	9/25/2020	NA	22' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								FILL GRAVEL (GP); approximately 12 inches of surificial gravel.	
1	71							SANDY SILT (ML); loose, moist, dark brown with white and light blue staining; low plasticity; fine to coarse sand; trace organics.	1
2	70	Boring backfilled with bentonite chips							2
3	69								3
4	68								4
5	67		S-1		3 4 2				5
6	66			▲					6
7	65								7
8	64							**GLACIAL RECESSIONAL DEPOSITS** SILT (ML); loose, moist, light brown with gray spotting and minor iron-oxide staining; low plasticity.	8
9	63								9
10	62		S-2		2 3 5				10
11	61			▲					11
12	60								12
13	59								13
14	58								14

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├──┤ Liquid Limit

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-03

Aspect CONSULTING	GSC South Liquefaction Study - 200456			Geotechnical Exploration Log	
	Project Address & Site Specific Location			Coordinates (Lat,Lon WGS84)	Exploration Number
	S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2			47.5866, -122.3035	AC-GTB-03
Contractor	Equipment	Sampling Method		Ground Surface Elev. (NAVD88)	
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop		72'	
Operator	Exploration Method(s)	Work Start/Completion Dates		Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Matt	Hollow Stem Auger	9/25/2020		NA	22' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ●	Blows/6"	Tests	Material Type	Description	Depth (ft)
			S-3		7 9 13			SILTY SAND (SM); medium dense, moist, light brown; fine to medium sand.	
16	56			▲					16
			S-4		8 9 10			Becomes gray brown with trace fine, subangular to subrounded gravel.	
17	55			▲					17
18	54		S-5		6 7 9			Becomes very moist with subtrace small organic fragments.	18
19	53			▲					19
20	52		S-6	▲	6 8 9			Becomes wet with slow dilatancy.	20
21	51		S-7		5 7 9				21
22	50	∇ 9/25/2020 Measured through augers ~30 minutes after drilling		▲					22
23	49		S-8	▲	9 33 46			**GLACIALLY CONSOLIDATED SOIL** SILTY SAND WITH GRAVEL (SM); very dense, very moist, gray; fine to coarse sand; fine to coarse, subangular to subrounded gravel; diamict texture.	23
24	48								24
25	47		S-9	▲	28 50/6"				25
26	46							Bottom of exploration at 26 ft. bgs.	26
27	45								27
28	44								28
29	43								29

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├──┤ Liquid Limit

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-03

Aspect CONSULTING	GSC South Liquefaction Study - 200456			Geotechnical Exploration Log	
	Project Address & Site Specific Location: S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2			Coordinates (Lat,Lon WGS84): 47.5865, -122.3035	Exploration Number: AC-GTB/MW-04
Contractor: Holocene Drilling, Inc	Equipment: Mobile B-58	Sampling Method: Autohammer; 140 lb hammer; 30" drop		Ground Surface Elev. (NAVD88): 72'	Ecology Well Tag No. BMP 823
Operator: Matt	Exploration Method(s): Hollow Stem Auger	Work Start/Completion Dates: 9/25/2020		Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): 19.6' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ●	Blows/6"	Tests	Description	Depth (ft)
0	72	8-inch-diameter steel monument set in concrete; 2-inch-diameter PVC pipe set in concrete					GRAVEL (GP); approximately 12 inches of surificial gravel.	
1	71	2-inch-diameter PVC pipe set in concrete					**FILL** SANDY SILT (ML); loose, moist, mottled gary to dark brown; low plasticity; fine to coarse sand; trace organics.	1
2	70	2-inch-diameter PVC pipe set in concrete						2
3	69						Drill action suggests gravel.	3
4	68	2-inch-diameter PVC pipe set in sand						4
5	67	2-inch-diameter PVC pipe set in bentonite chips	S-1		5, 3, 2			5
5.5							**GLACIAL RECESSIONAL DEPOSITS** SILTY SAND (SM); loose, moist, gray with iron-oxide staining; fine to coarse sand; trace fine, subangular gravel.	
6	66		No Soil Sample Recovery	▲ 5				6
7	65							7
8	64							8
9	63							9
10	62		S-2		8, 6, 7		CLAY WITH SAND (CL); sitff, moist, light brown with gray spotting and minor iron-oxide staining; medium plasticity; thin sand interbeds (<1-inch-thick).	10
11	61			▲ 13				11
12	60							12
13	59							13
14	58							14

Legend

Sample Type:
- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├─┤ Liquid Limit

Water Level:
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB/MW-04

GSC South Liquefaction Study - 200456

Geotechnical Exploration Log

Project Address & Site Specific Location	Coordinates (Lat,Lon WGS84)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2	47.5865, -122.3035	AC-GTB/MW-04

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)	Ecology Well Tag No.
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop	72'	BMP 823

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Matt	Hollow Stem Auger	9/25/2020	NA	19.6' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/6"	Tests	Description
15–16	57–56		S-3	9 6 9		SILTY SAND (SM); medium dense, moist, light brown; fine to medium sand.
17.5–18	54.5–54	2-inch-diameter PVC pipe set in sand	S-4	9 11 12		Becomes gray brown with faint iron-oxide banding.
19.5	52.5	∇ 9/25/2020 Measured in well prior to well development. Water was added during drilling				
20	52		S-5	7 8 9		Becomes wet with fine to coarse sand and trace fine, subangular gravel.
22	50	2-inch-diameter perforated PVC pipe set in sand				
22.5	49.5		S-6	5 8 11		Becomes with rapid dilatancy and pockets of sandy silt.
25	47		S-7	9 12 16		
27.5	44.5		S-8	9 11 26		

Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50

Plastic Limit ├──┤ Liquid Limit

Legend

Sample Type: ○ No Soil Sample Recovery; ◩ Split Barrel 2" X 1.375" (SPT)

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB/MW-04

Aspect CONSULTING	GSC South Liquefaction Study - 200456			Geotechnical Exploration Log	
	Project Address & Site Specific Location: S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2			Coordinates (Lat,Lon WGS84): 47.5865, -122.3035	Exploration Number: AC-GTB/MW-04
Contractor: Holocene Drilling, Inc	Equipment: Mobile B-58	Sampling Method: Autohammer; 140 lb hammer; 30" drop		Ground Surface Elev. (NAVD88): 72'	Ecology Well Tag No. BMP 823
Operator: Matt	Exploration Method(s): Hollow Stem Auger	Work Start/Completion Dates: 9/25/2020		Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): 19.6' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/6"	Tests	Description
		sand placed below perforated PVC pipe	S-9	7, 7, 14		SILTY SAND (SM); medium dense, moist, light brown; fine to medium sand. (continued)
31	41					
32	40					
33	39		S-10	7, 7, 28		
34	38					Becomes with few fine, subrounded to subangular gravel.
35	37		S-11	7, 15, 22		
36	36					
37	35					
38	34		S-12	18, 30, 33		**GLACIALLY CONSOLIDATED SOIL** SILTY SAND WITH GRAVEL (SM); very dense, very moist, gray; fine to coarse sand; fine to coarse, subangular to subrounded gravel; diamict texture.
39	33					
40	32		S-13	28, 27, 30		
41	31					Bottom of exploration at 41.5 ft. bgs.
42	30					
43	29					
44	28					

Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Plastic Limit — Liquid Limit

Water Level: Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB/MW-04

Aspect CONSULTING	GSC South Liquefaction Study - 200456			Geotechnical Exploration Log	
	Project Address & Site Specific Location: S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2			Coordinates (Lat,Lon WGS84): 47.5866, -122.3037	Exploration Number: **AC-GTB-05**
Contractor: Holocene Drilling, Inc	Equipment: Mobile B-58	Sampling Method: Autohammer; 140 lb hammer; 30" drop		Ground Surface Elev. (NAVD88): 70'	
Operator: Matt	Exploration Method(s): Hollow Stem Auger	Work Start/Completion Dates: 9/25/2020		Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): 21.5' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								FILL GRAVEL (GP); approximately 12 inches of surificial gravel.	
1	69							SILTY SAND (SM); loose, moist, mottled gray brown; fine to coarse sand.	1
2	68	Boring backfilled with bentonite chips							2
3	67								3
4	66								4
5	65		S-1		1 2 2				5
6	64			▲				SANDY SILT (ML); loose, moist, dark brown; low plasticity; fine sand.	6
7	63								7
8	62								8
9	61								9
10	60		S-2		3 3 5			**GLACIAL RECESSIONAL DEPOSITS** SANDY SILT (ML); loose, very moist, light brown with gray spotting and minor iron-oxide staining; low plasticity; slow dilatancy.	10
11	59			▲				SILT (ML); loose, moist, light brown with gray spotting and minor iron-oxide staining; low plasticity.	11
12	58								12
13	57								13
14	56								14

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├──┤ Liquid Limit

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-05

Sheet 1 of 2

Aspect Consulting	GSC South Liquefaction Study - 200456			Geotechnical Exploration Log	
	Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2			47.5866, -122.3037	**AC-GTB-05**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface Elev. (NAVD88)*	
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop		70'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Matt	Hollow Stem Auger	9/25/2020		NA	21.5' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/6"	Tests	Description
			S-3	2, 1, 2		CLAY WITH SAND (CL); soft, moist, brown; medium plasticity; thin sand interbeds (<1-inch-thick).
16	54					
17	53					
			S-4	2, 8, 5		SILTY SAND (SM); medium dense, very moist, gray brown; fine to coarse sand; trace fine, subangular to subrounded gravel; slow dilatancy.
18	52					
19	51					
20	50		S-5	5, 7, 9		No gravel observed.
21	49					Becomes wet.
		9/25/2020 Measured through augers immediately after drilling				
22	48					
			S-6	12, 17, 36		
23	47					
						GLACIALLY CONSOLIDATED SOIL SILTY SAND WITH GRAVEL (SM); very dense, very moist, gray; fine to coarse sand; fine to coarse, subangular to subrounded gravel.
24	46					
25	45		S-7	20, 37, 42		SANDY SILT (ML); very dense, very moist, gray; nonplastic; fine to coarse sand.; few fine, subangular to subrounded gravel; diamict texture.
26	44					
						Bottom of exploration at 26.5 ft. bgs.
27	43					
28	42					
29	41					

Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Plastic Limit ⊢—⊣ Liquid Limit

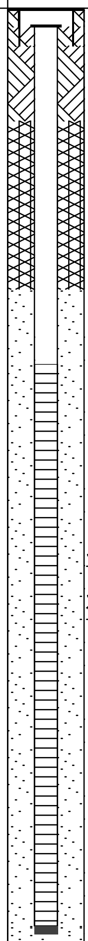
Water Level: Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-05

Aspect CONSULTING	Grand Street Commons - 170304			Monitoring Well Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block			E:1277578 N:217468	**AC-MW-02**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	Ecology Well Tag No. BKA 325
Cascade	CME 75 truck rig	300-lb autohammer w/ Dames & Moore sampler		70'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Curtis	Hollow Stem Auger	8/28/2017		69.4'	14.9' (Static)



Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	70	Flush 8-inch-diameter monument				**FILL** Loose, dry, gray, sandy GRAVEL (GP); coarse gravel; fine to medium sand.
		2-inch-diamter PVC casing in concrete	Split Barrel		Blows/ft (non-SPT)= 12 Sheen= None Odor= None PID= <1 ppm	Medium dense, moist, dark brown, silty to very silty SAND (SM); fine to medium sand, trace gravel, trace wood debris.
5	65	2-inch-diameter PVC casing in bentonite chips	Split Barrel	Chemically Analyzed	Blows/ft (non-SPT)= 4 Sheen= Moderate Odor= slight diesel PID= 5 ppm	Soft, moist, dark brown, sandy SILT (ML); fine to medium sand, trace coarse sand, with organics and wood debris.
10	60		Split Barrel	Chemically Analyzed	Blows/ft (non-SPT)= 8 Sheen= None Odor= None PID= <1 ppm	**GLACIAL RECESSIONAL DEPOSITS** Medium stiff, moist, brown, CLAY (CL); medium plasticity.
15	55	slotted screen in sand 3/1/2020 6/25/2019 11/15/2017	Split Barrel		Blows/ft (non-SPT)= 13 Sheen= None Odor= None PID= <1 ppm	
20	50		Split Barrel		Blows/ft (non-SPT)= 28 Sheen= None Odor= None PID= <1 ppm	**GLACIALLY CONSOLIDATED SOIL** Medium dense, very moist, gray-brown, sandy, silty GRAVEL (GM); fine to medium sand: fine to coarse subrounded gravel; pockets of sandy silt. Becomes wet
25	45		Split Barrel		Blows/ft (non-SPT)= 50 Sheen= None Odor= None PID= <1 ppm	Hard, slightly moist, gray, sandy SILT (ML); low plasticity, fine to medium sand, trace coarse sand and fine gravel. Bottom of exploration at 25 ft. bgs.
30	40					
35	35					
40	30					

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

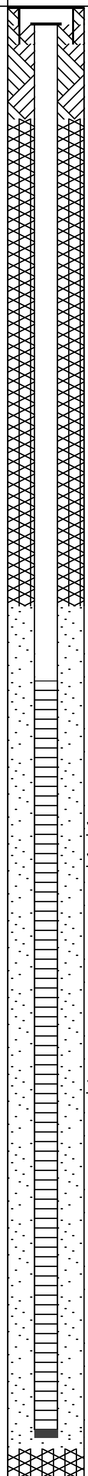
Exploration Log AC-MW-02

Sheet 1 of 1

Aspect CONSULTING

Grand Street Commons - 170304	Monitoring Well Log	
Project Address & Site Specific Location	*Coordinates (SPN NAD83 ft)*	*Exploration Number*
S Grand St and 22nd Ave S - Seattle, WA, South Block	E:1277712 N:217504 (est)	**AC-MW-24**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	Ecology Well Tag No.
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	76.88'(est)	BLK 090
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
James Goble	Hollow Stem Auger	5/16/2019	77.29'	22.12' (Static)



Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Analytical Sample Number & Lab Test(s)	Field Tests	Description
0	75	Expansion plug; Flush-mount well box in concrete			**FILL** Very loose, moist, dark brown, silty SAND (SM); fine to coarse sand; trace roots and other organics; trace charcoal fragments.
5	70	2 inch diam Sch 40 PVC casing	Chemically Analyzed	Blows (non-SPT)= 2,3,3 Sheen= None Odor= None PID= <1 ppm	**GLACIAL RECESSIONAL DEPOSITS** Medium stiff, moist, gray brown, CLAY (CL); medium to high plasticity.; trace organics; thin beds of silty sand.
10	65	Hydrated bentonite chips	Chemically Analyzed	Blows (non-SPT)= 12,15,21 Sheen= None Odor= None PID= <1 ppm	Becomes hard
15	60	12x20 sand	Chemically Analyzed	Blows (non-SPT)= 13,15,15 Sheen= None Odor= None PID= <1 ppm	
20	55	2 inch diam Sch 40 PVC screen 0.01 inch slot; 3/1/2020; 6/25/2019		Blows (non-SPT)= 21,29,22 Sheen= None Odor= None PID= <1 ppm	**GLACIALLY CONSOLIDATED SOIL** Hard, moist, gray, sandy SILT (ML); fine to medium sand, trace coarse; trace fine to coarse gravel.
25	50			Blows (non-SPT)= 31,50/6 Sheen= None Odor= None PID= <1 ppm	Becomes diamict fabric
30	45	5/16/2019	Chemically Analyzed	Blows (non-SPT)= 39,50/6 Sheen= None Odor= None PID= <1 ppm	Very dense, wet, gray brown, silty SAND (SM); fine to medium sand; trace fine gravel; pockets of sandy silt; diamict fabric.
35	40			Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	
40				Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm	Hard, moist, gray brown, sandy SILT (ML); non-elastic; fine to coarse sand. Bottom of exploration at 39.5 ft. bgs.

Legend

Sample Method: No Soil Sample Recovery; Split Barrel 3.25" X 2.375" (D&M)

Water Level: Static Water Level; Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-MW-24

Sheet 1 of 1

Aspect CONSULTING

Grand Street Commons - 170304

Environmental Exploration Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, South Block	E:217390.9 N:1277680 (est)	AC-SB-21

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)
Cascade Drilling	CME 75 truck rig	Downhole jars, 300 lb hammer, 30-inch drop	73'(est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
James Goble	Hollow Stem Auger	5/16/2019	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0	73	Concrete surface seal				**FILL** Loose, moist, brown, silty SAND (SM); fine to medium sand; trace fine gravel.	
	70						
5			Split Barrel	Chemically Analyzed	Blows (non-SPT)= 5,4,6 Sheen= None Odor= None PID= <1 ppm	**GLACIAL RECESSIONAL DEPOSITS** Loose, moist, brown, silty SAND (SM); fine to medium sand; trace fine gravel; thin beds of sandy silt.	5
	65						
10		Borehole backfilled with hydrated bentonite chips	Split Barrel / No Recovery	Chemically Analyzed	Blows (non-SPT)= 10,20,20 Sheen= None Odor= None PID= <1 ppm	**GLACIALLY CONSOLIDATED SOIL** Dense, moist, gray-brown, silty SAND (SM); fine to medium sand; diamict fabric.	10
	60						
15			Split Barrel / No Recovery	Chemically Analyzed	Blows (non-SPT)= 32,50/6 Sheen= None Odor= None PID= <1 ppm	Very hard, moist, gray, sandy SILT (ML); low plasticity; fine to coarse sand; trace gravel; pockets of silty sand; diamict fabric.	15
	55						
20			Split Barrel		Blows (non-SPT)= 50/6 Sheen= None Odor= None PID= <1 ppm		20
	50						
25			Split Barrel		Blows (non-SPT)= 34,50/5 Sheen= None Odor= None PID= <1 ppm	Very dense, very moist, gray, silty SAND (SM); fine to coarse sand.	25
	45						
30			Split Barrel		Blows (non-SPT)= 39,50/5 Sheen= None Odor= None PID= <1 ppm	Hard, moist, gray-brown, sandy SILT (ML); low to medium plasticity; fine to coarse sand; diamict fabric.	30
	40						
35			Split Barrel		Blows (non-SPT)= 27,20,20 Sheen= None Odor= None PID= <1 ppm	Dense, moist, gray, silty SAND (SM); fine to coarse sand; trace fine to coarse gravel; diamict fabric, post-depositionally disturbed.	35
	35		Split Barrel		Blows (non-SPT)= 17,22,25 Sheen= None Odor= None PID= <1 ppm		
40						Bottom of exploration at 39.5 ft. bgs.	40

Legend

Sample Method
- No Soil Sample Recovery
- Split Barrel 3.25" X 2.375" (D&M)

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

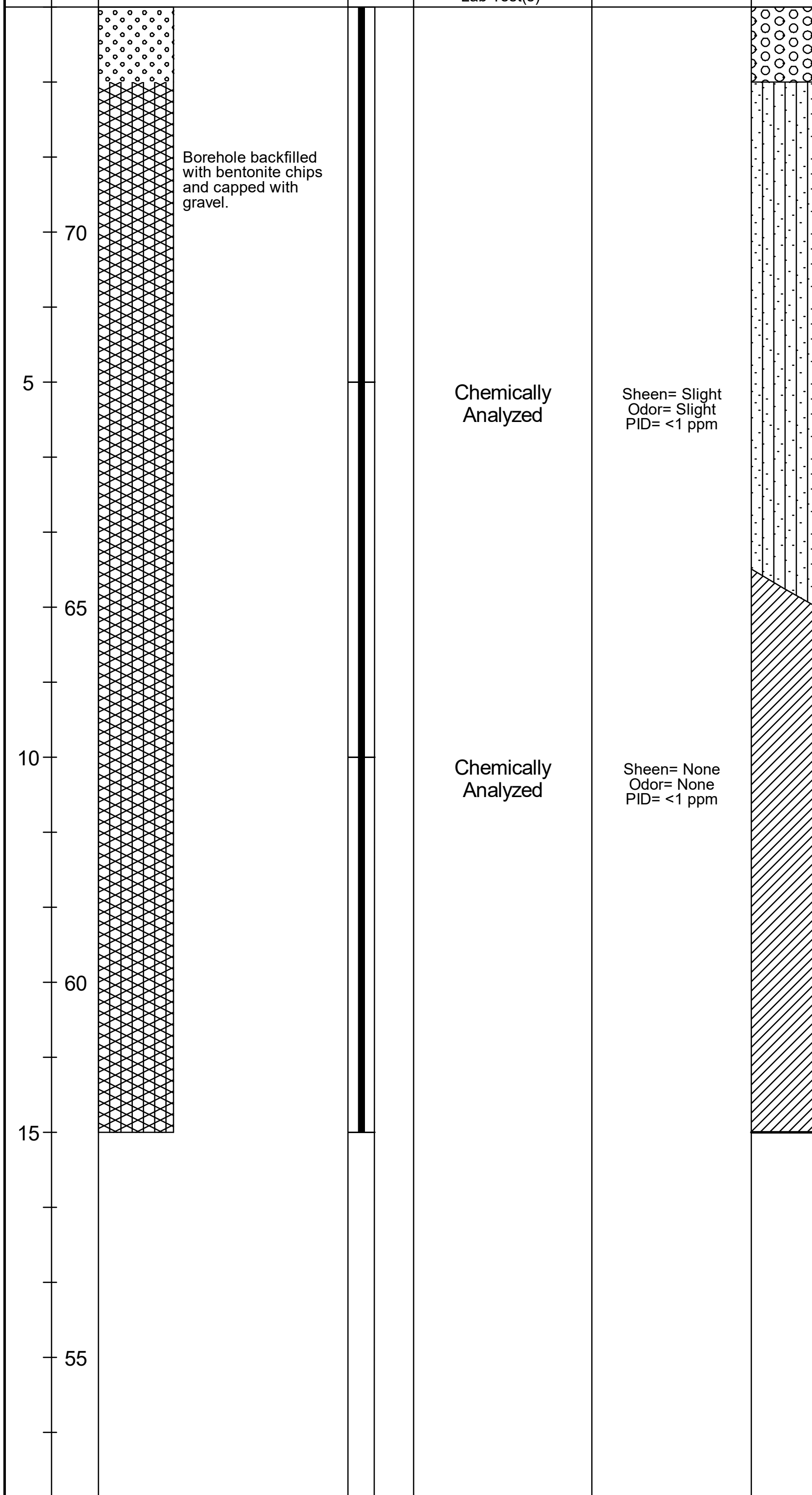
Logged by: FK
Approved by: MvA 4/28/2020

Exploration Log AC-SB-21

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block			E:1277626 N:217497 (est)	**DP-04**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	Direct push rig	Percussion hammer		73'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/5/2017		NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	73						**FILL** Moist, gray, GRAVEL (GP); fine to coarse angular gravel.	
1	72	Borehole backfilled with bentonite chips and capped with gravel.					Moist, gray, brown, slightly gravelly, silty SAND (SM); fine to medium sand; fine to coarse gravel; trace brick and wood debris.	
5				Chemically Analyzed	Sheen= Slight Odor= Slight PID= <1 ppm			5
8	65						**GLACIAL RECESSIONAL SOILS** Moist, brown, CLAY (CL); low plasticity.	
10				Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			10
15							Bottom of exploration at 15 ft. bgs.	15



Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-04

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block			E:1277681 N:217500 (est)	**DP-05**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	Direct push rig	Percussion hammer		75'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/5/2017		NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
							FILL Moist, gray, GRAVEL (GP); fine to coarse, angular gravel.	
		Borehole backfilled with bentonite chips and capped with gravel.					Moist, gray and brown, slightly gravelly, silty SAND (SM); fine to medium sand, trace organics.	
5	70			Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			5
							GLACIAL RECESSIONAL SOILS Moist, brown, CLAY (CL); low plasticity.	
10	65			Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			10
							GLACIALLY CONSOLIDATED SOILS Moist, gray, gravelly, silty SAND (SM); fine to medium sand; fine subrounded to rounded gravel.	
15	60				Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 15 ft. bgs.	15

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-05

Sheet 1 of 1

Aspect CONSULTING

Grand Street Commons - 170304	Environmental Exploration Log	
Project Address & Site Specific Location	*Coordinates (SPN NAD83 ft)*	*Exploration Number*
S Grand St and 22nd Ave S - Seattle, WA, South Block	E:1277668 N:217397 (est)	DP-06

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*
Cascade	Direct push rig	Percussion hammer	73'(est)
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*
Tim	Direct push	9/5/2017	NA

Depth to Water (Below GS): No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
0–1						**FILL** Moist, gray, GRAVEL (GP); fine to coarse, angular gravel.	
1–8	70	Borehole backfilled with bentonite chips and capped with gravel.				Moist, gray and brown, slightly gravelly, silty SAND (SM); fine to medium sand; trace organics.	
5				Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm		5
8–13.5	65					**GLACIAL RECESSIONAL SOILS** Moist, brown, CLAY (CL); low plasticity.	
10					Sheen= None Odor= None PID= <1 ppm		10
13.5–15	60					**GLACIALLY CONSOLIDATED SOILS** Moist, gray, silty SAND (SM); fine to medium sand; few fine, subrounded to rounded gravel.	
15					Sheen= None Odor= None PID= <1 ppm	Bottom of exploration at 15 ft. bgs.	15
	55						

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-06

Sheet 1 of 1

OLD STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\GRAND STREET COMMONS - 170304.GPJ November 13, 2020

Environmental Exploration Log

Aspect CONSULTING

Grand Street Commons - 170304	Coordinates (SPN NAD83 ft)	Exploration Number
Project Address & Site Specific Location: S Grand St and 22nd Ave S - Seattle, WA, South Block	E:1277583 N:217417 (est)	DP-07

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)
Cascade	Direct push rig	Percussion hammer	70'(est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Tim	Direct push	9/5/2017	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0–1							**FILL** Moist, gray, GRAVEL (GP); fine to coarse, angular gravel.	
1–6		Borehole backfilled with bentonite chips and capped with gravel.					Moist, gray and brown, slightly gravelly, silty SAND (SM); fine to medium sand; trace burnt wood debris.	
5	65			Chemically Analyzed	Sheen= Slight Odor= None PID= <1 ppm			5
6–12							**GLACIAL RECESSIONAL SOILS** Moist, brown, CLAY (CL); low plasticity.	
10	60			Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			10
12–15							**GLACIALLY CONSOLIDATED SOILS** Moist, gray, gravelly, silty SAND (SM); fine to medium sand; fine, subrounded to rounded gravel.	
15	55				Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 15 ft. bgs.	15

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-07

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			Coordinates (SPN NAD83 ft)	Exploration Number
	S Grand St and 22nd Ave S - Seattle, WA, South Block			E:1277515 N:217428 (est)	DP-08
Contractor	Equipment	Sampling Method		Ground Surface (GS) Elev. (NAVD88)	
Cascade	Direct push rig	Percussion hammer		69'(est)	
Operator	Exploration Method(s)	Work Start/Completion Dates		Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Tim	Direct push	9/5/2017		NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0–1							**FILL** Moist, gray, GRAVEL (GP); angular fine to coarse gravel.	
1–4		Borehole backfilled with bentonite chips and capped with gravel.					Moist, brown, slightly gravelly, silty SAND (SM); fine to medium sand; fine to coarse, subrounded gravel.	
4–7	65						**GLACIAL RECESSIONAL SOILS** Moist, brown, CLAY (CL); low plasticity.	
5				Chemically Analyzed	Sheen= Slight Odor= None PID= <1 ppm			5
7–15	60						**GLACIALLY CONSOLIDATED SOILS** Moist, gray, gravelly, silty SAND (SM); fine to medium sand; fine, subrounded to rounded gravel.	
10				Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm			10
	55							
15					Sheen= None Odor= None PID= <1 ppm		Bottom of exploration at 15 ft. bgs.	15
	50							

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log DP-08

Sheet 1 of 1

OLD STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\GRAND STREET COMMONS - 170304.GPJ November 13, 2020

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block			E:1277538 N:217508 (est)	**DP-09**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade	Direct push rig	Percussion hammer		70'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim	Direct push	9/5/2017		NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Description	Depth (ft)
						FILL Moist, gray, GRAVEL (GP); angular fine to coarse gravel.	
		Borehole backfilled with bentonite chips and capped with gravel.				**GLACIAL RECESSIONAL SOILS** Moist, brown, CLAY (CL); low plasticity.	
				Chemically Analyzed	Sheen= Slight Odor= None PID= <1 ppm		
5	65					**GLACIALLY CONSOLIDATED SOILS** Moist, gray, silty SAND (SM); fine to medium sand.	5
10	60			Chemically Analyzed	Sheen= None Odor= None PID= <1 ppm		10
15	55				Sheen= None Odor= None PID= <1 ppm	Bottom of exploration at 15 ft. bgs.	15

Legend

Sample Method: Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: FK
Approved by: DHM 1/11/2018

Exploration Log
DP-09
Sheet 1 of 1

OLD STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\GRAND STREET COMMONS - 170304.GPJ November 13, 2020

Environmental Exploration Log

Aspect CONSULTING

Grand Street Commons - 170304

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, South Block	E:217441.4 N:1277600 (est)	**DP-23**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)
Cascade Drilling	Geoprobe 7822DT	Percussion hammer	70'(est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Tim Dabner	Direct push	4/5/2019	NA	12' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		Borehole backfilled with bentonite chips		Chemically Analyzed			**FILL** Moist, gray, brown, black, and red, silty SAND (SM); crushed rock; concrete, asphalt, and brick debris.	
							GLACIAL RECESSIONAL SOILS Moist, brown and gray mottled, SILT (ML); low plasticity.	
5	65			Chemically Analyzed				5
							Becomes medium plasticity	
10	60			Chemically Analyzed				10
		∇ 4/5/2019					Wet, brown, silty SAND (SM); fine to medium sand	
							Moist, brown, sandy SILT (ML); low to medium plasticity; fine sand.	
15	55						Bottom of exploration at 15 ft. bgs.	15
20	50							20
25	45							25
30	40							30
35	35							35
40	30							40

Legend

Sample Method: No Soil Sample Recovery; Continuous core 1.85" ID

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: Mv
Approved by: MvA 4/28/2020

