DRAFT**

GEOTECHNICAL DATA REPORT

City of Alexandria, VA Waterfront Implementation Project
Phase II Geotechnical Exploration


Carollo Engineers, Inc.
530 Seventh Avenue, Suite 2402
New York, NY 10018

June 23, 2022

built on firm foundations

NEW YORK CITY | PHILADELPHIA | WASHINGTON, DC

**This report is marked draft pending finalization of geoarchaeological and environmental investigation reports. Those reports will also be posted separately to the City of Alexandria Waterfront Implementation Project website when completed.

MRCE
built on firm foundations

DRAFT

June 23, 2022

Carollo Engineers Inc.
530 Seventh Avenue, Suite 2402
New York, New York, 10018

Attn: Ms. Sara Igielski, PE

Re: **Geotechnical Data Report**
City of Alexandria Waterfront Implementation
Phase II Geotechnical Exploration
Alexandria, Virginia
MRCE File 14123

Greetings:

Mueser Rutledge Consulting Engineers (MRCE) is pleased to submit this Geotechnical Data Report (GDR) for the City of Alexandria Waterfront Implementation Project, Phase II Geotechnical Investigation.

The landside and waterside boring investigation was executed in accordance with authorized Task Order No. 1 and approved modifications.

Very truly yours,

MUESER RUTLEDGE CONSULTING ENGINEERS PLLC

Walter E. Kaeck

Walter E. Kaeck, Principal

Aaron L. Sacks, Associate

1.0 TABLE OF CONTENTS

2.0 EXHIBITS

The following exhibits are attached to this Data Report:

Figure 1	Site Location Plan
Figure 2	Historic Shoreline
Figure 3	Groundwater Level Data

Appendix A	Boring Location Plans
Appendix B	MRCE Boring Logs
Appendix C	Cone Penetration Test (CPT) Logs
Appendix D	Infiltration Test Logs
Appendix E	Geoarchaeological Report
Appendix F	Environmental Conditions Summary Report
Appendix G	Phase II Environmental Assessment Report
Appendix H	Phase II Geotechnical Lab Test Results
Appendix I	Historic Geotechnical Data
Appendix J	Soil Drum Characterization and Disposal Documentation

3.0 PURPOSE

This Geotechnical Data Report (GDR) presents the results of a Phase II geotechnical investigation performed to assist in design and construction of landside and waterside storm hardening and drainage improvements as part of the City of Alexandria Waterfront Implementation project. A Phase I geotechnical investigation was previously performed at the site in 2016. Subsurface data from the Phase I investigation and available records of other investigations made in the project area are compiled as part of this GDR.

4.0 AVAILABLE INFORMATION

We were provided the following information to assist in preparation of this report:

1. "Topographical Survey of Alexandria Waterfront Improvements" by Gordon, dated December 9, 2021.
2. "City of Alexandria Waterfront Flood Mitigation Implementation Project, Topographic Survey, Duke Street to Queen Street and Union Street to Potomac River", prepared by Stantec, dated September 12, 2016.
3. "Phase 1 Geotechnical Data Report Alexandria Waterfront Flood Mitigation, Alexandria Virginia", prepared by Schnabel, dated October 26, 2016.
4. "Phase 1 Geotechnical Report, Alexandria Waterfront Flood Mitigation, Alexandria, Virginia", prepared by Schnabel, dated January 25, 2017.

5.0 ELEVATION DATUM AND HORIZONTAL CONTROL

Elevations refer to the North American Vertical Datum of 1988 (NAVD88). Coordinate locations reference Virginia State Plan North, NAD83 (2011).

6.0 SITE DESCRIPTION

The project site encompasses several city blocks that span approximately one half mile of the Potomac River shoreline in Old Town Alexandria, Virginia. The investigation area is bound by Duke Street to the south, Oronoco Street to the north, Fairfax Street to the west, and the City of Alexandria pier line to the east as shown in Figure 1.

The site consists of residential buildings, commercial buildings, public parks, public roadways, and public and private docks/piers, and includes approximately 3,400 linear feet of manmade bulkhead/shoreline. Much of the area east of Lee Street is filled land dating as far back as the mid-1700s, as shown in Figure 2. The existing shoreline comprises a mix of bulkheads, piers, riprap revetments, and beaches. Ground surface elevation ranges from approximately El. +2 to +7 at the waterfront and slopes up to the west (inland), reaching approximately El. +30 at Fairfax Street. Mudline elevations outboard of the shoreline range from El. 0 to El. -20 and generally slope down from the bulkhead/shoreline toward the pier line. Site topography and bathymetry provided to MRCE by Carollo Engineers is depicted on the Boring Location Plans, Drawings B-1 through B-8 (Appendix A).

7.0 PROPOSED CONSTRUCTION

The Waterfront Implementation Project includes a variety of planned improvements. We understand that the construction scope is still in development and there are multiple potential schemes under consideration. Key elements of the schemes include:

- storm drainage improvements
- construction of two new below-grade pump stations (with surface access buildings) located approximately in Waterfront Park and Thompson's Alley
- improvements to the waterfront bulkhead/promenade and flood mitigation measures between King Street and Duke Street
- right-of-way (ROW) green infrastructure (GI) features including infiltration-based (bioswale) features and below-ground retention tanks

Approximate locations of the proposed pump stations and retention tanks are shown on the Boring Location Plans, Drawings B-1 through B-8.

8.0 AREA GEOLOGY

A description of the area geology is provided since a familiarity with the soil formations and their geological origin is helpful in understanding the descriptions and findings of the various subsurface explorations that follow.

The project site lies within the Atlantic coastal plain, which consists of a broad belt of flat lying sediments over deep bedrock. Bedrock was not encountered in any of the borings at the site. According to published data, bedrock lies 400 to 500 feet below ground surface in the project area. The oldest and lowest sediments overlying bedrock at the site are of Cretaceous age followed by Pleistocene age terrace deposits and river deposited alluvium of relatively recent origin.

The Cretaceous sediments consist of a succession of wedge shaped layers that were deposited in relatively shallow seas on the sloping bedrock surface by streams flowing eastward out of the continental interior. Cretaceous strata are grouped in the Potomac formation (Strata P) and consist primarily of hard clays (Stratum P1) and compact sands (Stratum P2). A succession of river terrace deposits of Pleistocene times overlies the Cretaceous formation. A time gap of many million years is represented at the discontinuity between these two major soil formations. While glacial ice did not reach south to the Washington area, the Pleistocene terraces were formed by debris carried in streams charged by glacial melt water flowing from the northwest. Periodic changes in climactic conditions produced cycles of advance and recession in the ice sheets resulting in wide variations in stream gradients, sediment load and the types of materials deposited. Therefore, the Pleistocene terrace deposits (Strata T) in the project area consist of a mixture of silty and sandy clays with clean sands and gravel interlayered and lensed in a complex pattern.

Over the period of the last five or six thousand years, sea level has risen 25 to 30 feet with respect to land along the north Atlantic coast. This rise submerged the Potomac and Anacostia Rivers and has resulted in the deposition of relatively fine grained alluvium (Stratum A) in river channels. The alluvium generally consists of medium to stiff organic clay and silt (Stratum A1) with lenses and layers of fine sand (Stratum A2). Surficial fills (Stratum F) placed by man to develop and expand the shoreline overlie the natural soil formations. Figure 2 shows the historic shoreline (circa 1750) relative to the current waterfront alignment. The area between the bounding shorelines is reclaimed land made by fill placement into the Potomac River.

9.0 PREVIOUS INVESTIGATIONS IN PROJECT AREA

Available records of prior borings made within the project site were collected and used in planning the Phase II investigation. Locations of these prior borings are shown on Drawings B-1 through B-8. Logs of the borings are provided in Appendix I.

9.1. Phase I Geotechnical Investigation

In 2016, a Phase I Geotechnical Investigation was performed for the Waterfront Implementation Project by Schnabel Engineering, LLC (Schnabel) covering the area between Duke and Queen Streets. The Phase I Investigation included seven (7) landside soil borings with associated laboratory testing. Borings BH-1 and BH-2 were drilled along the waterfront in the southern half of the project area and penetrated to a depth of 100 feet. The other five borings (SS-1, SS-2, PS-1, SW-1 and RCP-1) were made at more inland locations between Prince and Queen Streets and penetrated to depths of 15 to 65 feet.

Laboratory testing of soils samples recovered from the borings included water content, grain size analysis, Atterberg Limits, presence of organic material, undrained shear strength, and corrosion potential. Laboratory test data is provided in Appendix I.

9.2. Other Previous Geotechnical Investigations

Two borings (B-1 and B-2) were made by URS in 2014 near the area of the proposed pump stations. Both borings advanced to depths of 70 feet.

Several borings were made within the project area landside (2 borings) and waterside (5 borings) of the shoreline in 2018 and 2019 for the nearby Alexandria RiverRenew Tunnel System project. The RiverRenew borings penetrated to depths ranging from 123 to 160 feet.

10.0 PHASE II SUBSURFACE INVESTIGATION

The Phase II Subsurface Investigation was performed to supplement the previous investigations and provide geotechnical data to support design and construction of the planned improvements. The Phase II investigation included landside and waterside geotechnical soil borings, bulk sampling, cone penetration test (CPT) probes, infiltration testing, solid earth cores (geoprobes) for geo-archaeological testing, and environmental testing of soil, surface water, and sediment samples collected from the borings.

All Phase II work was performed under the inspection and oversight of MRCE.

10.1. Phase II Landside Investigation

The landside investigation was performed in accordance with the City of Alexandria Transportation and Environmental Services (T&ES) permit and Maintenance of Traffic (MOT) plan prepared by MRCE.

10.1.1. Geotechnical Soil Borings

The landside geotechnical soil borings consisted of four (4) deep borings penetrating to between 95 and 105 feet below ground surface (BH- and PS-series) and nine (9) shallow borings advanced to 20 feet below ground surface (GI- series). The landside borings were drilled by Free State Drilling Inc. of Frederick Maryland between November 1, and November 18, 2021 using track-mounted drilling equipment. The deep BH- and PS-series borings were made by mud rotary drilling and the shallow

GI-series borings were made using hollow stem augers.

Soil samples were typically obtained in the borings using a two-inch outer diameter (OD) split-spoon sampler driven with a 140-pound automatic (trip) hammer free-falling 30 inches. Land boring samples were collected continuously in the top 10 feet of each boring and at approximately 5-foot depth intervals thereafter. The number of blows required to advance the split-spoon sampler through each of three or four, six-inch drive intervals and recorded. The Standard Penetration Test (SPT) N-value, expressed in blows per foot (bpf), is an indication of the relative density of the material sampled. The N-value is calculated by summing the blows from the second and third six-inch drive intervals. Soils were classified in accordance with the Unified Soil Classification System (USCS) and placed in sealed jars for preservation.

Relatively undisturbed, 3-inch OD thin-walled tube samples were collected alternating with split-spoon samples at 10-foot depth intervals within the fine-grained alluvial (Stratum A1) deposits. Undisturbed samples were collected using a hydraulic fixed piston sampler.

Upon completion, the landside soil borings were backfilled with cement-bentonite grout or bentonite pellets, and the original ground surface restored in kind.

10.1.2. Groundwater Monitoring Wells

Open-standpipe monitoring wells consisting of 1.5- or 2-inch diameter PVC slotted well screen and riser pipe with sand filter pack were installed in Borings GI-13P and GI-15P and in offset holes at Borings PS-04A, PS-04P, and PS-02, to facilitate measurement of groundwater levels and environmental sampling of groundwater. Each well was completed with a flush-mounted traffic-rated cover to facilitate access for future monitoring. Well construction details and measured water levels are shown on the piezometer records included with the boring logs in Appendix B.

10.1.3. Cone Penetration Test (CPT) Probes

Three CPT probes with seismic velocity measurement (SCPT-series) were performed by In-Situ Soil Testing, L.C. of Lancaster Virginia (In-Situ) on November 23, 2021. SCPTs were performed in general accordance with ASTM D5778, "*Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils*" using a 10 cm^2 projected (base) area cone advanced by a truck-mounted ram system. Each SCPT location was pre-drilled through the upper fill (top 9.5 to 21 feet) to avoid shallow obstructions, and the pre-drilled hole was backfilled with pea gravel prior to making the SCPT probe. SCPT probes were carried to depths of 40.4 feet to 82.7 feet below ground surface, where they were terminated due to either probe refusal or excessive probe inclination.

Seismic velocity tests were performed at approximately 1-meter (3.3-foot) depth intervals in each SCPT, below the pre-drilled depth. These tests consisted of introducing an impact at the ground surface and measuring wave arrival time at the probe depth. One or two pore pressure dissipation tests were performed in each SCPT, within the fine-grained alluvial deposit.

Upon completion, SCPT probe holes were backfilled with bentonite pellets/chips and the original ground surface was restored. SCPT logs are provided in Appendix C.

10.1.4. Bulk Samples

Bulk composite samples of the shallow fill (upper 4 to 8.5 feet of each boring) were collected at five locations distributed among the planned pump stations, bulkhead, and underground retention tanks for geotechnical fill properties testing including moisture-density, California Bearing Ratio (CBR), and

corrosivity. Specifically, these locations were Borings BH-04, GI-10, GI-11, GI-14, and PS-02. Bulk samples were collected from the flights of the augers used to make the borings.

10.1.5. Infiltration Testing

Borehole infiltration testing was performed in Borings GI-6 and GI-8 in general accordance with the testing procedures prescribed in the Virginia Stormwater Best Management Practices. Infiltration tests were performed at 5 feet and 10 feet below street grade at Boring GI-6, and at 5 feet and 9 feet below grade in Boring GI-8. Tests were not performed at deeper depths due to the presence of the groundwater table.

At each infiltration test location, a sampled boring was first made to a depth of 20 feet below ground surface to define the soil profile and depth to groundwater. Infiltration tests were then performed in offset holes drilled near the sampled boring (within approximately 10 feet) using augers without sampling. A four-inch (4") OD PVC pipe casing was installed in each infiltration test hole and a 2-foot column of water was added to each casing and allowed to soak overnight. Water for the pre-soak was added gently by pouring along the inside wall of the casing to minimize disturbance of the soil at the test zone. Infiltration (falling head) testing was performed after the 24-hour soak period. Infiltration test logs are provided in Appendix D. The average infiltration rate measured at each location and depth are summarized in Table A.

Table A. Summary of Infiltration Test Results

Location	Test depth (ft bgs)	Description of soil at test depth	Average infiltration rate (in / hr)
GI-6	5	Red brown clay, some fine sand, trace silt (CL)	1.05
GI-6	10	Red brown fine sand, some silt, trace gravel, medium to coarse sand, clay (SM)	1.35
GI-8	5	Medium stiff to stiff brown and red brown clay, some fine sand, trace medium sand, wood, roots (CL)	0
GI-8	9	Stiff brown to light gray clay, trace fine sand (CL)	5.25

10.1.6. Geoarcheological Geoprobes

Six solid-earth core geoprobes for geo-archaeological evaluation and testing (GP-series) were performed by GSI Mid-Atlantic Inc. of Bel Air, Maryland on November 17, and December 6, 2021 under the inspection of Hayes & Monaghan, Geoarchaeologists LLC. Probes were advanced using 2.25-inch OD dual tube sampling equipment with clear PVC liners, to depths ranging from 20 to 60 feet. Upon completion, all geoprobes were backfilled with bentonite pellets/chips and the original ground surface was restored.

We refer to Hayes & Monaghan Geoarchaeological Report in Appendix E for a summary of the results of the geo-archaelogical sampling and testing.

10.2. Phase II Waterside Investigation

All water borings and CPTs were performed from a floating spud barge equipped with a turbidity

curtain. A turbidity curtain was deployed during work at all locations except Borings BH-10 and BH-03.

10.2.1. Geotechnical Soil Borings

The waterside soil borings consisted of seven (7) borings advanced to between 91 feet and 100 feet below mudline. All waterside borings were completed using track mounted drilling equipment mounted on a floating spud barge. The borings were performed by Connelly and Associates Inc. of Frederick Maryland (Connelly) between November 30, 2021 and January 12, 2022. Borings were made using wash rotary drilling methods with double casing.

SPT soil sampling was performed in the waterside borings at approximately 5-foot depth intervals below the mudline. Relatively undisturbed soil samples were obtained of the Stratum A1 deposits for laboratory testing typically using a mechanical fixed piston sampler. Shelby tube sampling, where a thin-walled tube is pushed directly into the soil without use of a fixed piston, was used occasionally in some water borings to improve sample recovery.

10.2.2. CPT Probes

Water-based CPT probes were performed by In-Situ between December 23 and December 28, 2021. The CPT instrumentation was provided by In-Situ and was pushed by Connelly using their drill rig with full-time monitoring by In-Situ. CPT probes were advanced to depths between 40 feet and 61 feet below mudline where they were terminated due to refusal, excessive rod bend, or uplift of the barge. Drill casing was installed at each location prior to CPT testing to reduce deflection of the CPT rods. Casing depth ranged between 5 feet below mudline to 13 feet below mudline. CPT data was not collected through the drill casing interval. Upon completion, drill tooling and casing were withdrawn from the hole and the hole was allowed to collapse below the mudline.

10.3. Environmental Samples

Soil samples for environmental characterization testing were collected from landside Borings GI-10, GI-11, GI-12, GI-13P, GI-14, GI-15P, BH-04, BH-15, PS-02P, PS-04P, and PS-04AP, and from waterside Borings BH-03, BH-10, BH-12, BH-16, BH-20 and PS-04 by Roux Associates (Roux). Roux also collected groundwater samples from each monitoring well and surface water samples at each waterside boring for environmental testing. We refer to the Roux Environmental Site Assessment Report in Appendix G for a summary of the results of environmental sampling and testing.

10.4. Disposal of Soil Cuttings from Borings

All soil cuttings and waste drilling fluid from the landside and waterside borings were containerized in 55-gallon drums and staged temporarily in the designated drum storage area located on Oronoco Street. The drum storage area consisted of a plastic-lined pad enclosed by chain-link fencing.

Characterization testing on a composite sample of the drummed soil cuttings and drilling fluid was performed by Eurofins Environment Testing America. Pickup and off-site disposal were performed by Environmental Waste Specialists, Inc. of Manassas, VA. Characterization testing and disposal documentation are included in Appendix J.

10.5. Boring/CPT Location and Elevation Survey

Landside boring and CPT probe locations were marked in the field by MRCE. Most boring locations were surveyed by a surveyor under subcontract to Carollo. Surveyed coordinates and elevations provided to MRCE are indicated on the boring location plans, Drawings B-1 through B-8. For landside

borings/CPTs that were not surveyed, coordinates and elevations were estimated based on the planned boring coordinates, field measurements, and topography. Waterside boring and CPT locations were measured using hand-held GPS equipment. Mudline elevations were determined based on water depth and tide level measurements at the location and time of each boring.

11.0 GEOTECHNICAL LABORATORY TESTING

All soil samples were transported to the MRCE Washington, DC office for review of field classifications. Selected samples from the investigation were then transported either to the MRCE laboratory in New York City or to Jay Kay Testing Inc. (Jay Kay) in Spring Grove, PA for geotechnical testing. Samples were handled and transported in accordance with ASTM D4220 Standard Practices for Preserving and Transporting Soil Samples. Sample descriptions in the typed boring logs in Appendix B reflect the results of laboratory testing and MRCE review.

Laboratory testing on undisturbed tube samples of the cohesive Stratum A1 clay collected from the land and water borings was performed by MRCE. This testing included index properties, drained and undrained shear strength, and compressibility. Index testing performed by MRCE included water content, Atterberg Limits, and specific gravity. Strength and compressibility testing included unconsolidated undrained tri-axial testing (UU), consolidated undrained tri-axial testing (CU), drained direct shear testing (DS), and incremental loading one-dimensional consolidation testing with both single- and double- rebound loading. Results of the MRCE laboratory testing are summarized on Table 1 in Appendix H.

Laboratory testing of split-spoon (disturbed) and bulk samples was performed by Jay Kay and consisted of water content, Atterberg Limits, specific gravity, grain size distribution, organic content, moisture density, California Bearing Ratio (CBR), and corrosion potential. Results of the Jay Kay laboratory testing are summarized on Tables 2 and 3 in Appendix H.

Table B summarizes the number and types of laboratory tests performed in each soil stratum.

Table B. Laboratory Testing by Soil Stratum

Soil Stratum	Moisture Content	Specific Gravity	Atterberg Limits	Organic Content	Grain Size	Moisture Density/ CBR	Strength			Consol-idation	Corro-sion
							UU	CU	DS		
F	10	11	5	0	13	5	0	0	0	0	3
A1	74	18	26	4	1	0	12	6	6	8	0
A2	1	5	0	0	13	0	0	0	0	0	0
T	3	5	0	0	17	0	0	0	0	0	0
T0	0	0	5	0	0	0	0	0	0	0	0
P1	25	7	10	0	3	0	0	0	0	0	0

11.1. Water Content

113 tests were performed in accordance with ASTM D2216 – *"Standard Test Methods for Laboratory* Determination of Water (Moisture) Content of Soil and Rock by Mass". Tests were conducted to assist

in soil classification and correlation with engineering properties. Results are reported in the summary tables in Appendix H and included on typed boring logs in Appendix B.

11.2. Atterberg Limits

Forty-six (46) tests were performed in accordance with ASTM D4318 – "Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils". Tests were performed to assist in soil classification and evaluate soil plasticity and compressibility. Results are summarized on Plates 1 to 5 in Appendix H.

11.3. Specific Gravity

Forty-six (46) tests were performed in accordance with ASTM D854 – "Standard Test Methods for Specific Gravity of Soil Solids by Water Pycnometer". Tests were conducted to assist in evaluation of soil unit weights and void ratios. Results are reported in the summary tables in Appendix H.

11.4. Grain Size Distribution

Forty-seven (47) tests were performed in accordance with ASTM D422 – "Standard Test Method for Particle-Size Analysis of Soils". Tests were conducted to assist in soil classification and correlations with engineering properties. Results are summarized on Plates GS-1 through GS-47 in Appendix H and included on typed boring logs in Appendix B.

11.5. Organic Content

Four (4) tests were performed in accordance with ASTM D-2974 – "*Standard Test Methods for Determining* the Water (Moisture) Content, Ash Content, and Organic Material of Peat and other Organic Soils". Tests were conducted to assist in soil classification. Results are reported in the summary tables in Appendix H and included on typed boring logs in Appendix B.

11.6. Compaction Testing

Five (5) tests were performed in accordance with ASTM D698 "*Standard Test Methods for Laboratory Compaction* Characteristics of Soil using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)". Tests were conducted to evaluate the engineering properties of existing fill materials for potential re-use. Results are provided in Plates MD-1 through MD-5 of Appendix H and summarized in Table C below.

11.7. California Bearing Ratio (CBR)

Five (5) tests were performed in accordance with ASTM D1883 – *"Standard Test Method for CBR (California* Bearing Ratio) of Laboratory-Compacted Soils". Samples were compacted to 95% maximum Standard Proctor dry density within 2% of optimum water content. Samples were then soaked, loaded and subjected to needle penetration. Tests were performed to evaluate the subgrade strength of existing fill soils. Results are provided in Plates CBR-1 through CBR-5 of Appendix H and summarized in Table C below.

Table C. Summary of Fill Engineering Properties Test Results

Boring	Sample	Description	Liquid Limit (LL)	Plasticity Index (PI)	Standard Proctor Max. Dry Density, Corrected (pcf)	Standard Proctor Optimum Moisture Content, Corrected (%)	CBR at 0.1 in. Penetration (%)	CBR at 0.2 in. Penetration (%)
BH-04	Fill (Bulk)	Brown well-graded sand with silt and gravel (SW-SM)	23	1	129.4	9.2	43.6	55.8
GI-10	Fill (Bulk)	Dark brown clayey sand with gravel (SC)	35	13	125.0	10.4	12.2	15.2
GI-11	Fill (Bulk)	Dark gray clayey sand with gravel (SC)	34	11	110.4	14.5	12.4	13.9
GI-14A/B	Fill (Bulk)	Brown sandy lean clay (CL)	30	14	115.9	12.4	2	2.1
PS-02	Fill (Bulk)	Gray / black clayey sand with gravel (SC)	29	10	124.5	10.0	14.7	17.8

11.8. Corrosion Potential

Three (3) sets of corrosion potential tests were performed on bulk samples of the fill from Borings GI-10, GI-11, and GI-14A/B. The testing included pH, oxidation-reduction potential, resistivity, sulfides ion presence, and water-soluble sulfates and chlorides. The results of the tests are summarized in Table 4 in Appendix H.

11.9. Unconsolidated Undrained (UU) Triaxial Shear Strength

Twelve (12) tests were performed in accordance with ASTM D2850 – *"Standard Test Method for Unconsolidated*-Undrained Tri-axial Compression Test on Cohesive Soils". Samples were subject to an isotropic confining pressure equal to 80% of the estimated effective vertical overburden stress at the sample depth and sheared without allowing drainage. Tests were conducted to evaluate the undrained shear strength of cohesive soil strata. Results are summarized on Table 1 and Plates UU-1 through UU-12 of Appendix H.

11.10. Consolidated Undrained (CU) Triaxial Shear Strength

Six (6) tests were performed in accordance with ASTM D4767 – *"Standard Test Method for Consolidated-Undrained Tri-axial Compression Test on Cohesive Soils"*. Samples were subject to an isotropic confining pressure equal to 80% of the estimated effective vertical overburden stress at the sample depth and allowed to consolidate to that pressure. At the completion of consolidation, samples were sheared without allowing drainage, with pore pressures measured. Tests were conducted to evaluate the undrained and drained shear strength of cohesive soil strata. Results are summarized on Table 1, Figure MC-1, and Plates CU-1 through CU-6 of Appendix H.

11.11. Drained Direct Shear (DS) Strength

Six (6) tests were performed in accordance with ASTM D3080 – *"Standard Test Method Direct Shear Test of Soils Under Consolidated Drained Conditions"*. Samples were subject vertical loads equal to approximately 50%, 100% and 200% of the estimated effective vertical overburden stress at the sample depth and allowed to consolidate. At the completion of consolidation samples were sheared in a horizontal plane at a rate that allowed drainage of the soil to a total deflection of 0.5 inches. At the completion of shear the direction of shear was reversed, shear reversal was performed a total of 5 times per sample. Tests were conducted to evaluate the drained peak and post-peak shear strength of cohesive soil strata. Results are summarized on Plates DS-1 through DS-6 of Appendix H.

11.12. Incremental Load Consolidation Testing

Eight (8) tests were performed in accordance with ASTM D2435 – *"Standard Test Methods for One-Dimensional Consolidation Properties of Soils using Incremental Loading"*. Double rebound loading tests were conducted to evaluate the maximum past loading (pre-consolidation stress) and compressibility parameters of cohesive strata for use in evaluation of magnitude and time-rate of settlement.

Results are summarized on Table 1 and Plates C-1 through C-8 of Appendix H. Existing overburden stress at the sample depth, p_o, is estimated using the estimated effective unit weights of soils above the sample depth and depth to groundwater indicated in site monitoring wells. The maximum past stress or pre-consolidation pressure, p_c, is determined from the consolidation curves using the Casagrande method of construction.

12.0 PREVIOUS GEOTECHNICAL LABORATORY TESTING

Laboratory testing was also performed on select soil samples obtained in the Phase 1 geotechnical borings and prior borings made by others. Previous geotechnical test data by others is provided in Appendix I.

13.0 SUBSURFACE CONDITIONS

General descriptions of the strata encountered in the borings and CPT probes are provided below, in order of their occurrence with depth. Stratum descriptions are based on the Phase II Investigation borings except where otherwise noted.

13.1. Stratum F – Fill

Fill (Stratum F) placed to create land outboard of the historical shoreline covers most of the project area. Stratum F consists of loose to very compact brown, black, gray, and dark gray fine to medium and fine to coarse sand with varying amounts of gravel, silt, clay, brick, concrete, wood and roots. Some previous investigation borings also noted metal, glass, and ceramics in the fill. N-values range from 1 to 152 bpf with an average of 19 bpf. The thickness of Stratum F in borings made along the waterfront in the Phase II Investigation ranges from 10 feet to more than 20 feet. Phase I borings SS-1 and BH-2A encountered greater fill thicknesses of 28.5 and 43.5 feet, respectively. Borings GI-6 and GI-8, made inland at higher elevations, encountered only 1 to 2 feet of fill.

Obstructions and evidence of possible environmental contamination are present in the Stratum F fill along the waterfront due to the industrial history and varied use of the waterfront over the last 250 years. Excavations made in this area will likely encounter buried remnant foundations, pilings, bulkheads, crib structures, pier structures, pavements, railways, etc. Obstructions were encountered in many of the borings performed during the Phase II and previous investigations as summarized in Table D. Petroleum odor is also evident in the fill in several borings as shown in Table D and further detailed in the Phase II Environmental Assessment Report in Appendix G.

Table D. Summary of Fill Thickness, Obstructions, and Odor Encountered in Borings

Boring	Fill Thickness (ft)	Obstruction Depth (ft)	Description of Obstruction and/or Odor
Phase II Investigation			
BH-04	10		
BH-15	11.8		
GI-6	1		
GI-8	2		
GI-10	14		Diesel odor in fill
GI-11	19.3	7	Auger through concrete 7 to 8 ft depth. Odor and black staining in fill.
GI-12	>20		Auger through concrete 7 to 8 ft depth. Black staining in fill.
GI-13P	>20	15	Wood from 15-16 ft depth
GI-14/A/B/C	17	4	Concrete obstruction at 4-5 feet depth required 3 offsets
GI-15P	11.8		
PS-02	15		
PS-04A	13.5		
PS-04P	>14		Wood obstruction at 13.5 ft depth. Offset boring terminated at 14 ft on wood obstruction.
Previous Investigations			
B-1	18.5	23	Auger refused at 23 feet; boring offset. Possible wood log between 23.5 and 28.5. Strong petroleum odor between 2.5 feet and 13.5 feet.
B-2	13.5	4	Concrete at 4 feet. Auger refusal. Boring offset. Strong petroleum odor between 2.5 and 13.5 feet.
BH-1	18.5		
BH-2 / 2A	43.5	14	Wood debris in upper 15 ft. Lead auger sheared off in borehole
PS-1	>15		Chemical odor 13.5-15 ft
RCP-1	18.5	2	Possible concrete or cobble stopping split spoon
SS-1	28.5		
SS-2	13.5		
SW-1	10		Chemical odor 8-10 ft
C12-02	18		
C12-03	13		Rig chatter, strong odor at 7 ft

13.2. Stratum A – Recent Alluvial Deposits

Alluvial river deposits (Stratum A) of relatively recent origin underlie the Stratum F fill landside and form the river bottom outboard of the shoreline. The alluvial soil deposits are divided into two separate strata (A1 and A2). Stratum A1 consists of primarily fine grained organic clay that exhibits plasticity and is moderately to highly compressible. Stratum A2 consists of predominantly loose to medium compact granular soils with slight amounts of organic matter.

13.2.1. Stratum A1 – Alluvial Clay/Silt:

Stratum A1 consists of soft to medium gray, gray brown, and dark gray clay and organic clay with varying amounts of sand, silt, shells, wood, and roots. Stratum A1 typically consists of high plasticity clay (USCS soil group symbol OH). N-values in landside borings range from sampler penetration under the weight of the hammer (WOH) to 8 bpf with an average of about 2 bpf. N-values in waterside borings are somewhat lower with a range from sampler penetration under the weight of the drill rods (WOR) to 10 bpf with an average of 1 bpf. Stratum A1 is present in all water borings and all land borings that penetrated Stratum F and varied between approximately 30 feet and 60 feet in thickness in borings that fully penetrated the stratum.

Undrained shear strength (Su), equal to one-half of the measured compressive strength, measured in the laboratory generally increases with depth in Stratum A1 with a range of about 330 to 1,220 pounds per square foot (psf) in landside borings and about 100 psf to 930 psf in waterside borings.

13.2.2. Stratum A2 – Alluvial Sand:

Stratum A2 consists of loose to medium compact dark gray and gray silty fine sand and clayey fine sand with varying amounts of medium to coarse sand, seashells, and gravel. N-values range from 2 to 15 bpf with an average of 7 bpf. Stratum A2 was encountered in borings BH-3, BH-12, BH-04, PS-02, BH-15, and PS-04A and varies between approximately 5 feet and 15 feet in thickness.

13.3. Stratum T – Pleistocene Terrace Deposits

Pleistocene Terrace deposits (Stratum T) underlie the alluvial deposits and are divided into coarser grained Stratum T and finer grained Stratum T0.

13.3.1. Stratum T – Old Town Terrace:

Stratum T consists of loose to medium compact gray fine to medium and fine to coarse sand with varying amounts of silt, clay, and gravel, gray fine sandy clay, and gray gravel. N-values range from 3 to 29 bpf with an average of 14 bpf. Stratum T is present in all borings except BH-16/A, PS-04P, and GI-10 through GI-15 (shallow borings), and varies between approximately 3 feet and 33 feet in thickness.

13.3.2. Stratum T0 – Organic Member of Terrace:

Stratum T0 consists of stiff gray fine sandy silt, trace medium to coarse sand, and stiff gray silt, trace fine sand and decomposed wood. N-values range from 11 to 17 bpf with an average of 14 bpf. Stratum T0 was only encountered in Boring PS-02 and is approximately 12 feet thick.

13.4. Stratum P – Cretaceous Deposits

13.4.1. Stratum P1 – Potomac Clay:

Cretaceous Clay (Stratum P1) is present beneath Stratum A2 or Stata T / T0 in all deep borings. Stratum P1 consists of stiff to hard mottled gray, gray brown, red brown, gray, light brown and purple clay and silt with varying amounts of sand and gravel. Stratum P1 is generally a high plasticity clay (CH). N values range from 10 to 52 bpf with an average of 31 bpf. All deep borings were terminated in Stratum P1. A distinctive feature of the Stratum P1 clay is the presence of a marked secondary structure (slickensides and fissures) as the result of past soil movements and pressure release with a consequent wide variation in soil strength.

14.0 GROUNDWATER

Periodic groundwater level measurements in the open-standpipe monitoring wells were collected for the duration of the Phase II investigation. Stabilized groundwater levels ranged from approximately Elev. -0.6 to +3.6, as summarized in Table E. A complete record of groundwater levels measured at each piezometer during the investigation is included with the boring logs in Appendix B. Groundwater levels in the piezometers are likely influenced by tidal fluctuation in the Potomac River. A comparison of measured groundwater levels with tide levels is provided in Figure 3.

Table E. Summary of Well Readings during Investigation

Well	Minimum Water Elevation Reading (ft)	Maximum Water Elevation Reading (ft)
PS-02P	-0.4	1.1
PS-04PA	-1.1	-0.3
PS-04AP	-0.6	0.1
GI-13P	0.6	1.2
GI-15P	2.9	3.6

Additional groundwater level measurements are planned in the period from February through June 2022 to further evaluate water level variations due to seasonal/tidal influences and will be provided under separate cover.

15.0 CLOSURE

This report is prepared for the sole use of the client and is specific to the project design contemplated at the time of report issue.

FTF:ALS:WEK: F:\141\14123\GDR\Geotechnical Data Report_Fnl.docx

EXHIBITS

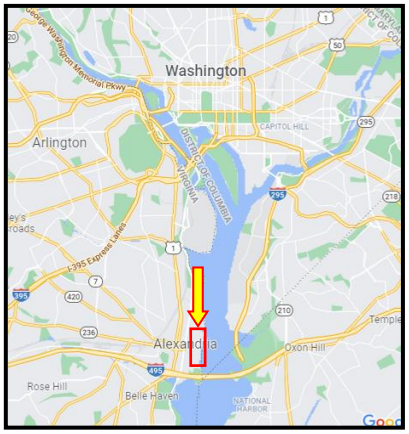
DRAFT

SOURCE: GOOGLE EARTH

feet

APPROX. SCALE: 0 200 400

KEY PLAN:



CITY OF ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

ALEXANDRIA VIRGINIA

CAROLLO ENGINEERS, INC.

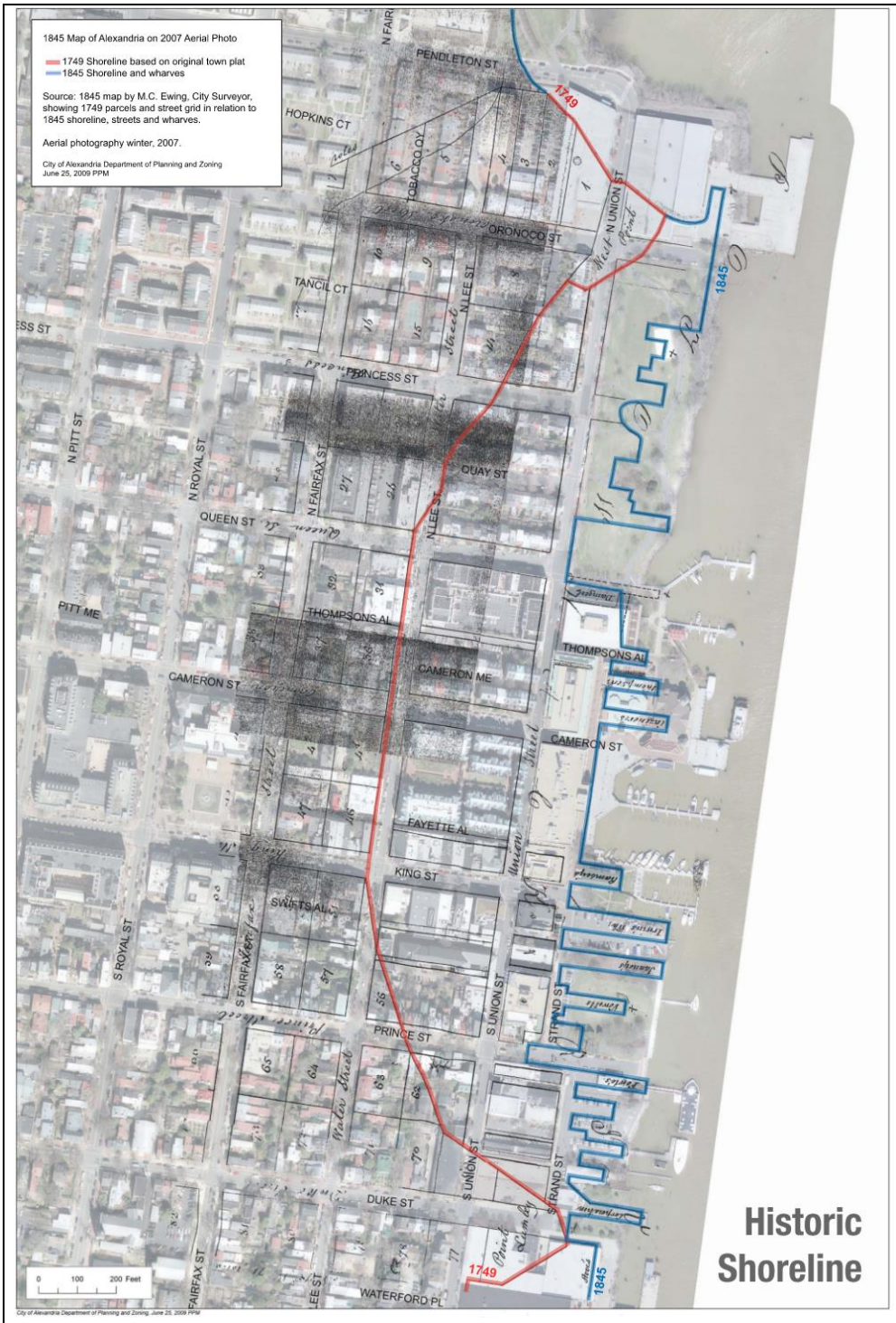
NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS

515 M STREET SE, WASHINGTON, DC 20003

SCALE	MADE BY: ALS	DATE: 2/14/2022	FILE NO.
N/A	CH'KD BY:	DATE:	14123

SITE LOCATION PLAN FIGURE NO. 1



SOURCE: CITY OF ALEXANDRIA DEPARTMENT OF PLANNING AND ZONING

https://www.alexandriava.gov/special/waterfront/default.aspx?id=24244

(Accessed Feb. 14, 2022)

LEGEND (ENLARGED):

1845 Map of Alexandria on 2007 Aerial Photo

1749 Shoreline based on original town plat
1845 Shoreline and wharves

Source: 1845 map by M.C. Ewing, City Surveyor, showing 1749 parcels and street grid in relation to 1845 shoreline, streets and wharves.

Aerial photography winter, 2007.

City of Alexandria Department of Planning and Zoning
June 25, 2009 PPM

CITY OF ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT
ALEXANDRIA VIRGINIA

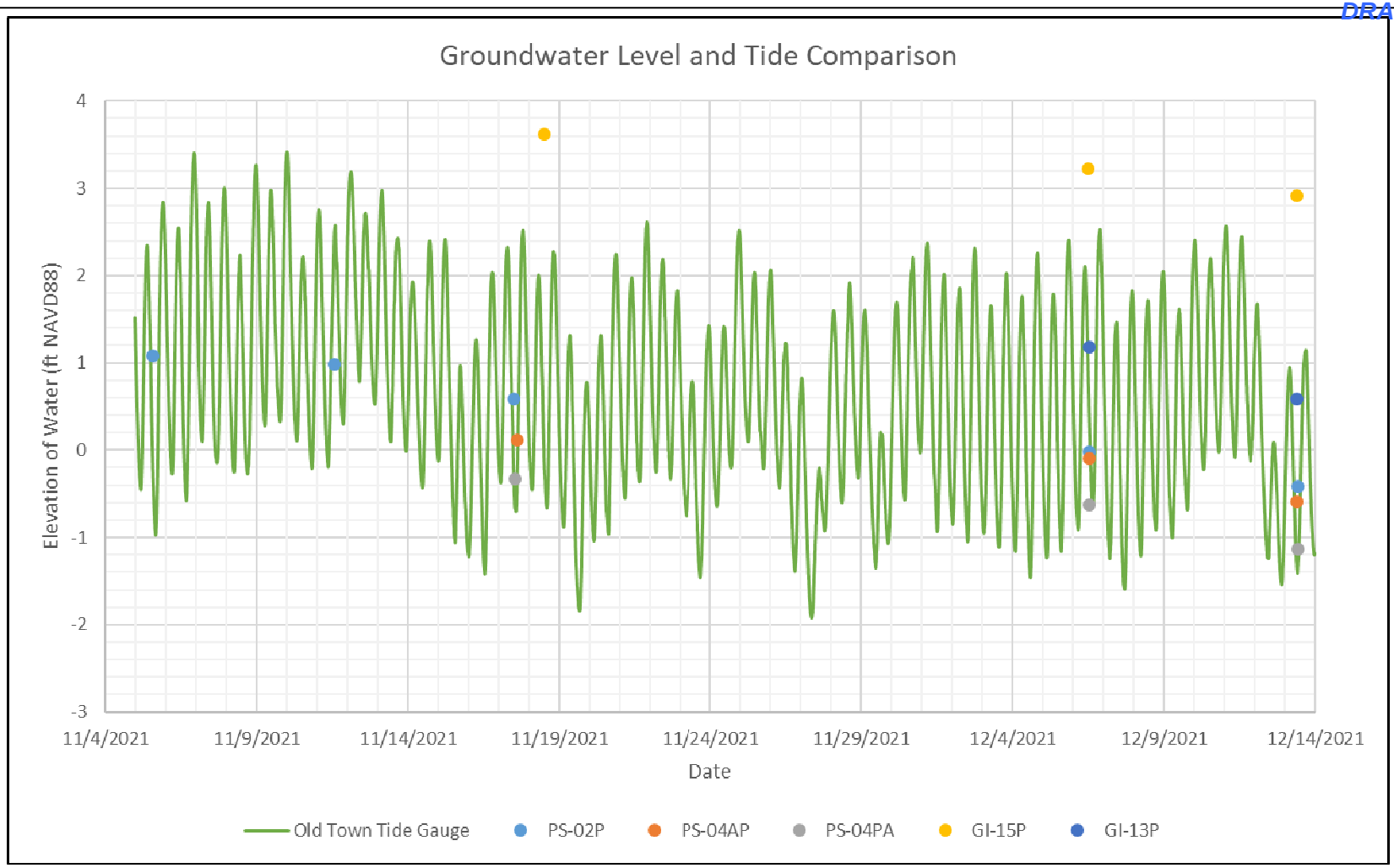
CAROLLO ENGINEERS, INC.
NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS
515 M STREET SE, WASHINGTON, DC 20003

SCALE	MADE BY: ALS	DATE: 2/14/2022	FILE NO.
N/A	CH'KD BY:	DATE:	14123

HISTORIC SHORELINE FIGURE NO. **2**

DRAFT



CITY OF ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT
ALEXANDRIA VIRGINIA

CAROLLO ENGINEERS, INC.
NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS
515 M STREET SE, WASHINGTON, DC 20003

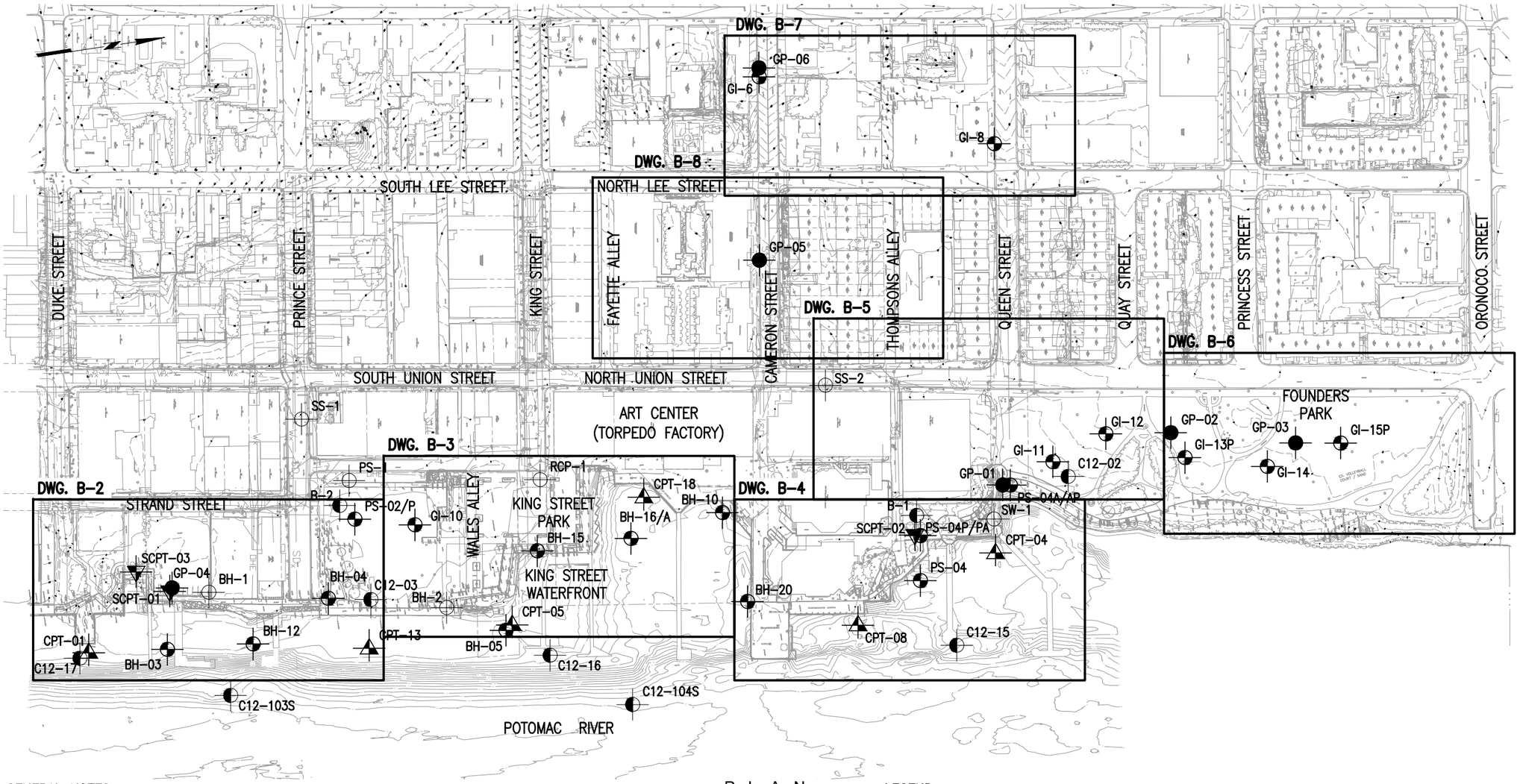
SCALE	MADE BY: ALS DATE: 2/14/2022 CH'KD BY: FTF DATE: 2/15/2022	FILE NO.
N/A		14123

GROUNDWATER LEVEL DATA FIGURE NO. 3

APPENDIX A

Boring Location Plans

DRAFT



	COORDINATES OF PHASE II BORINGS/CPTS			
	BORING/CPT	NORTHING	EASTING	GROUND SURFACE/ MUDLINE ELEVATION
LANDSIDE	BH-04*	6978822	11899218	4±
	BH-15*	6979200	11899190	3±
	PS-02P	6978889	11899087	5.28
	PS-04P	6979876	11899264	2.87
	PS-04AP	6980048	11899201	3.31
	GI-6*	6979714	11898413	23±
	GI-8*	6980107	11898597	18±
	GI-10*	6978993	11899112	6±
	GI-11	6980089	11899126	4.98
	GI-12	6980204	11899148	7.03
	GI-13P	6980357	11899199	7.78
	GI-14	6980543	11899233	7.81
	GI-15P	6980707	11899223	8.12
	GP-01	6980045	11899202	3.25
	GP-02	6980363	11899153	8.05
	GP-03	6980634	11899208	8.48
	GP-04	6978551	11899158	3.25
	GP-05*	6979671	11898703	8±
	GP-06*	6979718	11898389	25±
	SCPT-01	6978548	11899163	3.19
	SCPT-02	6979868	11899263	2.87
	SCPT-03	6978493	11899121	3.75
WATERSIDE	BH-03	6978527	11899265	-4.9
	BH-05	6979124	11899321	-3.7
	BH-10	6979534	11899172	-8.1
	BH-12	6978678	11899278	-4.5
	BH-16	6979354	11899180	-7.8
	BH-16A	6979367	11899193	-8.0
	BH-20	6979554	11899335	-12.0
	PS-04	6979843	11899351	-7.4
	CPT-01*	6978389	11899250	-9.5
	CPT-04	6980005	11899307	-8.5
	CPT-05*	6979667	11898743	-3.5
	CPT-08	6979741	11899405	-14
	CPT-13	6980376	11899203	-14.1
	CPT-18	6979400	11899125	-8.5

* INDICATES BORING OR CPT LOCATIONS WITHOUT GPS OR SURVEY COORDINATES. COORDINATES ARE BASED ON PROPOSED LOCATIONS, ADJUSTED FOR FIELD MEASUREMENTS WHERE AVAILABLE.

GENERAL NOTES:

1. PHASE II LAND BORING/CPT LOCATIONS SHOWN ARE BASED ON SURVEY COORDINATES PROVIDED BY GORDON, UNLESS OTHERWISE NOTED. WATER CPT LOCATIONS SHOWN ARE BASED ON HAND HELD GPS COORDINATES TAKEN BY MRCE AND ARE APPROXIMATE, UNLESS OTHERWISE NOTED.
2. BASE SURVEY TAKEN FROM "TOPOGRAPHICAL SURVEY OF ALEXANDRIA WATERFRONT IMPROVEMENTS" DATED 12/9/2021, PREPARED BY GORDON (CAD PROVIDED TO MRCE ON 12/22/2021).
3. BATHYMETRY TAKEN FROM CITY OF ALEXANDRIA – WATERFRONT FLOOD MITIGATION IMPLEMENTATION PROJECT, TOPOGRAPHIC SURVEY, DUKE ST.. TO QUEEN ST. & UNION ST. TO POTOMAC RIVER, PREPARED BY STANTEC, DATED 9/12/2016 (CAD PROVIDED TO MRCE ON 9/29/2021)
4. COORDINATES REFERENCE VIRGINIA STATE PLANE NORTH NAD83 (2011) HORIZONTAL DATUM. ELEVATIONS REFERENCE NAVD88 DATUM.
5. PRIOR BORING LOCATIONS WERE PROVIDED BY CAROLLO ENGINEERS INC., AND ARE APPROXIMATE.
6. PHASE II LAND BORINGS WERE MADE BY FREE STATE DRILLING INC., OF FREDERICK MARYLAND BETWEEN NOVEMBER 1, AND NOVEMBER 18, 2021 UNDER THE CONTINUOUS INSPECTION OF MUESER RUTLEDGE CONSULTING ENGINEERS, PLLC (MRCE).
7. PHASE II CPTS WERE PERFORMED BY INSITU SOIL TESTING, L.C. OF LANCASTER VIRGINIA (INSITU) ON NOVEMBER 23, 2021 (LANDSIDE), AND BETWEEN DECEMBER 23 AND DECEMBER 28, 2021 (WATER SIDE) UNDER THE INSPECTION OF MRCE.
8. PHASE II GEOPROBES WERE MADE BY GSI MID-ATLANTIC INC. OF BEL AIR MARYLAND ON NOVEMBER 17, AND DECEMBER 6 2021 UNDER THE CONTINUOUS INSPECTION OF HAYES & MONAGHAN, GEOARCHAEOLOGISTS, LLC.
9. PHASE II WATER BORINGS WERE MADE BY CONNELLY AND ASSOCIATES INC. OF FREDERICK MARYLAND BETWEEN NOVEMBER 30, 2021 AND JANUARY 12, 2022 UNDER THE CONTINUOUS INSPECTION OF MRCE.
10. PHASE I BORINGS WERE MADE BY FREE STATE STATE DRILLING INC., OF FREDERICK MARYLAND FOR SCHNABEL ENGINEERING, LLC IN 2016. BORING LOCATIONS ARE APPROXIMATE.

P L A N

100' 50' 0 100' 200'

LEGEND:

BH-04
- PHASE II SOIL BORING
- "BH" INDICATES 91-105 FT BULKHEAD BORING
- "PS" INDICATES 100 FT PUMP STATION BORING
- "GI" INDICATES 20 FT GREEN INFRASTRUCTURE BORING
- "P" INDICATES 14-20 FT OPEN STANDPIPE MONITORING WELL INSTALLED IN BORING

GP-01
- PHASE II GEOPROBE BORING FOR GEO-ARCHAEOLOGICAL SAMPLING

CPT-01
- PHASE II CPT PROBE

SCPT-01
- PHASE II SEISMIC CPT PROBE

SS-1
- PHASE I BORING PERFORMED BY OTHERS

B-1
- PRIOR BORING PERFORMED BY OTHERS

REV.	DATE	BY	DESCRIPTION

CITY OF ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

PHASE II GEOTECHNICAL INVESTIGATION

ALEXANDRIA VIRGINIA

CAROLLO ENGINEERS, INC.

NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS PLLC

14 PENN PLAZA – 225 WEST 34TH STREET, NEW YORK, NY 10122

SCALE	MADE BY: B.B./F.T.F. DATE: 11/19/2021	FILE NUMBER
AS NOTED	CH'KD BY: A.L.S. DATE: 11/19/2021	14123

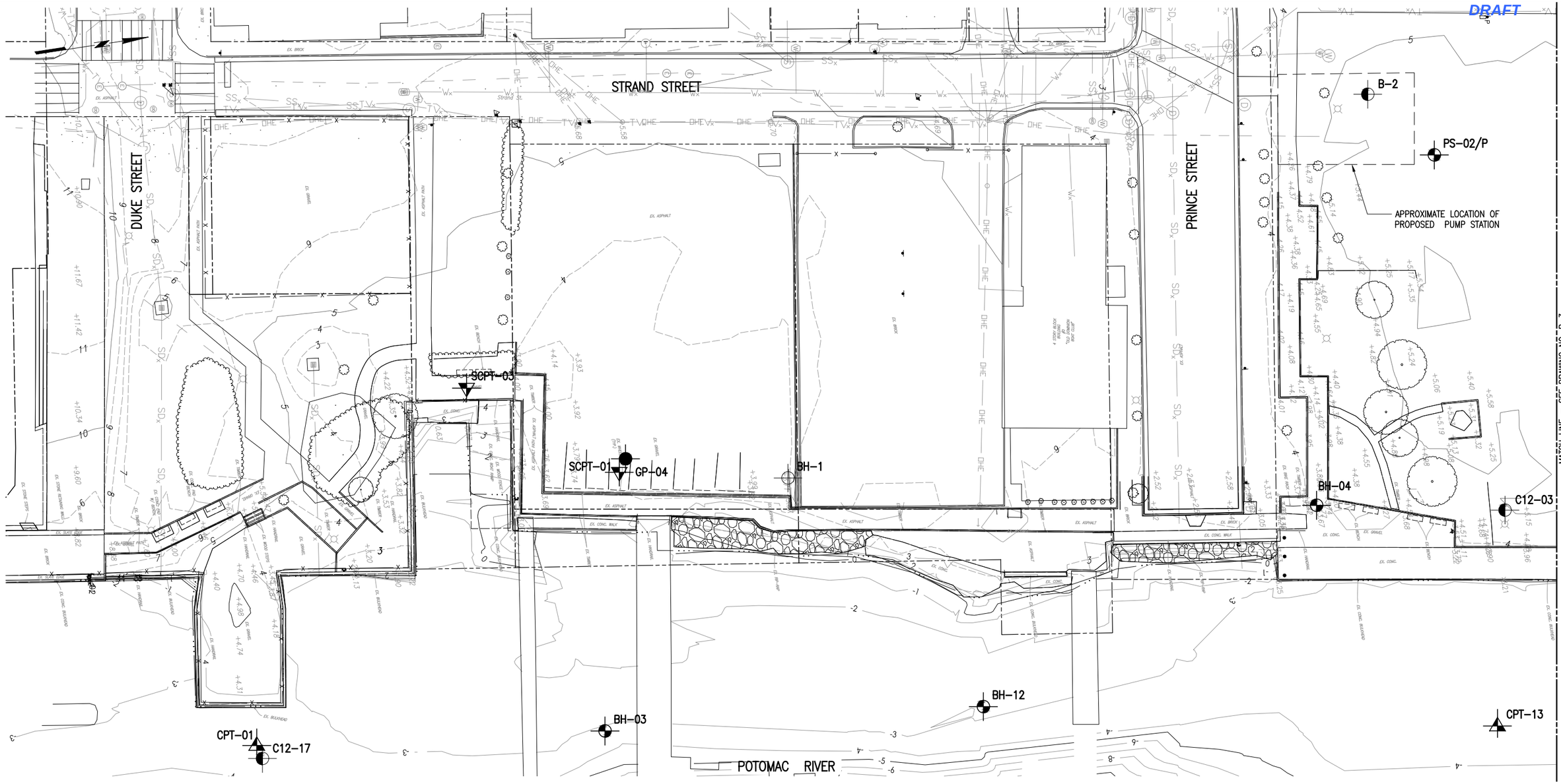
KEY PLAN
SHEET 1 OF 8

DRAWING NUMBER

B-1

Last saved by: ffalcone on Friday, Feb 11, 2022 – 3:25:47 PM
Printed on: Tuesday, Feb 15, 2022 – 05:24:12 PM
Printed by: Fred Falcone
G:\DWGS\141\14123\B-1.dwg

DRAFT



NOTES:

1. SEE DRAWING NO. B-1 FOR GENERAL NOTES AND LEGEND.

PLAN

20' 10' 0 20' 40'

REV.	DATE	BY	DESCRIPTION

CITY OF ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

PHASE II GEOTECHNICAL INVESTIGATION

ALEXANDRIA VIRGINIA

CAROLLO ENGINEERS, INC.

NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS PLLC

14 PENN PLAZA – 225 WEST 34TH STREET, NEW YORK, NY 10122

SCALE		FILE NUMBER
AS NOTED	MADE BY: B.B./F.T.F. DATE: 11/19/2021 CH'KD BY: A.L.S. DATE: 11/19/2021	14123

BORING LOCATION PLAN
SHEET 2 OF 8

DRAWING NUMBER

B-2

Last saved by: ffalcone on Friday, Feb 11, 2022 – 9:24:32 AM
Printed on: Tuesday, Feb 15, 2022 – 05:24:45 PM
Printed by: Fred Falcone
G:\DWGS\141\14123\B-2.dwg

DRAFT

MATCH LINE – SEE DRAWING NO. B-2

MATCH LINE – SEE DRAWING NO. B-4

GI-10

RCP-1

CPT-18

BH-10

BH-16

BH-16A

BH-15

KING STREET PARK

WALES ALLEY

APPROXIMATE LOCATION OF PROPOSED UNDERGROUND STORM WATER DETENTION BASIN

KING STREET WATERFRONT

BH-2/A

CPT-05

BH-05

PLAN

20' 10' 0 20' 40'

NOTES:

1. SEE DRAWING NO. B-1 FOR GENERAL NOTES AND LEGEND.

REV.	DATE	BY	DESCRIPTION

CITY OF ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

PHASE II GEOTECHNICAL INVESTIGATION

ALEXANDRIA VIRGINIA

CAROLLO ENGINEERS, INC.

NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS PLLC

14 PENN PLAZA – 225 WEST 34TH STREET, NEW YORK, NY 10122

SCALE	MADE BY: B.B./F.T.F. DATE: 11/19/2021	FILE NUMBER
AS NOTED	CH'KD BY: A.L.S. DATE: 11/19/2021	14123

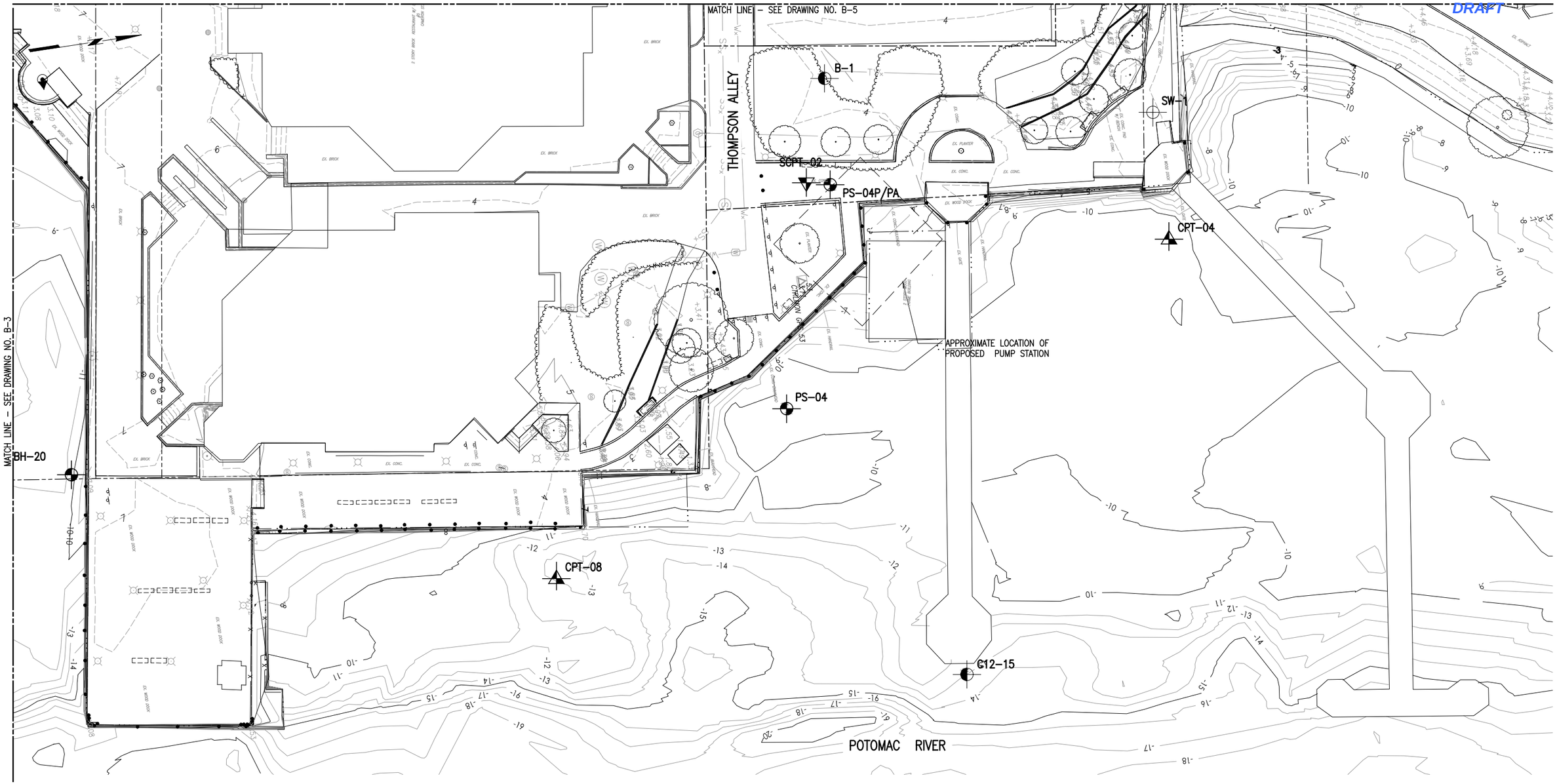
BORING LOCATION PLAN
SHEET 3 OF 8

DRAWING NUMBER

B-3

Last saved by: ffalcone on Tuesday, Feb 08, 2022 – 9:32:50 AM
Printed on: Tuesday, Feb 15, 2022 – 05:25:10 PM
Printed by: Fred Falcone
G:\DWGS\141\14123\B-3.dwg

DRAFT



P L A N

20' 10' 0 20' 40'

NOTES:

1. SEE DRAWING NO. B-1 FOR GENERAL NOTES AND LEGEND.

REV.	DATE	BY	DESCRIPTION

CITY OF ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

PHASE II GEOTECHNICAL INVESTIGATION

ALEXANDRIA VIRGINIA

CAROLLO ENGINEERS, INC.

NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS PLLC

14 PENN PLAZA – 225 WEST 34TH STREET, NEW YORK, NY 10122

SCALE	MADE BY: B.B./F.T.F. DATE: 11/19/2021	FILE NUMBER
AS NOTED	CH'KD BY: A.L.S. DATE: 11/19/2021	14123

BORING LOCATION PLAN
SHEET 4 OF 8

DRAWING NUMBER

B-4

Last saved by: tfalcone on Friday, Feb 04, 2022 – 2:45:27 PM
Printed on: Tuesday, Feb 15, 2022 – 05:25:39 PM
Printed by: Fred Falcone
G:\DWGS\141\14123\B-4.dwg

DRAFT

MATCH LINE – SEE DRAWING NO. B-9

THOMPSONS ALLEY

QUEEN STREET

NORTH UNION STREET

SS-2

APPROXIMATE LOCATION OF PROPOSED UNDERGROUND STORM WATER DETENTION BASIN

FOUNDERS PARK

GI-12

GI-11

C12-02

GP-01

PS-04A/AP

MATCH LINE – SEE DRAWING NO. B-4

MATCH LINE – SEE DRAWING NO. B-6

P L A N

20' 10' 0 20' 40'

NOTES:

1. SEE DRAWING NO. B-1 FOR GENERAL NOTES AND LEGEND.

REV.	DATE	BY	DESCRIPTION

CITY OF ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

PHASE II GEOTECHNICAL INVESTIGATION

ALEXANDRIA VIRGINIA

CAROLLO ENGINEERS, INC.

NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS PLLC

14 PENN PLAZA – 225 WEST 34TH STREET, NEW YORK, NY 10122

SCALE	MADE BY: B.B./F.T.F. DATE: 11/19/2021	FILE NUMBER
AS NOTED	CH'KD BY: A.L.S. DATE: 11/19/2021	14123

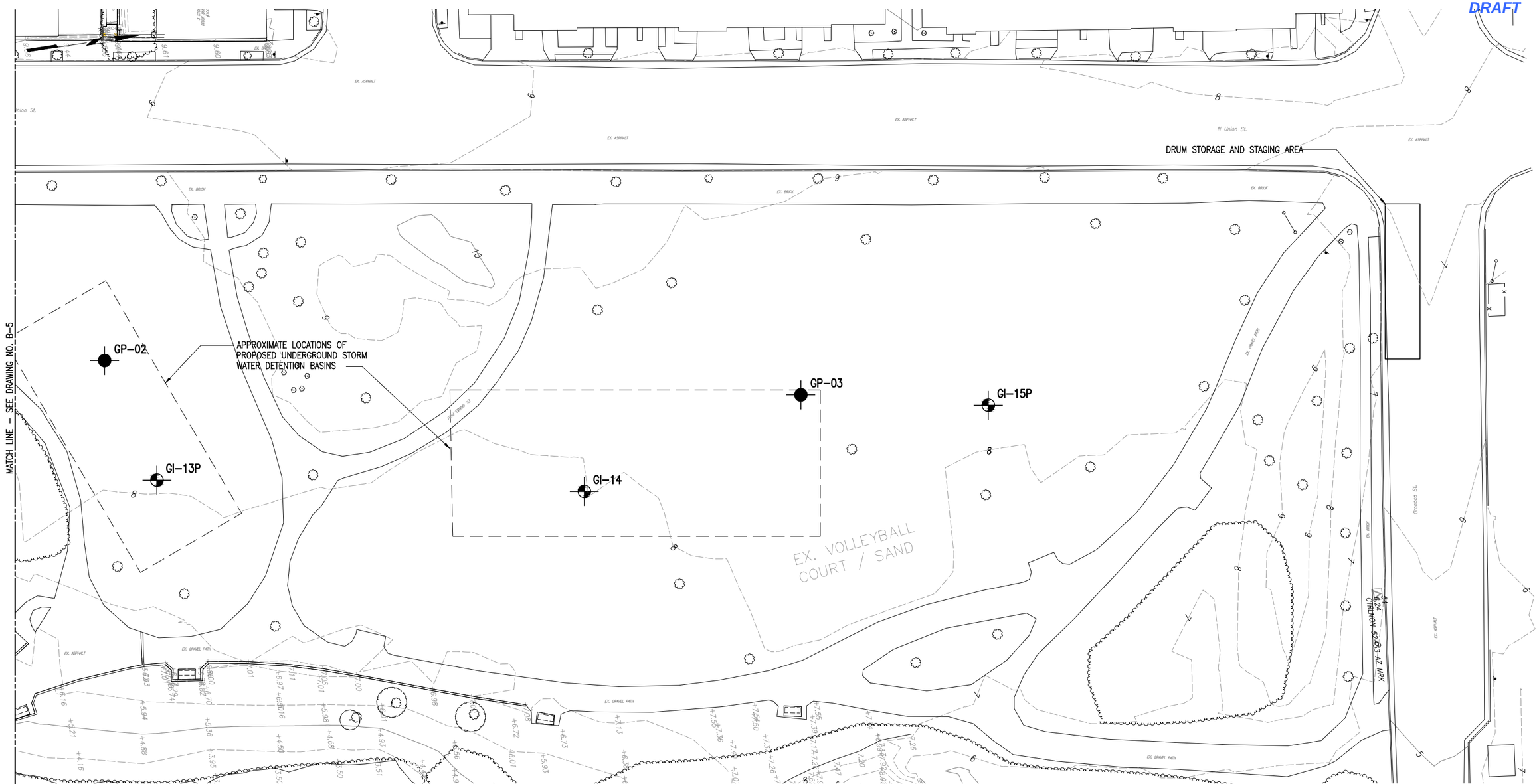
BORING LOCATION PLAN
SHEET 5 OF 8

DRAWING NUMBER

B-5

Last saved by: tfalcone on Friday, Feb 04, 2022 – 2:45:36 PM
Printed on: Tuesday, Feb 15, 2022 – 05:26:03 PM
Printed by: Fred Falcone
G:\DWGS\141\14123\B-5.dwg

DRAFT



NOTES:

1. SEE DRAWING NO. B-1 FOR GENERAL NOTES AND LEGEND.

PLAN

20' 10' 0 20' 40'

REV.	DATE	BY	DESCRIPTION

CITY OF ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

PHASE II GEOTECHNICAL INVESTIGATION

ALEXANDRIA VIRGINIA

CAROLLO ENGINEERS, INC.

NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS PLLC

14 PENN PLAZA – 225 WEST 34TH STREET, NEW YORK, NY 10122

SCALE	MADE BY: B.B./F.T.F. DATE: 11/19/2021	FILE NUMBER
AS NOTED	CH'KD BY: A.L.S. DATE: 11/19/2021	14123

BORING LOCATION PLAN
SHEET 6 OF 8

DRAWING NUMBER

B-6

Last saved by: ffalcone on Friday, Feb 04, 2022 – 2:45:47 PM
Printed on: Tuesday, Feb 15, 2022 – 05:26:25 PM
Printed by: Fred Falcone
G:\DWGS\141\14123\B-6.dwg

DRAFT

NOTES:

1. SEE DRAWING NO. B-1 FOR GENERAL NOTES AND LEGEND.

PLAN

20' 10' 0 20' 40'

REV.	DATE	BY	DESCRIPTION

CITY OF ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

PHASE II GEOTECHNICAL INVESTIGATION

ALEXANDRIA VIRGINIA

CAROLLO ENGINEERS, INC.

NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS PLLC

14 PENN PLAZA – 225 WEST 34TH STREET, NEW YORK, NY 10122

SCALE	MADE BY: B.B./F.T.F. DATE: 11/19/2021	FILE NUMBER
AS NOTED	CH'KD BY: A.L.S. DATE: 11/19/2021	14123

BORING LOCATION PLAN
SHEET 7 OF 8

DRAWING NUMBER
B-7

Last saved by: ffalcone on Friday, Feb 04, 2022 – 2:46:01 PM
Printed on: Tuesday, Feb 15, 2022 – 05:26:52 PM
Printed by: Fred Falcone
G:\DWGS\141\14123\B-7.dwg

DRAFT

SEE DRAWING NO. B-7

NORTH LEE STREET

CAMERON STREET

GP-05

SEE DRAWING NO. B-5

NOTES:

1. SEE DRAWING NO. B-1 FOR GENERAL NOTES AND LEGEND.

PLAN

20' 10' 0 20' 40'

REV.	DATE	BY	DESCRIPTION

CITY OF ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

PHASE II GEOTECHNICAL INVESTIGATION

ALEXANDRIA VIRGINIA

CAROLLO ENGINEERS, INC.

NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS PLLC

14 PENN PLAZA – 225 WEST 34TH STREET, NEW YORK, NY 10122

SCALE	MADE BY: F.T.F. DATE: 11/19/2021	FILE NUMBER
AS NOTED	CH'KD BY: A.L.S. DATE: 11/19/2021	14123

BORING LOCATION PLAN
SHEET 8 OF 8

DRAWING NUMBER

B-8

Last saved by: ffalcone on Friday, Feb 04, 2022 – 2:46:11 PM
Printed on: Tuesday, Feb 15, 2022 – 05:27:15 PM
Printed by: Fred Falcone
G:\DWGS\141\14123\B-8.dwg

APPENDIX B

MRCE Boring Logs

MRCE built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	BH-03
SHEET 1 OF	3
FILE NO.	14123
SURFACE ELEV.	Mudline El. -4.9
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
13:15	1D	0.0	WH/24"	Soft dark gray clay, trace brick, wood (OH)			DRILLED	pp=0, WC=86%
12/3/2021		2.0					AHEAD	
Friday	2D	2.0	WH/24"	Soft dark gray clay, trace roots (OH)			4"	pp=0, WC=89%
Cloudy		4.0					8"	
43°F						5	↓	
	3U	5.0	PUSH=24"	Soft dark gray clay, trace shells, wood (OH)				pp=0
		7.0	REC=24"					
	4D	7.0	WR/12"	Soft dark gray clay, trace plastic, roots (OH)				pp=0
		9.0	WH/12"					
	5D	9.0	WR/24"	Soft dark gray clay, trace wood, root fibers (OH)		10		pp=0
		11.0						
	6U	13.0	Push=24"	Soft dark gray organic silty clay (OH)				WC=83%
		15.0	Rec=24"			15		
	7D	18.5	WH/18"	Soft dark gray clay, trace fine sand pockets,				pp=0, WC=52%
14:45		20.0		wood, shells (OH)		20		
8:20								
12/6/2021								
Monday					A1			
Clear	8U	23.0	Push=24"	Medium dark gray clay (OH)				WC=52%
49°F		25.0	Rec=24"			25		
	9D	28.5	WR/6"	Soft dark gray clay, trace roots (OH)				pp=0
		30.0	WH/12"			30		
	10U	33.0	Push=24"	Medium dark gray clay (OH)				pp=0.5, WC=60%
		35.0	Rec=24"			35		
	11D	38.5	WH/18"	Soft dark gray clay, trace shells, wood, roots				pp=0.25, WC=55%
		40.0		(OH)		40		
	12U	43.0	Push=24"	Top: Soft dark gray clay (OH)				
11:10		45.0	Rec=24"	Bot: Gray fine to medium sand, trace silt,		45		
8:30				clay (SP-SM)				
12/7/2021								
Tuesday								
Cloudy	13D	48.5	6-5	Gray fine to medium sand, some clay, trace	A2			pp=0.25, WC=23%
38°F		50.0	4	coarse sand, silt (SC)		50		

MRCE built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	BH-03
SHEET 2 OF	3
FILE NO.	14123
SURFACE ELEV.	Mudline El. -4.9
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd 12/7/2021					A2			
	14D	53.5	6-7	Top 6": Gray f-m sand, some clay, trace gravel, silt (SC)		54		
		55.0	8	Bot 12": Brn to gray brown clayey fine sand, some gravel, gray clay pockets, trace silt (SC)	T	55		pp(bottom)=1.0
						56.8		Rig chatter 57'-58'
	15D	58.5	4-8	Stiff mottled gray, brown, red-brown clay, some gravel, trace fine to coarse sand (CH)		59.5		pp=2.0 to 2.5
		60.0	12			60		
	16D	63.5	7-12	Stiff mottled gray and light brown clay (CH)				pp=3.0, WC=37%
		65.0	11			65		Notable hard clay pockets
	17D	68.5	7-9	Stiff mottled gray, brown, light brown clay (CH)				pp=2.0 to 2.5
		70.0	9			70		
						71.8		
	18D	73.5	5-7	Stiff mottled gray and light brown clay (CH)				pp=2.5 to 3.5
		75.0	7			75		
	19D	78.5	7 - 10	Hard mottled gray and red brown clay (CH)	P1			pp>4.5
15:30		80.0	14			80		
9:40 12/8/2021 Wednesday Cloudy 39°F	20D	83.5	7-10	Stiff mottled gray, red-brown, light brown clay (CH)				pp=3.5
		85.0	12			85		
	21D	88.5	13-16	Hard mottled gray, red-brown, light brown clay (CH)				pp=4.5, WC=24%
		90.0	20			90		
	22D	93.5	12-18	Hard mottled gray, red-brown, purple clay (CH)				pp>4.5
		95.0	18			95		
	23D	98.5	15-22	Hard mottled gray, red-brown, purple clay (CH)				pp>4.5
13:20		100.0	29			100		End of boring at 100'.

DRAFT

M|R|C|E
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. BH-03
SHEET 3 **OF** 3

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. Mudline El. -4.9
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		TYPE OF FEED DURING CORING		CASING USED		X YES		NO		
TRUCK		MECHANICAL		DIA., IN.	8	DEPTH, FT. FROM	0	TO	5
SKID		HYDRAULIC	X	DIA., IN.	4	DEPTH, FT. FROM	0	TO	53.5
BARGE	TRACK CME-55	OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	3" FIXED PISTON
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	NWJ

DRILLING MUD USED X YES NO

DIAMETER OF ROTARY BIT, IN. 3 7/8
TYPE OF DRILLING MUD BENTONITE

AUGER USED YES X NO
TYPE AND DIAMETER, IN.

*CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM):

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED YES X NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	90	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	10	NO. OF 3" UNDISTURBED SAMPLES	5
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR CONNELLY AND ASSOCIATES, INC.
DRILLER BRANDON MCKINLEY **HELPERS** + 2 HELPERS
REMARKS
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 12-08-21
CLASSIFICATION CHECK: F.FALCONE **TYPING CHECK:** A. SACKS

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO. BH-04
SHEET 1 OF 3
PROJECT: WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION: ALEXANDRIA, VA
SURFACE ELEV. +4±
RES. ENGR. RAMIRO OSSIO

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	CASING DEPTH	CASING BLOWS	REMARKS
07:00	1D	0.0	10-10	Gray gravelly fine to medium sand, trace silt			DRILLED	
11/8/2021		2.0	13-12	(FILL)(SP-SM)			AHEAD	
Monday	2D	2.0	6-16	Brown to gray brown fine to medium sand with			3 1/4" HSA	
Clear		3.2	100/2	concrete, some gravel, clay (FILL) (SC)			4"	8" Concrete at 3.2'
47°F	3D	4.5	31-24	Top 6": Concrete, f, to m. sand, tr silt (GP-SM)	F	5		
		6.5	27-40	Bot 12": Brown f. to m. sand, trace silt (SP-SM)				pp=Pocket
	4D	6.5	32-78	Brown fine to medium sand, trace silt (FILL)				Penetrometer
		8.5	74-26	(SP-SM)				Unconfined Compres-
	5D	8.5	1-1	Top 18": Drk gr to blk f. to m. sa, sm cl, tr gvl (SC)				sive Strength in tsf.
		10.5	1-1	Bot 6": Soft dark gray clay, trace f. to m. sand (CL)		10		
								TV=Torvane Shear
								Strength in tsf.
	6D	13.5	WOH/18"	Soft dark gray and gray brown clay (OH)				pp=0.0, WC=51%
		15.0				15		6D: Organic odor
								Switch to mud rotary
								at 15'
	7U	19.5	PUSH=24"	Medium dark gray organic clayey silt (OL)		20		pp=0.25, TV=0.2
		21.5	REC=23"					WC=52%
	8D	24.0	WOH/18"	Soft dark gray clay (OH)		25		pp=0.25
		25.5						WC=61%
	9U	29.0	PUSH=24"	Medium dark gray organic silty clay (OH)		30		pp=0.75, TV=0.15
		31.0	REC=24"		A1			WC=56%
	10D	34.0	WOH/18"	Soft dark gray organic clayey silt (OH)		35		pp=0.25, WC=61%
		35.5						OM=7%
								OM=Organic matter,
								percent dry weight
	11U	39.0	PUSH=24"	Medium dark gray organic silty clay (OH)		40		pp=0.5 to 0.75, TV=0.2
		41.0	REC=24"					WC=55%
	12D	44.0	WOH/18"	Medium dark gray clay (OH)		45		pp=0.5
		45.5						WC=54%
	13U	49.0	PUSH=24"	Medium to stiff dark gray organic silty clay,		50		pp=0.75 to 1.0, TV=0.2
		51.0	REC=24"	trace fine sand, mica (OH-CH)				WC=52%

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO. BH-04
SHEET 2 OF 3
FILE NO. 14123
SURFACE ELEV. +4±
RES. ENGR. RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	CASING DEPTH	CASING BLOWS	REMARKS
Cont'd 11/8/2021								
					A1			
	14D	54.0	WOH/18"	Soft dark gray clay, trace mica (OH)		55		pp=0.25
		55.5						WC=47%
						57.3		
	15U	59.0	PUSH=24"	Top: Gray clayey fine to medium sand (SC)		60		15U Top: WC=34%
		61.0	REC=24"	Bot: Gray fine to medium sand, trace silt, gravel (SP-SM)				
					A2			Rig chatter at 63'
	16D	64.0	4-4	Gray fine sand, some silt, trace medium sand		65		
		65.5	5	(SM)				
								Rig chatter at 67.5'
						67.5		
				Top 5": Gray gravel, trace fine to coarse sand,	T	69.5		
	17D	69.0	42-20	silt (GP-GM)		70		
		71.0	6-4	Bot 13": Stiff mottled dark gray and gray brown clay (CH)				17D Bot: pp=2.5
								Rig chatter from 72'-74'
	18D	74.0	12-10	Stiff mottled red brown, light brown and gray		75		
		75.5	12	clay, trace gravel (CH)				
14:35	19D	79.0	7-10	Stiff mottled gray and gray brown silty clay,		80		pp=3.5 to 4.0
7:20		80.5	10	some fine sand (CH)				WC=32%
11/9/2021								19D: Sample is friable
Tuesday								
Clear								
46°F	20D	84.0	8-9	Stiff mottled gray and gray brown fine sandy	P1	85		pp=3.5 to 4.0
		85.5	12	clay (CH)				WC=35%
								20D: Sample is friable
	21D	89.0	6-10	Stiff mottled gray and red brown fine sandy		90		pp=3.5 to 4.0
		90.5	12	clay (CH)				21D: Sample is friable
	22D	94.5	7-12	Stiff mottled gray brown and red fine sandy		95		pp=3.0 to 3.5
		95.5	13	clay (CH)				
	23D	98.5	7-10	Stiff mottled gray brown and red silty clay,				pp=3.0, WC=33%
		100.0	12	some fine sand (CH)		100		End of boring at 100'

DRAFT

Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

built on firm foundations

BORING NO. BH-04
SHEET 3 **OF** 3

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. +4±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:

TRUCK
SKID
BARGE
OTHER TRACK CME-55

TYPE OF FEED DURING CORING

MECHANICAL
HYDRAULIC
OTHER

CASING USED [X] YES [ ] NO

DIA., IN.	3.25 HSA	DEPTH, FT. FROM	0	TO	8.5
DIA., IN.	4	DEPTH, FT. FROM	0	TO	29
DIA., IN.		DEPTH, FT. FROM		TO	

TYPE AND SIZE OF

D-SAMPLER 2" O. D. SPLIT SPOON
U-SAMPLER 3" FIXED PISTON
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS NWJ

DRILLING MUD USED [X] YES [ ] NO

DIAMETER OF ROTARY BIT, IN. 3 7/8
TYPE OF DRILLING MUD BENTONITE

AUGER USED [X] YES [ ] NO

TYPE AND DIAMETER, IN. 3.25" HOLLOW STEM AUGER

*CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM):

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
11-08-21		8.5FT	6.5FT	8FT	WET SOIL SAMPLE OBSERVED IN SPOON

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	90	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	10	NO. OF 3" UNDISTURBED SAMPLES	5
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** + 2 HELPERS
REMARKS BACKFILLED WITH GROUT VIA TREMIE METHOD, ORIGINAL SURFACE RESTORED
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-09-21
CLASSIFICATION CHECK: F.FALCONE **TYPING CHECK:** A. SACKS

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO. BH-05
SHEET 1 OF 3
FILE NO. 14123
SURFACE ELEV. Mudline El. -3.7
RES. ENGR. RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12:30 1/5/2022 Wednesday Cloudy 40°F							DRILLED AHEAD 4"	Casing pushed from mudline to 36ft
						5		
						10		
						15		
						20		
						25		
					A1			
						30		
						35		
14:00								
11:45 1/10/2022 Monday Clear 34°F						40		
						45		
14:30								
9:00 1/11/2022 Tuesday Clear 29°F	1D	48.5	2-3	Soft dark gray organic clay, trace fine sand, root fibers (CH-OH)				pp=0.25, WC=49%
		50.0	3			50		

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO. BH-05
SHEET 2 OF 3
FILE NO. 14123
SURFACE ELEV. Mudline El. -3.7
RES. ENGR. RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd							4"	
1/11/2022								
	2D	53.5	2-4	Top 14": Medium dark gray clay, trace fine	A1			pp=0.5
		55.0	3	sand seams (OH)		55		
				Bottom 4": Wood				
						56.8		
	3D	58.5	13-13	Top 9": Dark gray fine sand, some silt (SM)	A2			pp(top)=0.5
		60.0	10	Bottom 9": Light gray f-m sand, some gravel,		60		
				trace silt, coarse sand (SP-SM)				
						61.8		
								Rig chatter
	4D	63.5	8-5	Light brown to gray fine to medium sand, some				
		65.0	9	gravel, trace coarse sand, clay (SP-SC)		65		
								Rig chatter
	5D	68.5	11-7	Top 6": Li brn f-c sand, sm gravel, tr silt (SP-SM)				
		70.0	8	Bottom 9": Li gry f-m sand, trace silt, clay (SP-SM)		70		
								Change in wash color
								to a tan/white color
	6D	74.0	11-12	Light gray to tan fine sandy silt (ML)		75		WC=24%
		75.5	12					
	7D	79.0	13-12	Dark gray silty fine sand, trace clay, medium		80		WC=31%
16:30		80.5	13	to coarse sand, lignite, mica (SM)	T			
8:30							▼	
1/12/2022								Casing drops 3ft due to
Wednesday								undermining, re-set 85'
Clear						85	▼	Trace lignite in wash
30°F								
	8D	87.0	20-21	Dark gray silty fine sand, trace clay, lignite,				
		88.5	21	mica (SM)				
						90		
	9D	92.5	15-17	Dark gray silty fine sand, some gravel, trace				
		94.0	25	clay, lignite, mica (SM)				
						95		
	10D	98.5	15-25	Gray fine sand, some silt, pockets of gravel				WC=20%
13:30		100.0	25	trace medium to coarse sand, clay (SM)		100		End of boring at 100'.

DRAFT

M|R|C|E
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. BH-05
SHEET 3 **OF** 3

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. Mudline El. -3.7
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		TYPE OF FEED DURING CORING		CASING USED		X YES		NO		
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	85	
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO		
BARGE	TRACK CME-55	OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER										

TYPE AND SIZE OF

D-SAMPLER 2" O. D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED X YES NO
DIAMETER OF ROTARY BIT, IN. 3 7/8
TYPE OF DRILLING MUD BENTONITE

AUGER USED YES X NO
TYPE AND DIAMETER, IN.

*CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM):

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED YES X NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE	ID, IN.	LENGTH, FT.	TOP ELEV.			
INTAKE ELEMENT:	TYPE	OD, IN.	LENGTH, FT.	TIP ELEV.			
FILTER:	MATERIAL	OD, IN.	LENGTH, FT.	BOT. ELEV.			

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	100	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR CONNELLY AND ASSOCIATES, INC.
DRILLER BRANDON MCKINLEY **HELPERS** + 2 HELPERS
REMARKS
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 01-12-22
CLASSIFICATION CHECK: F. FALCONE **TYPING CHECK:** A. SACKS

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO. BH-10
SHEET 1 OF 3
FILE NO. 14123
SURFACE ELEV. MUDLINE -8.1
RES. ENGR. RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:00	1D	0.0	WR/24"	Soft dark gray organic clay, trace roots (OH)			DRILLED	pp=0, WC=86%
11/30/2021		2.0					AHEAD	
Tuesday	2D	2.0	WH/24"	Soft dark gray clay, trace brick (OH)			4"	pp=0
Cloudy		4.0						
44°F	3D	4.0	WR/6'	Soft dark gray clay, trace fine sand seams (OH)		5		pp=0
		6.0	WH/18"					
	4U	6.0	PUSH=24"	Soft dark gray clay (OH)				pp=0
		8.0	REC=24"					
	5D	8.0	WH/24"	Soft dark gray clay, trace wood, brown fine				pp=0, WC=65%
		10.0		sand seams (OH)		10		
	6D	13.5	WH/18"	Soft dark gray clay, trace fine to medium sand,				pp=0, WC=66%
		15.0		wood, fine sand seams (OH)		15		Purple staining
	7U	18.0	PUSH=24"	Soft dark gray clay, trace roots (OH)				pp=0
		20.0	REC=24"			20		
15:30								
9:45								
12/1/2021	8D	23.5	WH/18"	Soft dark gray clay, trace fine sand seams,				pp=0, WC=85%
Wednesday		25.0		shells (OH)	A1	25		
Clear								
43°F								
	9U	28.0	PUSH=24"	Soft dark gray clay, trace fine sand, seashells				pp=0
		30.0	REC=24"	(OH)		30		
	10D	33.5	WH/18"	Soft dark gray clay, trace wood (OH)				pp=0, WC=56%
		35.0				35		
	11U	38.0	PUSH=24"	Soft dark gray clay (OH)				pp=0
		40.0	REC=24"			40		
	12D	43.5	WOH/18"	Soft dark gray clay, trace fine sand seams,				pp=0, WC=58%
		45.0		seashells (OH)		45		pp=Pocket Penetrometer Unconfined Compres-sive Strength in tsf.
	13NR	48.0	PUSH=6"	No Recovery		48.5		Clayey sand, some
		48.5	REC=0"			50		gravel in tip of tube
	14D	48.5	9-17	Light gray fine to coarse sand, some gravel,	T			
		50.0	9	silt, trace clay (SM)				

MRCE built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	BH-10
SHEET 2 OF	3
FILE NO.	14123
SURFACE ELEV.	MUDLINE -8.1
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd							DRILLED	
12/1/2021							AHEAD	
							4"	
	15D	53.5	9-12	Brown fine to coarse sand, some rounded	T			
		55.0	13	gravel, silt (SM)		55		
						56.5		
	16D	58.5	4-4	Stiff mottled lt. gray, lt. brown, and red brown				pp=2.5 to 3.0
15:45		60.0	6	clay, trace fine sand pockets (CH)		60		
8:45								
12/2/2021	17NR	61.5	PUSH=24"	No Recovery				mottled gray / lt. brown
Thursday		63.5	REC=0"					clay on outside of tube
Cloudy	18D	63.5	6-8	Stiff to hard mottled gray and red brown clay				pp=3.5 to 4, WC=31%
43°F		65.0	12	(CH)		65		sample is friable
	19D	68.5	9-14	Hard mottled gray, red brown, and light brown				pp>4.5
		70.0	16	clay (CH)		70		sample is friable
	20D	73.5	14-16	Stiff mottled gray, gray brown, and red brown				pp=4.0
		75.0	18	clay (CH)		75		
					P1			
	21D	78.5	9-10	Stiff mottled gray, red brown and light brown				pp=3.5, WC=34%
		80.0	12	clay (CH)		80		
	22D	83.5	15-15	Hard mottled gray and brown clay (CH)				pp>4.5
		85.0	22			85		
	23D	88.5	20-25	Hard motteld gray, brown, and red brown clay				pp>4.5
		90.0	27	(CH)		90		
	24D	93.5	16-18	Stiff mottled gray, brown, and red brown clay				pp=3.5, WC=37%
15:45		95.0	19	(CH)		95		
								End of boring at 95'
						100		

DRAFT

M|R|C|E
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. BH-10
SHEET 3 **OF** 3

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. MUDLINE -8.1
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		TYPE OF FEED DURING CORING		CASING USED		x YES		NO		
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	70	
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO		
BARGE	TRACK CME-55	OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER										

TYPE AND SIZE OF

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	3" OD FIXED PISTON
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	NWJ

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN. 3 7/8
TYPE OF DRILLING MUD Water

AUGER USED [ ] YES [X] NO

TYPE AND DIAMETER, IN.

*CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM): N/A

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	87	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	8	NO. OF 3" UNDISTURBED SAMPLES	4
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR CONNELLY AND ASSOCIATES INC.
DRILLER BRANDON MCKINLEY **HELPERS** TIM
REMARKS BORING TERMINATED AT A DEPTH OF 95FT BELOW MUDLINE. TEN FT OF STEEL CASING LOST BELOW MUDLINE.
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 12-02-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** AARON SACKS

MRCE built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	BH-12
SHEET 1 OF	3
FILE NO.	14123
SURFACE ELEV.	Mudline El. -4.5
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:00	1D	0.0	WR/24"	Soft dark gray clay, trace wood, roots (OH)			DRILLED	pp=0, WC=88%
12/9/2021		2.0					AHEAD	
Thursday	2D	2.0	WH/24"	Soft dark gray clay, trace wood, roots (OH)			4"	pp=0
Partly Cloudy		4.0					8"	
38°F						5		
	3UD	5.0	PUSH=24"	Soft dark gray clay (OH)				pp=0
		7.0	REC=0"					
	4D	7.0	WH/24"	Soft dark gray clay, trace plastic (OH)				pp=0, WC=91%
		9.0						
	5D	9.0	WH/24"	Soft dark gray clay, trace shells (OH)		10		pp=0
		11.0						
	6U	13.0	Push=24"	Top: Soft dark gray clay (OH)				pp=0, WC=67%
		15.0	Rec=24"	Bottom: Soft dark gray clay, tr f sa, wood (OH)		15		
	7D	18.5	WH/18"	Soft dark gray to gray brown clay, trace root				pp=0
		20.0		fibers (OH)		20		
	8U	23.0	Push=24"	Soft dark gray clay (OH)				pp=0, WC=73%
		25.0	Rec=23"			25		
					A1			
	9D	28.5	WH/18"	Soft dark gray to gray brown clay, trace shells,				pp=0
		30.0		fine to medium sand, root fibers (OH)		30		
	10D	33.0	Push=6"	Top 4": Soft dark gray clay, trace roots, wood (OH)				pp=0.25, WC=50%
		33.5	Rec=6"	Bottom 2": Wood				
	11D	33.5	5-2	Top 10": Wood		35		pp(bottom)=0
		35.0	1	Bottom 2": Soft dark gray clay, trace roots (OH)				Rig chatter and wood in wash 35 to 37ft
	12D	38.0	Push=10"	Soft dark gray clay with wood (OH)				pp=0
		38.8	Rec=6"					
	13D	38.8	1-1	Soft dark gray clay, trace wood (OH)		40		pp=0, WC=55%
		40.3	2					
	14D	44.0	WR/6"	Soft dark gray clay, trace seashells (OH)		45		pp=0
		45.5	2-3					
								Sand in wash
	15S	48.0	Push-24"	Medium dark gray organic silty clay (OH)				WC=61%
		50.0	Rec=24"			50		
								Sand in wash

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO. BH-12
SHEET 2 OF 3
FILE NO. 14123
SURFACE ELEV. Mudline El. -4.5
RES. ENGR. RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd							4"	
12/9/2021					A1			Sand in wash
	16D	53.5	3-4	Top 9": Soft dk gry cl, tr f sa, seashells, wood (OH)		54.3		pp=0.5
		55.0	3	Bot 9": Gray fine to medium sand, trace coarse		55		
				sand, silt, gravel, seashells (SW-SM)				
	17D	58.5	9-8	Top 6": Gry f-m sa, sm cl pockets, tr si, wood (SC)		59		pp(bottom)=0.5
		60.0	5	Bot 12": Soft gray clay, some fine sand seams (CL)		60		
	18D	63.5	5-9	Soft to medium stiff dark gray clay, some fine	T			pp=0.5 to 0.75
15:30		65.0	11	sand, trace shells, root fibers, wood (CL)		65		
9:00								
12/10/2021	19S	66.0	Push=24"	Soft dark gray clay, trace fine sand (CL)				pp=0
Friday		68.0	Rec=24"					
Cloudy	20D	68.0	5-10	Top 18": Soft dark gray clay, tr f sa, shells (CL)		69.5		pp=0
45F		70.0	10-12	Bot 6": Brown clayey fine sand, some gravel,		70		WC=14%
				trace medium to coarse sand, silt (SC)				Gravel in wash
						72		Harder drilling at 72ft
	21D	73.5	9-15	Stiff gray, brown, red-brown clay,				pp=2.5 to 3.0
		75.0	14	trace fine sand (CH)		75		Sample friable
								Possible slickenside
	22D	78.5	6-10	Stiff mottled gray, brown, red-brown clay (CH)				pp=2.5-3.5, WC=39%
		80.0	13			80		Sample friable
	23D	83.5	12-15	Stiff mottled gray, brown, red-brown clay (CH)				pp=3.5 to 4.5
		85.0	12			85		
					P1			
	24D	88.5	9-17	Hard mottled gray, gray-brown, red-brown clay				pp>4.5
		90.0	15	(CH)		90		Possible slickenside
	25D	93.5	11-15	Hard mottled gray, brown, red-brown clay (CH)				pp>4.5
		95.0	15			95		
	26D	98.5	13-17	Hard mottled gray, brown, red-brown clay (CH)				pp>4.5, WC=36%
13:20		100.0	21			100		End of boring at 100'.

DRAFT

M|R|C|E
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. BH-12
SHEET 3 **OF** 3

PROJECT	WATERFRONT IMPLEMENTATION PROJECT	**FILE NO.**	14123
LOCATION	ALEXANDRIA, VA	**SURFACE ELEV.**	Mudline El. -4.5
BORING LOCATION	SEE BORING LOCATION PLAN	**DATUM**	NAVD88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		**TYPE OF FEED DURING CORING**		**CASING USED**	[X] YES	[ ] NO		
TRUCK		MECHANICAL		DIA., IN. 8	DEPTH, FT. FROM 0	TO 5.5		
SKID		HYDRAULIC	X	DIA., IN. 4	DEPTH, FT. FROM 0	TO 63.5		
BARGE	TRACK CME-55	OTHER		DIA., IN.	DEPTH, FT. FROM	TO		
OTHER								

TYPE AND SIZE OF

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	3" FIXED PISTON
S-SAMPLER	3" SHELBY TUBE
CORE BARREL	
CORE BIT	
DRILL RODS	NWJ

DRILLING MUD USED [X] YES [ ] NO

DIAMETER OF ROTARY BIT, IN. 3 7/8
TYPE OF DRILLING MUD BENTONITE

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

*CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM):

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	86	NO. OF 3" SHELBY TUBE SAMPLES	1
3.5" DIA. U-SAMPLE BORING	LIN. FT.	14	NO. OF 3" UNDISTURBED SAMPLES	6
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR CONNELLY AND ASSOCIATES, INC.
DRILLER BRANDON MCKINLEY **HELPERS** + 2 HELPERS
REMARKS
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 12-10-21
CLASSIFICATION CHECK: F.FALCONE **TYPING CHECK:** A. SACKS

DRAFT

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING LOG

BORING NO. BH-15
SHEET 1 OF 3
FILE NO. 14123
SURFACE ELEV. +3 ±
RES. ENGR. RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
9:20	1D	0.0	5-9	Brown fine to medium sand, some sand, gravel	*	0.3	DRILLED	*4" Gravel Base
11-4-2021		2.0	11-12	trace asphalt (FILL) (SM)			AHEAD	pp=1.0
Thursday	2D	2.0	5-3	Medium brown clay, trace fine to medium sand,			3 1/4" HSA	pp=1.0, WC=23%
Partly		4.0	4-5	gravel, wood fibers (FILL) (CL)			4"	
Cloudy	3D	4.0	1-2	Soft to medium dark brown clay, trace fine sand,		5		pp=0.5 to 0.75
43°F		6.0	2-3	gravel, glass (FILL) (CL)				
	4D	6.0	2-3	Dark gray to black fine to coarse sand, trace silt,	F			
		8.0	2-2	clay, gravel, brick (FILL) (SP-SM)				
	5D	8.0	1-1	Dark gray to black fine to coarse sand, some				WC=16%
		10.0	1-2	gravel, silt, trace clay (FILL) (SM)		10		
						11.8		
	6D	13.5	3-1	Dark gray silty fine to medium sand, trace gravel,				pp=0 to 0.25, WC=50%
		15.0	1	coarse sand, wood, brick (SM)		15		
								pp=Pocket
								Penetrometer
								Unconfined Compres-
								sive Strength in tsf.
	7NR	19.5	PUSH=24"	No Recovery		20		TV=Torvane Shear
		21.5	REC=0"					Strength in tsf.
	8D	22.0	WOH/18"	Soft dark gray organic clay, some fine sand layers,				WC=58%
		23.5		trace decomposed wood bark (OH)				
	9U	24.0	PUSH=24"	Soft dark gray organic silty clay, trace		25		pp=0.5, TV=0.2
		26.0	REC=24"	hardened silt, wood fibers (OH)				WC=53%
	10D	29.0	WOH/18"	Soft dark gray clay, trace decomposed wood		30		pp=0, WC=56%
		30.5		(OH)				
					A1			
	11U	34.0	PUSH 24"	Medium dark gray organic silty clay, trace		35		pp=0.5, TV=0.2
		36.0	REC=24"	fine sand (OH)				WC=57%
	12D	39.0	WOH/18"	Soft dark gray organic silty clay, trace shells (OH)		40		pp=0.25, WC=63%
		40.5						OM=7%
								OM=organic matter,
								percent dry weight
	13U	44.0	PUSH=24"	Medium dark gray organic silty clay, trace		45		pp=0.5 to 0.75
		46.0	REC=24"	fine sand, shells (OH)				TV=0.2 to 0.3, WC=50%
	14D	49.0	WOH/18"	Soft dark gray clay, trace mica (OH)		50		pp=0.25, WC=62%
14:10		50.5						

DRAFT

MRCE built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING LOG

BORING NO. BH-15
SHEET 2 OF 3
FILE NO. 14123
SURFACE ELEV. +3 ±
RES. ENGR. RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
7:20								
11-5-2021								
Friday								
Clear					A1			
35°F	15U	54.0	PUSH 24"	Medium dark gray organic clayey silt, trace		55		pp=0.75 to 1.0, TV=0.2
		56.0	REC=24"	fine sand (CL-OL)				WC=43%
						57.5		
	16D	59.0	11-18	Gray fine sand with 2" fine gravel layer, trace silt		60		
		60.5	11	(SP-SM)				
	17D	64.0	2-3	Gray silty fine sand, some decomposed wood,		65		
		65.5	3	trace clay, medium to coarse sand (SM)				
	18NR	69.0	4-3	No Recovery		70		
		70.5	4					
	19D	71.5	3-2	Gray clayey fine sand, trace silt, coarse sand				
		73.0	4	(SC)				
	20D	74.0	4-5	Gray fine sand, some silt, trace medium to	T	75		
		75.5	6	coarse sand (SM)				
	21D	79.0	11-11	Gray fine sandy gravel, trace silt (GP-GM)		80		
		80.5	14					Rig chatter at 81'
						82		Smoother drilling at 82'
	22D	84.0	10-8	Stiff gray to gray brown clay (CL)		85		WC=23%
		85.5	9					
								Rig chatter at 87.5'
						87.5		
	23D	89.0	13-9	Gray gravelly fine to medium sand, trace silt		90		
		90.5	11	(SP-SM)				
						92		Harder drilling at 92'
					P1			
	24D	94.0	11-12	Hard gray and gray brown clay (CL)		95		pp=2.5, WC=25%
11:20		95.5	14					End of Boring @ 95.5'
						100		

DRAFT

MRCE built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. BH-15
SHEET 3 **OF** 3

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. +3 ±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		TYPE OF FEED DURING CORING	
TRUCK		MECHANICAL	
SKID		HYDRAULIC	
BARGE		OTHER	
OTHER	TRACK CME-55		

CASING USED [X] YES [ ] NO

DIA., IN.	3.25 ID HSA	DEPTH, FT. FROM	0	TO	13.5
DIA., IN.	4 STEEL	DEPTH, FT. FROM	0	TO	29
DIA., IN.		DEPTH, FT. FROM		TO	

TYPE AND SIZE OF

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	3" O.D. FIXED PISTON TUBE
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	NWJ

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN. 3 7/8
TYPE OF DRILLING MUD BENTONITE

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3.25 ID HOLLOW STEM AUGER

*CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM): N/A

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
11-04-21	09:40	8FT	6FT	6FT	OBSERV. MADE THROUGH HSA, WET SOIL CUTTINGS/SAMPLE

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	85.5	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	10	NO. OF 3" UNDISTURBED SAMPLES	5
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** +2 HELPERS
REMARKS BORING ABANDONED VIA TREMIE GROUTING. ORIGINAL GRAVEL SURFACE RESTORED.
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-05-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** A. SACKS

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	BH-16
SHEET 1 OF	1
FILE NO.	14123
SURFACE ELEV.	Mudline El. -7.8
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:45	1D	0.0	WR/24"	Soft dark gray clay (OH)			DRILLED	pp=0, WC=63%
12/20/21		2.0					AHEAD	
Monday	2D	2.0	WR/24"	Soft dark gray clay, trace wood, mica (OH)			4"	pp=0
Clear		4.0					8"	
36°F						5		
	3U	5.0	PUSH=24"	Soft dark gray clay, trace wood (OH)				pp=0
		7.0	REC=24"					TV=0
	4D	7.0	WH/24"	Soft dark gray clay, trace wood (OH)				pp=0
		9.0						
	5D	9.0	WH/24"	Soft dark gray clay (OH)		10		pp=0, WC=60%
		11.0						
					A1			
	6UD	13.0	Push=24"	Top: Soft dark gray clay (OH)				pp=0 bent tube
		15.0	Rec=17"	Bot: Soft dark gray clay, trace wood (OH)		15		
	7D	18.5	WH/12"	Soft dark gray clay (OH)				
		20.0	3			20		
14:00						22.5		Obstruction encountered at 22.5 feet. Boring offset to BH-16A
						25		
						30		pp=Pocket Penetrometer Unconfined Compressive Strength in tsf.
						35		
						40		
						45		
						50		

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	BH-16A
SHEET 1 OF	3
FILE NO.	14123
SURFACE ELEV.	Mudline El. -8.0
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00							DRILLED	See boring log
12/21/2021							AHEAD	BH-16 for samples 1D
Tuesday							4"	to 7D
Cloudy								
35°F						5		
								pp=Pocket
								Penetrometer
								Unconfined Compres-
								sive Strength in tsf.
						10		
						15		
						20		
	8U	23.0	Push=24"	Soft dark gray clay (OH)				pp=0
		25.0	Rec=24"			25		
					A1			
	9D	28.5	WH/18"	Soft dark gray clay (OH)				pp=0, WC=71%
		30.0				30		
	10NR	33.0	Push=24"	No Recovery				
		35.0	Rec=24"			35		
	11D	35.0	WH/18"	Soft dark gray clay (OH)				pp=0
		36.5						
	12D	38.5	WH/18"	Soft dark gray clay, trace fine sand (OH)				pp=0, WC=50%
		40.0	1			40		
	13U	43.0	Push=24"	Soft dark gray clay, trace fine sand (OH)				pp=0
		45.0	Rec=24"			45		
	14D	48.5	5-5	Soft dark gray clay, some wood, trace fine				pp=0, WC=67%
		50.0	5	sand (OH)		50		

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	BH-16A
SHEET 2 OF	3
FILE NO.	14123
SURFACE ELEV.	Mudline El. -8.0
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd					A1		DRILLED	Sand in wash
12/21/2021						52	AHEAD	
							4"	
	15D	53.0	8-5	Gray gravel, some fine to coarse sand, some				Gravel stuck in tip of
		55.0	4	clay, trace light brown and brown gravel (GC)		55		spoon
					A2			
14:45								
8:40								
12/22/2021	16D	59.5	4-8	Top 9": Light brown and brown medium to		60		
Wednesday		61.0	19	coarse sand, trace gravel, f. sand, si, cl (SP-SM)		60.3		
Clear				Bot 9": Stiff mottled gray and brown clay (CH)				pp=4.0
38°F								
	17D	64.5	3-8	Stiff mottled gray, brown, and red brown clay		65		pp=4.0, WC=35%
		66.0	13	(CH)				
	18D	69.5	7-9	Hard mottled gray, brown, and red brown clay		70		pp>4.5
		71.0	13	(CH)				
						71.8		
	19D	47.5	14-15	Hard mottled red brown, gray, and brown clay		75		pp=4.0
		76.0	16	(CH)	P1			
	20D	79.5	10-13	Hard mottled gray, tan, and red brown clay (CH)		80		pp=4.0
		81.0	15					
	21D	84.5	12-15	Hard mottled brown, gray, and red brown clay		85		pp>4.5
		86.0	15	(CH)				
	22D	89.5	17-22	Hard mottled gray, brown, and red brown clay		90		pp>4.5, WC=24%
12:55		91.0	26	(CH)		91		End of boring at 91 feet
						95		
						100		

DRAFT

M|R|C|E
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. BH-16A
SHEET 2 **OF** 3

PROJECT	WATERFRONT IMPLEMENTATION PROJECT	**FILE NO.**	14123
LOCATION	ALEXANDRIA, VA	**SURFACE ELEV.**	Mudline El. -8.0
BORING LOCATION	SEE BORING LOCATION PLAN	**DATUM**	NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		**TYPE OF FEED DURING CORING**		**CASING USED**	[X] YES	[ ] NO		
TRUCK		MECHANICAL		DIA., IN. 4	DEPTH, FT. FROM 0	TO 67		
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM	TO		
BARGE	TRACK CME-55	OTHER		DIA., IN.	DEPTH, FT. FROM	TO		
OTHER								

TYPE AND SIZE OF

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	3" FIXED PISTON
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	NWJ

DRILLING MUD USED [X] YES [ ] NO

DIAMETER OF ROTARY BIT, IN. 3 7/8
TYPE OF DRILLING MUD BENTONITE

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

*CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM):

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	87	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	4	NO. OF 3" UNDISTURBED SAMPLES	2
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR CONNELLY AND ASSOCIATES, INC.
DRILLER BRANDON MCKINLEY **HELPERS** + 2 HELPERS
REMARKS
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 12-22-21
CLASSIFICATION CHECK: F.FALCONE **TYPING CHECK:** A. SACKS

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	BH-20
SHEET 1 OF	3
FILE NO.	14123
SURFACE ELEV.	Mudline El. -12.0
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
08:25	1D	0.0	WR/24"	Soft dark gray clay, trace shells, roots (CH)			DRILLED	pp=0
12/14/2021		2.0					AHEAD	WC=89%
Tuesday	2D	2.0	WR/24"	Soft dark gray clay, trace shells, roots (OH)			4"	pp=0
Clear		4.0					8"	
39°F						5		
	3U	5.0	PUSH=24"	Top: Gray f-m snd, sm gvl, tr wood, cl, si (SP-SC)				pp=0
		7.0	REC=24"	Bot: Soft dark gray clay (OH)				
	4D	7.0	WH/24"	Soft dark gray clay, trace wood (OH)				pp=0
		9.0						Strong odor
	5D	9.0	WH/24"	Soft dark gray clay, trace roots (OH)		10		pp=0
		11.0						WC=56%
								Strong odor
	6U	13.0	Push=24"	Soft dark gray organic silty clay (OH)				WC=85%
		15.0	Rec=24"			15		
	7D	18.5	WH/18"	Soft dark gray organic silty clay (OH)				pp=0
		20.0				20		Strong odor
	8U	23.0	Push=24"	Soft dark gray clay (OH)				pp=0
		25.0	Rec=24"			25		WC=59%
					A1			
	9D	28.5	WH/18"	Soft dark gray organic silty clay (OH)				pp=0
		30.0				30		
	10U	33.0	Push=24"	Soft dark gray organic silty clay (OH)				pp=0
		35.0	Rec=24"			35		WC=59%
	11D	38.5	WH/12"	Soft dark gray clay, trace wood, shells (OH)				pp=0.25
		40.0	1			40		
	12U	43.0	Push=24"	Top: Medium dark gray clay (OH)				WC=76%
		45.0	Rec=24"	Bot: Medium dark gray clay, trace gravel (OH)		45		
								Sand in wash
	13D	48.5	1-1	Top 16": Soft dark gray clay, trace 1" fine to				pp=0.25
		50.0	2	medium sand layer (OH)		50		
				Bot 2": Soft dark gray clay and wood (OH)				

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO. BH-20
SHEET 2 OF 3
FILE NO. 14123
SURFACE ELEV. Mudline El. -12.0
RES. ENGR. RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd							DRILLED	
12/14/2021							AHEAD	
							4"	
	14U	53.0	Push=24"	Top: Soft gray clay (OH)				pp=0
		55.0	Rec=24"	Bot: Soft gray clay, some wood (OH)	A1	55		
15:15								pp=20
8:45	15D	58.5	9-12	Top 12": Soft dark gray clay (OH)		59.5		pp(top)=0
12/15/2021		60.0	10	Bot 6": Brown silty fine sand, trace gravel,		60		
Wednesday				medium to coarse sand (SM)				
Cloudy								
43°F								
	16D	63.5	5-9	Gray to gray brown clayey fine sand, trace				WC=23%
		65.0	10	silt, medium to coarse sand (SC)	T	65		
	17D	68.5	5-9	Brown to gray fine sand, some silt, trace				WC=25%
		70.0	13	medium to coarse sand, gravel (SM)		70		
						71.8		
	18D	73.5	9-10	Stiff mottled gray, brown, and red-brown clay				pp=1.5 to 2.0
		75.0	14	(CH)		75		WC=39%
	19D	78.5	11-12	Hard mottled gray and red brown clay (CH)				pp>4.5
		80.0	15			80		
	20D	83.5	14-17	Stiff to hard gray clay, trace red brown clay (CH)				pp=3.5 to 4.5
		85.0	21		P1	85		
	21D	88.5	12-15	Hard mottled gray and red brown clay (CH)				pp>4.5
		90.0	21			90		
	22D	93.5	11-13	Hard mottled gray and red brown clay (CH)				pp>4.5
		95.0	15			95		
	23D	98.5	9-15	Hard mottled gray red brown, and brown clay				pp>4.5
13:20		100.0	21	(CH)		100		WC=32%
								End of boring at 100'.

DRAFT

M|R|C|E
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. BH-20
SHEET 2 **OF** 3

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. Mudline El. -12.0
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		TYPE OF FEED DURING CORING		CASING USED					
TRUCK		MECHANICAL		DIA., IN.	8	DEPTH, FT. FROM	0	TO	5
SKID		HYDRAULIC	X	DIA., IN.	4	DEPTH, FT. FROM	0	TO	65
BARGE	TRACK CME-55	OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	3" FIXED PISTON
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	NWJ

DRILLING MUD USED [X] YES [ ] NO

DIAMETER OF ROTARY BIT, IN. 3 7/8
TYPE OF DRILLING MUD BENTONITE

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

*CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM):

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	88	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	12	NO. OF 3" UNDISTURBED SAMPLES	6
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR CONNELLY AND ASSOCIATES, INC.
DRILLER BRANDON MCKINLEY **HELPERS** + 2 HELPERS
REMARKS
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 12-15-21
CLASSIFICATION CHECK: F.FALCONE **TYPING CHECK:** A. SACKS

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	GI-6
SHEET 1 OF	2
FILE NO.	14123
SURFACE ELEV.	+23 ±
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
07:33	1D	0.7	3-3	Red brown clayey fine sand, some silt ,trace	*		DRILLED	4" Asphalt 4" Gvl Base
11/16/2021		2.7	5-5	asphalt (SC-SM)			AHEAD	1D: WC=16%
Tuesday	2D	2.7	7-5	Red brown fine sand, trace silt (SP-SM)			2 1/4" HSA	WC=14%
Partly Cloudy		4.7	5-6					
39°F	3D	4.7	4-5	Red brown clay, some fine sand, trace silt (CL)		5		WC=21%
		6.7	6-5					
	4D	6.7	3-4	Red brown clay, some fine sand, trace medium				WC=18%
		8.7	5-5	to coarse sand (CL)				
	5D	8.7	4-2	Red brown fine sand, some silt, trace gravel,				WC=23%
		10.7	10-6	medium to coarse sand, clay (SM)		10		Moist sample at 10'
					T2			
	6D	13.5	4-2	Red brown fine sand, some silt, trace medium				
		15.0	3	sand, clay (SM)		15		Wet sample 13.5' to 15'
	7D	18.5	5-4	Red brown fine sand, some silt, trace clay (SM)				
8:26		20.0	4			20		End of boring at 20'
						25		
						30		
						35		
						40		
						45		
						50		

DRAFT

Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122
built on firm foundations

BORING NO. GI-6
SHEET 2 **OF** 2

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. +23 ±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:

TRUCK
SKID
BARGE
OTHER TRACK CME-55

TYPE OF FEED DURING CORING

MECHANICAL
HYDRAULIC X
OTHER

CASING USED [ ] YES [X] NO

	DIA., IN.	DEPTH, FT. FROM	TO
TRUCK			
SKID			
BARGE			

TYPE AND SIZE OF

D-SAMPLER 2" O. D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS AWJ

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN. N/A
TYPE OF DRILLING MUD N/A

AUGER USED [X] YES [ ] NO

TYPE AND DIAMETER, IN. 2 1/4 HOLLOW STEM AUGER

*CASING HAMMER, LBS. N/A AVERAGE FALL, IN. N/A
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM): N/A

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					WET SAMPLE OBSERVED AT 13.5FT
11-16-21		20		13	MEASURED AFTER AUGER REMOVAL

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	20	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** 2 HELPERS
REMARKS BORING ABANDONED BY BACKFILILNG WITH BENTOINTE PELLETS, SURFACE RESTORED WITH COLD PATCH.
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-18-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** RAMIRO OSSIO

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	GI-8
SHEET 1 OF	2
FILE NO.	14123
SURFACE ELEV.	+18 ±
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:20	1D	0.0	3-2	Brown silty fine sand, trace black gravel, clay	F		DRILLED	
11/16/2021		2.0	1-1	(FILL)(SM)		2	AHEAD	
Tuesday	2D	2.0	1-1	Medium stiff brown and red brown clay, some			2 1/4" HSA	pp=0.75, WC=23%
Clear		4.0	2-3	fine sand, trace wood, roots, medium sand (CL)				
50°F	3D	4.0	3-3	Medium stiff to stiff brown and red brown clay		5		pp=0.75 to 1.25
		6.0	3-4	some fine sand, trace med. sand, wood, roots (CL)				3D: WC=19%
	4D	6.0	1-2	Top 16": Soft red brown sandy clay (CL)	T1			pp=0.5
		8.0	7-5	Bot 2": Brn and blk f. sand, tr gvl, si. (SP-SM)				Black coloring from
	5D	8.0	3-3	Stiff bown to light gray clay, trace fine				staining
		10.0	5-8	sand (CL)		10		pp=1.5 to 2.0
								5D: WC=22%
						11.8		Water at 11.5'
	6D	13.5	3-4	Light brown to light gray fine sand, some silt,				
		15.0	5	trace medium sand (SM)		15		
					T2			
	7D	18.5	5-5	Light brown to light gray fine sand, trace silt				
12:20		20.0	4	(SP-SM)		20		End of boring at 20'
								pp=Pocket
								Penetrometer
								Unconfined Compres-
						25		sive Strength in tsf.
						30		
						35		
						40		
						45		
						50		

DRAFT

M|R|C|E
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. GI-8
SHEET 2 **OF** 2

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. +18 ±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:

TRUCK
SKID
BARGE
OTHER TRACK CME-55

TYPE OF FEED DURING CORING

MECHANICAL
HYDRAULIC X
OTHER

CASING USED [ ] YES [X] NO

	DIA., IN.	DEPTH, FT. FROM	TO
TRUCK			
SKID			
BARGE			

TYPE AND SIZE OF

D-SAMPLER 2" O. D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS AWJ

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN. N/A
TYPE OF DRILLING MUD N/A

AUGER USED [X] YES [ ] NO

TYPE AND DIAMETER, IN. 2 1/4 HOLLOW STEM AUGER

*CASING HAMMER, LBS. N/A AVERAGE FALL, IN. N/A
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM): N/A

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
11-16-21		20		11.5	MEASURED THROUGH AUGERS

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

			ID, IN.	LENGTH, FT.	TOP ELEV.
STANDPIPE:	TYPE				
INTAKE ELEMENT:	TYPE		OD, IN.	LENGTH, FT.	TIP ELEV.
FILTER:	MATERIAL		OD, IN.	LENGTH, FT.	BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	20	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** 2 HELPERS
REMARKS BORING ABANDONED BY BACKFILILNG WITH BENTOINTE PELLETS, SURFACE RESTORED WITH REMOVED BRICKS
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-18-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** RAMIRO OSSIO

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	GI-10
SHEET 1 OF	2
FILE NO.	14123
SURFACE ELEV.	+6 ±
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
8:55	1D	0.0	2-2	Dark brown clayey fine to medium sand, trace			DRILLED	
11-1-2021		2.0	4-7	gravel, silt, glass, asphalt, roots (FILL) (SC)			AHEAD	
Monday	2D	2.0	26-44	Brown fine to medium sand, some gray gravel,			3 1/4" HSA	Strong diesel odor
Clear		4.0	39-49	trace silt, brick (FILL) (SP-SM)				
55°F	3D	4.0	43-50	Top 6": Black green f-m sa, sm si, tr gvl (SM)		5		Strong diesel odor
		5.2	50/2"	Bot 8": Light gray f-m sand, sm gvl, silt (SM)				
	4D	6.0	10-6	Red brick, black clayey fine to medium sand,	F			
		8.0	2-3	trace silt, gravel (SC)				
	5D	8.0	3-1	Red brick, trace fine sand, silt (SP-SM)				Trace diesel odor
		10.0	2-3			10		
	6D	13.5	2-1	Top 7": Brown fine to medium clayey sand,				
		15.0	2	some gravel, trace silt, asphalt, roots (SC)		15		pp = 0
				6D Bot 3": Soft brown clay, trace coarse sand, gravel (OH)	A1			
	7D	18.5	1/9"-1/9"	Soft dark gray clay (OH)				Organic odor, WC=59%
10:00		20.0				20		
								End of boring @ 20'
								pp=Pocket Penetrometer Unconfined Compressive Strength in tsf.
						25		
						30		
						35		
						40		
						45		
						50		

DRAFT

Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122
built on firm foundations

BORING NO. GI-10
SHEET 2 **OF** 2

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. +6 ±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:

TRUCK
SKID
BARGE
OTHER TRACK CME-55

TYPE OF FEED DURING CORING

MECHANICAL
HYDRAULIC
OTHER

CASING USED [X] YES [ ] NO

	DIA., IN.	DEPTH, FT. FROM	TO
TRUCK	3 1/4 HSA	0	18.5
SKID			
BARGE			

TYPE AND SIZE OF

D-SAMPLER 2" O. D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS AWJ

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN. N/A
TYPE OF DRILLING MUD N/A

AUGER USED [X] YES [ ] NO

TYPE AND DIAMETER, IN. 3 1/4 HOLLOW STEM AUGER

*CASING HAMMER, LBS. N/A AVERAGE FALL, IN. N/A
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM): N/A

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
11-01-21	10:05	12FT	0FT	4FT	MADE FOLLOWING HSA REMOVAL, HOLE CAVE-IN TO 12FT

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	20	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** +2 HELPERS
REMARKS BORING ABANDONED BY BACKFILILNG WITH BENTOINTE PELLETS. ORIGINAL GRASS SURFACE RESTORED
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-01-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** RAMIRO OSSIO

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	GI-11
SHEET 1 OF	2
FILE NO.	14123
SURFACE ELEV.	+4.98
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:15	1D	0.0	2-3	Stiff brown clay, some fine sand, trace			DRILLED	pp=1.5
11/18/2021		2.0	12-9	wood, brick, gravel, asphalt, roots (FILL)(CL)			AHEAD	
Thursday	2D	2.0	3-3	Medium to stiff brown clay, some fine to coarse			3 1/4" HSA	pp=1.0
Clear		4.0	6-3	sand, trace wood, brick (FILL)(CL)			↓	
66°F	3D	4.0	7-4	Medium to stiff brown clay, some fine sand, trace		5		pp=1.0
		6.0	6-5	gravel, asphalt (FILL)(CL)				
	4D	6.0	10-10	Wood, trace gravel, soft brown gray clay (FILL)				
		7.1	50/1"					Auger thru conc. 7'-8'
	5D	8.0	7-2	Soft brown to gray clay, some fine to medium				Strong odor
		10.0	2-2	sand, trace wood, brick (FILL)(CL)	F	10		
						11.8		
	6D	13.5	3-1	Red brick, trace clayey sand (FILL)				Rec=4"
		15.0	2			15		
	7D	18.5	WOH-1	Top 9": Brown and black fine to medium sand,		19.3		Black color is staining
11:45		20.0	1	trace silt, gravel, brick (FILL)(SP-SM)	A1	20		pp=0
				Bot 9": Soft gray clay (OH)				End of boring at 20'
						25		
								pp=Pocket
								Penetrometer
								Unconfined Compres-
								sive Strength in tsf.
						30		
						35		
						40		
						45		
						50		

DRAFT

Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122
built on firm foundations

BORING NO. GI-11
SHEET 2 **OF** 2

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. +4.98
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		TYPE OF FEED DURING CORING		CASING USED					
TRUCK		MECHANICAL		DIA., IN.		DEPTH, FT. FROM		TO	
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER	TRACK CME-55								

TYPE AND SIZE OF

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	AWJ

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN. N/A
TYPE OF DRILLING MUD N/A

AUGER USED [X] YES [ ] NO

TYPE AND DIAMETER, IN. 3 1/4 HOLLOW STEM AUGER

*CASING HAMMER, LBS. N/A AVERAGE FALL, IN. N/A
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM): N/A

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	20	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER JOE SCRIBELLITO **HELPERS** 2 HELPERS
REMARKS BORING ABANDONED BY BACKFILILNG WITH BENTOINTE PELLETS, GRASS PATCH REPLACED OVER BORING
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-18-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** RAMIRO OSSIO

MRCE built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO. GI-12
SHEET 1 OF 2
FILE NO. 14123
SURFACE ELEV. +7.03
RES. ENGR. RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:00	1D	0.0	2-3	Stiff brown fine to coarse sandy clay, trace			DRILLED	pp=1.5
11/18/2021		2.0	5-7	brick, gravel, grass, roots (FILL)(CL)			AHEAD	
Thursday	2D	2.0	7-8	Top 9": Same as 1D (FILL)(CL)			3 1/4" HSA	pp=1.25
Clear		4.0	7-7	Bot 9": Br and blk f-c sa, sm gvl, tr wood, si (SP-SM)			↓	Black color is staining
61°F	3D	4.0	2-2	Brown fine to coarse sand, some brick, wood		5		
		6.0	5-7	clay, trace asphalt, gravel (FILL)(SC)				
	4D	6.0	14-19	Brown fine to medium sand, some brick,				
		8.0	7-7	gravel, trace clay (FILL)(SP-SC)				Auger thru conc. 7'-8'
	5D	8.0	4-4	Soft gray clay, some fine sand seams, trace				pp=0.25
		10.0	2-1	brick (FILL)(CL)	F	10		
	6D	13.5	2-2	Wood and soft gray clay (FILL)(CL)				pp=0
		15.0	12			15		Rec=7"
	7D	18.5	8-11	Wood and soft gray clay (FILL)(CL)				
10:32		20.0	4			20		pp=0
								End of boring at 20'
						25		
								pp=Pocket Penetrometer Unconfined Compres-sive Strength in tsf.
						30		
						35		
						40		
						45		
						50		

DRAFT

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO.	GI-12		
SHEET	2	**OF**	2
PROJECT	WATERFRONT IMPLEMENTATION PROJECT	**FILE NO.**	14123
LOCATION	ALEXANDRIA, VA	**SURFACE ELEV.**	+7.03
BORING LOCATION	SEE BORING LOCATION PLAN	**DATUM**	NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		**TYPE OF FEED DURING CORING**		**CASING USED**		YES	X	NO		
TRUCK		MECHANICAL		DIA., IN.		DEPTH, FT. FROM		TO		
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO		
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER	TRACK CME-55									

TYPE AND SIZE OF		**DRILLING MUD USED**		YES	X	NO
D-SAMPLER	2" O. D. SPLIT SPOON	DIAMETER OF ROTARY BIT, IN.	N/A			
		TYPE OF DRILLING MUD	N/A			
U-SAMPLER						
S-SAMPLER		**AUGER USED**	X	YES		NO
CORE BARREL		TYPE AND DIAMETER, IN.	3 1/4 HOLLOW STEM AUGER			
CORE BIT						
DRILL RODS	AWJ	*CASING HAMMER, LBS.	N/A	AVERAGE FALL, IN.	N/A	
		SAMPLER HAMMER, LBS.	140	AVERAGE FALL, IN.	30	
		*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC):	AUTOMATIC			
		*HAMMER RATE, BLOWS PER MINUTE (BPM):	N/A			

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED YES NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	20	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR	FREE STATE DRILLING INC		
DRILLER	JOE SCRIBELLITO	**HELPERS**	2 HELPERS
REMARKS	BORING ABANDONED BY BACKFILILNG WITH BENTOINTE PELLETS, GRASS PATCH REPLACED OVER BORING		
RESIDENT ENGINEER	RAMIRO OSSIO	**DATE**	11-18-21
CLASSIFICATION CHECK:	FRED FALCONE	**TYPING CHECK:**	AARON SACKS

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	GI-13P
SHEET 1 OF	3
FILE NO.	14123
SURFACE ELEV.	+7.78
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
7:55	1D	0.0	2-2	Medium stiff brown clay, some fine to medium			DRILLED	pp=1.0
11/18/2021		2.0	3-4	sand, tr. f. sand lyr, grass, roots, gvl (GILL)(CL)			AHEAD	
Thursday	2D	2.0	6-6	Stiff brown fine to medium sandy clay, trace			4 1/4" HSA	pp=1.5, WC=17%
Clear		4.0	5-5	silt, brick, roots (FILL)(CL)			↓	
52°F	3D	4.0	5-6	Top 16": Stiff brown f-m sandy clay (FILL)(CL)		5		pp=1.5
		6.0	14-21	Bot 6": Black asphalt (FILL)				
	4D	6.0	7-5	Medium stiff gray clay and asphalt, trace gravel,				pp=0.75
		8.0	3-3	fine to coarse sand, brown clay, roots (FILL)(SC)				
	5D	8.0	3-4	Medium stiff gray and brown clay, trace fine to				pp=0.5
		10.0	4-5	coarse sand, gravel, wood (CL)	F	10		
	6D	13.5	4-2	Brown clayey fine to coarse sand and gravel,				pp=4.0 (silt layer)
		15.0	2	2" hard gray silt layer, trace plastic (SC-GC)		15		Hard shard of plastic
								Wood from 15'-16'
	7D	18.5	5-6	Gray clayey fine to coarse sand, some gravel,				
13:20		20.0	4	trace wood (SC)		20		End of boring at 20'
						25		pp=Pocket Penetrometer Unconfined Compres-sive Strength in tsf.
						30		
						35		
						40		
						45		
						50		

DRAFT

PIEZOMETER RECORD

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
515 M Street SE, Suite 210
Washington, DC 20003

PIEZOMETER OR BORING NO. GI-13P

PROJECT: Alexandria Waterfront

SHEET 2 OF 3

LOCATION: Alexandria, VA

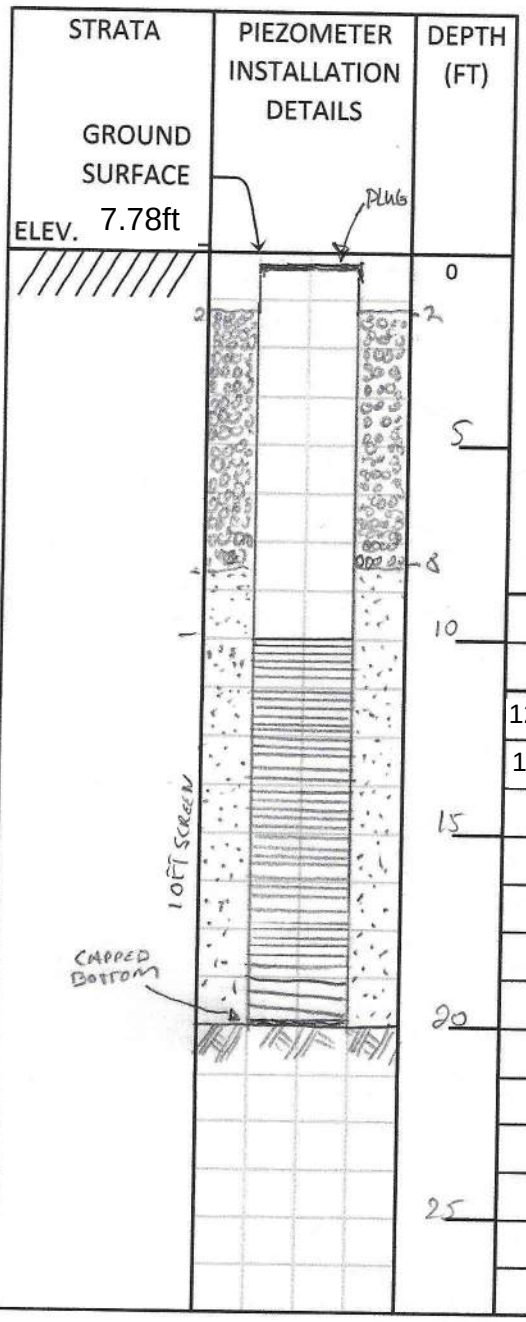
FILE NO. 14123

PIEZOMETER LOCATION: See BLP

INSTALLATION DATE 11/18/21

☐ SEE SKETCH ON BACK

RES ENGR. R. Olsson



PIEZOMETER TYPE OPEN - SCREENED

INTAKE POINT

depth to bottom, ft = 20

depth to top, ft = 8

length, ft = 12 = L

diameter, in = 8, ft = 0.67 = 2R

STANDPIPE/RISER

elevation of rim, ft = 7.78ft

diameter, in = 2, ft = .083 = 2r

READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
12/6/2021	12:35	6.6	1.18	
12/13/2021	09:33	7.2	0.58	

SAND BENTONITE

GRAVEL GROUT

GROUND SURFACE ELEV. 7.78ft

PIEZOMETER NO. GI-13P

DRAFT

Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

built on firm foundations

BORING NO. GI-13P
SHEET 3 **OF** 3

PROJECT	WATERFRONT IMPLEMENTATION PROJECT	**FILE NO.**	14123
LOCATION	ALEXANDRIA, VA	**SURFACE ELEV.**	+7.78
BORING LOCATION	SEE BORING LOCATION PLAN	**DATUM**	NAVD88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		**TYPE OF FEED DURING CORING**		**CASING USED**		YES	X	NO		
TRUCK		MECHANICAL		DIA., IN.		DEPTH, FT. FROM		TO		
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO		
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER	TRACK CME-55									

TYPE AND SIZE OF		**DRILLING MUD USED**		YES	X	NO
D-SAMPLER	2" O. D. SPLIT SPOON	DIAMETER OF ROTARY BIT, IN.	N/A			
		TYPE OF DRILLING MUD	N/A			
U-SAMPLER						
S-SAMPLER		**AUGER USED**		X	YES	NO
CORE BARREL		TYPE AND DIAMETER, IN.	4 1/4 HOLLOW STEM AUGER			
CORE BIT						
DRILL RODS	AWJ	*CASING HAMMER, LBS.	N/A	AVERAGE FALL, IN.	N/A	
		SAMPLER HAMMER, LBS.	140	AVERAGE FALL, IN.	30	
		*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC):	AUTOMATIC			
		*HAMMER RATE, BLOWS PER MINUTE (BPM):	N/A			

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					SEE PIEZOMETER INSTALLATION RECORD

PIEZOMETER INSTALLED X YES NO **SKETCH SHOWN ON** SHEET 2

STANDPIPE:	TYPE	PVC	ID, IN.	2	LENGTH, FT.	10	TOP ELEV.		
INTAKE ELEMENT:	TYPE	Slotted PVC	OD, IN.	2	LENGTH, FT.	10	TIP ELEV.		
FILTER:	MATERIAL	Filter sand	OD, IN.	8	LENGTH, FT.	12	BOT. ELEV.		