Exploration Log DP-23

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block			E:217414.9 N:1277630 (est)	**DP-24**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	Geoprobe 7822DT	Percussion hammer		73'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim Dabner	Direct push	4/5/2019		NA	13' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0–5	70	Borehole backfilled with bentonite chips		Chemically Analyzed			**FILL** Moist, gray, brown, black, and red, silty SAND (SM); crushed rock; concrete, asphalt, and brick debris.	
5				Chemically Analyzed			**GLACIAL RECESSIONAL SOILS** Moist, gray and brown mottled, SILT (ML); low plasticity.	5
	65							
10				Chemically Analyzed			Becomes medium plasticity	10
	60	⊻ 4/5/2019					Wet, brown, silty SAND (SM); fine to medium sand.	
15							Bottom of exploration at 15 ft. bgs.	15
	55							
20								20
	50							
25								25
	45							
30								30
	40							
35								35
	35							
40								40

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ◧ Continuous core 1.85" ID

Water Level
- ⊻ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: Mv
Approved by: MvA 4/28/2020

Exploration Log DP-24

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304	Environmental Exploration Log	
	Project Address & Site Specific Location	*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block	E:217416.2 N:1277560 (est)	**DP-25**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*
Cascade Drilling	Geoprobe 7822DT	Percussion hammer	69'(est)

Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Tim Dabner	Direct push	4/5/2019	NA	7' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0–5	69–64	Borehole backfilled with bentonite chips		Chemically Analyzed			**FILL** Moist, gray, brown, black, and red, silty GRAVEL (GM); crushed rock; concrete, asphalt, and brick debris.	
5	64			Chemically Analyzed			**GLACIAL RECESSIONAL SOILS** Moist, gray and brown mottled, SILT (ML); low plasticity.	5
7	62	∇ 4/5/2019					Becomes wet, dilatant from 7 to 8 ft bgs	
9	60						Becomes medium plasticity	
10				Chemically Analyzed				10
12							Wet, brown, silty SAND (SM); fine to medium sand.	
13	55						Very moist, brown, SILT (ML); low to medium plasticity; with fine sand.	
15							Bottom of exploration at 15 ft. bgs.	15
20	50							20
25	45							25
30	40							30
35	35							35
40	30							40

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ◨ Continuous core 1.85" ID

Water Level
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: Mv
Approved by: MvA 4/28/2020

Exploration Log DP-25

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location: S Grand St and 22nd Ave S - Seattle, WA, South Block			Coordinates (SPN NAD83 ft): E:217479.5 N:1277560 (est)	Exploration Number: **DP-26**
Contractor: Cascade Drilling	Equipment: Direct push rig	Sampling Method: Geoprobe 6600		Ground Surface (GS) Elev. (NAVD88): 70'(est)	
Operator: Brandon Pizzuti	Exploration Method(s): Direct push	Work Start/Completion Dates: 7/3/2019		Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0–5	70–65	Borehole backfilled with bentonite chips		Chemically Analyzed Chemically Analyzed			**FILL** Slightly moist to moist, gray, silty GRAVEL (GM) with sand; fine to coarse sand; fine and coarse gravel. Becomes dark brown Becomes dark brown to black, with wood fragments and organics.	
5	65						**GLACIAL RECESSIONAL SOILS** Moist, tan, SILT (ML); low plasticity. Moist, mottled tan and brown, CLAY (CL); medium plasticity. Moist, brown silty SAND (SM); fine to medium sand.	5
10	60							10
							Bottom of exploration at 12 ft. bgs.	
15	55							15
20	50							20
25	45							25
30	40							30
35	35							35
40	30							40

Legend

Sample Method:
- No Soil Sample Recovery
- Continuous core 1.85" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: Mv
Approved by: MvA 4/28/2020

Exploration Log DP-26

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304			Environmental Exploration Log	
	Project Address & Site Specific Location			*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block			E:217480.8 N:1277600 (est)	**DP-27**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	Direct push rig	Geoprobe 6600		70'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Brandon Pizzuti	Direct push	7/3/2019		NA	12' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0–4.5		Borehole backfilled with bentonite chips	○	Chemically Analyzed			**FILL** Moist, gray brown, silty SAND (SM) with gravel and brick debris; fine to coarse sand; fine angular gravel.	
5	65			Chemically Analyzed			Moist, brown, SILT (ML) with sand and roots; low plasticity; fine to medium sand.	5
			○				**GLACIAL RECESSIONAL SOILS** Moist, gray and tan mottled, CLAY (CL); medium plasticity. Becomes brown and tan mottled.	
10	60						Sandy from 10.5 to 10.6 ft bgs.	10
		∇ 7/3/2019					Becomes wet.	
							Bottom of exploration at 13 ft. bgs.	
15	55							15
20	50							20
25	45							25
30	40							30
35	35							35
40	30							40

Legend

Sample Method
- ○ No Soil Sample Recovery
- Continuous core 1.85" ID

Water Level
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: Mv
Approved by: MvA 4/28/2020

Exploration Log DP-27

Sheet 1 of 1

Aspect CONSULTING

Grand Street Commons - 170304	Environmental Exploration Log	
Project Address & Site Specific Location S Grand St and 22nd Ave S - Seattle, WA, South Block	*Coordinates (SPN NAD83 ft)* E:217474.2 N:1277660 (est)	*Exploration Number* **DP-28**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*
Cascade Drilling	Direct push rig	Geoprobe 6600	70'(est)
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*
Brandon Pizzuti	Direct push	7/3/2019	NA

Depth to Water (Below GS): No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		Borehole backfilled with bentonite chips		Chemically Analyzed			**FILL** Moist, gray brown, silty SAND (SM); fine to coarse sand; fine angular gravel; trace metal and plastic debris.	
5	65			Chemically Analyzed			Brick debris Trace organics	5
							GLACIAL RECESSIONAL SOILS Moist, dark gray, SILT (ML) with sand; low plasticity. Becomes gray and brown mottled	
10	60						Moist, gray and brown mottled, CLAY (CL); medium plasticity.	10
							Bottom of exploration at 12 ft. bgs.	
15	55							15
20	50							20
25	45							25
30	40							30
35	35							35
40	30							40

Legend

Sample Method
- No Soil Sample Recovery
- Continuous core 1.85" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: Mv
Approved by: MvA 4/28/2020

Exploration Log DP-28

Sheet 1 of 1

Aspect CONSULTING	Grand Street Commons - 170304		Environmental Exploration Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block		E:217416.8 N:1277650 (est)	**DP-29**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	
Cascade Drilling	Direct push rig	Geoprobe 6600	70'(est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Brandon Pizzuti	Direct push	7/2/2019	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		Borehole backfilled with bentonite chips		Chemically Analyzed			**FILL** Moist, gray, black, and light brown, silty SAND (SM) with gravel; fine to coarse sand; fine gravel. Becomes gray Becomes black and with roots	
5	65			Chemically Analyzed			**GLACIAL RECESSIONAL SOILS** Moist, blue gray and green, CLAY (CL); medium plasticity; trace organics.	5
							Moist, dark brown, silty SAND (SM); fine to medium sand; with roots.	
							Moist, gray and brown mottled, CLAY (CL) and SILT (ML); medium plasticity; trace fine sand.	
10	60						Becomes light brown	10
							Bottom of exploration at 12 ft. bgs.	
15	55							15
20	50							20
25	45							25
30	40							30
35	35							35
40	30							40

Legend

Sample Method
- No Soil Sample Recovery
- Continuous core 1.85" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: Mv
Approved by: MvA 4/28/2020

Exploration Log DP-29

Sheet 1 of 1

Aspect CONSULTING

GSC South - 200456	Geotechnical Exploration Log	
Project Address & Site Specific Location	*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2	47.5865, -122.3035	**AC-GTB/MW-04**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop	72'	Ecology Well Tag No. BMP 823
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Matt	Hollow Stem Auger	9/25/2020	NA	19.6' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes
0	72	8-inch-diameter steel monument set in concrete; 2-inch-diameter PVC pipe set in concrete
2	70	2-inch-diameter PVC pipe set in concrete
4	68	2-inch-diameter PVC pipe set in sand
5	67	2-inch-diameter PVC pipe set in bentonite chips
18	54	2-inch-diameter PVC pipe set in sand
19.6		9/25/2020 Measured in well prior to well development. Water was added during drilling
22	50	2-inch-diameter perforated PVC pipe set in sand

Sample Type/ID	Depth (ft)	Blows/6"	Tests
S-1	5	5, 3, 2	
S-2	10	8, 6, 7	
S-3	15	9, 6, 9	
S-4	17.5	9, 11, 12	
S-5	20	7, 8, 9	
S-6	22.5	5, 8, 11	

Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50

Description

0 ft: GRAVEL (GP); approximately 12 inches of surificial gravel.

1 ft: **FILL**

SANDY SILT (ML); loose, moist, mottled gary to dark brown; low plasticity; fine to coarse sand; trace organics.

Drill action suggests gravel.

5.5 ft: **GLACIAL RECESSIONAL DEPOSITS**

SILTY SAND (SM); loose, moist, gray with iron-oxide staining; fine to coarse sand; trace fine, subangular gravel.

10 ft: CLAY WITH SAND (CL); sitff, moist, light brown with gray spotting and minor iron-oxide staining; medium plasticity; thin sand interbeds (<1-inch-thick).

15 ft: SILTY SAND (SM); medium dense, moist, light brown; fine to medium sand.

Becomes gray brown with faint iron-oxide banding.

Becomes wet with fine to coarse sand and trace fine, subangular gravel.

Becomes with rapid dilatancy and pockets of sandy silt.

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├─┤ Liquid Limit

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB/MW-04

Aspect CONSULTING	GSC South - 200456			Geotechnical Exploration Log	
	Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2			47.5865, -122.3035	**AC-GTB/MW-04**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface Elev. (NAVD88)*	
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop		72'	Ecology Well Tag No. BMP 823
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Matt	Hollow Stem Auger	9/25/2020		NA	19.6' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
			S-7		9, 12, 16			SILTY SAND (SM); medium dense, moist, light brown; fine to medium sand. (continued)	
26	46								26
27	45								27
28	44		S-8		9, 11, 26				28
29	43								29
30	42	sand placed below perforated PVC pipe	S-9		7, 7, 14				30
31	41								31
32	40								32
33	39		S-10		7, 7, 28			Becomes with few fine, subrounded to subangular gravel.	33
34	38								34
35	37		S-11		7, 15, 22				35
36	36								36
37	35								37
38	34		S-12		18, 30, 33			**GLACIALLY CONSOLIDATED SOIL** SILTY SAND WITH GRAVEL (SM); very dense, very moist, gray; fine to coarse sand; fine to coarse, subangular to subrounded gravel; diamict texture.	38
39	33								39
40	32		S-13		28, 27, 30				40
41	31							Bottom of exploration at 41.5 ft. bgs.	41
42	30								42
43	29								43
44	28								44
45	27								45
46	26								46
47	25								47
48	24								48
49	23								49

Legend

Sample Type:
- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├──┤ Liquid Limit

Water Level: Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB/MW-04

Sheet 2 of 2

GSC South - 200456

Geotechnical Exploration Log

Aspect CONSULTING

Project Address & Site Specific Location		*Coordinates (Lat,Lon WGS84)*	*Exploration Number*	
S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2		47.5867, -122.3037	**AC-GTB-01**	
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop	70'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Matt	Hollow Stem Auger	9/25/2020	NA	19.8' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								FILL GRAVEL (GP); approximately 12 inches of surficial gravel.	
1	69							SANDY SILT (ML); soft, moist, mottled gray to dark brown; low plasticity; fine sand; trace fine, angular to subrounded gravel; trace charcoal and organics.	1
2	68	Boring backfilled with bentonite chips							2
3	67								3
4	66								4
5	65		S-1		2 1 2				5
6	64								6
7	63								7
8	62								8
9	61								9
10	60		S-2		3 6 5			**GLACIAL RECESSIONAL DEPOSITS** CLAY (CL); stiff, moist, brown; medium plasticity.	10
11	59							2-inch-thick interbed of very moist, silty sand.	11
12	58								12
13	57								13
14	56								14
15	55		S-3		4 9 11			SILTY SAND (SM); medium dense, moist, gray brown; fine to medium sand; very faint, horizontal iron-oxide banding; pockets of sandy silt; subtrace small organic fragments.	15
16	54							Becomes very moist.	16
17	53		S-4		9 9 11			Becomes with trace, fine subrounded gravel; slow dilatancy.	17
18	52		S-5		11 12 16			Becomes with fine to coarse sand.	18
19	51								19
20	50	9/25/2020 Measured through augers immediately after drilling	S-6		14 30 48			**GLACIALLY CONSOLIDATED SOIL** SILTY SAND (SM); very dense, very moist, brown; fine to coarse sand; few fine, subangular to subrounded gravel; pockets of sandy silt.	20
21	49		S-7		24 50/6"				21
22	48		S-8		29 35 50/3"				22
23	47							Becomes wet.	23
24	46								24

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├──┤ Liquid Limit

Water Level: Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-01

Aspect CONSULTING	GSC South - 200456			Geotechnical Exploration Log	
	Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2			47.5867, -122.3037	**AC-GTB-01**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface Elev. (NAVD88)*	
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop		70'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Matt	Hollow Stem Auger	9/25/2020		NA	19.8' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
			S-9		22				
					35				
26	44			▲	50/5"				26
27	43							Bottom of exploration at 26.5 ft. bgs.	27
28	42								28
29	41								29
30	40								30
31	39								31
32	38								32
33	37								33
34	36								34
35	35								35
36	34								36
37	33								37
38	32								38
39	31								39
40	30								40
41	29								41
42	28								42
43	27								43
44	26								44
45	25								45
46	24								46
47	23								47
48	22								48
49	21								49

Legend

Plastic Limit ├──┤ Liquid Limit

Sample Type:
- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)

Water Level:
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-01

Sheet 2 of 2

Aspect CONSULTING	GSC South - 200456		Geotechnical Exploration Log	
	Project Address & Site Specific Location		Coordinates (Lat,Lon WGS84)	Exploration Number
	S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2		47.5867, -122.3035	AC-GTB-02
Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)	
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop	72'	
Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Matt	Hollow Stem Auger	9/25/2020	NA	19.5' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Blows/foot ▲ Water Content (%)●	Blows/6"	Tests	Material Type	Description	Depth (ft)
								FILL GRAVEL (GP); approximately 12 inches of surificial gravel.	
1	71							SANDY SILT WITH GRAVEL (ML); loose, wet, mottled dark brown with white spotting; low plasticity; fine to coarse sand; fine, angular to subrounded gravel; trace organics.	1
2	70	Boring backfilled with bentonite chips							2
3	69								3
4	68								4
5	67		S-1		5, 2, 2				5
6	66								6
7	65								7
8	64								8
9	63								9
10	62		S-2		3, 4, 5			**GLACIAL RECESSIONAL DEPOSITS** CLAY (CL); stiff, moist to very moist, brown with gray spotting and minor iron-oxide staining; medium plasticity; thin sand interbeds (<1-inch-thick).	10
11	61								11
12	60								12
13	59								13
14	58								14
15	57		S-3		4, 1, 2			Becomes soft with 1 to 2-inch thick interbeds of wet, gray brown silty sand.	15
16	56								16
17	55		S-4		1, 2, 2				17
18	54		S-5		4, 8, 12				18
19	53	∇ 9/25/2020 Inferred from sample moisture						SILTY SAND (SM); medium dense, very moist, gray brown; fine to coarse sand; slow dilatancy.	19
20	52		S-6		7, 8, 9				20
21	51		S-7		5, 9, 10			Becomes wet with subtrace small organic fragments.	21
22	50								22
23	49		S-8		5, 8, 9			Becomes with trace, fine, subangular to subrounded gravel and rapid dilatancy.	23
24	48		S-9		3, 7				24

Plastic Limit ├──┤ Liquid Limit

Legend

Sample Type: ◯ No Soil Sample Recovery; ◩ Split Barrel 2" X 1.375" (SPT)

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-02

Sheet 1 of 2

Aspect CONSULTING	GSC South - 200456			Geotechnical Exploration Log	
	Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2			47.5867, -122.3035	**AC-GTB-02**
Contractor	*Equipment*	*Sampling Method*		*Ground Surface Elev. (NAVD88)*	
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop		72'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*		*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Matt	Hollow Stem Auger	9/25/2020		NA	19.5' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
			S-9		15			SILTY SAND (SM); medium dense, very moist, gray brown; fine to coarse sand; slow dilatancy. (continued)	
26	46		S-10		10 13 16				26
27	45								27
28	44		S-11		9 12 16				28
29	43		S-12		9 12 15				29
30	42		S-13		5 13 28			**GLACIALLY CONSOLIDATED SOIL** SILTY SAND (SM); dense, wet, gray brown; fine to coarse sand; few fine, subangular to subrounded gravel.	30
31	41								31
32	40		S-14		14 50/6"			SILTY GRAVEL WITH SAND (GM); very dense, wet, gray brown; fine to coarse, subangular to subrounded gravel; fractured gravels observed; fine to coarse sand.	32
33	39								33
34	38								34
35	37		S-15		17 28 50/5"			SILTY SAND (SM); dense, wet, gray brown; fine to coarse sand; few fine, subangular to subrounded gravel.	35
36	36							SANDY SILT (ML); very dense, very moist, gray; nonplastic; fine to coarse sand; few fine, subangular to subrounded gravel; diamict texture.	36
37	35							Bottom of exploration at 36.5 ft. bgs.	37
38	34								38
39	33								39
40	32								40
41	31								41
42	30								42
43	29								43
44	28								44
45	27								45
46	26								46
47	25								47
48	24								48
49	23								49

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├──┤ Liquid Limit

Water Level: ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-02

Aspect Consulting	GSC South - 200456	Geotechnical Exploration Log	
	Project Address & Site Specific Location	*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2	47.5866, -122.3035	**AC-GTB-03**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop	72'

Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Matt	Hollow Stem Auger	9/25/2020	NA	22' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Blows/foot ▲ Water Content (%) ●	Blows/6"	Tests	Material Type	Description
0–1	72–71	Boring backfilled with bentonite chips						**FILL** GRAVEL (GP); approximately 12 inches of surificial gravel.
1–10	71–62							SANDY SILT (ML); loose, moist, dark brown with white and light blue staining; low plasticity; fine to coarse sand; trace organics.
5	67		S-1		3 4 2			
10–15	62–57							**GLACIAL RECESSIONAL DEPOSITS** SILT (ML); loose, moist, light brown with gray spotting and minor iron-oxide staining; low plasticity.
10	62		S-2		2 3 5			
15–23.5	57–48.5							SILTY SAND (SM); medium dense, moist, light brown; fine to medium sand.
15	57		S-3		7 9 13			
16.5	55.5		S-4		8 9 10			Becomes gray brown with trace fine, subangular to subrounded gravel.
18	54		S-5		6 7 9			Becomes very moist with subtrace small organic fragments.
19.5	52.5		S-6		6 8 9			Becomes wet with slow dilatancy.
21	51		S-7		5 7 9			
22	50	▽ 9/25/2020 Measured through augers ~30 minutes after drilling						
22.5	49.5		S-8		9 33 46			
23.5–25	48.5–47							**GLACIALLY CONSOLIDATED SOIL** SILTY SAND WITH GRAVEL (SM); very dense, very moist, gray; fine to coarse sand; fine to coarse, subangular to subrounded gravel; diamict texture.

Legend

Sample Type: ○ No Soil Sample Recovery; ◩ Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├─┤ Liquid Limit

Water Level: ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-03

Sheet 1 of 2

GSC South - 200456

Geotechnical Exploration Log

Project Address & Site Specific Location	Coordinates (Lat,Lon WGS84)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2	47.5866, -122.3035	**AC-GTB-03**

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop	72'

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Matt	Hollow Stem Auger	9/25/2020	NA	22' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
			S-9	▲	28 50/6"				
26	46							Bottom of exploration at 26 ft. bgs.	26
27	45								27
28	44								28
29	43								29
30	42								30
31	41								31
32	40								32
33	39								33
34	38								34
35	37								35
36	36								36
37	35								37
38	34								38
39	33								39
40	32								40
41	31								41
42	30								42
43	29								43
44	28								44
45	27								45
46	26								46
47	25								47
48	24								48
49	23								49

Legend

Sample Type
- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├──┤ Liquid Limit

Water Level
- ∇ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-03

GSC South - 200456

Geotechnical Exploration Log

Aspect CONSULTING

Project Address & Site Specific Location	Coordinates (Lat,Lon WGS84)	Exploration Number
S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2	47.5866, -122.3037	AC-GTB-05

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop	70'

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Matt	Hollow Stem Auger	9/25/2020	NA	21.5' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Blows/6"	Description
0	70	Boring backfilled with bentonite chips			**FILL** GRAVEL (GP); approximately 12 inches of surificial gravel.
1	69				SILTY SAND (SM); loose, moist, mottled gray brown; fine to coarse sand.
5	65		S-1 (No Soil Sample Recovery)	1, 2, 2	
6	64				SANDY SILT (ML); loose, moist, dark brown; low plasticity; fine sand.
10	60		S-2	3, 3, 5	**GLACIAL RECESSIONAL DEPOSITS** SANDY SILT (ML); loose, very moist, light brown with gray spotting and minor iron-oxide staining; low plasticity; slow dilatancy.
11	59				SILT (ML); loose, moist, light brown with gray spotting and minor iron-oxide staining; low plasticity.
15	55		S-3	2, 1, 2	CLAY WITH SAND (CL); soft, moist, brown; medium plasticity; thin sand interbeds (<1-inch-thick).
17.5			S-4	2, 8, 5	SILTY SAND (SM); medium dense, very moist, gray brown; fine to coarse sand; trace fine, subangular to subrounded gravel; slow dilatancy.
20	50		S-5	5, 7, 9	No gravel observed.
21	49	9/25/2020 Measured through augers immediately after drilling			Becomes wet.
22.5			S-6	12, 17, 36	
23.5					**GLACIALLY CONSOLIDATED SOIL** SILTY SAND WITH GRAVEL (SM); very dense, very moist, gray; fine to coarse sand; fine to coarse, subangular to subrounded gravel.

Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50

Tests

Legend

Sample Type: No Soil Sample Recovery; Split Barrel 2" X 1.375" (SPT)

Plastic Limit ├──┤ Liquid Limit

Water Level: Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-05

Aspect CONSULTING	GSC South - 200456		Geotechnical Exploration Log	
	Project Address & Site Specific Location		*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
	S Grand St and 22nd Ave S - Seattle, WA, South Block, See Figure 2		47.5866, -122.3037	AC-GTB-05
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
Holocene Drilling, Inc	Mobile B-58	Autohammer; 140 lb hammer; 30" drop	70'	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Matt	Hollow Stem Auger	9/25/2020	NA	21.5' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
26	44		S-7	▲	20 37 42			SANDY SILT (ML); very dense, very moist, gray; nonplastic; fine to coarse sand.; few fine, subangular to subrounded gravel; diamict texture.	26
27	43							Bottom of exploration at 26.5 ft. bgs.	27
28	42								28
29	41								29
30	40								30
31	39								31
32	38								32
33	37								33
34	36								34
35	35								35
36	34								36
37	33								37
38	32								38
39	31								39
40	30								40
41	29								41
42	28								42
43	27								43
44	26								44
45	25								45
46	24								46
47	23								47
48	22								48
49	21								49

Legend

Plastic Limit ├──┤ Liquid Limit

Sample Type
- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)

Water Level
- Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: HNH
Approved by: ECS 10/26/2020

Exploration Log AC-GTB-05

PRESENTATION OF SITE INVESTIGATION RESULTS

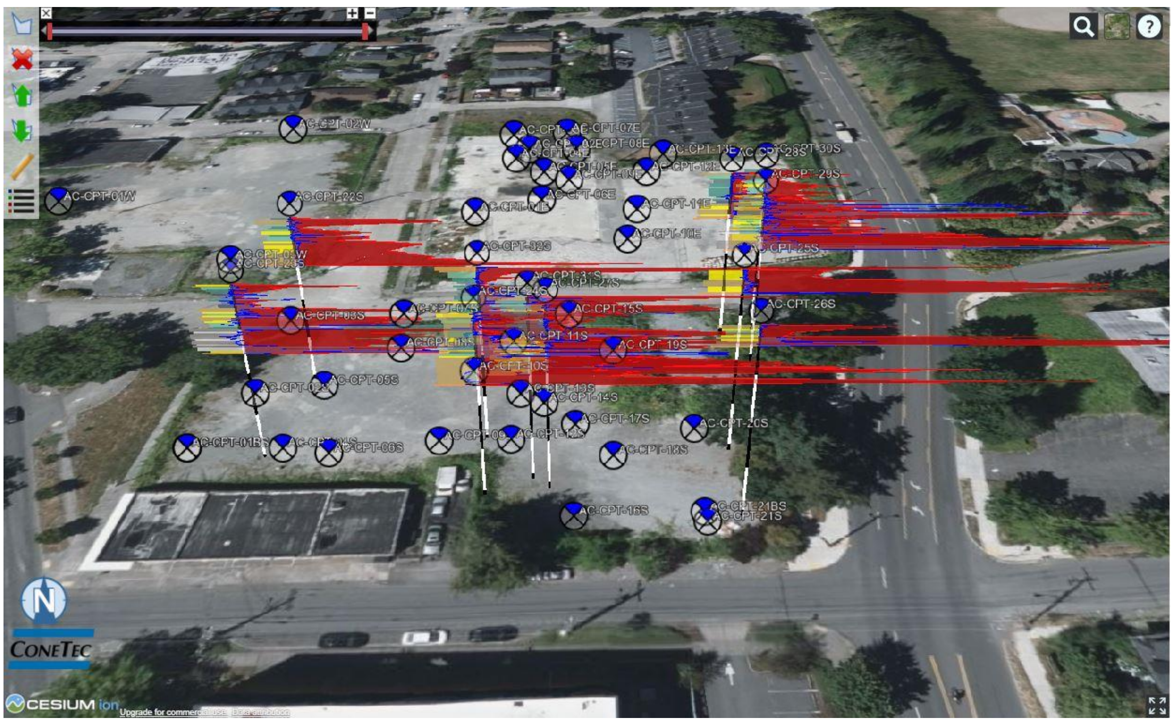
Grand Street Commons

Prepared for:

Aspect Consulting

ConeTec Job No: 20-59-21343

Project Start Date: 5-Nov-2020
Project End Date: 5-Nov-2020
Report Date: 11-Nov-2020



Prepared by:

ConeTec Inc.
1508 O Street SW, Unit 103-104
Auburn, WA 98001

Tel: (253) 397-4861

ConeTecWA@conetec.com
www.conetec.com
www.conetecdataservices.com

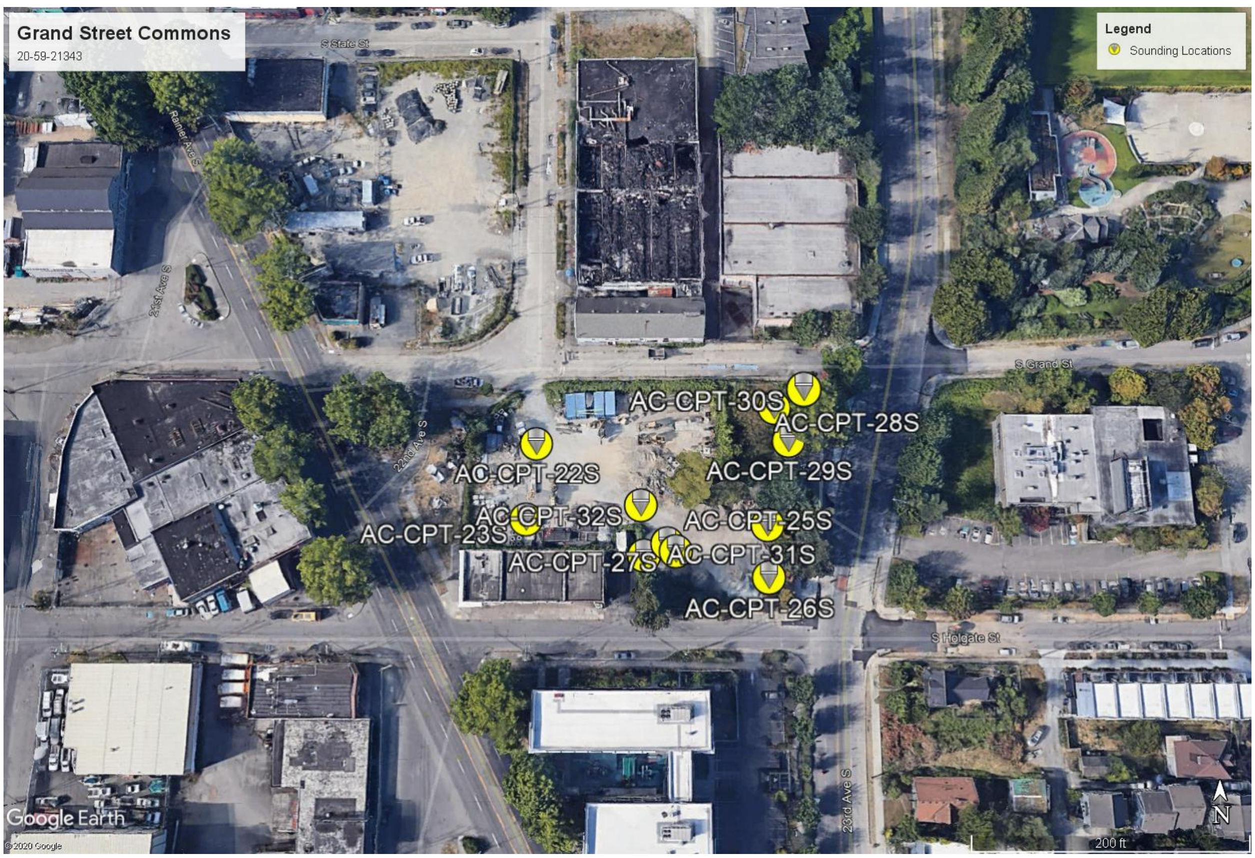
Introduction

The enclosed report presents the results of the site investigation program conducted by ConeTec Inc. for Aspect Consulting at 1818 Rainier Ave S, Seattle, WA, 98144. The program consisted of cone penetration tests.

Project Information

Project	
Client	Aspect Consulting
Project	Grand Street Commons
ConeTec project number	20-59-21343

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



Rig Description	Deployment System	Test Type
C20-30Ton Truck 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)
529:T1500F15U35	EC529	15	225	1500	15	35
Cone 529 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 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 Aspect Consulting (Client) for the project titled "Grand Street Commons". 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.

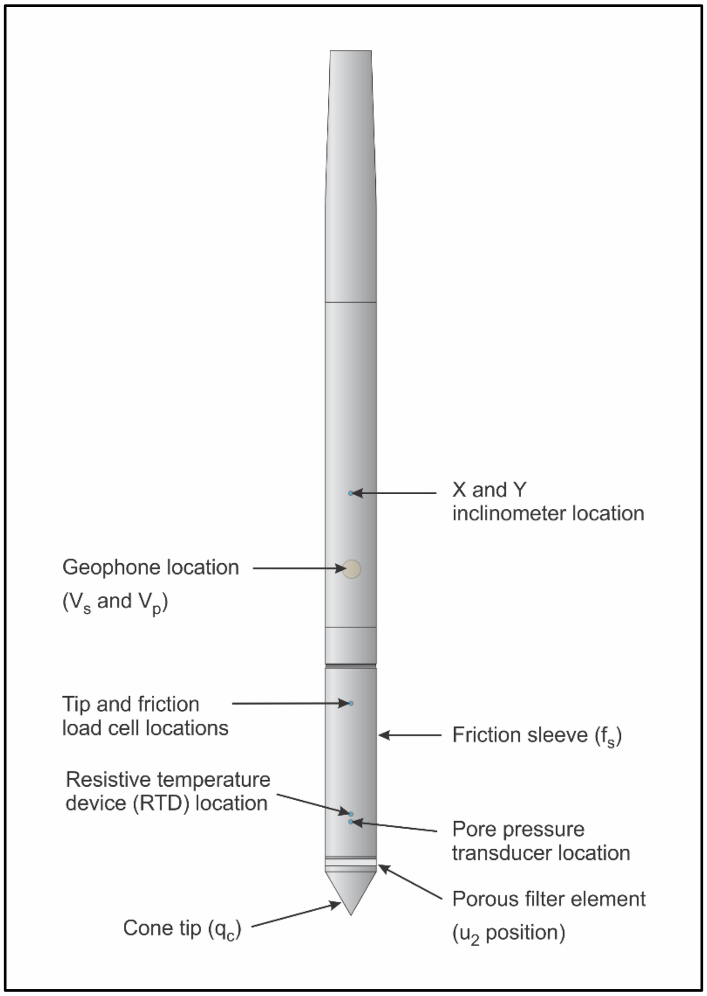


Figure CPTu. Piezocone Penetrometer (15 cm^2)

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):

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

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).

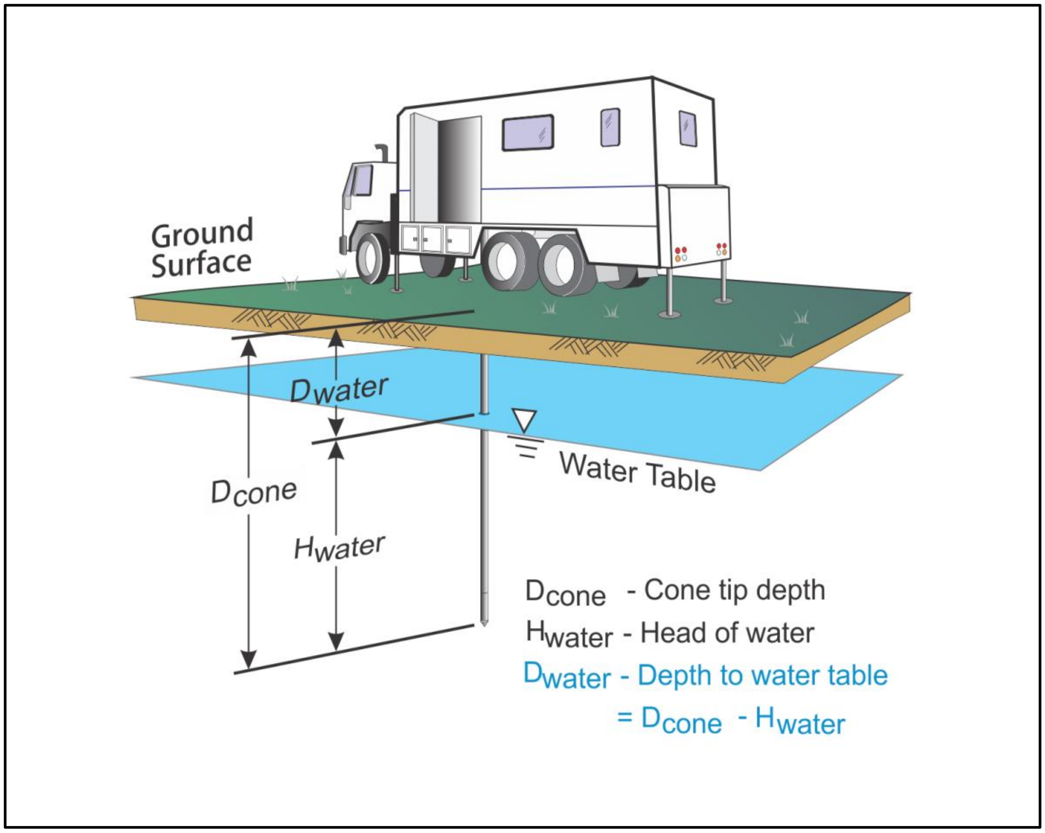


Figure PPD-1. Pore pressure dissipation test setup

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.

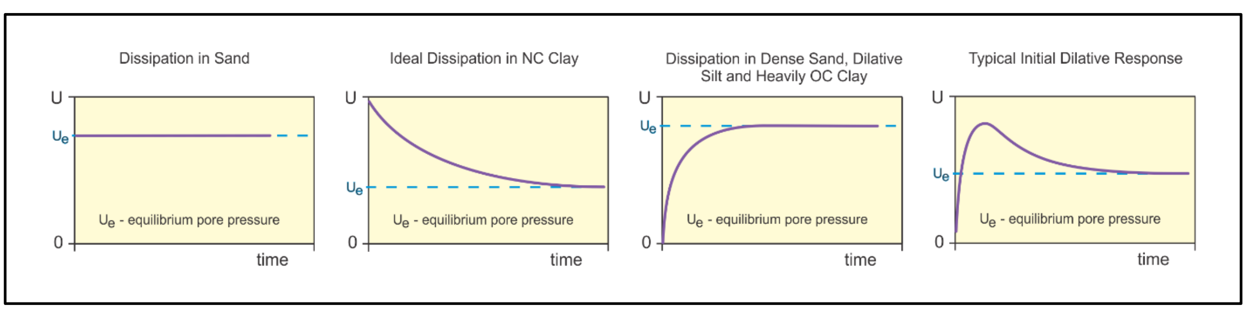


Figure PPD-2. Pore pressure dissipation curve examples

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:	20-59-21343
Client:	Aspect Consulting
Project:	Grand Street Commons
Start Date:	05-Nov-2020
End Date:	05-Nov-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Latitude[4] (deg)	Longitude[4] (deg)	Refer to Notation Number
AC-CPT-22S	20-59-21343_CP-22S	05-Nov-2020	EC529		18.87		47.58674	-122.30389	3
AC-CPT-23S	20-59-21343_CP-23S	05-Nov-2020	EC529	20.1	25.02		47.58657	-122.30392	2
AC-CPT-24S	20-59-21343_CP-24S	05-Nov-2020	EC529	20.1	25.26		47.58649	-122.30354	
AC-CPT-25S	20-59-21343_CP-25S	05-Nov-2020	EC529		8.28		47.58656	-122.30315	3
AC-CPT-26S	20-59-21343_CP-26S	05-Nov-2020	EC529		6.89		47.58644	-122.30315	3
AC-CPT-27S	20-59-21343_CP-27S	05-Nov-2020	EC529	19.5	23.38		47.58650	-122.30344	
AC-CPT-28S	20-59-21343_CP-28S	05-Nov-2020	EC529		18.04		47.58681	-122.30311	3
AC-CPT-29S	20-59-21343_CP-29S	05-Nov-2020	EC529	19.5	21.16		47.58674	-122.30307	2
AC-CPT-30S	20-59-21343_CP-30S	05-Nov-2020	EC529	22.665	31.086		47.58682	-122.30305	
AC-CPT-31S	20-59-21343_CP-31S	05-Nov-2020	EC529	21.4	27.15		47.58652	-122.30347	
AC-CPT-32S	20-59-21343_CP-32S	05-Nov-2020	EC529	18.6	28.71		47.58660	-122.30355	
Totals	11 soundings				233.84	0			

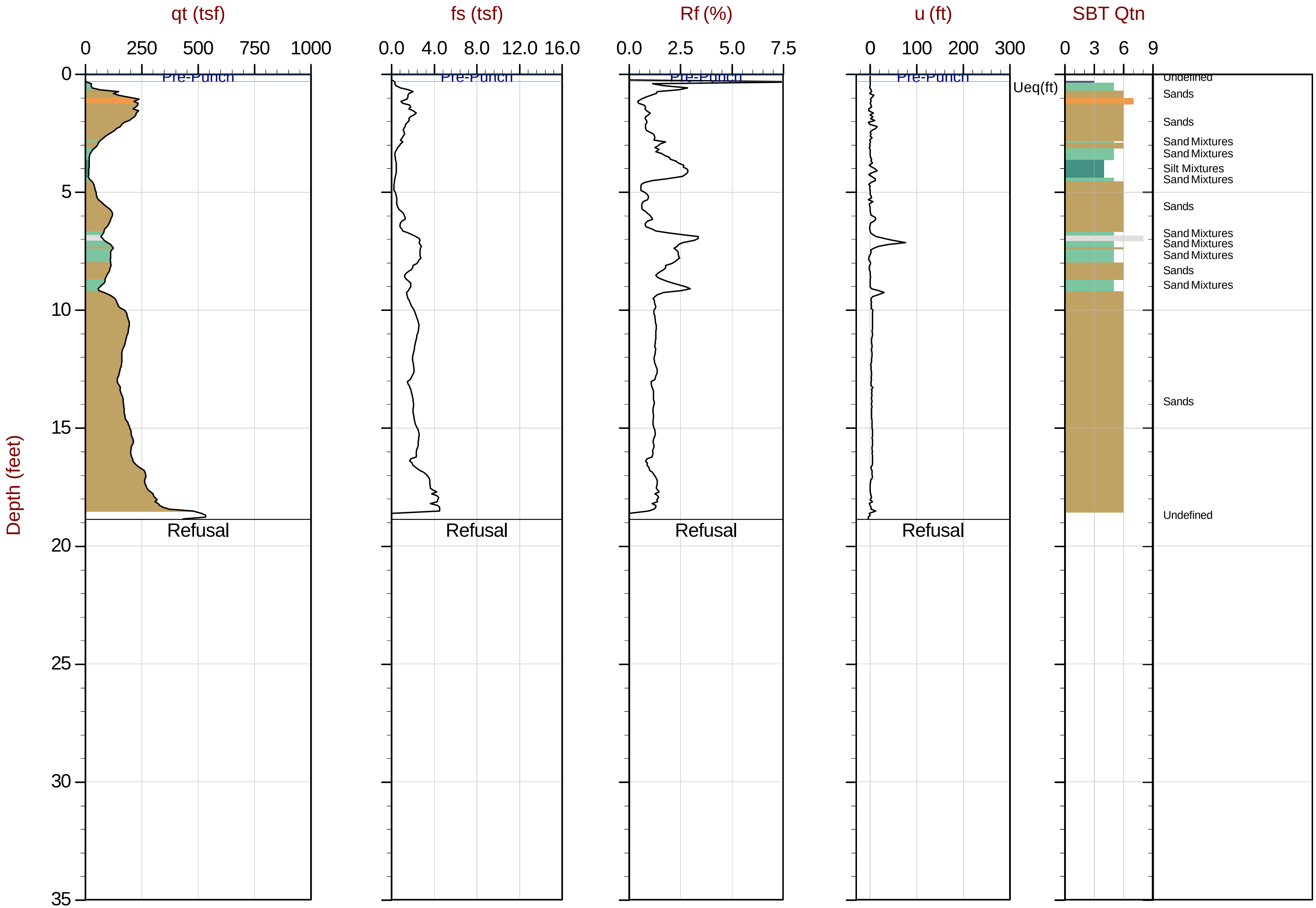
1. Phreatic surface based on pore pressure dissipation test unless otherwise noted. Hydrostatic profile applied to interpretation tables
2. Phreatic surface based on adjacent pore pressure dissipation tests unless otherwise noted. Hydrostatic profile applied to interpretation tables
3. Phreatic surface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

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 08:45
Site: Grand Street Commons

Sounding: AC-CPT-22S
Cone: EC529



Max Depth: 5.750 m / 18.86 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-22S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58674 Long: -122.30389

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

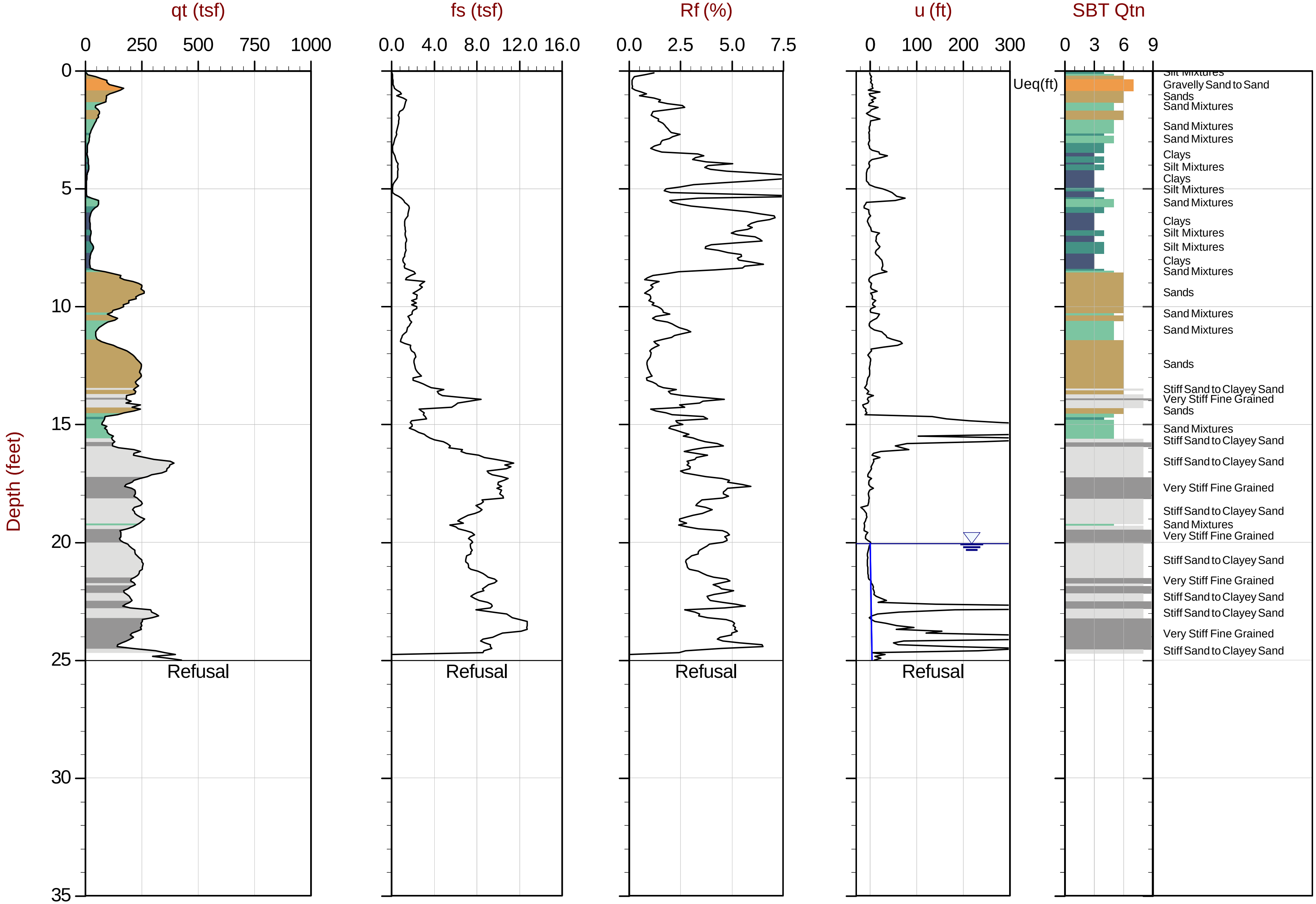
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 09:38
Site: Grand Street Commons

Sounding: AC-CPT-23S
Cone: EC529



Max Depth: 7.625 m / 25.02 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-23S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30392

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

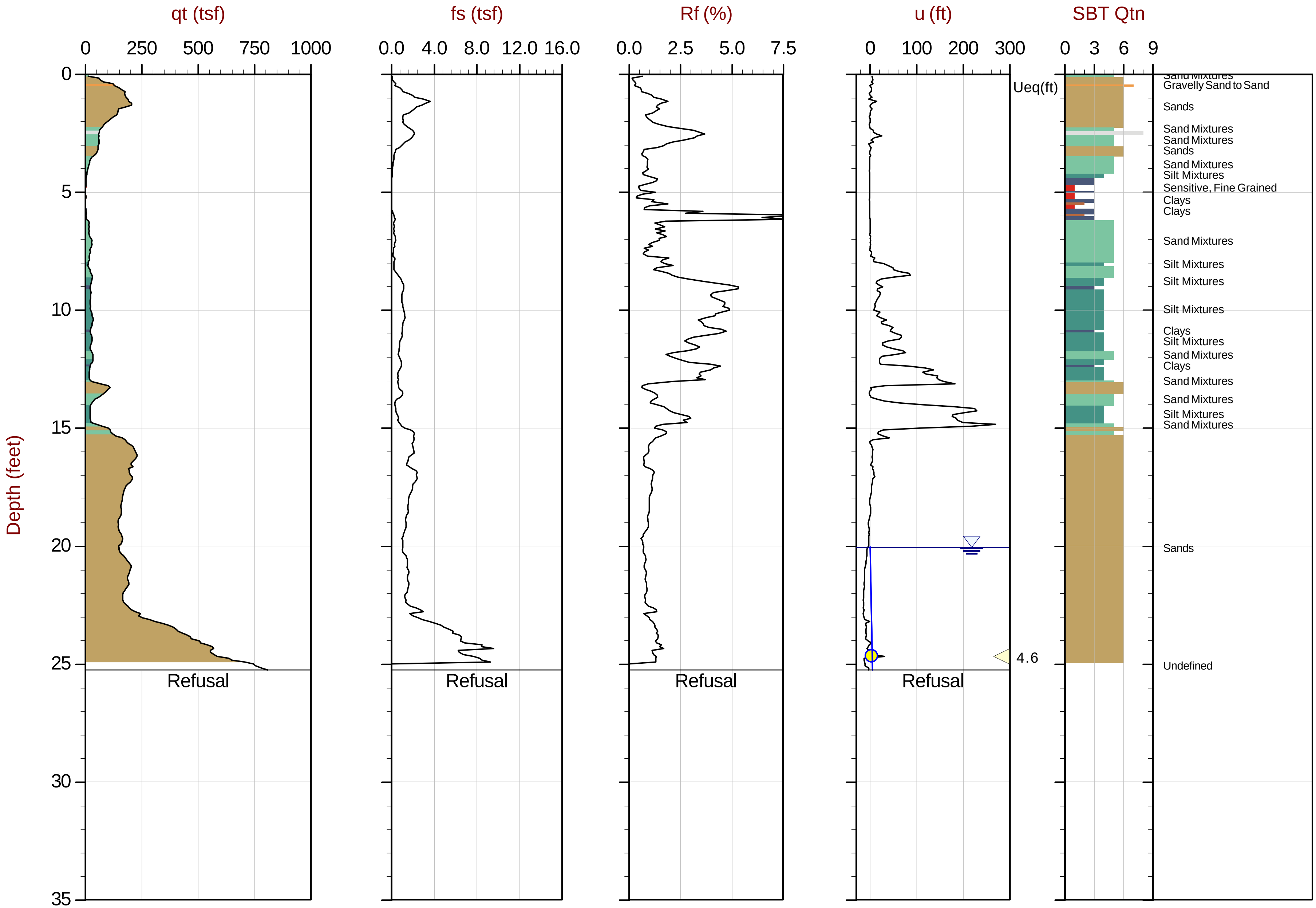
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 10:20
Site: Grand Street Commons

Sounding: AC-CPT-24S
Cone: EC529



Max Depth: 7.700 m / 25.26 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-24S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58649 Long: -122.30354

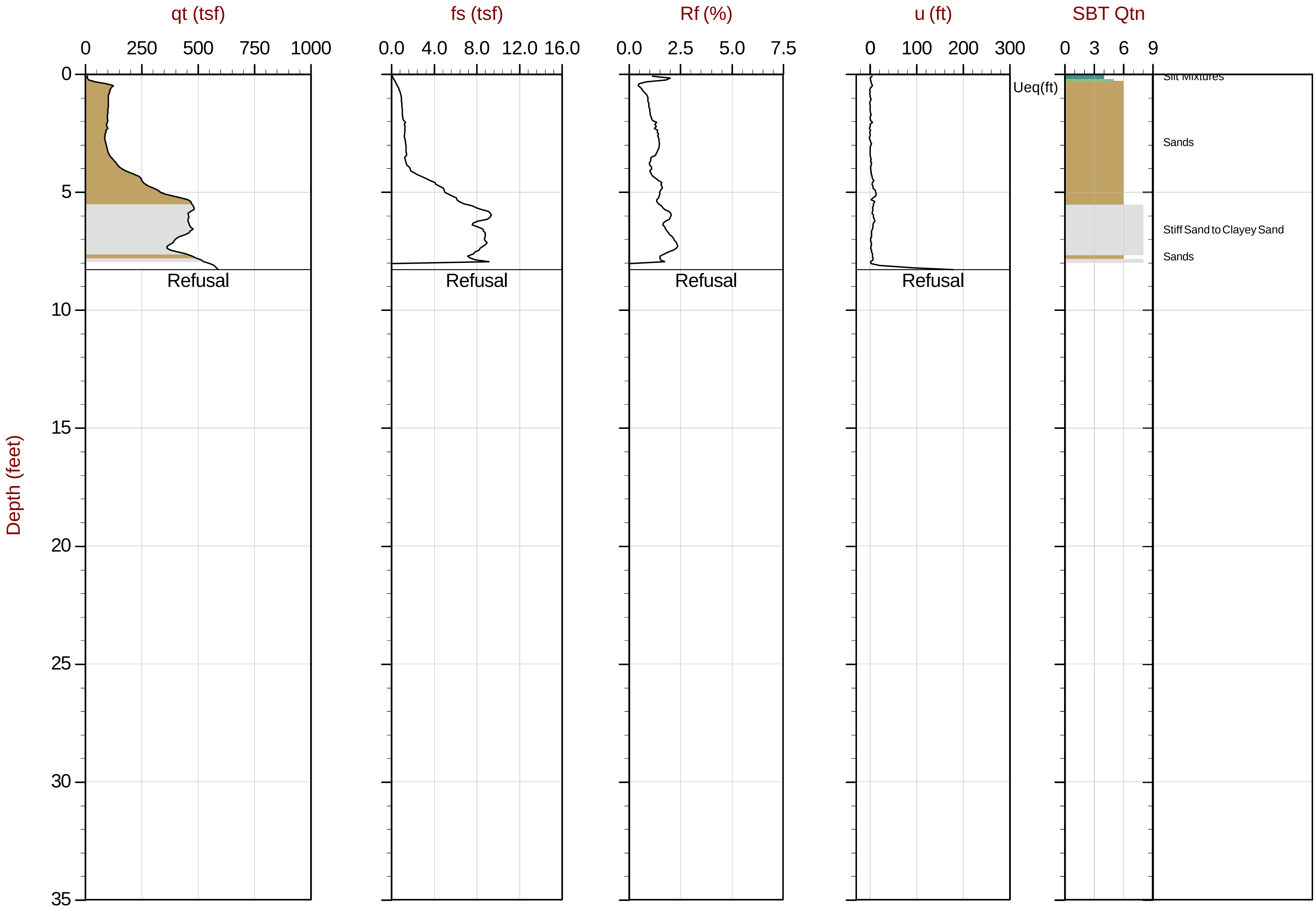
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 11:18
Site: Grand Street Commons
Sounding: AC-CPT-25S
Cone: EC529



Max Depth: 2.525 m / 8.28 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-25S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30315

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

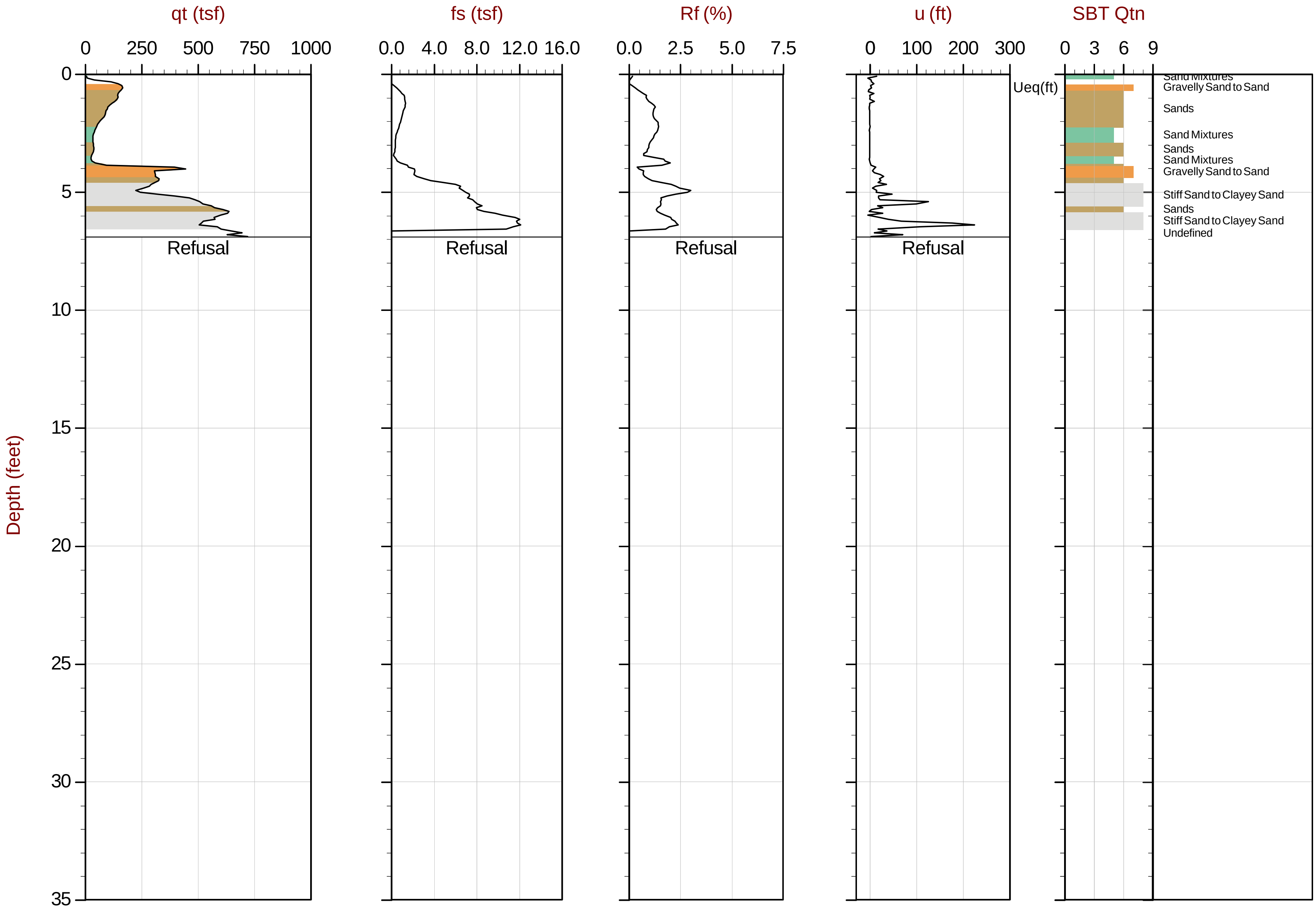
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 11:57
Site: Grand Street Commons

Sounding: AC-CPT-26S
Cone: EC529



Max Depth: 2.100 m / 6.89 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-26S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58644 Long: -122.30315