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	20	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR	FREE STATE DRILLING INC		
DRILLER	JOE SCRIBELLITO	**HELPERS**	2 HELPERS
REMARKS	FLUSH MOUNTED STEEL WELL COVER INSTALLED AT COMPLETED PIEZOMETER		
RESIDENT ENGINEER	RAMIRO OSSIO	**DATE**	11-18-21
CLASSIFICATION CHECK:	FRED FALCONE	**TYPING CHECK:**	AARON SACKS

M|R|C|E
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	GI-14
SHEET 1 OF	2
FILE NO.	14123
SURFACE ELEV.	+7.81
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12:45	1D	0.0	1-3	Stiff brown fine to medium sandy clay, trace			DRILLED	pp=1.5
11/17/2021		2.0	3-5	brick, asphalt, grass, roots (FILL)(CL)	F		AHEAD	
Wednesday	2D	2.0	3-5	Hard mottled brown and light brown clay, trace			3 1/4" HSA	pp=4.5+
Clear		4.0	8-11	fine sand, asphalt, brick		4	↓	
50°F						5		End of boring at 4' due
13:20								to concrete obstruction.
								Offset boring attempts
								GI-14A and GI-14B
								encountered refusal on
						10		concrete at same depth.
								See boring GI-14C for
								successful offset boring.
						15		
						20		
						25		
								pp=Pocket
								Penetrometer
								Unconfined Compres-
								sive Strength in tsf.
						30		
						35		
						40		
						45		
						50		

DRAFT

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. GI-14
SHEET 2 **OF** 2

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. +7.81
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:

TRUCK
SKID
BARGE
OTHER TRACK CME-55

TYPE OF FEED DURING CORING

MECHANICAL
HYDRAULIC X
OTHER

CASING USED [ ] YES [X] NO

	DIA., IN.	DEPTH, FT. FROM	TO
TRUCK			
SKID			
BARGE			

TYPE AND SIZE OF

D-SAMPLER 2" O. D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS AWJ

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN. N/A
TYPE OF DRILLING MUD N/A

AUGER USED [X] YES [ ] NO

TYPE AND DIAMETER, IN. 3 1/4 HOLLOW STEM AUGER

*CASING HAMMER, LBS. N/A AVERAGE FALL, IN. N/A
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM): N/A

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	4	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** 2 HELPERS
REMARKS BORING ABANDONED BY BACKFILILNG WITH BENTOITE PELLETS, SURFACE RESTORED WITH COLD PATCH.
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-17-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** AARON SACKS

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO. GI-14C
SHEET 1 OF 2
FILE NO. 14123
SURFACE ELEV. +7.81
RES. ENGR. RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12:45							DRILLED	4" Asphalt 4" Gvl Base
11/17/2021							AHEAD	See Boring GI-14 for
Wednesday							3 1/4" HSA	Samples 1D and 2D
Clear								Concrete from 4' to 5'
50°F						5		(auger through)
	3D	5.0	9-21	Black Asphalt (FILL)				
		7.0	13-10					
	4D	7.0	2-1/12"	Black asphalt, some brown clay (FILL)(CL)				
		9.0			F			
						10		
						11.3		
	5D	13.5	1-1	Soft gray clay, some fine sand, trace asphalt				pp=0
		15.0	1	roots and gravel (CL)		15		
						17		
	6D	18.5	WOH/12"-2	Soft dark gray clay, some fine sand seams (OH)	A1			pp=0.25
13:20		20.0				20		End of boring at 20'
						25		
								pp=Pocket
								Penetrometer
								Unconfined Compres-
								sive Strength in tsf.
						30		
						35		
						40		
						45		
						50		

DRAFT

Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122
built on firm foundations

BORING NO. GI-14C
SHEET 2 **OF** 2

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. +7.81
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		TYPE OF FEED DURING CORING		CASING USED		YES		NO		
TRUCK		MECHANICAL		DIA., IN.		DEPTH, FT. FROM		TO		
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO		
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER	TRACK CME-55									

TYPE AND SIZE OF

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	AWJ

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN. N/A
TYPE OF DRILLING MUD N/A

AUGER USED [X] YES [ ] NO

TYPE AND DIAMETER, IN. 3 1/4 HOLLOW STEM AUGER

*CASING HAMMER, LBS. N/A AVERAGE FALL, IN. N/A
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM): N/A

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	20	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** 2 HELPERS
REMARKS BORING ABANDONED BY BACKFILILNG WITH BENTONITE PELLETS, SURFACE RESTORED WITH COLD PATCH.
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-17-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** AARON SACKS

MRCE built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	GI-15P
SHEET 1 OF	3
FILE NO.	14123
SURFACE ELEV.	+8.12
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:32	1D	0.0	2-6	Stiff brown fine to medium sandy clay, some			DRILLED	pp=1.5
11/17/2021		2.0	6-8	brick, trace silt, gravel (FILL)(CL)		2	AHEAD	
Wednesday	2D	2.0	7-7	Brown clayey sand and brick and asphalt			3 1/4" HSA	
Partly Cloudy		4.0	18-30	(FILL)(SC)				
48°F	3D	4.0	10-6	Top 6": Blk f-c sand, sm brick, silt (FILL)(SM)		5		
		6.0	6-10	Bot 4": Brown f sand, sm cly, tr roots (FILL)(SC)	F			
	4D	6.0	2-2	Top 16": Brown f sa, sm cly, tr roots (FILL)(SC)				Water at 7.5' to 8'
		8.0	2-2	Bot 8": Gray to tan silty fine sand (SM)				
	5D	8.0	1-1	Gray to tan silty fine sand, some clay layers				
		10.0	2-1	trace medium to coarse sand, gravel (SM)		10		
						11.8		
	6D	13.5	1/12"-1	Dark gray silty fine sand, trace medium to				Organic odor
		15.0		coarse sand (SM)		15		
					A1			
	7D	18.5	WOH/18"	Soft dark gray clay, trace fine sand (OH)				pp=0
10:17		20.0				20		
								End of boring at 20'
								pp=Pocket
						25		Penetrometer
								Unconfined Compres-
								sive Strength in tsf.
						30		
						35		
						40		
						45		
						50		

DRAFT

Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122
built on firm foundations

BORING NO.	GI-15P		
SHEET	3	**OF**	3
PROJECT	WATERFRONT IMPLEMENTATION PROJECT	**FILE NO.**	14123
LOCATION	ALEXANDRIA, VA	**SURFACE ELEV.**	+8.12
BORING LOCATION	SEE BORING LOCATION PLAN	**DATUM**	NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		**TYPE OF FEED DURING CORING**		**CASING USED**		☐ YES	X NO		
TRUCK		MECHANICAL		DIA., IN.		DEPTH, FT. FROM		TO	
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER	TRACK CME-55								

TYPE AND SIZE OF		**DRILLING MUD USED**	☐ YES	X NO
D-SAMPLER	2" O. D. SPLIT SPOON	DIAMETER OF ROTARY BIT, IN.	N/A	
		TYPE OF DRILLING MUD	N/A	
U-SAMPLER				
S-SAMPLER		**AUGER USED**	X YES	☐ NO
CORE BARREL		TYPE AND DIAMETER, IN.	3 1/4 HOLLOW STEM AUGER	
CORE BIT				
DRILL RODS	AWJ			

*CASING HAMMER, LBS.	N/A	AVERAGE FALL, IN.	N/A
SAMPLER HAMMER, LBS.	140	AVERAGE FALL, IN.	30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC):	AUTOMATIC		
*HAMMER RATE, BLOWS PER MINUTE (BPM):	N/A		

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					SEE PIEZOMETER INSTALLATION RECORD

PIEZOMETER INSTALLED X YES ☐ NO **SKETCH SHOWN ON** SHEET 2

STANDPIPE:	TYPE	PVC	ID, IN.	2	LENGTH, FT.	10	TOP ELEV.		
INTAKE ELEMENT:	TYPE	Slotted PVC	OD, IN.	2	LENGTH, FT.	10	TIP ELEV.		
FILTER:	MATERIAL	Filter Sand	OD, IN.	8	LENGTH, FT.	15	BOT. ELEV.		

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	20	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR	FREE STATE DRILLING INC		
DRILLER	RON STIDHAM	**HELPERS**	2 HELPERS
REMARKS	BORING ABANDONED BY BACKFILILNG WITH BENTOINTE PELLETS, SURFACE RESTORED WITH CONCRETE PATCH		
RESIDENT ENGINEER	RAMIRO OSSIO	**DATE**	11-15-21
CLASSIFICATION CHECK:	FRED FALCONE	**TYPING CHECK:**	AARON SACKS

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	PS-02
SHEET 1 OF	4
FILE NO.	14123
SURFACE ELEV.	+5.2
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:45	1D	0.0	1-3	Brown fine to medium sandy clay, trace silt,			DRILLED	
11-1-2021		2.0	4-10	gravel (FILL) (CL)			AHEAD	
Monday	2D	2.0	7-8	Brown fine to medium sand, some concrete,			3 1/4" HSA	WC=10%
Clear		4.0	10-13	trace silt, clay, gravel, brick (FILL) (SP-SM)			4"	
59°F	3D	4.0	36-36	Black to gray fine to coarse sand, some silt, gray		5		pp=Pocket
		6.0	19-18	gravel, brick, trace concrete (FILL) (SM)				Penetrometer
	4D	6.0	2-2	Black fine to coarse sand, some gravel, silt, brick				Unconfined Compres-
		8.0	3-2	(FILL) (SP-SM)	F			sive Strength in tsf.
	5D	8.0	1-1	Black fine to medium sandy gravel, some clay,				WC=47%
		10.0	2-4	trace coarse sand, silt, wood (FILL) (SC)		10		
								TV=Torvane Shear
								Strength in tsf.
	6D	13.5	1-1	Dark gray to black fine to medium sand, trace silt				WC=water content
		15.0	2	(SP-SM)		15		
	7D	15.5	1-1	Soft gray brown clay, trace coarse sand, gravel				OM=Organic Matter,
		17.0	1	(CL)				percent dry weight
	8D	19.0	1-2	Soft dark gray organic silty clay, trace gravel (OH)		20		WC=55%, OM=9%
13:20		20.5	2					
7:20								
11-2-2021								
Tuesday	9U	23.5	PUSH=24"	Soft gray organic silty clay, trace fine to medium				pp=0.25, TV=0.1
Cloudy		25.0	REC=12"	sand, shells, wood fragments (OH)		25		WC=77%
59°F								
	10D	29.0	WOH/6"-1	Soft dark gray organic silty clay (OH)		30		pp=0.25, WC=45%
		30.5	1		A1			
	11U	34.0	PUSH=24"	Medium dark gray organic silty clay,		35		pp=0.75, TV=0.2
		36.0	REC=22"	trace fine sand (CH-OH)				WC=55%
	12D	39.0	WOH/18"	Soft dark gray organic silty clay (OH)		40		pp=0.25, WC=72%
		40.5						
	13U	44.0	PUSH=24"	Soft dark gray organic silty clay, trace fine		45		pp=0.25, TV=0.1
		46.0	REC=16"	sand (OH)				WC=62%
						47.5		
	14D	49.0	3-1	Dark gray fine sand, some silt, trace clay, mica,	A2	50		
		50.5	2	medium sand (SM)				

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	PS-02
SHEET 2 OF	4
FILE NO.	14123
SURFACE ELEV.	+5.2
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd 11-2-2021								
	15D	54.0	1-1	Gray silty fine sand, trace mica, medium		55		
		55.5	1	sand (SM)	A2			
	16U	59.0	PUSH=24"	Gray fine to medium sand, trace silt (SP-SM)		60		WC=25%
		61.0	REC=13"					
						62.5		
	17D	64.0	7-7	Gray fine sand, trace silt, gravel (SP-SM)		65		WC=26%
		65.5	8					
	18D	69.0	5-8	Gray fine to medium sand, trace silt (SP-SM)		70		
		70.5	10					
	19D	74.0	9-7	Gray fine to medium sand, some gravel, trace	T	75		Gravel in 2" layer
12:45		75.5	7	silt, coarse sand layer (SP-SM)				
7:00 11-3-2021 Wednesday Clear 37°F	20NR	79.0		No Recovery		80		
		80.5						
	21D	80.5	10-5	Gray fine to coarse sand, some fine gravel, trace				
		82.0	10	silt (SP-SM)				
	22D	84.0	6-8	Gray fine to medium sand, trace silt (SP-SM)		85		WC=24%
		85.5	13					
						87.3		
	23D	89.0	5-5	Stiff gray fine sandy silt, trace mica (ML)		90		pp=1.75, WC=33%
		90.5	6-13		T0			
	24D	94.0	4-6	Stiff gray silt, trace fine sand, decomposed wood,		95		
		95.5	7	mica (ML)				
	25D	98.5	6-7	Stiff mottled gray and gray brown silt, trace				pp=2.0, WC=40%
		100.0	10	hard gray clay pockets (MH)	P1	100		

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	PS-02
SHEET 3 OF	4
FILE NO.	14123
SURFACE ELEV.	+5.2
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
11-3-2021								
					P1			
	26D	103.5	6-10	Stiff mottled gray and gray brown clay, trace				pp = 2.5
11:15		105.0	12	hard gray clay pockets (CL)		105		End of boring at 105'
						110		
						115		
						120		
						125		
						130		
						135		
						140		
						145		
						150		

DRAFT

M|R|C|E
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. PS-02
SHEET 4 **OF** 4

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. +5.28
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		TYPE OF FEED DURING CORING		CASING USED					
TRUCK		MECHANICAL		DIA., IN.	3.25 ID HSA	DEPTH, FT. FROM	0	TO	15
SKID		HYDRAULIC	X	DIA., IN.	4 STEEL	DEPTH, FT. FROM	0	TO	29
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER	TRACK CME-55								

[X] YES [ ] NO

TYPE AND SIZE OF

D-SAMPLER: 2" O. D. SPLIT SPOON
U-SAMPLER: 3" O.D. FIXED PISTON TUBE
S-SAMPLER:
CORE BARREL:
CORE BIT:
DRILL RODS: NWJ

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN.: 3 7/8
TYPE OF DRILLING MUD: BENTONITE

AUGER USED [X] YES [ ] NO

TYPE AND DIAMETER, IN.: 3 1/4 HOLLOW STEM AUGER

*CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM): N/A

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
11-02-21		6FT	4FT	5	OBSERVED DURING SAMPLING, WET SOIL CUTTINGS

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	97	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	8	NO. OF 3" UNDISTURBED SAMPLES	4
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** +2 HELPERS
REMARKS BORING ABANDONED VIA TREMIE GROUTING. ORIGNIAL GRASS SURFACE RESTORED.
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-03-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** A. SACKS

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	PS-02P
SHEET 1 OF	3
FILE NO.	14123
SURFACE ELEV.	+5.28
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
13:00				Offset boring drilled without sampling for piezometer installation. See Boring PS-02.			DRILLED	
11-3-2021							AHEAD	
Wednesday							4 1/2" HSA	
Clear								
54°F						5		
						10		
14:00						15		
7:20								
11/4/2021								
Thursday								
Clear								
37°F						20		End of boring at 20'.
8:20								
						25		
						30		
						35		
						40		
						45		
						50		

DRAFT

PIEZOMETER RECORD

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
515 M Street SE, Suite 210
Washington, DC 20003

PIEZOMETER OR BORING NO. PS-02P

PROJECT: Alexandria Waterfront

SHEET 2 OF 3

LOCATION: Alexandria, VA

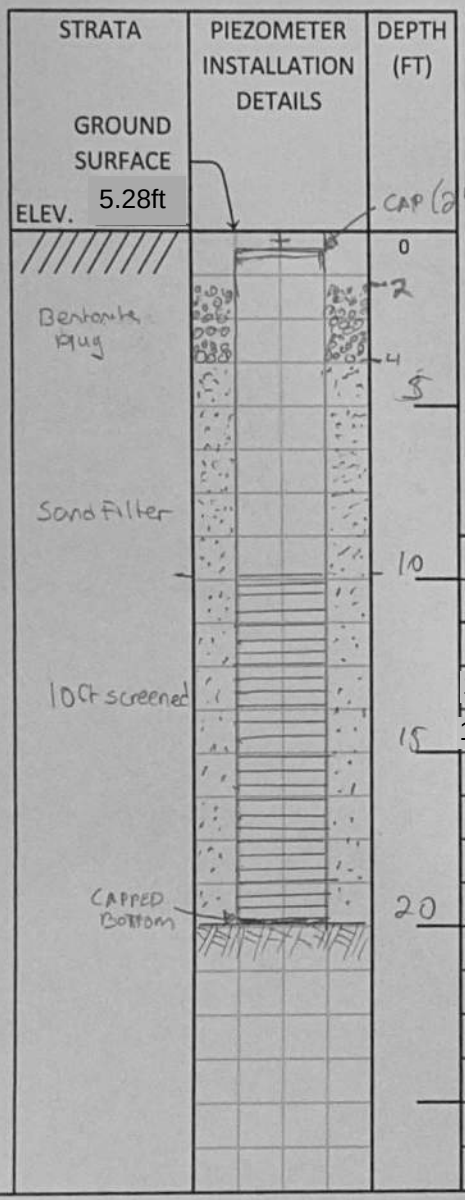
FILE NO. 14123

PIEZOMETER LOCATION: See BLP

INSTALLATION DATE 11/4/21

☐ SEE SKETCH ON BACK

RES ENGR. R-05510



PIEZOMETER TYPE OPEN SCREENED

INTAKE POINT

depth to bottom, ft = 20

depth to top, ft = 4

length, ft = 16 = L

diameter, in = 8, ft = 0.67 = 2R

STANDPIPE/RISER

elevation of rim, ft = 5.28

diameter, in = 1.5, ft = .125 = 2r

READING TIME		DEPTH – RIM (G.S.) TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
11/5/21	13:30	4.2	1.08	
11/11/2021	13:26	4.3	0.98	
11/17/2021	11:42	4.7	0.58	
12/6/2021	12:54	5.3	-0.02	
12/13/2021	10:00	5.7	-0.42	

SAND BENTONITE

GRAVEL GROUT

GROUND SURFACE ELEV. +5.28

PIEZOMETER NO. PS-02P

BOR-5_JUNE2018

DRAFT

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO.	PS-02P		
SHEET	3	**OF**	3
PROJECT	WATERFRONT IMPLEMENTATION PROJECT	**FILE NO.**	14123
LOCATION	ALEXANDRIA, VA	**SURFACE ELEV.**	+5.28
BORING LOCATION	SEE BORING LOCATION PLAN	**DATUM**	NAVD88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		**TYPE OF FEED DURING CORING**		**CASING USED**	X YES	NO			
TRUCK		MECHANICAL		DIA., IN.	4.5 ID HSA	DEPTH, FT. FROM	0	TO	20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER	TRACK CME-55								

TYPE AND SIZE OF

D-SAMPLER	
U-SAMPLER	
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN.

TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO

TYPE AND DIAMETER, IN. 4.5 HOLLOW STEM AUGER

*CASING HAMMER, LBS.	N/A	AVERAGE FALL, IN.	N/A
SAMPLER HAMMER, LBS.	N/A	AVERAGE FALL, IN.	N/A

*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): N/A

*HAMMER RATE, BLOWS PER MINUTE (BPM): N/A

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [x] YES [ ] NO **SKETCH SHOWN ON** Sheet 2

STANDPIPE:	TYPE	PVC	ID, IN.	2	LENGTH, FT.	10	TOP ELEV.		
INTAKE ELEMENT:	TYPE	Slotted PVC	OD, IN.	2	LENGTH, FT.	10	TIP ELEV.		
FILTER:	MATERIAL	Filter sand	OD, IN.	8	LENGTH, FT.	16	BOT. ELEV.		

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	20	NO. OF 3" SHELBY TUBE SAMPLES	0
3.5" DIA. U-SAMPLE BORING	LIN. FT.	0	NO. OF 3" UNDISTURBED SAMPLES	0
CORE DRILLING IN ROCK	LIN. FT.	0	OTHER:	

BORING CONTRACTOR	FREE STATE DRILLING INC		
DRILLER	RON STIDHAM	**HELPERS**	+2 HELPERS
REMARKS	Screened piezometer insalleld to full depth and tremie grouted in place. Flush mounted cover installed.		
RESIDENT ENGINEER	RAMIRO OSSIO	**DATE**	11-04-21
CLASSIFICATION CHECK:	FRED FALCONE	**TYPING CHECK:**	FRED FALCONE

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	PS-04
SHEET 1 OF	3
FILE NO.	14123
SURFACE ELEV.	Mudline El. -7.4
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
14:20	1D	0.0	WR/24"	Soft dark gray clay, trace roots (OH)			DRILLED	pp=0, WC=109%
12/15/2021		2.0					AHEAD	
Wednesday	2D	2.0	WR/24"	Soft dark gray clay, trace wood (OH)			4"	pp=0
Clear		4.0					8"	
60°F						5		
	3U	5.0	PUSH=24	Soft dark gray clay (OH)				pp=0
		7.0	REC=					
	4D	7.0	WH/24"	Soft dark gray clay, trace shells, roots (OH)				pp=0
		9.0						
	5D	9.0	WH/24"	Soft dark gray clay, trace wood, roots (OH)		10		pp=0
		11.0						
	6U	13.0	PUSH=24	Soft dark gray clay (OH)				pp=0,WC=56%
		15.0	REC=19			15		
	7D	18.5	WH/18"	Soft dark gray clay, trace fine sand seams,				pp=0
		20.0		wood (OH)		20		
	8U	23.0	PUSH=24	Soft dark gray clay (OH)				WC=53%
		25.0	REC=24			25		
					A1			
	9D	28.5	WH/18"	Soft dark gray clay, trace fine sand (OH)				pp=0
		30.0				30		
	10U	33.0	PUSH=24	Medium dark gray organic clay (OH)				WC=53%
		35.0	REC=24			35		
	11D	38.5	WH/18"	Soft dark gray clay, trace fine sand, roots (OH)				pp=0
		40.0				40		
	12U	43.0	PUSH=24	Soft dark gray organic clay (OH)				pp=0, WC=66%
		45.0	REC=24			45		
	13D	48.5	1-1	Soft dark gray clay, some 2" gray fine to medium				pp=0.25
		50.0	1	sand layer, trace silt (OH)		50		

MRCE built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO. PS-04
SHEET 2 OF 3
FILE NO. 14123
SURFACE ELEV. Mudline El. -7.4
RES. ENGR. RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd							DRILLED	
12/16/2021							AHEAD	
							4"	
					A1	55		
	14U	55.0	PUSH=24	Top: Soft dark gray clay (OH)				Tube and sampler dropped
		57.0	REC=24	Bot: Gray clayey fine sand, trace gravel (SC)				in river during retrieve
	15D	57.0	WH/24"	Top 14": Soft dark gray clay, some f. sand (OH)				pp=0, WC=52%
12:40		59.0		Bot 6": Gray clayey fine to medium sand, trace		58.2		
11:30				silt (SC)		60		
12/17/2021								Sand in wash 59'-63'
Friday								switch to mud rotary
Clear								
65°F	16D	63.5	11-13	Gray fine sand, some silt, 1" brown fine	T			
		65.0	13	to coarse sand layer (SM)		65		Sand in wash 66'-70'
	17D	68.5	7-12	Top 4": Gray to gray brown fine to coarse sand,		68.8		
		70.0	14	some clay pockets, trace silt (SC)		70		pp=3
				Bot 14": Stiff mottled gray, red brown, and brown clay (CH)				
	18D	73.5	12-17	Hard mottled brown, gray, and red brown clay				pp>4.5, WC=27%
		75.0	23	(CH)		75		
	19D	78.5	15-18	Hard mottled brown, gray, and red brown clay				pp>4.5
		80.0	28	(CH)		80		
	20D	83.5	10-18	Hard mottled brown, gray, and red brown clay				pp>4.5, WC=32%
		85.0	28	(CH)	P1	85		
	21D	88.5	13-20	Hard mottled brown, gray, and red brown clay				pp>4.5
		90.0	28	(CH)		90		
	22D	93.5	19-19	Hard mottled brown, gray, and red brown clay				pp>4.5
		95.0	20	(CH)		95		
	23D	98.5	17-21	Hard mottled brown, gray, and red brown clay				pp>4.5, WC=25%
15:45		100.0	21	(CH)		100		
								End of boring at 100'.

DRAFT

M|R|C|E built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. PS-04
SHEET 3 **OF** 3

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. Mudline El. -7.4
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		TYPE OF FEED DURING CORING		CASING USED					
TRUCK		MECHANICAL		DIA., IN.	8	DEPTH, FT. FROM	0	TO	7
SKID		HYDRAULIC	X	DIA., IN.	4	DEPTH, FT. FROM	0	TO	58
BARGE	TRACK CME-55	OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	3" FIXED PISTON
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	NWJ

DRILLING MUD USED [X] YES [ ] NO

DIAMETER OF ROTARY BIT, IN. 3 7/8
TYPE OF DRILLING MUD BENTONITE

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

*CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM):

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	88	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	12	NO. OF 3" UNDISTURBED SAMPLES	6
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR CONNELLY AND ASSOCIATES, INC.
DRILLER BRANDON MCKINLEY **HELPERS** + 2 HELPERS
REMARKS
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 12-16-21
CLASSIFICATION CHECK: F.FALCONE **TYPING CHECK:** A. SACKS

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	PS-04A
SHEET 1 OF	3
FILE NO.	14123
SURFACE ELEV.	+3.31
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VIRGINIA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
7:40	1D	0.0	2-6	Brown clayey fine to medium sand, some gravel			DRILLED	pp=Pocket
11-10-2021		2.0	11-8	(FILL) (SC)			AHEAD	Penetrometer
Wednesday	2D	2.0	6-1	Brown clayey fine sand, trace decomposed			3 1/4" HSA	Unconfined Compres-
Clear		4.0	2-2	wood, gravel (FILL) (SC)			4"	sive Strength in tsf.
61°F	3D	4.0	2-3	Gray gravel, trace clay, wood, fine to medium		5		
		6.0	2-1	sand (FILL) (GP)				TV=Torvane Shear
	4D	6.0	1-1	Dark gray, black stained clayey fine to medium	F			Strength in tsf.
		8.0	1-1	sand, trace gravel, wood (FILL) (SC)				
	5D	8.0	3-1	Dark gray, black stained fine to coarse sand,				strong odor, WC=36%
		10.0	2-2	some clay, trace c. sand, gvl., wood (FILL) (SC)		10		
	6D	10.0	2-2	Dark gray, black stained fine to medium sand,				strong odor
		12.0	1/12"	trace 1" gray clay layer, silt, gravel (FILL) (SP-SM)				
								change in wash color at
						13.5		13.5' to dark gray color
	7D	14.0	WOH/18"	Soft dark gray clay, trace wood, shells (OH)		15		pp=0, WC=61%
		15.5						
	8U	19.0	PUSH=24"	Soft to medium dark gray organic silty clay (OH)		20		pp=0.25 to 1.0
		21.0	REC=24"					TV=0.1 to 0.2, WC=50%
	9D	23.5	WOH/12"	Soft dark gray organic silty clay, trace shells		25		pp=0.25, WC=56%
		25.0	1	(OH)				OM=6%
								OM=organic matter,
								percent dry weight
	10U	29.0	PUSH=24"	Medium dark gray organic silty clay (OH)		30		pp=0.75, TV=0.2
		30.5	REC=24"					WC=65%
					A1			
	11D	34.0	WOH/18"	Soft dark gray organic silty clay (OH)		35		pp=0.25, WC=84%
		35.5						
	12U	39.0	PUSH=24"	Medium dark gray organic silty clay (OH)		40		pp=0.5, TV=0.2
		41.0	REC=24"					WC=70%
	13D	44.0	2-2	Soft dark gray clay (OH)		45		pp=0,WC=75%
		45.5	3					
	14U	49.0	PUSH=18"	Soft dark gray clay organic silty clay, trace				pp=0.25, TV=0.1
		50.5	REC = 16"	fine sand (OH)		50		WC=50%
						50.3		Rig chatter/gvl layer at
					A2			50.5' to 51.5'

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	PS-04A
SHEET 2 OF	3
FILE NO.	14123
SURFACE ELEV.	+3.31
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VIRGINIA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
CONT'D						**50.3**		Rig chatter/gvl layer at
11-10-2021								50.5' to 51.5'
	15D	54.0	1/10"-1/10"	Gray fine sandy silt, some clay, trace gravel,		**55**		
		55.7		medium sand (ML)				
					A2			
	16D	59.0	1-1	Gray silty fine sand, trace 1" brown silty fine sand		**60**		
		60.5	3	layer, clay, medium sand (SM)				
						62.3		
	17NR	64.0	7-11	No Recovery		**65**		
		65.5	8					
	18D	66.5	3-4	Gray fine to medium sand, trace silt, coarse				
		68.0	4-7	sand, wood (SP-SM)	**T**			
	19D	69.0	4-5	Gray clayey fine sand and medium gray fine		**70**		pp=1.0
		70.5	6	sandy clay, trace silt, lignite, wood (SC+CL)				
								Rig chatter/gvl layer at
						73		72' to 73'
	20D	74.0	9-17	Hard mottled gray, gray brown, and red brown		**75**		pp=3.5 to 4.0
14:15		75.5	24	silty clay, trace gravel layer (CH)				WC=32%
7:00								
11-11-2021								
Thursday								
Clear	21D	79.0	16-17	Hard mottled gray, gray brown, red brown clay		**80**		pp=4.0
47°F		80.5	21	(CH)				
	22D	84.0	11-15	Hard mottled gray and gray brown clay, trace fine		**85**		pp>4.5
		85.5	20	sand (CH)				
					P1			
	23D	89.0	15-18	Hard mottled gray and gray brown silty clay,		**90**		pp>4.5, WC=27%
		90.5	23	trace fine sand (CH)				
	24D	94.0	14-16	Hard mottled gray and gray brown clay, trace fine		**95**		pp>4.5
		95.5	25	sand, trace purple and red brown clay (CH)				
	25D	98.5	18-18	Hard mottled gray and gray brown clay, trace fine				pp>4.5
9:50		100.0	22	sand, trace purple and red brown clay (CH)		**100**		End of Boring @ 100'

DRAFT

Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122
built on firm foundations

BORING NO. PS-04A
SHEET 3 **OF** 3

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VIRGINIA
SURFACE ELEV. +3.31
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:

TRUCK
SKID
BARGE
OTHER TRACK CME-55

TYPE OF FEED DURING CORING

MECHANICAL
HYDRAULIC
OTHER

CASING USED [X] YES [ ] NO

DIA., IN.	3 1/4 HSA	DEPTH, FT. FROM	0	TO	14
DIA., IN.	4 STEEL	DEPTH, FT. FROM	0	TO	14
DIA., IN.		DEPTH, FT. FROM		TO	

TYPE AND SIZE OF

D-SAMPLER 2" O. D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN. 3 7/8
TYPE OF DRILLING MUD BENTONITE

AUGER USED [X] YES [ ] NO

TYPE AND DIAMETER, IN. 3 1/4 ID HOLLOW STEM AUGER

*CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM): N/A

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
11-10-21		6FT	4FT	5FT	WET SOIL SAMPLE OBSERVED IN SPLIT SPOON

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	92	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	8	NO. OF 3" UNDISTURBED SAMPLES	4
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** +2 HELPERS
REMARKS BORING ABANDONED BY TREMIE GROUTING. ORGINAL GRAVEL SURFACE RESTORED.
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-11-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** A. SACKS

Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122
built on firm foundations

DRAFT

BORING LOG

BORING NO.	PS-04AP
SHEET 1 OF	3
FILE NO.	14123
SURFACE ELEV.	+3.31
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VIRGINIA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:10				Offset boring drilled without sampling for piezometer installation. See Boring PS-04A.			DRILLED	
11/11/2021							AHEAD	
Thursday							4 1/2" HSA	
Clear								
64°F						5		
						10		
						15		
11:50						20		End of boring at 20'.
						25		
						30		
						35		
						40		
						45		
						50		

DRAFT

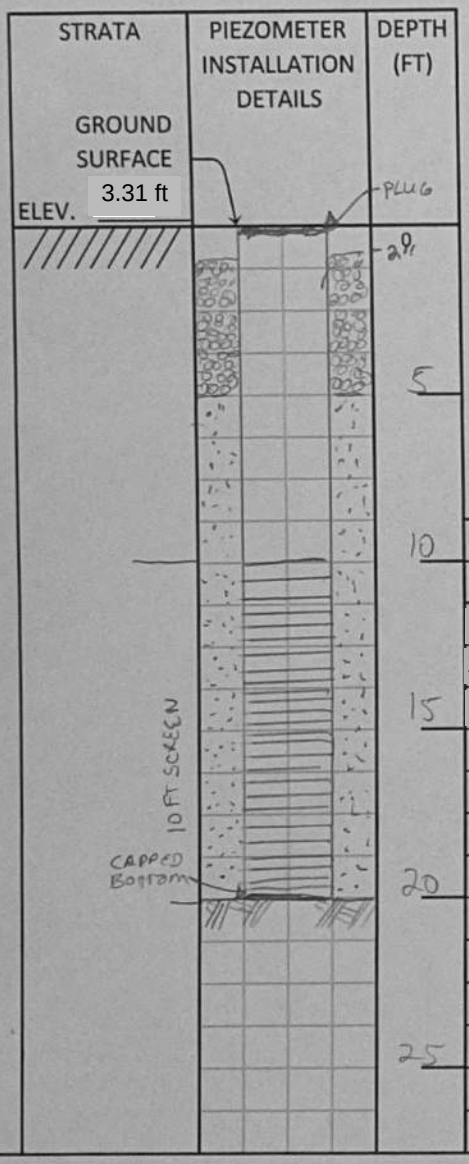
PIEZOMETER RECORD

MRCE
built on firm foundations

Mueser Rutledge Consulting Engineers
515 M Street SE, Suite 210
Washington, DC 20003

PIEZOMETER OR BORING NO. PS-04AP
SHEET 2 OF 3
FILE NO. 14123
INSTALLATION DATE 11/11/21
RES ENGR. R. Olson

PROJECT: Alexandria Waterfront
LOCATION: Alexandria, VA
PIEZOMETER LOCATION: See PLP
☐ SEE SKETCH ON BACK



PIEZOMETER TYPE OPEN - SCREENED

INTAKE POINT
depth to bottom, ft = 20
depth to top, ft = 5
length, ft = 15 = L
diameter, in = 2, ft = .0833 = 2R

STANDPIPE/RISER
elevation of rim, ft = 3.31
diameter, in = 2, ft = .0833 = 2r

READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
11/17/2021	14:19	3.2	0.11	
12/06/2021	13:00	3.4	-0.09	
12/13/2021	09:45	3.9	-0.59	

SAND BENTONITE GRAVEL GROUT

GROUND SURFACE ELEV. 3.31 ft

PIEZOMETER NO. PS-04AP

BOR-5_JUNE2018

DRAFT

MRCE built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. PS-04AP
SHEET 3 **OF** 3

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VIRGINIA
SURFACE ELEV. +3.31
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:

TRUCK
SKID
BARGE
OTHER TRACK CME-55

TYPE OF FEED DURING CORING

MECHANICAL
HYDRAULIC
OTHER

CASING USED [X] YES [ ] NO

	DIA., IN.	DEPTH, FT. FROM	TO
TRUCK	4 1/2 HSA	0	20
SKID			
BARGE			

TYPE AND SIZE OF

D-SAMPLER
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO

TYPE AND DIAMETER, IN. 4 1/2 ID HOLLOW STEM AUGER

*CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. AVERAGE FALL, IN.
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC):
*HAMMER RATE, BLOWS PER MINUTE (BPM):

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [X] YES [ ] NO **SKETCH SHOWN ON** Sheet 2

STANDPIPE:	TYPE	PVC	ID, IN.	2	LENGTH, FT.	20	TOP ELEV.
INTAKE ELEMENT:	TYPE	Slotted PVC	OD, IN.	3	LENGTH, FT.	10	TIP ELEV.
FILTER:	MATERIAL	Filter Sand	OD, IN.	8	LENGTH, FT.	15	BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	20	NO. OF 3" SHELBY TUBE SAMPLES	0
3.5" DIA. U-SAMPLE BORING	LIN. FT.	0	NO. OF 3" UNDISTURBED SAMPLES	0
CORE DRILLING IN ROCK	LIN. FT.	0	OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** +2 HELPERS
REMARKS STEEL FLUSH MOUNT COVER INSTALLED AT COMPLETED PIEZOMETER.
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-11-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** F. FALCONE

M|R|C|E
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	PS-04P
SHEET 1 OF	2
FILE NO.	14123
SURFACE ELEV.	+2.87
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
07:30	1D	0.5	7-2	Dark brown clayey fine to medium sand,	*		DRILLED	4" conc, 2" gvl base
11/15/2021		2.5	1-2	trace silt, gravel, wood (FILL)(SC)		2	AHEAD	
Monday	2D	2.5	6-7	Stiff dark brown fine sandy clay, trace gravel,			3 1/4" HSA	pp=2.0
Cloudy		4.5	4-3	silt, brick, asphalt (FILL)(CL)				
43°F	3D	4.5	3-4	Light gray fine to medium sand, some brick		5		pp=0.75 to 1.25
		6.5	3-2	trace clay, gravel (FILL)(SP-SC)				
	4D	6.5	8-7	Dark brown and black stained fine to coarse	F			
		8.5	4-6	sand, some gravel, clay (SC)				Black coloring is
	5NR	8.5	6-5	No Recovery				staining
		10.5	4-6			10		Soft clay in tip of spoon
	6D	10.5	7-8	Brown wood, some black fine to medium sand,				
		12.5	23-24	trace clay layers, silt (SP-SM)				
8:42						13.5		End of boring at 13.5' due to wood obstruction
						15		Offset, see PS-04PA
						20		
						25		
						30		
						35		
						40		
						45		
						50		

DRAFT

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. PS-04P
SHEET 2 **OF** 2

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. +2.87
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		TYPE OF FEED DURING CORING	
TRUCK		MECHANICAL	
SKID		HYDRAULIC	X
BARGE		OTHER	
OTHER	TRACK CME-55		

CASING USED [ ] YES [X] NO

DIA., IN.	3.25 ID HSA	DEPTH, FT. FROM	0	TO	13.5
DIA., IN.		DEPTH, FT. FROM		TO	
DIA., IN.		DEPTH, FT. FROM		TO	

TYPE AND SIZE OF

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	AWJ

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN. N/A
TYPE OF DRILLING MUD N/A

AUGER USED [X] YES [ ] NO
TYPE AND DIAMETER, IN. 3 1/4 HOLLOW STEM AUGER

*CASING HAMMER, LBS. N/A AVERAGE FALL, IN. N/A
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): AUTOMATIC
*HAMMER RATE, BLOWS PER MINUTE (BPM): N/A

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	13.5	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** 2 HELPERS
REMARKS BORING ABANDONED BY BACKFILILNG WITH BENTOINTE PELLETS, SURFACE RESTORED WITH CONCRETE PATCH
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-15-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** AARON SACKS

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	PS-04PA
SHEET 1 OF	3
FILE NO.	14123
SURFACE ELEV.	+2.87
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VIRGINIA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
08:55				Offset boring drilled without sampling for piezometer installation. See Boring PS-04P.	**		DRILLED	**4" concrete and
11/15/21							AHEAD	3" gravel layer
Monday							4 1/2" HSA	
Cloudy								
45°F						5		
						10		
								Obstruction at 14'.
9:20						14		End of boring at 14'.
						15		
						20		
						25		
						30		
						35		
						40		
						45		
						50		

DRAFT

PIEZOMETER RECORD

MRCE
built on firm foundations

Mueser Rutledge Consulting Engineers
515 M Street SE, Suite 210
Washington, DC 20003

PIEZOMETER OR BORING NO. PS-04PA

PROJECT: Alexandria Waterfront

SHEET 2 OF 3

LOCATION: Alexandria, VA

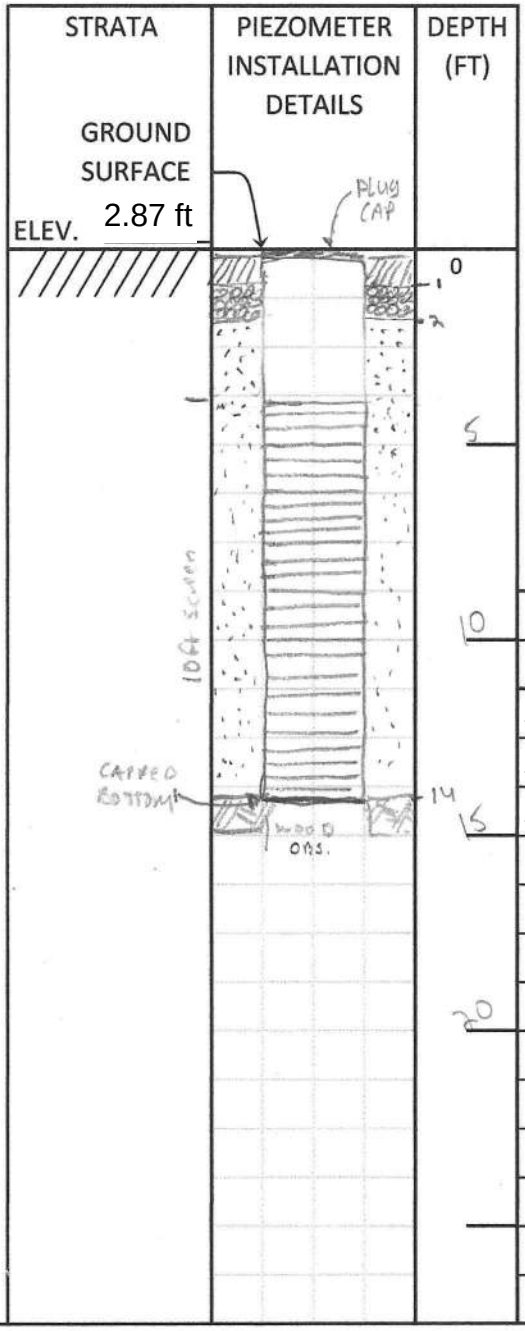
FILE NO. 14123

PIEZOMETER LOCATION: See BLP

INSTALLATION DATE 11/15/21

☐ SEE SKETCH ON BACK

RES ENGR. R. OSSIO



PIEZOMETER TYPE Open - SCREENED

INTAKE POINT

depth to bottom, ft = 14

depth to top, ft = 2

length, ft = 12 = L

diameter, in = 8, ft = 0.67 = 2R

STANDPIPE/RISER

elevation of rim, ft = 2.87

diameter, in = 2, ft = .0833 = 2r

READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
11/17/2021	12:38	3.2	-0.33	
12/6/2021	13:05	3.5	-0.63	
12/13/2021	09:55	4.0	-1.13	

SAND BENTONITE GROUT GRAVEL

GROUND SURFACE ELEV. 2.87 ft

PIEZOMETER NO. PS-04PA

DRAFT

Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

built on firm foundations

BORING NO. PS-04PA
SHEET 3 **OF** 3

PROJECT WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VIRGINIA
SURFACE ELEV. +2.87
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:

TRUCK
SKID
BARGE
OTHER TRACK CME-55

TYPE OF FEED DURING CORING

MECHANICAL
HYDRAULIC
OTHER

CASING USED [X] YES [ ] NO

DIA., IN.	4 1/2 HSA	DEPTH, FT. FROM	0	TO	20
DIA., IN.		DEPTH, FT. FROM		TO	
DIA., IN.		DEPTH, FT. FROM		TO	

TYPE AND SIZE OF

D-SAMPLER
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED [X] YES [ ] NO

TYPE AND DIAMETER, IN. 4 1/2 ID HOLLOW STEM AUGER

*CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. AVERAGE FALL, IN.
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC):
*HAMMER RATE, BLOWS PER MINUTE (BPM):

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [X] YES [ ] NO **SKETCH SHOWN ON** Sheet 2

STANDPIPE:	TYPE	PVC	ID, IN.	2	LENGTH, FT.	4	TOP ELEV.	
INTAKE ELEMENT:	TYPE	Slotted PVC	OD, IN.	2	LENGTH, FT.	10	TIP ELEV.	
FILTER:	MATERIAL	Filter Sand	OD, IN.	8	LENGTH, FT.	12	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	14	NO. OF 3" SHELBY TUBE SAMPLES	0
3.5" DIA. U-SAMPLE BORING	LIN. FT.	0	NO. OF 3" UNDISTURBED SAMPLES	0
CORE DRILLING IN ROCK	LIN. FT.	0	OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** +2 HELPERS
REMARKS STEEL FLUSH MOUNT COVER INSTALLED AT COMPLETED PIEZOMETER.
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-15-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** F. FALCONE

APPENDIX C

Cone Penetration Test (CPT) Logs

Land CPT Logs

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	SCPT-01
SHEET 1 OF	2
FILE NO.	14123
SURFACE ELEV.	+3.19
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:15				Boring drilled without sampling for SCPT pre-drill. See SCPT-01 log.	*		DRILLED	*2" gvl base, 5" concrete
11/9/2021							AHEAD	
Tuesday							3 1/4" HSA	
Clear								
67°F						5		
						10		
12:00						14.5		End of predrill boing at 14.5'. Backfilled with pea gravel.
						15		
						20		
						25		
						30		
						35		
						40		
						45		
						50		

DRAFT

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO.	SCPT-01		
SHEET	2	**OF**	2
PROJECT	WATERFRONT IMPLEMENTATION PROJECT	**FILE NO.**	14123
LOCATION	ALEXANDRIA, VA	**SURFACE ELEV.**	+3.19
BORING LOCATION	SEE BORING LOCATION PLAN	**DATUM**	NAVD88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		**TYPE OF FEED DURING CORING**		**CASING USED**					
TRUCK		MECHANICAL			YES	X	NO		
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER	TRACK CME-55			DIA., IN.		DEPTH, FT. FROM		TO	

TYPE AND SIZE OF		**DRILLING MUD USED**					
D-SAMPLER				YES	X	NO	
		DIAMETER OF ROTARY BIT, IN.	N/A				
		TYPE OF DRILLING MUD	N/A				
U-SAMPLER							
S-SAMPLER		**AUGER USED**	X	YES		NO	
CORE BARREL		TYPE AND DIAMETER, IN.	3 1/4 HOLLOW STEM AUGER				
CORE BIT							
DRILL RODS		*CASING HAMMER, LBS.	N/A	AVERAGE FALL, IN.	N/A		
		SAMPLER HAMMER, LBS.	N/A	AVERAGE FALL, IN.	N/A		
		*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC):	N/A				
		*HAMMER RATE, BLOWS PER MINUTE (BPM):	N/A				

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

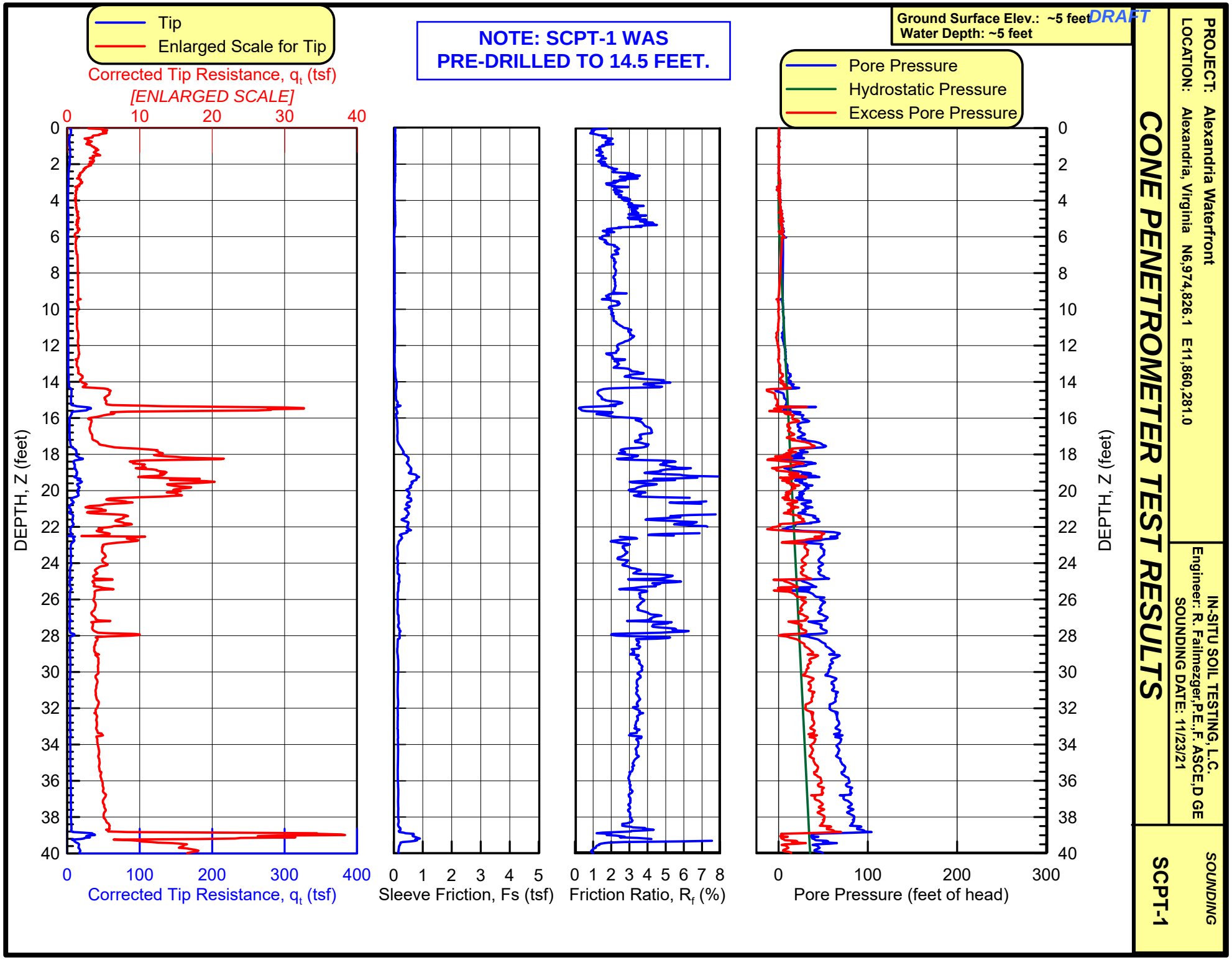
PIEZOMETER INSTALLED YES [ ] NO [X] **SKETCH SHOWN ON**

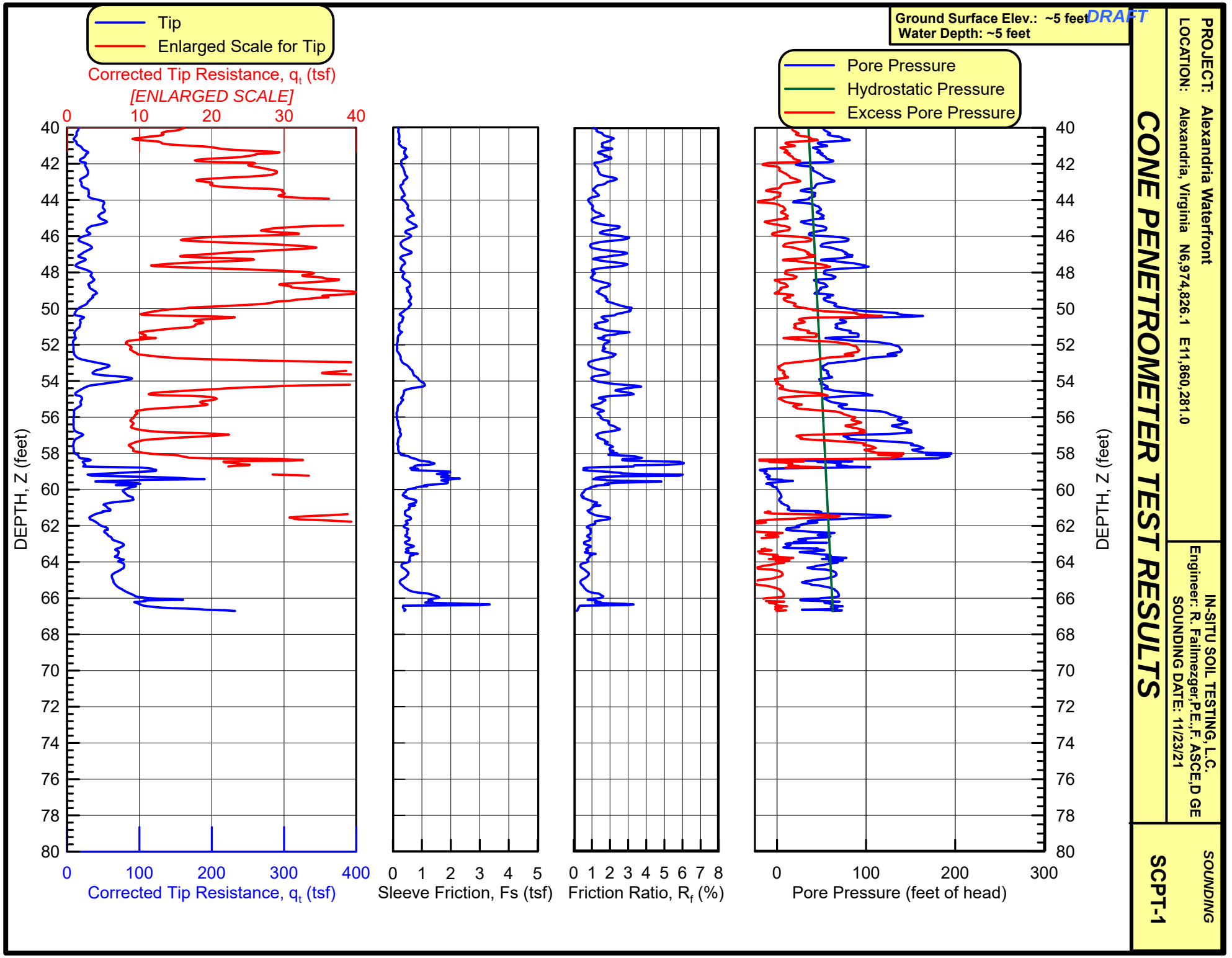
STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	14.5	NO. OF 3" SHELBY TUBE SAMPLES	0
3.5" DIA. U-SAMPLE BORING	LIN. FT.	0	NO. OF 3" UNDISTURBED SAMPLES	0
CORE DRILLING IN ROCK	LIN. FT.	0	OTHER:	

BORING CONTRACTOR	FREE STATE DRILLING INC		
DRILLER	RON STIDHAM	**HELPERS**	2 HELPERS
REMARKS	PREDRILLED SCPT BORING BACKFILLED WITH PEA GRAVEL TO EXISTING GRADE.		
RESIDENT ENGINEER	RAMIRO OSSIO	**DATE**	11-09-21
CLASSIFICATION CHECK:	FRED FALCONE	**TYPING CHECK:**	RAMIRO OSSIO


Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
NOTE: SCPT-1 WAS
PRE-DRILLED TO 14.5 FEET.
Ground Surface Elev.: ~5 feet
Water Depth: ~5 feet
DRAFT
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
DEPTH, Z (feet)
Corrected Tip Resistance, q_t (tsf)
Sleeve Friction, Fs (tsf)
Friction Ratio, R_f (%)
Pore Pressure (feet of head)
CONE PENETROMETER TEST RESULTS
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia N6,974,826.1 E11,860,281.0
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21
SOUNDING
SCPT-1

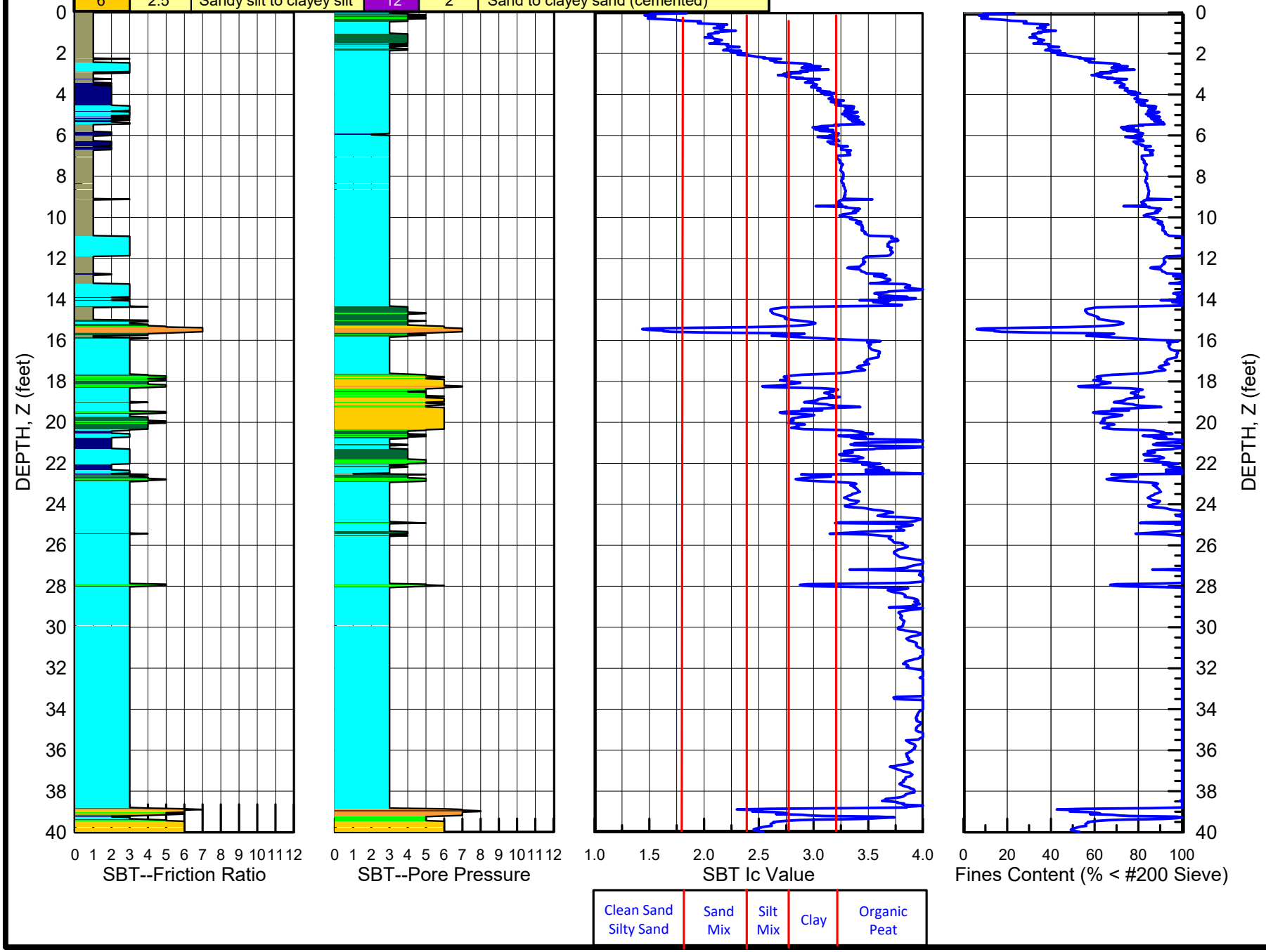

Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
0 10 20 30 40
DEPTH, Z (feet)
0 100 200 300 400
Corrected Tip Resistance, q_t (tsf)
0 1 2 3 4 5
Sleeve Friction, Fs (tsf)
0 1 2 3 4 5 6 7 8
Friction Ratio, R_f (%)
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
0 100 200 300
Pore Pressure (feet of head)
40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80
Ground Surface Elev.: ~5 feet
Water Depth: ~5 feet
DRAFT
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia N6,974,826.1 E11,860,281.0
CONE PENETROMETER TEST RESULTS
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21
SOUNDING
SCPT-1

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~5 feet
Water Depth: ~5 feet

DRAFT

NOTE: SCPT-1 WAS PRE-DRILLED TO 14.5 FEET.



PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia N6,974,826.1 E11,860,281.0

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

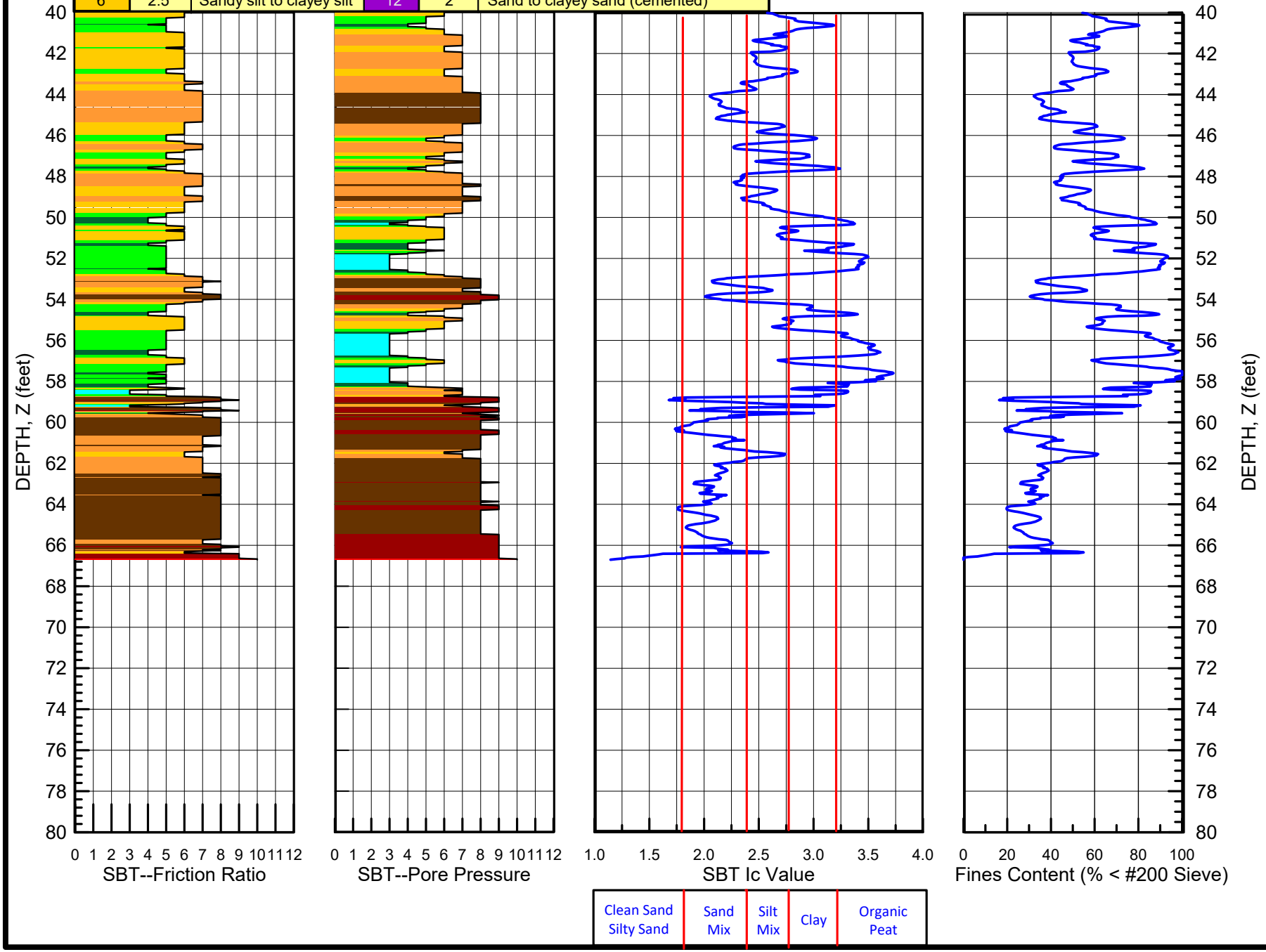
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21

SOUNDING
SCPT-1

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~5 feet
Water Depth: ~5 feet

DRAFT



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia N6,974,826.1 E11,860,281.0

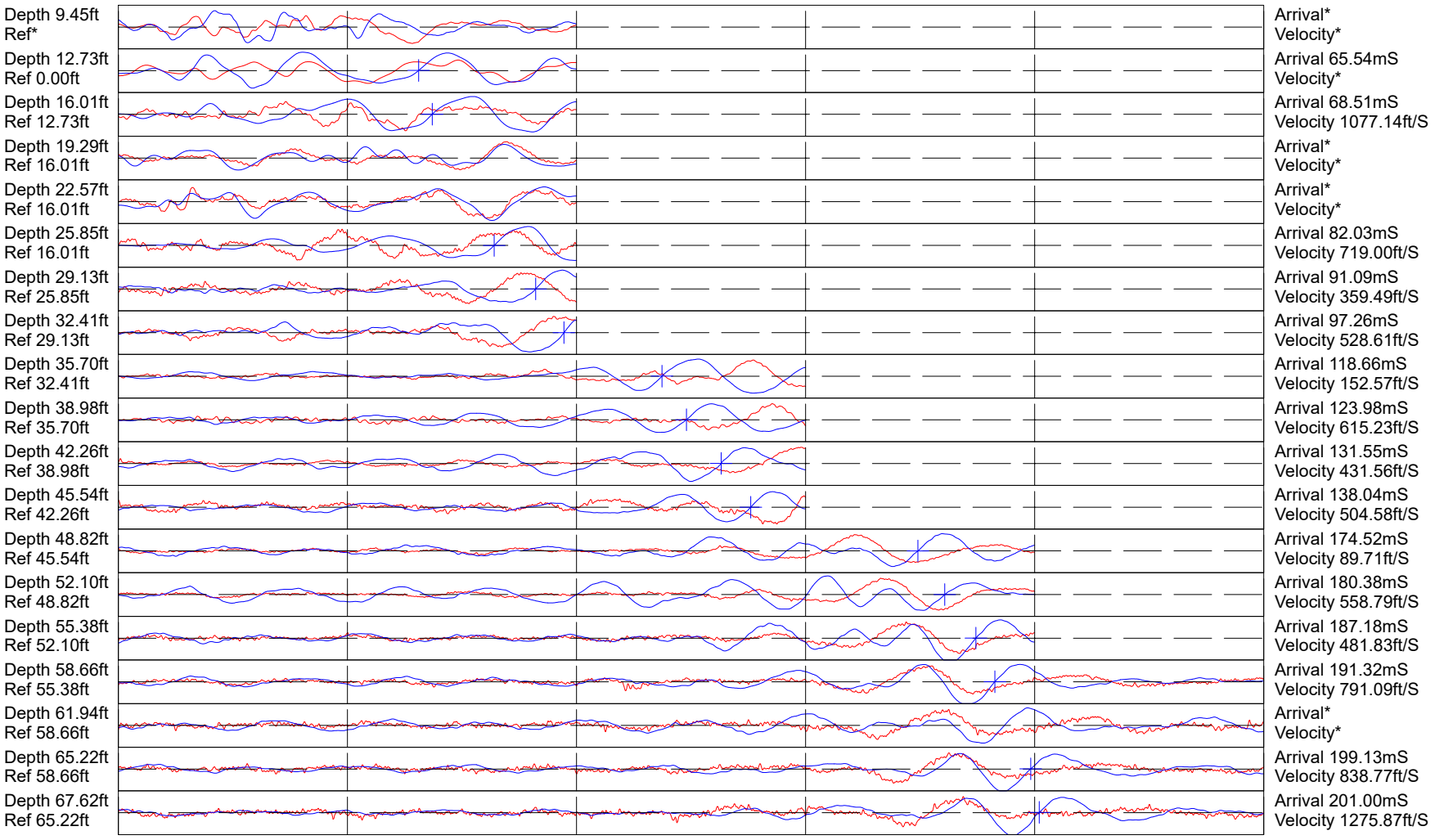
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21

SOUNDING
SCPT-1

DRAFT

NOTE: SCPT-1 WAS PRE-DRILLED TO 14.5 FEET.