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

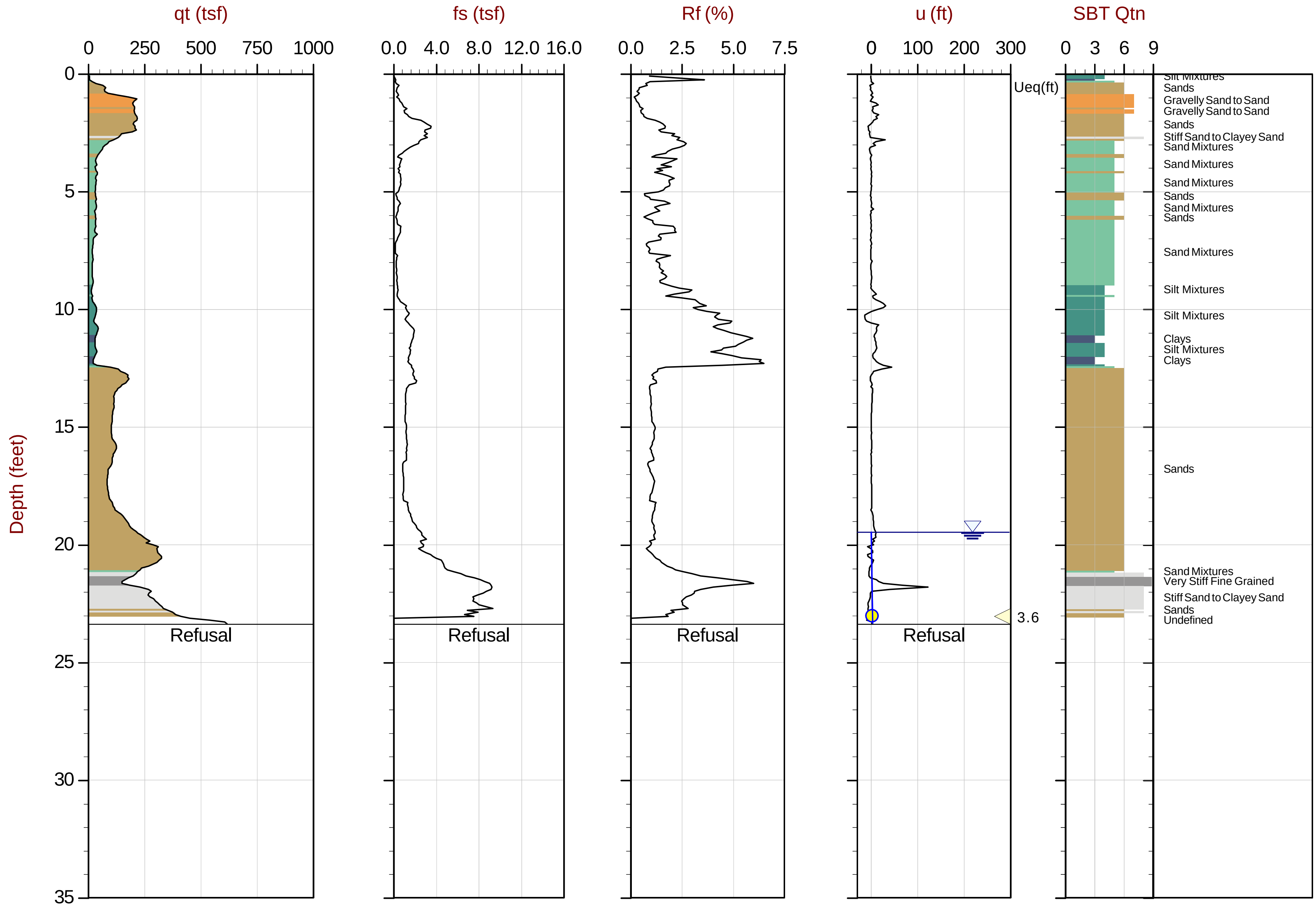
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 12:22
Site: Grand Street Commons

Sounding: AC-CPT-27S
Cone: EC529



Max Depth: 7.125 m / 23.38 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-27S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58650 Long: -122.30344

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

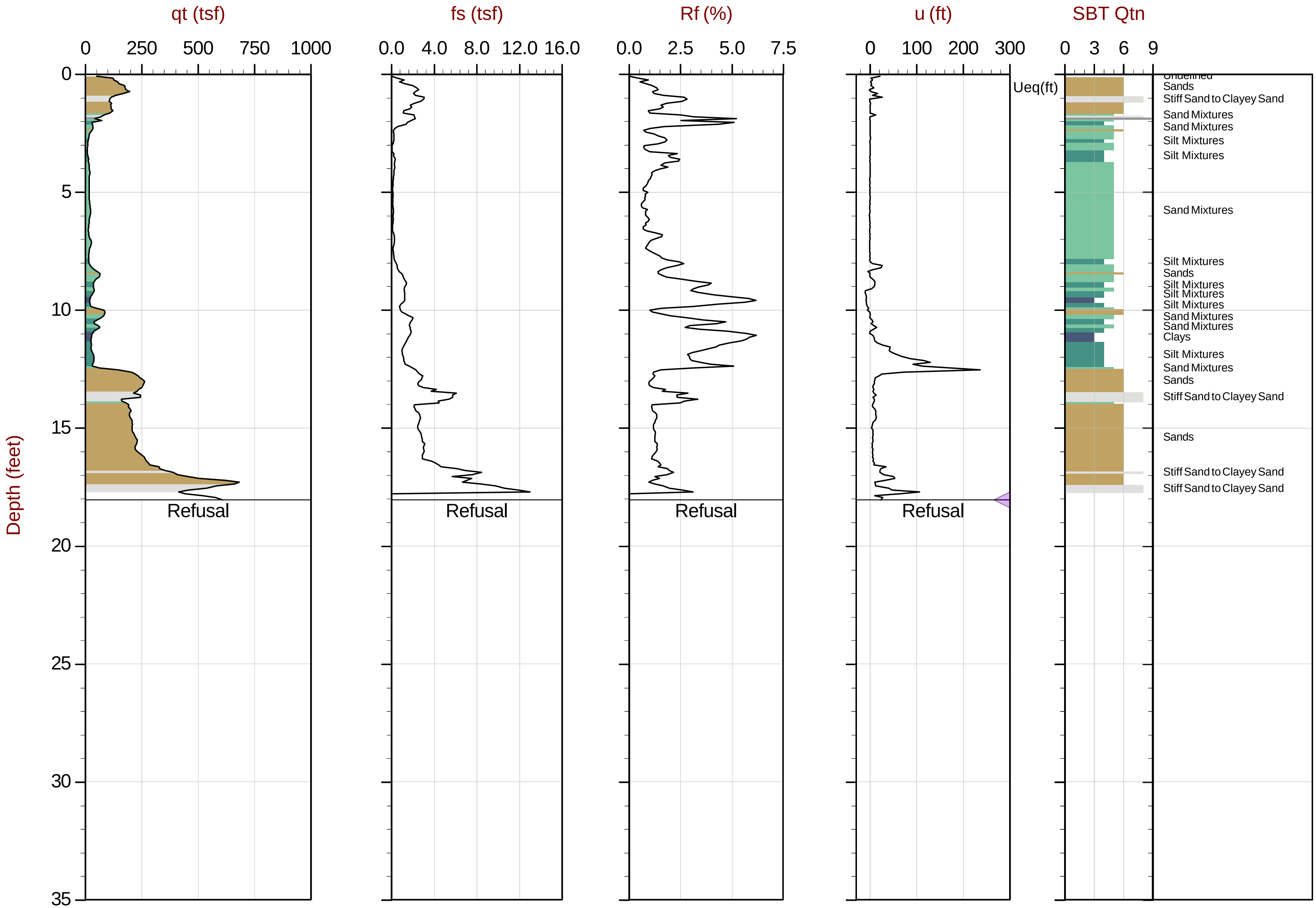
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 01:18
Site: Grand Street Commons

Sounding: AC-CPT-28S
Cone: EC529



Max Depth: 5.500 m / 18.04 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-28S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58681 Long: -122.30311

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

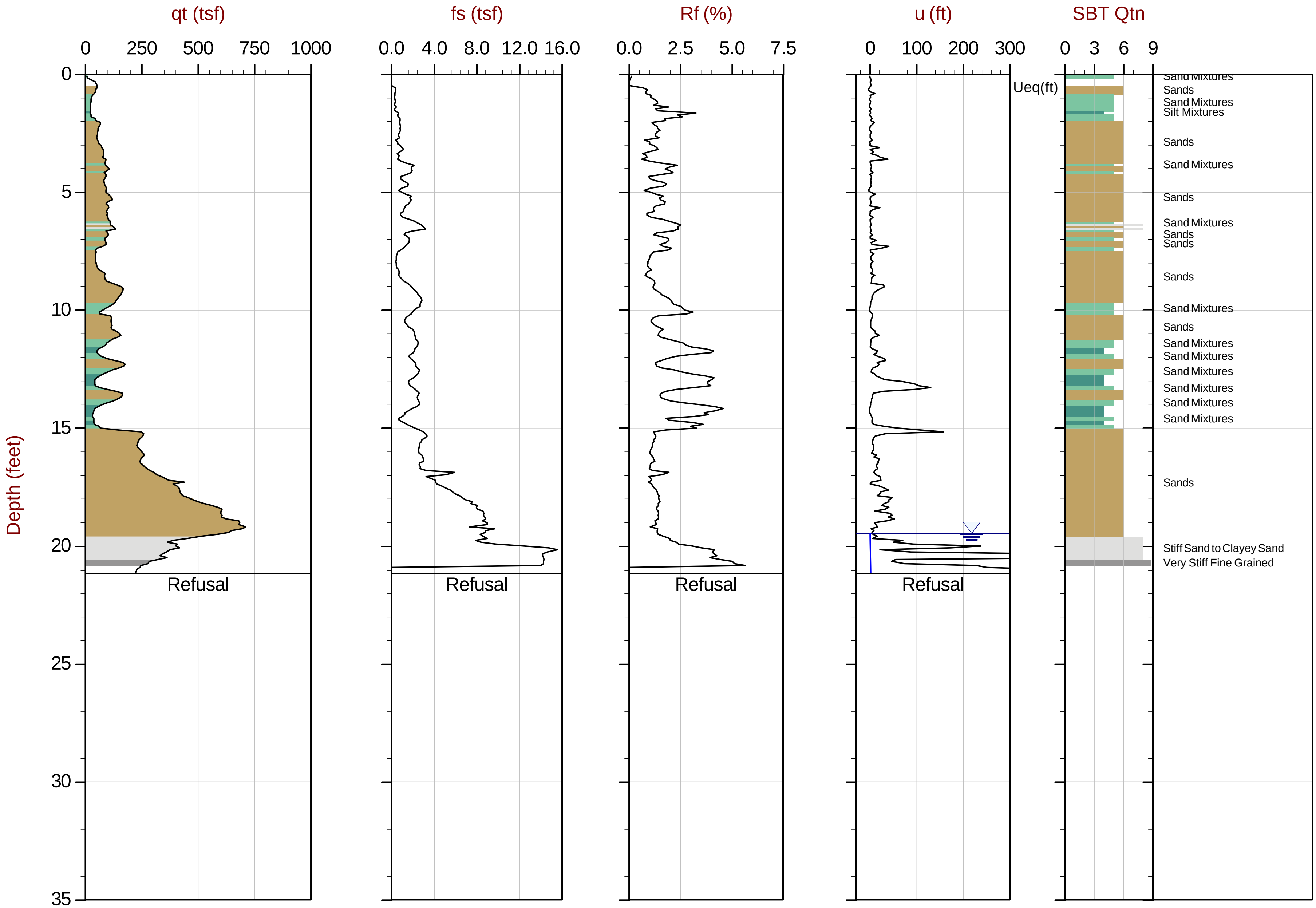
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 02:02
Site: Grand Street Commons

Sounding: AC-CPT-29S
Cone: EC529



Max Depth: 6.450 m / 21.16 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-29S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58674 Long: -122.30307

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

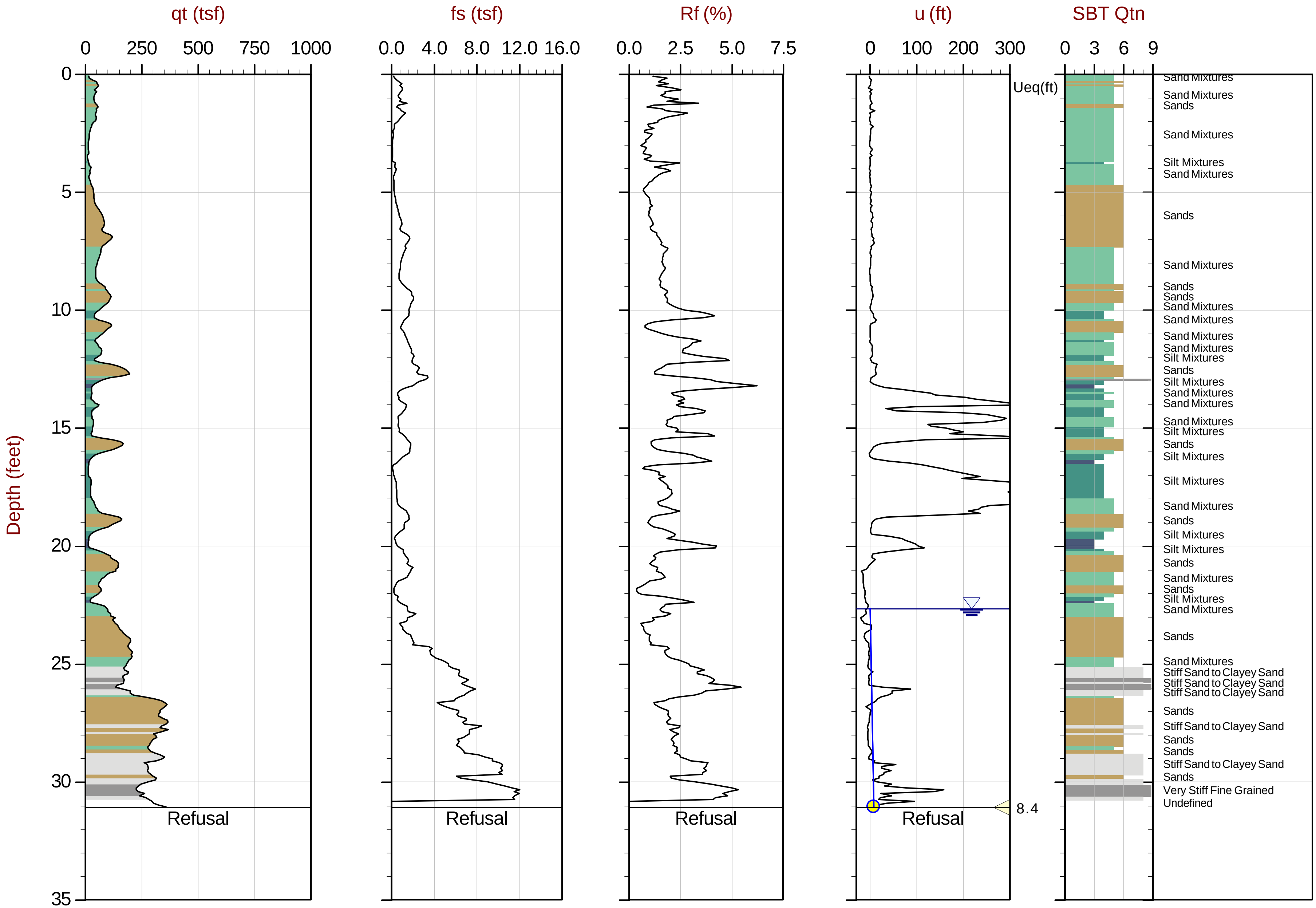
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 02:38
Site: Grand Street Commons

Sounding: AC-CPT-30S
Cone: EC529



Max Depth: 9.475 m / 31.09 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-30S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58682 Long: -122.30305

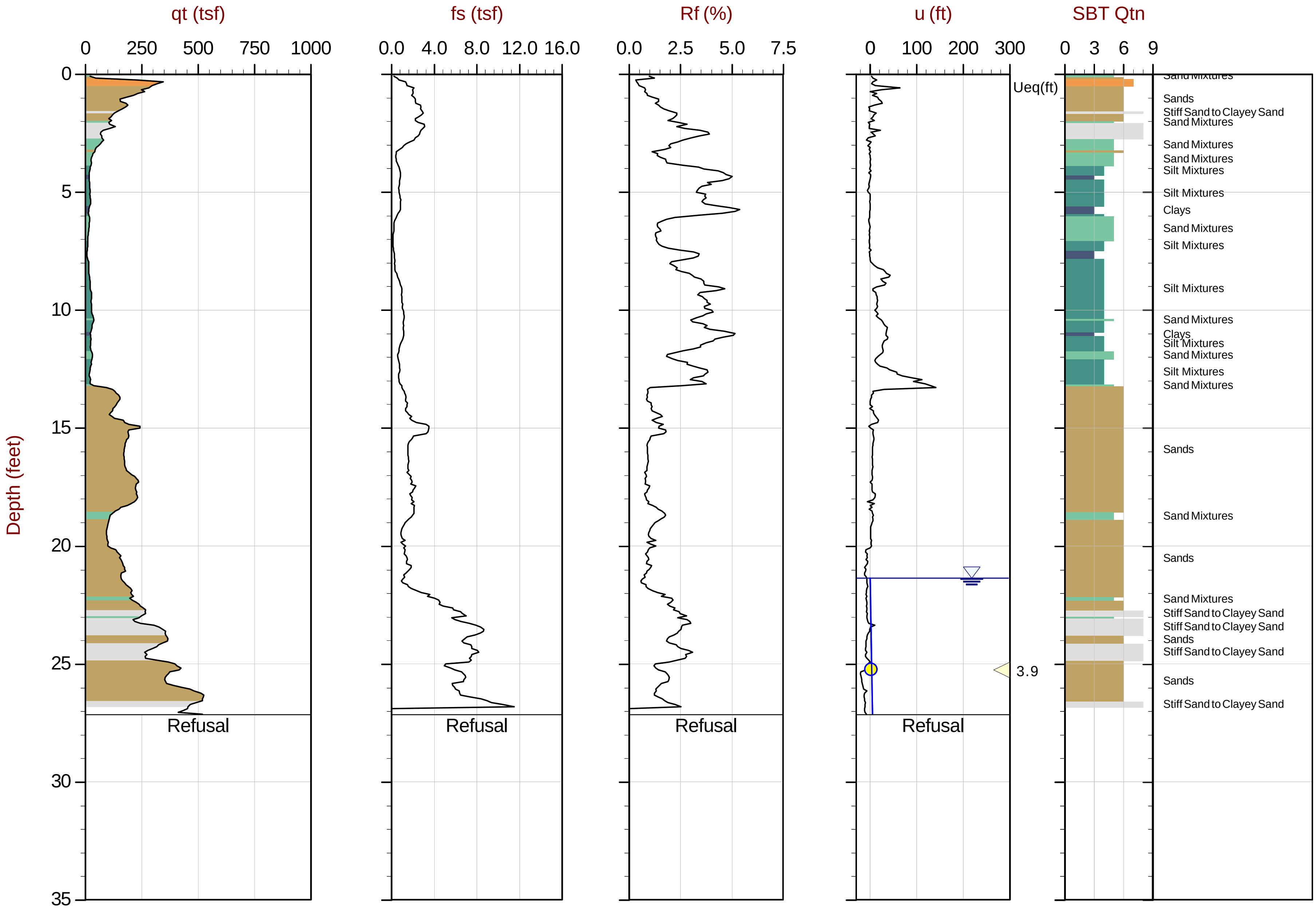
Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 03:19
Site: Grand Street Commons

Sounding: AC-CPT-31S
Cone: EC529



Max Depth: 8.275 m / 27.15 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-31S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58652 Long: -122.30347

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

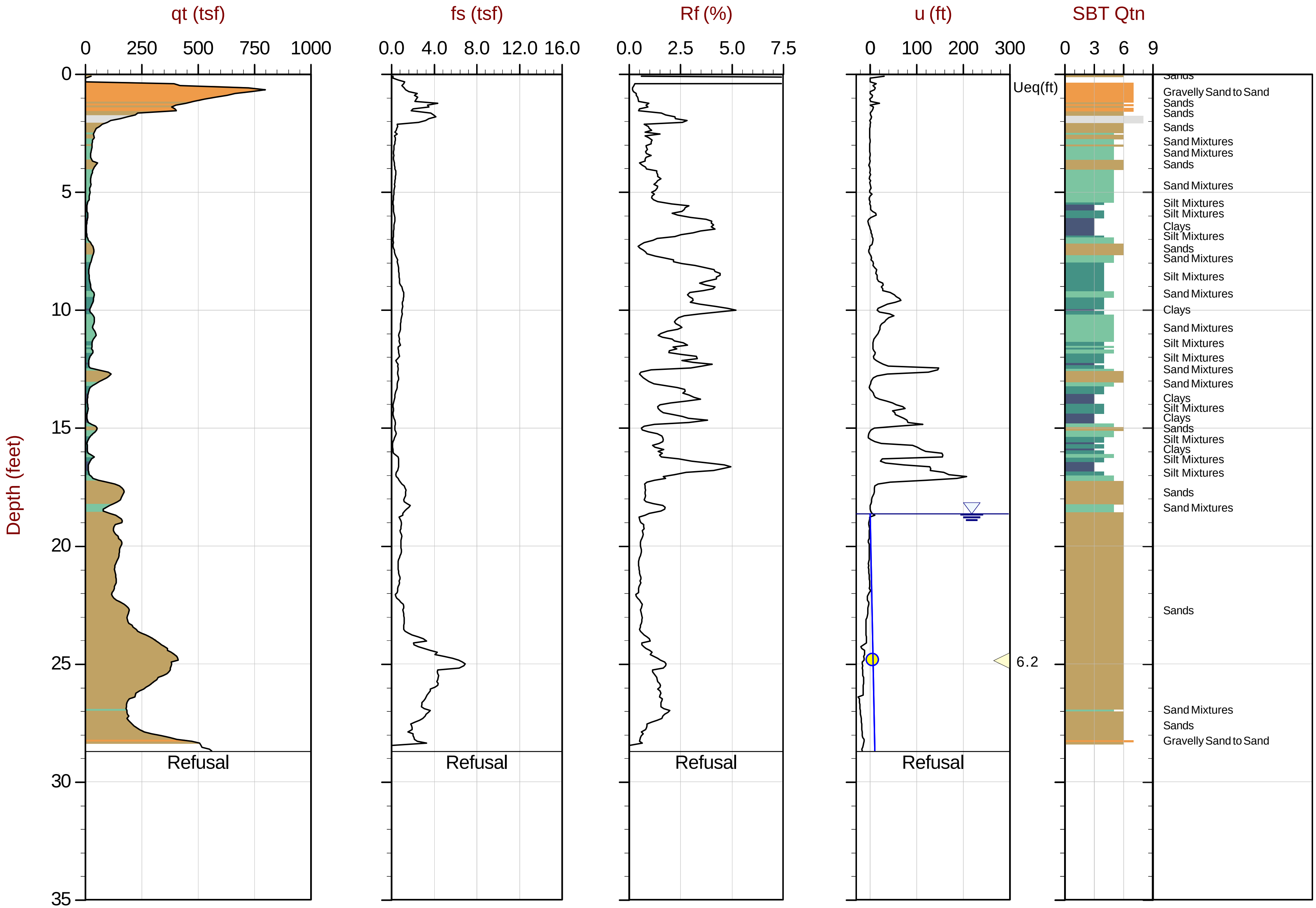
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 04:11
Site: Grand Street Commons

Sounding: AC-CPT-32S
Cone: EC529



Max Depth: 8.750 m / 28.71 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-32S.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58660 Long: -122.30355

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.

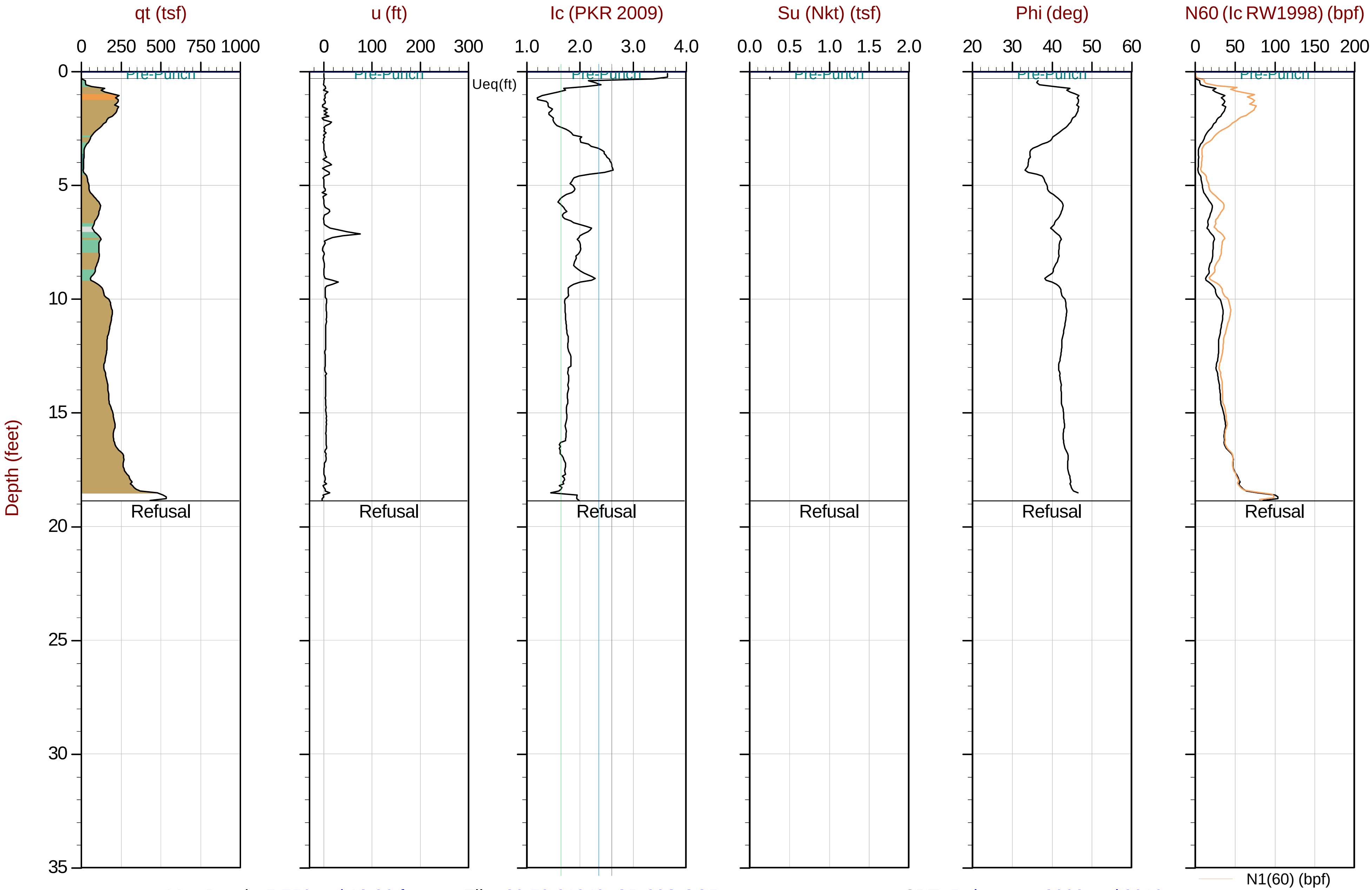
Advanced Cone Penetration Test Plots with Ic, Su, Phi and N(60)/N1(60)

ConeTec

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 08:45
Site: Grand Street Commons
Sounding: AC-CPT-22S
Cone: EC529



Max Depth: 5.750 m / 18.86 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-22S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58674 Long: -122.30389

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

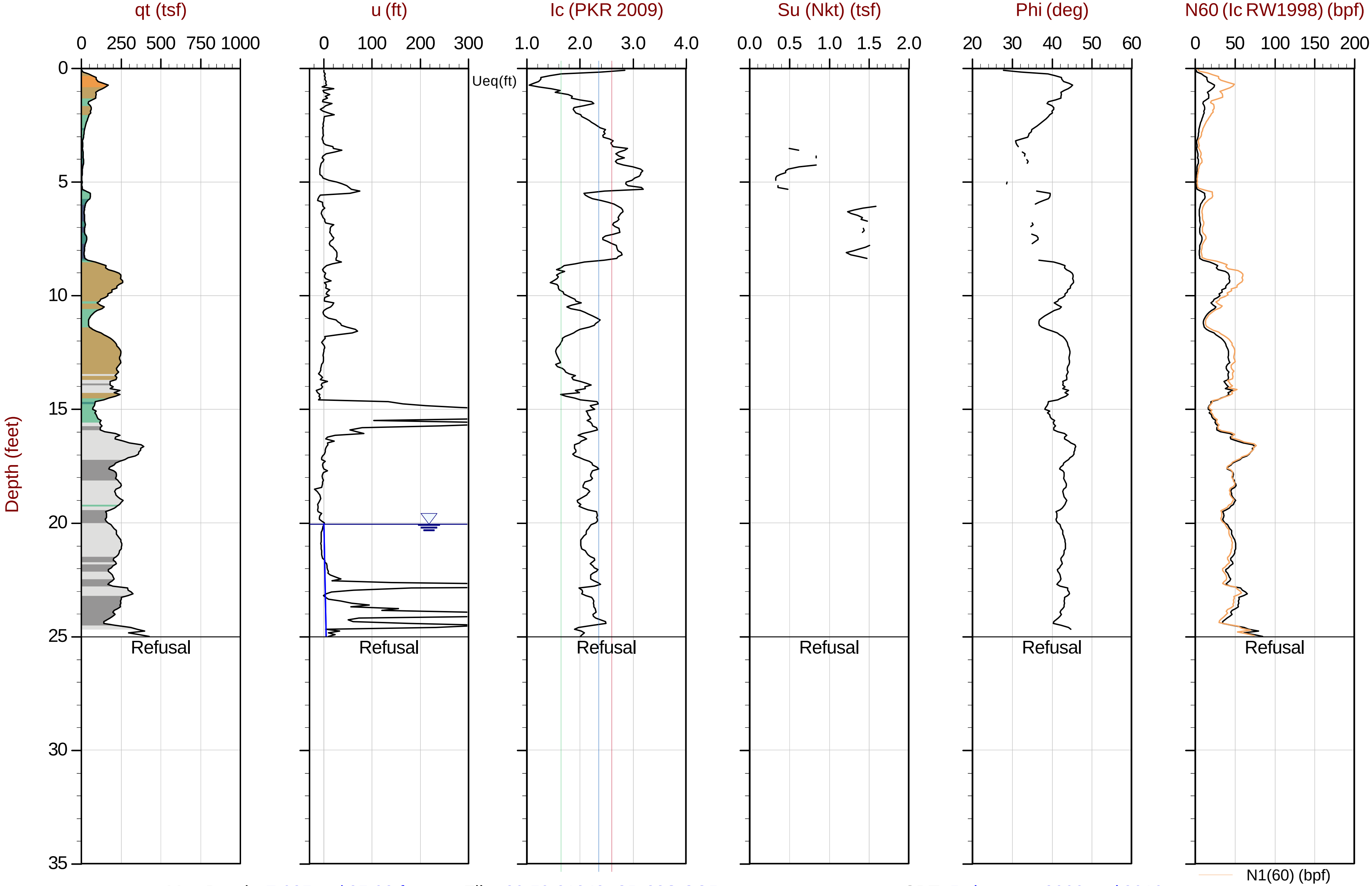
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 09:38
Site: Grand Street Commons