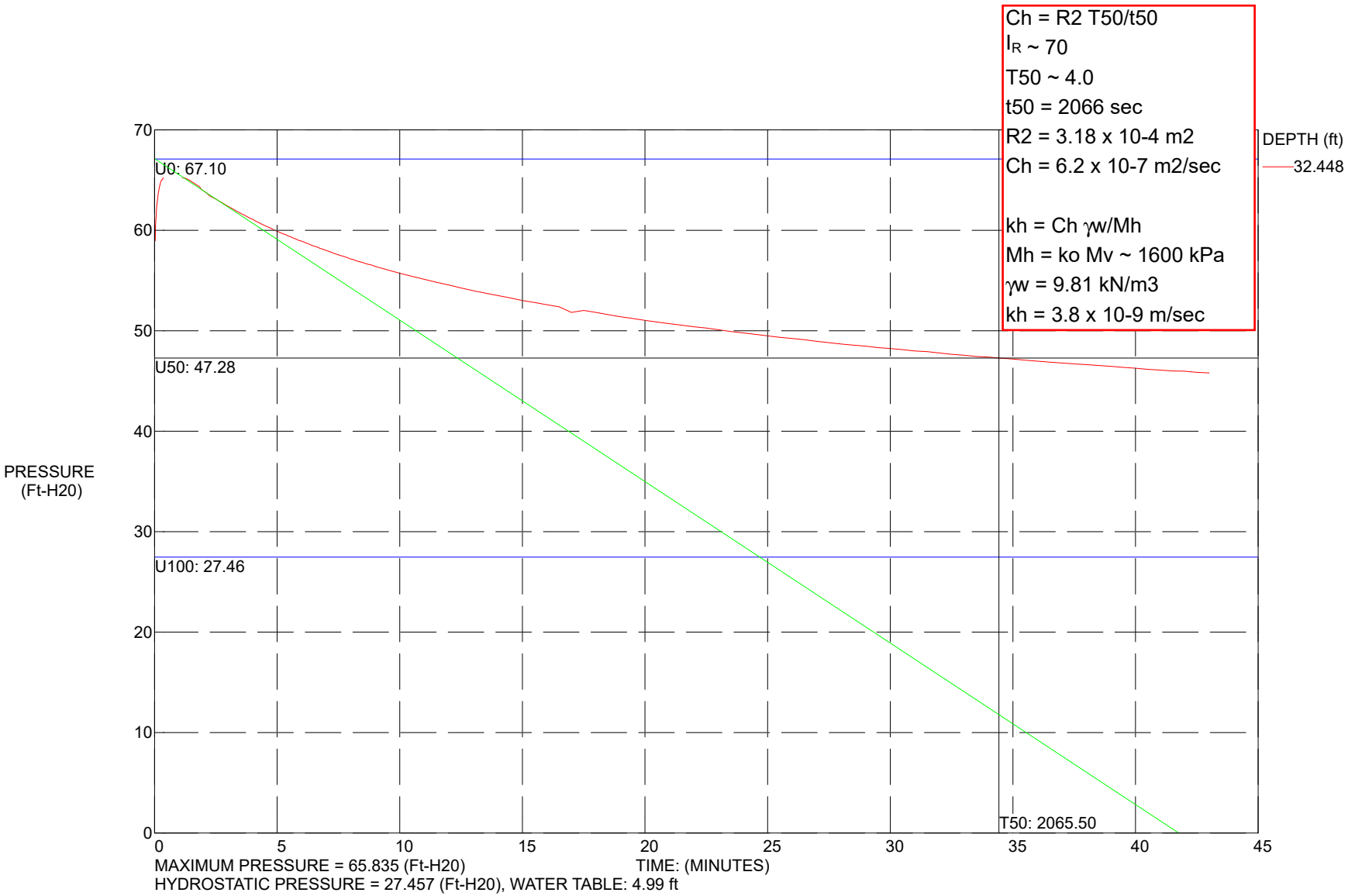
SEISMIC TEST



Hammer to Rod String Distance (ft): 3.28
* = Not Determined

COMMENT:

DRAFT


Ch = R2 T50/t50
I_R ~ 70
T50 ~ 4.0
t50 = 2066 sec
R2 = 3.18 x 10-4 m2
Ch = 6.2 x 10-7 m2/sec
kh = Ch γw/Mh
Mh = ko Mv ~ 1600 kPa
γw = 9.81 kN/m3
kh = 3.8 x 10-9 m/sec
DEPTH (ft)
32.448
U0: 67.10
U50: 47.28
U100: 27.46
T50: 2065.50
PRESSURE
(Ft-H20)
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
MAXIMUM PRESSURE = 65.835 (Ft-H20)
TIME: (MINUTES)
HYDROSTATIC PRESSURE = 27.457 (Ft-H20), WATER TABLE: 4.99 ft

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	SCPT-02
SHEET 1 OF	2
FILE NO.	14123
SURFACE ELEV.	+2.87
RES. ENGR.	RAMIRO OSSIO

PROJECT: WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:45				Drilled without sampling to 19.5 feet for SCPT pre-drill. See SCPT-02 log.	*		DRILLED	*4" concrete, 2" gvl base
11/15/2021							AHEAD	
Monday							3 1/4" HSA	
Cloudy								
47°F						5		
						10		
						15		
	1NR	19.5	3-2			20		End of predrill boring at 21'. Split Spoon sample confirms no obstruction. Boring backfilled with pea gravel and surface patched with asphalt.
11:20		21.0	2			21		
						25		
						30		
						35		
						40		
						45		
						50		

DRAFT

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. SCPT-02
SHEET 2 **OF** 2

PROJECT	WATERFRONT IMPLEMENTATION PROJECT	**FILE NO.**	14123
LOCATION	ALEXANDRIA, VA	**SURFACE ELEV.**	+2.87
BORING LOCATION	SEE BORING LOCATION PLAN	**DATUM**	NAVD88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:		**TYPE OF FEED DURING CORING**		**CASING USED**			YES	X	NO		
TRUCK		MECHANICAL		DIA., IN.		DEPTH, FT. FROM		TO	
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER	TRACK CME-55								

TYPE AND SIZE OF		**DRILLING MUD USED**		YES	X	NO
D-SAMPLER	2" O.D. S.S.	DIAMETER OF ROTARY BIT, IN.	N/A			
		TYPE OF DRILLING MUD	N/A			
U-SAMPLER						
S-SAMPLER		**AUGER USED**	X	YES		NO
CORE BARREL		TYPE AND DIAMETER, IN.	3 1/4 HOLLOW STEM AUGER			
CORE BIT						
DRILL RODS	AWJ	*CASING HAMMER, LBS.	N/A	AVERAGE FALL, IN.	N/A	
		SAMPLER HAMMER, LBS.	140	AVERAGE FALL, IN.	30	
		*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC):	Automatic			
		*HAMMER RATE, BLOWS PER MINUTE (BPM):	N/A			

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

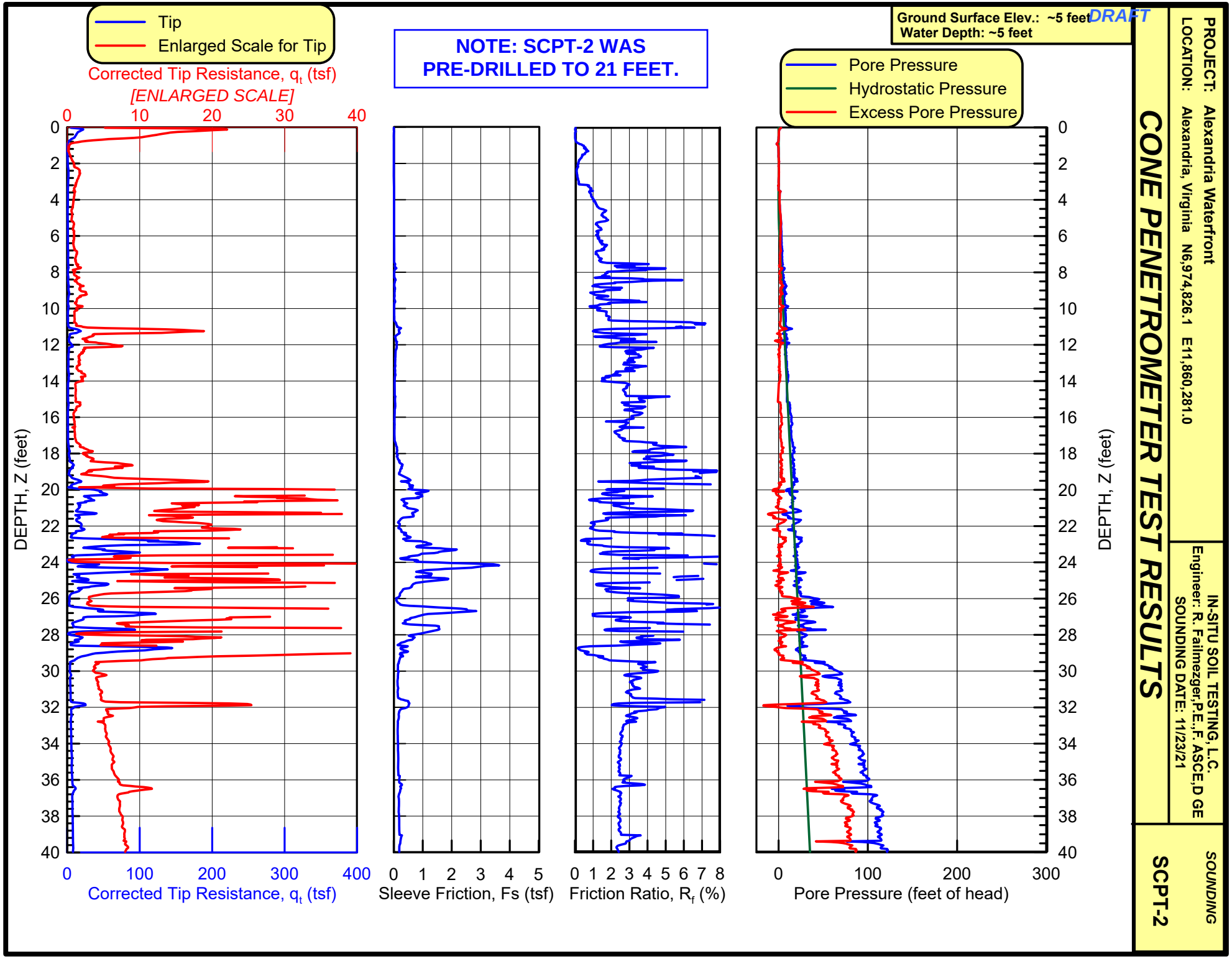
PIEZOMETER INSTALLED YES X NO **SKETCH SHOWN ON**

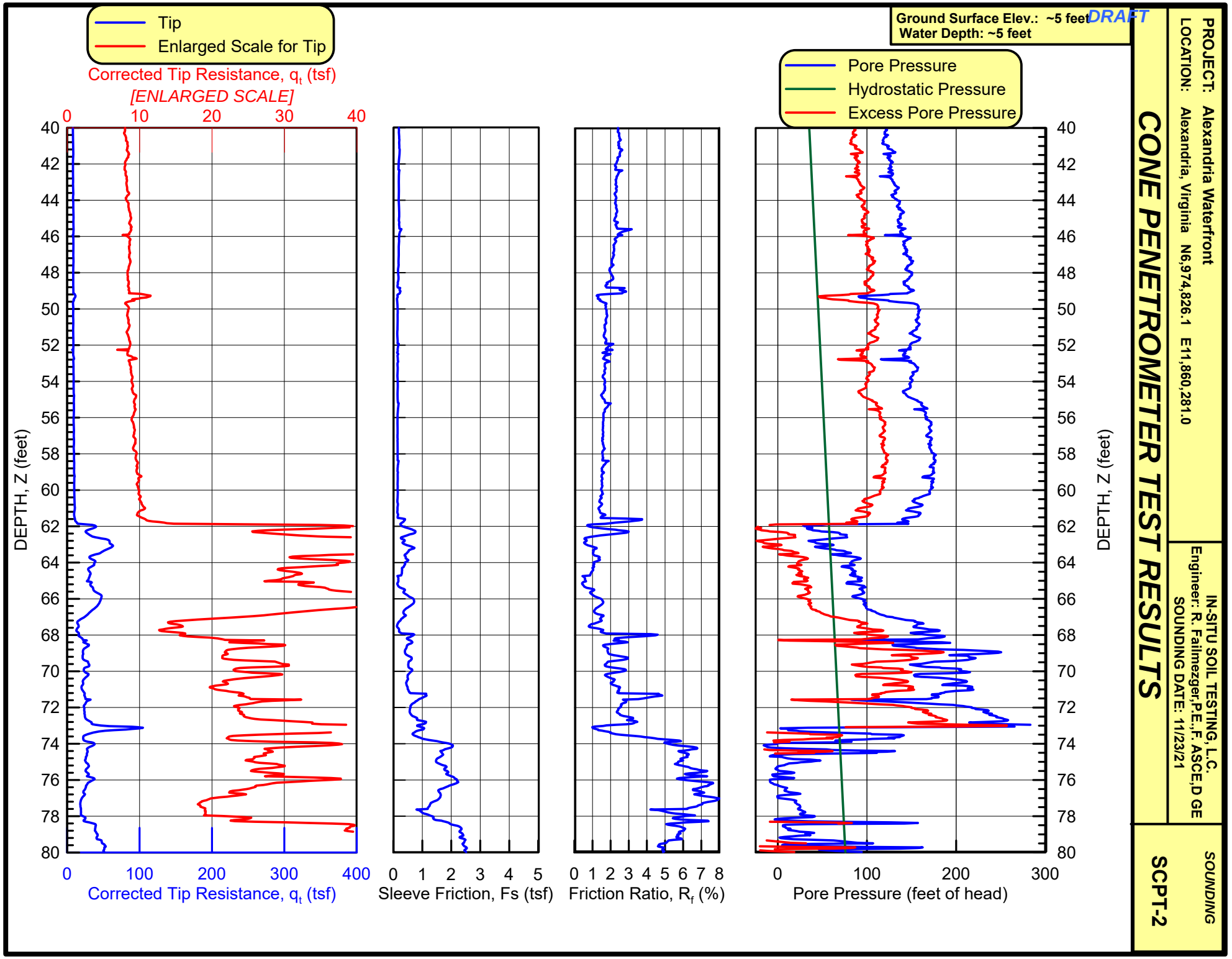
STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	21	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** 2 HELPERS
REMARKS PREDRILLED SCPT BORING BACKFILLED WITH PEA GRAVEL TO EXISTING GRADE. SURFACE PATCHED WITH ASPHALT.
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-15-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** RAMIRO OSSIO


Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
NOTE: SCPT-2 WAS PRE-DRILLED TO 21 FEET.
Ground Surface Elev.: ~5 feet
Water Depth: ~5 feet
DRAFT
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
DEPTH, Z (feet)
Corrected Tip Resistance, q_t (tsf)
Sleeve Friction, Fs (tsf)
Friction Ratio, R_f (%)
Pore Pressure (feet of head)
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia N6,974,826.1 E11,860,281.0
CONE PENETROMETER TEST RESULTS
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21
SOUNDING
SCPT-2

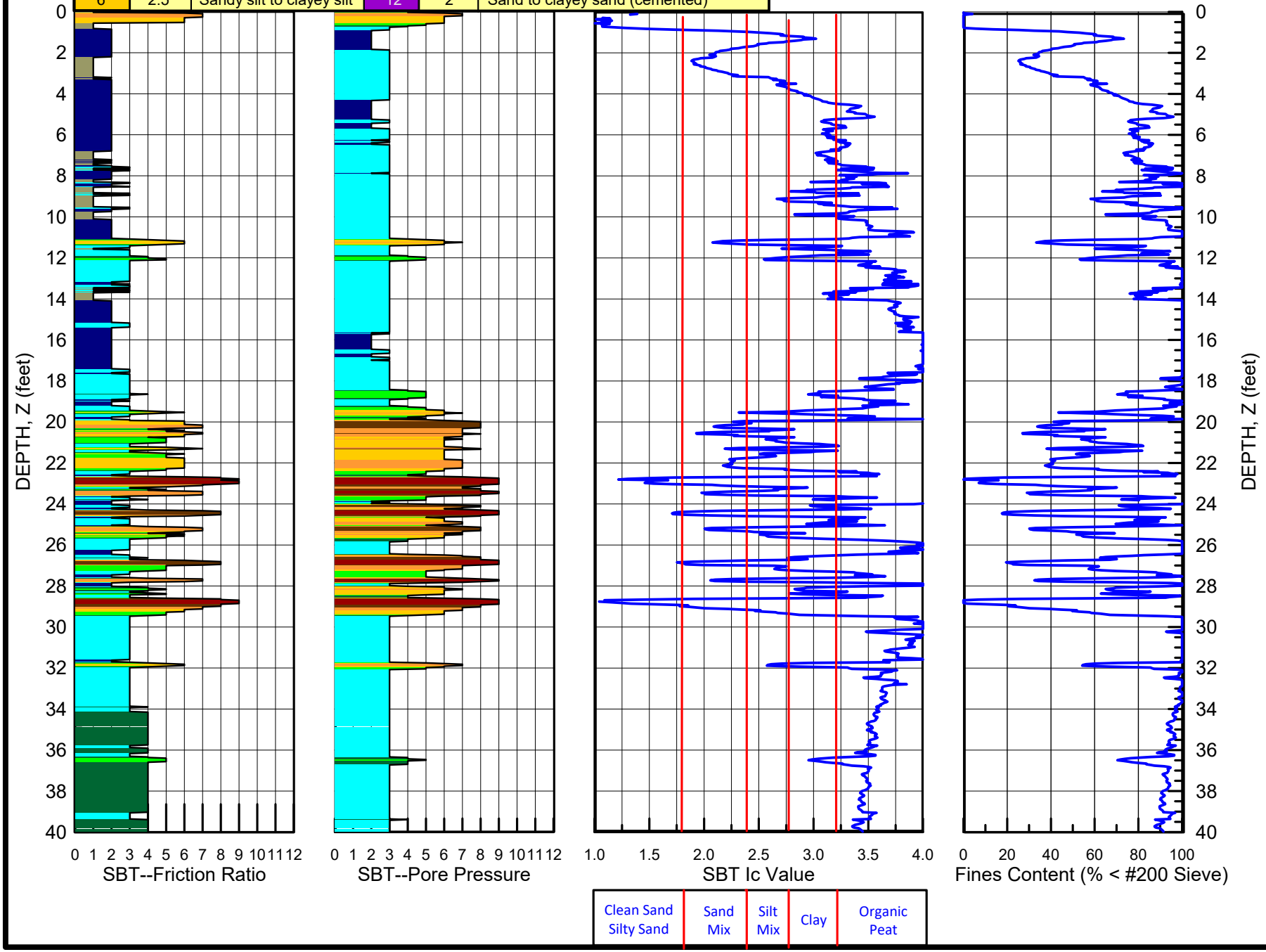

Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
0 10 20 30 40
DEPTH, Z (feet)
40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80
0 100 200 300 400
Corrected Tip Resistance, q_t (tsf)
0 1 2 3 4 5
Sleeve Friction, Fs (tsf)
0 1 2 3 4 5 6 7 8
Friction Ratio, R_f (%)
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
0 100 200 300
Pore Pressure (feet of head)
Ground Surface Elev.: ~5 feet
Water Depth: ~5 feet
DRAFT
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia N6,974,826.1 E11,860,281.0
CONE PENETROMETER TEST RESULTS
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21
SOUNDING
SCPT-2

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~5 feet
Water Depth: ~5 feet

DRAFT

NOTE: SCPT-2 WAS PRE-DRILLED TO 21 FEET.



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia N6,974,826.1 E11,860,281.0

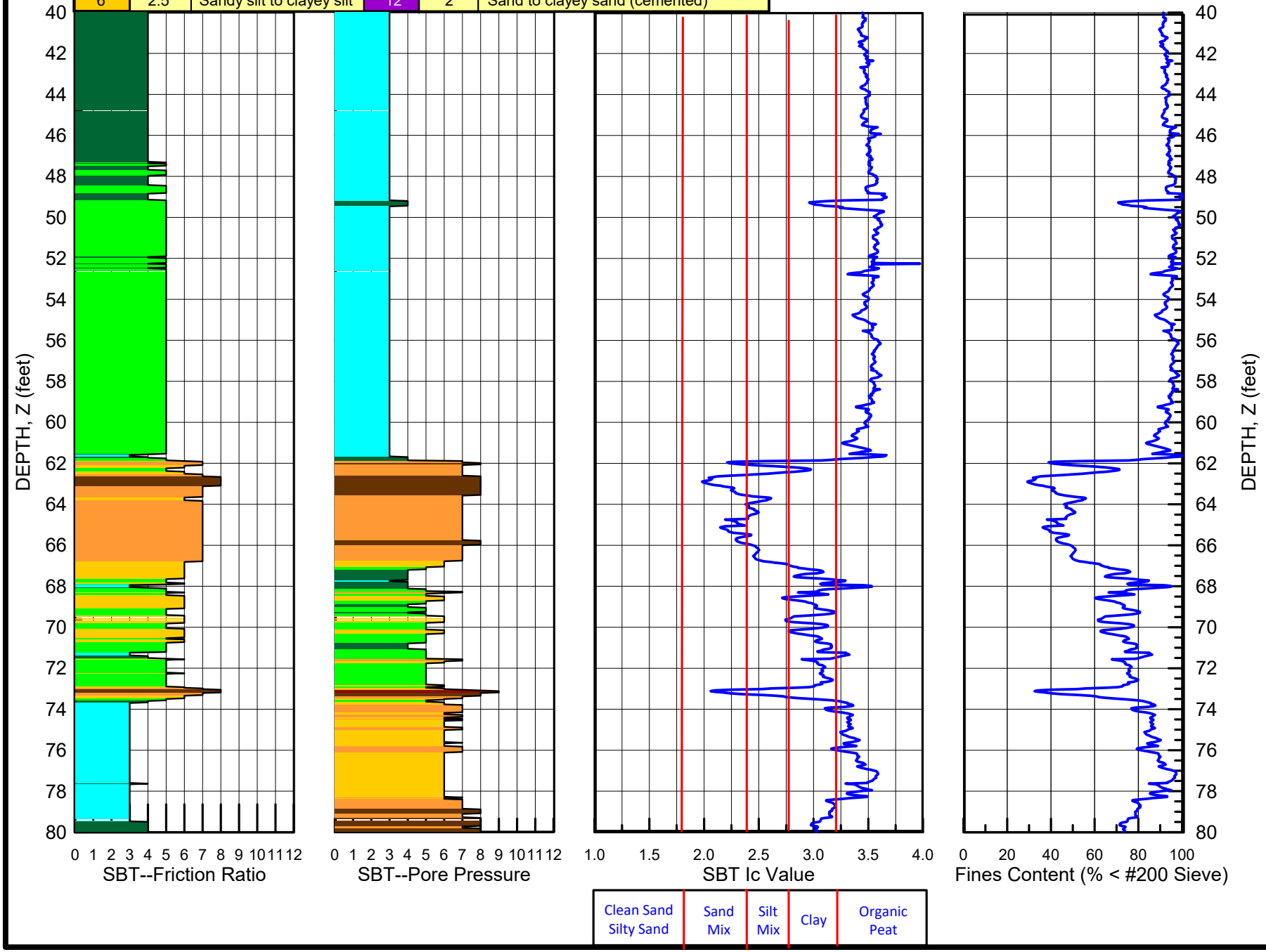
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21

SOUNDING
SCPT-2

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~5 feet
Water Depth: ~5 feet

DRAFT



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia N6,974,826.1 E11,860,281.0

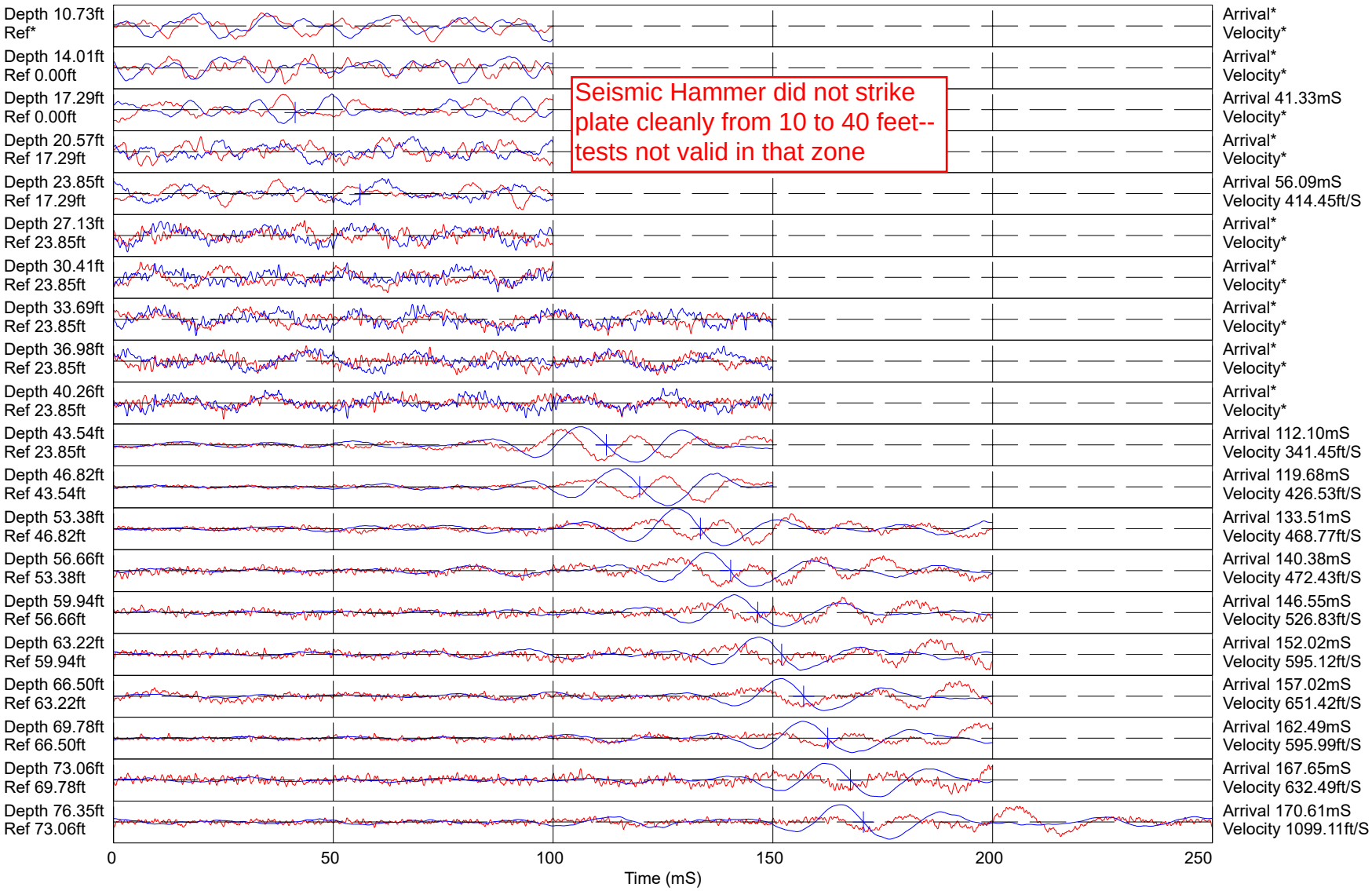
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21

SOUNDING
SCPT-2

DRAFT

NOTE: SCPT-2 WAS PRE-DRILLED TO 21 FEET.

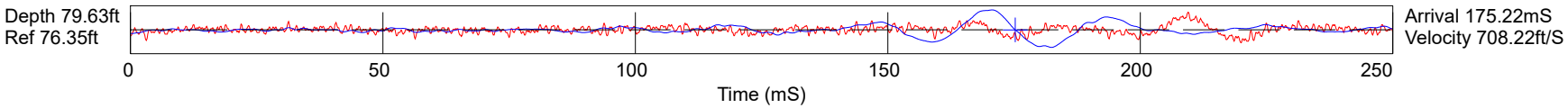
SEISMIC TEST



Hammer to Rod String Distance (ft): 7.87
* = Not Determined

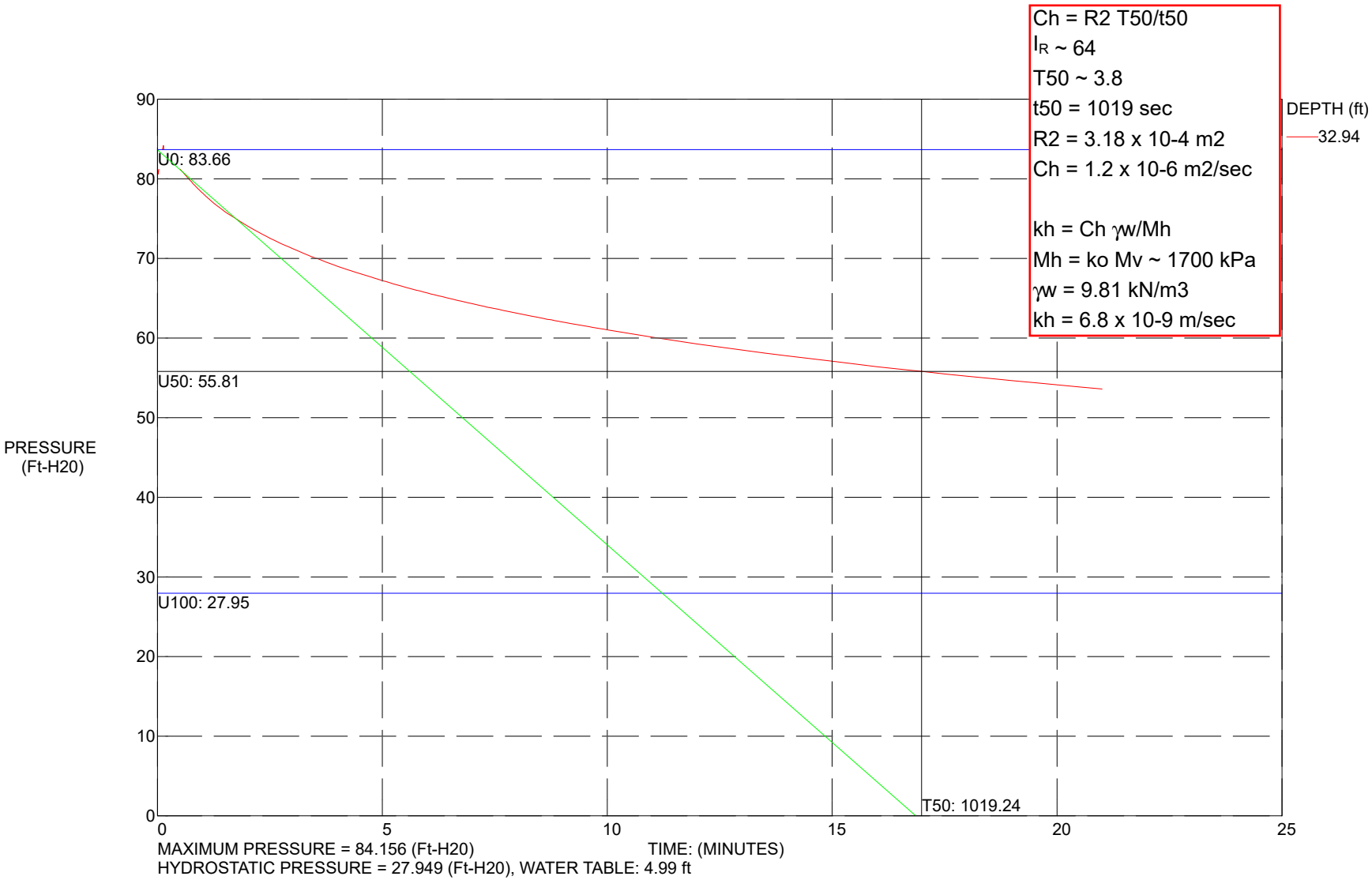
COMMENT:

SEISMIC TEST

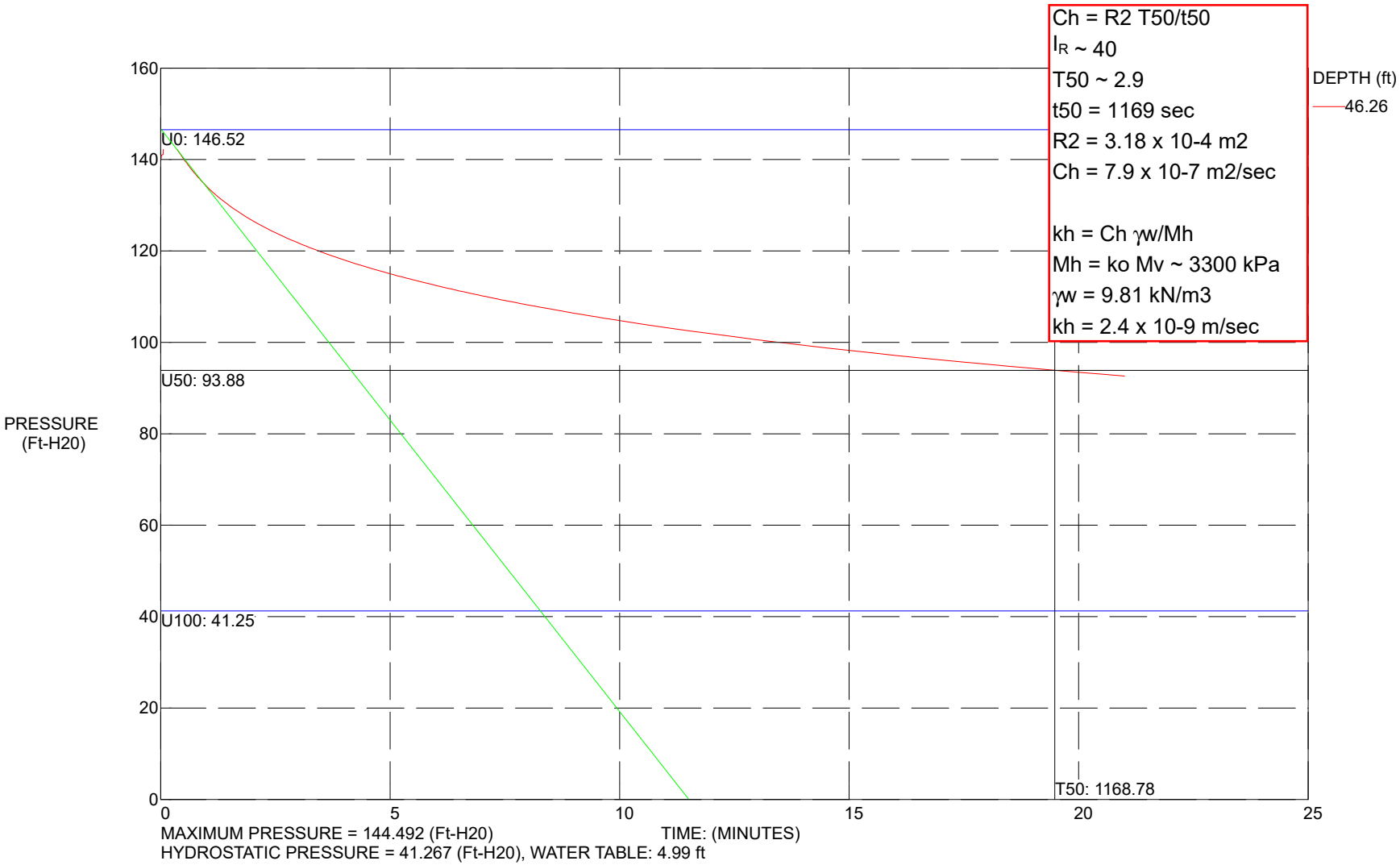


Hammer to Rod String Distance (ft): 7.87
* = Not Determined

COMMENT:


Ch = R2 T50/t50
I_R ~ 64
T50 ~ 3.8
t50 = 1019 sec
R2 = 3.18 x 10-4 m2
Ch = 1.2 x 10-6 m2/sec
kh = Ch γw/Mh
Mh = ko Mv ~ 1700 kPa
γw = 9.81 kN/m3
kh = 6.8 x 10-9 m/sec
DEPTH (ft)
32.94
PRESSURE
(Ft-H20)
U0: 83.66
U50: 55.81
U100: 27.95
T50: 1019.24
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
MAXIMUM PRESSURE = 84.156 (Ft-H20)
TIME: (MINUTES)
HYDROSTATIC PRESSURE = 27.949 (Ft-H20), WATER TABLE: 4.99 ft

DRAFT


Ch = R2 T50/t50
I_R ~ 40
T50 ~ 2.9
t50 = 1169 sec
R2 = 3.18 x 10-4 m2
Ch = 7.9 x 10-7 m2/sec
kh = Ch γw/Mh
Mh = ko Mv ~ 3300 kPa
γw = 9.81 kN/m3
kh = 2.4 x 10-9 m/sec
DEPTH (ft)
46.26
PRESSURE
(Ft-H20)
160
140
120
100
80
60
40
20
0
U0: 146.52
U50: 93.88
U100: 41.25
T50: 1168.78
0
5
10
15
20
25
TIME: (MINUTES)
MAXIMUM PRESSURE = 144.492 (Ft-H20)
HYDROSTATIC PRESSURE = 41.267 (Ft-H20), WATER TABLE: 4.99 ft

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

DRAFT

BORING LOG

BORING NO.	SCPT-03
SHEET 1 OF	2
FILE NO.	14123
SURFACE ELEV.	+3.75
RES. ENGR.	RAMIRO OSSIO

PROJECT: ALEXANDRIA, VA WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12:20				Boring drilled without sampling for SCPT pre-drill. See SCPT-03 log.			DRILLED	
11/9/2021							AHEAD	
Tuesday							3 1/4" HSA	
Clear								
70°F						5		
						9.5		End of predrill boring at 9.5'. Backfilled with pea gravel.
12:40						10		
						15		
						20		
						25		
						30		
						35		
						40		
						45		
						50		

DRAFT

MRCE
built on firm foundations
Mueser Rutledge Consulting Engineers
14 Penn Plaza, 225 W. 34th Street
New York, NY 10122

BORING NO. SCPT-03
SHEET 2 **OF** 2

PROJECT ALEXANDRIA, VA WATERFRONT IMPLEMENTATION PROJECT
FILE NO. 14123
LOCATION ALEXANDRIA, VA
SURFACE ELEV. +3.75
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG MAKE AND MODEL:

TRUCK
SKID
BARGE
OTHER TRACK CME-55

TYPE OF FEED DURING CORING

MECHANICAL
HYDRAULIC X
OTHER

CASING USED [ ] YES [X] NO

	DIA., IN.	DEPTH, FT. FROM	TO
TRUCK			
SKID			
BARGE			

TYPE AND SIZE OF

D-SAMPLER
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO

DIAMETER OF ROTARY BIT, IN. N/A
TYPE OF DRILLING MUD N/A

AUGER USED [X] YES [ ] NO

TYPE AND DIAMETER, IN. 3 1/4 HOLLOW STEM AUGER

*CASING HAMMER, LBS. N/A AVERAGE FALL, IN. N/A
SAMPLER HAMMER, LBS. N/A AVERAGE FALL, IN. N/A
*HAMMER TYPE (DONUT/SAFETY/AUTOMATIC): N/A
*HAMMER RATE, BLOWS PER MINUTE (BPM): N/A

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION

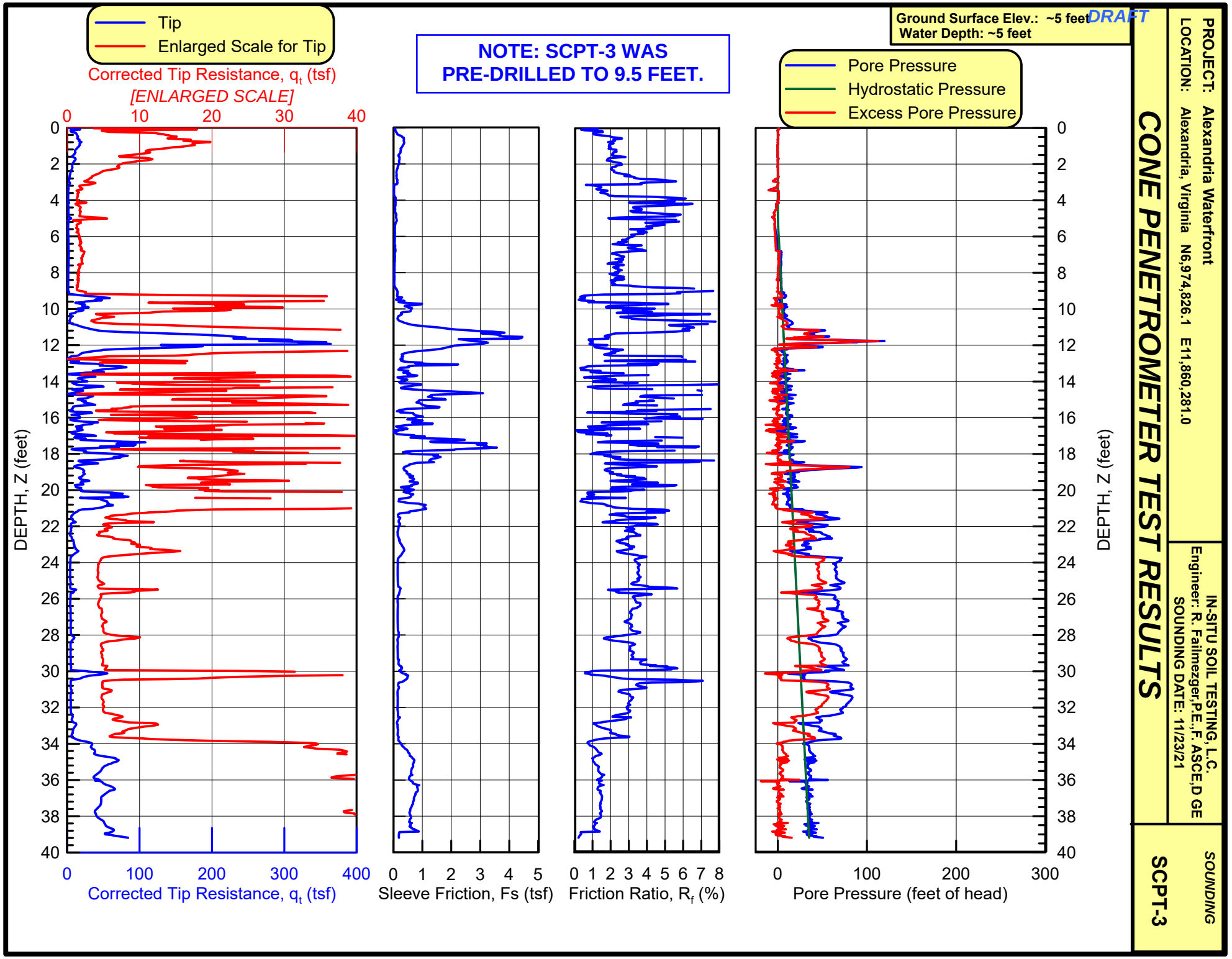
PIEZOMETER INSTALLED [ ] YES [X] NO **SKETCH SHOWN ON**

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	9.5	NO. OF 3" SHELBY TUBE SAMPLES	0
3.5" DIA. U-SAMPLE BORING	LIN. FT.	0	NO. OF 3" UNDISTURBED SAMPLES	0
CORE DRILLING IN ROCK	LIN. FT.	0	OTHER:	

BORING CONTRACTOR FREE STATE DRILLING INC
DRILLER RON STIDHAM **HELPERS** 2 HELPERS
REMARKS PREDRILLED SCPT BORING BACKFILLED WITH PEA GRAVEL TO EXISTING GRADE.
RESIDENT ENGINEER RAMIRO OSSIO **DATE** 11-09-21
CLASSIFICATION CHECK: FRED FALCONE **TYPING CHECK:** RAMIRO OSSIO


Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
NOTE: SCPT-3 WAS PRE-DRILLED TO 9.5 FEET.
Ground Surface Elev.: ~5 feet
Water Depth: ~5 feet
DRAFT
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
DEPTH, Z (feet)
Corrected Tip Resistance, q_t (tsf)
Sleeve Friction, Fs (tsf)
Friction Ratio, R_f (%)
Pore Pressure (feet of head)
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia N6,974,826.1 E11,860,281.0
CONE PENETROMETER TEST RESULTS
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21
SOUNDING
SCPT-3

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~5 feet
Water Depth: ~5 feet

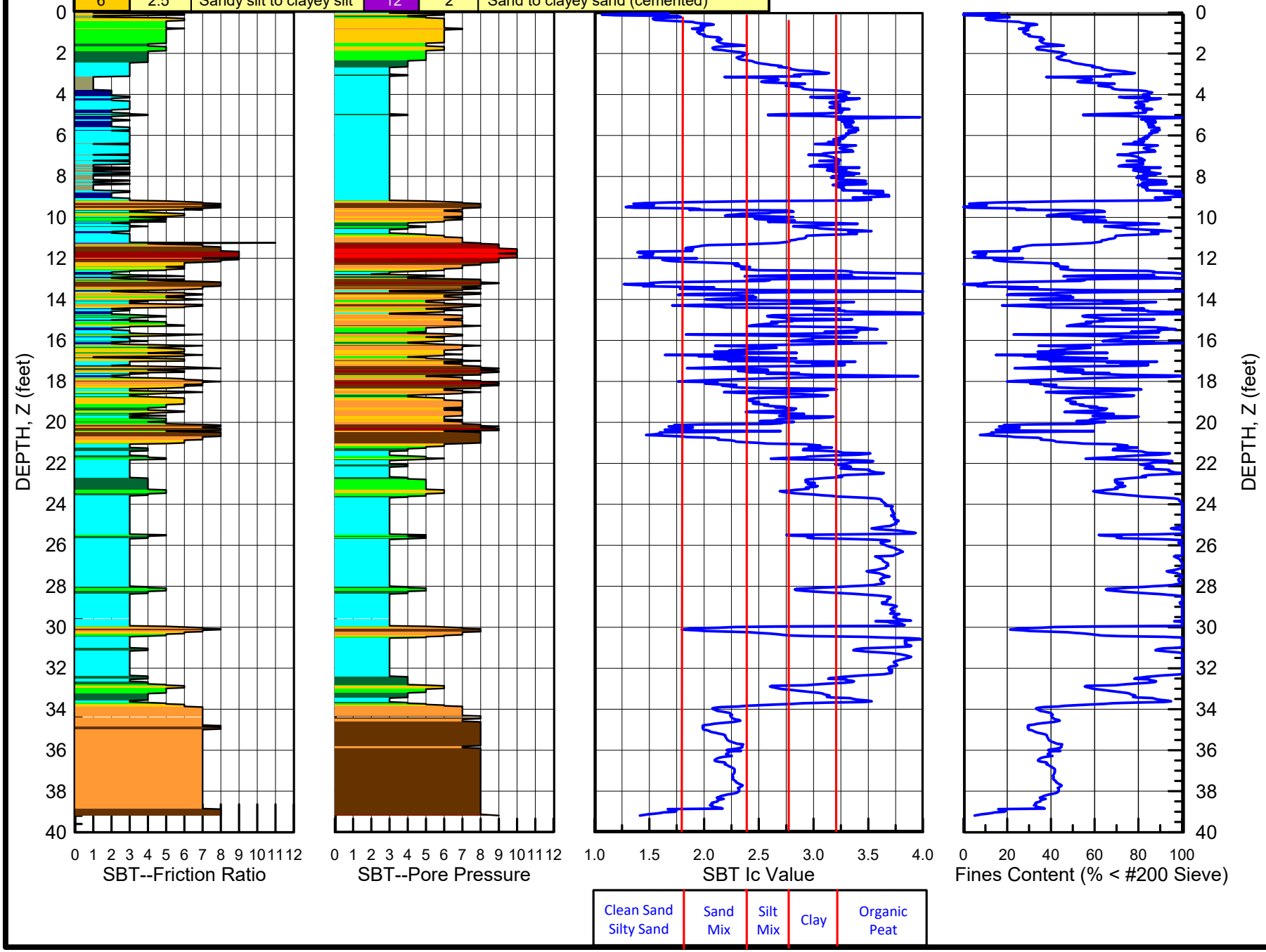
DRAFT

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia N6,974,826.1 E11,860,281.0

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21

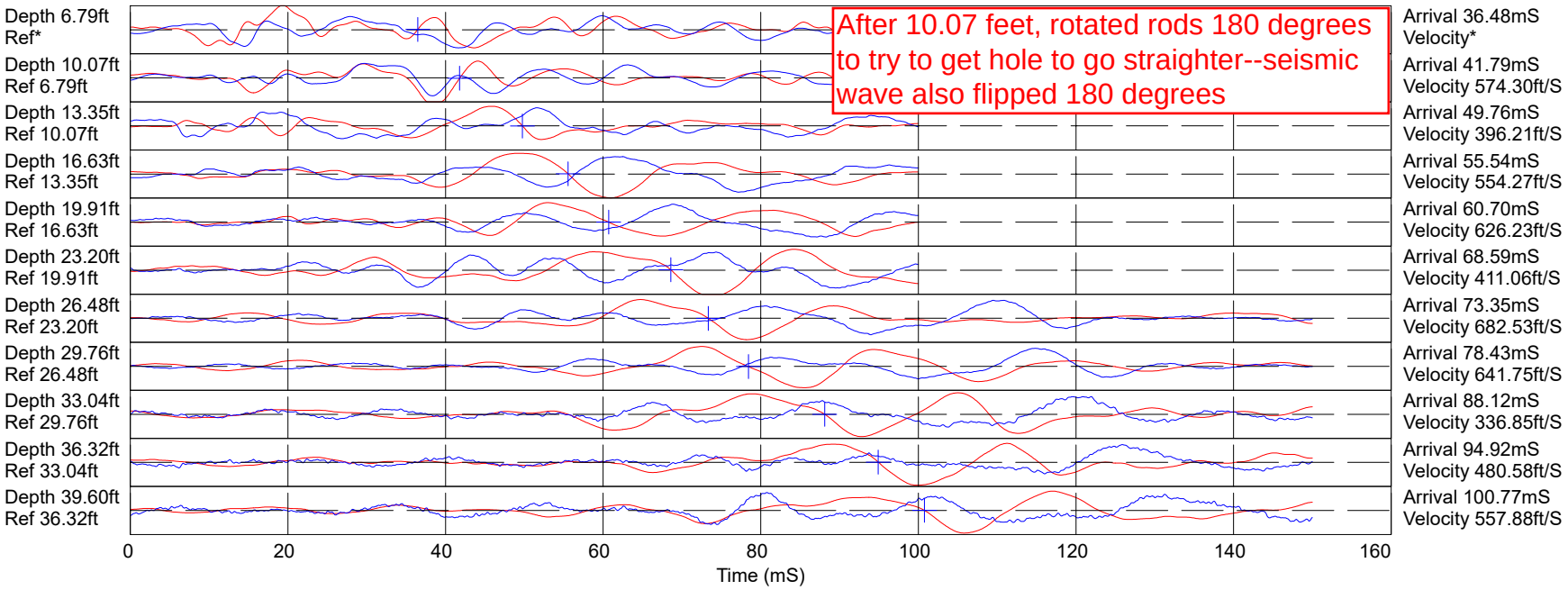
SOUNDING
SCPT-3



DRAFT

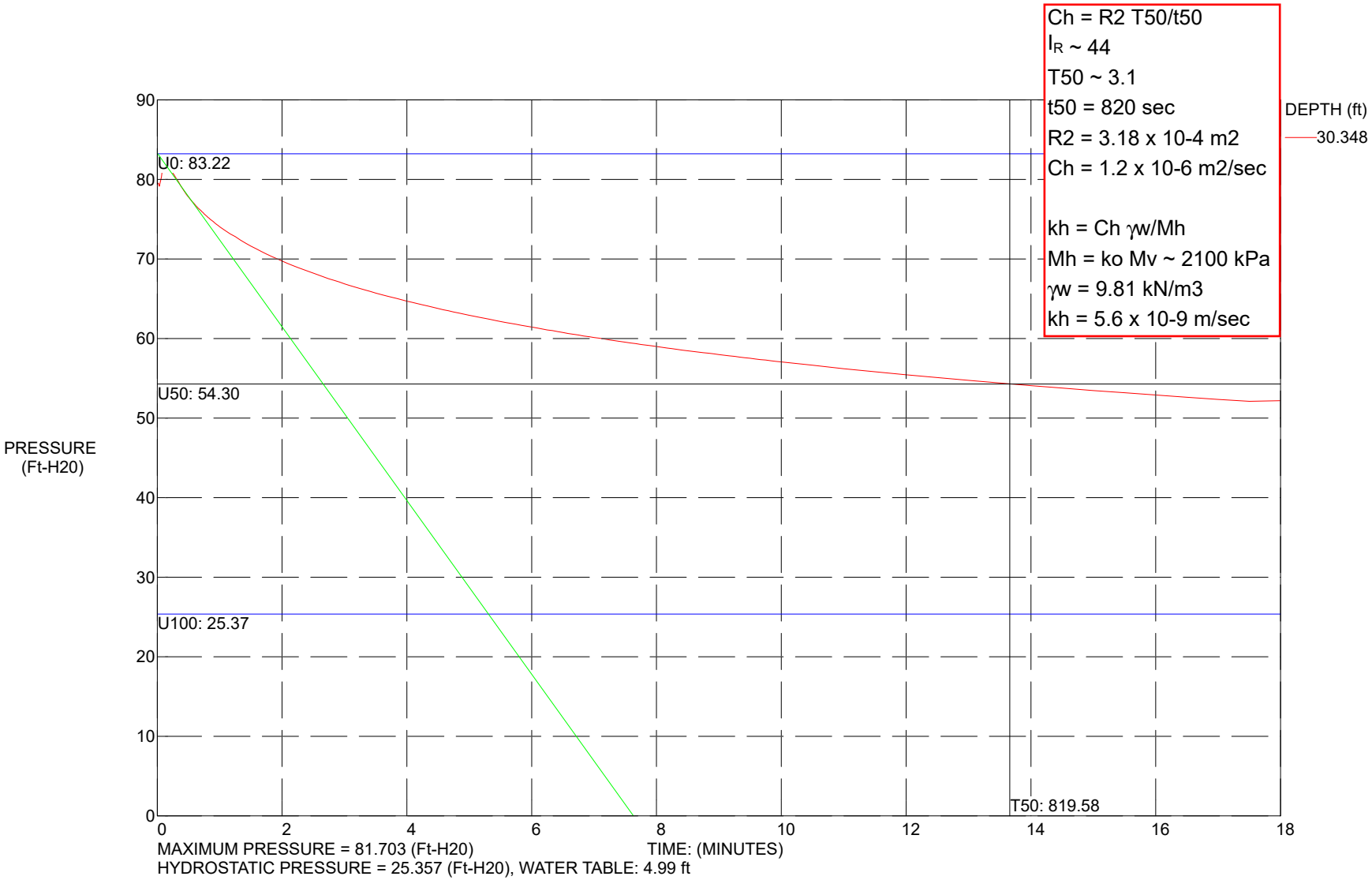
NOTE: SCPT-3 WAS PRE-DRILLED TO 9.5 FEET.

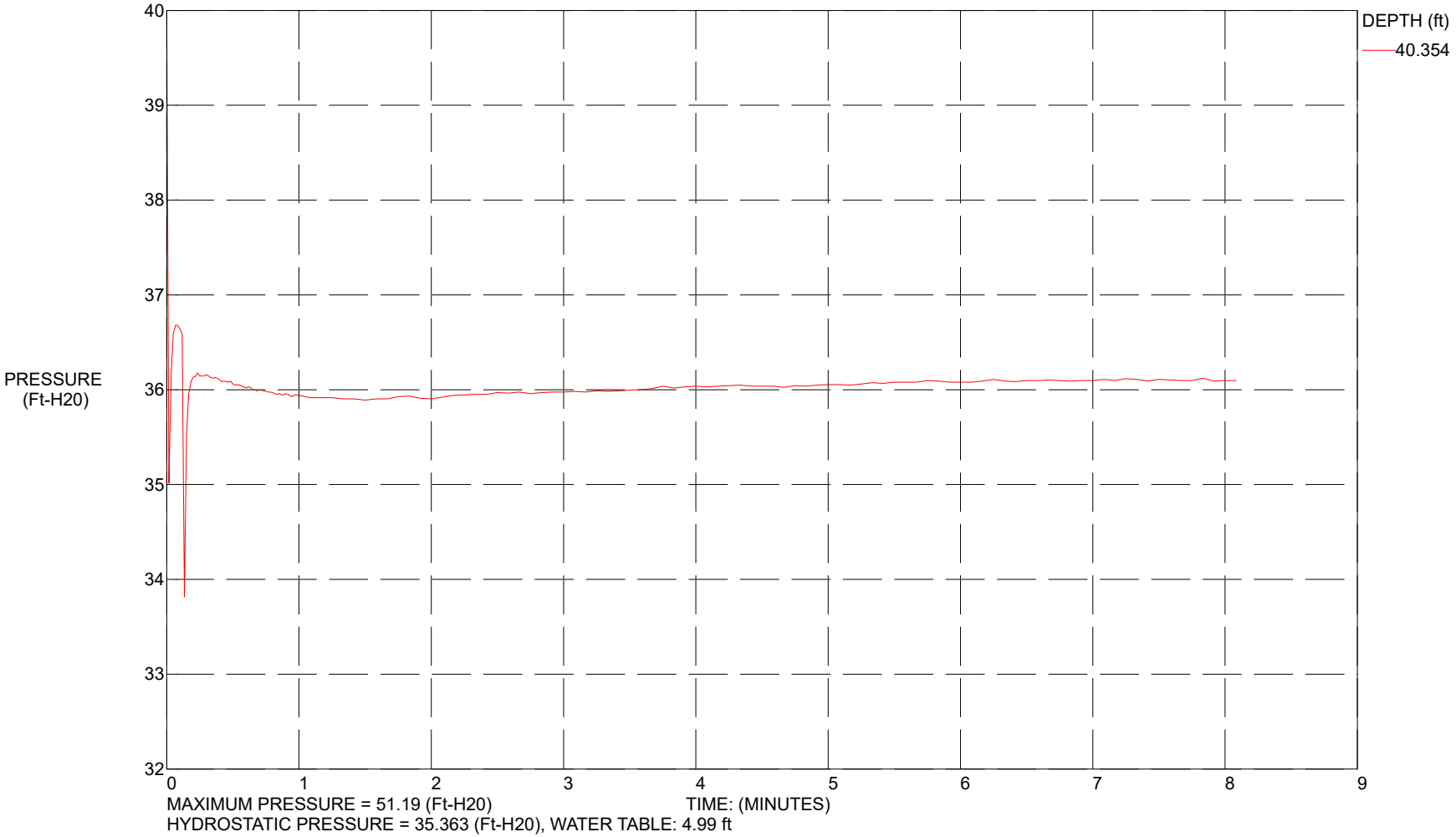
SEISMIC TEST



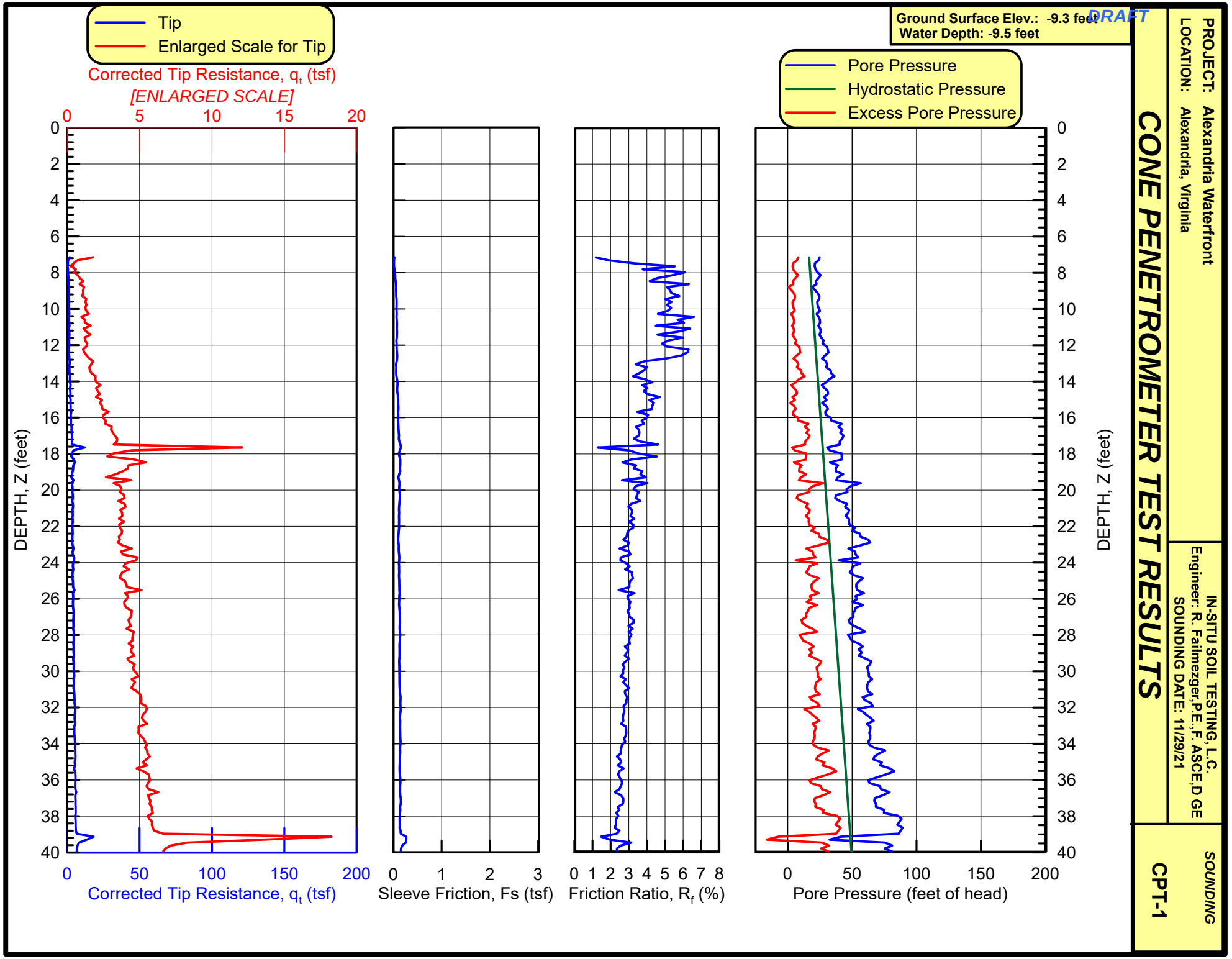
Hammer to Rod String Distance (ft): 3.28
* = Not Determined

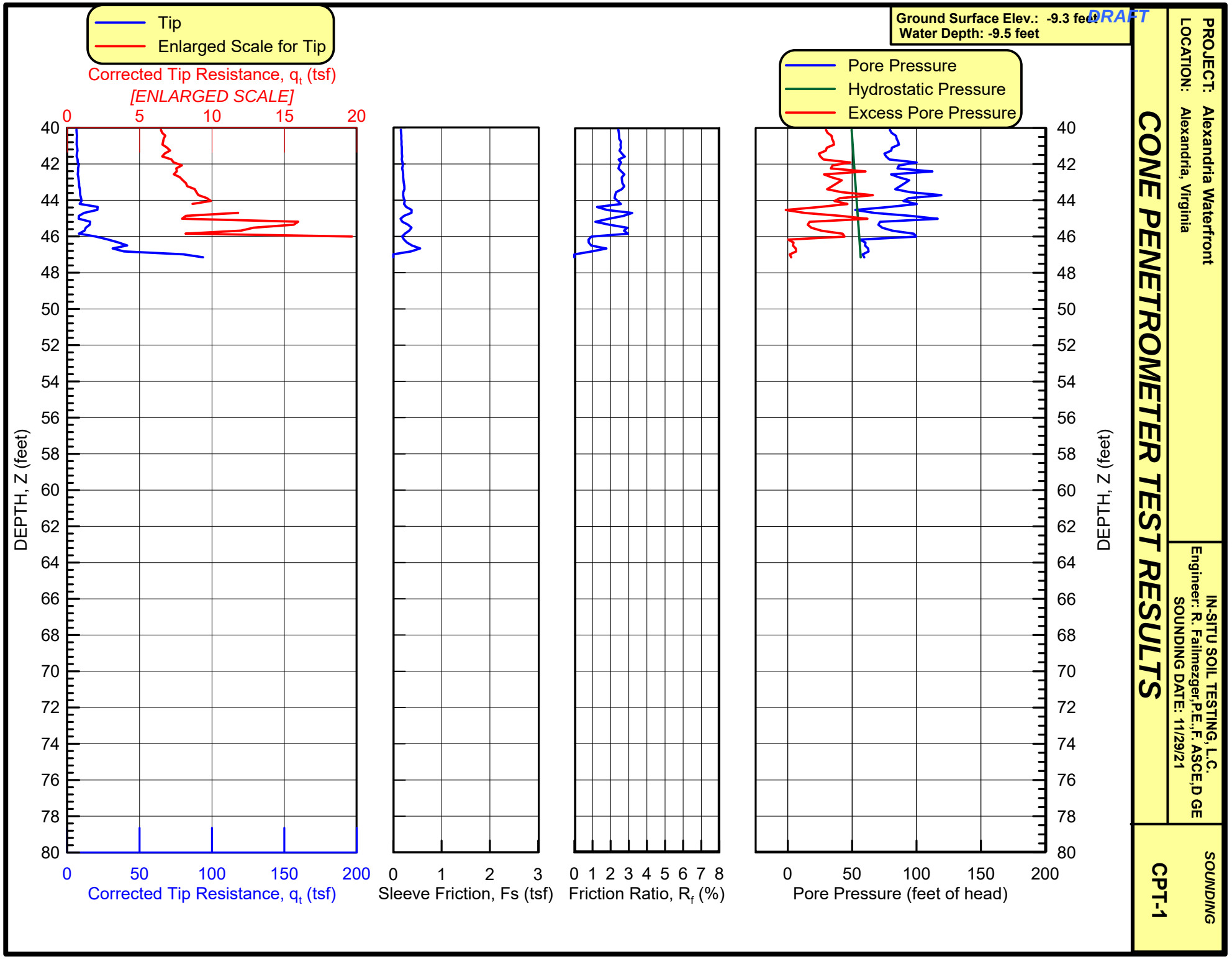
COMMENT:


Ch = R2 T50/t50
I_R ~ 44
T50 ~ 3.1
t50 = 820 sec
R2 = 3.18 x 10-4 m2
Ch = 1.2 x 10-6 m2/sec
kh = Ch γw/Mh
Mh = ko Mv ~ 2100 kPa
γw = 9.81 kN/m3
kh = 5.6 x 10-9 m/sec
DEPTH (ft)
30.348
U0: 83.22
U50: 54.30
U100: 25.37
T50: 819.58
PRESSURE
(Ft-H20)
0
10
20
30
40
50
60
70
80
90
0
2
4
6
8
10
12
14
16
18
MAXIMUM PRESSURE = 81.703 (Ft-H20)
TIME: (MINUTES)
HYDROSTATIC PRESSURE = 25.357 (Ft-H20), WATER TABLE: 4.99 ft


PRESSURE
(Ft-H20)
40
39
38
37
36
35
34
33
32
0
1
2
3
4
5
6
7
8
9
DEPTH (ft)
40.354
MAXIMUM PRESSURE = 51.19 (Ft-H20)
TIME: (MINUTES)
HYDROSTATIC PRESSURE = 35.363 (Ft-H20), WATER TABLE: 4.99 ft

Water CPT Logs


Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
0 5 10 15 20
DEPTH, Z (feet)
0 50 100 150 200
Corrected Tip Resistance, q_t (tsf)
0 1 2 3
Sleeve Friction, Fs (tsf)
0 1 2 3 4 5 6 7 8
Friction Ratio, R_f (%)
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
0 50 100 150 200
Pore Pressure (feet of head)
DEPTH, Z (feet)
Ground Surface Elev.: -9.3 feet
Water Depth: -9.5 feet
DRAFT
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia
CONE PENETROMETER TEST RESULTS
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/29/21
SOUNDING
CPT-1


Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
0 5 10 15 20
Ground Surface Elev.: -9.3 feet
Water Depth: -9.5 feet
DRAFT
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
DEPTH, Z (feet)
40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80
0 50 100 150 200
Corrected Tip Resistance, q_t (tsf)
0 1 2 3
Sleeve Friction, Fs (tsf)
0 1 2 3 4 5 6 7 8
Friction Ratio, R_f (%)
0 50 100 150 200
Pore Pressure (feet of head)
DEPTH, Z (feet)
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia
CONE PENETROMETER TEST RESULTS
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/29/21
CPT-1
SOUNDING

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: -9.3 feet
Water Depth: -9.5 feet

DRAFT

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/29/21

CPT-1

SOUNDING

DEPTH, Z (feet)

SBT--Friction Ratio

SBT--Pore Pressure

SBT Ic Value

Fines Content (% < #200 Sieve)

Clean Sand Silty Sand	Sand Mix	Silt Mix	Clay	Organic Peat

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: -9.3 feet
Water Depth: -9.5 feet

DRAFT

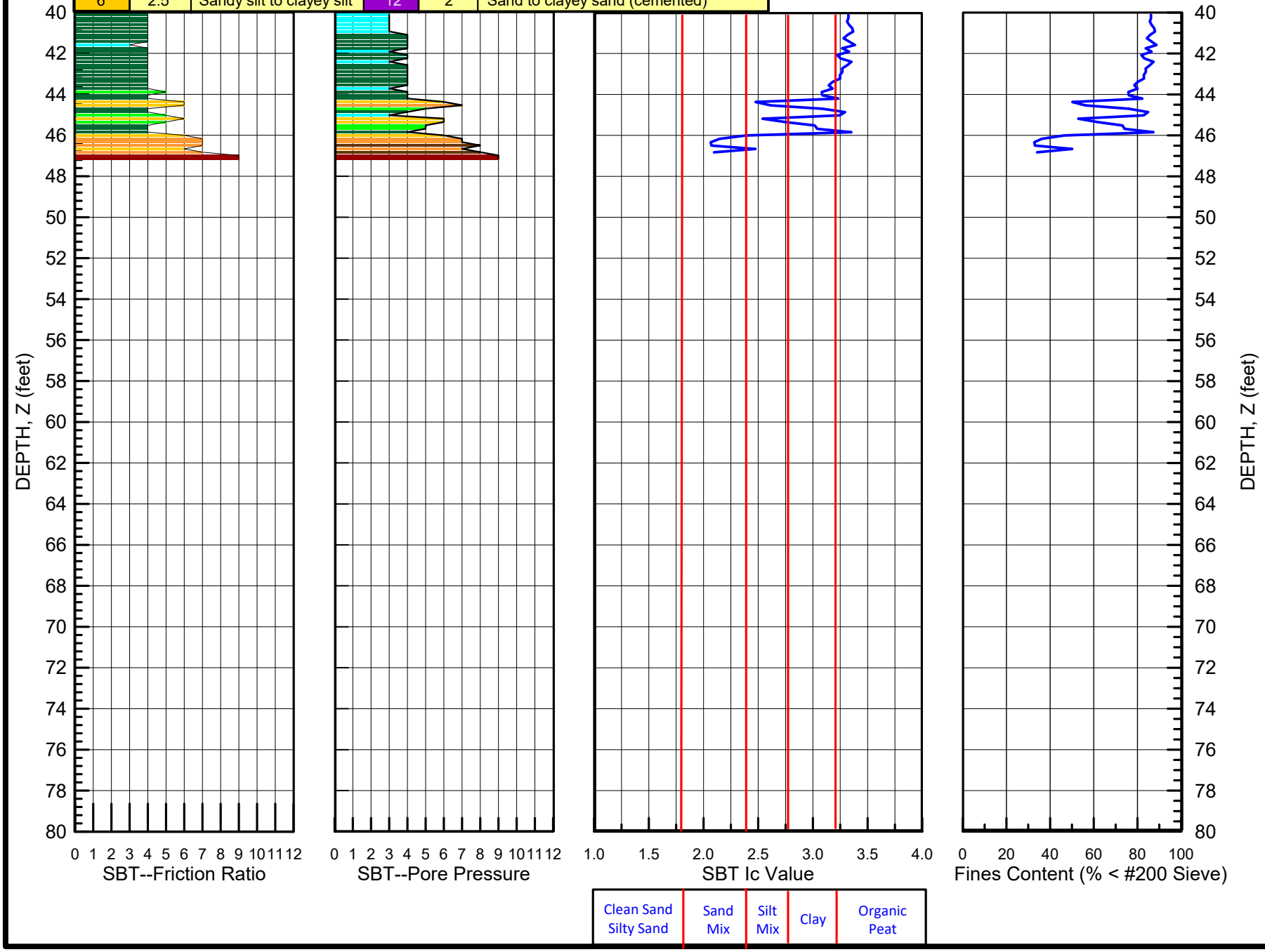
CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

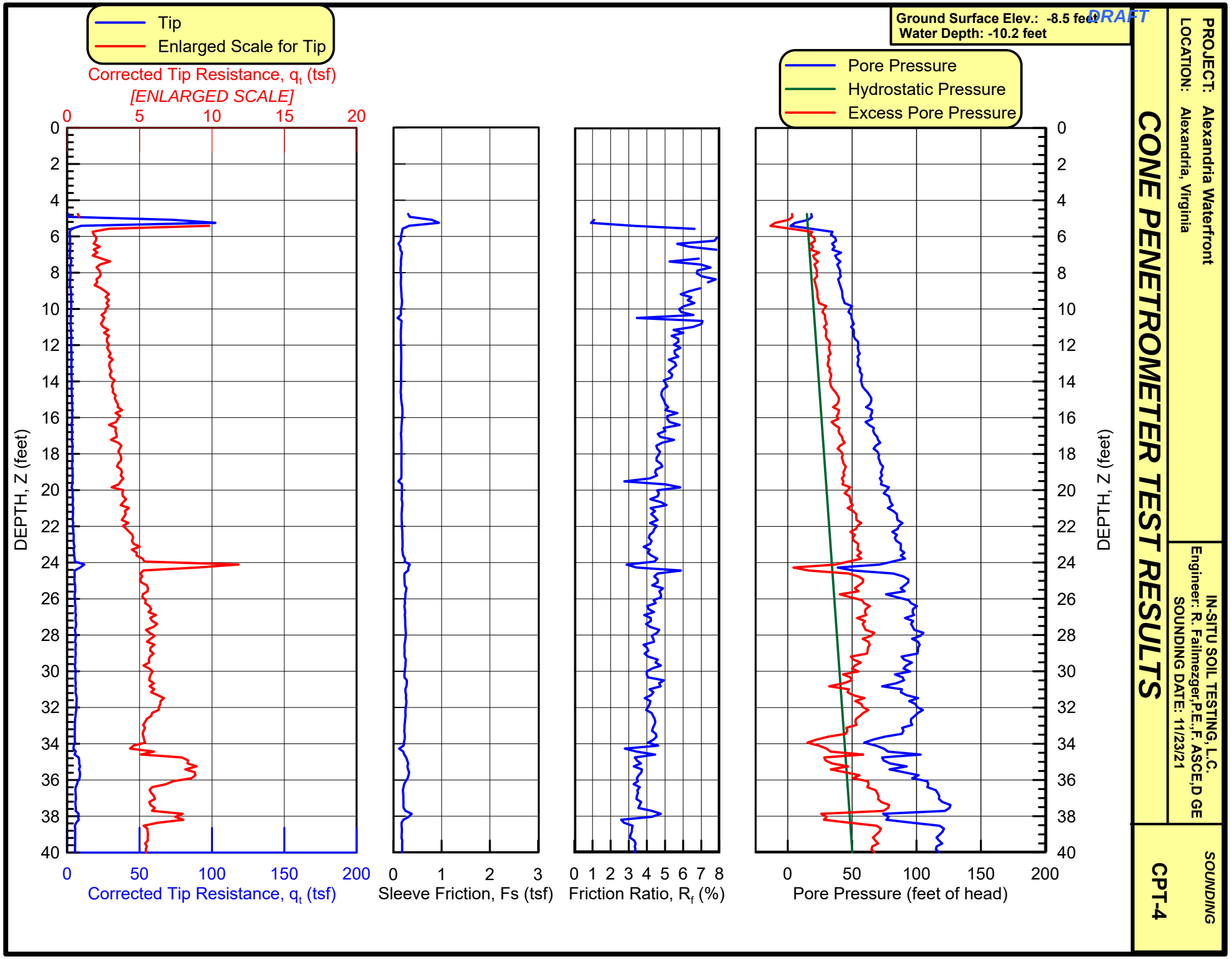
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia

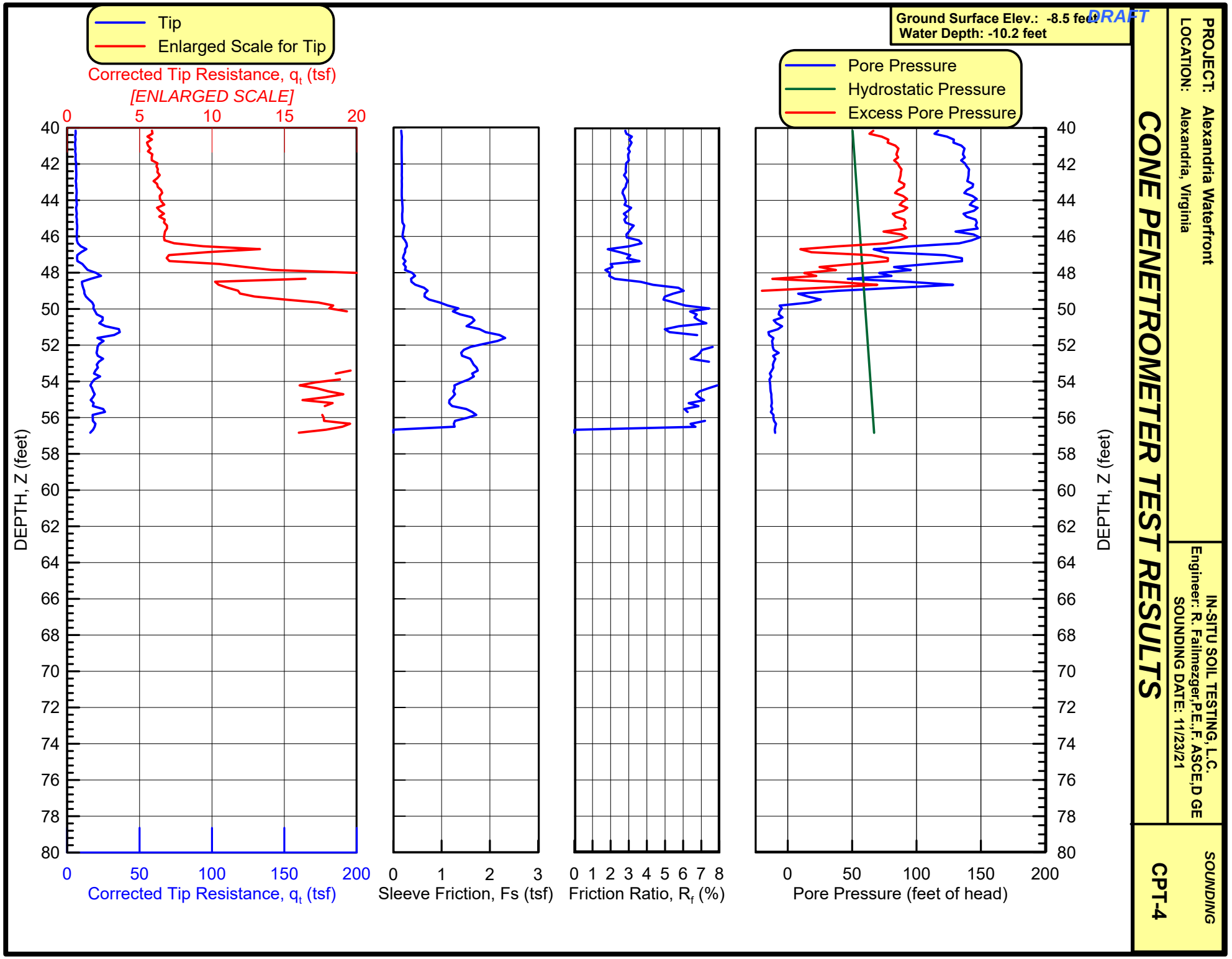
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/29/21

CPT-1

SOUNDING




Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
0 5 10 15 20
DEPTH, Z (feet)
0 50 100 150 200
Corrected Tip Resistance, q_t (tsf)
0 1 2 3
Sleeve Friction, Fs (tsf)
0 1 2 3 4 5 6 7 8
Friction Ratio, R_f (%)
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
0 50 100 150 200
Pore Pressure (feet of head)
DEPTH, Z (feet)
Ground Surface Elev.: -8.5 feet
Water Depth: -10.2 feet
DRAFT
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia
CONE PENETROMETER TEST RESULTS
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21
SOUNDING
CPT-4


Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
0 5 10 15 20
DEPTH, Z (feet)
40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80
0 50 100 150 200
Corrected Tip Resistance, q_t (tsf)
0 1 2 3
Sleeve Friction, Fs (tsf)
0 1 2 3 4 5 6 7 8
Friction Ratio, R_f (%)
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
0 50 100 150 200
Pore Pressure (feet of head)
DEPTH, Z (feet)
Ground Surface Elev.: -8.5 feet
Water Depth: -10.2 feet
DRAFT
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia
CONE PENETROMETER TEST RESULTS
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21
CPT-4
SOUNDING

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: -8.5 feet
Water Depth: -10.2 feet

DRAFT

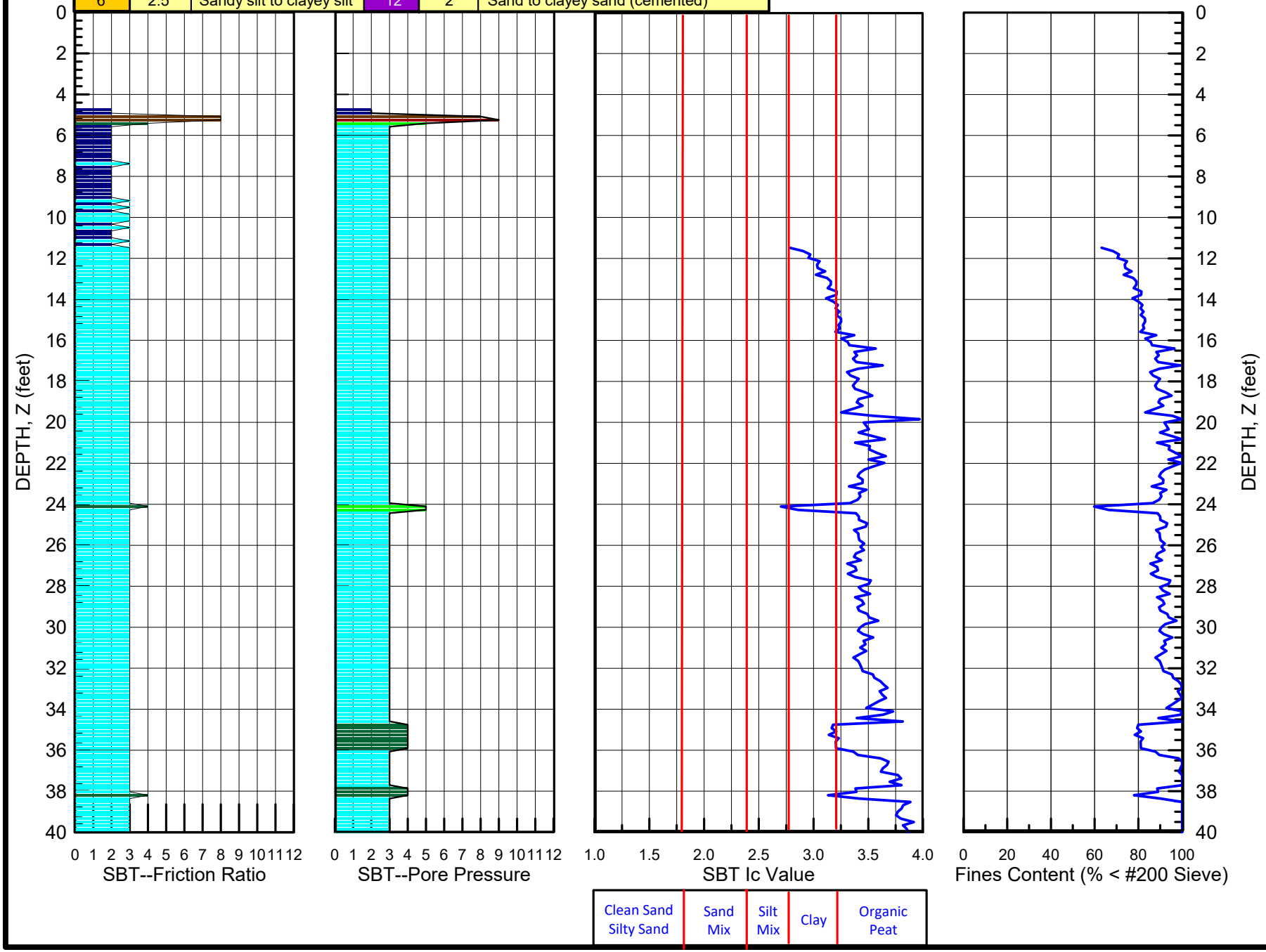
CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21

CPT-4

SOUNDING



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: -8.5 feet
Water Depth: -10.2 feet

DRAFT

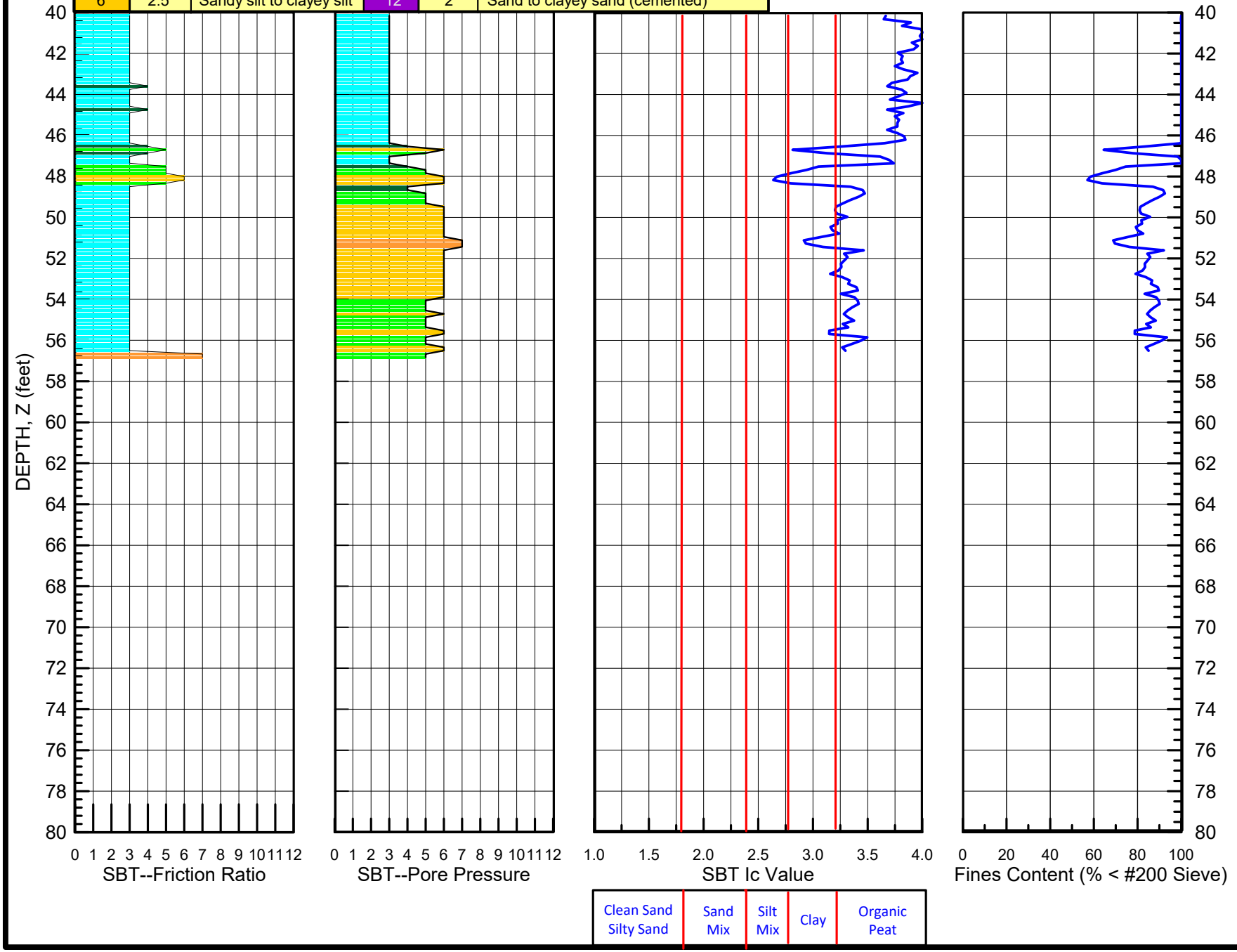
CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

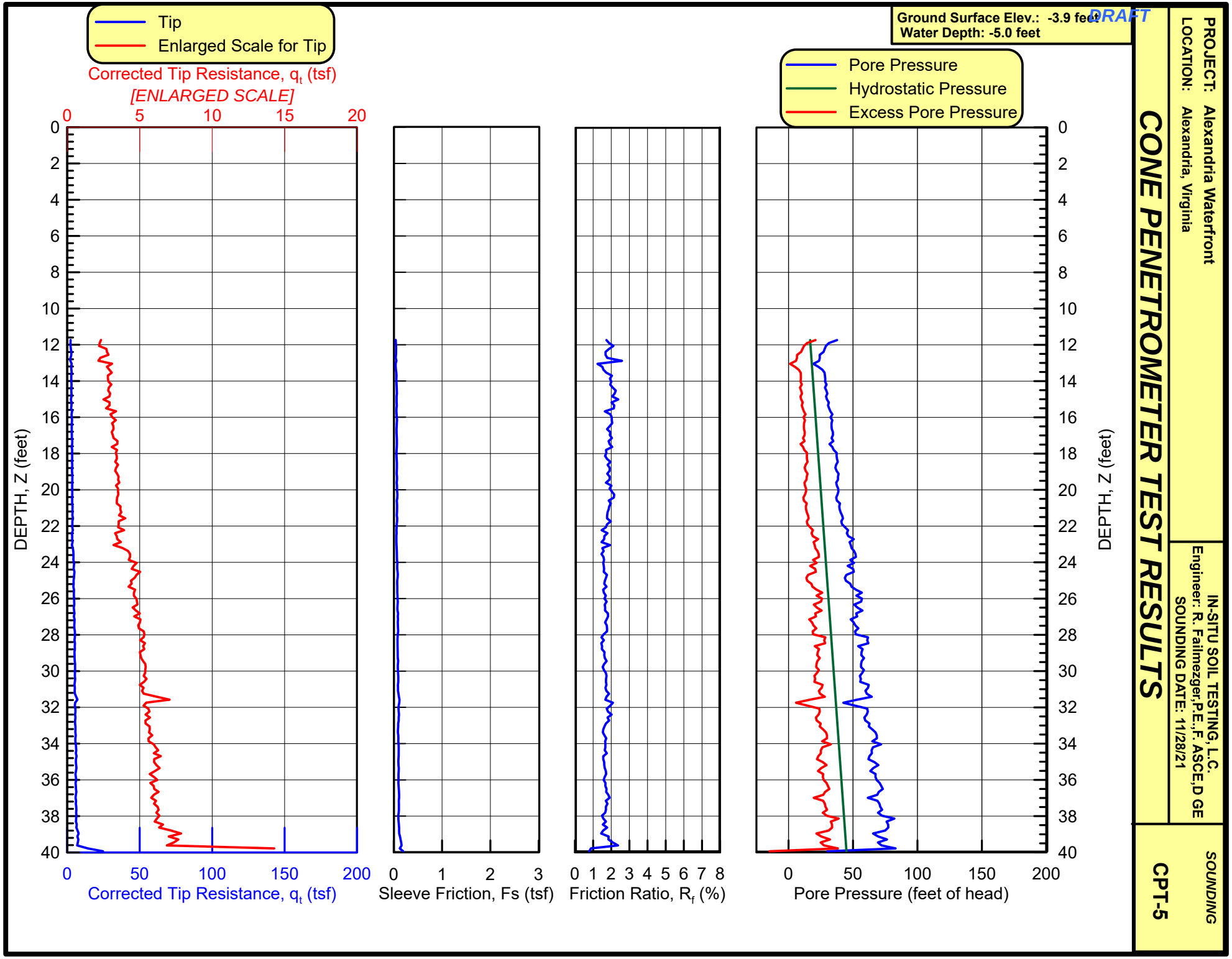
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia

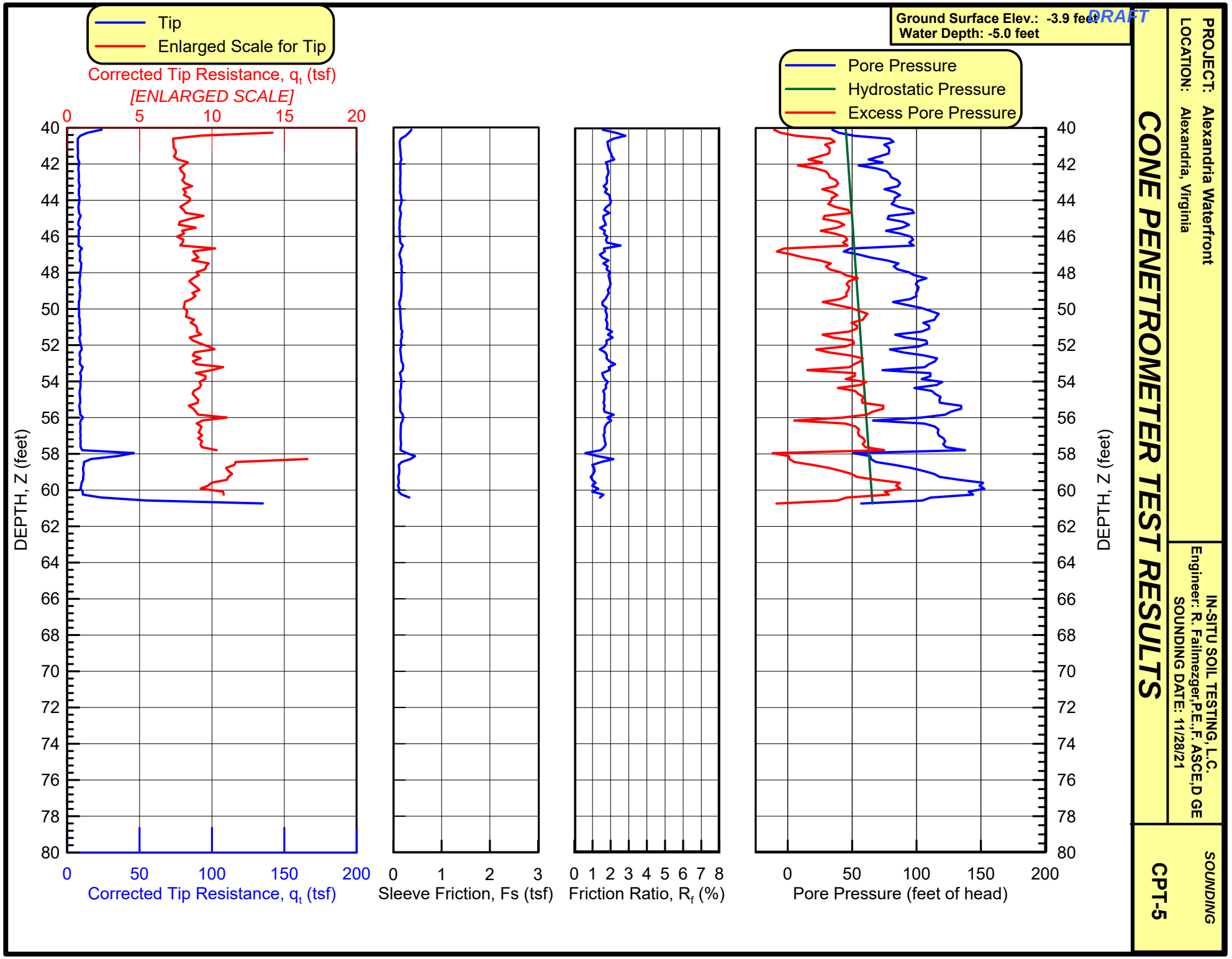
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/23/21

CPT-4

SOUNDING




Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
0 5 10 15 20
DEPTH, Z (feet)
0 50 100 150 200
Corrected Tip Resistance, q_t (tsf)
0 1 2 3
Sleeve Friction, Fs (tsf)
0 1 2 3 4 5 6 7 8
Friction Ratio, R_f (%)
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
0 50 100 150 200
Pore Pressure (feet of head)
DEPTH, Z (feet)
Ground Surface Elev.: -3.9 feet
Water Depth: -5.0 feet
DRAFT
CONE PENETROMETER TEST RESULTS
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/28/21
SOUNDING
CPT-5


Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
0 5 10 15 20
Ground Surface Elev.: -3.9 feet
Water Depth: -5.0 feet
DRAFT
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
DEPTH, Z (feet)
40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80
0 50 100 150 200
Corrected Tip Resistance, q_t (tsf)
0 1 2 3
Sleeve Friction, Fs (tsf)
0 1 2 3 4 5 6 7 8
Friction Ratio, R_f (%)
0 50 100 150 200
Pore Pressure (feet of head)
CONE PENETROMETER TEST RESULTS
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/28/21
CPT-5
SOUNDING

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: -3.9 feet
Water Depth: -5.0 feet

DRAFT

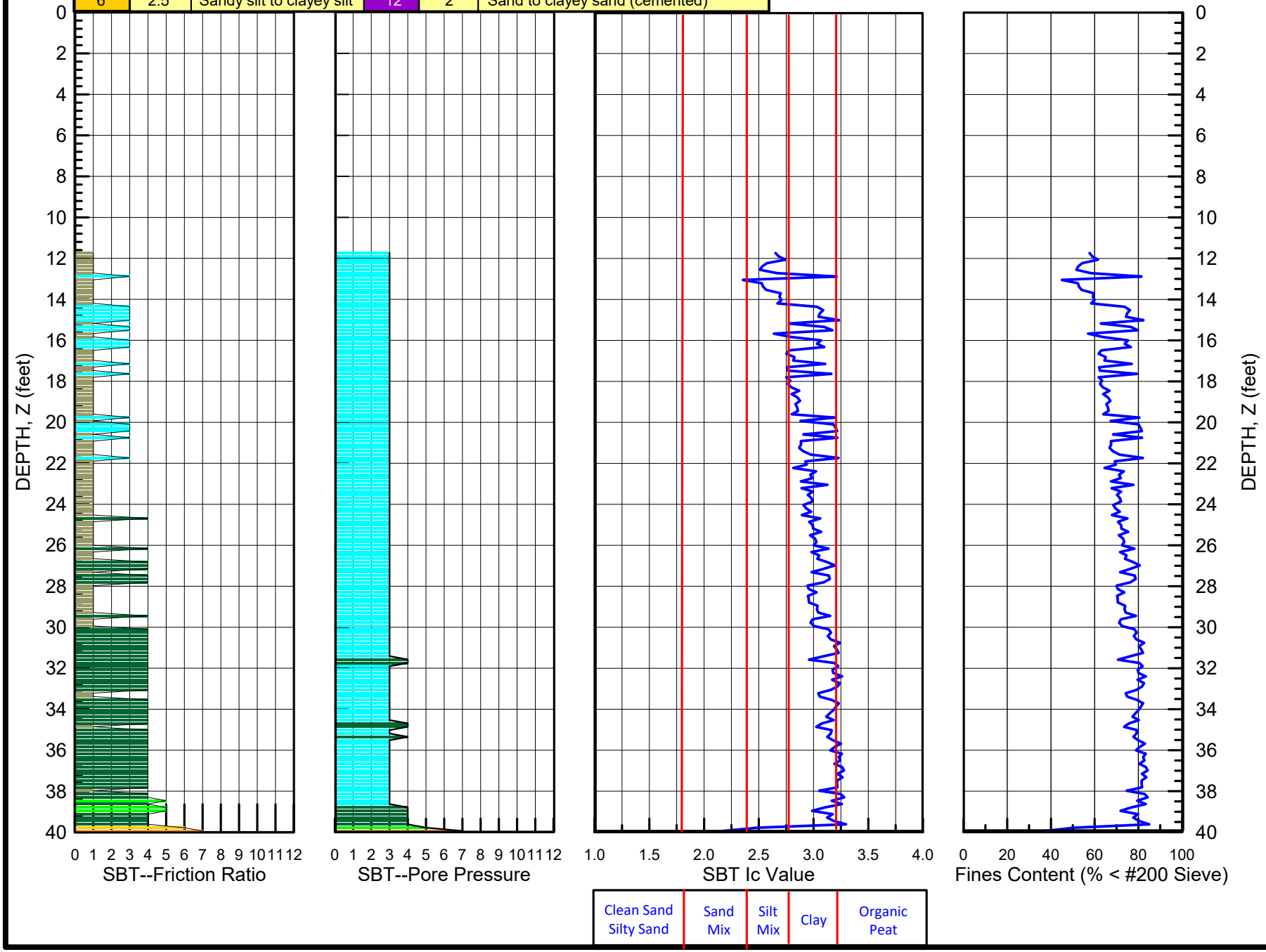
CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/28/21

CPT-5

SOUNDING



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: -3.9 feet
Water Depth: -5.0 feet

DRAFT

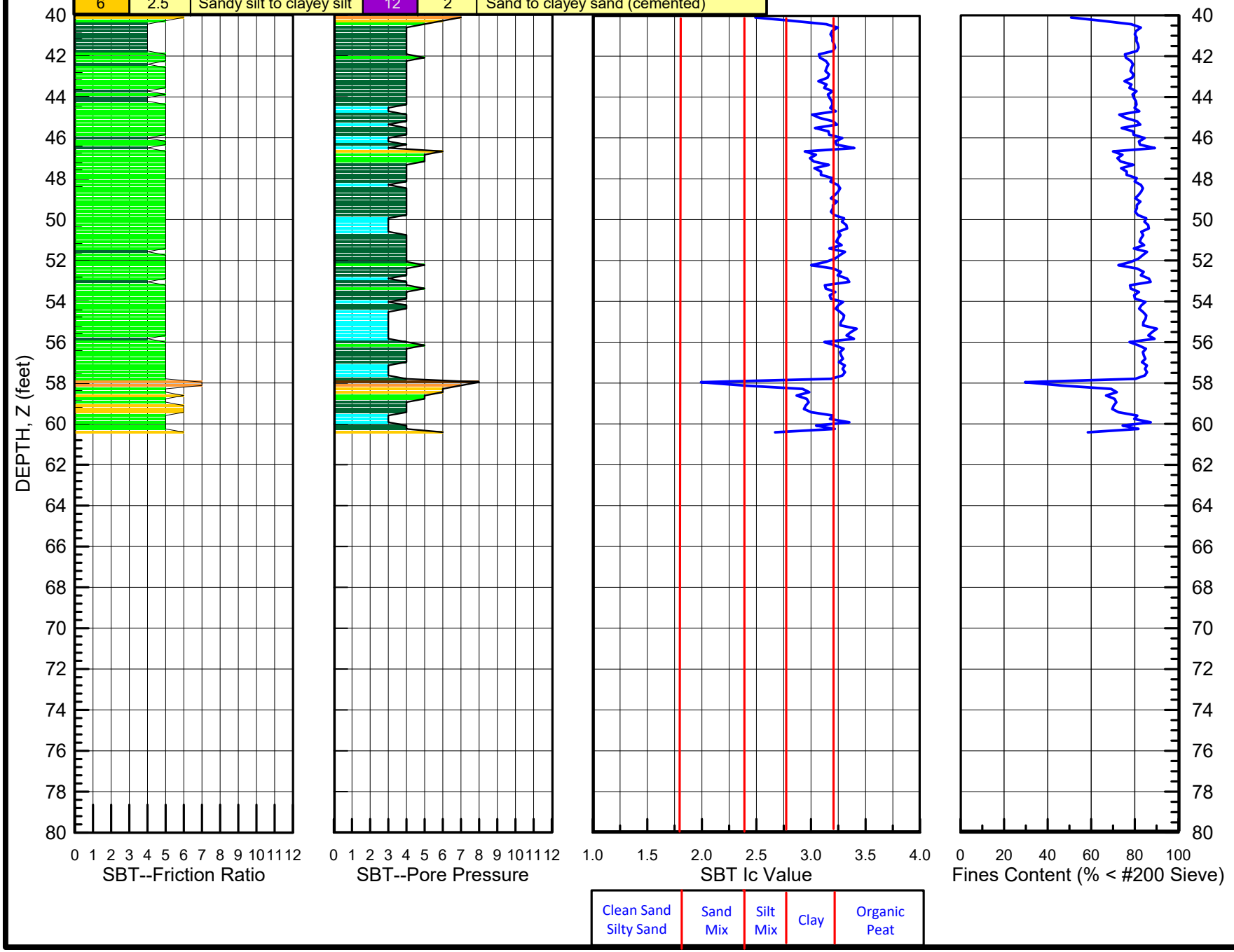
CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

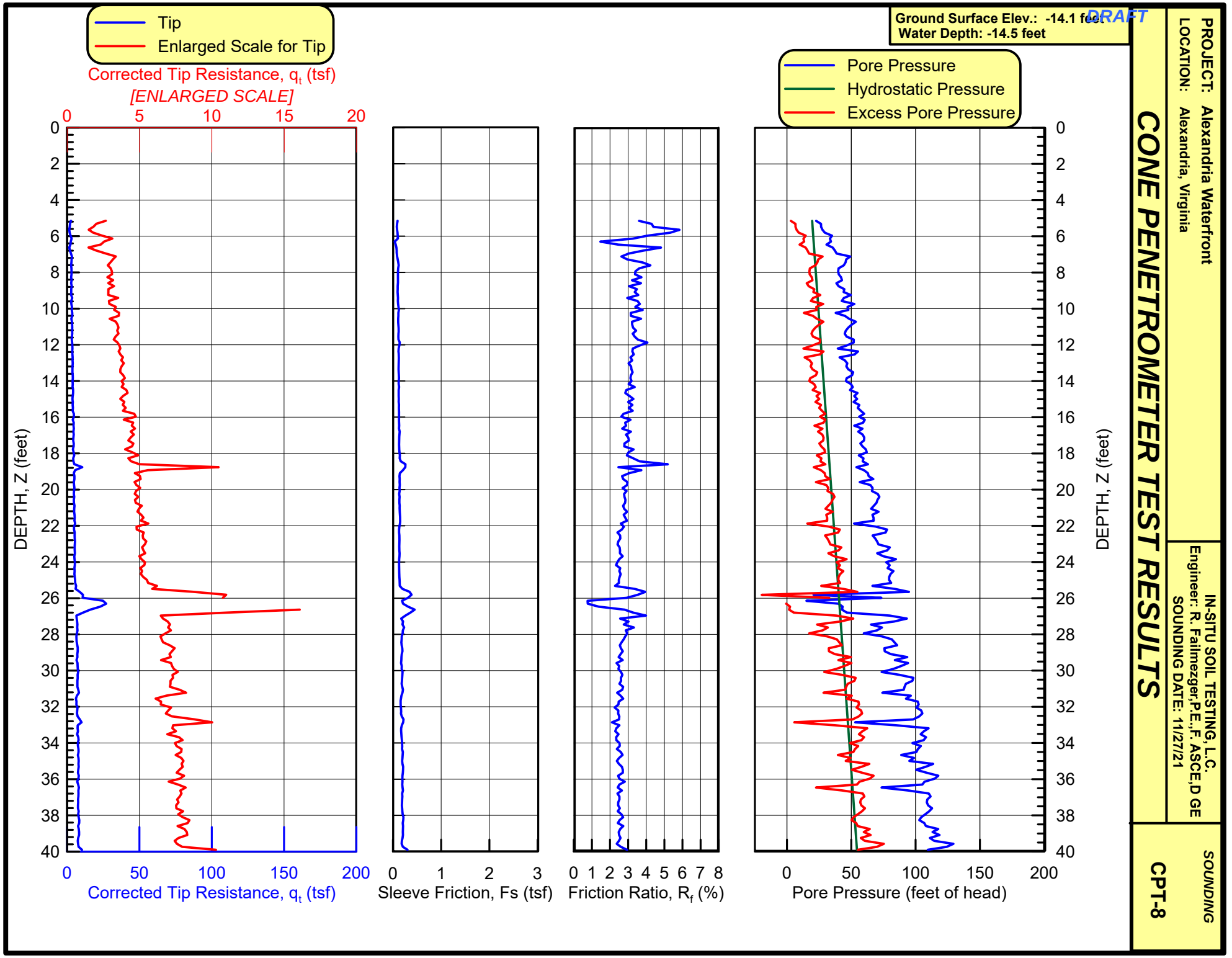
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia

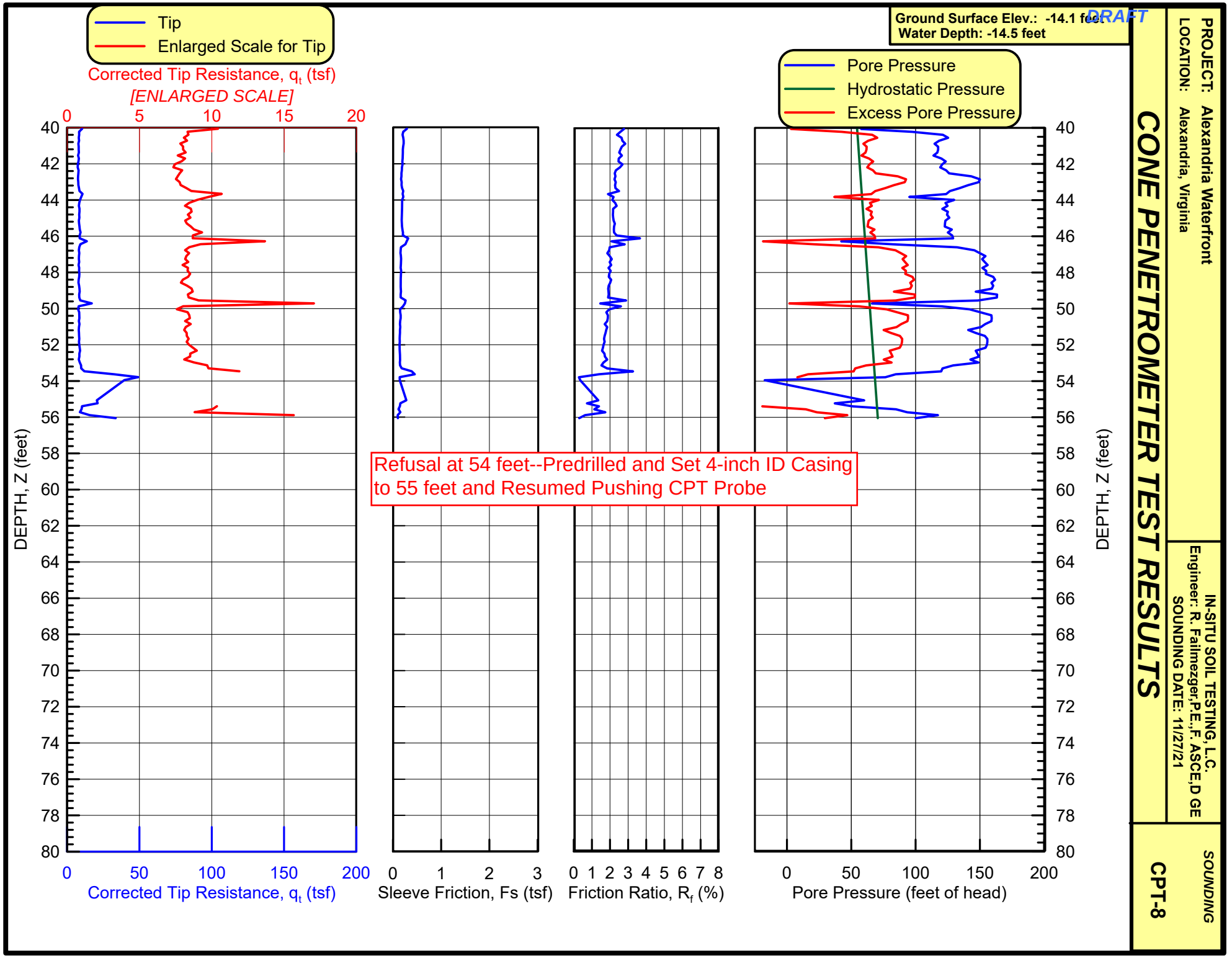
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/28/21

CPT-5

SOUNDING




Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
0 5 10 15 20
DEPTH, Z (feet)
0 50 100 150 200
Corrected Tip Resistance, q_t (tsf)
0 1 2 3
Sleeve Friction, Fs (tsf)
0 1 2 3 4 5 6 7 8
Friction Ratio, R_f (%)
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
0 50 100 150 200
Pore Pressure (feet of head)
DEPTH, Z (feet)
Ground Surface Elev.: -14.1 feet
Water Depth: -14.5 feet
DRAFT
CONE PENETROMETER TEST RESULTS
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/27/21
CPT-8
SOUNDING


Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
0 5 10 15 20
Ground Surface Elev.: -14.1 feet
Water Depth: -14.5 feet
DRAFT
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
DEPTH, Z (feet)
40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80
Refusal at 54 feet--Predrilled and Set 4-inch ID Casing to 55 feet and Resumed Pushing CPT Probe
0 50 100 150 200
Corrected Tip Resistance, q_t (tsf)
0 1 2 3
Sleeve Friction, Fs (tsf)
0 1 2 3 4 5 6 7 8
Friction Ratio, R_f (%)
0 50 100 150 200
Pore Pressure (feet of head)
CONE PENETROMETER TEST RESULTS
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/27/21
CPT-8
SOUNDING

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: -14.1 feet
Water Depth: -14.5 feet

DRAFT

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/27/21

CPT-8

SOUNDING

DEPTH, Z (feet)

SBT--Friction Ratio

SBT--Pore Pressure

SBT Ic Value

Fines Content (% < #200 Sieve)

Clean Sand Silty Sand | Sand Mix | Silt Mix | Clay | Organic Peat

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: -14.1 feet
Water Depth: -14.5 feet

DRAFT

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/27/21

CPT-8

SOUNDING

DEPTH, Z (feet)

Refusal at 54 feet--Predrilled and Set 4-inch ID Casing to 55 feet and Resumed Pushing CPT Probe

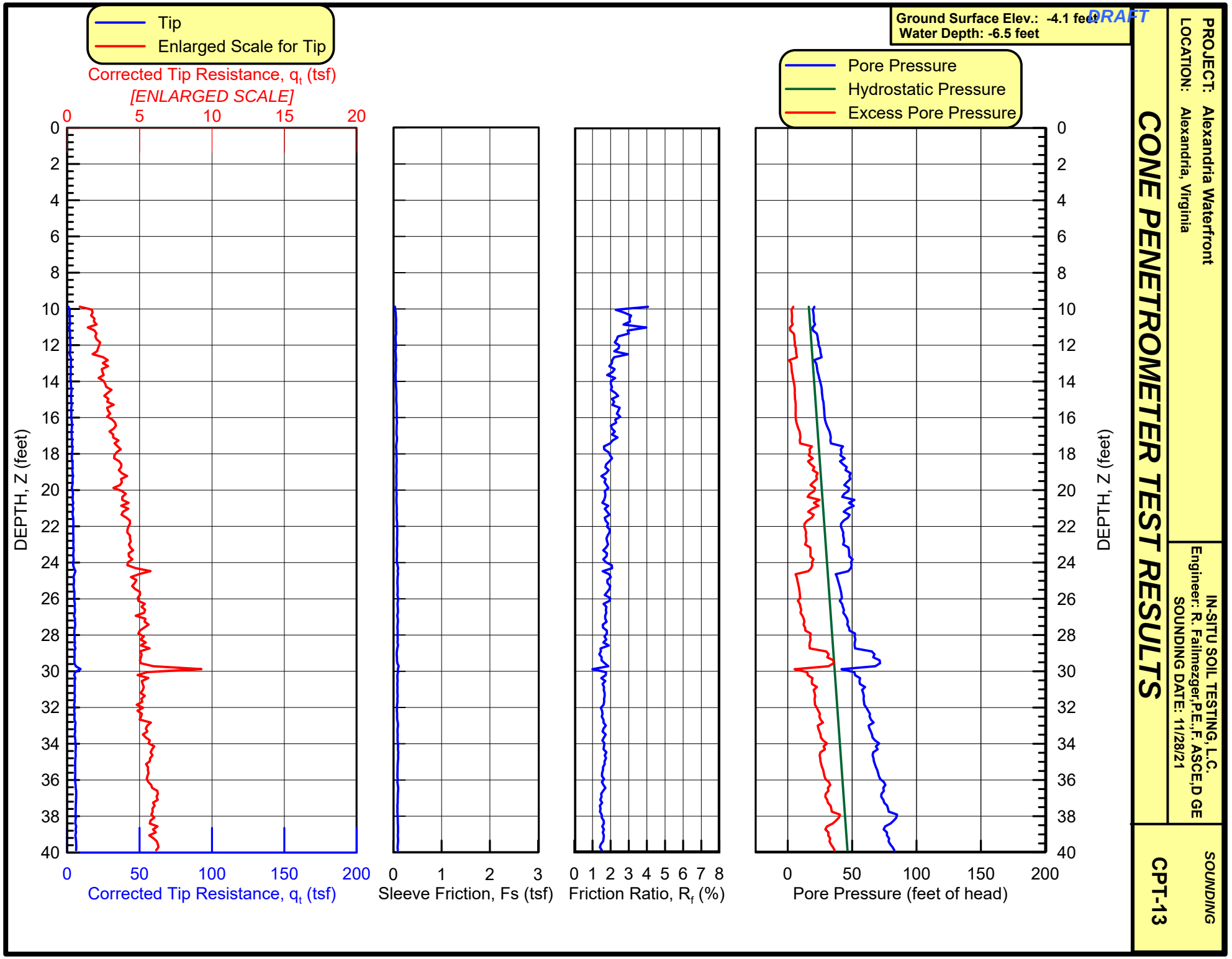
SBT--Friction Ratio

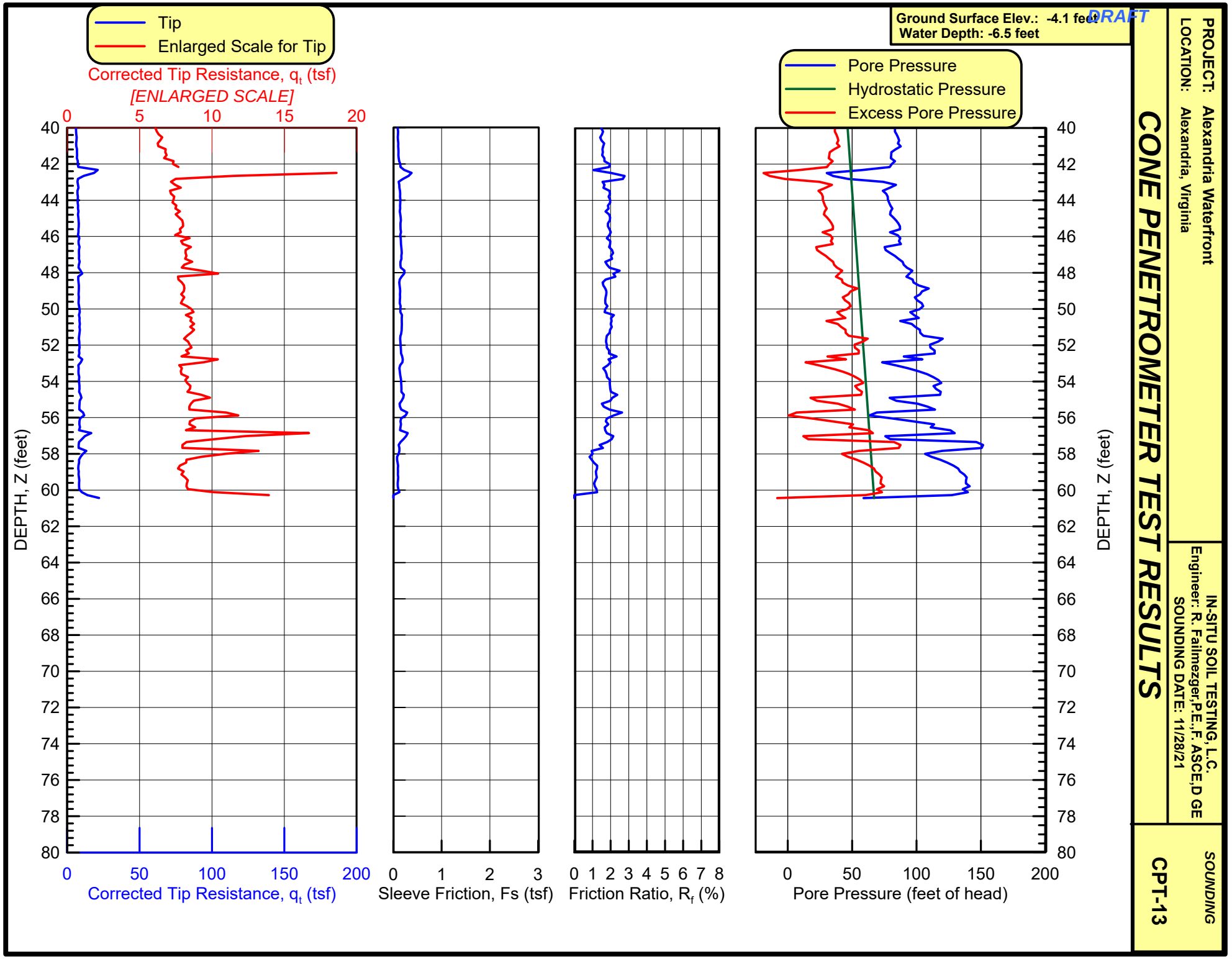
SBT--Pore Pressure

SBT Ic Value

Fines Content (% < #200 Sieve)

Clean Sand Silty Sand	Sand Mix	Silt Mix	Clay	Organic Peat


Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
0 5 10 15 20
DEPTH, Z (feet)
0 50 100 150 200
Corrected Tip Resistance, q_t (tsf)
0 1 2 3
Sleeve Friction, Fs (tsf)
0 1 2 3 4 5 6 7 8
Friction Ratio, R_f (%)
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
0 50 100 150 200
Pore Pressure (feet of head)
DEPTH, Z (feet)
Ground Surface Elev.: -4.1 feet
Water Depth: -6.5 feet
DRAFT
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia
CONE PENETROMETER TEST RESULTS
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/28/21
SOUNDING
CPT-13


Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
0 5 10 15 20
Ground Surface Elev.: -4.1 feet
Water Depth: -6.5 feet
DRAFT
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
DEPTH, Z (feet)
40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80
0 50 100 150 200
Corrected Tip Resistance, q_t (tsf)
0 1 2 3
Sleeve Friction, Fs (tsf)
0 1 2 3 4 5 6 7 8
Friction Ratio, R_f (%)
0 50 100 150 200
Pore Pressure (feet of head)
CONE PENETROMETER TEST RESULTS
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/28/21
SOUNDING
CPT-13

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: -4.1 feet
Water Depth: -6.5 feet

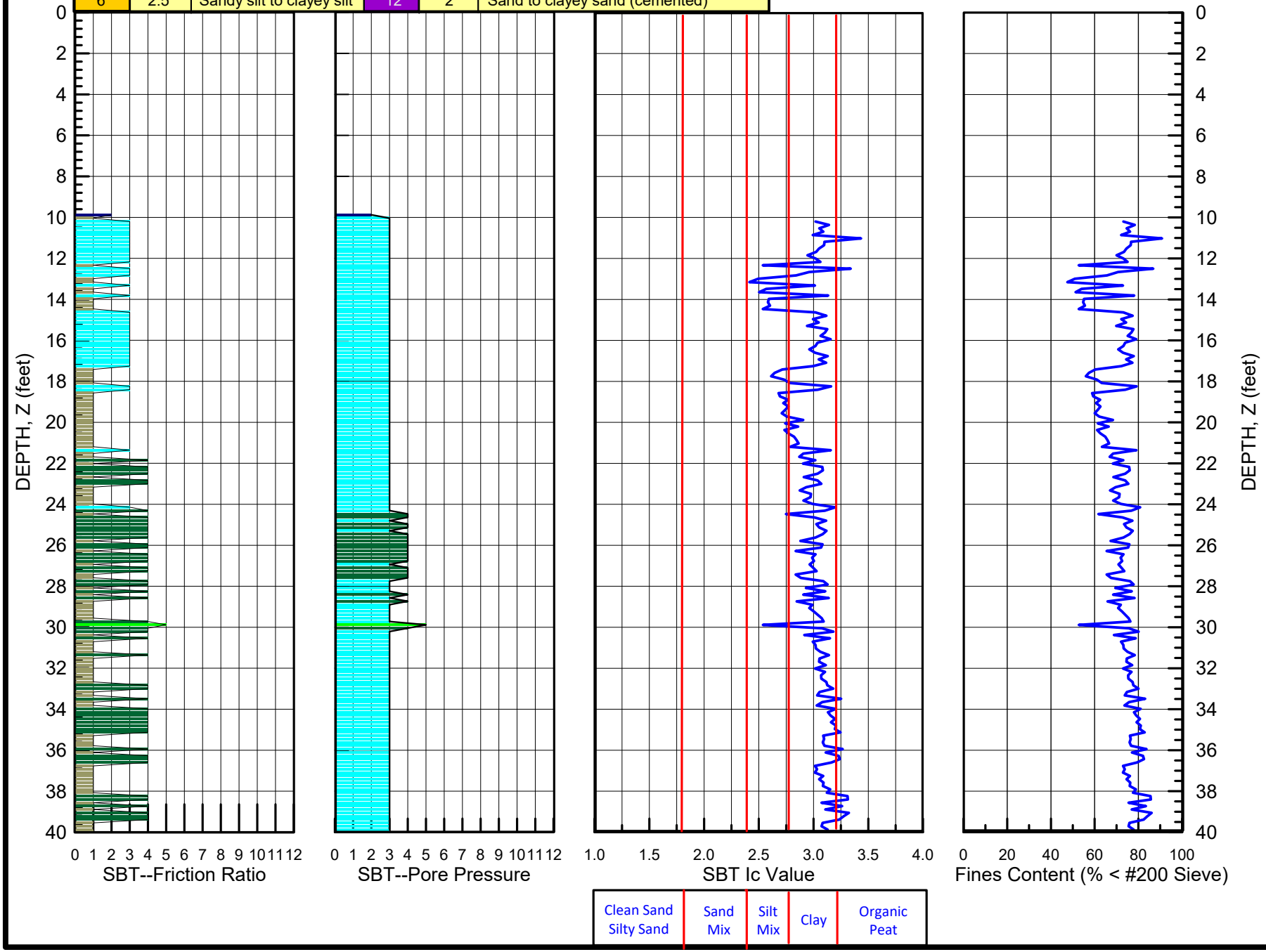
DRAFT

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/28/21

SOUNDING
CPT-13



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: -4.1 feet
Water Depth: -6.5 feet

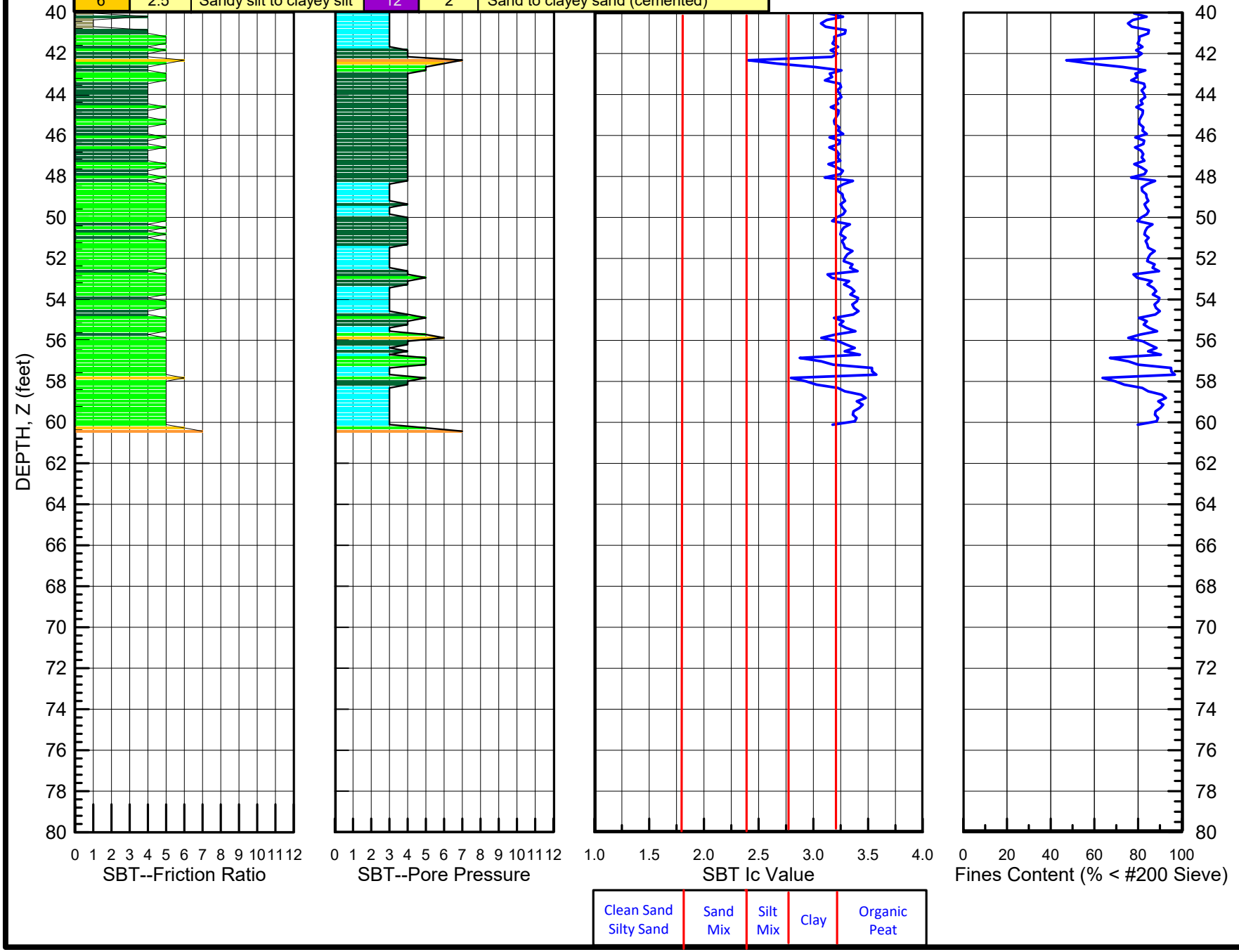
DRAFT

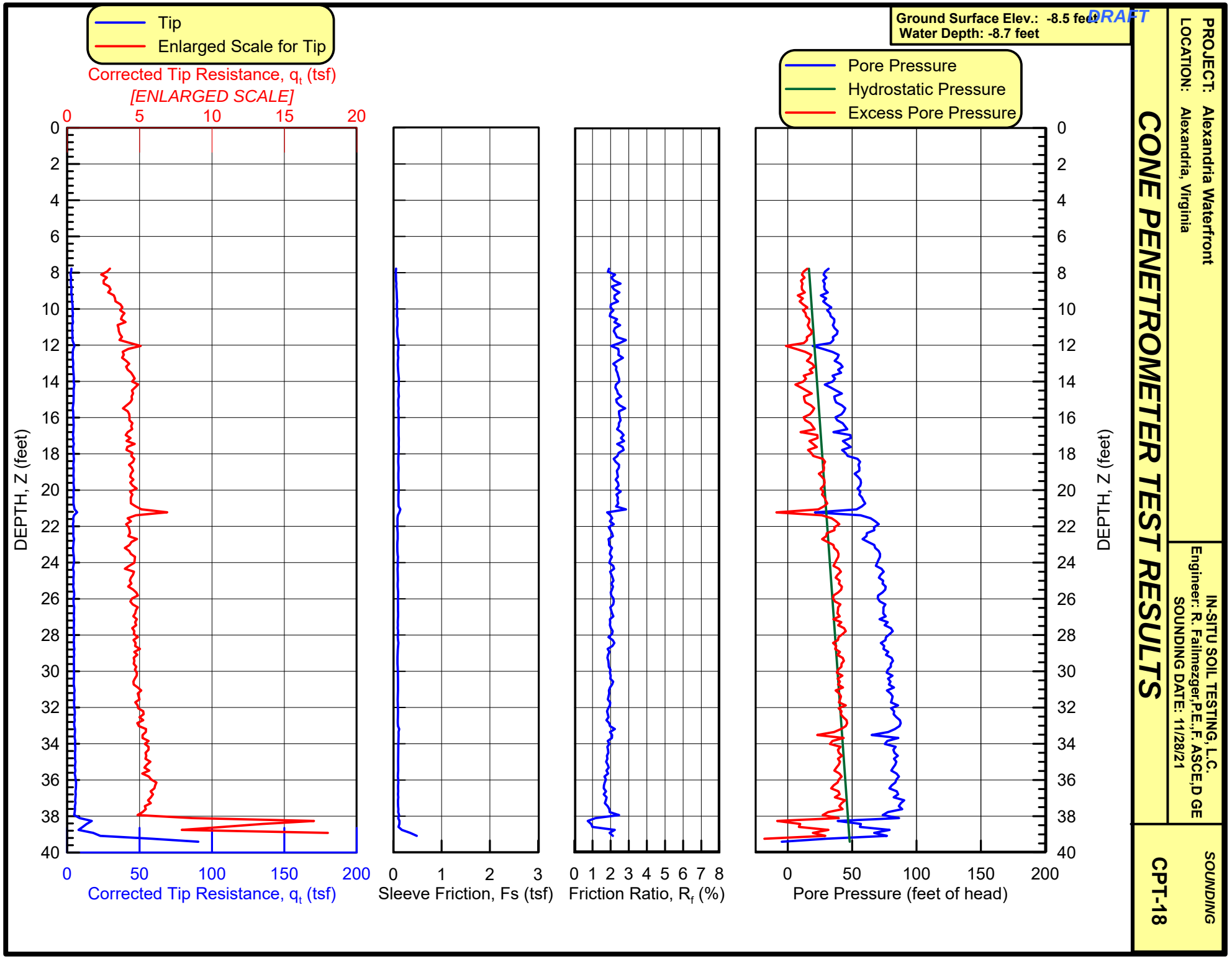
CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/28/21

SOUNDING
CPT-13




Tip
Enlarged Scale for Tip
Corrected Tip Resistance, q_t (tsf)
[ENLARGED SCALE]
0 5 10 15 20
DEPTH, Z (feet)
0 50 100 150 200
Corrected Tip Resistance, q_t (tsf)
0 1 2 3
Sleeve Friction, Fs (tsf)
0 1 2 3 4 5 6 7 8
Friction Ratio, R_f (%)
Pore Pressure
Hydrostatic Pressure
Excess Pore Pressure
0 50 100 150 200
Pore Pressure (feet of head)
DEPTH, Z (feet)
Ground Surface Elev.: -8.5 feet
Water Depth: -8.7 feet
DRAFT
CONE PENETROMETER TEST RESULTS
PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/28/21
SOUNDING
CPT-18

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: -8.5 feet
Water Depth: -8.7 feet

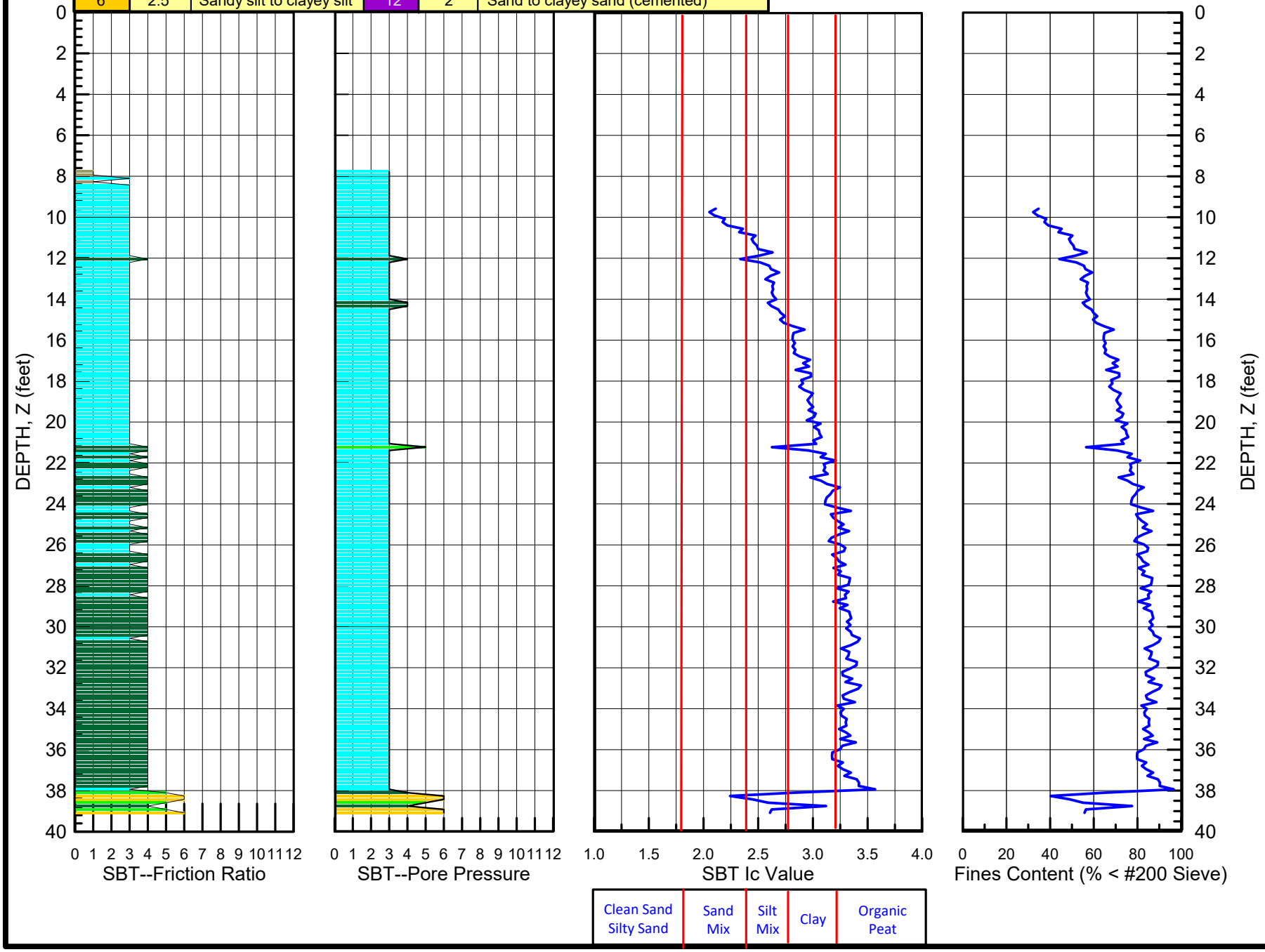
DRAFT

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Alexandria Waterfront
LOCATION: Alexandria, Virginia

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 11/28/21

SOUNDING
CPT-18



APPENDIX D

Infiltration Test Logs

DRAFT

MUESER RUTLEDGE CONSULTING ENGINEERS

INFILTRATION TEST LOG

FILE NO. 14123

RES. ENGR. R. Ossio / F. Falcone

PROJECT: WATERFRONT IMPLEMENTATION PROJECT

LOCATION: ALEXANDRIA, VIRGINIA

Boring Number: **GI-6** Boring Depth : **5 ft** Drill Method: 2.25" 'H.S.A

Soil at Test Depth: Clay (CL) Casing Type/Dia. 4" PVC Sand Filter Used? N

Phase	Date	Time	Initial Water Depth (ft)	Time	Final Water Depth (ft)	Infiltration Rate (in/hr)	Notes
Soak	11/16/2021	10:07	3	10:07 (11/17)	3.65		
1st Test	11/17/2021	10:07	3	11:07	3.3	3.6	
2nd Test	11/17/2021	11:07	3	12:07	3.05	0.6	
3rd Test	11/17/2021	12:07	3	13:07	3	0	
4th Test	11/17/2021	13:07	3	14:07	3	0	
					Average Infiltration Rate from 4 tests (in/hr):	1.05	

Boring Number: **GI-6** Boring Depth : **10 ft** Drill Method: 2.25" 'H.S.A

Soil at Test Depth: F. Sand (SM) Casing Type/Dia. 4" PVC Sand Filter Used? N

Phase	Date	Time	Initial Water Depth (ft)	Time	Final Water Depth (ft)	Infiltration Rate (in/hr)	Notes
Soak	11/16/2021	9:30	8	09:26 (11/17)	9.5		
1st Test	11/17/2021	9:28	8	10:28	8.3	3.6	8.2' at 09:40
2nd Test	11/17/2021	10:28	8	11:31	8.1	1.2	
3rd Test	11/17/2021	11:32	8	12:32	8	0	
4th Test	11/17/2021	13:32	8	13:36	8.05	0.6	
					Average Infiltration Rate from 4 tests (in/hr):	1.35	

Boring Number: **GI-8** Boring Depth : **5 ft** Drill Method: 2.25" 'H.S.A

Soil at Test Depth: Clay (CL) Casing Type/Dia. 4" PVC Sand Filter Used? N

Phase	Date	Time	Initial Water Depth (ft)	Time	Final Water Depth (ft)	Infiltration Rate (in/hr)	Notes
Soak	11/17/2021	7:47	3	07:46 (11/18)	3.2		
1st Test	11/18/2021	7:49	2.95	8:49	2.95	0	
2nd Test	11/18/2021	8:49	2.95	9:49	2.95	0	
3rd Test	11/18/2021	9:49	2.95	10:49	2.95	0	
4th Test	11/18/2021	10:49	2.95	11:49	2.95	0	
					Average Infiltration Rate from 4 tests (in/hr):	0	

Boring Number: **GI-8** Boring Depth : **9 ft** Drill Method: 2.25" 'H.S.A

Soil at Test Depth: Clay (CL) Casing Type/Dia. 4" PVC Sand Filter Used? N

Phase	Date	Time	Initial Water Depth (ft)	Time	Final Water Depth (ft)	Infiltration Rate (in/hr)	Notes
Soak	11/17/2021	7:47	7	07:46 (11/18)	8.54		
1st Test	11/18/2021	7:53	7	8:53	7.9	10.8	
2nd Test	11/18/2021	8:55	7	9:54	7.4	4.8	
3rd Test	11/18/2021	9:56	7	10:56	7.4	4.8	
4th Test	11/18/2021	10:57	7	11:57	7.05	0.6	
					Average Infiltration Rate from 4 tests (in/hr):	5.25	

APPENDIX E

Geo-Archaeological Report

To be posted to City of Alexandria Waterfront Implementation Project website when completed.

APPENDIX F

Environmental Conditions Summary Report

To be posted to City of Alexandria Waterfront Implementation Project website when completed.

APPENDIX G

Phase II Environmental Site Assessment Report

To be posted to City of Alexandria Waterfront Implementation Project website when completed.

APPENDIX H

Geotechnical Laboratory Test Results

DRAFT

TABLE NO. 1

SUMMARY OF LABORATORY TEST DATA

SAMPLE IDENTIFICATION					CLASSIFICATION PROPERTIES								PHYSICAL PROPERTIES											
										UNIFIED SOIL CLASSIFICATION SYSTEM			STRENGTH						CONSOLIDATION						
BORING NUMBER	SAMPLE NUMBER	ELEVATION , FT.	STRATUM DESIGNATION	IN-SITU UNIT WEIGHT, PCF	AVERAGE NATURAL WATER CONTENT, W_n , %	LIQUID LIMIT, W_L, %	PLASTICITY INDEX, I_P , %	NATURAL WATER CONTENT OF LIMIT SAMPLE, W_n , %	SPECIFIC GRAVITY OF SOLIDS, G_s	GROUP SYMBOL	% SAND (< #4 > #200 SIEVE)	% FINES (< #200 SIEVE)	TYPE OF TEST	COMPRESSIVE STRENGTH (σ_1 - σ_3), TSF	CONFINING PRESSURE** TSF	STRAIN AT FAILURE, %	NATURAL WATER CONTENT, W_n , %	WATER CONTENT AT END OF TEST, W_f , %	NATURAL WATER CONTENT, W_n , %	INITIAL VOID RATIO, e_o	EXISTING OVERBURDEN STRESS, P_o , TSF	ESTIMATED PRECONSOLIDATION STRESS, P_c , TSF	COMPRESSION INDEX, C_c	RECOMPRESSION INDEX, C_R	TEST TYPE OR STRAIN RATE DURING LOADING, %/HR
BH-04	7U	-16.5	A1	107	52	50	19	54.7	2.71	OL			CU	0.57	0.53	11.7	50.0	47.2	54.6	1.536	0.7	0.8	0.50	0.04	IL
	9U	-26.0	A1	106	56	52	20	58.0	2.69	OH			CU	0.68	0.70	10.0	54.5	50.4	56.0	1.565	0.9	0.9	0.52	0.04	IL
	13U	-46.0	A1	112	52	55	25	45.5	2.64	OH-CH			CU	1.22	1.03	3.7	56.0	50.2	47.8	1.271	1.3	1.9	0.63	0.05	IL
	15U	-56.0	A2	118	30					SP															
BH-15	9U	-22.0	A1	105	53	56	22	61.2		OH			UU	0.39	0.58	12.5	50.9	50.6							
	11U	-32.0	A1	104	57	58	26	55.4		OH			UU	0.55	0.75	10.1	57.0	56.8							
	15U	-52.0	A1	111	43	44	19	46.8		CL-OL			UU	0.78	1.10	11.0	41.4	41.2							
PS-02	11U	-29.7	A1	104	55	60	30	54.4	2.58	CH-OH			UU	0.76	0.80	5.8	55.9	56.0	53.6	1.365	1.0	1.3	0.62	0.05	IL
	13U	-39.7	A1	99	62	68	34	62.0		OH			UU	0.33	0.98	14.9	61.1	60.8	71.4	1.855	1.1	1.1	0.87	0.11	IL
	16U	-54.7	A2	119	25					SP-SM															
PS-04A	10U TOP	-26.9	A1	97	65	75	36	66.0	2.63	OH									71.5	1.919					DS
	10U MID	-27.0	A1	98						OH									65.4	1.780					DS
	10U BOT	-27.3	A1	97						OH									67.6	1.844					DS
	12U	-36.7	A1	98	70	72	36	65.8	2.61	OH			UU	0.74	0.90	0.9	69.8	69.5							
BH-03	6U	-18.9	A1	98	83	64	31	83.0		OH			CU	0.31	0.24	14.8	84.3	68.3							
	8U	-28.9	A1	106	52					CL			CU	0.55	0.44	16.8	51.6	47.1							
	10U	-38.9	A1		60	55	23	55.2		OH									59.1	1.110					DS
BH-12	6U	-18.5	A1		67																				
	8U	-28.5	A1		73																				
	15S	-53.5	A1		61	53	21	58.2		OH			CU	0.93	0.83	13.0									
BH-20	6U	-26.0	A1	92	85					OH			UU	0.06	0.24	19.4	83.8	83.4	53.5						
	8U	-36.0	A1	104	59	55	27	60.8		CL			UU	0.33	0.41	9.3	58.7	58.5							
	12U	-56.0	A1	94	76	65	30	58.7		OH			UU	0.80	0.75	6.0	79.0	79.5							
PS-04	6U	-21.4	A1		56																				
	8U	-32.0	A1	106	53	56	27	52.7	2.68	CL			UU	0.47	0.41	12.1	52.5	52.3	52.7	1.451	0.5	0.8	0.42	-	IL
	10U	-41.6	A1	107	53	52	23	50.8	2.68	OH			UU	0.59	0.57	8.7	50.1	51.1	50.8	1.484	0.7	1.3	0.51	-	IL
	12U	-51.6	A1	95	70	72	35	61.5	2.60	OH			UU	0.98	0.75	5.6	73.0	73.0	61.5	1.872	0.9	1.5	0.90	-	IL

STRATA DESIGNATIONS

A1 - Alluvial Clay/Silt

A2 - Alluvial Sand

NOTES

1. All tests summarized were performed in the laboratory of Mueser Rutledge Consulting Engineers.
2. The sample elevation is the average of the sampling interval.
3. Ground surface elevations at borings are:

BORING NO.	BORING ELEVATION	BORING NO.	BORING ELEVATION
BH-04	+4.0 ±	BH-15	+3.0 ±
PS-02	+5.3	PS-04A	+3.3
BH-03	-4.9	BH-20	-12.0
BH-12	-4.5	PS-04	-7.4

4. "Average natural water content" is a weighted average of all material tested.
5. Strength tests performed were:
   UU - Unconsolidated Undrained Triaxial Compression
   CU - Consolidated Undrained Triaxial Compression
6. Strength tests were performed on specimens 2.8 inches in diameter with height to diameter ratio of approximately 2.
7. Confining pressure for UU and CU compression tests is equivalent to 80 percent of estimated vertical effective overburden stress, unless otherwise noted.
8. **Confining pressure reported is total confining stress for UU tests and effective confining stress at start of shearing for CU tests.
9. Compression Index, Cc = slope of the virgin compression portion of the e-log p curve.
10. Recompression Index, Cr = slope of the recompression portion of the e-log p curve.
11. Most probable preconsolidation stress, Pc, is determined by the Casagrande method of construction.
12. Consolidation tests were performed using incremental loading (IL), or constant rate of strain (CRS) at the strain rate indicated.