Sounding: AC-CPT-23S
Cone: EC529



Max Depth: 7.625 m / 25.02 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-23S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58657 Long: -122.30392

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

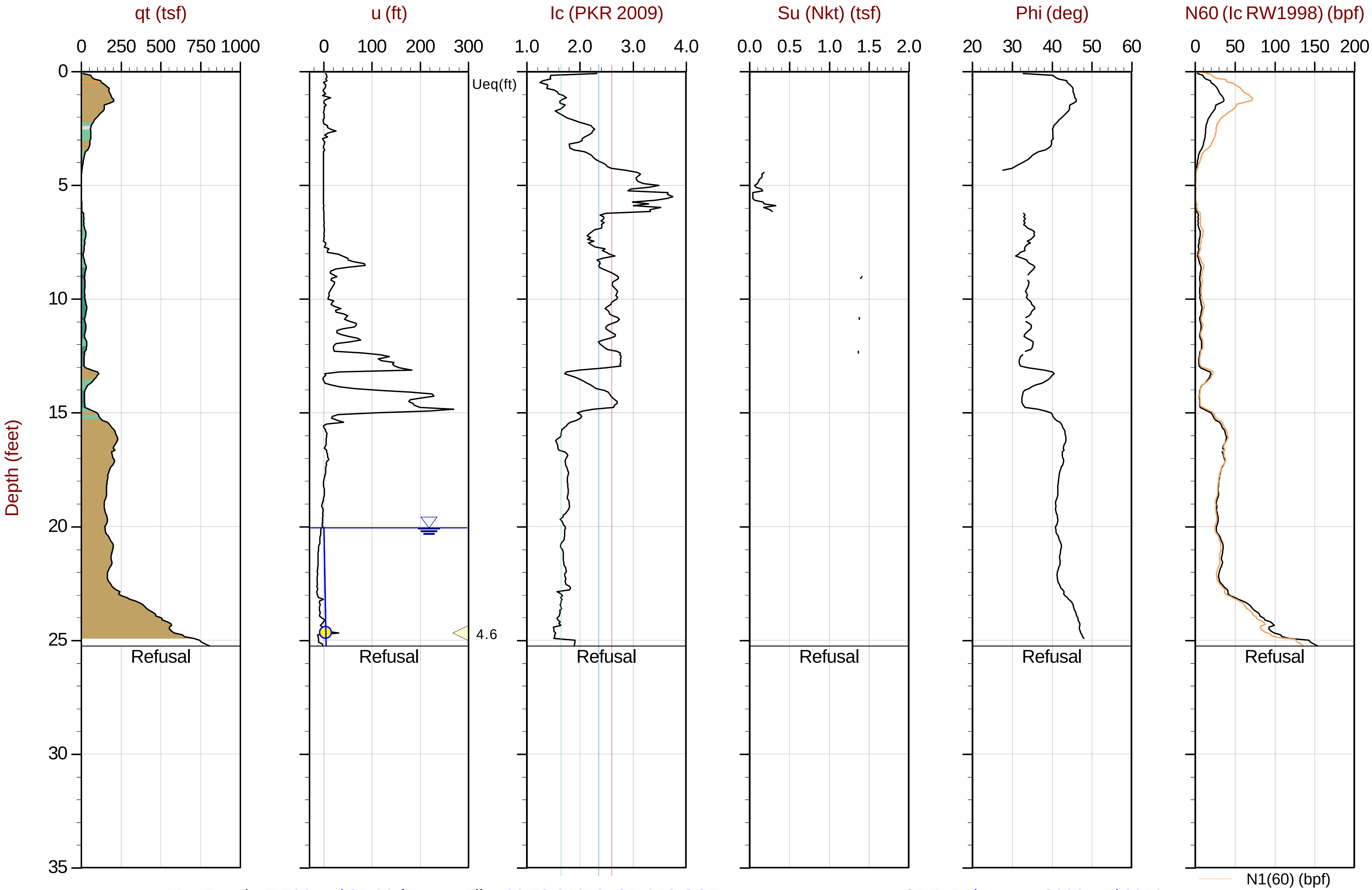
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 10:20
Site: Grand Street Commons

Sounding: AC-CPT-24S
Cone: EC529



Max Depth: 7.700 m / 25.26 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-24S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58649 Long: -122.30354

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

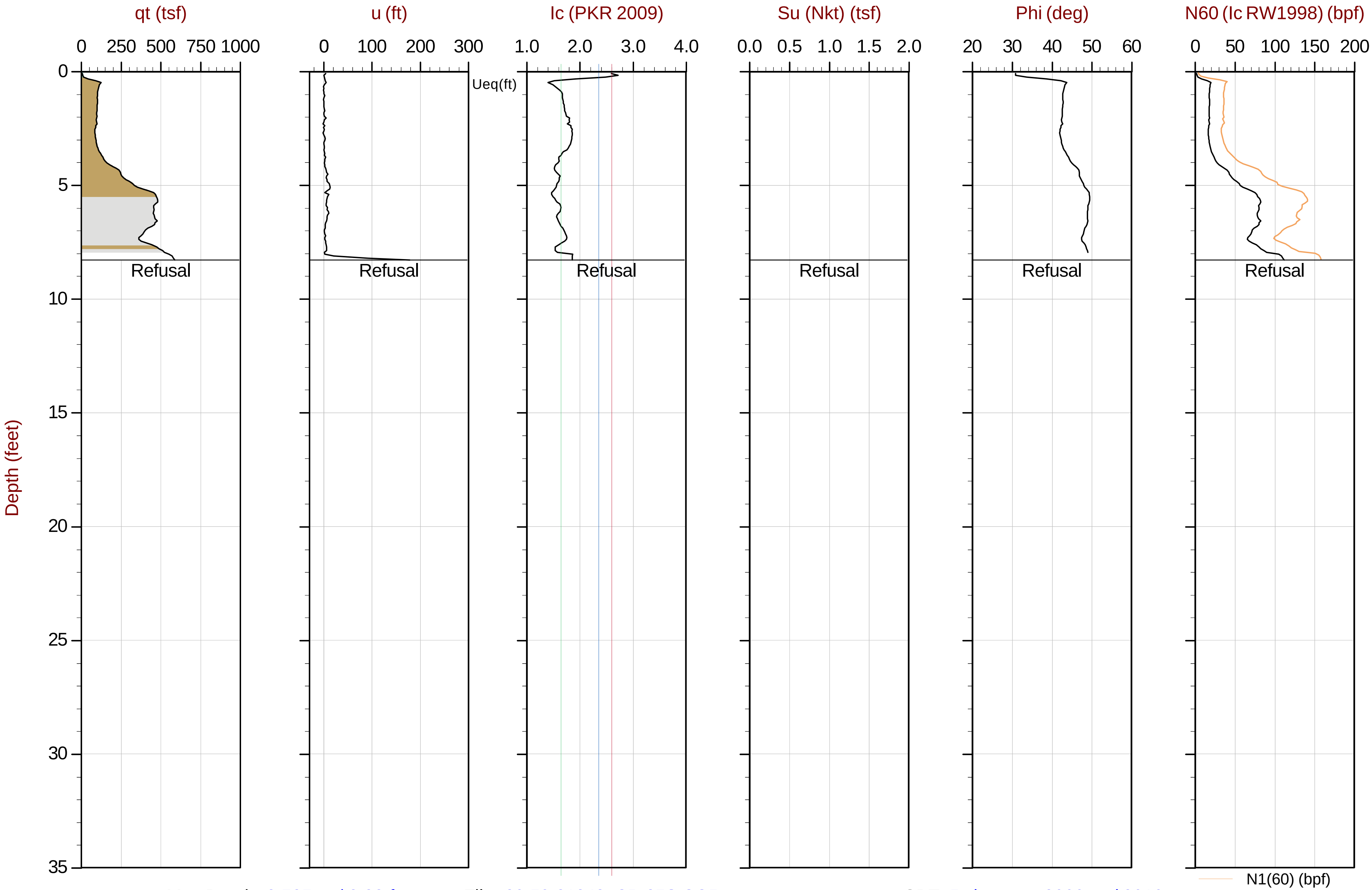
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 11:18
Site: Grand Street Commons

Sounding: AC-CPT-25S
Cone: EC529



Max Depth: 2.525 m / 8.28 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-25S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58656 Long: -122.30315

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

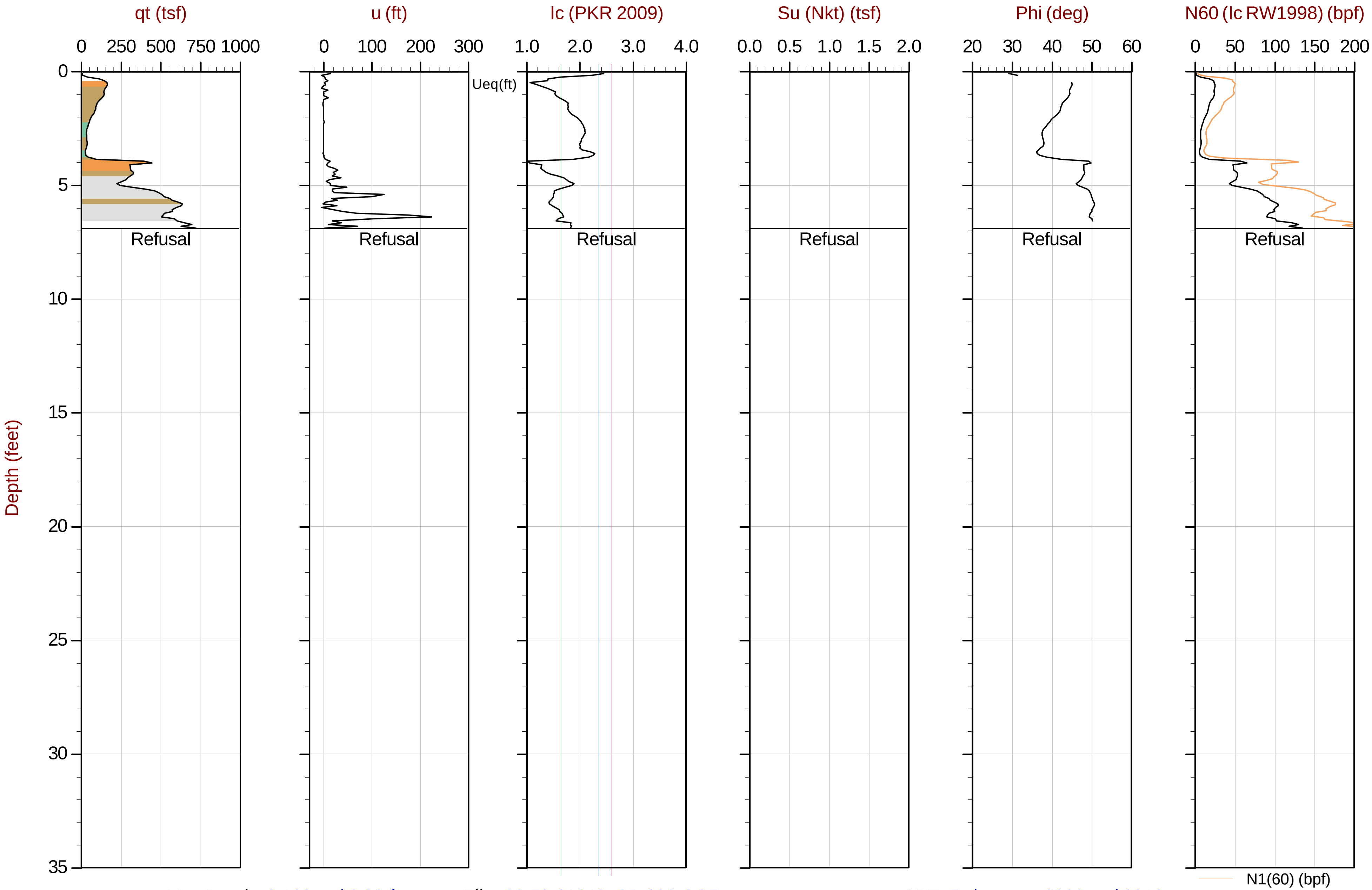
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 11:57
Site: Grand Street Commons

Sounding: AC-CPT-26S
Cone: EC529



Max Depth: 2.100 m / 6.89 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-26S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58644 Long: -122.30315

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

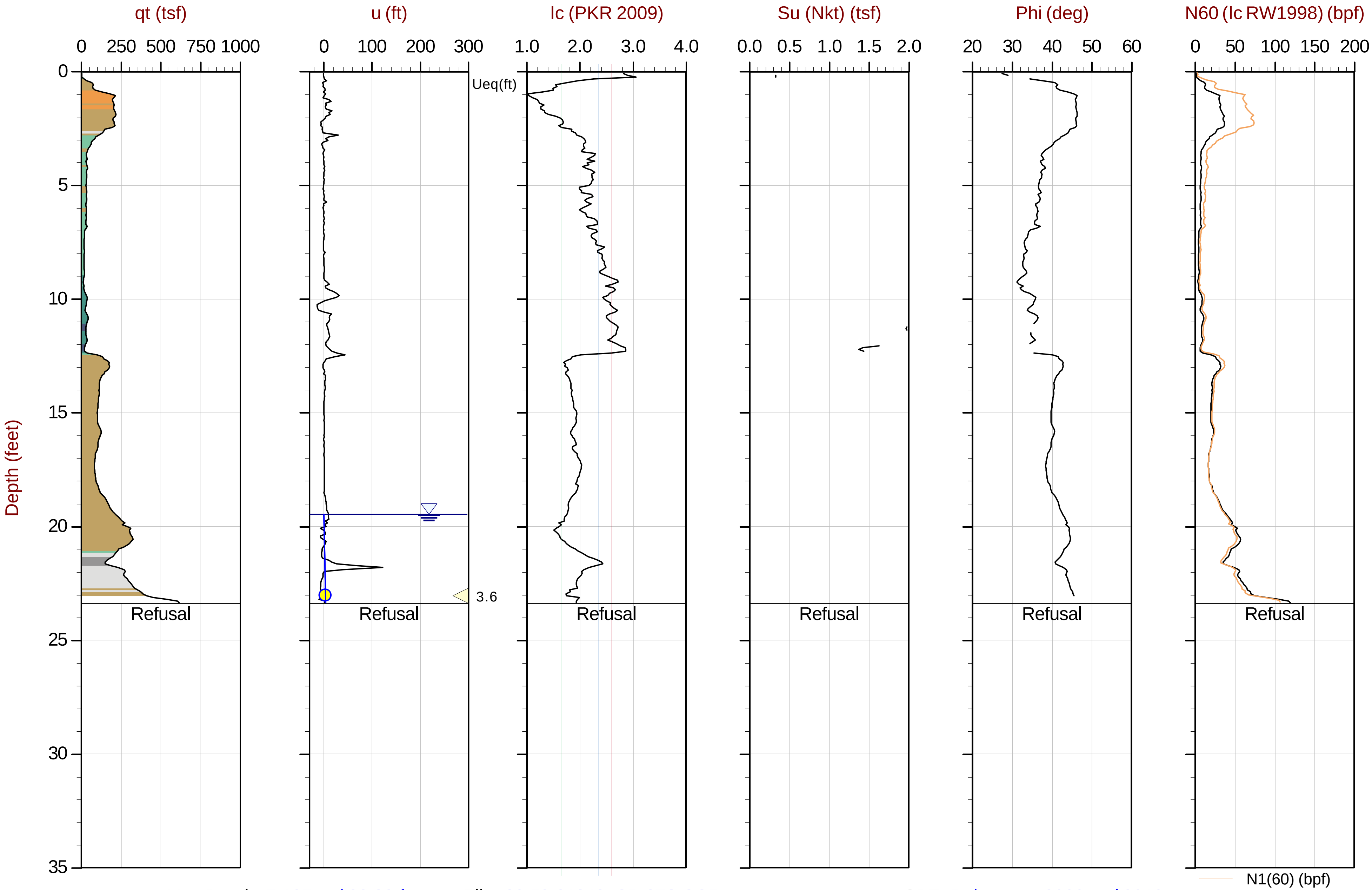
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 12:22
Site: Grand Street Commons

Sounding: AC-CPT-27S
Cone: EC529



Max Depth: 7.125 m / 23.38 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

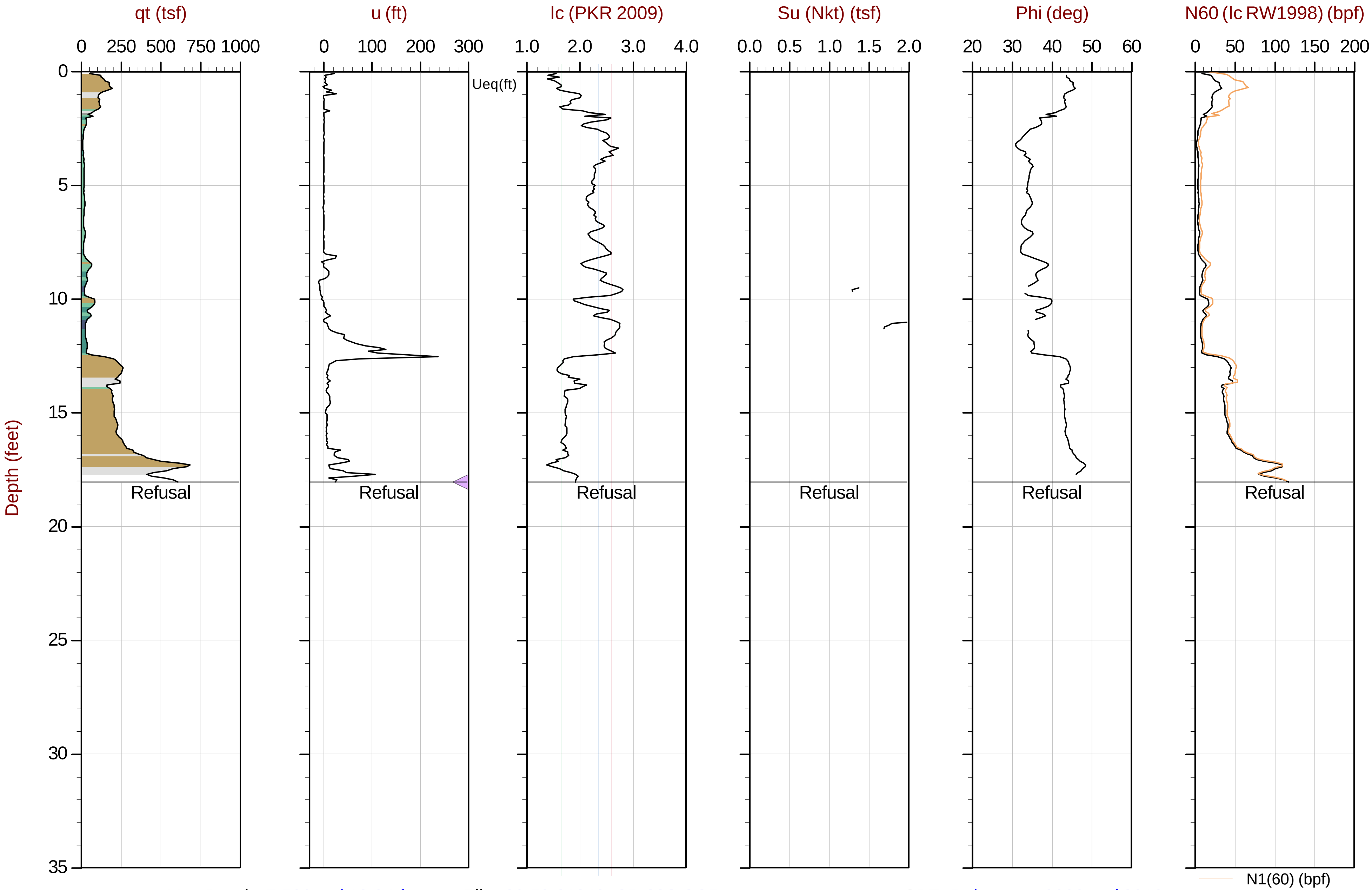
File: 20-59-21343_CP-27S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58650 Long: -122.30344

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	*Aspect Consulting*	Job No: 20-59-21343 Date: 2020-11-05 01:18 Site: Grand Street Commons
		Sounding: AC-CPT-28S Cone: EC529



Max Depth: 5.500 m / 18.04 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-28S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

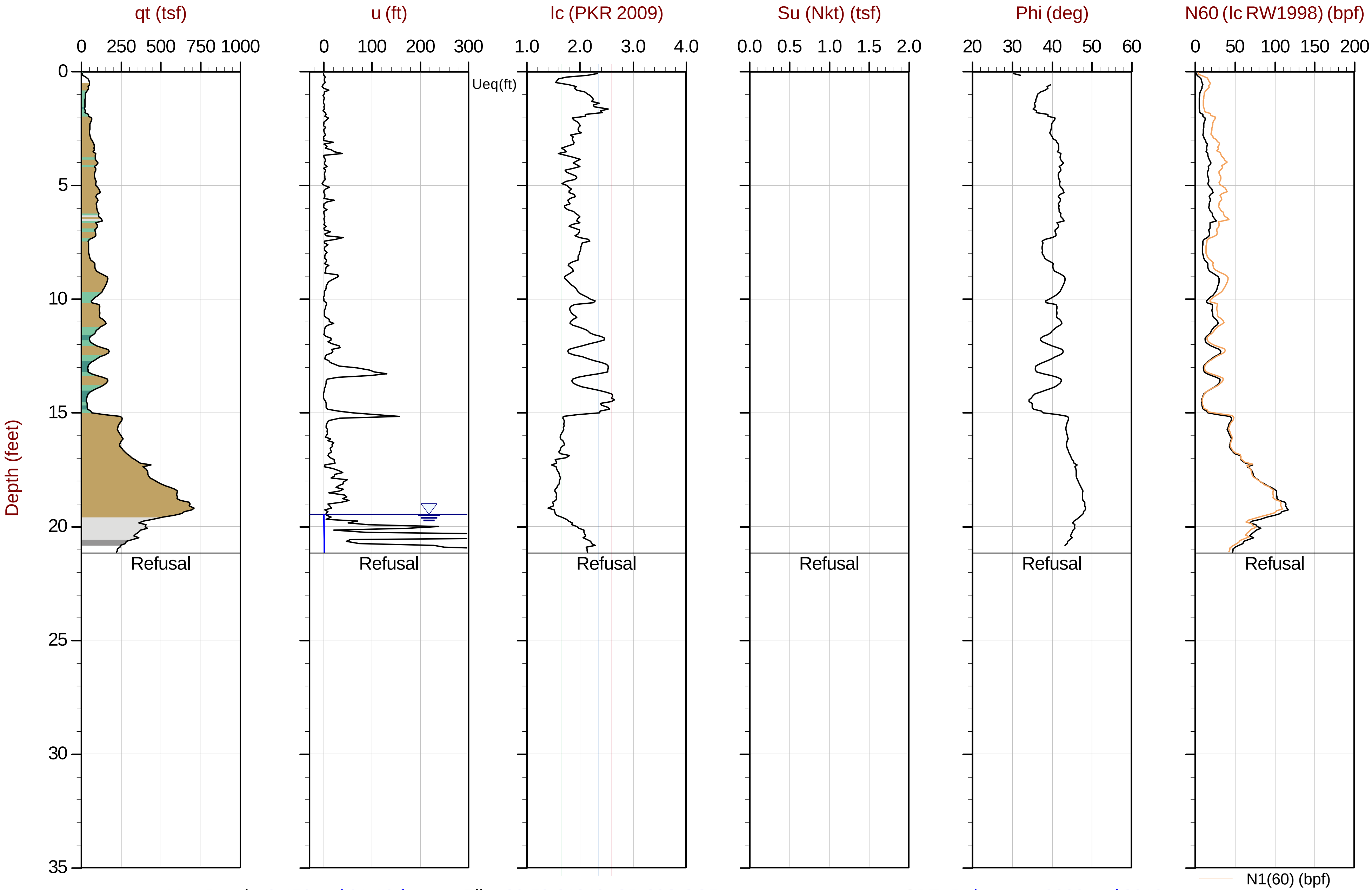
SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58681 Long: -122.30311

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.

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 02:02
Site: Grand Street Commons
Sounding: AC-CPT-29S
Cone: EC529



Max Depth: 6.450 m / 21.16 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-29S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58674 Long: -122.30307

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

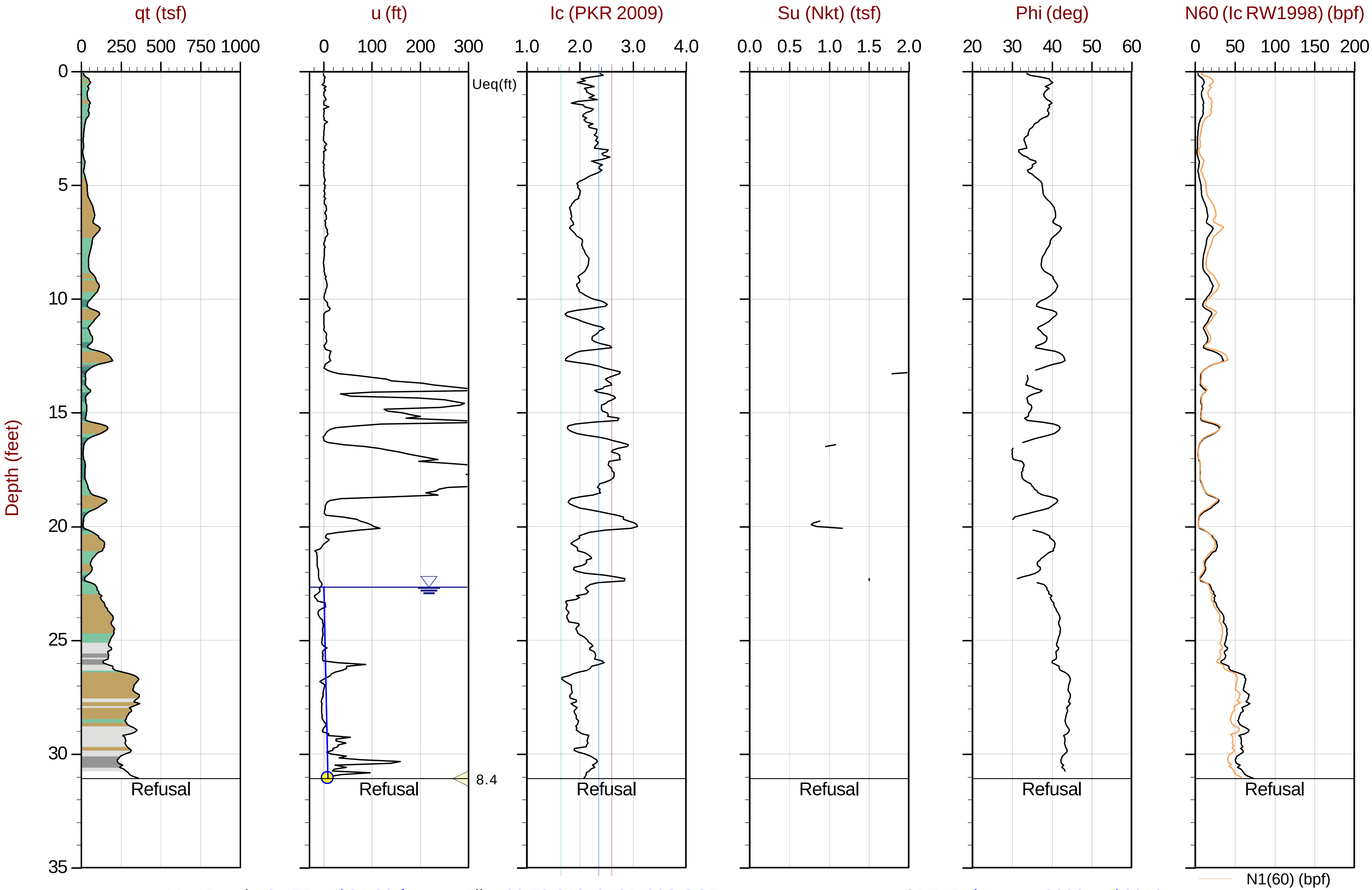
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 02:38
Site: Grand Street Commons

Sounding: AC-CPT-30S
Cone: EC529



Max Depth: 9.475 m / 31.09 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-30S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58682 Long: -122.30305