MRCE Form LT-1

MUESER RUTLEDGE CONSULTING ENGINEERS

225 WEST 34th STREET, NEW YORK, N.Y. 10122

ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT
PHASE II - LAND BORINGS

ALEXANDRIA **VIRGINIA**

DATE: 01-11-2022 FILE NO. 14123 SHEET 1 OF 1 TABLE NO.1

Alexandria Waterfront Implementation Project

Project Number: 14123

Jay Kay Testing, Inc.
(814) 404-9283
www.jaykaytesting.com

Summary of Laboratory Testing

Location:
Sample Date:

Boring ID	Sample ID	Depth (ft)		WC %	OM %	Atterberg Limits			SG	% Fines	USCS
						LL %	PL %	PI %			
-	-	Top	Btm	D-2216	D-2974	D-4318	D-4318	D-4318	D-854	-	D-2487
BH-04	Bulk-1	0	6.5	22.2	-	-	-	-	-	-	-
BH-04	Bulk-2	6.5	8.5	8.2	-	-	-	-	-	-	-
BH-04	Bulk Composite	0	8.5	-	-	23	22	1	2.68	12.0	SW-SM
BH-04	6D	13.5	15	51.1	-	-	-	-	-	-	-
BH-04	8D	24	25.5	60.8	-	-	-	-	-	-	-
BH-04	10D	34	35.5	60.6	7.17	59	32	27	-	-	-
BH-04	12D	44	45.5	54.3	-	-	-	-	-	-	-
BH-04	14D	54	55.5	47.2	-	-	-	-	-	-	-
BH-04	16D	64	65.5	-	-	-	-	-	-	25.5	-
BH-04	19D	79	80.5	31.7	-	69	31	38	2.86	-	-
BH-04	20D	84	85.5	34.9	-	-	-	-	2.80	-	-
BH-04	23D	98.5	100	32.9	-	96	30	66	-	-	-
BH-15	2D	2	4	22.5	-	-	-	-	2.67	-	-
BH-15	5D	8	10	15.7	-	-	-	-	2.59	16.6	-
BH-15	6D	13.5	15	49.5	-	-	-	-	-	34.9	-
BH-15	8D	22	23.5	58.0	-	-	-	-	-	-	-
BH-15	10D	29	30.5	55.7	-	-	-	-	-	-	-
BH-15	12D	39	40.5	62.9	7.37	71	34	37	-	-	-
BH-15	14D	49	50.5	62.1	-	-	-	-	-	-	-
BH-15	17D	64	65.5	-	-	-	-	-	-	41.1	-
BH-15	20D	74	75.5	-	-	-	-	-	-	17.6	-
BH-15	22D	84	85.5	22.6	-	32	19	13	-	-	-
BH-15	24D	94	95.5	24.9	-	-	-	-	-	-	-
GI-6	1D	0.7	2.7	16.2	-	24	18	6	-	49.5	SC-SM
GI-6	2D	2.7	4.7	14.2	-	-	-	-	-	-	-
GI-6	3D	4.7	6.7	20.5	-	-	-	-	-	78.8	-
GI-6	4D	6.7	8.7	17.8	-	26	16	10	-	72.4	CL
GI-6	5D	8.7	10.7	23.1	-	-	-	-	-	23.2	-
GI-6	6D	13.5	15	-	-	-	-	-	-	25.1	-
GI-8	2D	2	4	23.3	-	29	19	10	-	83.5	CL
GI-8	3D	4	6	18.6	-	37	19	18	-	85.8	CL
GI-8	5D	8	10	21.5	-	35	18	17	-	95.6	CL
GI-8	6D	13.5	15	23.2	-	-	-	-	-	26.0	-
GI-10	Bulk	0	6	6.1	-	35	22	13	2.68	22.1	SC
GI-10	6D	13.5	15	-	-	-	-	-	-	48.6	-
GI-10	7D	18.5	20	59.0	-	-	-	-	-	-	-
GI-11	Bulk-1	0	4	21.1	-	-	-	-	-	-	-
GI-11	Bulk-2	4	8	32.4	-	-	-	-	-	-	-
GI-11	Bulk Composite	0	8	-	-	34	23	11	2.69	42.4	SC
GI-12	3D	4	6	-	-	-	-	-	-	23.1	-

Jay Kay Testing, Inc. is an AASHTO-Accredited laboratory

Alexandria Waterfront Implementation Project

Project Number: 14123

Summary of Laboratory Testing

DRAFT
Jay Kay Testing, Inc.
(814) 404-9283
www.jaykaytesting.com

Location:
Sample Date:

Boring ID	Sample ID	Depth (ft)		WC %	OM %	Atterberg Limits			SG	% Fines	USCS
						LL %	PL %	PI %			
-	-	Top	Btm	D-2216	D-2974	D-4318	D-4318	D-4318	D-854	-	D-2487
GI-13P	2D	2	4	17.4	-	-	-	-	2.66	-	-
GI-13P	6D	13.5	15	-	-	-	-	-	-	35.9	-
GI-14A-B	Bulk-1	0	4	17.0	-	30	16	14	2.68	69.4	CL
GI-15P	5D	8	10	-	-	-	-	-	-	38.8	-
GI-15P	6D	13.5	15	-	-	-	-	-	-	34.0	-
PS-02	Bulk-1	0	4	19.7	-	-	-	-	-	-	-
PS-02	Bulk-2	4	8	11.6	-	-	-	-	-	-	-
PS-02	Bulk Composite	0	8	-	-	29	19	10	2.57	20.1	SC
PS-02	2D	2	4	9.5	-	-	-	-	2.69	10.7	-
PS-02	5D	8	10	47.2	-	-	-	-	2.59	20.1	-
PS-02	8D	19	20.5	55.2	9.16	61	34	27	-	-	-
PS-02	10D	29	30.5	45.0	-	-	-	-	-	-	-
PS-02	12D	39	40.5	71.8	-	-	-	-	-	-	-
PS-02	14D	49	50.5	-	-	-	-	-	-	31.0	-
PS-02	15D	54	55.5	-	-	-	-	-	-	42.4	-
PS-02	17D	64	65.5	25.5	-	-	-	-	-	-	-
PS-02	19D	74	75.5	-	-	-	-	-	-	7.5	-
PS-02	22D	84	85.5	24.2	-	-	-	-	-	-	-
PS-02	23D	89	91	33.1	-	-	-	-	-	51.5	-
PS-02	25D	98.5	100	39.8	-	59	31	28	-	-	-
PS-04A	5D	8	10	36.1	-	-	-	-	2.68	19.1	-
PS-04A	7D	14	15.5	60.7	-	-	-	-	-	-	-
PS-04A	9D	24	25.5	55.8	5.86	62	32	30	-	-	-
PS-04A	11D	34	35.5	83.9	-	-	-	-	-	-	-
PS-04A	13D	44	45.5	74.9	-	-	-	-	-	-	-
PS-04A	15D	54	55.5	-	-	-	-	-	-	52.5	-
PS-04A	16D	59	60.5	-	-	-	-	-	-	36.3	-
PS-04A	18D	66.5	68.5	-	-	-	-	-	-	9.3	-
PS-04A	20D	74	75.5	31.8	-	112	34	78	-	-	-
PS-04A	23D	89	90.5	27.3	-	72	21	51	-	-	-

Jay Kay Testing, Inc. is an AASHTO-Accredited laboratory

DRAFT

Jay Kay Testing, Inc.
(814) 404-9283
www.jaykaytesting.com

Alexandria Waterfront Implementation Project

Project Number: 14123

Summary of Laboratory Testing

Location:

Sample Date:

Boring ID	Sample ID	Depth (ft)		WC %	OM %	Atterberg Limits			SG	% Fines	USCS
						LL %	PL %	PI %			
-	-	Top	Btm	D-2216	D-2974	D-4318	D-4318	D-4318	D-854	-	D-2487
BH-03	1D	0	2	85.7	-	-	-	-	2.65	-	-
BH-03	2D	2	4	88.8	-	-	-	-	-	-	-
BH-03	7D	18.5	20	51.9	-	-	-	-	-	-	-
BH-03	11D	38.5	40	54.9	-	-	-	-	-	-	-
BH-03	13D	48.5	50	23.3	-	-	-	-	2.68	12.9	-
BH-03	16D	63.5	65	37.1	-	81	27	54	2.77	-	-
BH-03	21D	87.5	90	23.5	-	-	-	-	-	-	-
BH-05	1D	48.5	50	64.7	-	81	36	45	2.64	-	-
BH-05	3D BTM	58.5	60	-	-	-	-	-	-	6.1	-
BH-05	4D	63.5	65	-	-	-	-	-	-	5.4	-
BH-05	6D	74	75.5	23.6	-	-	-	-	-	52.6	-
BH-05	7D	79	80.5	31.1	-	-	-	-	-	46.8	-
BH-05	10D	98.5	100	19.9	-	-	-	-	-	23.2	-
BH-10	1D	0	2	86.4	-	97	45	52	2.79	-	-
BH-10	5D	8	10	65.4	-	-	-	-	-	-	-
BH-10	6D	13.5	15	66.4	-	-	-	-	-	-	-
BH-10	8D	23.5	25	84.9	-	-	-	-	-	-	-
BH-10	10D	33.5	35	56.4	-	-	-	-	-	-	-
BH-10	12D	43.5	45	58.0	-	-	-	-	-	-	-
BH-10	18D	63.5	65	30.6	-	-	-	-	2.89	-	-
BH-10	21D	78.5	80	33.7	-	-	-	-	-	-	-
BH-10	24D	93.5	95	37.0	-	98	30	68	2.84	-	-
BH-12	1D	0	2	87.7	-	-	-	-	2.58	-	-
BH-12	4D	7	9	90.5	-	-	-	-	-	-	-
BH-12	10D TOP	33	33.5	50.1	-	-	-	-	-	-	-
BH-12	13D	38.8	40.3	54.7	-	-	-	-	-	-	-
BH-12	16D BTM	53.5	55	-	-	-	-	-	-	11.0	-
BH-12	20D BTM	68	70	14.3	-	-	-	-	-	37.4	-
BH-12	22D	78.5	80	39.1	-	104	30	74	2.89	-	-
BH-12	26D	98.5	100	35.9	-	-	-	-	-	-	-
BH-16A	1D	0	2	62.8	-	-	-	-	2.68	-	-
BH-16A	5D	9	11	60.3	-	-	-	-	-	-	-
BH-16A	9D	28.5	30	71.2	-	-	-	-	-	-	-
BH-16A	12D	38.5	40	49.9	-	-	-	-	-	-	-
BH-16A	14D	48.5	50	66.5	-	-	-	-	2.58	-	-
BH-16A	15D	53.5	55	-	-	-	-	-	-	12.3	-
BH-16A	16D TOP	59.5	61	-	-	-	-	-	-	9.1	-
BH-16A	17D	64.5	66	35.3	-	94	27	67	-	-	-
BH-16A	22D	89.5	91	24.4	-	-	-	-	-	-	-
BH-20	1D	0	2	88.9	-	82	36	46	2.70	-	-

Jay Kay Testing, Inc. is an AASHTO-Accredited laboratory

Alexandria Waterfront Implementation Project

Project Number: 14123

Summary of Laboratory Testing

DRAFT
Jay Kay Testing, Inc.
(814) 404-9283
www.jaykaytesting.com

Location:
Sample Date:

Boring ID	Sample ID	Depth (ft)		WC %	OM %	Atterberg Limits			SG	% Fines	USCS
						LL %	PL %	PI %			
-	-	Top	Btm	D-2216	D-2974	D-4318	D-4318	D-4318	D-854	-	D-2487
BH-20	5D	9	11	56.1	-	-	-	-	-	-	-
BH-20	16D	63.5	65	23.3	-	-	-	-	2.76	49.9	-
BH-20	17D	68.5	70	24.7	-	-	-	-	-	13.3	-
BH-20	18D	73.5	75	38.6	-	-	-	-	2.85	-	-
BH-20	23D	98.5	100	31.6	-	-	-	-	2.87	-	-
PS-04	1D	0	2	108.9	-	-	-	-	-	-	-
PS-04	15D TOP	57	59	52.0	-	-	-	-	-	-	-
PS-04	16D	63.5	65	-	-	-	-	-	-	21.9	-
PS-04	18D	73.5	75	27.1	-	74	22	52	-	-	-
PS-04	20D	83.5	85	31.5	-	-	-	-	-	-	-
PS-04	23D	98.5	100	25.3	-	-	-	-	-	-	-

Jay Kay Testing, Inc. is an AASHTO-Accredited laboratory

Summary of Corrosion Testing

Alexandria Waterfront Implementation Project

14123

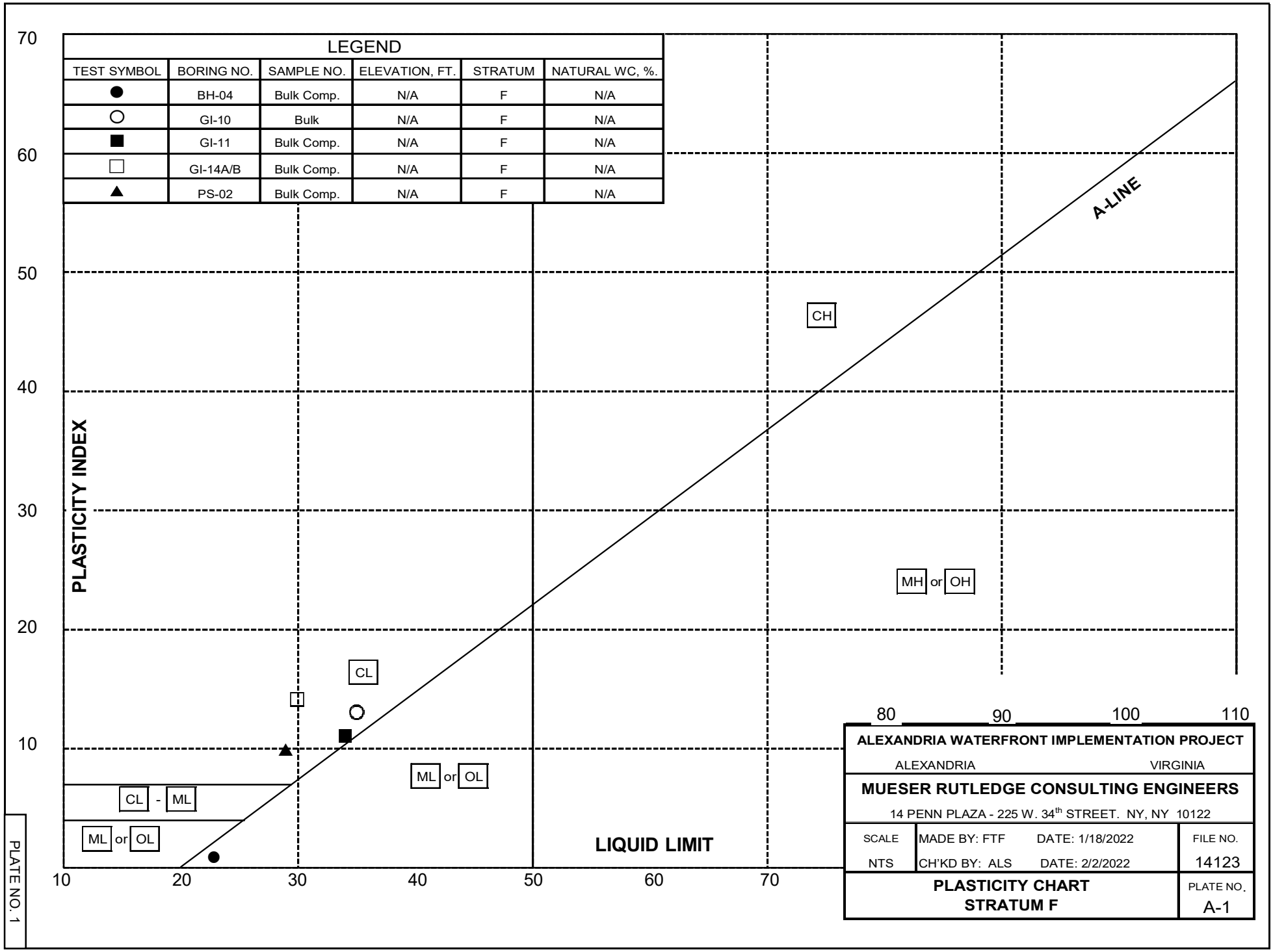
DRAFT

Jay Kay Testing, Inc.
(814) 404-9283
www.jaykaytesting.com

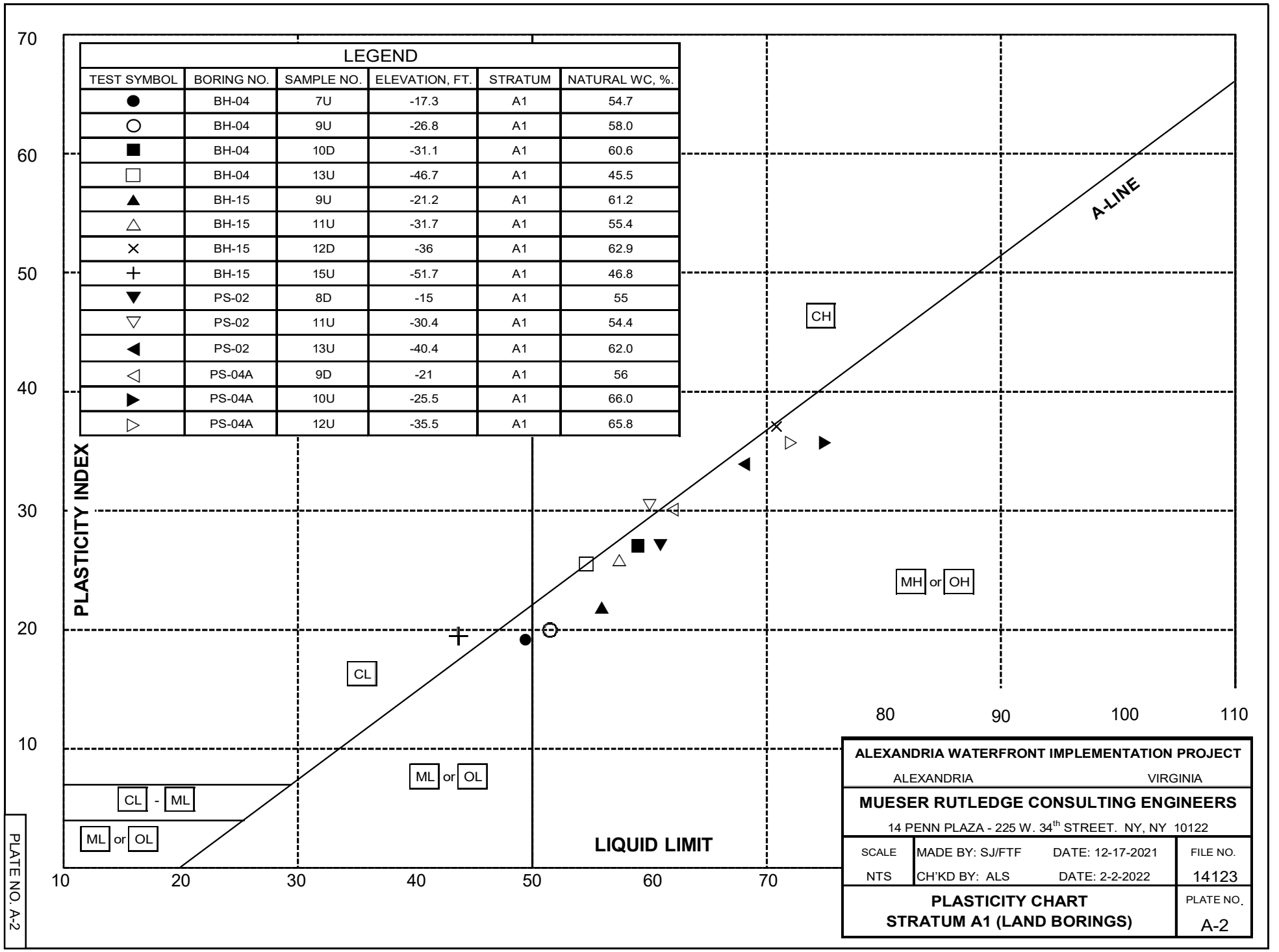
Sample Identification				WC%	pH[1]	Temp (°C)	Resistivity (Ω-cm)			ORP Redox (mV)	Chlorides[2]		Sulfates[3]	Sulfides Ion Presence[4] PPM (mg/kg)
Boring ID	Sample ID	Depth (ft)					Rec'd	Min	Sat		PPM	µg/kg	PPM (mg/kg)	
		Top	Btm	T-265	T-289	-	T-288			D-1498	T-291 A		T-290 B	Methylene Titration
GI-10	Bulk	0	6	6.1	8.14	20.9	9,600	1,190	-	119	129	129,000	112	negative
GI-11	Bulk Composite	0	8	32.4	7.16	20.6	1,490	737	-	101	38	38,000	1470	negative
GI-14A-B	Bulk-1	0	4	17.0	7.54	20.5	1,880	1,730	-	210	15	15,000	22	negative
Distilled Water : Soil Ratio					1:1	-	-	-	-	1:1	1:1		3:1	1:1

[1] pH verified with pH paper.
[2] Verified with separate chloride photometer method.
[3] Turbidimetric photometer method. Verified with separate turbidimetric titration method.
[4] Pomeroy methylene blue method (titration). Verified with separate colorimetric method.

DRAFT


LEGEND
TEST SYMBOL | BORING NO. | SAMPLE NO. | ELEVATION, FT. | STRATUM | NATURAL WC, %.
● | BH-04 | Bulk Comp. | N/A | F | N/A
○ | GI-10 | Bulk | N/A | F | N/A
■ | GI-11 | Bulk Comp. | N/A | F | N/A
□ | GI-14A/B | Bulk Comp. | N/A | F | N/A
▲ | PS-02 | Bulk Comp. | N/A | F | N/A
PLASTICITY INDEX
LIQUID LIMIT
A-LINE
CH
MH or OH
CL
ML or OL
CL - ML
ML or OL
70
60
50
40
30
20
10
10
20
30
40
50
60
70
80
90
100
110
ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT
ALEXANDRIA VIRGINIA
MUESER RUTLEDGE CONSULTING ENGINEERS
14 PENN PLAZA - 225 W. 34th STREET. NY, NY 10122
SCALE NTS
MADE BY: FTF DATE: 1/18/2022
CH'KD BY: ALS DATE: 2/2/2022
FILE NO. 14123
PLASTICITY CHART
STRATUM F
PLATE NO. A-1
PLATE NO. 1

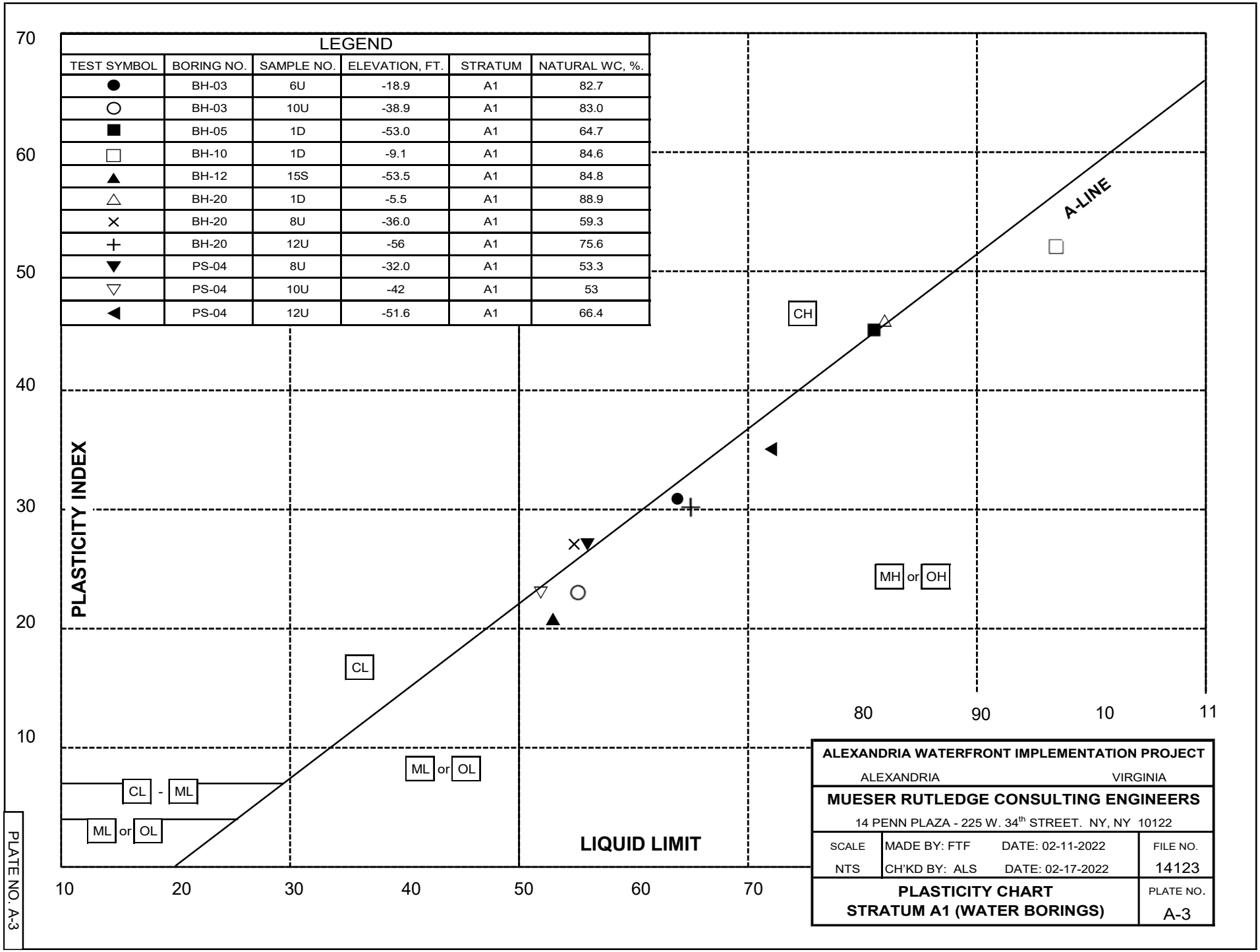
DRAFT



ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT		
ALEXANDRIA		VIRGINIA
MUESER RUTLEDGE CONSULTING ENGINEERS		
14 PENN PLAZA - 225 W. 34th STREET. NY, NY 10122		
SCALE: NTS	MADE BY: SJ/FTF DATE: 12-17-2021 CH'KD BY: ALS DATE: 2-2-2022	FILE NO. 14123
PLASTICITY CHART STRATUM A1 (LAND BORINGS)		PLATE NO. A-2

PLATE NO. A-2

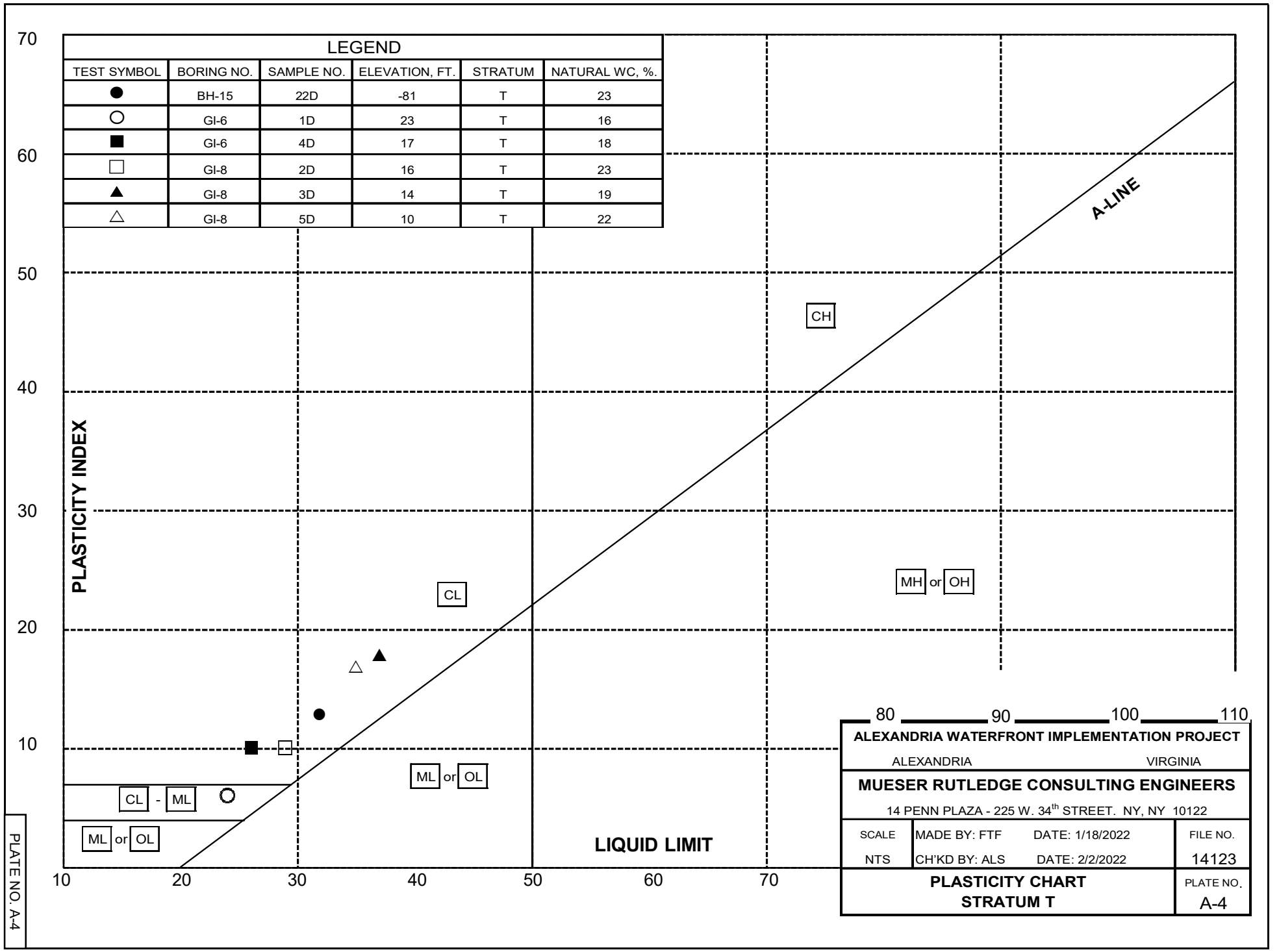
DRAFT



ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT		
ALEXANDRIA		VIRGINIA
MUESER RUTLEDGE CONSULTING ENGINEERS		
14 PENN PLAZA - 225 W. 34th STREET. NY, NY 10122		
SCALE: NTS	MADE BY: FTF DATE: 02-11-2022 CH'KD BY: ALS DATE: 02-17-2022	FILE NO. 14123
PLASTICITY CHART STRATUM A1 (WATER BORINGS)		PLATE NO. A-3

PLATE NO. A-3

DRAFT



ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

ALEXANDRIA VIRGINIA

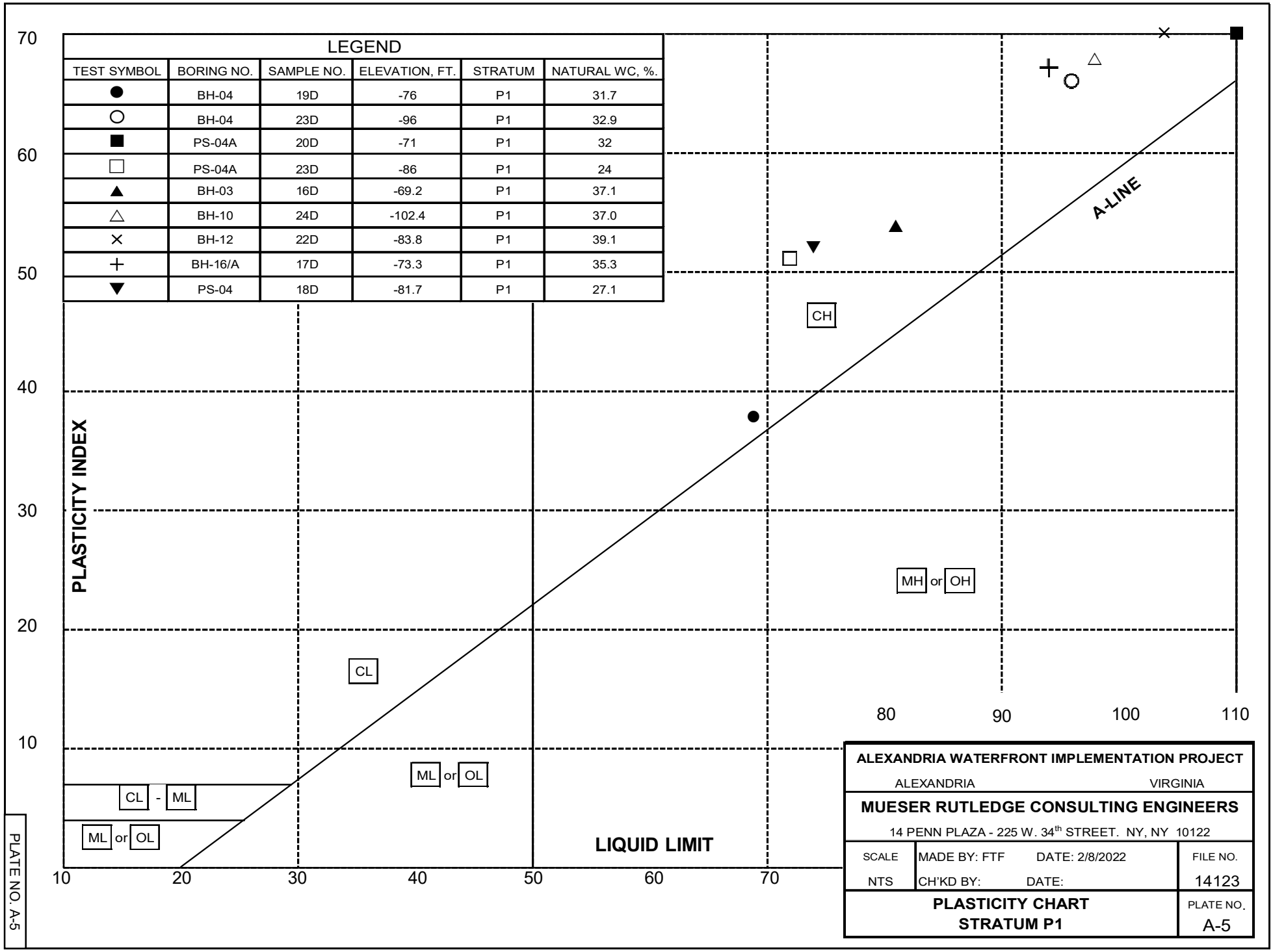
MUESER RUTLEDGE CONSULTING ENGINEERS

14 PENN PLAZA - 225 W. 34th STREET. NY, NY 10122

SCALE	MADE BY: FTF DATE: 1/18/2022	FILE NO.
NTS	CH'KD BY: ALS DATE: 2/2/2022	14123
PLASTICITY CHART STRATUM T		PLATE NO. A-4

PLATE NO. A-4

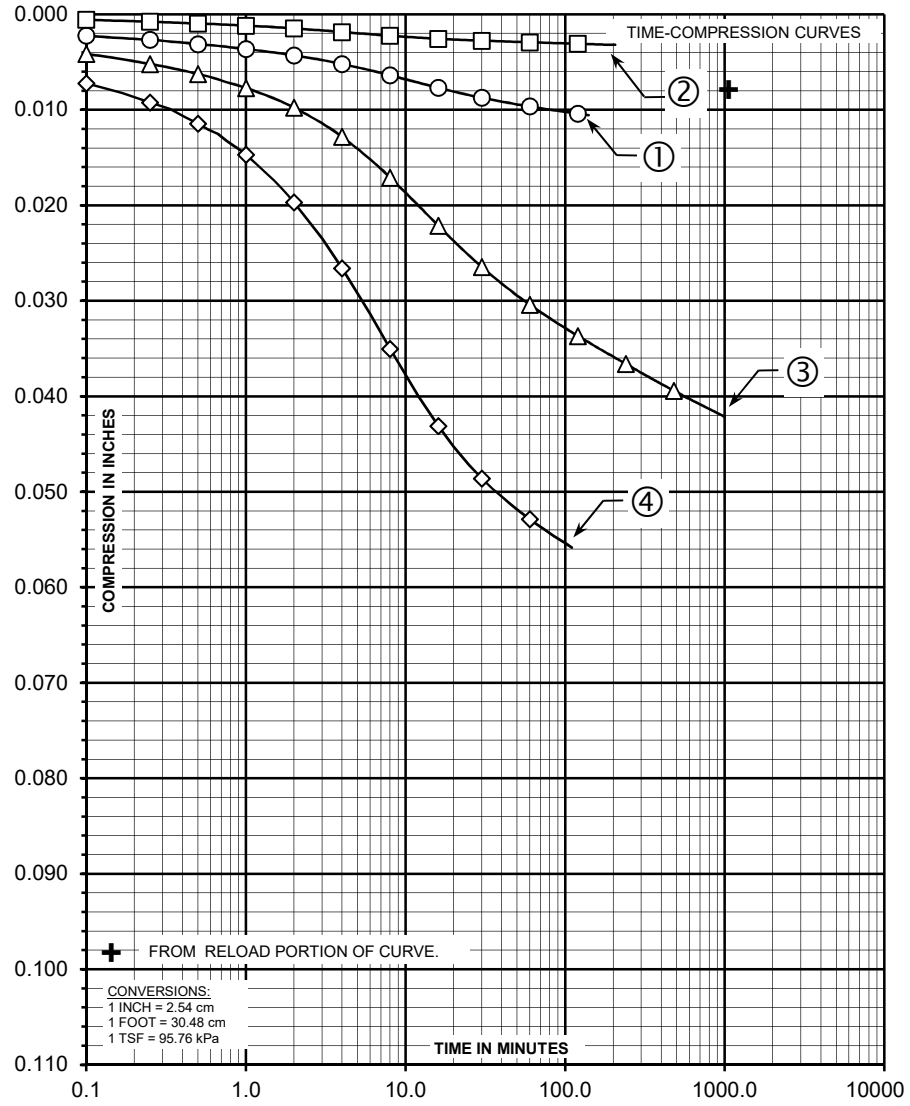
DRAFT



ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT		
ALEXANDRIA		VIRGINIA
MUESER RUTLEDGE CONSULTING ENGINEERS		
14 PENN PLAZA - 225 W. 34th STREET. NY, NY 10122		
SCALE: NTS	MADE BY: FTF DATE: 2/8/2022 CH'KD BY: DATE:	FILE NO. 14123
PLASTICITY CHART STRATUM P1		PLATE NO. A-5

PLATE NO. A-5

DRAFT



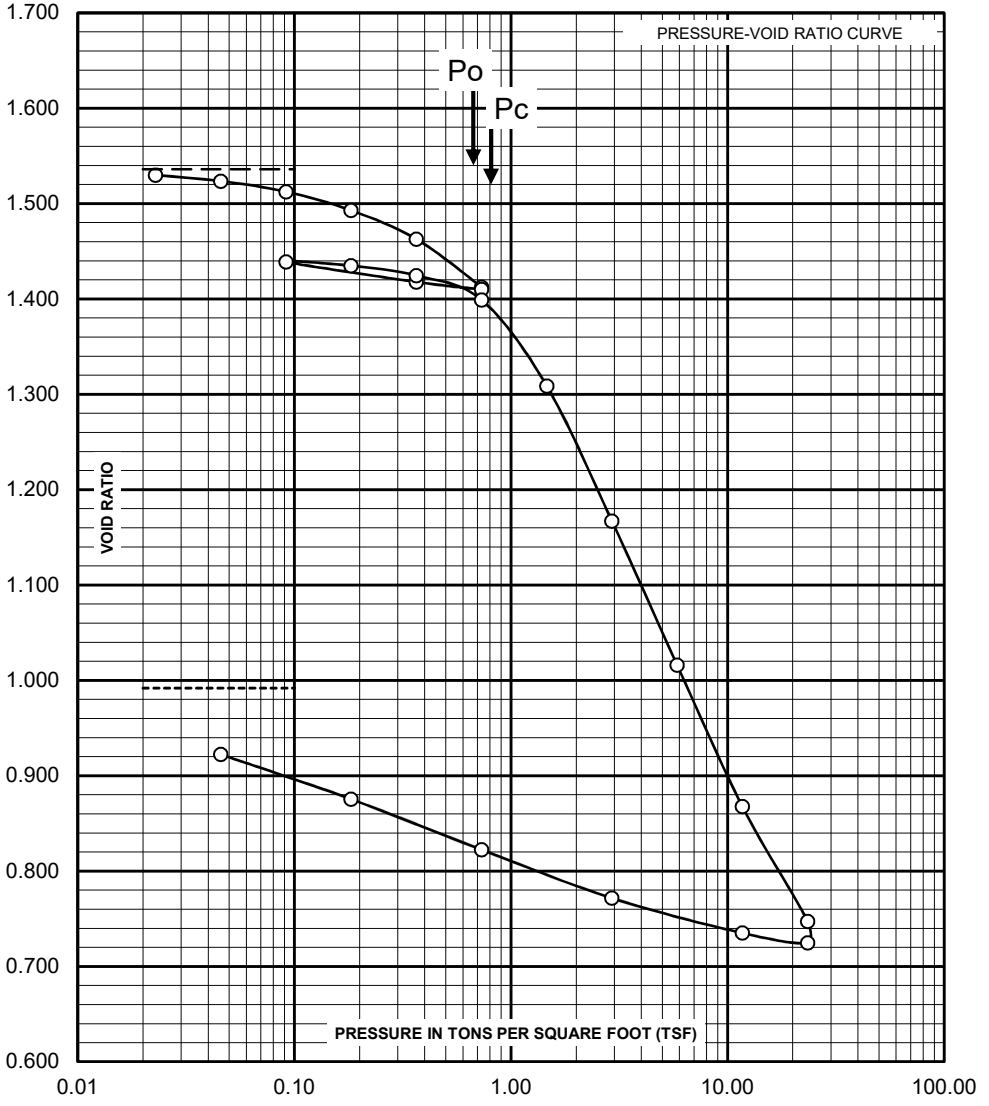


PLATE NO. C-1

CURVE NO.	INCREMENT FROM (TSF)	INCREMENT TO (TSF)
○	0.18	0.37
□ ✚	0.18	0.37
△	0.73	1.46
◇	2.93	5.85

SPECIMEN DESCRIPTION: BROWN GRAY ORGANIC CLAYEY SILT, TRACE SHELLS, GRAVEL (OL) — STRATUM A1

PROPERTIES OF PLASTICITY LIMIT SPECIMEN

UNIFIED SOILS CLASSIFICATION - OL
LIQUID LIMIT, w_L = 50
PLASTIC LIMIT, w_P = 30
PLASTICITY INDEX, I_P = 19
NATURAL WATER CONT., W_n% = 54.7
LIQUIDITY INDEX, $(w-w_P)/I_P$ = 1.26
SPECIFIC GRAVITY, G_s = 2.709

PROPERTIES OF CONSOLIDATION SPECIMEN

ELEVATION OF SPECIMEN = -17.1
DEPTH OF SPECIMEN (FT) = 21.1
DIAMETER OF SPECIMEN (IN) = 2.49
INITIAL THICKNESS OF SPECIMEN (IN) = 1.009
INITIAL WATER CONTENT, % = 54.6
FINAL WATER CONTENT, % = 37.2
INITIAL DEGREE OF SATURATION, % = 96.3
FINAL DEGREE OF SATURATION, % = 101.7

— — — – INITIAL VOID RATIO, e_o = 1.536
---------- FINAL VOID RATIO, e_f = 0.992
$\Delta e/e_0$ AT IN-SITU EFF. OVERBURDEN STRESS = 0.076
ESTIMATED PRECONSOLIDATION STRESS (TSF), P_c = 0.81
IN-SITU EFFECTIVE OVERBURDEN STRESS (TSF), P_o = 0.67
COMPRESSION INDEX, C_c = 0.495
RECOMPRESSION INDEX, C_r = 0.042
SWELLING INDEX, C_s = 0.090, REBOUND FROM e = 0.725

ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT
ALEXANDRIA VIRGINIA

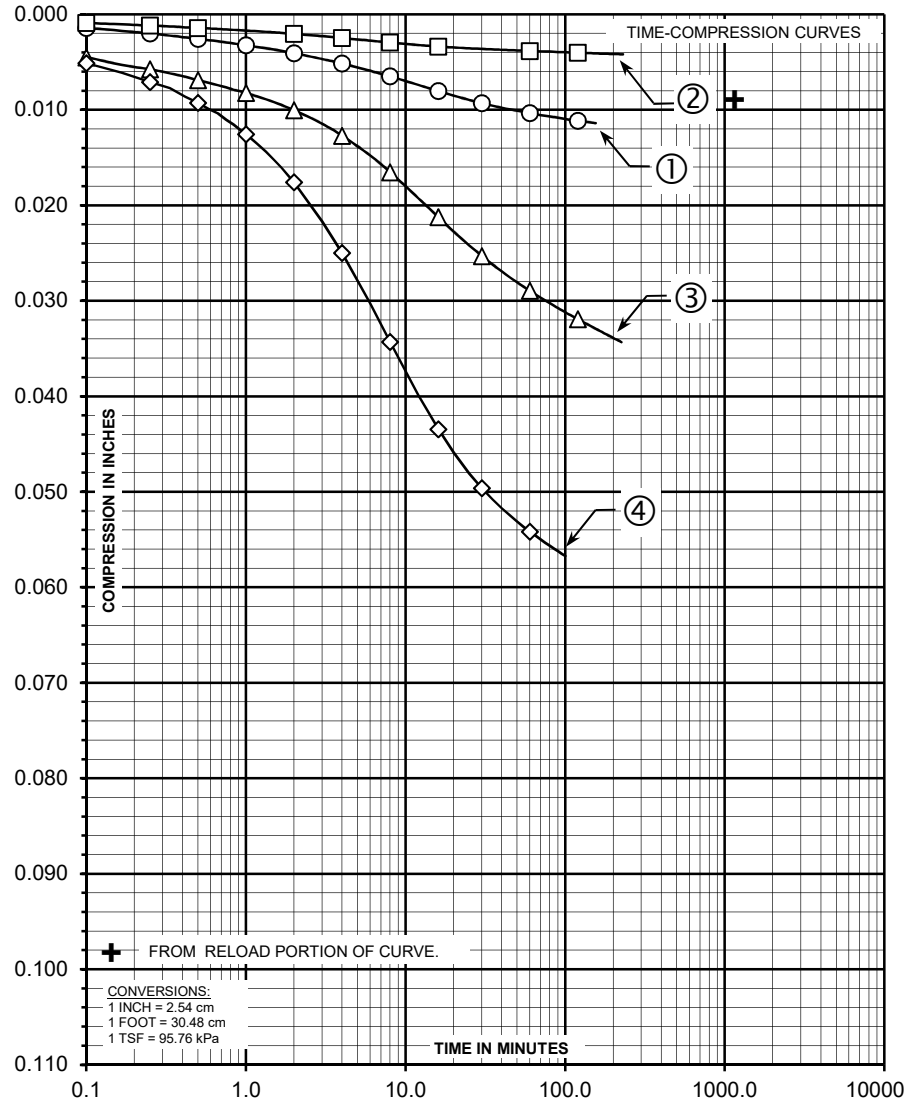
MUESER RUTLEDGE CONSULTING ENGINEERS
225 WEST 34TH STREET, NEW YORK, N.Y. 10122

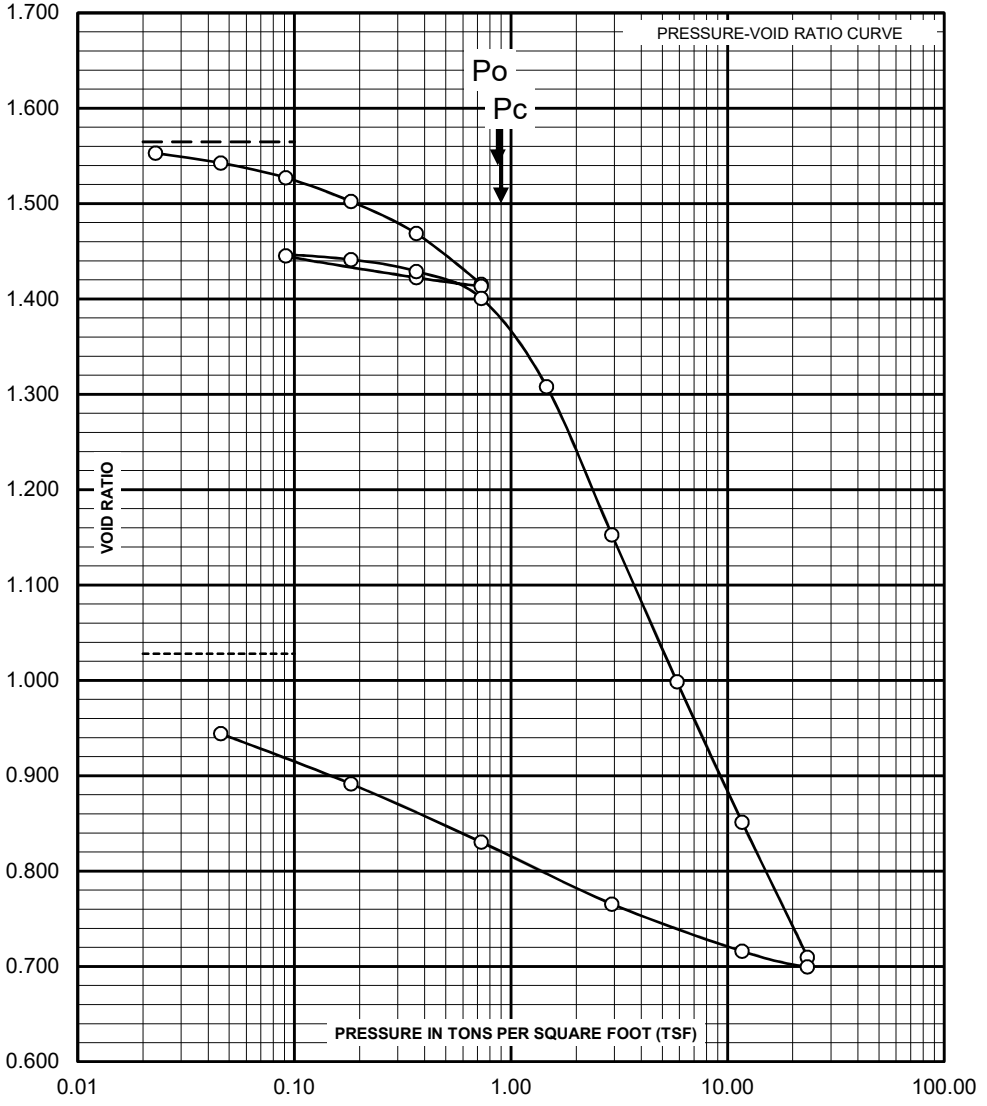
MADE BY: SJ DATE: 12-09-2021
CH'KD BY: HK DATE: 12-13-2021
FILE NO. **14123**

CONSOLIDATION TEST
BORING NO. BH-04 SAMPLE NO. 7U
PLATE NO. C-1

MRCE Form CONSOL-1

DRAFT





CURVE NO.	INCREMENT FROM (TSF)	INCREMENT TO (TSF)
○	0.18	0.37
□ +	0.18	0.37
△	0.73	1.46
◇	2.92	5.84

SPECIMEN DESCRIPTION: BROWN GRAY ORGANIC SILTY CLAY, TRACE HARDENED SILT

STRATUM A1

PLATE NO. C-2

PROPERTIES OF PLASTICITY LIMIT SPECIMEN

UNIFIED SOILS CLASSIFICATION - OH
LIQUID LIMIT, w_L = 52
PLASTIC LIMIT, w_P = 32
PLASTICITY INDEX, I_P = 20
NATURAL WATER CONT., W_n% = 58
LIQUIDITY INDEX, $(w-w_P)/I_P$ = 1.33
SPECIFIC GRAVITY, G_s = 2.690

PROPERTIES OF CONSOLIDATION SPECIMEN

ELEVATION OF SPECIMEN = -26.6
DEPTH OF SPECIMEN (FT) = 30.6
DIAMETER OF SPECIMEN (IN) = 2.49
INITIAL THICKNESS OF SPECIMEN (IN) = 1.010
INITIAL WATER CONTENT, % = 56.0
FINAL WATER CONTENT, % = 39.7
INITIAL DEGREE OF SATURATION, % = 96.3
FINAL DEGREE OF SATURATION, % = 104.0

— — — – INITIAL VOID RATIO, e_o = 1.565
---------- FINAL VOID RATIO, e_f = 1.028
$\Delta e/e_0$ AT IN-SITU EFF. OVERBURDEN STRESS = 0.116
ESTIMATED PRECONSOLIDATION STRESS (TSF), P_c = 0.90
IN-SITU EFFECTIVE OVERBURDEN STRESS (TSF), P_o = 0.87
COMPRESSION INDEX, C_c = 0.520
RECOMPRESSION INDEX, C_r = 0.042
SWELLING INDEX, C_s = 0.106, REBOUND FROM e = 0.700

ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

ALEXANDRIA VIRGINIA

MUESER RUTLEDGE CONSULTING ENGINEERS

225 WEST 34TH STREET, NEW YORK, N.Y. 10122

MADE BY: SJ DATE: 12-09-2021
CH'KD BY: HK DATE: 12-13-2021

FILE NO. **14123**

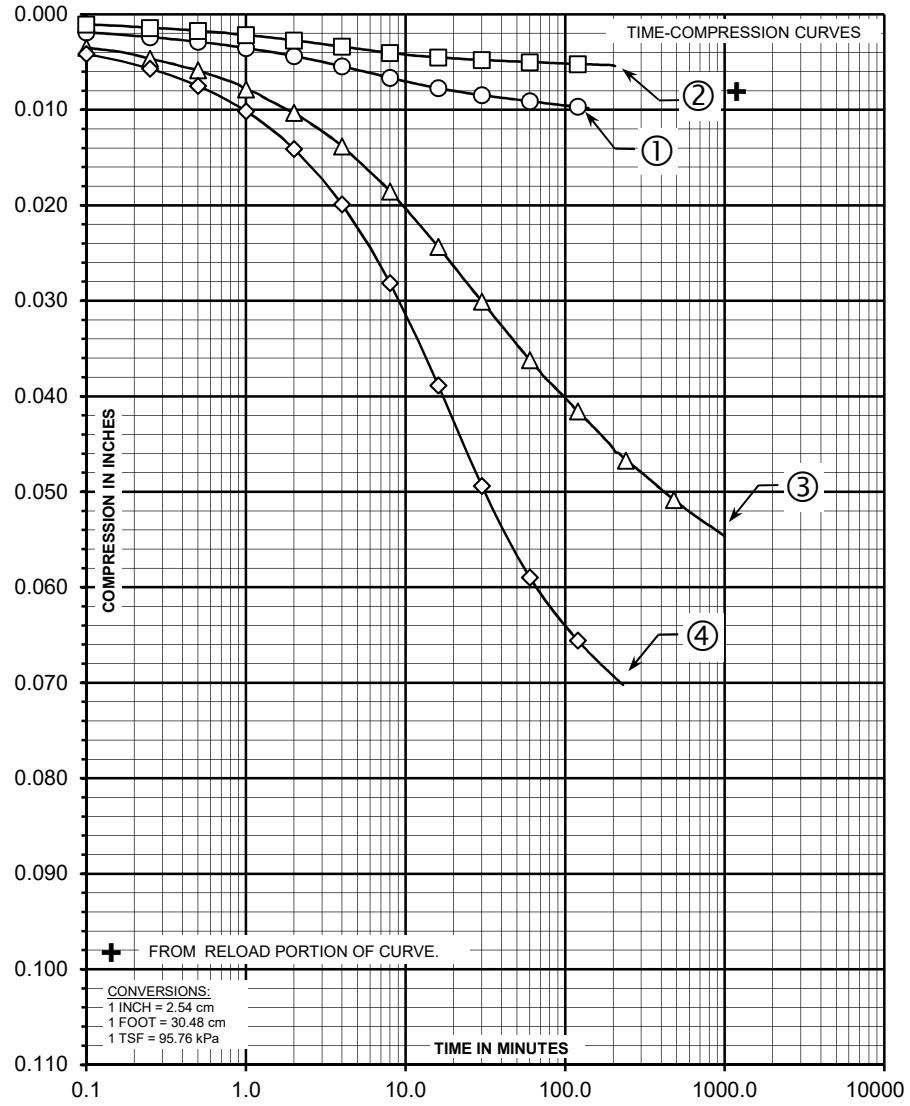
CONSOLIDATION TEST

BORING NO. BH-04 SAMPLE NO. 9U

PLATE NO. C-2

MRCE Form CONSOL-1

DRAFT



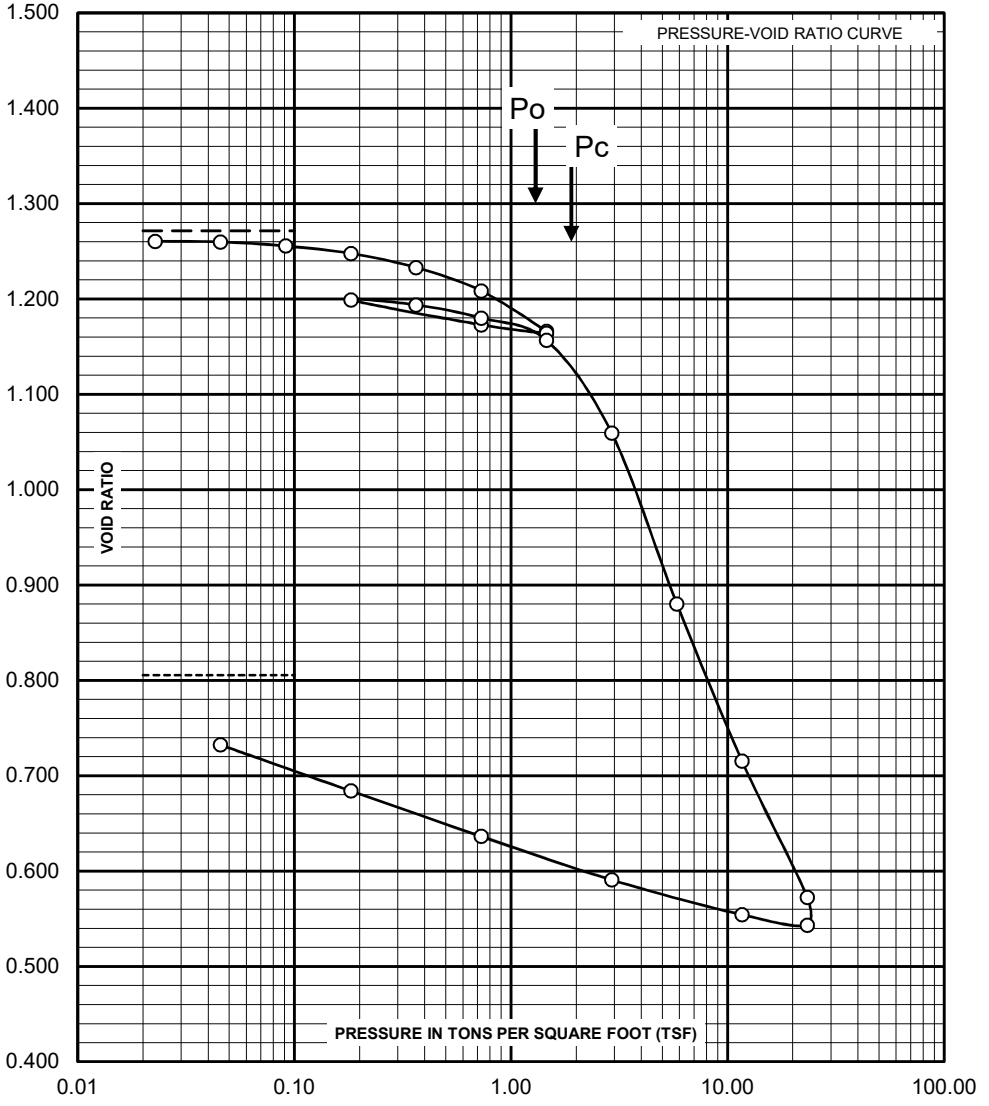


PLATE NO. C-3

CURVE NO.	INCREMENT FROM (TSF)	INCREMENT TO (TSF)
○	0.36	0.73
□ +	0.36	0.73
△	1.46	2.92
◇	2.92	5.84

SPECIMEN DESCRIPTION: DARK GRAY ORGANIC SILTY CLAY, TRACE FINE SAND, GRAVEL

STRATUM A1

PROPERTIES OF PLASTICITY LIMIT SPECIMEN

UNIFIED SOILS CLASSIFICATION - OH-CH
LIQUID LIMIT, w_L = 55
PLASTIC LIMIT, w_P = 29
PLASTICITY INDEX, I_P = 25
NATURAL WATER CONT., W_n% = 45.5
LIQUIDITY INDEX, $(w-w_P)/I_P$ = 0.64
SPECIFIC GRAVITY, G_s = 2.636

PROPERTIES OF CONSOLIDATION SPECIMEN

ELEVATION OF SPECIMEN = -46.5
DEPTH OF SPECIMEN (FT) = 50.5
DIAMETER OF SPECIMEN (IN) = 2.51
INITIAL THICKNESS OF SPECIMEN (IN) = 0.998
INITIAL WATER CONTENT, % = 47.8
FINAL WATER CONTENT, % = 33.3
INITIAL DEGREE OF SATURATION, % = 99.1
FINAL DEGREE OF SATURATION, % = 108.8

— — — — INITIAL VOID RATIO, e_o = 1.271
---------- FINAL VOID RATIO, e_f = 0.806
$\Delta e/e_0$ AT IN-SITU EFF. OVERBURDEN STRESS = 0.076
ESTIMATED PRECONSOLIDATION STRESS (TSF), P_c = 1.9
IN-SITU EFFECTIVE OVERBURDEN STRESS (TSF), P_o = 1.3
COMPRESSION INDEX, C_c = 0.630
RECOMPRESSION INDEX, C_r = 0.047
SWELLING INDEX, C_s = 0.077, REBOUND FROM e = 0.543

ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

ALEXANDRIA VIRGINIA

MUESER RUTLEDGE CONSULTING ENGINEERS

225 WEST 34TH STREET, NEW YORK, N.Y. 10122

MADE BY: SJ DATE: 12-09-2021
CH'KD BY: HK DATE: 12-13-2021

FILE NO. **14123**

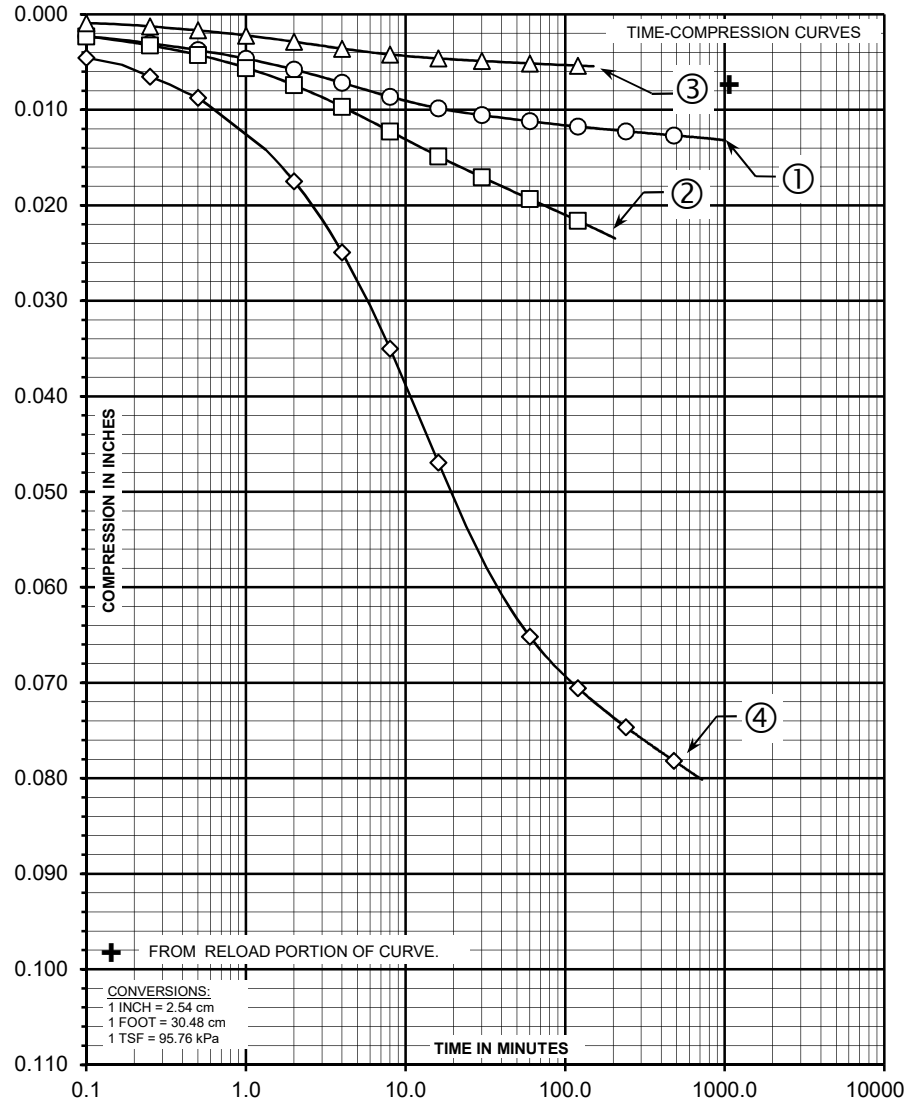
CONSOLIDATION TEST

BORING NO. BH-04 SAMPLE NO. 13U

PLATE NO. C-3

MRCE Form CONSOL-1

DRAFT



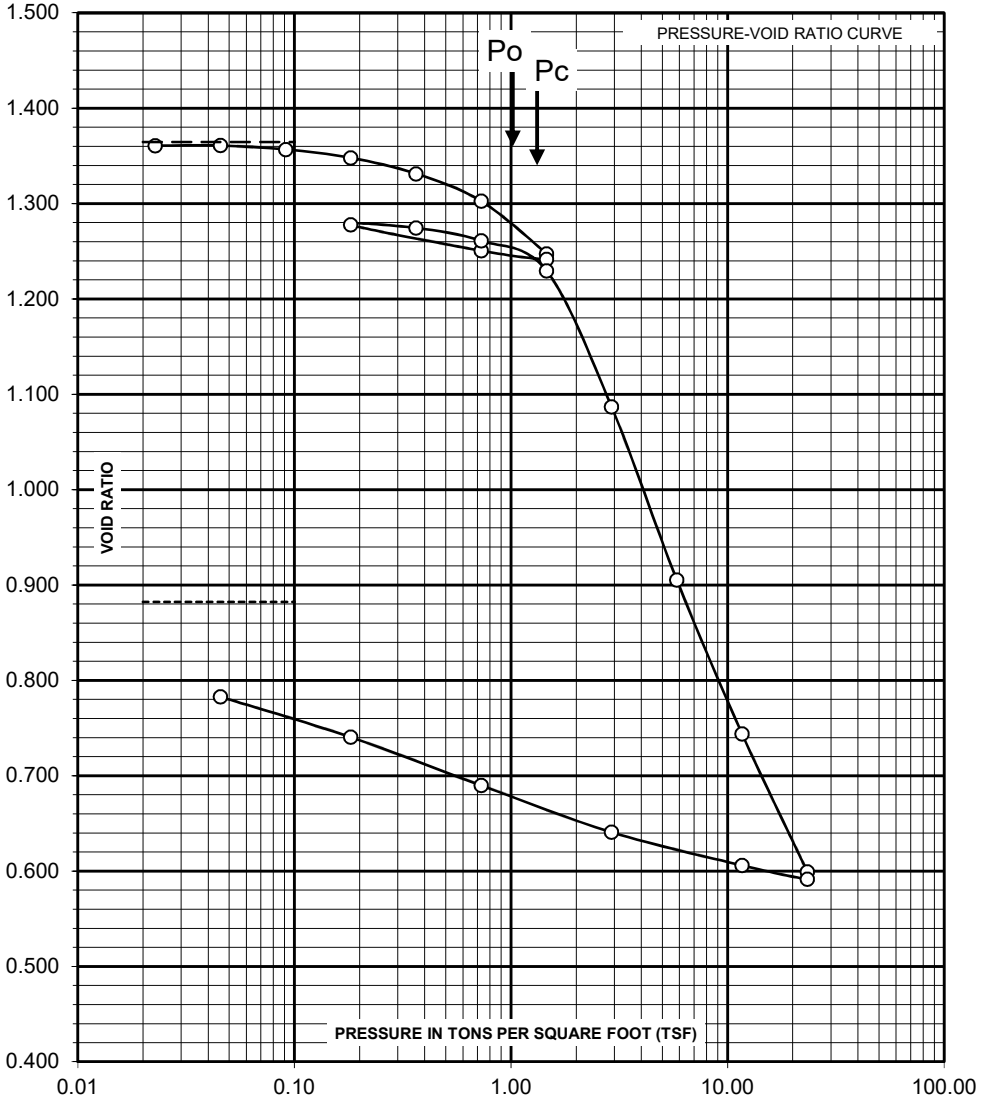


PLATE NO. C-4

CURVE NO.	INCREMENT FROM (TSF)	INCREMENT TO (TSF)
○	0.36	0.73
□	0.73	1.46
△ +	0.36	0.73
◇	2.92	5.83

SPECIMEN DESCRIPTION: MEDIUM DARK GRAY ORGANIC SILTY CLAY, TRACE FINE SAND, FIBERS (OH) — STRATUM A1

PROPERTIES OF PLASTICITY LIMIT SPECIMEN

UNIFIED SOILS CLASSIFICATION - OH
LIQUID LIMIT, w_L = 60
PLASTIC LIMIT, w_P = 30
PLASTICITY INDEX, I_P = 30
NATURAL WATER CONT., W_n% = 54.4
LIQUIDITY INDEX, $(w-w_P)/I_P$ = 0.81
SPECIFIC GRAVITY, G_s = 2.581