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

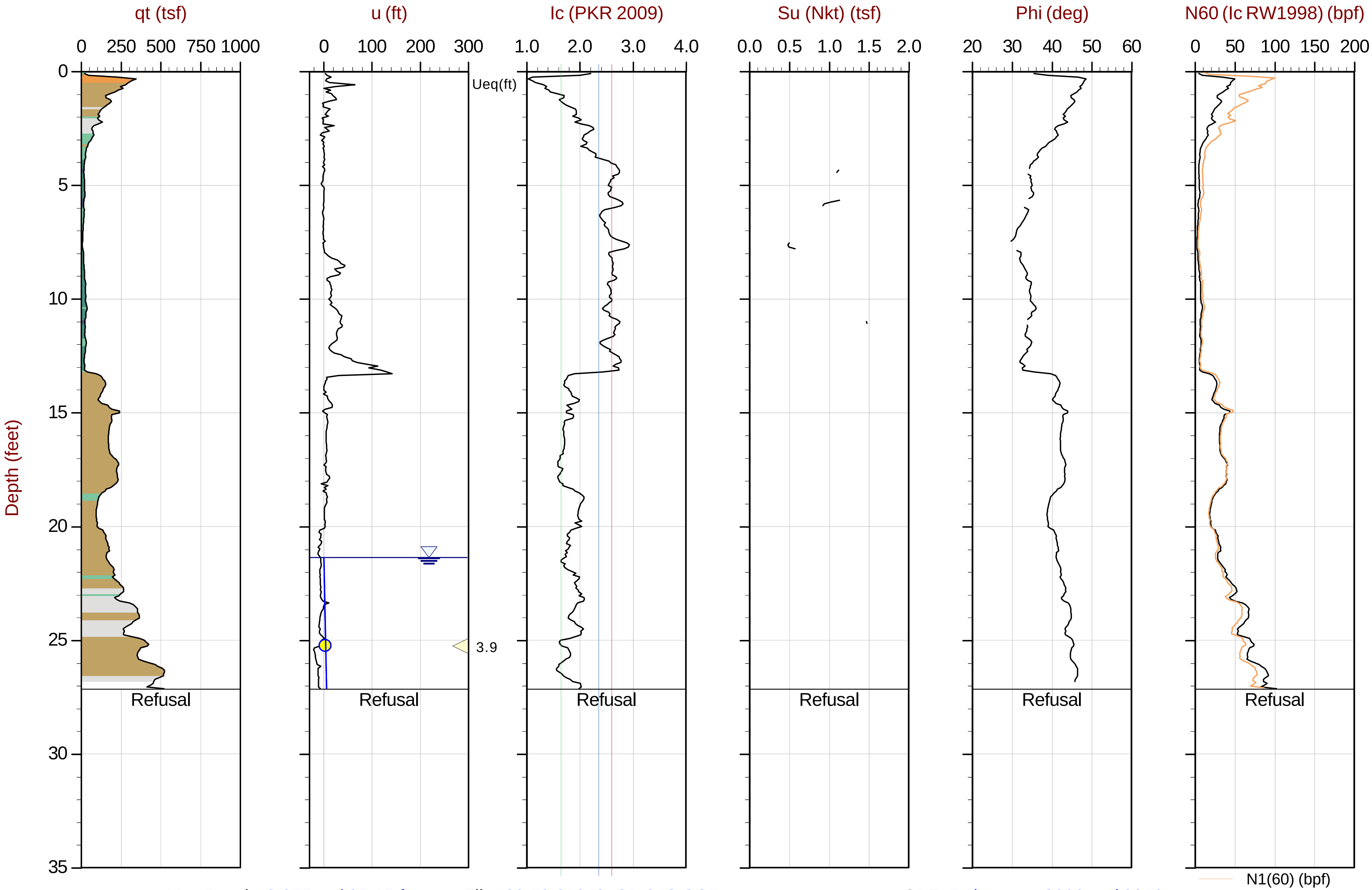
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 03:19
Site: Grand Street Commons

Sounding: AC-CPT-31S
Cone: EC529



Max Depth: 8.275 m / 27.15 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-31S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58652 Long: -122.30347

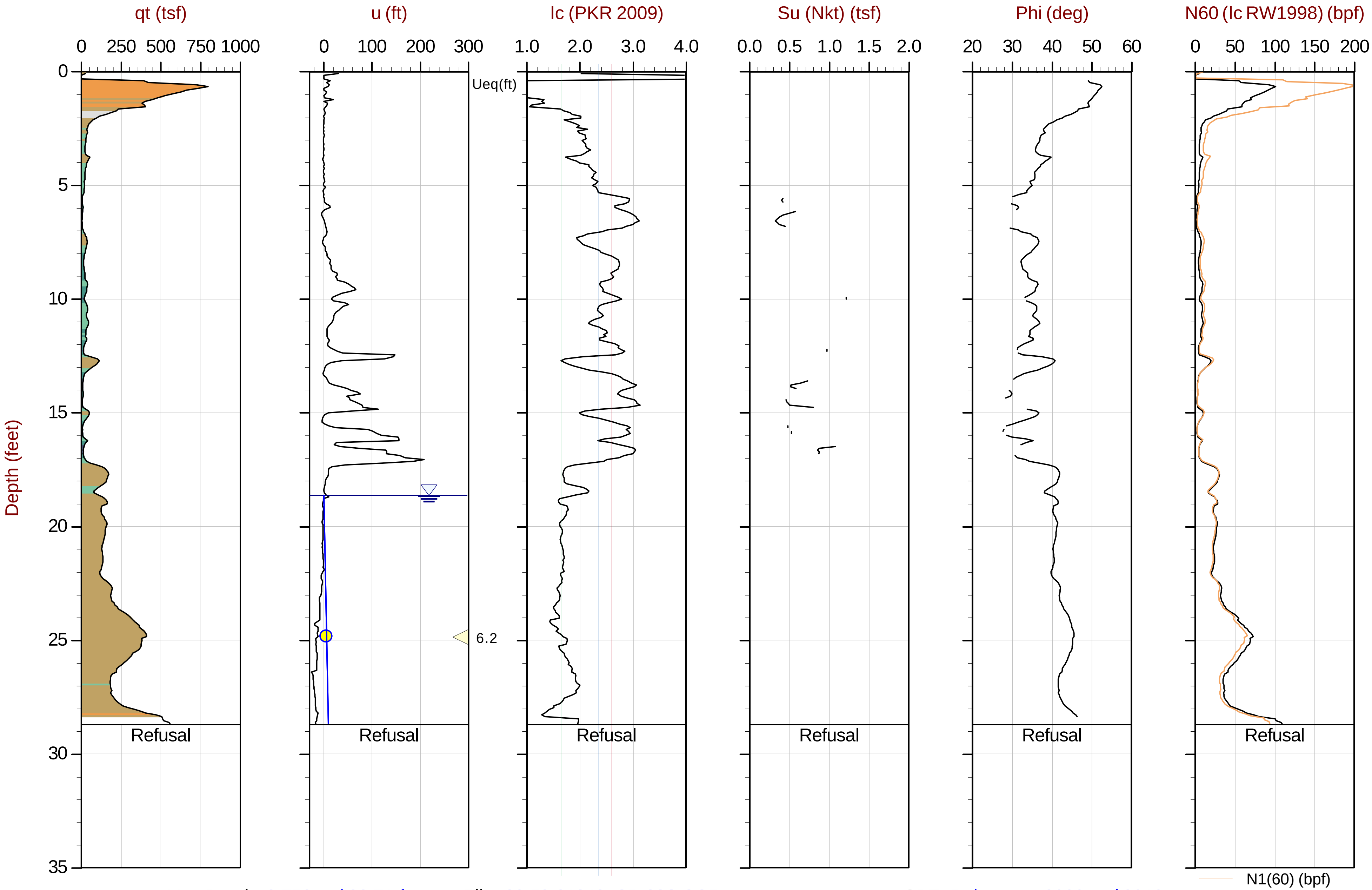
Equilibrium Pore Pressure (Ueq) · Assumed Ueq · Dissipation, Ueq achieved · Dissipation, Ueq not achieved · Hydrostatic Line

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

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 04:11
Site: Grand Street Commons
Sounding: AC-CPT-32S
Cone: EC529



Max Depth: 8.750 m / 28.71 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-59-21343_CP-32S.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 47.58660 Long: -122.30355

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

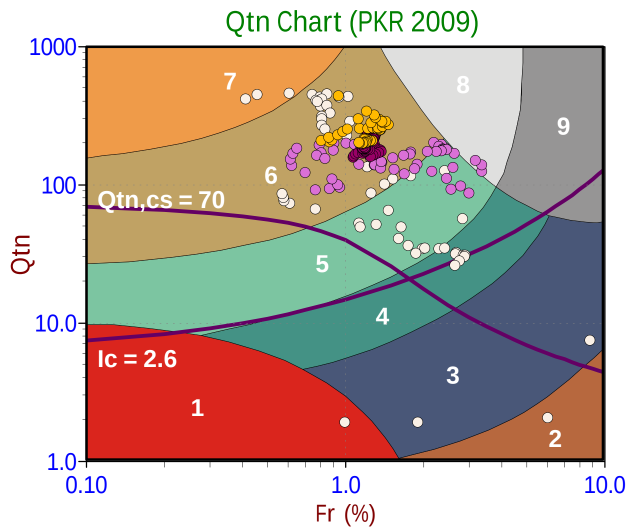
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

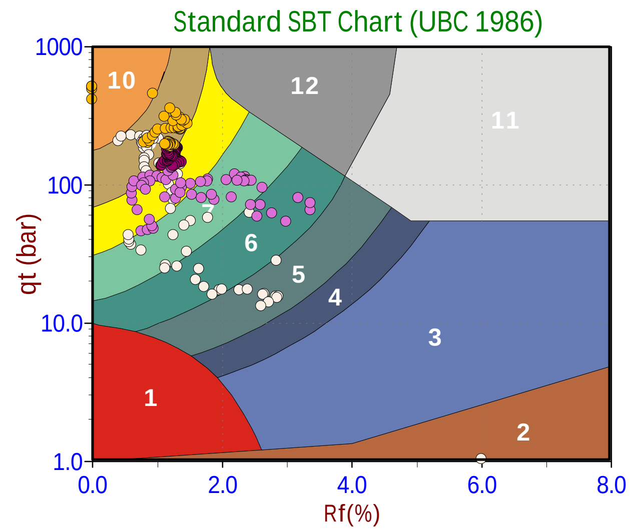
Soil Behavior Type (SBT) Scatter Plots

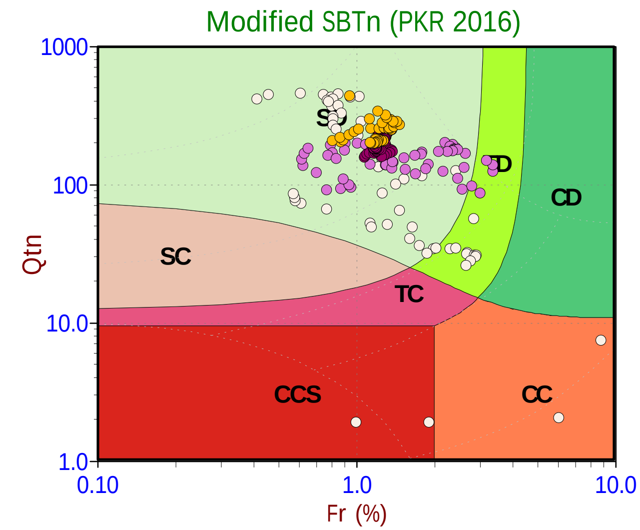
Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 08:45
Site: Grand Street Commons

Sounding: AC-CPT-22S
Cone: EC529







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)

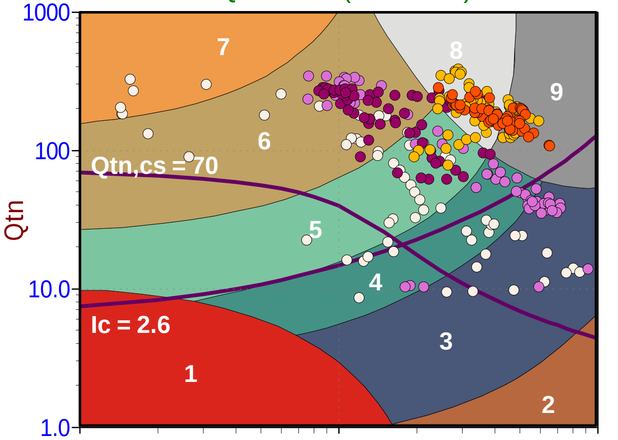
CONETEC

Aspect Consulting

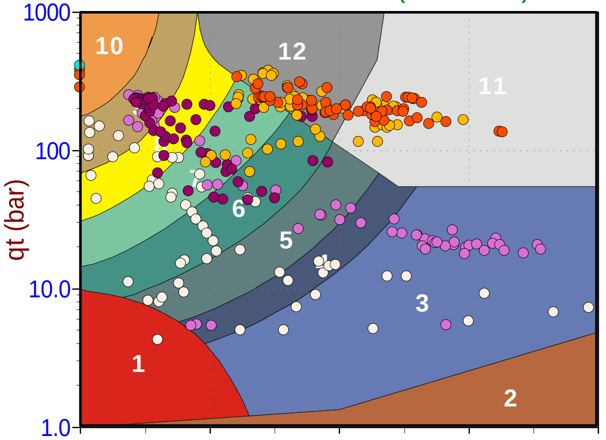
Job No: 20-59-21343
Date: 2020-11-05 09:38
Site: Grand Street Commons

Sounding: AC-CPT-23S
Cone: EC529

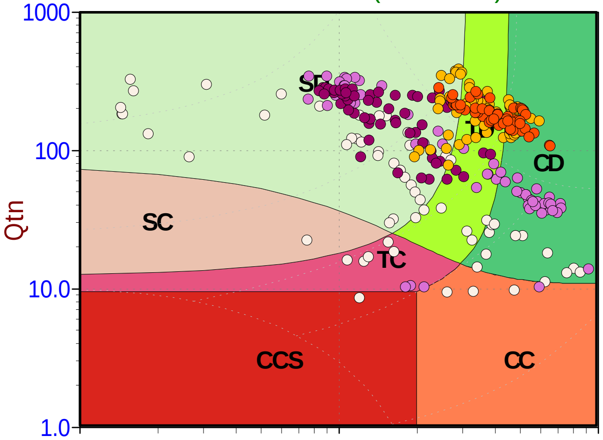
Qtn Chart (PKR 2009)



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

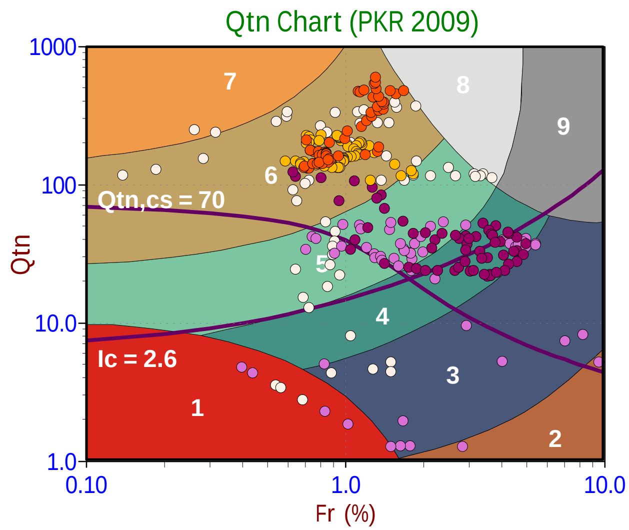
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

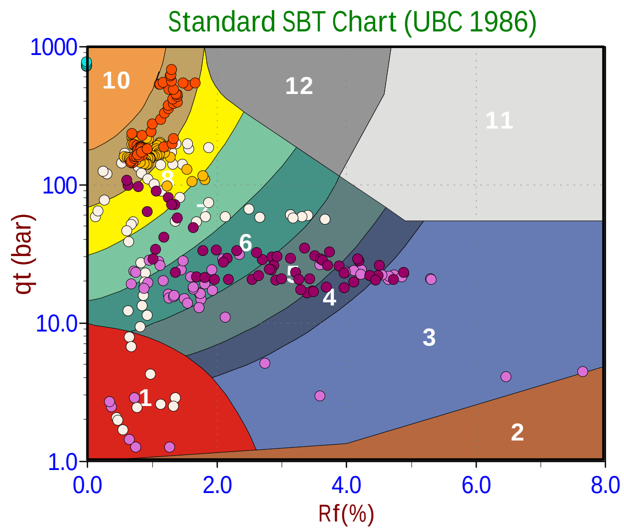
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

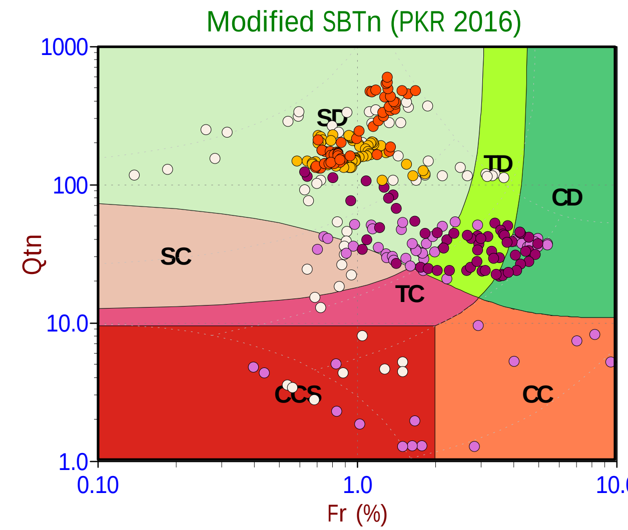
CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 10:20
Site: Grand Street Commons
Sounding: AC-CPT-24S
Cone: EC529







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

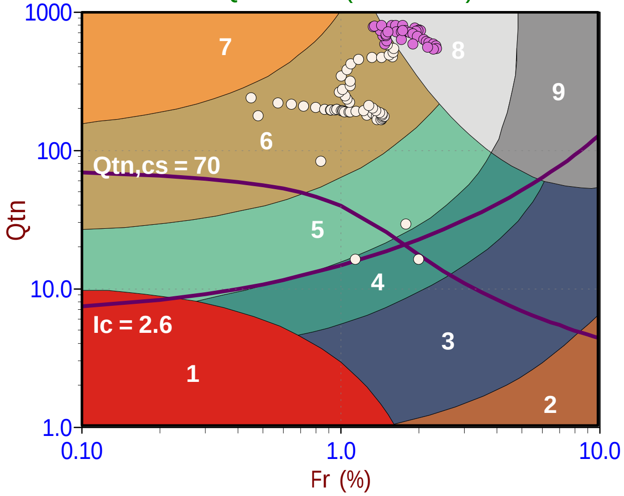
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Aspect Consulting

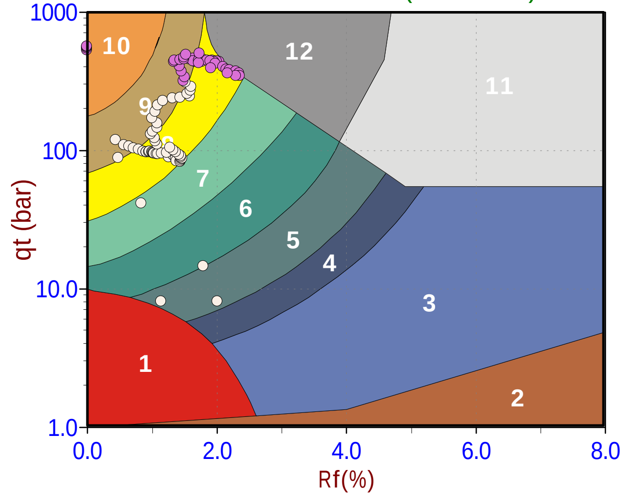
Job No: 20-59-21343
Date: 2020-11-05 11:18
Site: Grand Street Commons

Sounding: AC-CPT-25S
Cone: EC529

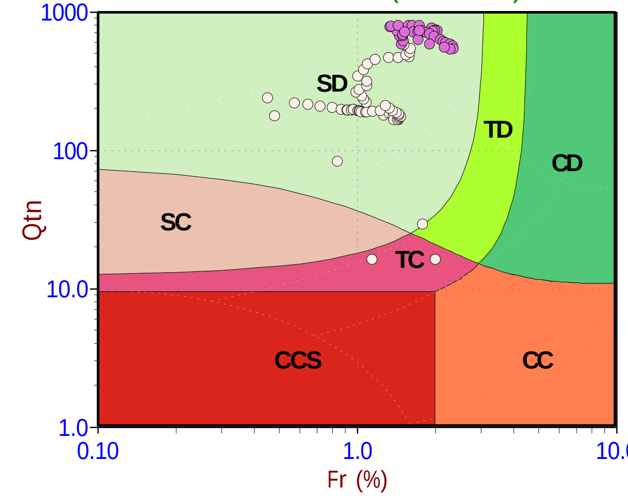
Qtn Chart (PKR 2009)



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

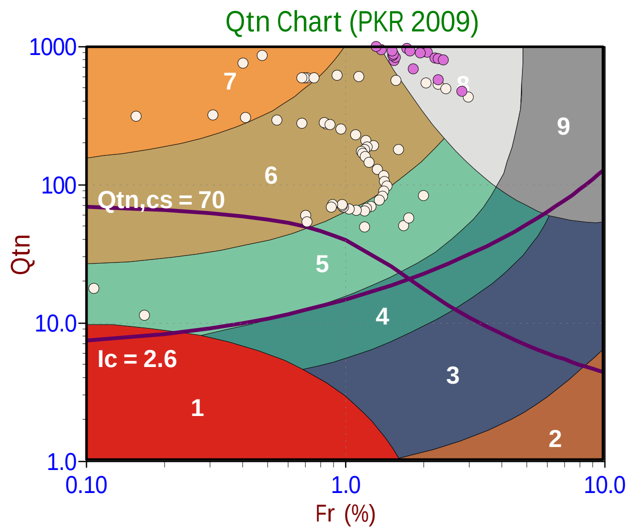
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

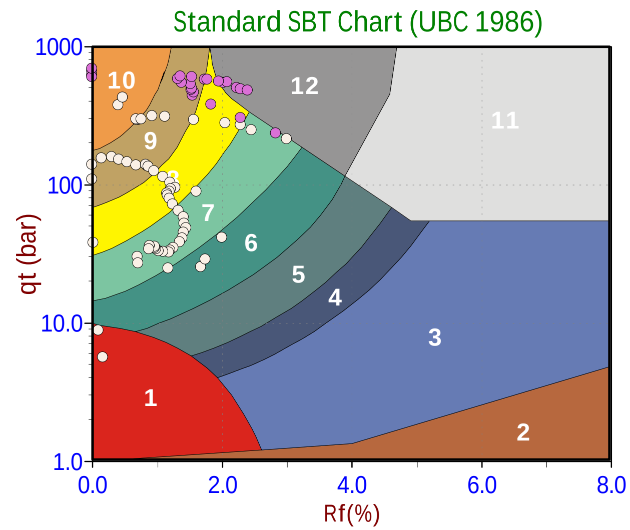
ConeTec

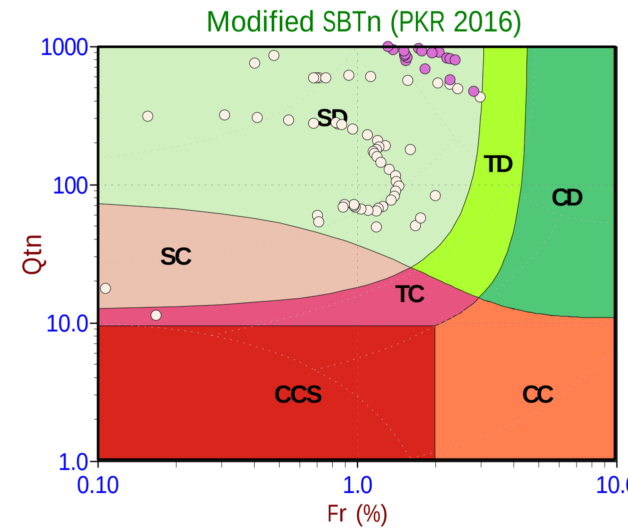
Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 11:57
Site: Grand Street Commons

Sounding: AC-CPT-26S
Cone: EC529







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)

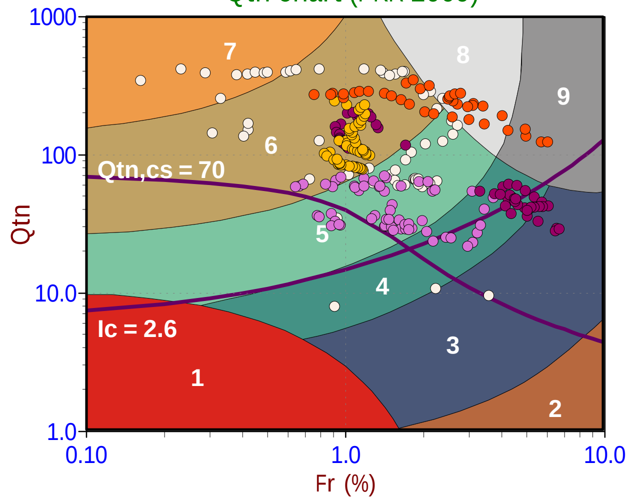
CONETEC

Aspect Consulting

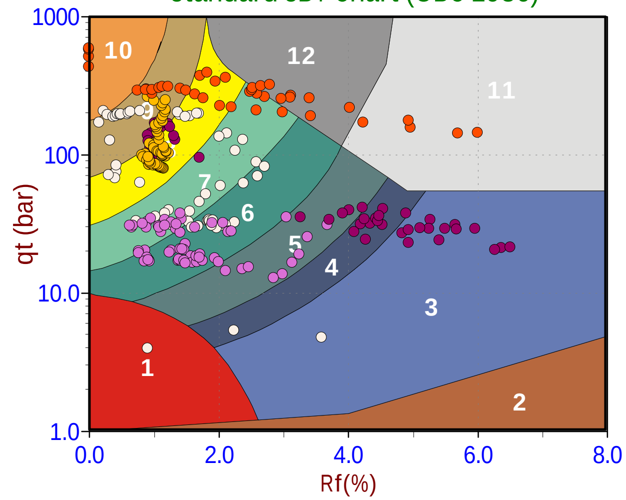
Job No: 20-59-21343
Date: 2020-11-05 12:22
Site: Grand Street Commons

Sounding: AC-CPT-27S
Cone: EC529

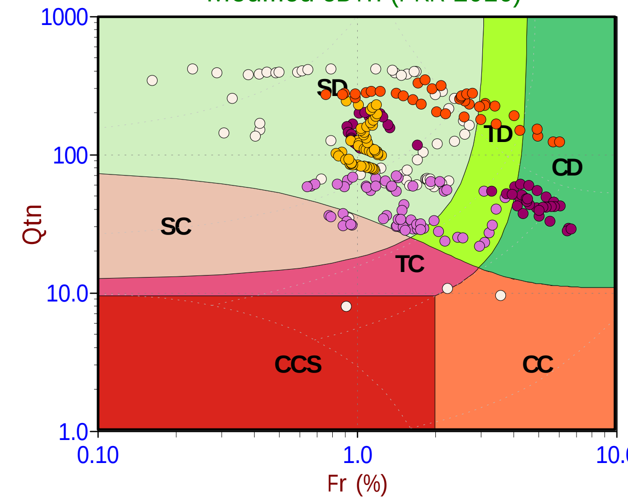
Qtn Chart (PKR 2009)



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

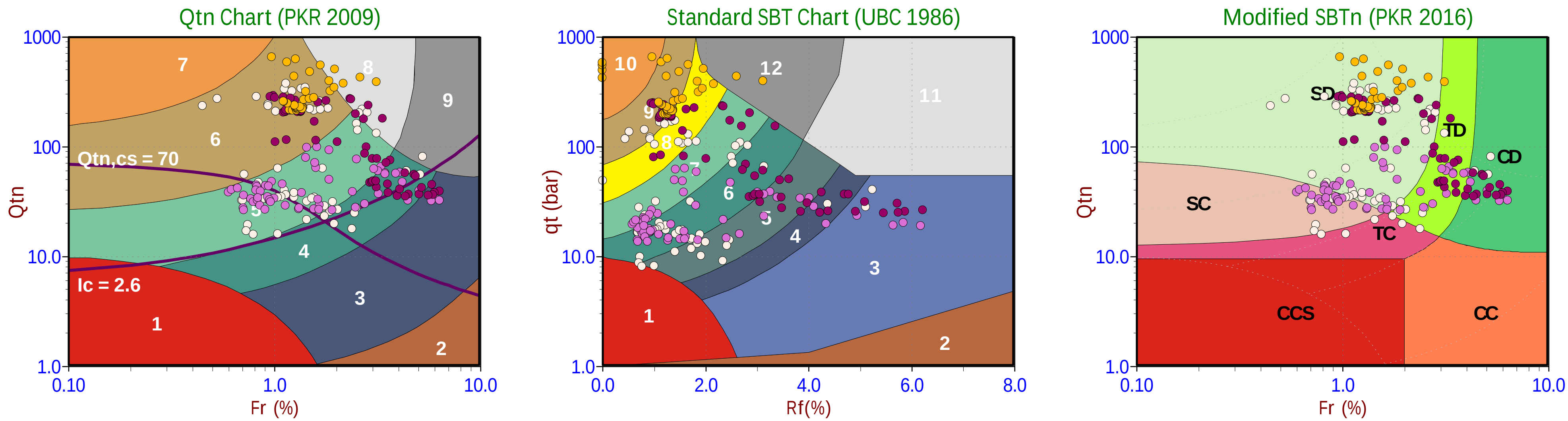
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 01:18
Site: Grand Street Commons

Sounding: AC-CPT-28S
Cone: EC529



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

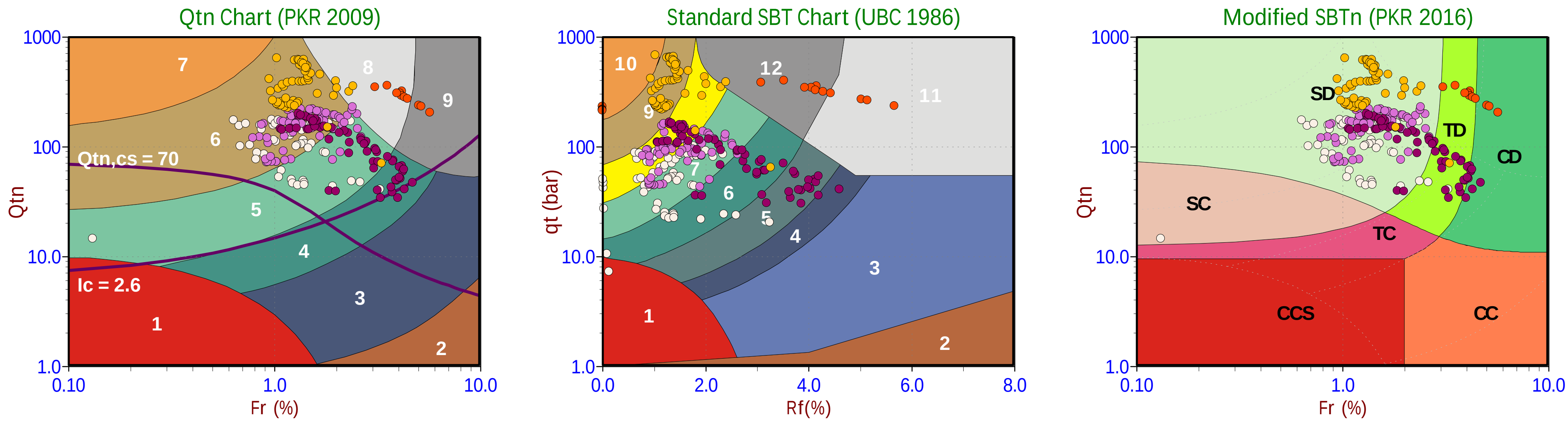
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 02:02
Site: Grand Street Commons

Sounding: AC-CPT-29S
Cone: EC529



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)

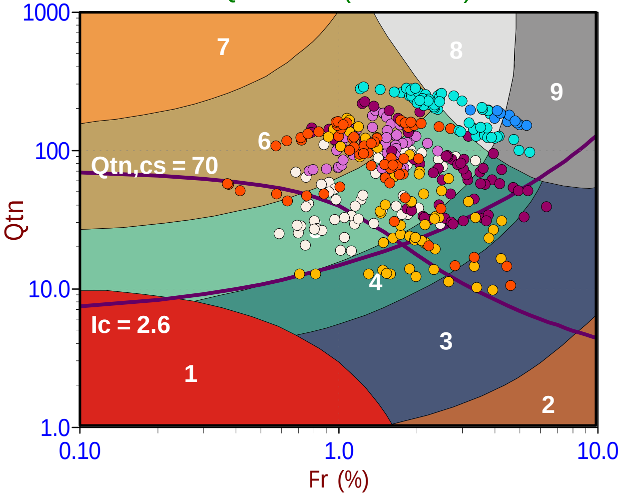
ConeTec

Aspect Consulting

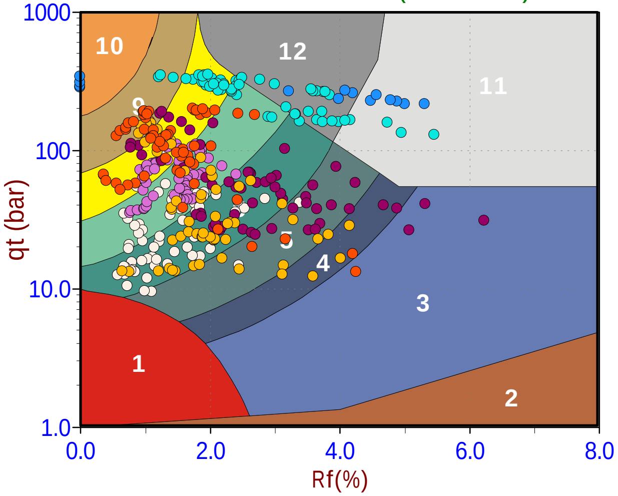
Job No: 20-59-21343
Date: 2020-11-05 02:38
Site: Grand Street Commons

Sounding: AC-CPT-30S
Cone: EC529

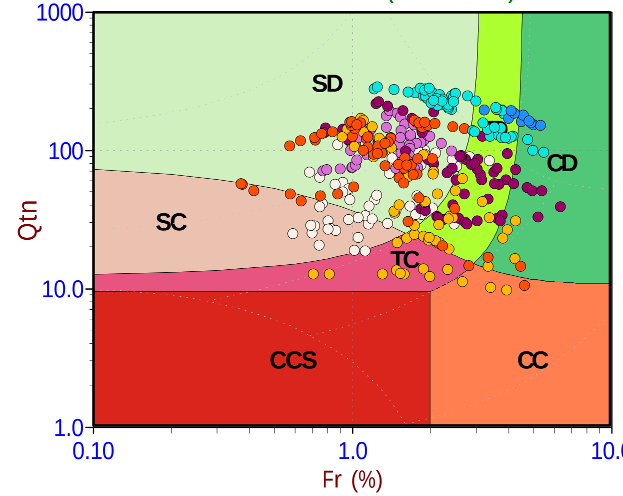
Qtn Chart (PKR 2009)



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

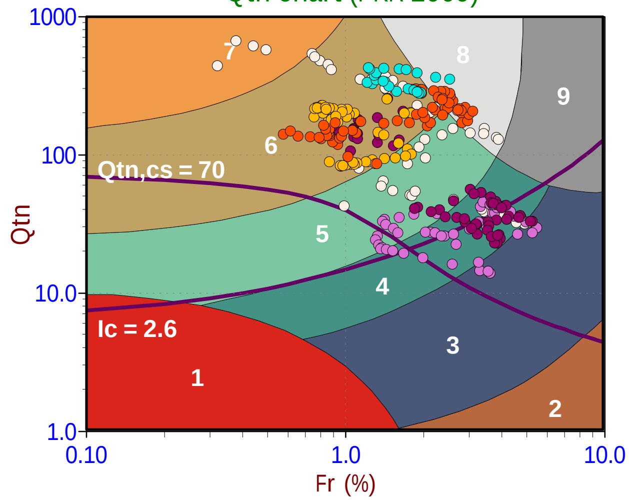
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

CONETEC

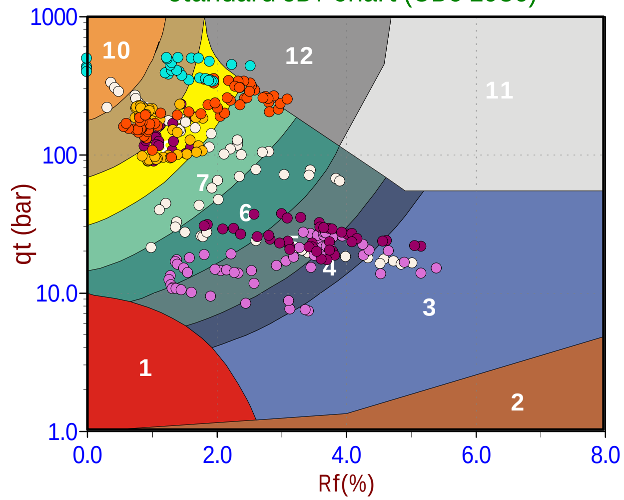
Aspect Consulting

Job No: 20-59-21343
Date: 2020-11-05 03:19
Site: Grand Street Commons
Sounding: AC-CPT-31S
Cone: EC529

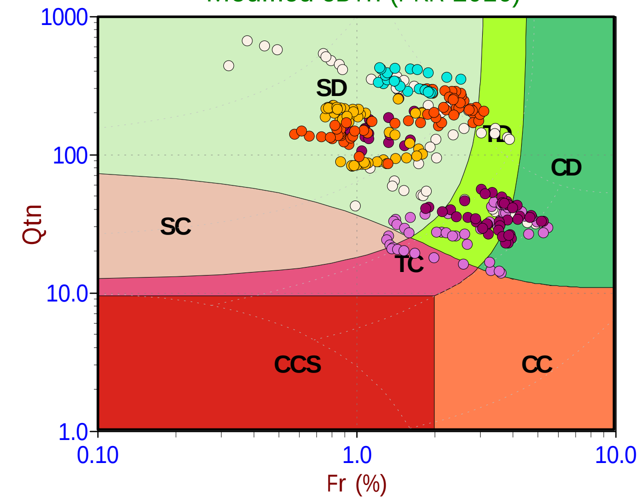
Qtn Chart (PKR 2009)



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

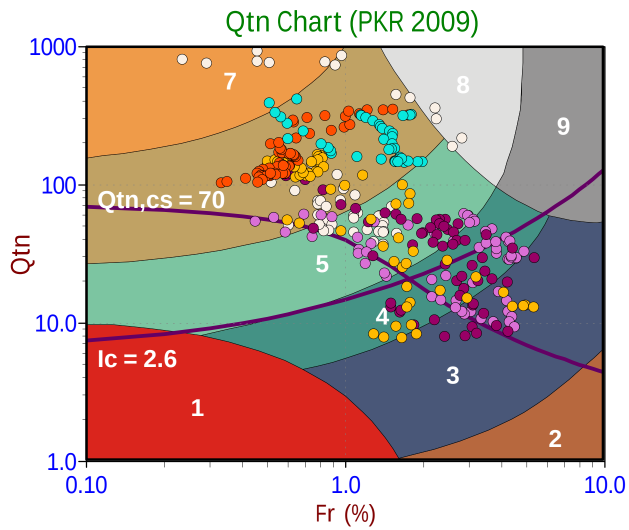
Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

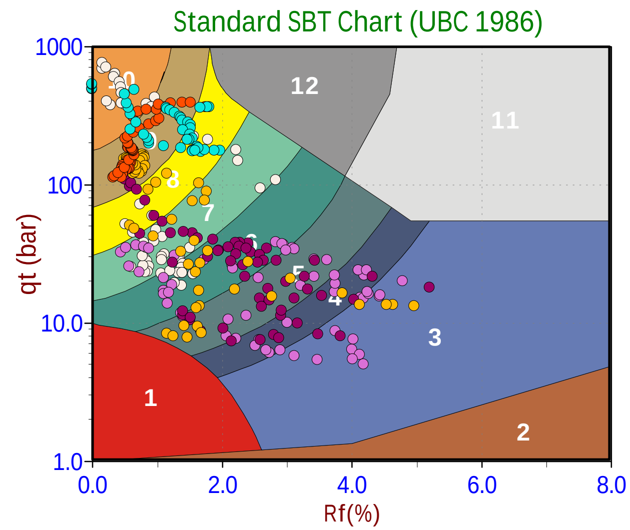
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

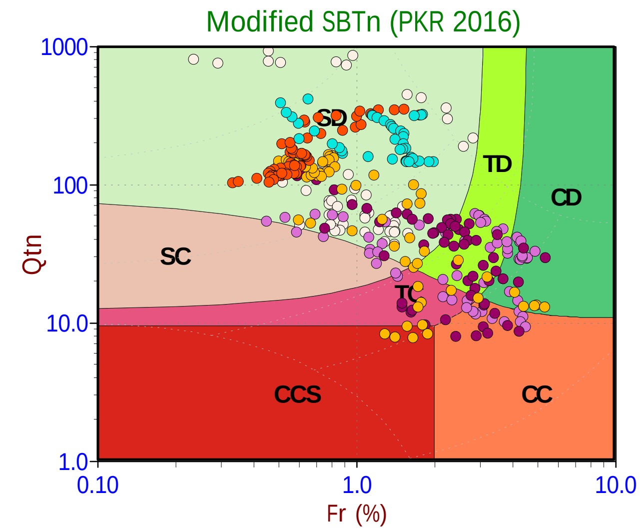
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Job No: 20-59-21343	Sounding: AC-CPT-32S
Date: 2020-11-05 04:11	Cone: EC529
Site: Grand Street Commons	

Aspect Consulting







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

CONETEC

Job No: 20-59-21343
Client: Aspect Consulting
Project: Grand Street Commons
Start Date: 05-Nov-2020
End Date: 05-Nov-2020

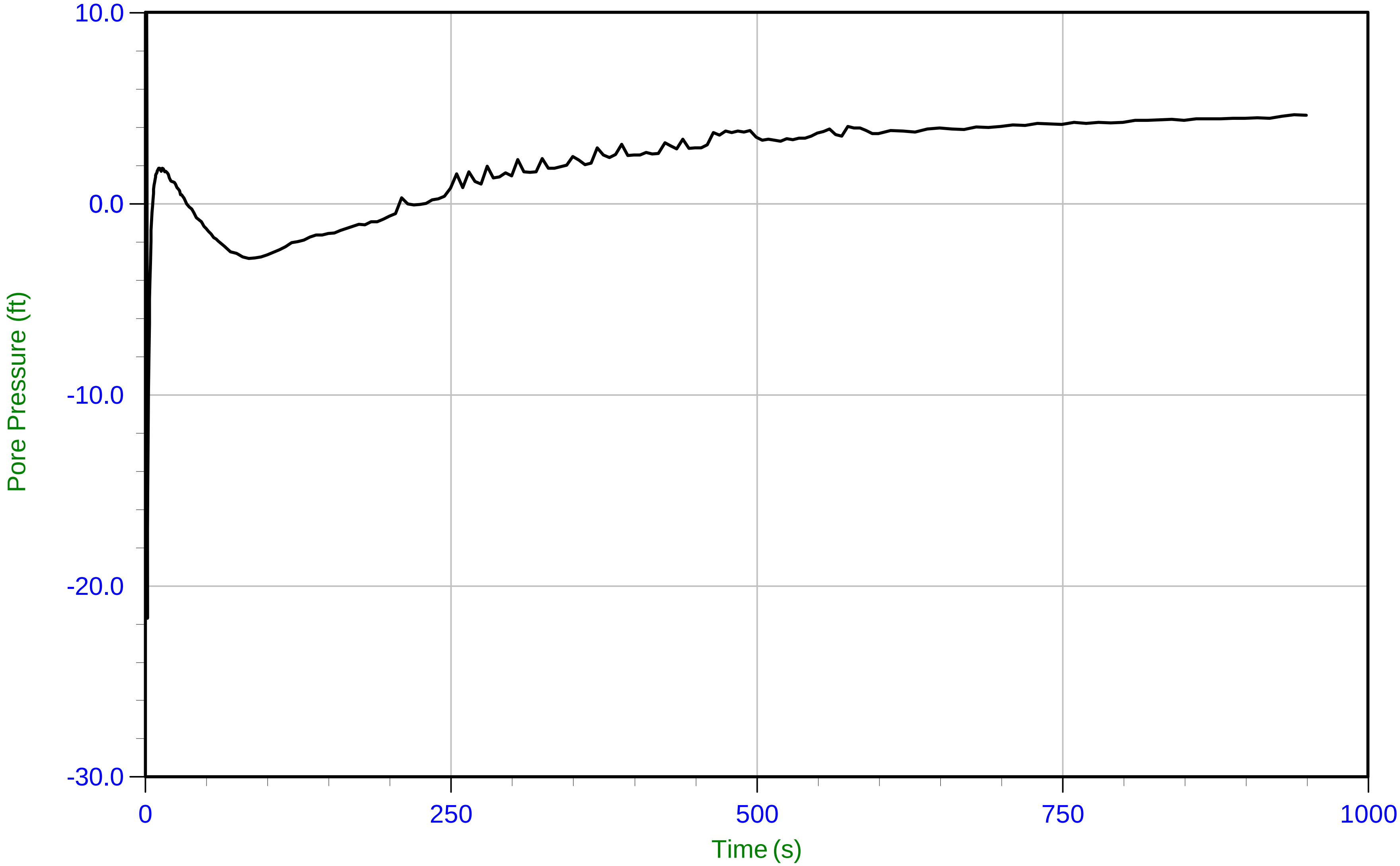
CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)
AC-CPT-24S	20-59-21343_CP-24S.ppd2	15	950	24.7	4.6	20.1
AC-CPT-27S	20-59-21343_CP-27S.ppd2	15	980	23.0	3.6	19.5
AC-CPT-28S	20-59-21343_CP-28S.ppd2	15	305	18.0		
AC-CPT-30S	20-59-21343_CP-30S.ppd2	15	445	31.1	8.4	22.7
AC-CPT-31S	20-59-21343_CP-31S.ppd2	15	600	25.3	3.9	21.4
AC-CPT-32S	20-59-21343_CP-32S.ppd2	15	1420	24.9	6.2	18.6
Total Duration			78.3 min			

Aspect Consulting

Job No: 20-59-21343
Date: 05-Nov-2020 10:20-08
Site: Grand Street Commons

Sounding: AC-CPT-24S
Cone: EC529 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP-24S.ppd2
Depth: 7.525 m / 24.688 ft
Duration: 950.0 s

u Min: -21.7 ft
u Max: 26.4 ft
u Final: 4.6 ft

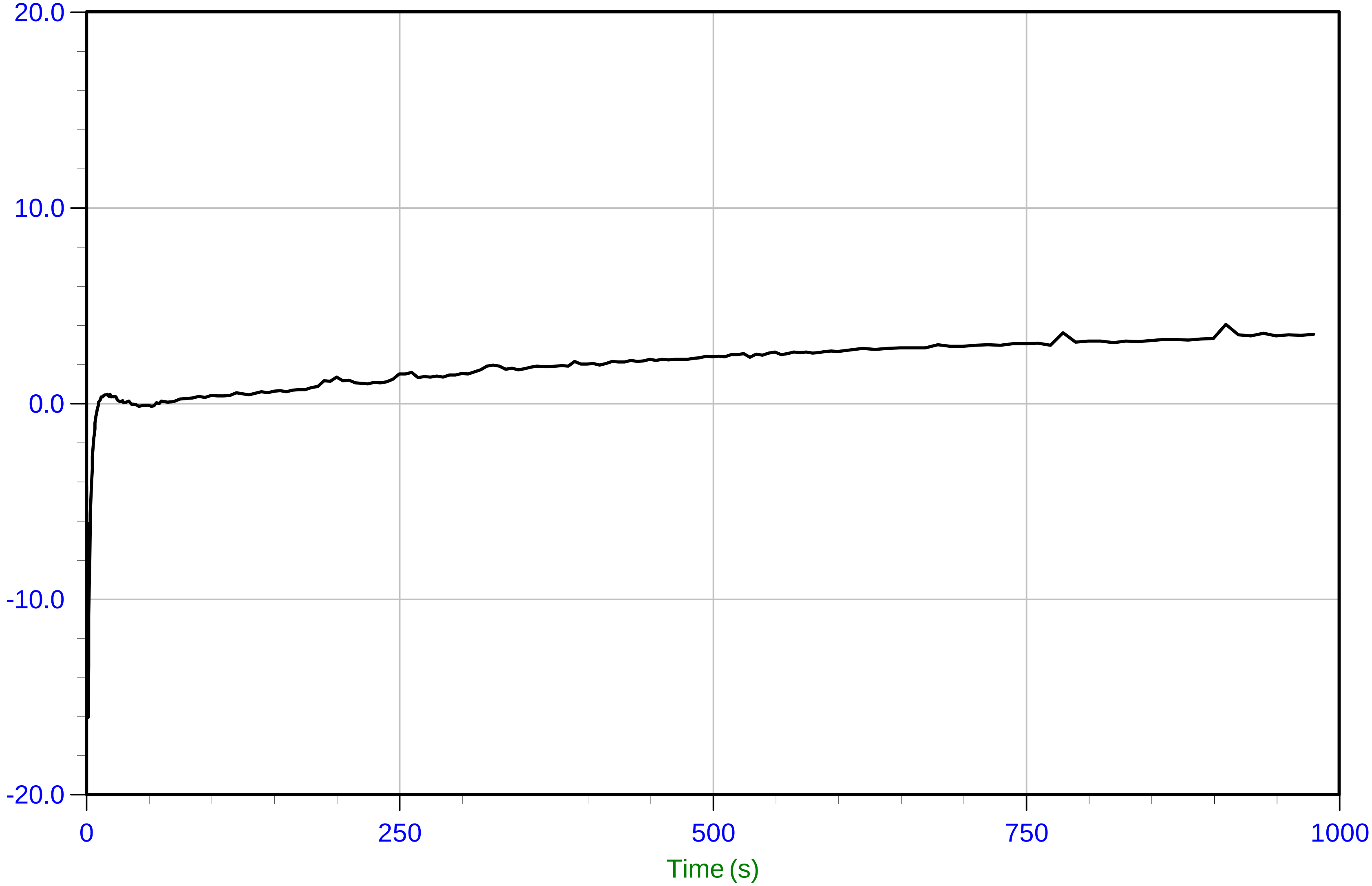
WT: 6.113 m / 20.056 ft
Ueq: 4.6 ft

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 05-Nov-2020 12:22-51
Site: Grand Street Commons

Sounding: AC-CPT-27S
Cone: EC529 Area=15 cm²



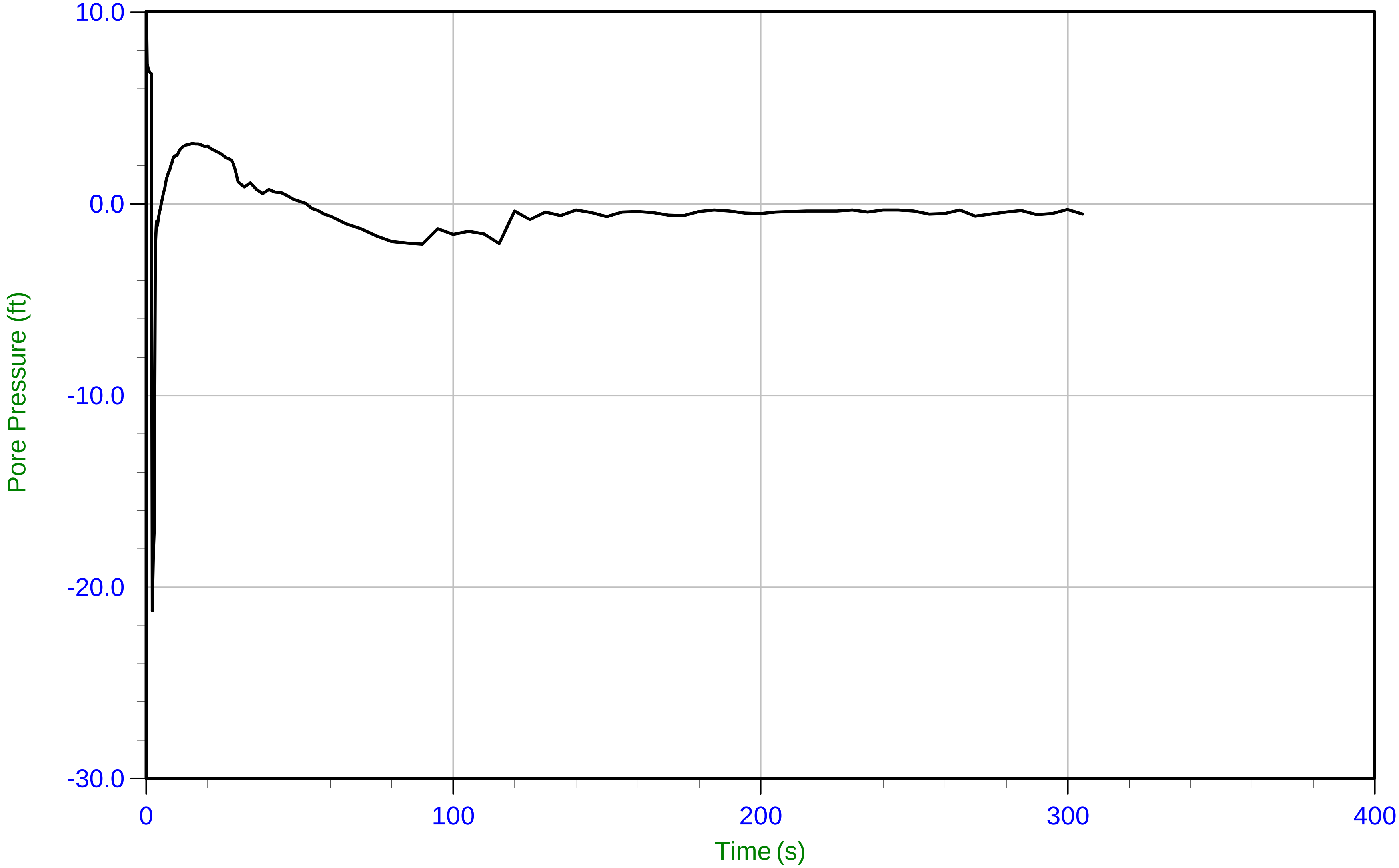
Trace Summary:

Filename: 20-59-21343_CP-27S.ppd2
Depth: 7.025 m / 23.048 ft
Duration: 980.0 s

u Min: -16.0 ft
u Max: 4.0 ft
u Final: 3.5 ft

WT: 5.934 m / 19.469 ft
Ueq: 3.6 ft

Aspect Consulting	Job No: 20-59-21343 Date: 05-Nov-2020 01:18-18 Site: Grand Street Commons	Sounding: AC-CPT-28S Cone: EC529 Area=15 cm²



Trace Summary:

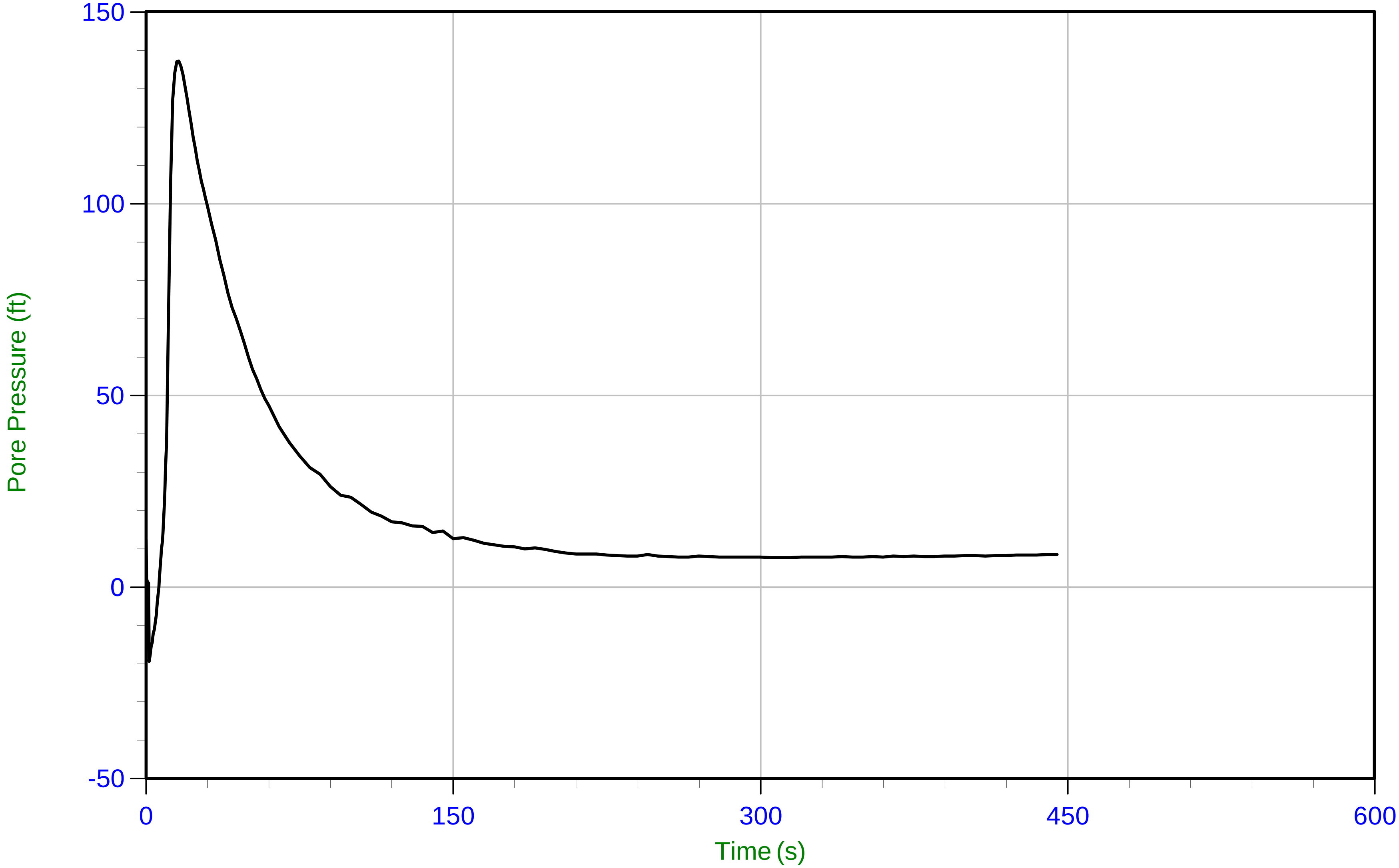
Filename: 20-59-21343_CP-28S.ppd2	u Min: -21.2 ft
Depth: 5.500 m / 18.044 ft	u Max: 11.5 ft
Duration: 305.0 s	u Final: -0.5 ft

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 05-Nov-2020 02:38-30
Site: Grand Street Commons

Sounding: AC-CPT-30S
Cone: EC529 Area=15 cm²



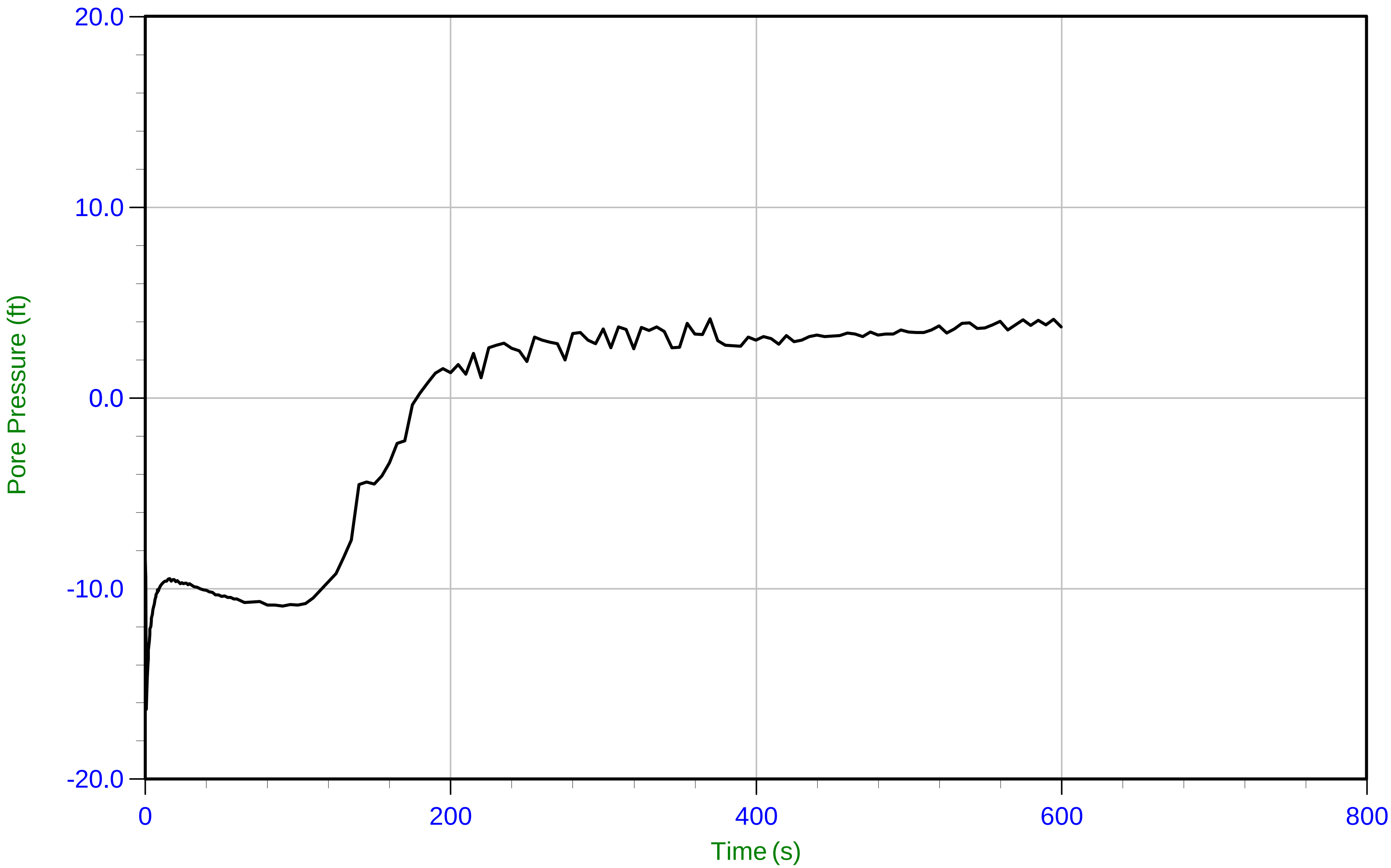
Trace Summary:

Filename: 20-59-21343_CP-30S.ppd2
Depth: 9.475 m / 31.086 ft
Duration: 445.0 s

u Min: -19.4 ft
u Max: 137.1 ft
u Final: 8.5 ft

WT: 6.908 m / 22.665 ft
Ueq: 8.4 ft

Aspect Consulting	Job No: 20-59-21343 Date: 05-Nov-2020 03:19-46 Site: Grand Street Commons	Sounding: AC-CPT-31S Cone: EC529 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP-31S.ppd2
Depth: 7.700 m / 25.262 ft
Duration: 600.0 s

u Min: -16.3 ft
u Max: 4.1 ft
u Final: 3.7 ft

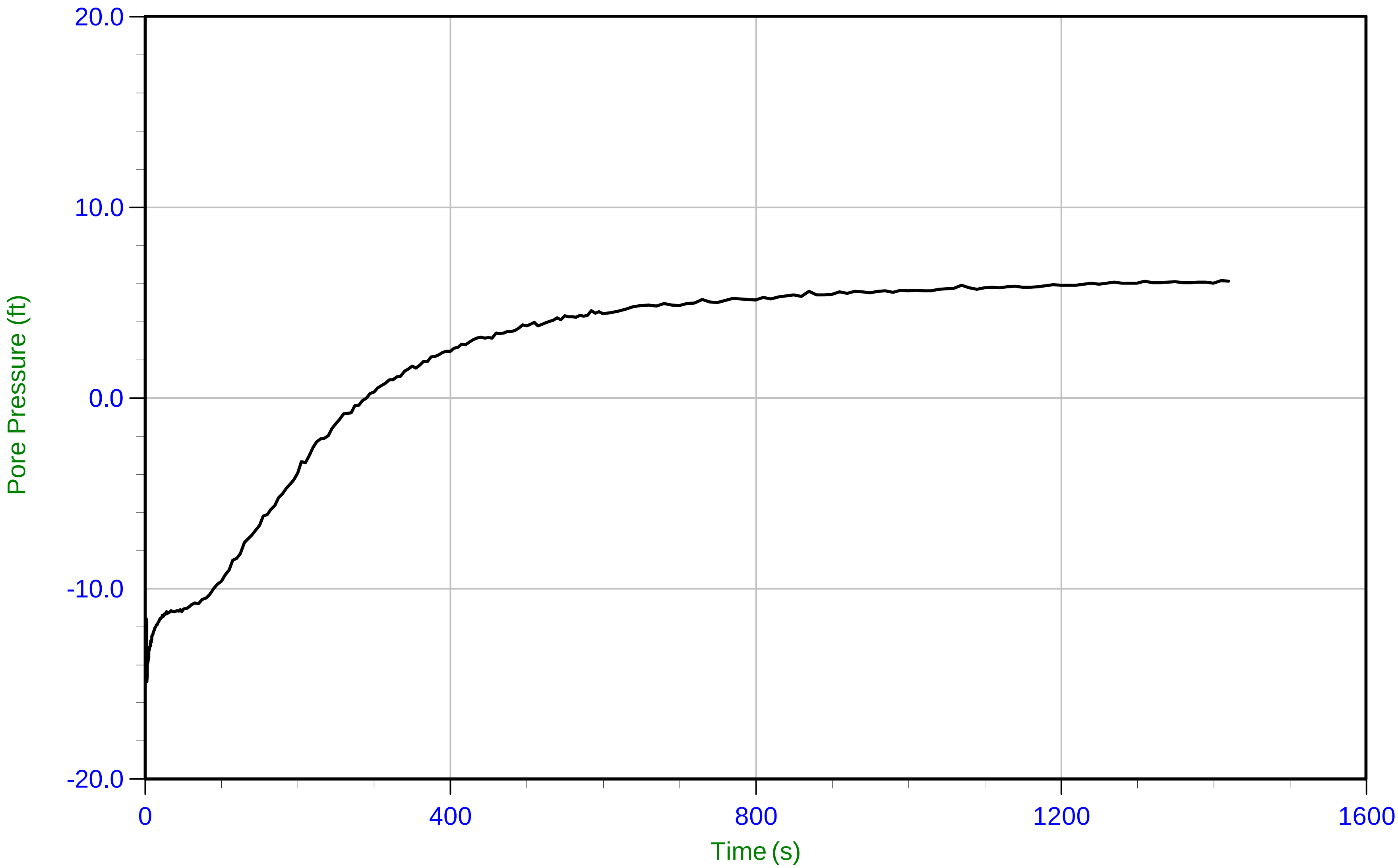
WT: 6.513 m / 21.367 ft
Ueq: 3.9 ft

ConeTec

Aspect Consulting

Job No: 20-59-21343
Date: 05-Nov-2020 04:11-01
Site: Grand Street Commons

Sounding: AC-CPT-32S
Cone: EC529 Area=15 cm²



Trace Summary:

Filename: 20-59-21343_CP-32S.ppd2
Depth: 7.575 m / 24.852 ft
Duration: 1420.0 s

u Min: -14.9 ft
u Max: 6.1 ft
u Final: 6.1 ft

WT: 5.682 m / 18.642 ft
Ueq: 6.2 ft

APPENDIX B

Results of Geotechnical Laboratory Testing

B.1 Geotechnical Laboratory Testing

Laboratory tests were conducted on selected soil samples to characterize certain engineering (physical) properties of the soils at the Site. Laboratory testing included determination of moisture content and Atterberg limits. The laboratory tests were conducted in general accordance with appropriate ASTM International (ASTM) test methods. Test procedures are discussed below.

The moisture content of selected samples was analyzed in general accordance with ASTM D2216, *Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass*. Atterberg Limits were analyzed in general accordance ASTM D4318, *Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.*

The results of the moisture content tests are presented in Appendix C and graphically on the boring logs in Appendix A.

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client:	Aspect Consulting	**Date:**	September 13, 2019
Address:	401 2nd Ave S	**Project:**	Q.C. - Grand Street Commons
	Seattle, WA 98104	**Project #:**	18B011-30
Attn:	Eric Schellenger	**Sample #:**	B19-0817-0819
Date Revised:		**Date Sampled:**	Various

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

B19-0817 AC-SB-11 @ 7.5ft; Brown Clay with Silt; Plasticity Index - 21.6% - sampled 5-15-19
B19-0818 AC-SB-19 @ 5ft; Brown Clay with Silt; Plasticity Index - 21.1% - sampled 3-26-19
B19-0819 AC-MW-24 @ 10ft; Brown Clay with Silt and Sand; Liquid Limit - 29.9% Non-plastic - sampled 5-16-19

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,
Meghan Blodgett-Carrillo
NW Region Laboratory Manager

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project:	Q.C. - Grand Street Commons	**Date Received:**	6-Sep-19	**Visual Identification**
Project #:	18B011-30	**Sampled By:**	Client	Clay with Silt
Client:	Aspect Consulting	**Date Tested:**	12-Sep-19	**Sample Color**
Source:	AC-SB-11 @ 7.5'	**Tested By:**	A. Eifrig	brown
Sample #:	B19-0817			

Liquid Limit Determination

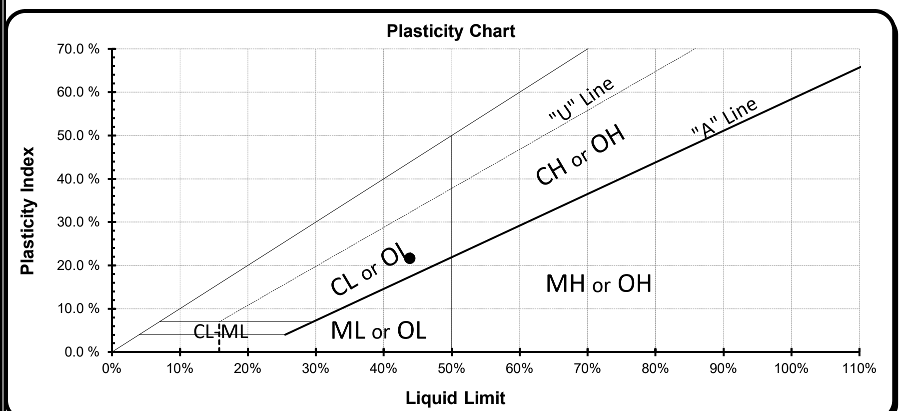
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	32.83	34.33	33.48			
Weight of Dry Soils + Pan:	28.86	29.70	29.01			
Weight of Pan:	19.56	19.35	19.33			
Weight of Dry Soils:	9.30	10.35	9.68			
Weight of Moisture:	3.97	4.63	4.47			
% Moisture:	42.7 %	44.7 %	46.2 %			
Number of Blows:	29	22	17			

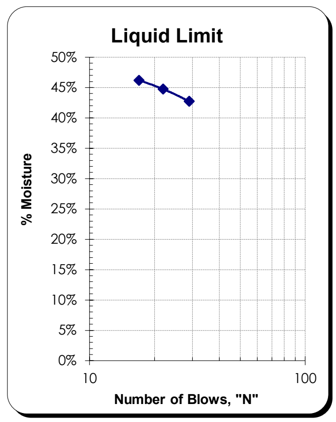
Liquid Limit @ 25 Blows:	43.9 %
Plastic Limit:	22.3 %
Plasticity Index, I_P:	21.6 %

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	36.37	38.10				
Weight of Dry Soils + Pan:	34.88	36.34				
Weight of Pan:	28.13	28.50				
Weight of Dry Soils:	6.75	7.84				
Weight of Moisture:	1.49	1.76				
% Moisture:	22.1 %	22.5 %				

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: 28.5

Reviewed by: Meghan Blodgett-Carrillo

Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C. - Grand Street Commons
Project #: 18B011-30
Client: Aspect Consulting
Source: AC-SB-19 @ 5 ft
Sample #: B19-0818

Date Received: 6-Sep-19
Sampled By: Client
Date Tested: 12-Sep-19
Tested By: A. Eifrig

Visual Identification
Clay with Silt
Sample Color
brown

Liquid Limit Determination

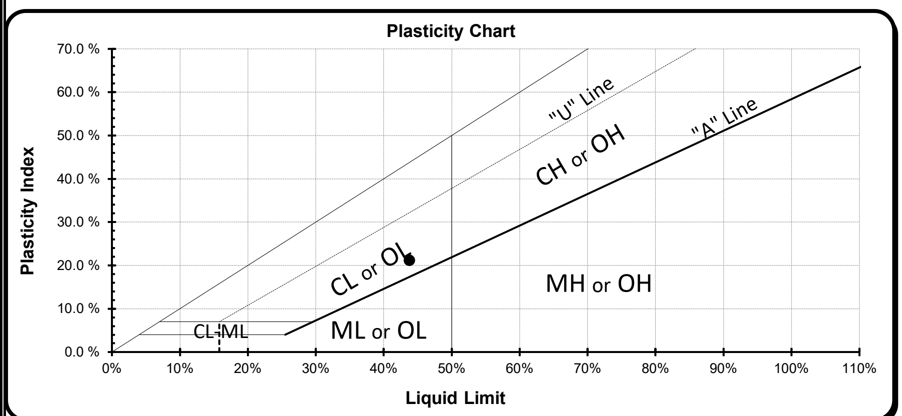
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	30.13	29.75	32.34			
Weight of Dry Soils + Pan:	25.65	25.21	26.96			
Weight of Pan:	14.90	14.71	14.87			
Weight of Dry Soils:	10.75	10.50	12.09			
Weight of Moisture:	4.48	4.54	5.38			
% Moisture:	41.7 %	43.2 %	44.5 %			
Number of Blows:	33	28	22			

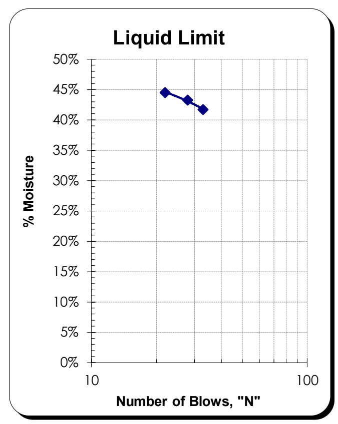
Liquid Limit @ 25 Blows: 43.8 %
Plastic Limit: 22.8 %
Plasticity Index, I_P: 21.1 %

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	37.79	39.08				
Weight of Dry Soils + Pan:	36.03	37.13				
Weight of Pan:	28.23	28.63				
Weight of Dry Soils:	7.80	8.50				
Weight of Moisture:	1.76	1.95				
% Moisture:	22.6 %	22.9 %				

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: 28.5

Reviewed by: Meghan Blodgett-Carrillo

Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project:	Q.C. - Grand Street Commons	**Date Received:**	6-Sep-19
Project #:	18B011-30	**Sampled By:**	Client
Client:	Aspect Consulting	**Date Tested:**	12-Sep-19
Source:	AC-MW-24 @ 10 ft	**Tested By:**	A. Eifrig
Sample #:	B19-0819		

Visual Identification
Clay with Silt and Sand
Sample Color
brown

Liquid Limit Determination

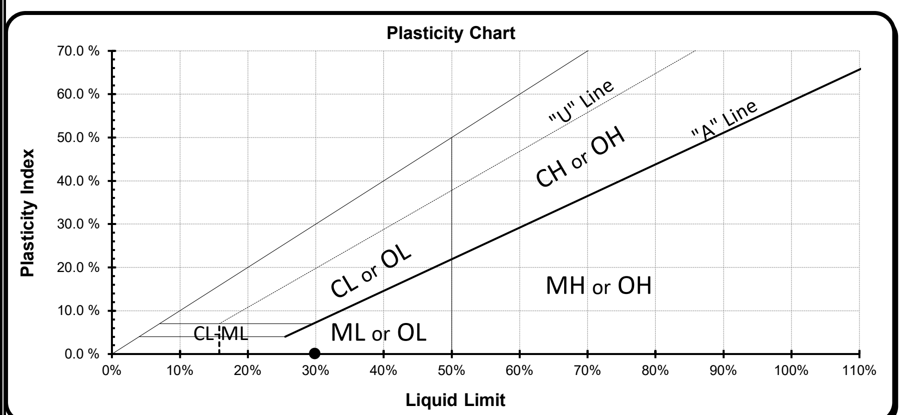
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	39.45	35.62	33.80			
Weight of Dry Soils + Pan:	35.05	31.95	30.45			
Weight of Pan:	19.65	19.67	19.63			
Weight of Dry Soils:	15.40	12.28	10.82			
Weight of Moisture:	4.40	3.67	3.35			
% Moisture:	28.6 %	29.9 %	31.0 %			
Number of Blows:	30	26	20			

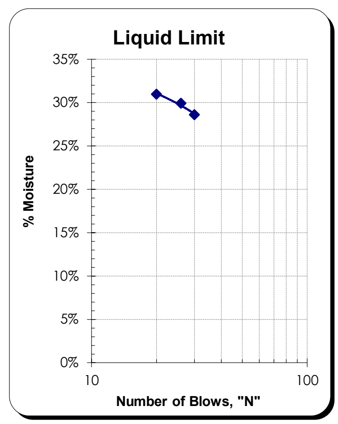
Liquid Limit @ 25 Blows:	29.9 %
Plastic Limit:	N/A
Plasticity Index, I_P:	N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:		Non-plastic				
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: Plastic limit cannot be determined as the material does not roll down to 1/8" threads. Material is non-plastic

Reviewed by: Meghan Blodgett-Carrillo

Meghan Blodgett-Carrillo

APPENDIX C

Groundwater Levels Measured in Monitoring Wells

Summary of Monitoring Wells Construction and Groundwater Elevations

Project No. 170304, Grand Street Commons Property, Seattle, Washington

Monitoring Well Location	Monitoring Well Identification	Total Well Depth	Depth to Top of Screen	Depth to Bottom of Screen	Top of Well Monument Elevation	Top of Well Casing Elevation	November 2017 Depth-to-Groundwater	November 2017 Groundwater Elevation	November 2019 Depth-to-Groundwater	November 2019 Groundwater Elevation	March 2020 Depth-to-Groundwater	March 2020 Groundwater Elevation
		Feet bgs	Feet bgs	Feet bgs	Feet	Feet	Feet btoc	Feet	Feet btoc	Feet	Feet btoc	Feet
Shallow Groundwater Monitoring Wells (Screened Above Silt Aquitard)												
East Block	AC-SB-13	30	15	30	77.69	77.38	Not Installed	--	17.74	59.64	16.14	61.24
	AC-MW-4	35	20	35	77.78	77.29	24.29	53.00	23.56	53.73	22.37	54.92
	AC-MW-5	35	20	35	77.78	77.43	18.6	58.83	17.76	59.67	17.22	60.21
	AC-MW-6	30	20	30	77.90	77.39	21.61	55.78	17.84	59.55	12.89	64.50
	AC-MW-7	30	20	30	77.93	77.44	23.55	53.89	21.89	55.55	18.75	58.69
	AC-MW-8	35	20	35	77.92	77.55	Not Installed	--	23.56	53.99	22.29	55.26
	AC-MW-11	35	20	35	77.89	77.50	Not Installed	--	9.79	67.71	8.79	68.71
	AC-MW-12	35	20	35	77.90	77.52	Not Installed	--	20.21	57.31	17.55	59.97
	AC-MW-13	35	15	35	77.63	77.29	Not Installed	--	20.54	56.75	18.68	58.61
	AC-MW-14	35	20	35	77.85	77.45	Not Installed	--	23.4	54.05	22.19	55.26
	AC-MW-15	35	15	35	77.38	76.95	Not Installed	--	23.22	53.73	20	56.95
	URS-MW-12	30.5	20	30	74.41	73.98	9.42	64.56	9.85	64.13	Not accessible	--
	URS-MW-16	30	20	30	72.14	71.73	10.51	61.22	13.92	57.81	13.19	58.54
West Block	AC-MW-1	30	15	30	74.30	73.87	21.01	52.86	20.45	53.42	19.62	54.25
	AC-MW-3	30	15	30	69.01	68.48	14.97	53.51	14.2	54.28	11.34	57.14
	AC-MW-9	35	15	35	76.76	76.21	22.4	53.81	21.5	54.71	20.46	55.75
	AC-MW-10	35	15	35	73.40	72.63	19.18	53.45	18.81	53.82	17.55	55.08
	AC-MW-16	35	15	35	72.66	72.24	Not Installed	--	17.74	54.50	15.61	56.63
	AC-MW-17	35	15	35	74.40	74.01	Not Installed	--	20.38	53.63	19.34	54.67
	AC-MW-18	35	15	35	73.19	72.70	Not Installed	--	18.59	54.11	17.06	55.64
	AC-MW-19	35	15	35	72.37	71.83	Not Installed	--	17.06	54.77	14.7	57.13
	AC-MW-20	35	15	35	72.63	72.11	Not Installed	--	16.65	55.46	13.65	58.46
	AC-MW-21	32	22	32	68.8	68.41	Not Installed	--	Not Installed	--	13.83	54.58
	AC-MW-22	40	15	40	73.62	73.16	Not Installed	--	19.79	53.37	17.84	55.32
	AC-MW-23	35	15	35	73.88	73.48	Not Installed	--	20.21	53.27	15.63	57.85
	AC-MW-27	30	10	30	70.46	69.77	Not Installed	--	23.4	46.37	11.4	58.37
	AC-MW-28	35	10	30	70.09	69.66	Not Installed	--	23.22	46.44	11.27	58.39
	AC-MW-29	30	10	30	70.5	70.00	Not Installed	--	Not Installed	--	15.06	54.94
	AC-MW-30	36	16	36	69.3	68.98	Not Installed	--	Not Installed	--	14.02	54.96
	URS-MW-2	20	6	21	69.23	68.89	12.48	56.41	13.78	55.11	11.13	57.76
	URS-MW-3	30	20	30	71.75	71.48	15.11	56.37	14.75	56.73	12.3	59.18
	URS-MW-10	28	18	28	72.46	72.08	Not Installed	--	16.49	55.59	13.38	58.70
	URS-MW-13	30	20	30	74.46	74.05	20.74	53.31	20.12	53.93	18.85	55.20
	URS-MW-21S	30	14.5	29.5	71.47	71.02	Not Installed	--	15.85	55.17	14.66	56.36
	URS-MW-21D	40	35	40	71.28	70.90	Not Installed	--	15.96	54.94	15.13	55.77
	URS-MW-22	35	25	35	71.51	71.10	Not Installed	--	12.64	58.46	10.89	60.21
	URS-MW-27S	20	15	20	69.69	69.17	14.01	55.16	12.75	56.42	11.20	57.97
	URS-MW-27I	36	31	36	69.81	69.35	Not Installed	--	13.11	56.24	11.1	58.25
	URS-MW-28S	23	18	23	70.06	69.66	Not Installed	--	14.75	54.91	11.61	58.05
	URS-MW-28I	38	33	38	70.22	69.79	15.19	54.60	14.75	55.04	11.93	57.86
	PC-MW-17	30	20	30	69.82	69.49	Not Installed	--	14.81	54.68	13.56	55.93
	PC-MW-30S	24	19	24	69.78	69.51	15.11	54.40	14.85	54.66	14.79	54.72
	PC-MW-30I	45	40	45	69.75	69.46	Not Installed	--	14.92	54.54	14.98	54.48
	PC-MW-31S	19	15	20	70.10	69.78	Not Installed	--	14.25	55.53	12.42	57.36
	PC-MW-31I	40	35	40	70.14	69.76	Not Installed	--	14.66	55.10	13.26	56.50
	PC-MW-33S	21	15	20	70.09	69.68	Not Installed	--	15.64	54.04	14.25	55.43
	PC-MW-33I	46	40	45	70.04	69.61	Not Installed	--	15.58	54.03	14.43	55.18
	PC-MW-34S	21	15	20	70.95	70.56	Not Installed	--	16.26	54.30	15.02	55.54
	PC-MW-34I	40	34	39	70.97	70.58	Not Installed	--	16.28	54.30	15.05	55.53
	PC-MW-35S	35	30	35	73.53	73.09	Not Installed	--	19.04	54.05	17.7	55.39
	PC-MW-35I	50	45	50	73.76	73.27	Not Installed	--	19.25	54.02	17.52	55.75
	PC-SCC1	37.5	27.5	37.5	70.6	70.39	Not Installed	--	15.81	54.58	15.81	54.58
	PC-SCC3	29.5	24.5	29.5	70.6	70.24	Not Installed	--	Not accessible	--	14.68	55.56
South Block	AC-MW-2	25	10	25	69.70	69.32	15.87	53.45	16	53.32	14.9	54.42
	AC-MW-24	38	18	38	76.88	76.31	Not Installed	--	20.54	55.77	22.12	54.19
Deep Groundwater Monitoring Wells (Screened Below Silt Aquitard)												
West Block	AC-DMW-1	90	70	90	70.6	70.32	Not Installed	--	Not Installed	--	15.98	54.34
	AC-DMW-2	90	70	90	70.9	70.52	Not Installed	--	Not Installed	--	16.66	53.86
	URS-MW-28D	59	54	59	69.83	69.35	15.81	43.19	15.81	53.54	15.33	54.02
	PC-MW-30D	68	65	70	69.69	69.32	16.19	53.81	16.19	53.13	15.38	53.94
	PC-MW-31D	67	66	71	70.19	69.80	16.66	54.34	16.66	53.14	16.5	53.30
	PC-MW-33D	98	95	100	69.96	69.57	16.15	83.85	16.15	53.42	15.66	53.91
	PC-MW-34D	100	95	100	71.42	71.00	16.92	83.08	16.92	54.08	16.38	54.62
	PC-MW-35D	95	85	95	73.74	73.35	19.45	75.55	19.45	53.90	18.97	54.38

Notes:

bgs - below existing ground surface

btoc - below top of well casing

"--" - no data

* These wells were installed during the RI Stage III Explorations in February 2020.

All wells were surveyed relative to the North American Vertical Datum (NAVD 88) by PACE Engineers subcontracted to Aspect Consulting, except URS-MW-12 which was inaccessible during the PACE surveys in 2019 and 2020 as it is buried under concrete rubble (approximately 5 feet thick). This well was surveyed in 2017 by Aspect when it was accessible.

APPENDIX D

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND GUIDELINES FOR USE

This Report and Project-Specific Factors

Aspect Consulting, LLC (Aspect) considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual limitations. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with our Agreement with the Client and recognized geoscience practices in the same locality and involving similar conditions at the time this report was prepared.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope instability, or groundwater fluctuations. If any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques, and personnel used to perform a geotechnical or geologic study differ significantly from those used to perform an environmental study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions, or recommendations (e.g., about the likelihood of encountering underground storage tanks or regulated contaminants). Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

We appreciate the opportunity to perform these services. If you have any questions please contact the Aspect Project Manager for this project.

APPENDIX K

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND USE GUIDELINES

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on this report or the product of our services without the express written consent of Aspect Consulting, LLC (Aspect). This limitation is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual conditions or limitations and guidelines governing their use of the report. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and recognized standards of professionals in the same locality and involving similar conditions.

Services for Specific Purposes, Persons and Projects

Aspect has performed the services in general accordance with the scope and limitations of our Agreement. This report has been prepared for the exclusive use of the Client and their authorized third parties, approved in writing by Aspect. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

This report is not, and should not, be construed as a warranty or guarantee regarding the presence or absence of hazardous substances or petroleum products that may affect the subject property. The report is not intended to make any representation concerning title or ownership to the subject property. If real property records were reviewed, they were reviewed for the sole purpose of determining the subject property's historical uses. All findings, conclusions, and recommendations stated in this report are based on the data and information provided to Aspect, current use of the subject property, and observations and conditions that existed on the date and time of the report.

Aspect structures its services to meet the specific needs of our clients. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and subject property. This report should not be applied for any purpose or project except the purpose described in the Agreement.

This Report Is Project-Specific

Aspect considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

If changes are made to the project or subject property after the date of this report, Aspect should be retained to assess the impact of the changes with respect to the conclusions contained in the report.

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

Environmental Regulations Are Not Static

Some hazardous substances or petroleum products may be present near the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or petroleum products or do not otherwise present potential liability. Changes may occur in the standards for appropriate inquiry or regulatory definitions of hazardous substance and petroleum products; therefore, this report has a limited useful life.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time (for example, Phase I ESA reports are applicable for 180 days), by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope failure or groundwater fluctuations. If more than six months have passed since issuance of our report, or if any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Phase I ESAs – Uncertainty Remains After Completion

Aspect has performed the services in general accordance with the scope and limitations of our Agreement and the current version of the "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process", ASTM E1527, and U.S. Environmental Protection Agency (EPA)'s Federal Standard 40 CFR Part 312 "Innocent Landowners, Standards for Conducting All Appropriate Inquiries".

No ESA can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with subject property. Performance of an ESA study is intended to reduce, but not eliminate, uncertainty regarding the potential for environmental conditions affecting the subject property. There is always a potential that areas with contamination that were not identified during this ESA exist at the subject property or in the study area. Further evaluation of such potential would require additional research, subsurface exploration, sampling and/or testing.

Historical Information Provided by Others

Aspect has relied upon information provided by others in our description of historical conditions and in our review of regulatory databases and files. The available data does not provide definitive information with regard to all past uses, operations or incidents affecting the subject property or adjacent properties. Aspect makes no warranties or guarantees regarding the accuracy or completeness of information provided or compiled by others.

Exclusion of Mold, Fungus, Radon, Lead, and HBM

Aspect's services do not include the investigation, detection, prevention or assessment of the presence of molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detection, assessment, prevention or abatement of molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts. Aspect's services also do not include the investigation or assessment of hazardous building materials (HBM) such as asbestos, polychlorinated biphenyls (PCBs) in light ballasts, lead based paint, asbestos-containing building materials, urea-formaldehyde insulation in on-site structures or debris or any other HBMs. Aspect's services do not include an evaluation of radon or lead in drinking water, unless specifically requested.