PROPERTIES OF CONSOLIDATION SPECIMEN

ELEVATION OF SPECIMEN = -30.6
DEPTH OF SPECIMEN (FT) = 35.6
DIAMETER OF SPECIMEN (IN) = 2.51
INITIAL THICKNESS OF SPECIMEN (IN) = 0.995
INITIAL WATER CONTENT, % = 53.6
FINAL WATER CONTENT, % = 36.1
INITIAL DEGREE OF SATURATION, % = 101.3
FINAL DEGREE OF SATURATION, % = 105.5

— — — – INITIAL VOID RATIO, e_o = 1.365
---------- FINAL VOID RATIO, e_f = 0.882
$\Delta e/e_0$ AT IN-SITU EFF. OVERBURDEN STRESS = 0.063
ESTIMATED PRECONSOLIDATION STRESS (TSF), P_c = 1.32
IN-SITU EFFECTIVE OVERBURDEN STRESS (TSF), P_o = 1.0
COMPRESSION INDEX, C_c = 0.615
RECOMPRESSION INDEX, C_r = 0.049
SWELLING INDEX, C_s = 0.082, REBOUND FROM e = 0.592

ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT
ALEXANDRIA VIRGINIA

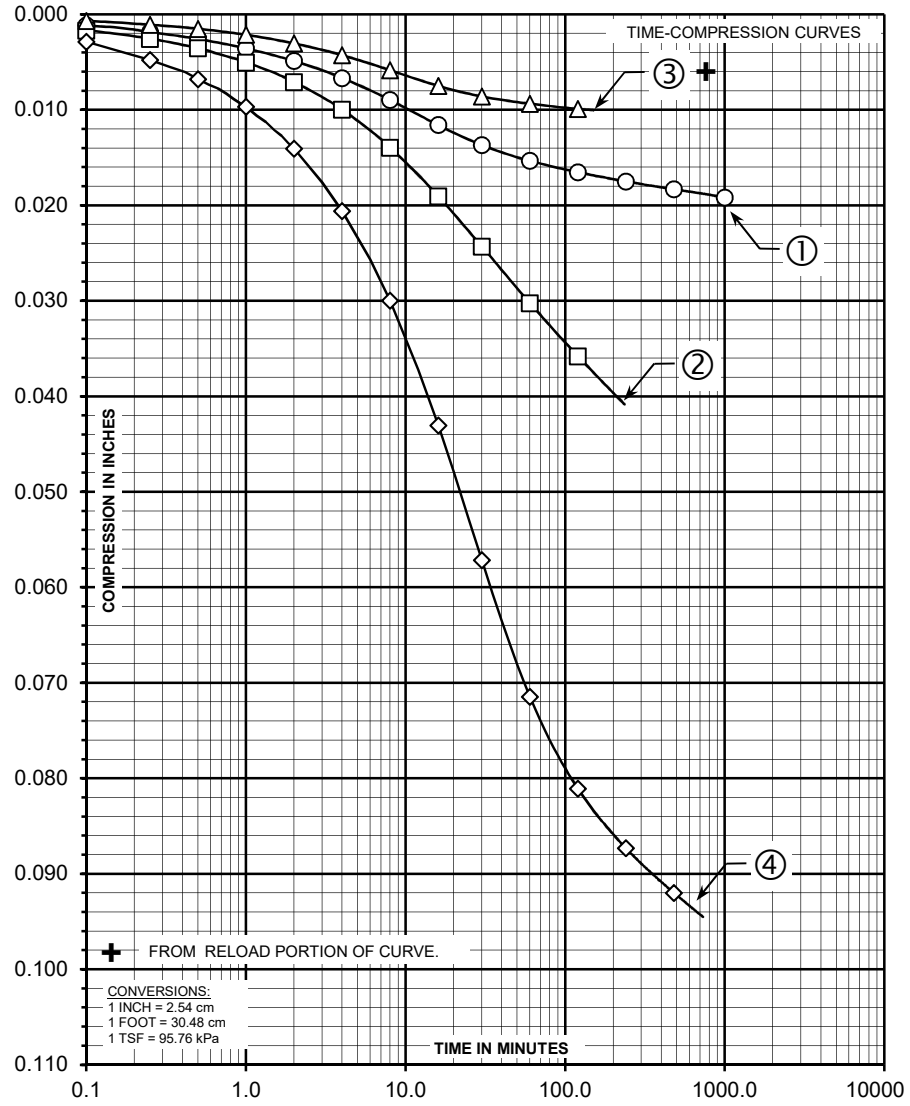
MUESER RUTLEDGE CONSULTING ENGINEERS
225 WEST 34TH STREET, NEW YORK, N.Y. 10122

MADE BY: SJ DATE: 12-08-2021
CH'KD BY: CJM DATE: 12-08-2021
FILE NO. **14123**

CONSOLIDATION TEST
BORING NO. PS-02 SAMPLE NO. 11U
PLATE NO. C-4

MRCE Form CONSOL-1

DRAFT



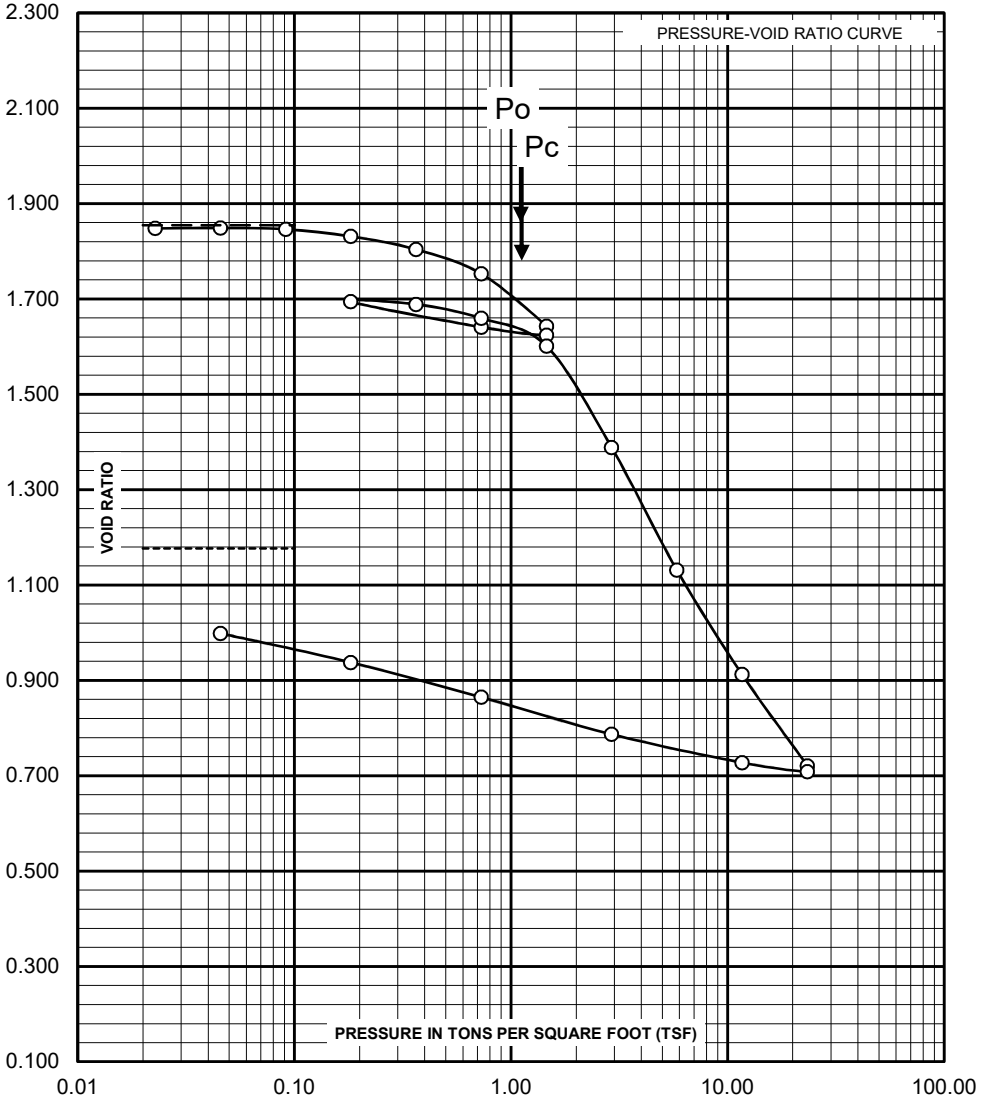


PLATE NO. C-5

CURVE NO.	INCREMENT FROM (TSF)	INCREMENT TO (TSF)
○	0.36	0.73
□	0.73	1.46
△ +	0.36	0.73
◇	2.92	5.83

SPECIMEN DESCRIPTION: MEDIUM DARK GRAY ORGANIC SILTY CLAY, TRACE FIBERS (OH)

STRATUM A1

PROPERTIES OF PLASTICITY LIMIT SPECIMEN

UNIFIED SOILS CLASSIFICATION - OH
LIQUID LIMIT, w_L = 72
PLASTIC LIMIT, w_P = 37
PLASTICITY INDEX, I_P = 36
NATURAL WATER CONT., W_n% = 65.8
LIQUIDITY INDEX, $(w\text{-}w_P)/I_P$ = 0.82
SPECIFIC GRAVITY, G_s = 2.608

PROPERTIES OF CONSOLIDATION SPECIMEN

ELEVATION OF SPECIMEN = -35.6
DEPTH OF SPECIMEN (FT) = 40.6
DIAMETER OF SPECIMEN (IN) = 2.51
INITIAL THICKNESS OF SPECIMEN (IN) = 1.002
INITIAL WATER CONTENT, % = 71.4
FINAL WATER CONTENT, % = 47.1
INITIAL DEGREE OF SATURATION, % = 100.4
FINAL DEGREE OF SATURATION, % = 104.4

— — — – INITIAL VOID RATIO, e_o = 1.855
---------- FINAL VOID RATIO, e_f = 1.177
$\Delta e/e_0$ AT IN-SITU EFF. OVERBURDEN STRESS = 0.089
ESTIMATED PRECONSOLIDATION STRESS (TSF), P_c = 1.12
IN-SITU EFFECTIVE OVERBURDEN STRESS (TSF), P_o = 1.1
COMPRESSION INDEX, C_c = 0.865
RECOMPRESSION INDEX, C_r = 0.109
SWELLING INDEX, C_s = 0.130, REBOUND FROM e = 0.708

ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT
ALEXANDRIA VIRGINIA

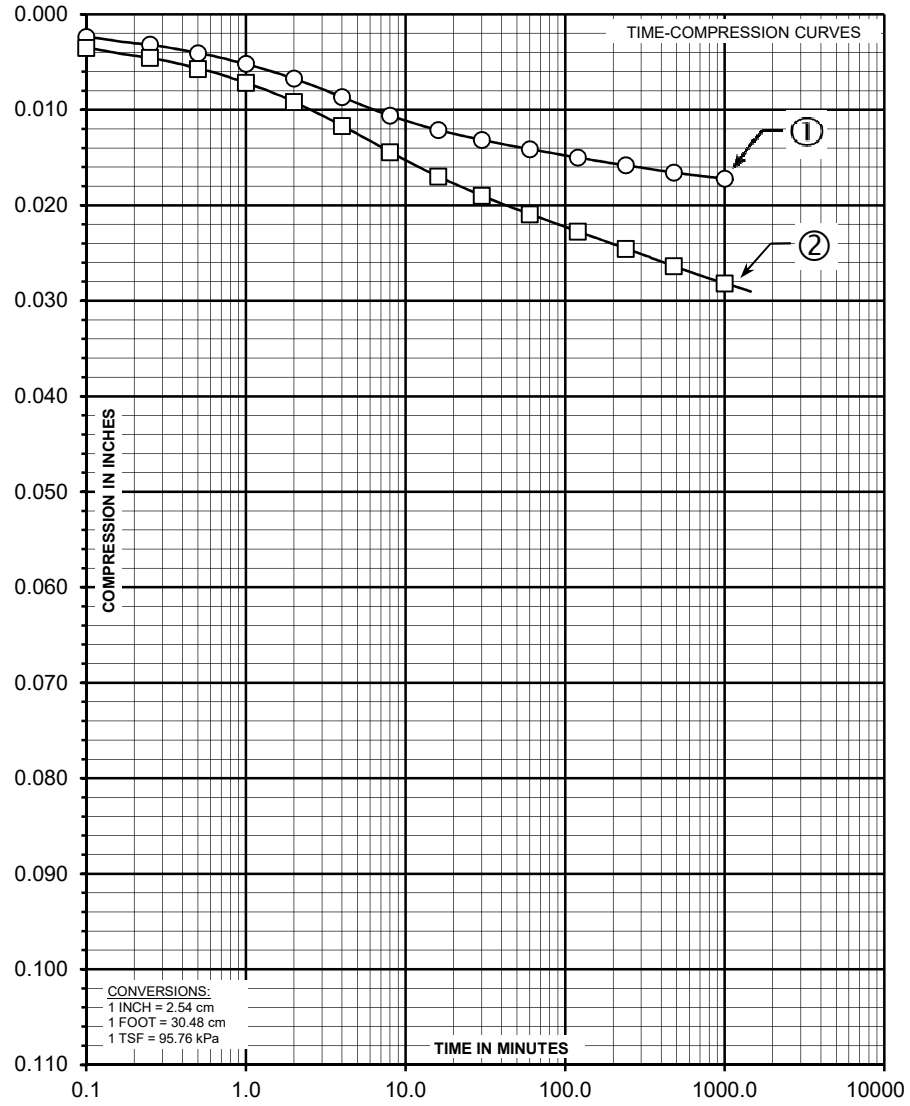
MUESER RUTLEDGE CONSULTING ENGINEERS
225 WEST 34TH STREET, NEW YORK, N.Y. 10122

MADE BY: SJ DATE: 12-08-2021
CH'KD BY: CJM DATE: 12-08-2021
FILE NO. **14123**

CONSOLIDATION TEST
BORING NO. PS-04A SAMPLE NO. 12U
PLATE NO. C-5

MRCE Form CONSOL-1

DRAFT



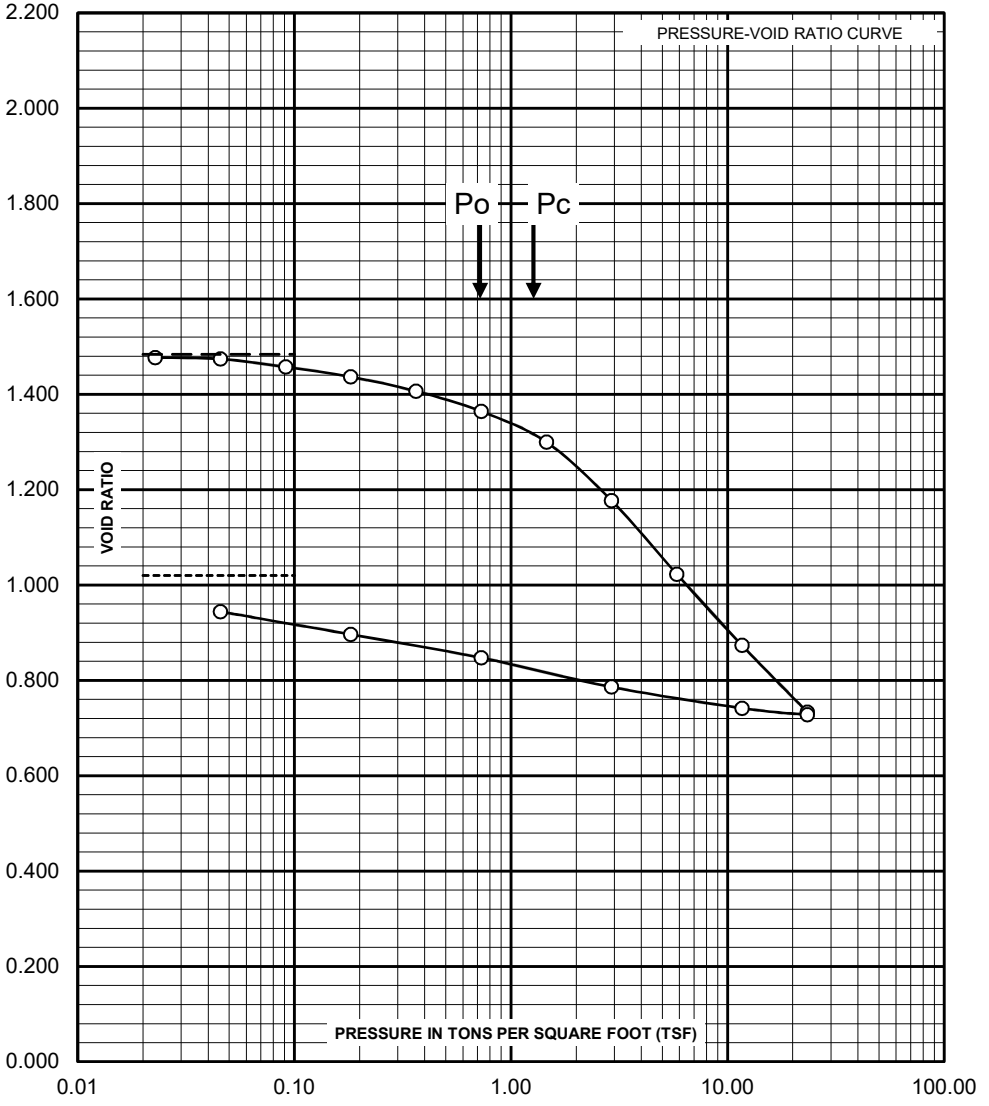


PLATE NO. C-6

CURVE NO.	INCREMENT FROM (TSF)	INCREMENT TO (TSF)
○	0.36	0.73
□	0.73	1.46

SPECIMEN DESCRIPTION: GRAY BROWN ORGANIC SILTY CLAY, TRACE SILTY FINE SAND SEAMS

STRATUM A1

PROPERTIES OF PLASTICITY LIMIT SPECIMEN

UNIFIED SOILS CLASSIFICATION - OH
LIQUID LIMIT, w_L = 52
PLASTIC LIMIT, w_P = 29
PLASTICITY INDEX, I_P = 23
NATURAL WATER CONT., W_n% = 50.8
LIQUIDITY INDEX, $(w\text{-}w_P)/I_P$ = 0.94
SPECIFIC GRAVITY, G_s = 2.681

PROPERTIES OF CONSOLIDATION SPECIMEN

MUDLINE
ELEVATION OF SPECIMEN = -41.6
DEPTH OF SPECIMEN (FT) = 34.2
DIAMETER OF SPECIMEN (IN) = 2.51
INITIAL THICKNESS OF SPECIMEN (IN) = 0.993
INITIAL WATER CONTENT, % = 54.6
FINAL WATER CONTENT, % = 38.4
INITIAL DEGREE OF SATURATION, % = 98.7
FINAL DEGREE OF SATURATION, % = 100.8

— — — — INITIAL VOID RATIO, e_o = 1.484
---------- FINAL VOID RATIO, e_f = 1.020
$\Delta e/e_0$ AT IN-SITU EFF. OVERBURDEN STRESS = 0.080
ESTIMATED PRECONSOLIDATION STRESS (TSF), P_c = 1.27
IN-SITU EFFECTIVE OVERBURDEN STRESS (TSF), P_o = 0.72
COMPRESSION INDEX, C_c = 0.506
SWELLING INDEX, Cs = 0.098, REBOUND FROM e = 0.728

ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

ALEXANDRIA VIRGINIA

MUESER RUTLEDGE CONSULTING ENGINEERS

225 WEST 34TH STREET, NEW YORK, N.Y. 10122

MADE BY: SJ DATE: 02-03-2022
CH'KD BY: HK DATE: 02-04-2022

FILE NO. **14123**

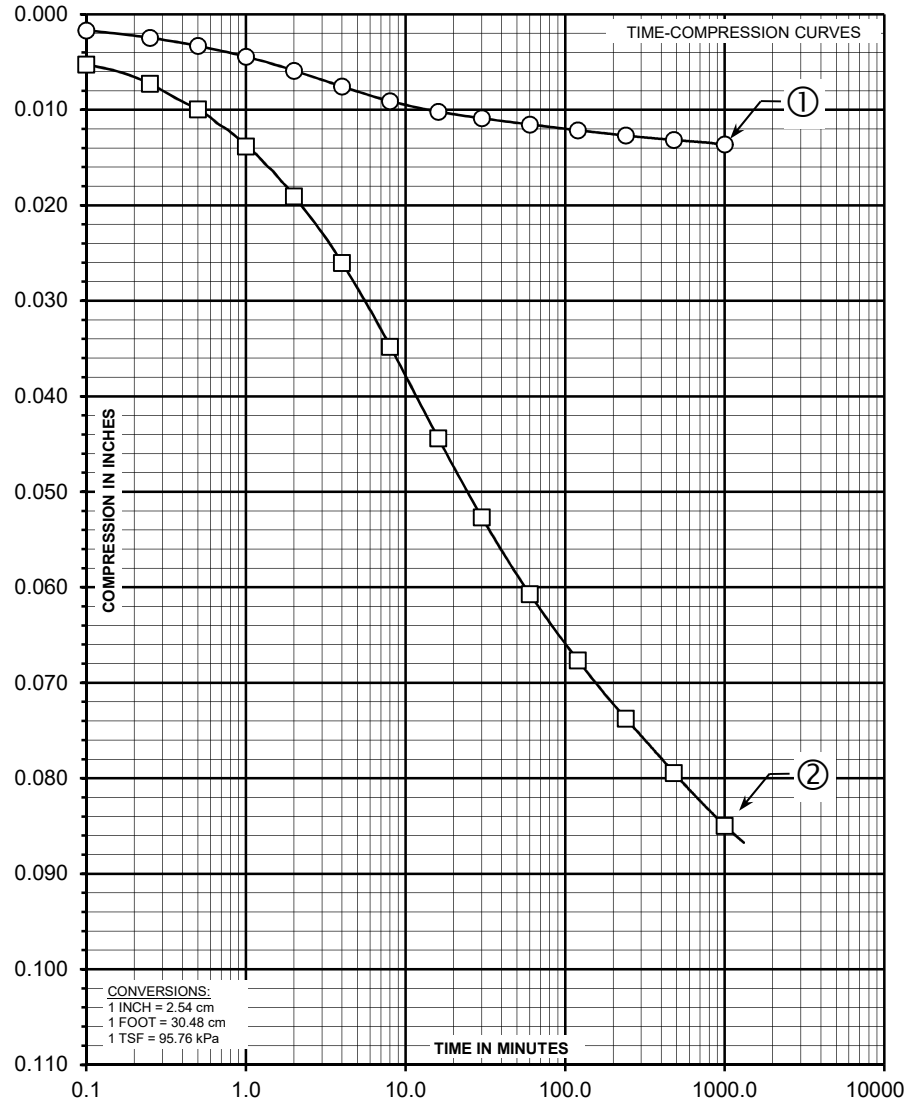
CONSOLIDATION TEST

BORING NO. PS-04 SAMPLE NO. 10U

PLATE NO. C-6

MRCE Form CONSOL-1

DRAFT



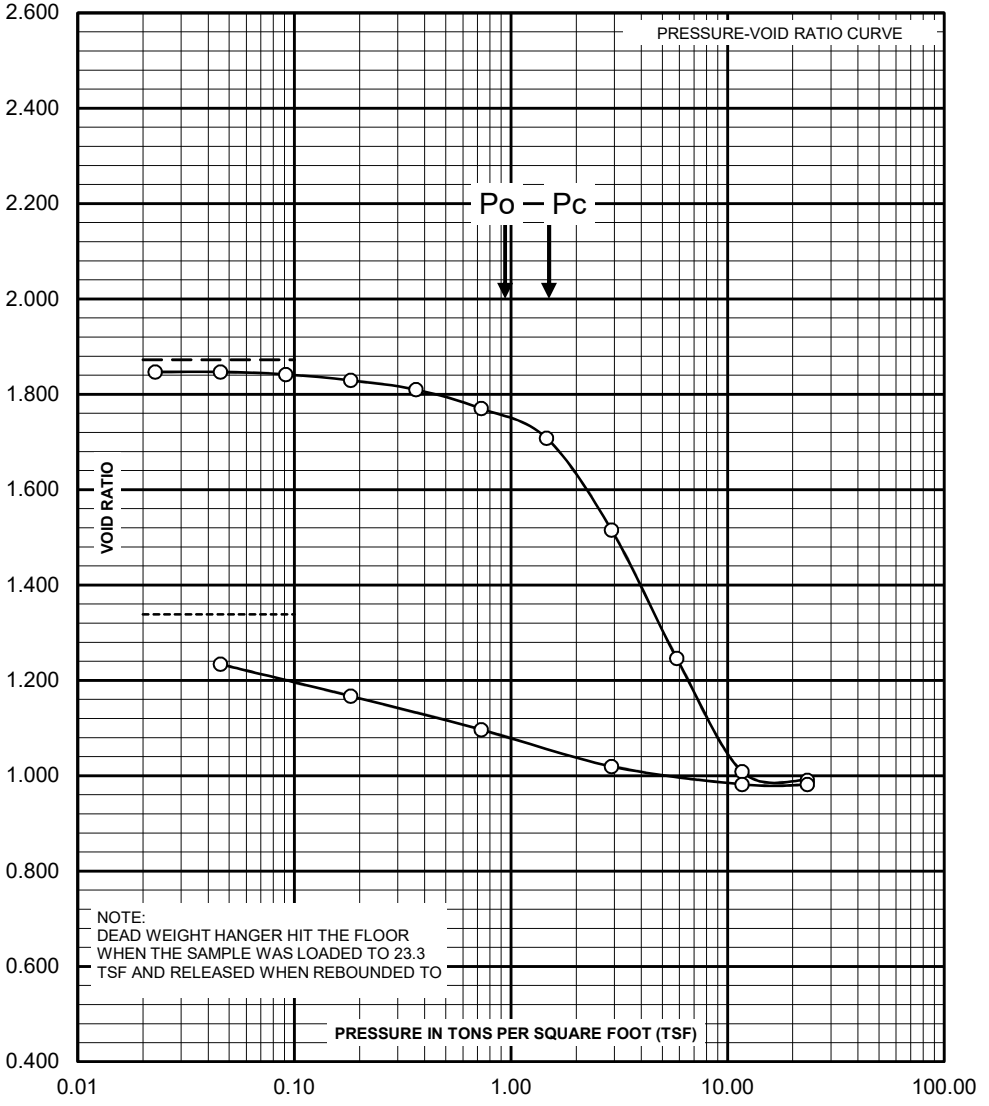


PLATE NO. C-7

CURVE NO.	INCREMENT FROM (TSF)	INCREMENT TO (TSF)
○	0.36	0.73
□	1.46	2.92

SPECIMEN DESCRIPTION: GRAY BROWN ORGANIC SILTY CLAY, TRACE FINE SAND, GRAVEL, SHELLS

STRATUM A1

PROPERTIES OF PLASTICITY LIMIT SPECIMEN

UNIFIED SOILS CLASSIFICATION - OH
LIQUID LIMIT, w_L = 72
PLASTIC LIMIT, w_P = 37
PLASTICITY INDEX, I_P = 35
NATURAL WATER CONT., W_n% = 61.5
LIQUIDITY INDEX, $(w\text{-}w_P)/I_P$ = 0.71
SPECIFIC GRAVITY, G_s = 2.599

PROPERTIES OF CONSOLIDATION SPECIMEN

MUDLINE
ELEVATION OF SPECIMEN = -51.6
DEPTH OF SPECIMEN (FT) = 44.2
DIAMETER OF SPECIMEN (IN) = 2.51
INITIAL THICKNESS OF SPECIMEN (IN) = 0.994
INITIAL WATER CONTENT, % = 71.5
FINAL WATER CONTENT, % = 54.6
INITIAL DEGREE OF SATURATION, % = 99.3
FINAL DEGREE OF SATURATION, % = 105.9

— — — — INITIAL VOID RATIO, e_o = 1.872
---------- FINAL VOID RATIO, e_f = 1.339
$\Delta e/e_0$ AT IN-SITU EFF. OVERBURDEN STRESS = 0.063
ESTIMATED PRECONSOLIDATION STRESS (TSF), P_c = 1.5
IN-SITU EFFECTIVE OVERBURDEN STRESS (TSF), P_o = 0.94
COMPRESSION INDEX, C_c = 0.903
SWELLING INDEX, Cs = 0.128, REBOUND FROM e = 0.982

ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

ALEXANDRIA VIRGINIA

MUESER RUTLEDGE CONSULTING ENGINEERS

225 WEST 34TH STREET, NEW YORK, N.Y. 10122

MADE BY: SJ DATE: 02-03-2022 FILE NO. **14123**

CH'KD BY: HK DATE: 02-04-2022

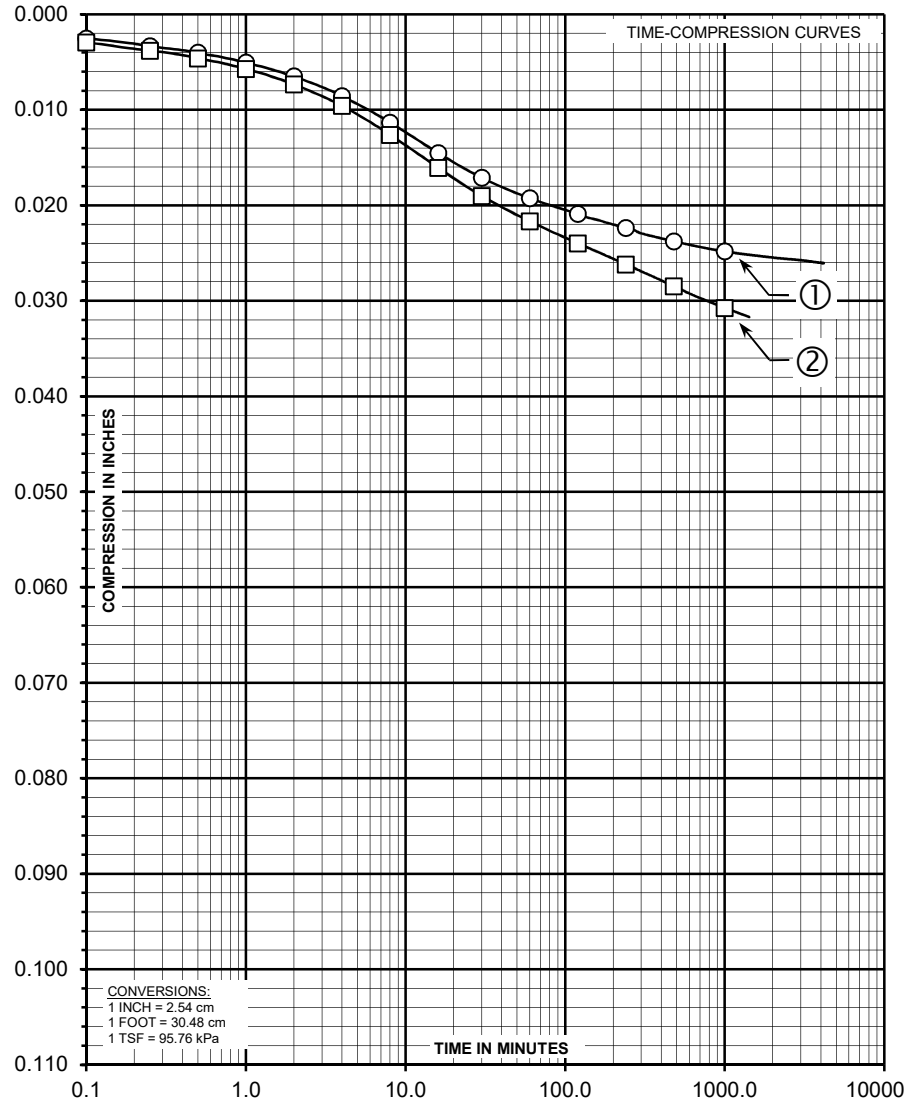
CONSOLIDATION TEST

BORING NO. PS-04 SAMPLE NO. 12U

PLATE NO. C-7

MRCE Form CONSOL-1

DRAFT



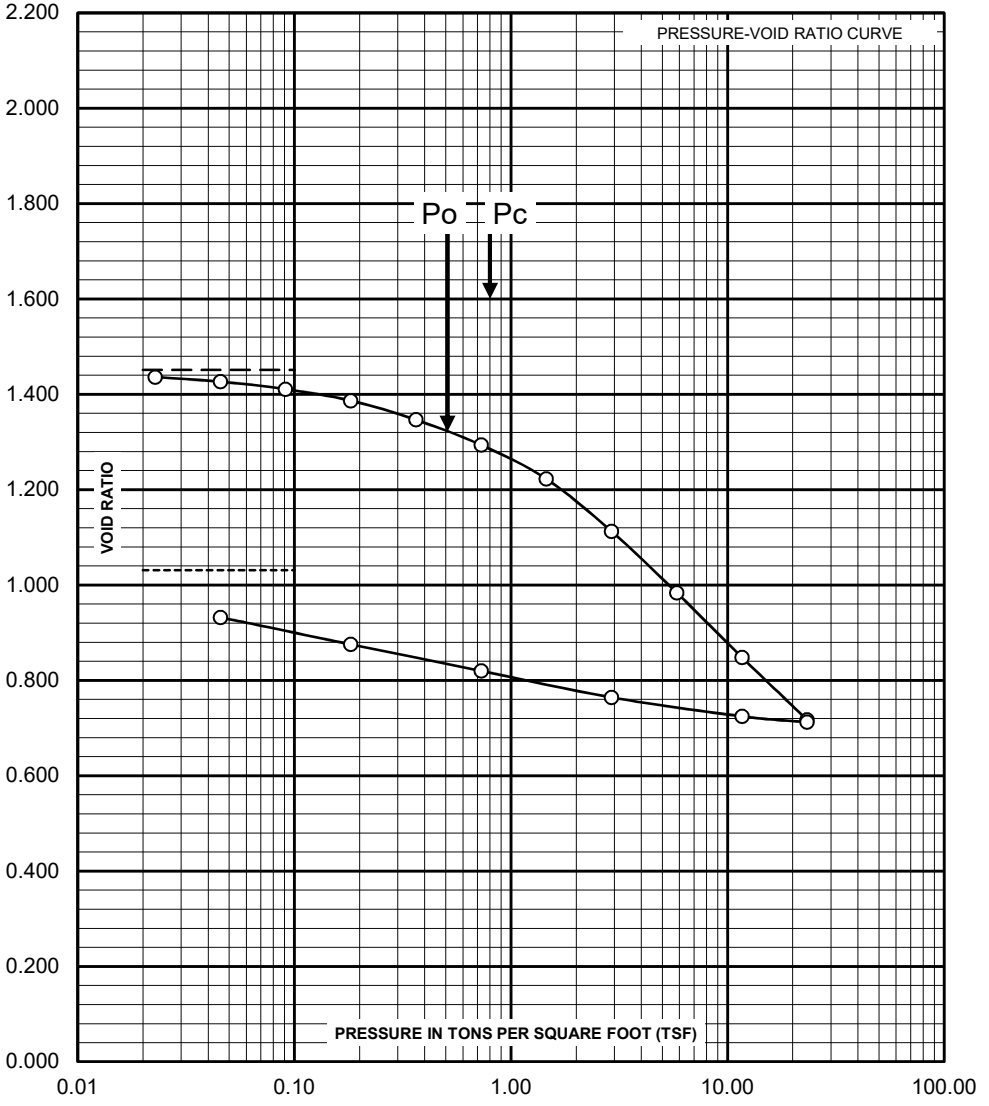


PLATE NO. C-8

CURVE NO.	INCREMENT FROM (TSF)	INCREMENT TO (TSF)
○	0.36	0.73
□	0.73	1.46

SPECIMEN DESCRIPTION: GRAY BROWN SILTY CLAY, TRACE FINE SAND, GRAVEL

STRATUM A1

PROPERTIES OF PLASTICITY LIMIT SPECIMEN

UNIFIED SOILS CLASSIFICATION - CH
LIQUID LIMIT, w_L = 56
PLASTIC LIMIT, w_P = 29
PLASTICITY INDEX, I_P = 27
NATURAL WATER CONT., W_n% = 52.7
LIQUIDITY INDEX, $(w-w_P)/I_P$ = 0.88
SPECIFIC GRAVITY, G_s = 2.683

PROPERTIES OF CONSOLIDATION SPECIMEN

MUDLINE
ELEVATION OF SPECIMEN = -32
DEPTH OF SPECIMEN (FT) = 24.6
DIAMETER OF SPECIMEN (IN) = 2.51
INITIAL THICKNESS OF SPECIMEN (IN) = 1.010
INITIAL WATER CONTENT, % = 54.2
FINAL WATER CONTENT, % = 38.6
INITIAL DEGREE OF SATURATION, % = 100.3
FINAL DEGREE OF SATURATION, % = 100.5

— — — — INITIAL VOID RATIO, e_o = 1.451
---------- FINAL VOID RATIO, e_f = 1.031
$\Delta e/e_0$ AT IN-SITU EFF. OVERBURDEN STRESS = 0.089
ESTIMATED PRECONSOLIDATION STRESS (TSF), P_c = 0.8
IN-SITU EFFECTIVE OVERBURDEN STRESS (TSF), P_o = 0.5
COMPRESSION INDEX, C_c = 0.422
SWELLING INDEX, Cs = 0.095, REBOUND FROM e = 0.713

ALEXANDRIA WATERFRONT IMPLEMENTATION PROJECT

ALEXANDRIA VIRGINIA

MUESER RUTLEDGE CONSULTING ENGINEERS

225 WEST 34TH STREET, NEW YORK, N.Y. 10122

MADE BY: SJ DATE: 02-09-2022
CH'KD BY: HK DATE: 02-10-2022

FILE NO. **14123**

CONSOLIDATION TEST

BORING NO. PS-04 SAMPLE NO. 8U

PLATE NO. C-8

MRCE Form CONSOL-1

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-04	Bulk Composite	0'	8.5'

Location: -

Sample Date: -

California Bearing Ratio of Laboratory-Compacted Soils (CBR)

Test Method: ASTM D-1883, Compaction Method: ASTM D-698 (B)

	Uncorrected	*Corrected**
Soaked (96 hours) CBR at 0.1"	30.1%	43.6%
Soaked (96 hours) CBR at 0.2"	49.1%	55.8%

*Corrected for concave upward shape and/or surface irregularities.

Surcharge, lb/ft^2	50
Target MDD, lb/ft^3	129.4
Target OMC	9.2%

CBR at 0.1"*	CBR at 0.2"*
43.6%	55.8%

Specimen Swell: -0.10%

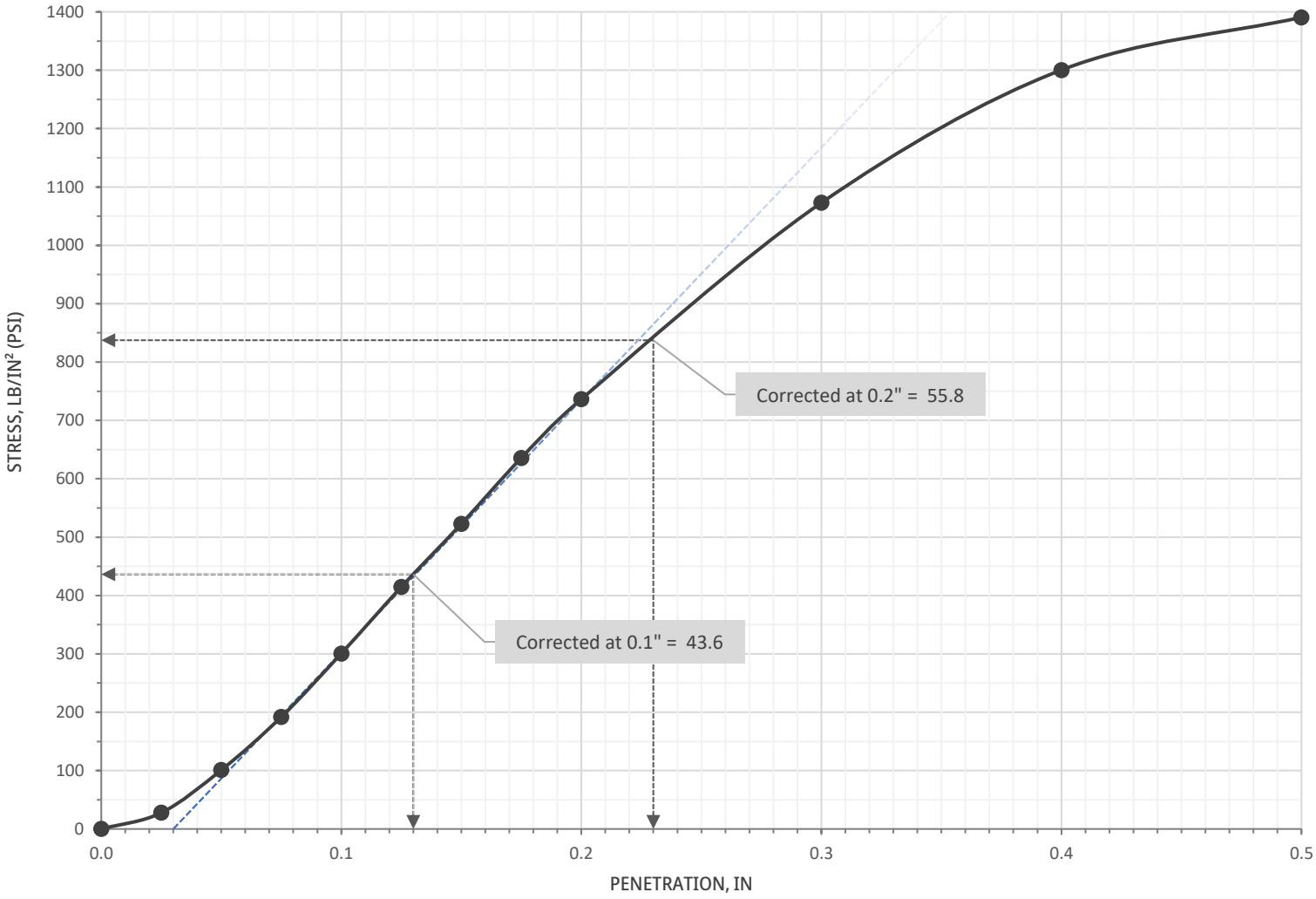
Specimen Data

AS-MOLDED

Dry unit weight, lb/ft^3	125.1	Blows per layer, #	20
Water content	10.0%	Achieved compaction	96.7%

AFTER-SOAK

Water content of top 1" layer: 9.5%



WC	LL	PL	PI	% Fines	USCS	AASHTO	Soil Description (D-2487)
-	23%	22%	1%	12.0	SW-SM	A-1-b	Brown well-graded SAND with silt and gravel

12/27/21 Tested by: ST/JT Reviewed by: FF Jay Kay Testing, Inc.

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-10	Bulk	0'	6'

Location: -

Sample Date: -

California Bearing Ratio of Laboratory-Compacted Soils (CBR)

Test Method: ASTM D-1883, Compaction Method: ASTM D-698 (B)

	Uncorrected	*Corrected*
Soaked (96 hours) CBR at 0.1"	12.2%	-
Soaked (96 hours) CBR at 0.2"	15.2%	-

Surcharge, lb/ft^2	50
Target MDD, lb/ft^3	125.0
Target OMC	10.4%

CBR at 0.1"	CBR at 0.2"
12.2%	15.2%

Specimen Swell 0.10%

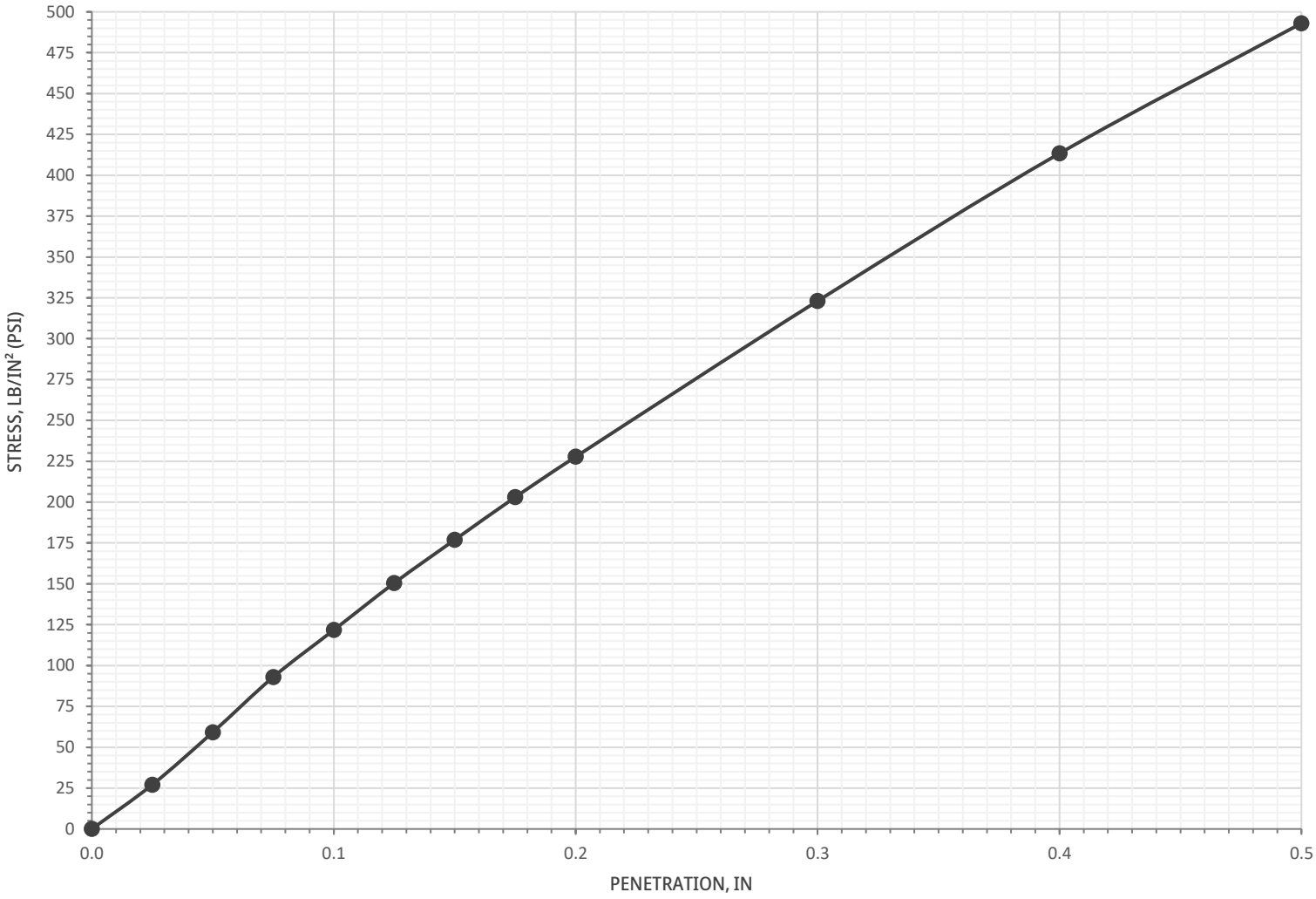
Specimen Data

AS-MOLDED

Dry unit weight, lb/ft^3	120.1	Blows per layer, #	25
Water content	11.9%	Achieved compaction	96.1%

AFTER-SOAK

Water content of top 1" layer 13.6%



WC	LL	PL	PI	% Fines	USCS	AASHTO	Soil Description (D-2487)
6.1%	35%	22%	13%	22.1	SC	A-2-6	Dark brown clayey SAND with gravel

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-11	Bulk Composite	0'	8'

Location: -

Sample Date: -

California Bearing Ratio of Laboratory-Compacted Soils (CBR)

Test Method: ASTM D-1883, Compaction Method: ASTM D-698 (B)

	Uncorrected	*Corrected*
Soaked (96 hours) CBR at 0.1"	12.4%	-
Soaked (96 hours) CBR at 0.2"	13.9%	-

Surcharge, lb/ft²	50
Target MDD, lb/ft³	110.4
Target OMC	14.5%

CBR at 0.1"	CBR at 0.2"
12.4%	13.9%

Specimen Swell 0.63%

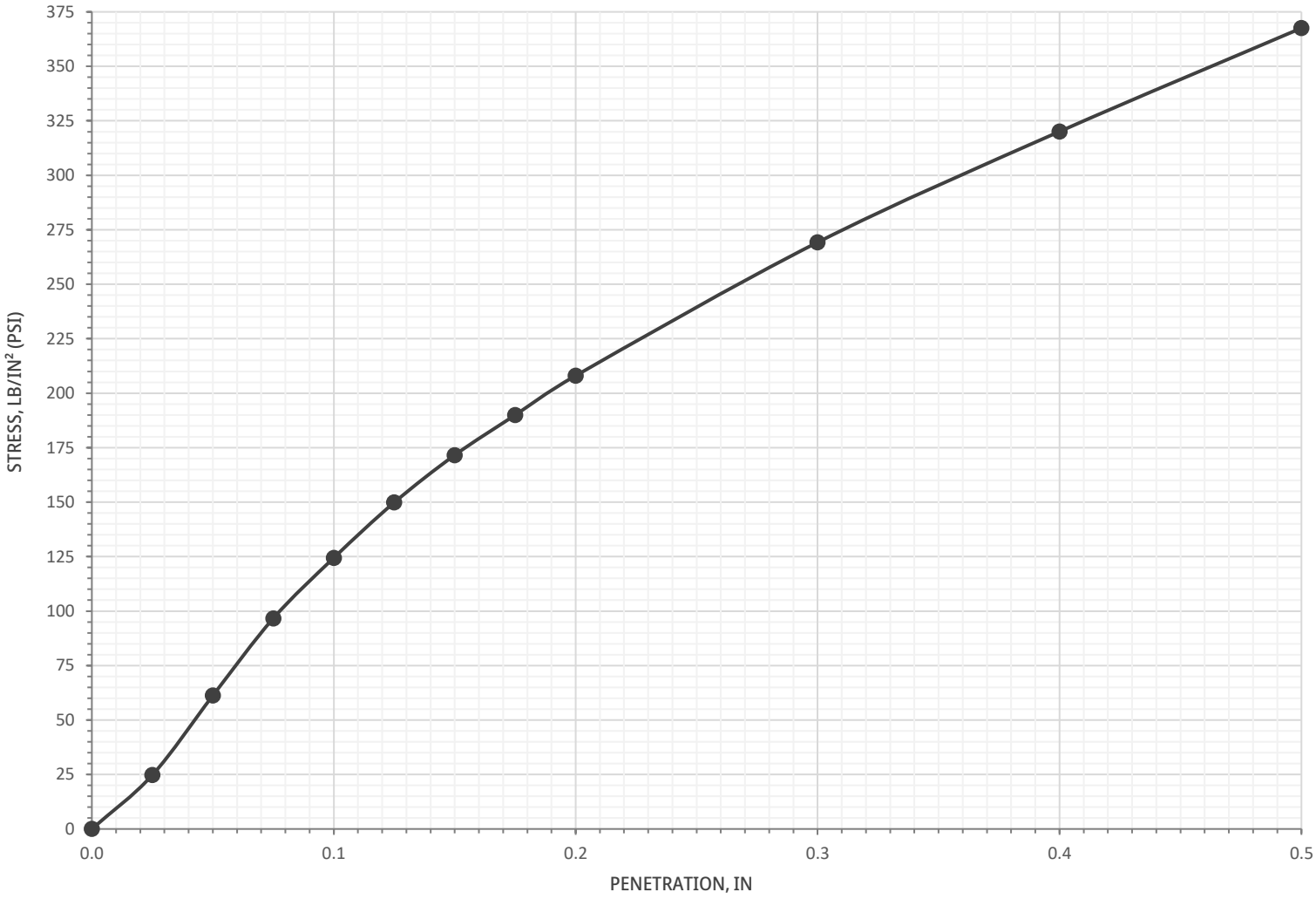
Specimen Data

AS-MOLDED

Dry unit weight, lb/ft³	106.3	Blows per layer, #	25
Water content	14.4%	Achieved compaction	96.3%

AFTER-SOAK

Water content of top 1" layer 19.4%



WC	LL	PL	PI	% Fines	USCS	AASHTO	Soil Description (D-2487)
-	34%	23%	11%	42.4	SC	A-6	Dark gray clayey SAND with gravel

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-14A-B	Bulk-1	0'	4'

Location: -

Sample Date: -

California Bearing Ratio of Laboratory-Compacted Soils (CBR)

Test Method: ASTM D-1883, Compaction Method: ASTM D-698 (B)

	Uncorrected	*Corrected*
Soaked (96 hours) CBR at 0.1"	2.0%	-
Soaked (96 hours) CBR at 0.2"	2.1%	-

Surcharge, lb/ft^2	50
Target MDD, lb/ft^3	115.9
Target OMC	12.4%

CBR at 0.1"	CBR at 0.2"
2.0%	2.1%

Specimen Swell 2.45%

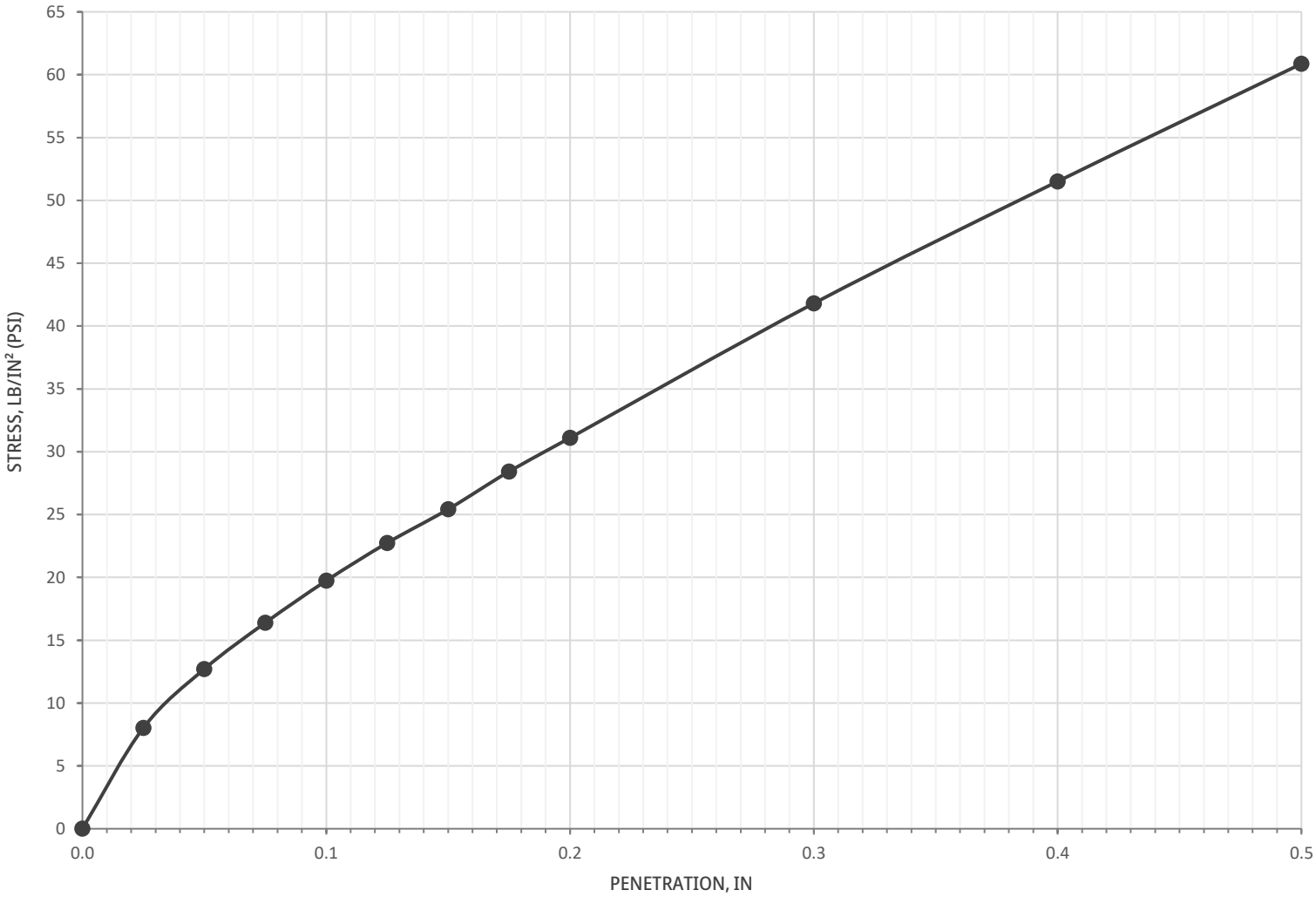
Specimen Data

AS-MOLDED

Dry unit weight, lb/ft^3	109.6	Blows per layer, #	30
Water content	11.9%	Achieved compaction	94.6%

AFTER-SOAK

Water content of top 1" layer 22.3%



WC	LL	PL	PI	% Fines	USCS	AASHTO	Soil Description (D-2487)
17.0%	30%	16%	14%	69.4	CL	A-6	Brown sandy lean CLAY

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-02	Bulk Composite	0'	8'

Location: -

Sample Date: -

California Bearing Ratio of Laboratory-Compacted Soils (CBR)

Test Method: ASTM D-1883, Compaction Method: ASTM D-698 (B)

	Uncorrected	*Corrected*
Soaked (96 hours) CBR at 0.1"	14.7%	-
Soaked (96 hours) CBR at 0.2"	17.8%	-

Surcharge, lb/ft^2	50
Target MDD, lb/ft^3	124.5
Target OMC	10.0%

CBR at 0.1"	CBR at 0.2"
14.7%	17.8%

Specimen Swell 0.11%

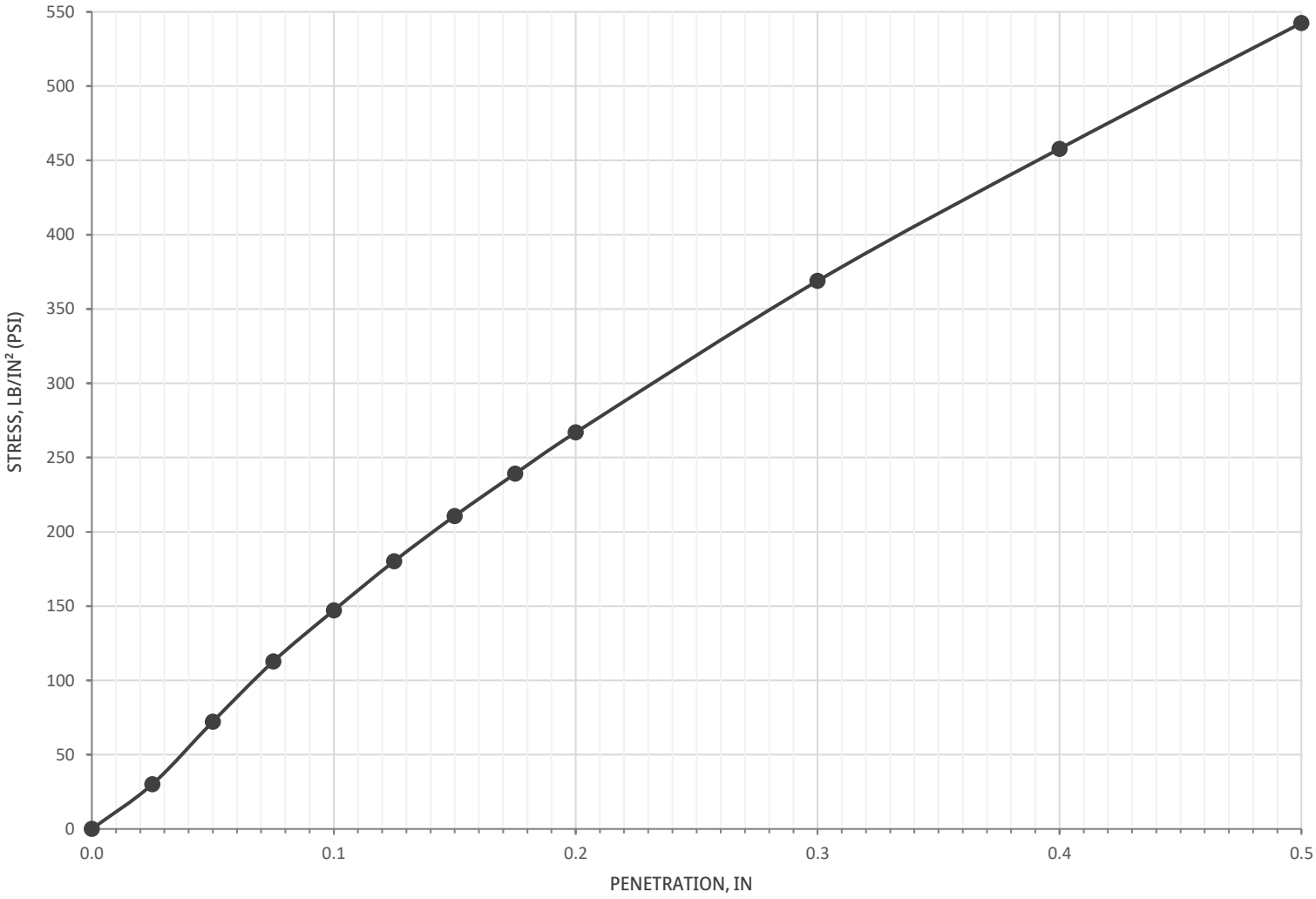
Specimen Data

AS-MOLDED

Dry unit weight, lb/ft^3	117.5	Blows per layer, #	20
Water content	10.7%	Achieved compaction	94.3%

AFTER-SOAK

Water content of top 1" layer 11.7%



WC	LL	PL	PI	% Fines	USCS	AASHTO	Soil Description (D-2487)
-	29%	19%	10%	20.1	SC	A-2-4	Gray/black clayey SAND with gravel

DRAFT

MUESER RUTLEDGE CONSULTING ENGINEERS

CONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

File	14123
Boring No.	BH-04
Sample No.	7U

Sample Description: MEDIUM GRAY BROWN ORGANIC SILTY CLAY, TRACE GRAVEL

Perf by:	SJ	Date: 12/07/21
Calc by:	SJ	Date: 12/14/21
Ch'kd by:	YO	Date: 12/23/21

TEST DATA

Cell Pressure =	67.4 psi	4.85 tsf	465 kPa
Back Pressure =	60.0 psi	4.32 tsf	414 kPa
Eff. Consol. Pressure =	7.4 psi	0.53 tsf	51 kPa
Dry Density =	**72.15** pcf		

TEST SUMMARY

Compressive Strength =	**0.57 tsf**	**7.9 psi**	
Strain at Failure =	**11.7 %**		
Pore Pressure at Failure =	**65.6 psi**	**4.72 tsf**	**452 kPa**
In Situ Density =	**108.21** pcf		

SAMPLE DATA

Init. Height =	5.56 in
Corr. Height =	5.50 in
Init. Diameter =	2.84 in
Init. Area =	6.35 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012 in
Weight of piston+gage+clamp =	352.00 gm
Weight of end cap+porous stone =	173.90 gm
Correction for membrane =	-0.018 tsf
Correction for end cap+assembly =	0.004 tsf

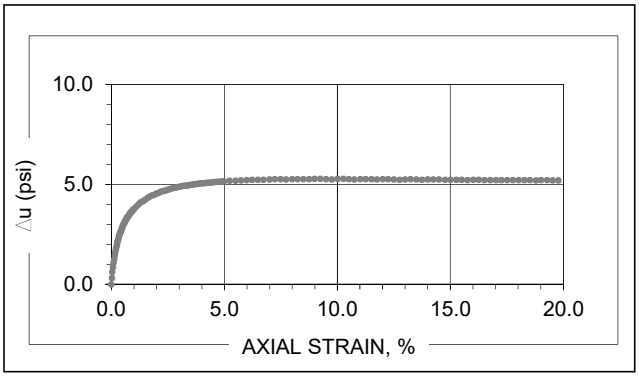
TEST CONSTANTS

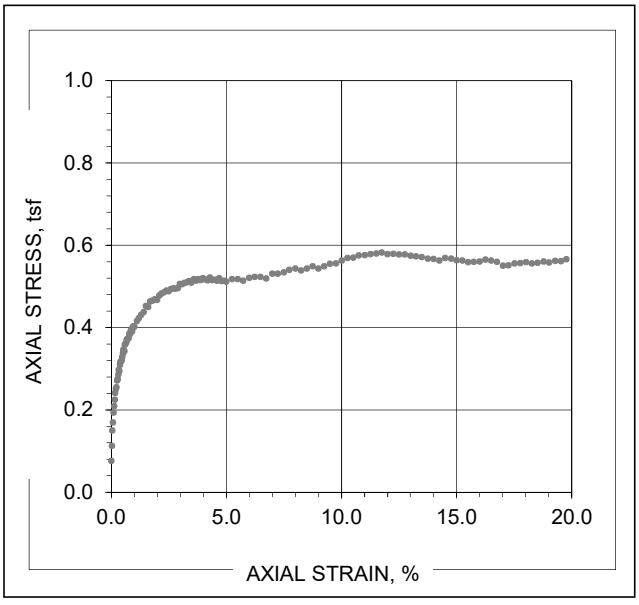
Strain Rate = 0.0167 %/min

WATER CONTENT

	START	END
Tare No.		#1
Wet + Tare	991.29	1333.59
Dry + Tare		1021.73
Water	330.28	311.86
Tare		360.72
Sample Dry	661.01	661.01
Water Content	50.0%	47.2%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
0.00	18.61	0.00	60.3	0.0	0.08
1.50	21.85	0.00	60.7	0.0	0.11
3.00	25.16	0.00	61.0	0.0	0.15
4.50	26.91	0.00	61.2	0.1	0.17
6.00	28.98	0.01	61.4	0.1	0.19
7.50	30.36	0.01	61.6	0.1	0.21
9.00	31.74	0.01	61.8	0.2	0.22
10.50	33.18	0.01	61.9	0.2	0.24
12.00	34.03	0.01	62.1	0.2	0.25
13.50	34.43	0.01	62.2	0.2	0.26
15.00	35.91	0.01	62.3	0.2	0.27
16.50	36.25	0.01	62.5	0.3	0.28
18.00	37.22	0.02	62.6	0.3	0.29
19.50	38.21	0.02	62.7	0.3	0.30
21.00	38.02	0.02	62.8	0.3	0.30
22.50	39.32	0.02	62.9	0.4	0.31
24.00	39.85	0.02	62.9	0.4	0.32
25.52	40.15	0.02	63.0	0.4	0.32
27.02	40.33	0.02	63.1	0.4	0.32
28.52	41.02	0.03	63.1	0.5	0.33
30.02	41.71	0.03	63.2	0.5	0.34
31.52	42.40	0.03	63.3	0.5	0.34
33.02	42.69	0.03	63.3	0.5	0.35
34.52	42.31	0.03	63.4	0.6	0.34
36.02	43.72	0.03	63.5	0.6	0.36
37.52	43.88	0.03	63.5	0.6	0.36
39.02	44.26	0.04	63.6	0.6	0.36
40.52	44.71	0.04	63.6	0.7	0.37
42.02	44.88	0.04	63.7	0.7	0.37
43.52	45.17	0.04	63.7	0.7	0.37
45.02	45.14	0.04	63.7	0.7	0.37
46.52	45.90	0.04	63.8	0.8	0.38





ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
48.02	46.26	0.04	63.8	0.8	0.39
49.52	46.14	0.05	63.9	0.8	0.39
51.02	46.50	0.05	63.9	0.8	0.39
52.52	47.04	0.05	64.0	0.9	0.40
54.03	46.69	0.05	64.0	0.9	0.39
55.53	47.41	0.05	64.0	0.9	0.40
57.03	47.74	0.05	64.1	0.9	0.40
58.53	47.76	0.05	64.1	1.0	0.40
60.03	47.73	0.05	64.1	1.0	0.40
66.03	49.03	0.06	64.2	1.1	0.42
72.03	49.65	0.07	64.3	1.2	0.42
78.03	50.42	0.07	64.4	1.3	0.43
84.03	51.04	0.08	64.5	1.4	0.44
90.05	52.40	0.08	64.6	1.5	0.45
96.05	52.24	0.09	64.7	1.6	0.45
102.05	53.45	0.09	64.7	1.7	0.46
108.05	53.70	0.10	64.8	1.8	0.47
114.07	54.09	0.10	64.8	1.9	0.47
120.07	53.98	0.11	64.9	2.0	0.47
126.07	55.00	0.11	64.9	2.1	0.48
132.08	55.44	0.12	65.0	2.2	0.48
138.08	55.78	0.13	65.0	2.3	0.49
144.08	56.20	0.13	65.0	2.4	0.49
150.08	56.04	0.14	65.1	2.5	0.49
156.10	56.63	0.14	65.1	2.6	0.49
162.10	56.78	0.15	65.1	2.7	0.50
168.10	56.77	0.15	65.2	2.8	0.49
174.10	56.98	0.16	65.2	2.9	0.50
180.10	57.95	0.16	65.2	3.0	0.51
186.12	57.89	0.17	65.2	3.1	0.51
192.12	58.24	0.17	65.3	3.2	0.51
198.12	58.45	0.18	65.3	3.3	0.51
204.12	58.74	0.19	65.3	3.4	0.51
210.12	58.43	0.19	65.3	3.5	0.51
216.13	59.26	0.20	65.3	3.6	0.52
222.13	58.93	0.20	65.4	3.7	0.51
228.13	59.41	0.21	65.4	3.8	0.52
234.15	59.19	0.21	65.4	3.9	0.52
240.15	59.66	0.22	65.4	4.0	0.52
246.15	59.42	0.22	65.4	4.1	0.52
252.15	59.26	0.23	65.4	4.2	0.51
258.15	59.97	0.24	65.4	4.3	0.52
264.17	59.43	0.24	65.4	4.4	0.52
270.17	59.57	0.25	65.5	4.5	0.52
276.17	59.39	0.25	65.5	4.6	0.51
282.17	60.07	0.26	65.5	4.7	0.52
288.18	59.45	0.26	65.5	4.8	0.51
294.18	59.58	0.27	65.5	4.9	0.51
300.18	59.43	0.27	65.5	5.0	0.51
315.18	60.09	0.29	65.5	5.2	0.52
330.18	60.26	0.30	65.5	5.5	0.52
345.18	59.99	0.31	65.5	5.7	0.51
360.18	60.78	0.33	65.6	6.0	0.52
375.18	61.09	0.34	65.6	6.2	0.52
390.20	61.26	0.36	65.6	6.5	0.52
405.20	61.01	0.37	65.6	6.7	0.52

ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
420.20	62.28	0.38	65.6	7.0	0.53
435.20	62.36	0.40	65.6	7.2	0.53
450.20	62.84	0.41	65.6	7.5	0.53
465.20	63.56	0.43	65.6	7.7	0.54
480.20	64.02	0.44	65.6	8.0	0.54
495.20	63.67	0.45	65.6	8.2	0.54
510.22	64.31	0.47	65.6	8.5	0.54
525.22	64.93	0.48	65.6	8.7	0.55
540.22	64.57	0.49	65.6	9.0	0.54
555.22	65.22	0.51	65.6	9.2	0.55
570.22	66.03	0.52	65.6	9.5	0.56
585.22	66.22	0.54	65.6	9.7	0.56
600.22	67.07	0.55	65.6	10.0	0.56
615.22	67.85	0.56	65.6	10.3	0.57
630.23	68.10	0.58	65.6	10.5	0.57
645.23	68.73	0.59	65.6	10.7	0.58
660.23	69.04	0.61	65.6	11.0	0.58
675.23	69.37	0.62	65.6	11.3	0.58
690.25	69.73	0.63	65.6	11.5	0.58
705.25	70.12	0.65	65.6	11.7	0.58
720.25	69.91	0.66	65.6	12.0	0.58
735.25	70.10	0.67	65.6	12.2	0.58
750.27	70.12	0.69	65.6	12.5	0.58
765.27	70.34	0.70	65.6	12.7	0.58
780.27	70.19	0.71	65.6	13.0	0.58
795.27	70.14	0.73	65.6	13.2	0.57
810.28	70.15	0.74	65.6	13.5	0.57
825.28	69.94	0.76	65.6	13.7	0.57
840.28	70.04	0.77	65.6	14.0	0.57
855.30	69.83	0.78	65.6	14.2	0.56
870.30	70.58	0.80	65.6	14.5	0.57
885.30	70.62	0.81	65.6	14.8	0.57
900.30	70.43	0.82	65.6	15.0	0.56
915.30	70.46	0.84	65.6	15.3	0.56
930.30	70.26	0.85	65.6	15.5	0.56
945.30	70.53	0.87	65.6	15.7	0.56
960.30	70.74	0.88	65.6	16.0	0.56
975.30	71.46	0.89	65.6	16.3	0.57
990.32	71.40	0.91	65.6	16.5	0.56
1005.32	71.25	0.92	65.6	16.8	0.56
1020.32	70.41	0.94	65.6	17.0	0.55
1035.33	70.70	0.95	65.6	17.3	0.55
1050.33	71.38	0.96	65.6	17.5	0.56
1065.33	71.64	0.98	65.6	17.8	0.56
1080.33	72.07	0.99	65.6	18.0	0.56
1095.35	71.88	1.00	65.6	18.3	0.56
1110.35	72.22	1.02	65.6	18.5	0.56
1125.35	72.75	1.03	65.5	18.8	0.56
1140.35	72.70	1.05	65.6	19.0	0.56
1155.35	73.31	1.06	65.6	19.3	0.56
1170.35	73.47	1.07	65.5	19.5	0.56
1185.35	74.12	1.09	65.5	19.8	0.57
1199.73	74.36	1.10	65.5	20.0	0.57

ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

MUESER RUTLEDGE CONSULTING ENGINEERS

CONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

File	14123
Boring No.	BH-04
Sample No.	9U

Sample Description: MEDIUM DARK GRAY ORGANIC SILTY CLAY

Perf by:	YO/SJ	Date:	12/13/21
Calc by:	SJ	Date:	12/20/21
Ch'kd by:	YO	Date:	12/22/21

TEST DATA

Cell Pressure =	69.7 psi	5.01 tsf	480 kPa
Back Pressure =	60.0 psi	4.32 tsf	414 kPa
Eff. Consol. Pressure =	9.7 psi	0.70 tsf	67 kPa
Dry Density =	**69.09** pcf		

TEST SUMMARY

Compressive Strength =	**0.68 tsf**	**9.4 psi**	
Strain at Failure =	**10.0 %**		
Pore Pressure at Failure =	**67.3 psi**	**4.85 tsf**	**464 kPa**
In Situ Density =	**106.78** pcf		

SAMPLE DATA

Init. Height =	5.56 in
Corr. Height =	5.45 in
Init. Diameter =	2.84 in
Init. Area =	6.36 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012 in
Weight of piston+gage+clamp =	352.00 gm
Weight of end cap+porous stone =	173.82 gm
Correction for membrane =	-0.015 tsf
Correction for end cap+assembly =	0.004 tsf

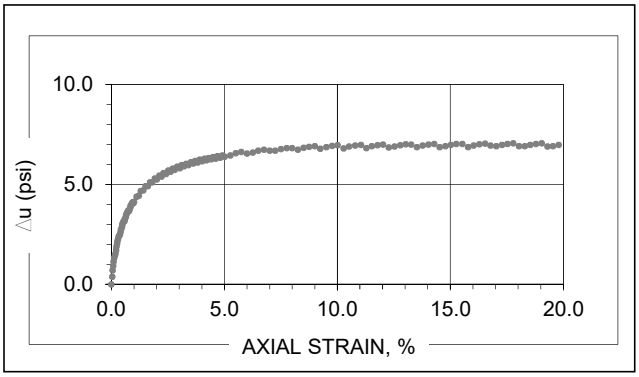
TEST CONSTANTS

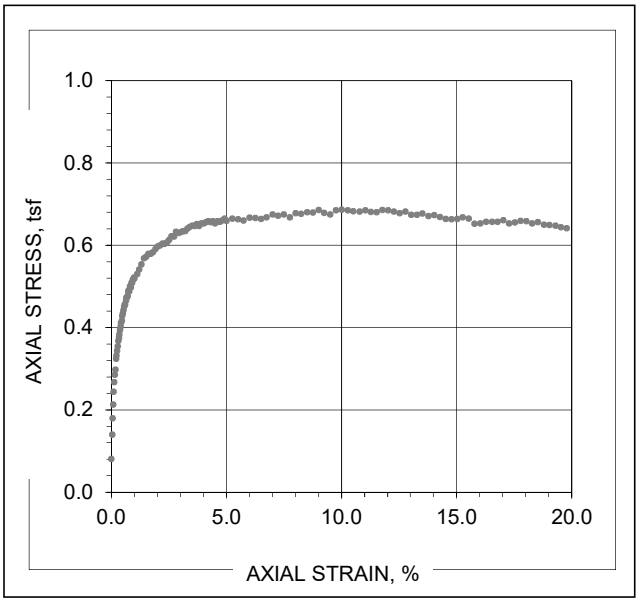
Strain Rate = 0.0167 %/min

WATER CONTENT

	START	END
Tare No.		#6
Wet + Tare	970.93	1308.35
Dry + Tare		991.43
Water	342.67	316.92
Tare		363.17
Sample Dry	628.26	628.26
Water Content	54.5%	50.4%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
0.00	20.83	0.00	60.4	0.0	0.08
1.50	26.03	0.00	60.8	0.0	0.14
3.00	29.51	0.00	61.1	0.1	0.18
4.52	32.49	0.00	61.3	0.1	0.21
6.02	35.28	0.01	61.5	0.1	0.24
7.52	37.34	0.01	61.7	0.1	0.27
9.02	38.94	0.01	61.8	0.1	0.29
10.52	40.01	0.01	61.9	0.2	0.30
12.02	42.35	0.01	62.1	0.2	0.32
13.52	43.04	0.01	62.3	0.2	0.33
15.02	44.06	0.01	62.4	0.2	0.34
16.52	45.06	0.01	62.5	0.3	0.35
18.02	46.25	0.02	62.7	0.3	0.37
19.52	46.90	0.02	62.8	0.3	0.38
21.02	47.61	0.02	62.8	0.3	0.38
22.52	48.64	0.02	62.9	0.4	0.39
24.02	49.28	0.02	63.0	0.4	0.40
25.52	50.16	0.02	63.1	0.4	0.41
27.02	50.66	0.02	63.2	0.5	0.42
28.52	51.69	0.03	63.3	0.5	0.43
30.02	52.25	0.03	63.4	0.5	0.44
31.52	52.95	0.03	63.5	0.5	0.44
33.02	53.71	0.03	63.6	0.6	0.45
34.52	54.22	0.03	63.5	0.6	0.46
36.02	54.17	0.03	63.6	0.6	0.46
37.52	55.04	0.03	63.7	0.6	0.47
39.02	55.72	0.04	63.8	0.6	0.47
40.52	55.81	0.04	63.9	0.7	0.47
42.03	56.06	0.04	64.0	0.7	0.48
43.53	57.07	0.04	64.1	0.7	0.49
45.03	57.28	0.04	64.1	0.7	0.49
46.53	57.10	0.04	64.1	0.8	0.49





ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
48.03	58.12	0.04	64.1	0.8	0.50
49.53	58.36	0.05	64.2	0.8	0.50
51.03	57.98	0.05	64.3	0.8	0.50
52.53	59.00	0.05	64.4	0.9	0.51
54.03	59.03	0.05	64.4	0.9	0.51
55.53	59.67	0.05	64.5	0.9	0.52
57.03	59.84	0.05	64.5	1.0	0.52
58.53	60.20	0.05	64.5	1.0	0.52
60.03	60.00	0.05	64.5	1.0	0.52
66.05	61.06	0.06	64.8	1.1	0.53
72.05	62.02	0.07	64.8	1.2	0.54
78.05	63.20	0.07	65.1	1.3	0.55
84.05	64.61	0.08	65.1	1.4	0.57
90.07	64.98	0.08	65.3	1.5	0.57
96.07	65.64	0.09	65.3	1.6	0.58
102.07	65.74	0.09	65.5	1.7	0.58
108.07	66.14	0.10	65.5	1.8	0.58
114.08	66.88	0.10	65.7	1.9	0.59
120.08	67.47	0.11	65.6	2.0	0.60
126.08	67.76	0.12	65.8	2.1	0.60
132.08	68.25	0.12	65.8	2.2	0.60
138.10	68.18	0.13	66.0	2.3	0.60
144.10	68.66	0.13	65.9	2.4	0.61
150.10	69.25	0.14	66.1	2.5	0.61
156.10	70.06	0.14	66.0	2.6	0.62
162.12	70.09	0.15	66.2	2.7	0.62
168.12	71.18	0.15	66.1	2.8	0.63
174.12	70.99	0.16	66.3	2.9	0.63
180.12	71.21	0.16	66.2	3.0	0.63
186.12	71.51	0.17	66.4	3.1	0.64
192.13	71.54	0.17	66.3	3.2	0.63
198.13	72.20	0.18	66.4	3.3	0.64
204.13	72.59	0.19	66.4	3.4	0.64
210.15	72.92	0.19	66.5	3.5	0.65
216.15	72.94	0.20	66.4	3.6	0.65
222.15	73.44	0.20	66.6	3.7	0.65
228.15	73.05	0.21	66.5	3.8	0.65
234.15	73.66	0.21	66.6	3.9	0.65
240.15	73.78	0.22	66.5	4.0	0.65
246.17	74.08	0.22	66.7	4.1	0.66
252.17	74.40	0.23	66.6	4.2	0.66
258.17	74.23	0.23	66.7	4.3	0.66
264.17	74.52	0.24	66.6	4.4	0.66
270.18	74.05	0.25	66.8	4.5	0.65
276.18	74.67	0.25	66.7	4.6	0.66
282.18	74.53	0.26	66.8	4.7	0.66
288.20	74.93	0.26	66.7	4.8	0.66
294.20	75.43	0.27	66.8	4.9	0.67
300.20	74.99	0.27	66.8	5.0	0.66
315.20	75.67	0.29	66.8	5.3	0.67
330.20	75.65	0.30	66.9	5.5	0.66
345.22	75.54	0.31	67.0	5.7	0.66
360.22	76.32	0.33	66.9	6.0	0.67
375.22	76.42	0.34	67.0	6.3	0.67
390.23	76.41	0.35	67.1	6.5	0.66
405.23	76.89	0.37	67.1	6.7	0.67

ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
420.23	77.75	0.38	67.1	7.0	0.68
435.25	77.61	0.39	67.1	7.2	0.67
450.25	78.10	0.41	67.2	7.5	0.68
465.25	77.63	0.42	67.2	7.7	0.67
480.25	78.74	0.44	67.2	8.0	0.68
495.25	78.79	0.45	67.1	8.2	0.68
510.25	79.34	0.46	67.2	8.5	0.68
525.25	79.43	0.48	67.3	8.7	0.68
540.25	80.21	0.49	67.3	9.0	0.69
555.25	79.74	0.50	67.2	9.2	0.68
570.25	79.57	0.52	67.3	9.5	0.68
585.25	80.72	0.53	67.3	9.8	0.69
600.25	81.03	0.55	67.3	10.0	0.69
615.25	81.12	0.56	67.2	10.3	0.69
630.25	81.05	0.57	67.3	10.5	0.68
645.25	81.16	0.59	67.3	10.8	0.68
660.27	81.66	0.60	67.4	11.0	0.69
675.27	81.44	0.61	67.2	11.3	0.68
690.27	81.62	0.63	67.3	11.5	0.68
705.27	82.30	0.64	67.4	11.8	0.69
720.27	82.40	0.66	67.4	12.0	0.69
735.28	82.35	0.67	67.2	12.3	0.68
750.28	82.13	0.68	67.3	12.5	0.68
765.28	82.69	0.70	67.3	12.8	0.68
780.28	82.08	0.71	67.4	13.0	0.67
795.28	82.30	0.72	67.4	13.3	0.67
810.30	82.86	0.74	67.2	13.5	0.68
825.30	82.43	0.75	67.3	13.8	0.67
840.30	82.82	0.76	67.4	14.0	0.67
855.30	82.56	0.78	67.4	14.3	0.67
870.30	82.25	0.79	67.2	14.5	0.66
885.30	82.39	0.81	67.3	14.8	0.66
900.32	82.66	0.82	67.4	15.0	0.66
915.32	83.30	0.83	67.4	15.3	0.67
930.32	83.21	0.85	67.4	15.5	0.67
945.32	82.11	0.86	67.3	15.8	0.65
960.33	82.39	0.87	67.3	16.0	0.65
975.33	82.97	0.89	67.4	16.3	0.66
990.33	83.16	0.90	67.4	16.5	0.66
1005.33	83.35	0.91	67.3	16.8	0.66
1020.33	84.02	0.93	67.3	17.0	0.66
1035.33	83.41	0.94	67.4	17.3	0.65
1050.33	83.88	0.96	67.4	17.5	0.66
1065.35	84.50	0.97	67.4	17.8	0.66
1080.35	84.65	0.98	67.3	18.0	0.66
1095.35	84.24	1.00	67.3	18.3	0.65
1110.35	84.80	1.01	67.4	18.5	0.66
1125.35	84.33	1.02	67.4	18.8	0.65
1140.35	84.47	1.04	67.4	19.0	0.65
1155.35	84.56	1.05	67.3	19.3	0.65
1170.37	84.37	1.06	67.3	19.5	0.64
1185.37	84.28	1.08	67.4	19.8	0.64
1199.97	83.80	1.09	67.4	20.0	0.64

ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

MUESER RUTLEDGE CONSULTING ENGINEERS

CONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

File	14123
Boring No.	BH-04
Sample No.	13U

Sample Description: STIFF DARK GRAY ORGANIC SILTY CLAY, TRACE FINE SAND

Perf by:	YO/SJ	Date:	12/13/21
Calc by:	SJ	Date:	12/17/21
Ch'kd by:	YO	Date:	12/22/21

TEST DATA

Cell Pressure =	74.4 psi	5.35 tsf	513 kPa
Back Pressure =	60.0 psi	4.32 tsf	414 kPa
Eff. Consol. Pressure =	14.4 psi	1.03 tsf	99 kPa
Dry Density =	**72.05** pcf		

TEST SUMMARY

Compressive Strength =	**1.22 tsf**	**16.9 psi**	
Strain at Failure =	**3.7 %**		
Pore Pressure at Failure =	**69.1 psi**	**4.97 tsf**	**476 kPa**
In Situ Density =	**112.41** pcf		

SAMPLE DATA

Init. Height =	5.58 in
Corr. Height =	5.54 in
Init. Diameter =	2.86 in
Init. Area =	6.44 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012 in
Weight of piston+gage+clamp =	352.00 gm
Weight of end cap+porous stone =	173.90 gm
Correction for membrane =	-0.006 tsf
Correction for end cap+assembly =	0.004 tsf

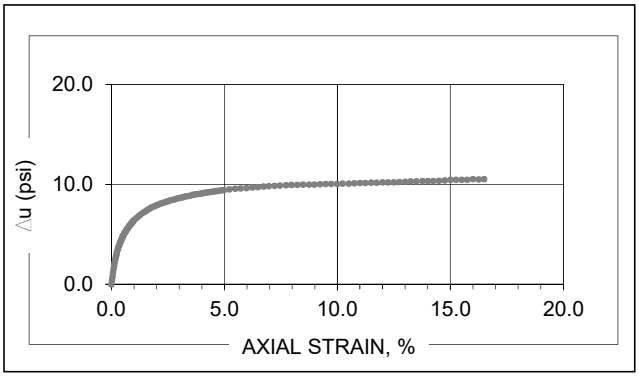
TEST CONSTANTS

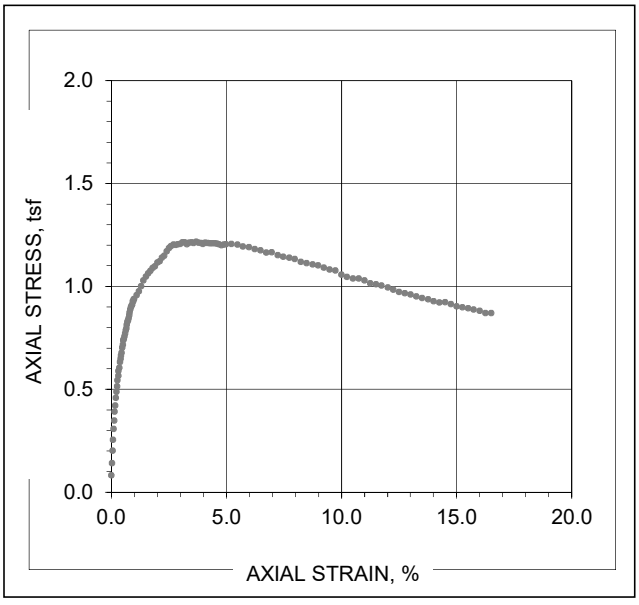
Strain Rate = 0.0167 %/min

WATER CONTENT

	START	END
Tare No.		#2
Wet + Tare	1052.83	1378.98
Dry + Tare		1040.37
Water	378.00	338.61
Tare		365.54
Sample Dry	674.83	674.83
Water Content	56.0%	50.2%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
0.00	18.46	0.00	60.1	0.0	0.08
1.50	23.77	0.00	60.5	0.0	0.14
3.02	29.22	0.00	60.9	0.0	0.20
4.52	33.94	0.00	61.3	0.1	0.26
6.02	38.67	0.01	61.6	0.1	0.31
7.52	42.29	0.01	62.0	0.1	0.35
9.02	46.19	0.01	62.3	0.1	0.39
10.52	48.88	0.01	62.5	0.2	0.42
12.02	52.27	0.01	62.8	0.2	0.46
13.52	54.95	0.01	63.0	0.2	0.49
15.02	57.25	0.01	63.2	0.2	0.52
16.52	59.92	0.01	63.5	0.3	0.54
18.02	61.92	0.02	63.7	0.3	0.57
19.52	63.98	0.02	63.8	0.3	0.59
21.02	65.42	0.02	64.0	0.3	0.61
22.52	67.98	0.02	64.1	0.4	0.63
24.02	69.41	0.02	64.3	0.4	0.65
25.52	70.78	0.02	64.4	0.4	0.66
27.02	72.03	0.02	64.6	0.4	0.68
28.52	74.31	0.03	64.7	0.5	0.70
30.03	75.65	0.03	64.8	0.5	0.72
31.53	77.55	0.03	64.9	0.5	0.74
33.03	78.11	0.03	65.1	0.5	0.75
34.53	79.21	0.03	65.2	0.6	0.76
36.03	80.53	0.03	65.3	0.6	0.77
37.53	81.99	0.03	65.3	0.6	0.79
39.03	82.89	0.04	65.4	0.6	0.80
40.53	84.38	0.04	65.5	0.7	0.81
42.03	85.61	0.04	65.6	0.7	0.83
43.53	86.34	0.04	65.7	0.7	0.84
45.03	87.38	0.04	65.8	0.7	0.85
46.53	88.68	0.04	65.9	0.8	0.86





ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
48.05	89.93	0.04	66.0	0.8	0.87
49.55	91.17	0.05	66.0	0.8	0.89
51.05	92.31	0.05	66.1	0.8	0.90
52.55	92.98	0.05	66.2	0.9	0.91
54.05	93.36	0.05	66.2	0.9	0.91
55.55	94.95	0.05	66.3	0.9	0.93
57.05	94.80	0.05	66.4	0.9	0.93
58.55	95.88	0.05	66.5	1.0	0.94
60.05	96.00	0.05	66.5	1.0	0.94
66.07	97.80	0.06	66.7	1.1	0.96
72.07	99.52	0.07	66.9	1.2	0.98
78.07	101.89	0.07	67.1	1.3	1.00
84.07	104.52	0.08	67.3	1.4	1.03
90.07	106.31	0.08	67.4	1.5	1.05
96.07	107.81	0.09	67.5	1.6	1.06
102.07	109.09	0.09	67.7	1.7	1.08
108.08	110.43	0.10	67.8	1.8	1.09
114.08	111.30	0.10	67.9	1.9	1.10
120.08	113.07	0.11	68.0	2.0	1.12
126.08	113.73	0.12	68.1	2.1	1.12
132.10	115.41	0.12	68.2	2.2	1.14
138.10	116.31	0.13	68.3	2.3	1.15
144.10	118.46	0.13	68.3	2.4	1.17
150.10	120.04	0.14	68.4	2.5	1.19
156.12	120.96	0.14	68.5	2.6	1.20
162.12	121.79	0.15	68.5	2.7	1.20
168.12	121.77	0.15	68.6	2.8	1.20
174.13	122.21	0.16	68.7	2.9	1.21
180.13	122.38	0.17	68.7	3.0	1.21
186.13	123.29	0.17	68.8	3.1	1.22
192.13	123.38	0.18	68.8	3.2	1.22
198.13	122.56	0.18	68.9	3.3	1.21
204.13	123.43	0.19	68.9	3.4	1.21
210.15	123.70	0.19	69.0	3.5	1.22
216.15	123.53	0.20	69.0	3.6	1.21
222.15	124.21	0.20	69.1	3.7	1.22
228.15	123.99	0.21	69.1	3.8	1.21
234.15	123.96	0.22	69.2	3.9	1.21
240.17	123.56	0.22	69.2	4.0	1.21
246.17	124.27	0.23	69.2	4.1	1.21
252.17	124.24	0.23	69.3	4.2	1.21
258.17	124.24	0.24	69.3	4.3	1.21
264.17	124.38	0.24	69.3	4.4	1.21
270.17	124.50	0.25	69.4	4.5	1.21
276.17	124.39	0.25	69.4	4.6	1.21
282.17	124.18	0.26	69.4	4.7	1.21
288.18	123.98	0.26	69.5	4.8	1.20
294.18	124.35	0.27	69.5	4.9	1.20
300.18	124.58	0.28	69.5	5.0	1.21
315.18	125.09	0.29	69.6	5.2	1.21
330.20	125.07	0.30	69.6	5.5	1.20
345.20	124.45	0.32	69.7	5.7	1.20
360.20	124.55	0.33	69.7	6.0	1.19
375.20	123.93	0.34	69.8	6.2	1.18
390.20	123.60	0.36	69.8	6.5	1.18
405.20	122.92	0.37	69.9	6.7	1.17

ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
420.20	123.31	0.39	69.9	7.0	1.17
435.22	122.26	0.40	70.0	7.2	1.15
450.22	121.76	0.41	70.0	7.5	1.15
465.22	121.64	0.43	70.0	7.7	1.14
480.22	121.38	0.44	70.0	8.0	1.13
495.22	120.26	0.46	70.1	8.2	1.12
510.22	120.04	0.47	70.1	8.5	1.11
525.22	119.64	0.48	70.1	8.7	1.11
540.23	119.47	0.50	70.1	9.0	1.10
555.23	118.73	0.51	70.1	9.2	1.09
570.23	118.18	0.53	70.1	9.5	1.08
585.23	117.95	0.54	70.1	9.7	1.08
600.25	116.22	0.55	70.1	10.0	1.06
615.25	115.41	0.57	70.2	10.2	1.05
630.25	115.02	0.58	70.2	10.5	1.04
645.25	115.32	0.59	70.2	10.7	1.04
660.25	114.58	0.61	70.2	11.0	1.03
675.27	113.47	0.62	70.2	11.2	1.02
690.27	113.37	0.64	70.3	11.5	1.01
705.27	113.02	0.65	70.3	11.7	1.01
720.27	112.26	0.66	70.3	12.0	1.00
735.27	111.44	0.68	70.3	12.2	0.98
750.27	110.71	0.69	70.3	12.5	0.97
765.27	110.34	0.71	70.3	12.7	0.97
780.28	109.89	0.72	70.4	13.0	0.96
795.28	109.24	0.73	70.4	13.2	0.95
810.28	108.77	0.75	70.4	13.5	0.94
825.28	108.48	0.76	70.4	13.8	0.94
840.28	107.80	0.78	70.4	14.0	0.93
855.28	107.42	0.79	70.4	14.2	0.92
870.28	107.81	0.80	70.5	14.5	0.92
885.28	107.06	0.82	70.5	14.8	0.91
900.30	106.19	0.83	70.6	15.0	0.90
915.30	106.03	0.84	70.6	15.2	0.90
930.30	105.75	0.86	70.6	15.5	0.89
945.30	105.36	0.87	70.6	15.7	0.89
960.30	105.01	0.89	70.6	16.0	0.88
975.30	104.18	0.90	70.6	16.2	0.87
990.32	104.51	0.91	70.6	16.5	0.87
1005.32	103.61	0.93	70.9	16.7	0.86
1020.32	101.18	0.94	71.1	17.0	0.84
1035.32	100.43	0.96	71.2	17.2	0.83
1050.32	100.39	0.97	71.2	17.5	0.82
1065.32	97.71	0.98	71.8	17.7	0.80
1080.33	88.84	1.00	72.7	18.0	0.71
1095.33	81.31	1.01	73.1	18.3	0.64
1110.33	74.86	1.03	73.3	18.5	0.58
1125.33	70.21	1.04	73.5	18.8	0.54
1140.33	65.77	1.05	73.6	19.0	0.50
1155.33	62.72	1.07	73.8	19.3	0.47
1170.33	60.57	1.08	73.9	19.5	0.45
1185.33	58.45	1.10	73.9	19.8	0.42
1199.60	56.48	1.11	74.0	20.0	0.41

ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

MUESER RUTLEDGE CONSULTING ENGINEERS

CONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

File	14123
Boring No.	BH-3
Sample No.	6U

Sample Description: SOFT GRAY BROWN SILTY CLAY (OH)

Perf by:	YO	Date:	02/03/22
Calc by:	SJ	Date:	02/10/22
Ch'kd by:	YO	Date:	02/11/22

TEST DATA

Cell Pressure =	52.8 psi	3.80 tsf	364 kPa
Back Pressure =	49.5 psi	3.56 tsf	341 kPa
Eff. Consol. Pressure =	3.3 psi	0.24 tsf	23 kPa
Dry Density =	**53.05** pcf		

TEST SUMMARY

Compressive Strength =	**0.31 tsf**	**4.3 psi**	
Strain at Failure =	**14.8 %**		
Pore Pressure at Failure =	**52.1 psi**	**3.75 tsf**	**359 kPa**
In Situ Density =	**97.76** pcf		

SAMPLE DATA

Init. Height =	5.51 in
Corr. Height =	5.31 in
Init. Diameter =	2.81 in
Init. Area =	6.18 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012 in
Weight of piston+gage+clamp =	352.00 gm
Weight of end cap+porous stone =	173.90 gm
Correction for membrane =	-0.022 tsf
Correction for end cap+assembly =	0.007 tsf

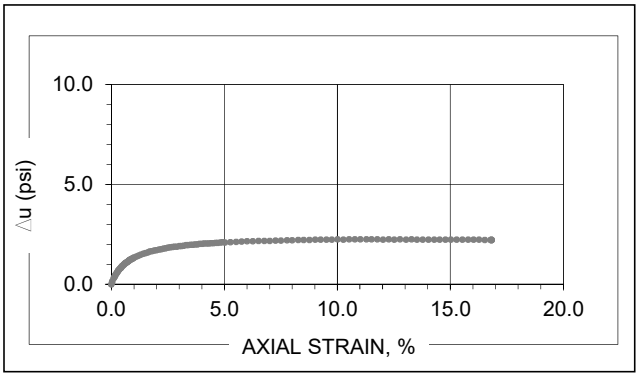
TEST CONSTANTS

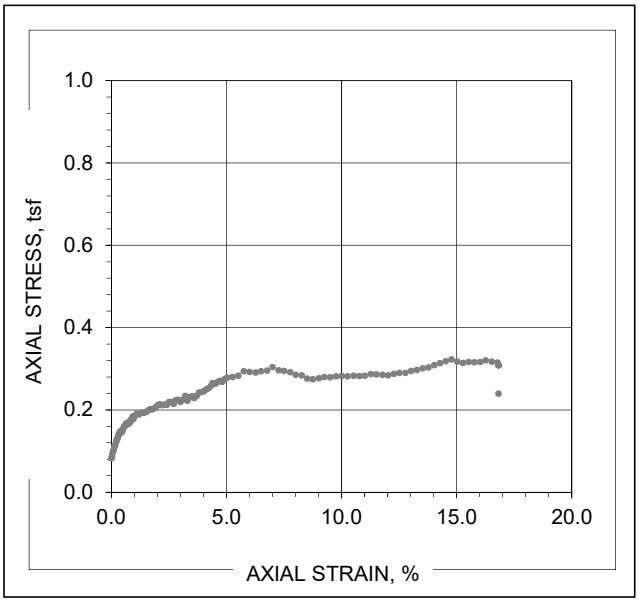
Strain Rate = 0.0067 %/min

WATER CONTENT

	START	END
Tare No.		SID
Wet + Tare	842.62	1162.14
Dry + Tare		849.75
Water	385.38	312.39
Tare		392.51
Sample Dry	457.24	457.24
Water Content	84.3%	68.3%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
0.00	18.97	0.00	49.8	0.0	0.08
3.02	19.17	0.00	49.9	0.0	0.09
6.02	19.83	0.00	50.0	0.0	0.09
9.02	20.45	0.00	49.7	0.1	0.10
12.03	20.57	0.01	50.1	0.1	0.10
15.03	21.25	0.01	50.2	0.1	0.11
18.03	21.67	0.01	50.2	0.2	0.11
21.03	21.78	0.01	50.3	0.2	0.12
24.05	22.45	0.01	50.3	0.2	0.12
27.05	22.66	0.01	50.4	0.2	0.13
30.05	23.06	0.01	50.4	0.2	0.13
33.07	23.18	0.01	50.5	0.3	0.13
36.07	23.78	0.02	50.5	0.3	0.14
39.07	23.90	0.02	50.6	0.3	0.14
42.07	24.21	0.02	50.6	0.3	0.14
45.07	24.56	0.02	50.6	0.4	0.15
48.08	24.56	0.02	50.7	0.4	0.15
51.08	24.37	0.02	50.7	0.4	0.15
54.08	24.87	0.02	50.7	0.5	0.15
57.08	24.72	0.02	50.7	0.5	0.15
60.08	24.99	0.03	50.8	0.5	0.15
63.10	25.45	0.03	50.8	0.5	0.16
66.10	25.67	0.03	50.8	0.5	0.16
69.10	25.67	0.03	50.9	0.6	0.16
72.10	25.83	0.03	50.9	0.6	0.16
75.12	26.20	0.03	50.9	0.6	0.17
78.12	26.09	0.03	50.9	0.6	0.16
81.13	26.41	0.04	50.9	0.7	0.17
84.13	26.50	0.04	51.0	0.7	0.17
87.13	26.22	0.04	51.0	0.7	0.17
90.13	26.46	0.04	51.0	0.8	0.17
93.15	26.71	0.04	51.0	0.8	0.17





ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
96.15	26.59	0.04	51.1	0.8	0.17
99.15	26.78	0.04	51.1	0.8	0.17
102.15	27.09	0.04	51.1	0.8	0.18
105.17	27.29	0.05	51.1	0.9	0.18
108.17	27.58	0.05	51.1	0.9	0.18
111.17	27.80	0.05	51.1	0.9	0.18
114.18	27.30	0.05	51.1	1.0	0.18
117.18	27.86	0.05	51.2	1.0	0.18
120.18	27.95	0.05	51.2	1.0	0.19
132.18	28.46	0.06	51.2	1.1	0.19
144.18	28.32	0.06	51.3	1.2	0.19
156.20	28.68	0.07	51.3	1.3	0.19
168.20	28.69	0.07	51.4	1.4	0.19
180.20	28.91	0.08	51.4	1.5	0.20
192.20	29.29	0.09	51.4	1.6	0.20
204.20	29.56	0.09	51.5	1.7	0.20
216.20	29.51	0.10	51.5	1.8	0.20
228.20	29.84	0.10	51.5	1.9	0.21
240.20	30.34	0.11	51.6	2.0	0.21
252.20	30.68	0.11	51.6	2.1	0.21
264.20	30.46	0.12	51.6	2.2	0.21
276.20	30.65	0.12	51.6	2.3	0.21
288.22	30.58	0.13	51.7	2.4	0.21
300.22	31.22	0.13	51.7	2.5	0.22
312.22	31.22	0.14	51.7	2.6	0.22
324.22	30.83	0.14	51.7	2.7	0.21
336.22	31.64	0.15	51.7	2.8	0.22
348.22	31.76	0.15	51.7	2.9	0.22
360.22	31.30	0.16	51.8	3.0	0.22
372.22	31.81	0.16	51.8	3.1	0.23
384.22	32.64	0.17	51.8	3.2	0.23
396.22	31.65	0.18	51.8	3.3	0.22
408.23	32.41	0.18	51.8	3.4	0.23
420.23	32.68	0.19	51.8	3.5	0.23
432.23	32.24	0.19	51.8	3.6	0.23
444.23	32.78	0.20	51.8	3.7	0.23
456.23	33.51	0.20	51.8	3.8	0.24
468.23	33.66	0.21	51.9	3.9	0.24
480.25	33.83	0.21	51.9	4.0	0.25
492.25	34.24	0.22	51.9	4.1	0.25
504.25	34.57	0.22	51.9	4.2	0.25
516.25	35.05	0.23	51.9	4.3	0.26
528.25	35.70	0.23	51.9	4.4	0.27
540.25	35.62	0.24	51.9	4.5	0.26
552.25	35.98	0.24	51.9	4.6	0.27
564.25	36.28	0.25	51.9	4.7	0.27
576.25	36.11	0.26	51.9	4.8	0.27
588.25	36.69	0.26	51.9	4.9	0.27
600.27	37.07	0.27	51.9	5.0	0.28
630.27	37.27	0.28	52.0	5.3	0.28
660.27	37.65	0.29	52.0	5.5	0.28
690.27	38.72	0.31	52.0	5.8	0.29
720.27	38.61	0.32	52.0	6.0	0.29
750.27	38.52	0.33	52.0	6.3	0.29
780.27	38.86	0.35	52.0	6.5	0.29
810.27	39.13	0.36	52.0	6.8	0.30

ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
840.28	39.99	0.37	52.0	7.0	0.30
870.28	39.35	0.39	52.0	7.3	0.30
900.28	39.27	0.40	52.0	7.5	0.30
930.28	39.07	0.41	52.0	7.8	0.29
960.28	38.57	0.42	52.1	8.0	0.29
990.28	38.49	0.44	52.1	8.3	0.28
1020.30	37.82	0.45	52.1	8.5	0.28
1050.30	37.75	0.46	52.1	8.8	0.28
1080.30	37.99	0.48	52.1	9.0	0.28
1110.32	38.36	0.49	52.1	9.2	0.28
1140.32	38.41	0.50	52.1	9.5	0.28
1170.32	38.68	0.52	52.1	9.8	0.28
1200.32	38.83	0.53	52.1	10.0	0.28
1230.32	38.83	0.54	52.1	10.3	0.28
1260.32	39.08	0.56	52.1	10.5	0.28
1290.33	39.04	0.57	52.1	10.8	0.28
1320.33	39.22	0.58	52.1	11.0	0.28
1350.33	39.66	0.60	52.1	11.3	0.29
1380.33	39.65	0.61	52.1	11.5	0.29
1410.33	39.70	0.62	52.1	11.8	0.29
1440.33	39.60	0.64	52.1	12.0	0.28
1470.33	40.07	0.65	52.1	12.3	0.29
1500.33	40.34	0.66	52.1	12.5	0.29
1530.35	40.47	0.68	52.1	12.8	0.29
1560.35	41.03	0.69	52.1	13.0	0.30
1590.35	41.34	0.70	52.1	13.3	0.30
1620.35	41.81	0.72	52.1	13.5	0.30
1650.37	42.08	0.73	52.1	13.8	0.30
1680.37	42.77	0.74	52.1	14.0	0.31
1710.37	43.32	0.76	52.1	14.3	0.31
1740.37	43.85	0.77	52.1	14.5	0.32
1770.37	44.46	0.78	52.1	14.8	0.32
1800.38	43.99	0.80	52.1	15.0	0.32
1830.38	43.77	0.81	52.1	15.3	0.31
1860.38	44.05	0.82	52.1	15.5	0.32
1890.38	44.12	0.84	52.1	15.8	0.32
1920.38	44.25	0.85	52.1	16.0	0.32
1950.38	44.77	0.86	52.1	16.3	0.32
1980.38	44.55	0.88	52.1	16.5	0.32
2010.38	44.43	0.89	52.1	16.8	0.32
2040.38	43.80	0.89	52.1	16.8	0.31
2479.92	43.80	0.89	52.1	16.8	0.31
2509.92	43.80	0.89	52.1	16.8	0.31
2514.42	43.80	0.89	52.1	16.8	0.31
2515.40	36.59	0.89	52.1	16.8	0.24

ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

MUESER RUTLEDGE CONSULTING ENGINEERS

CONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

File	14123
Boring No.	BH-3
Sample No.	8U

Sample Description: GRAY BROWN SILTY CLAY (CL)

Perf by:	YO	Date:	02/03/22
Calc by:	SJ	Date:	02/10/22
Ch'kd by:	YO	Date:	02/11/22

TEST DATA

Cell Pressure =	56.1 psi	4.04 tsf	387 kPa
Back Pressure =	50.0 psi	3.60 tsf	345 kPa
Eff. Consol. Pressure =	6.1 psi	0.44 tsf	42 kPa
Dry Density =	**70.20** pcf		

TEST SUMMARY

Compressive Strength =	**0.55 tsf**	**7.7 psi**	
Strain at Failure =	**16.8 %**		
Pore Pressure at Failure =	**54.8 psi**	**3.95 tsf**	**378 kPa**
In Situ Density =	**106.41** pcf		

SAMPLE DATA

Init. Height =	5.57 in
Corr. Height =	5.50 in
Init. Diameter =	2.85 in
Init. Area =	6.38 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012 in
Weight of piston+gage+clamp =	352.00 gm
Weight of end cap+porous stone =	173.90 gm
Correction for membrane =	-0.024 tsf
Correction for end cap+assembly =	0.004 tsf

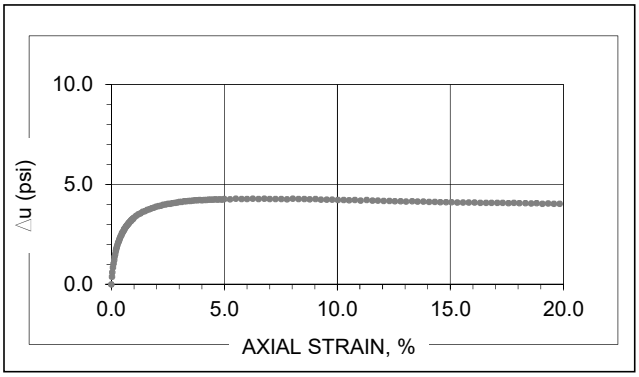
TEST CONSTANTS

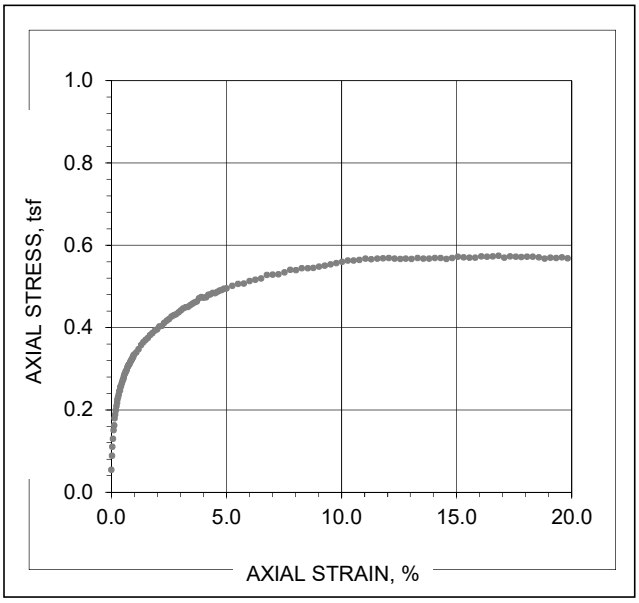
Strain Rate = 0.0084 %/min

WATER CONTENT

	START	END
Tare No.		BP-1
Wet + Tare	980.06	1540.38
Dry + Tare		1236.13
Water	333.51	304.25
Tare		589.58
Sample Dry	646.55	646.55
Water Content	51.6%	47.1%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
0.00	14.72	0.00	50.7	0.0	0.05
3.02	17.74	0.00	51.1	0.0	0.09
6.02	19.65	0.00	51.3	0.0	0.11
9.02	21.37	0.00	51.6	0.1	0.13
12.02	23.24	0.01	51.8	0.1	0.15
15.02	24.32	0.01	51.9	0.1	0.16
18.02	25.85	0.01	52.1	0.1	0.18
21.02	26.64	0.01	52.2	0.2	0.19
24.02	27.55	0.01	52.4	0.2	0.20
27.02	28.44	0.01	52.5	0.2	0.21
30.02	29.25	0.01	52.6	0.2	0.22
33.03	29.90	0.01	52.7	0.3	0.23
36.03	30.43	0.02	52.8	0.3	0.23
39.03	30.96	0.02	52.9	0.3	0.24
42.03	31.77	0.02	52.9	0.3	0.25
45.03	31.90	0.02	53.0	0.4	0.25
48.05	32.64	0.02	53.1	0.4	0.26
51.05	32.79	0.02	53.1	0.4	0.26
54.05	33.35	0.02	53.2	0.4	0.26
57.05	33.76	0.03	53.3	0.5	0.27
60.05	34.18	0.03	53.3	0.5	0.27
63.05	34.52	0.03	53.4	0.5	0.28
66.05	34.90	0.03	53.4	0.5	0.28
69.05	35.43	0.03	53.5	0.6	0.29
72.05	35.69	0.03	53.5	0.6	0.29
75.05	36.04	0.03	53.6	0.6	0.29
78.07	36.21	0.04	53.6	0.6	0.30
81.07	36.37	0.04	53.6	0.7	0.30
84.07	36.94	0.04	53.7	0.7	0.30
87.07	37.16	0.04	53.7	0.7	0.31
90.07	37.50	0.04	53.7	0.7	0.31
93.07	37.60	0.04	53.8	0.8	0.31





ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
96.07	37.76	0.04	53.8	0.8	0.31
99.08	38.18	0.04	53.9	0.8	0.32
102.08	38.38	0.05	53.9	0.8	0.32
105.08	38.68	0.05	53.9	0.9	0.32
108.08	38.75	0.05	53.9	0.9	0.32
111.08	39.07	0.05	54.0	0.9	0.33
114.10	39.23	0.05	54.0	0.9	0.33
117.10	39.58	0.05	54.0	1.0	0.33
120.10	39.80	0.05	54.0	1.0	0.33
132.10	40.36	0.06	54.1	1.1	0.34
144.10	41.05	0.07	54.2	1.2	0.35
156.12	42.03	0.07	54.3	1.3	0.36
168.12	42.66	0.08	54.3	1.4	0.37
180.12	43.17	0.08	54.4	1.5	0.37
192.12	43.66	0.09	54.5	1.6	0.38
204.12	44.30	0.09	54.5	1.7	0.38
216.12	44.80	0.10	54.5	1.8	0.39
228.12	45.33	0.10	54.6	1.9	0.39
240.13	45.67	0.11	54.6	2.0	0.40
252.13	46.33	0.11	54.6	2.1	0.40
264.13	46.52	0.12	54.7	2.2	0.40
276.13	47.20	0.13	54.7	2.3	0.41
288.13	47.71	0.13	54.7	2.4	0.42
300.13	48.16	0.14	54.7	2.5	0.42
312.15	48.73	0.14	54.8	2.6	0.43
324.15	49.05	0.15	54.8	2.7	0.43
336.15	49.35	0.15	54.8	2.8	0.43
348.15	49.77	0.16	54.8	2.9	0.44
360.15	50.26	0.17	54.8	3.0	0.44
372.15	50.73	0.17	54.9	3.1	0.45
384.15	51.01	0.18	54.9	3.2	0.45
396.17	51.17	0.18	54.9	3.3	0.45
408.17	51.57	0.19	54.9	3.4	0.45
420.17	51.99	0.19	54.9	3.5	0.46
432.17	52.28	0.20	54.9	3.6	0.46
444.17	52.53	0.20	54.9	3.7	0.46
456.17	53.31	0.21	54.9	3.8	0.47
468.17	53.61	0.21	54.9	3.9	0.47
480.17	53.52	0.22	54.9	4.0	0.47
492.17	53.67	0.23	54.9	4.1	0.47
504.17	54.25	0.23	54.9	4.2	0.48
516.17	54.36	0.24	55.0	4.3	0.48
528.17	54.79	0.24	55.0	4.4	0.48
540.18	54.77	0.25	55.0	4.5	0.48
552.18	55.12	0.25	55.0	4.6	0.49
564.18	55.46	0.26	55.0	4.7	0.49
576.18	55.65	0.26	55.0	4.8	0.49
588.18	55.97	0.27	55.0	4.9	0.49
600.18	56.10	0.27	55.0	5.0	0.50
630.20	56.81	0.29	55.0	5.2	0.50
660.20	57.35	0.30	55.0	5.5	0.51
690.20	57.56	0.32	55.0	5.8	0.51
720.20	58.30	0.33	55.0	6.0	0.51
750.20	58.69	0.34	55.0	6.3	0.52
780.20	59.16	0.36	55.0	6.5	0.52
810.20	60.06	0.37	55.0	6.8	0.53

ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
840.22	60.26	0.39	55.0	7.0	0.53
870.22	60.52	0.40	55.0	7.3	0.53
900.22	61.11	0.41	55.0	7.5	0.53
930.22	61.83	0.43	55.0	7.8	0.54
960.22	61.89	0.44	55.0	8.0	0.54
990.23	62.45	0.46	55.0	8.3	0.54
1020.23	62.59	0.47	55.0	8.5	0.54
1050.23	62.86	0.48	55.0	8.8	0.55
1080.23	63.33	0.50	55.0	9.0	0.55
1110.23	63.69	0.51	55.0	9.3	0.55
1140.23	64.14	0.52	55.0	9.5	0.55
1170.23	64.62	0.54	55.0	9.8	0.56
1200.23	65.08	0.55	54.9	10.0	0.56
1230.25	65.47	0.56	54.9	10.3	0.56
1260.25	65.67	0.58	54.9	10.5	0.56
1290.25	65.95	0.59	54.9	10.8	0.56
1320.25	66.45	0.61	54.9	11.0	0.57
1350.25	66.43	0.62	54.9	11.3	0.57
1380.25	66.76	0.63	54.9	11.5	0.57
1410.25	67.00	0.65	54.9	11.8	0.57
1440.27	67.26	0.66	54.9	12.0	0.57
1470.27	67.22	0.68	54.9	12.3	0.57
1500.27	67.33	0.69	54.9	12.5	0.57
1530.27	67.58	0.70	54.9	12.8	0.57
1560.27	67.65	0.72	54.9	13.0	0.57
1590.27	68.08	0.73	54.9	13.3	0.57
1620.27	68.05	0.75	54.9	13.5	0.57
1650.27	68.23	0.76	54.9	13.8	0.57
1680.28	68.63	0.77	54.8	14.1	0.57
1710.28	68.79	0.79	54.8	14.3	0.57
1740.28	68.68	0.80	54.8	14.6	0.57
1770.28	69.11	0.81	54.8	14.8	0.57
1800.28	69.58	0.83	54.8	15.0	0.57
1830.28	69.62	0.84	54.8	15.3	0.57
1860.28	69.68	0.86	54.8	15.5	0.57
1890.28	69.93	0.87	54.8	15.8	0.57
1920.30	70.42	0.88	54.8	16.1	0.57
1950.30	70.51	0.90	54.8	16.3	0.57
1980.30	70.76	0.91	54.8	16.6	0.57
2010.30	71.09	0.93	54.8	16.8	0.57
2040.30	70.80	0.94	54.8	17.1	0.57
2070.32	71.29	0.95	54.8	17.3	0.57
2100.32	71.41	0.97	54.8	17.6	0.57
2130.32	71.56	0.98	54.8	17.8	0.57
2160.32	71.76	0.99	54.8	18.0	0.57
2190.32	71.97	1.01	54.8	18.3	0.57
2220.32	72.04	1.02	54.8	18.6	0.57
2250.32	71.88	1.03	54.8	18.8	0.57
2280.32	72.30	1.05	54.8	19.1	0.57
2310.33	72.45	1.06	54.8	19.3	0.57
2340.33	72.80	1.08	54.7	19.6	0.57
2370.33	72.72	1.09	54.7	19.8	0.57
2400.33	72.24	1.10	54.7	20.1	0.56

ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

MUESER RUTLEDGE CONSULTING ENGINEERS

CONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

File	14123
Boring No.	BH-12
Sample No.	15S

Sample Description: GRAY BROWN ORGANIC SILTY CLAY (OH)

Perf by:	YO	Date:	02/08/22
Calc by:	SJ	Date:	02/11/22
Ch'kd by:	YO	Date:	02/11/22

TEST DATA

Cell Pressure =	61.7 psi	4.44 tsf	425 kPa
Back Pressure =	50.1 psi	3.61 tsf	345 kPa
Eff. Consol. Pressure =	11.6 psi	0.83 tsf	80 kPa
Dry Density =		pcf	

TEST SUMMARY

Compressive Strength =	**0.93 tsf**	**13.0 psi**	
Strain at Failure =	**13.0 %**		
Pore Pressure at Failure =	**58.3 psi**	**4.20 tsf**	**402 kPa**
In Situ Density =	**106.59**	pcf	

SAMPLE DATA

Init. Height =	5.60 in
Corr. Height =	5.47 in
Init. Diameter =	2.84 in
Init. Area =	6.34 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012	in
Weight of piston+gage+clamp =	352.00	gm
Weight of end cap+porous stone =	173.90	gm
Correction for membrane =	-0.019	tsf
Correction for end cap+assembly =	0.004	tsf

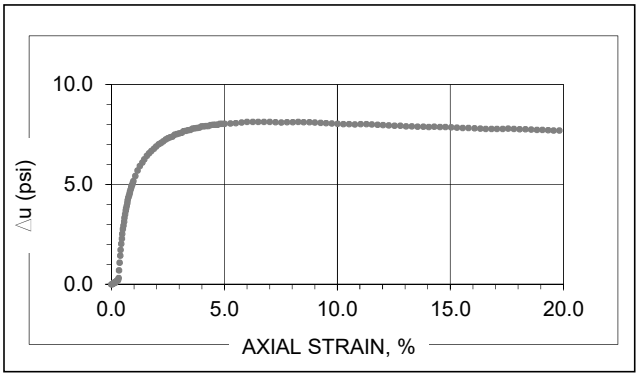
TEST CONSTANTS

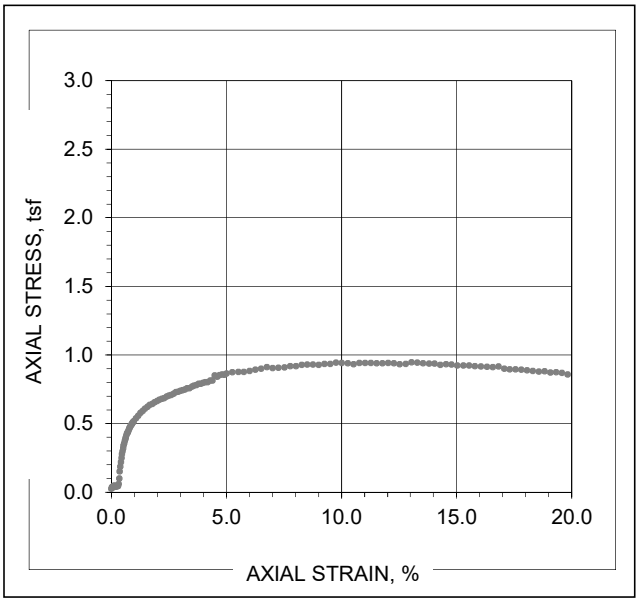
Strain Rate = 0.0167 %/min

WATER CONTENT

	START	END
Tare No.		22
Wet + Tare	970.08	1035.68
Dry + Tare		
Water	#VALUE!	1035.68
Tare		103.42
Sample Dry		
Water Content		#VALUE!

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
0.00	13.67	0.00	50.4	0.0	0.03
1.52	14.63	0.00	50.4	0.0	0.04
3.02	14.83	0.00	50.4	0.0	0.04
4.52	14.40	0.00	50.4	0.1	0.04
6.02	15.00	0.01	50.4	0.1	0.04
7.52	15.57	0.01	50.5	0.1	0.05
9.03	14.76	0.01	50.5	0.1	0.04
10.53	15.18	0.01	50.5	0.2	0.04
12.03	15.06	0.01	50.5	0.2	0.04
13.53	14.96	0.01	50.5	0.2	0.04
15.03	15.42	0.01	50.6	0.2	0.05
16.55	15.18	0.01	50.6	0.3	0.04
18.05	15.51	0.02	50.6	0.3	0.05
19.55	16.78	0.02	50.7	0.3	0.06
21.05	20.16	0.02	51.1	0.3	0.10
22.57	24.66	0.02	51.5	0.4	0.15
24.07	27.93	0.02	51.8	0.4	0.19
25.57	30.66	0.02	52.1	0.4	0.22
27.07	33.32	0.02	52.4	0.4	0.25
28.57	35.84	0.03	52.7	0.5	0.28
30.07	37.83	0.03	52.9	0.5	0.30
31.57	39.59	0.03	53.1	0.5	0.32
33.07	41.50	0.03	53.3	0.5	0.34
34.57	42.68	0.03	53.5	0.6	0.35
36.07	44.43	0.03	53.7	0.6	0.37
37.57	45.61	0.03	53.9	0.6	0.39
39.07	46.72	0.03	54.1	0.6	0.40
40.57	48.05	0.04	54.2	0.7	0.42
42.07	49.43	0.04	54.3	0.7	0.43
43.57	49.87	0.04	54.4	0.7	0.44
45.07	50.53	0.04	54.6	0.7	0.44
46.57	51.42	0.04	54.7	0.7	0.45





ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
48.08	52.42	0.04	54.8	0.8	0.46
49.58	53.16	0.04	54.9	0.8	0.47
51.08	53.85	0.04	55.0	0.8	0.48
52.58	54.46	0.05	55.1	0.8	0.49
54.08	55.23	0.05	55.2	0.9	0.50
55.60	55.61	0.05	55.3	0.9	0.50
57.10	56.29	0.05	55.4	0.9	0.51
58.60	56.77	0.05	55.5	0.9	0.51
60.10	57.50	0.05	55.5	1.0	0.52
66.10	59.34	0.06	55.8	1.1	0.54
72.12	61.00	0.06	56.1	1.2	0.56
78.12	62.88	0.07	56.3	1.3	0.58
84.12	64.31	0.07	56.5	1.4	0.59
90.12	65.85	0.08	56.6	1.5	0.61
96.13	66.97	0.09	56.8	1.6	0.62
102.13	68.38	0.09	56.9	1.7	0.64
108.13	69.11	0.10	57.1	1.8	0.65
114.13	70.07	0.10	57.2	1.9	0.66
120.13	71.03	0.11	57.3	2.0	0.67
126.13	71.96	0.11	57.4	2.1	0.67
132.13	72.64	0.12	57.5	2.2	0.68
138.15	73.18	0.13	57.5	2.3	0.69
144.15	74.19	0.13	57.6	2.4	0.70
150.15	75.05	0.14	57.7	2.5	0.71
156.13	75.43	0.14	57.7	2.6	0.71
162.13	76.43	0.15	57.8	2.7	0.72
168.15	77.59	0.15	57.9	2.8	0.73
174.15	77.71	0.16	57.9	2.9	0.73
180.15	78.46	0.16	57.9	3.0	0.74
186.15	79.03	0.17	58.0	3.1	0.75
192.15	79.48	0.17	58.0	3.2	0.75
198.15	80.29	0.18	58.1	3.3	0.76
204.17	80.49	0.19	58.1	3.4	0.76
210.17	81.68	0.19	58.1	3.5	0.77
216.17	82.29	0.20	58.2	3.6	0.78
222.17	82.76	0.20	58.2	3.7	0.78
228.17	83.65	0.21	58.2	3.8	0.79
234.17	83.77	0.21	58.2	3.9	0.79
240.17	84.53	0.22	58.3	4.0	0.80
246.17	85.06	0.22	58.3	4.1	0.80
252.18	85.05	0.23	58.3	4.2	0.80
258.18	86.26	0.23	58.3	4.3	0.82
264.18	86.36	0.24	58.4	4.4	0.82
270.18	89.79	0.25	58.4	4.5	0.85
276.20	89.07	0.25	58.4	4.6	0.84
282.20	90.21	0.26	58.4	4.7	0.85
288.20	90.86	0.26	58.4	4.8	0.86
294.20	90.58	0.27	58.4	4.9	0.86
300.22	91.62	0.27	58.4	5.0	0.87
315.22	92.70	0.29	58.4	5.3	0.88
330.22	93.19	0.30	58.5	5.5	0.88
345.22	93.21	0.31	58.5	5.8	0.88
360.23	94.22	0.33	58.5	6.0	0.89
375.23	95.37	0.34	58.5	6.2	0.90
390.23	96.10	0.36	58.5	6.5	0.90
405.23	97.46	0.37	58.5	6.8	0.91

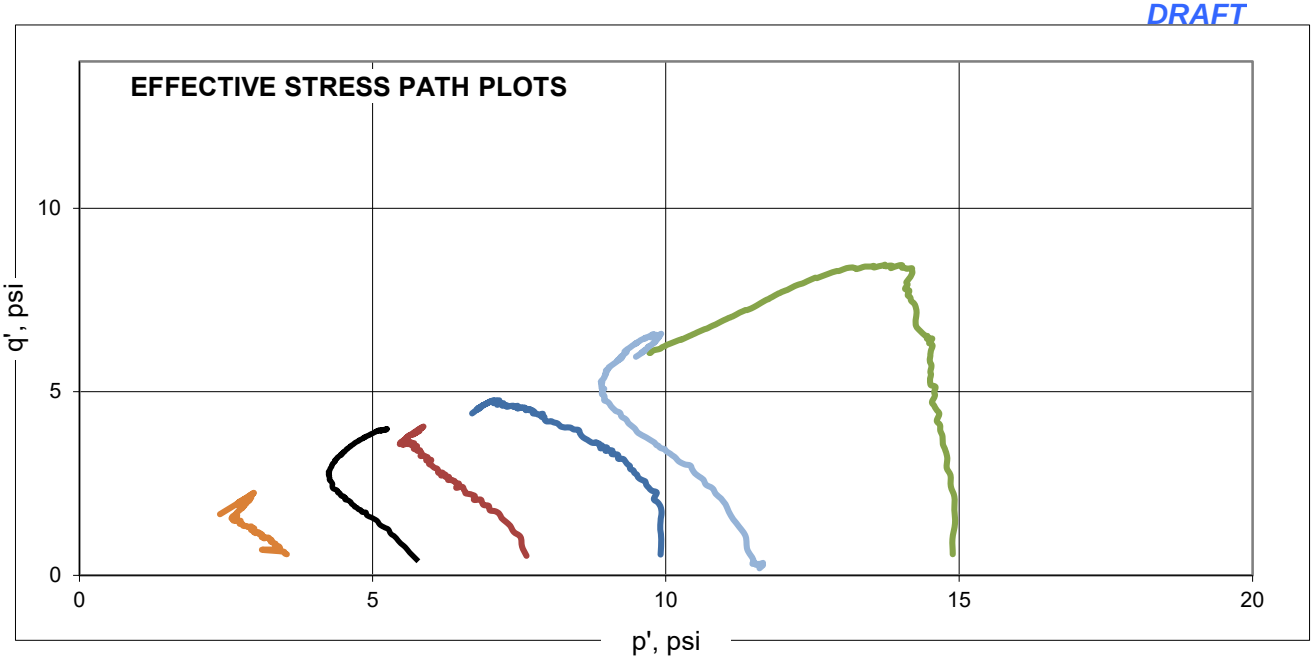
ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

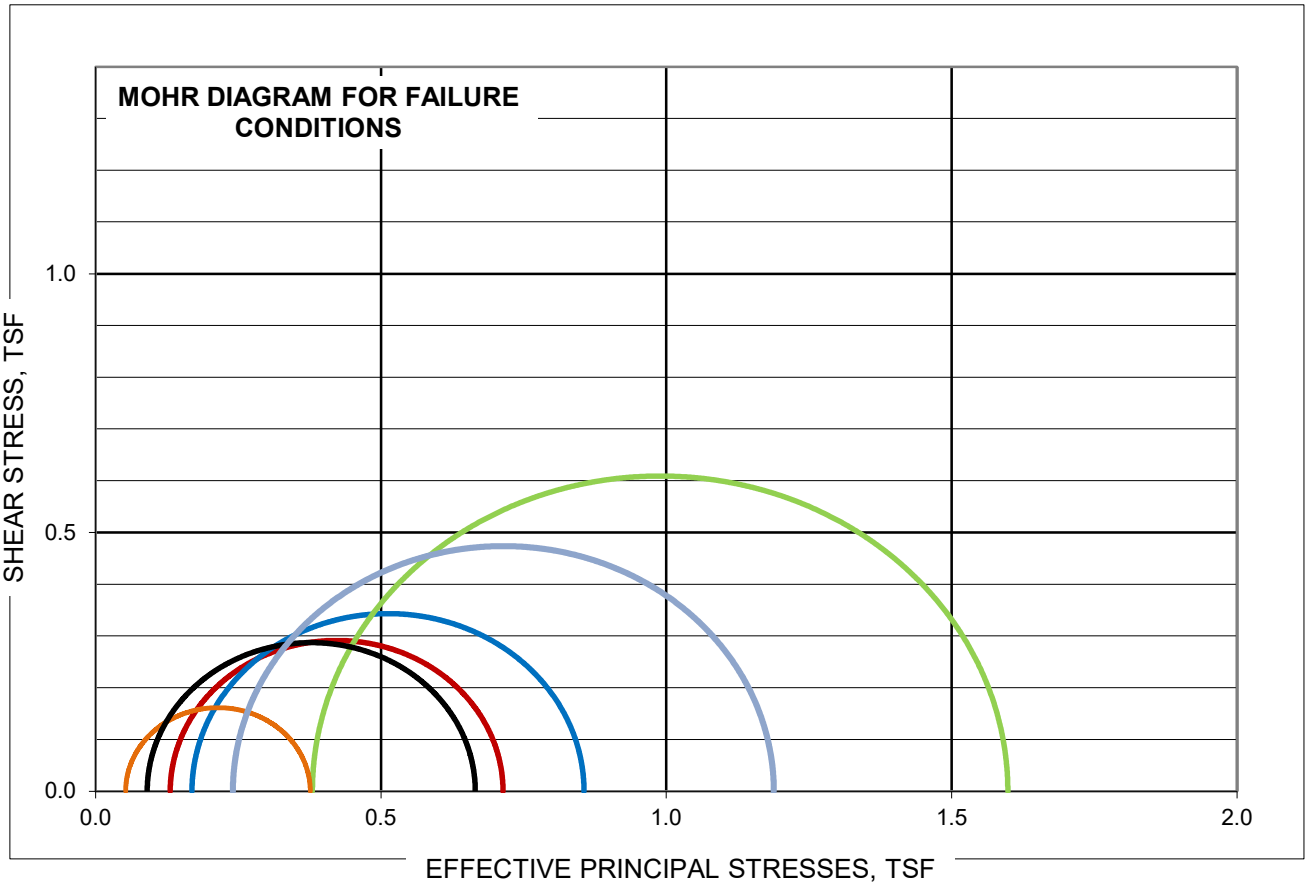
DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	PORE PRESSURE (psi)	STRAIN (%)	STRESS (tsf)
420.23	97.15	0.38	58.5	7.0	0.91
435.25	97.55	0.40	58.5	7.3	0.91
450.25	97.98	0.41	58.5	7.5	0.91
465.25	99.02	0.42	58.5	7.8	0.92
480.25	99.41	0.44	58.5	8.0	0.92
495.25	100.44	0.45	58.5	8.3	0.93
510.25	100.90	0.47	58.5	8.5	0.93
525.25	101.20	0.48	58.5	8.8	0.93
540.25	101.14	0.49	58.5	9.0	0.93
555.25	102.04	0.51	58.5	9.2	0.94
570.27	102.46	0.52	58.5	9.5	0.94
585.27	103.54	0.53	58.4	9.8	0.95
600.27	103.61	0.55	58.4	10.0	0.94
615.28	103.53	0.56	58.4	10.3	0.94
630.28	103.16	0.58	58.4	10.5	0.93
645.28	104.40	0.59	58.4	10.8	0.94
660.28	104.52	0.60	58.4	11.0	0.94
675.28	104.90	0.62	58.4	11.3	0.94
690.28	104.87	0.63	58.4	11.5	0.94
705.28	105.11	0.64	58.4	11.8	0.94
720.28	105.61	0.66	58.4	12.0	0.94
735.28	105.64	0.67	58.3	12.3	0.94
750.28	105.40	0.69	58.3	12.5	0.94
765.30	105.83	0.70	58.3	12.8	0.94
780.30	107.21	0.71	58.3	13.0	0.95
795.30	107.24	0.73	58.3	13.3	0.95
810.30	107.03	0.74	58.3	13.5	0.94
825.30	107.23	0.75	58.3	13.8	0.94
840.30	107.54	0.77	58.3	14.0	0.94
855.30	106.84	0.78	58.3	14.3	0.93
870.30	107.45	0.79	58.3	14.5	0.93
885.30	107.50	0.81	58.3	14.8	0.93
900.32	107.19	0.82	58.2	15.0	0.93
915.32	107.33	0.84	58.2	15.3	0.92
930.32	107.77	0.85	58.2	15.5	0.93
945.32	107.47	0.86	58.2	15.8	0.92
960.32	107.64	0.88	58.2	16.1	0.92
975.32	107.71	0.89	58.2	16.3	0.92
990.33	107.56	0.91	58.2	16.6	0.91
1005.33	108.34	0.92	58.2	16.8	0.92
1020.35	106.96	0.93	58.2	17.1	0.90
1035.35	106.70	0.95	58.2	17.3	0.90
1050.35	107.01	0.96	58.2	17.6	0.90
1065.35	106.98	0.97	58.2	17.8	0.89
1080.35	106.95	0.99	58.2	18.1	0.89
1095.37	106.67	1.00	58.1	18.3	0.89
1110.37	106.35	1.02	58.1	18.6	0.88
1125.37	107.02	1.03	58.1	18.8	0.88
1140.37	106.23	1.04	58.1	19.1	0.87
1155.38	106.89	1.06	58.1	19.3	0.88
1170.38	106.54	1.07	58.1	19.6	0.87
1185.38	105.65	1.08	58.1	19.8	0.86
1199.87	105.62	1.10	58.1	20.1	0.86

ALL TEST METHODS / RESULTS CONFORM TO ASTM D4767: "STANDARD TEST METHOD FOR CONSOLIDATION UNDRAINED TRIAXIAL COMPRESSION TEST FOR COHESIVE SOILS"

DRAFT





DESCRIPTION OF TESTS

KEY	BORING NO.	SAMPLE NO.	ELEV., FT.	TEST TYPE	EFF. CONSOL. PRESSURE, TSF	INITIAL WC, %	FINAL WC, %	MAX/FINAL DEVIATOR STRESS, TSF	STRAIN AT FAILURE, %
1	BH-04	7U	-16.5	CIU	0.53	50.0	47.2	0.57	11.7
2	BH-04	9U	-26.1	CIU	0.70	54.5	50.4	0.68	10.0
3	BH-04	13U	-46.1	CIU	1.03	56.0	50.2	1.22	3.7
4	BH-03	6U	-19.4	CIU	0.20	84.3	68.3	0.31	14.8
5	BH-03	8U	-29.5	CIU	0.44	51.6	47.1	0.55	16.8
6	BH-12	15S	-54.0	CIU	0.83	55.5	49.4	0.93	13.0

ALEXANDRIA, VA WATERFRONT IMPLEMENTATION PROJECT

ALEXANDRIA VIRGINIA

MUESER RUTLEDGE CONSULTING ENGINEERS
225 WEST 34TH STREET, NEW YORK, N.Y. 10122

SCALE	MADE BY: SJ DATE: 6-20-22	FILE NO.
-----	CH'KD BY: HK DATE: 6-21-22	14123

SUMMARY OF CONSOLIDATED UNDRAINED TRIAXIAL STRENGTH -- STRATUM A1

PLATE NO. MC-1

MRCE Form Mohr-1

DRAFT

MUESER RUTLEDGE CONSULTING ENGINEERS
GEOTECHNICAL LABORATORY

FILE NO. 14123
BORING NO. PS-04A
SAMPLE NO. 10U

DIRECT SHEAR TEST

PERFORMED BY: SJ DATE: 12/7/21
COMPUTED BY: SJ DATE: 12/13/21
CHECKED BY: HK DATE: 2/10/22

PROJECT: ALEXANDRIA VA, WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VIRGINIA

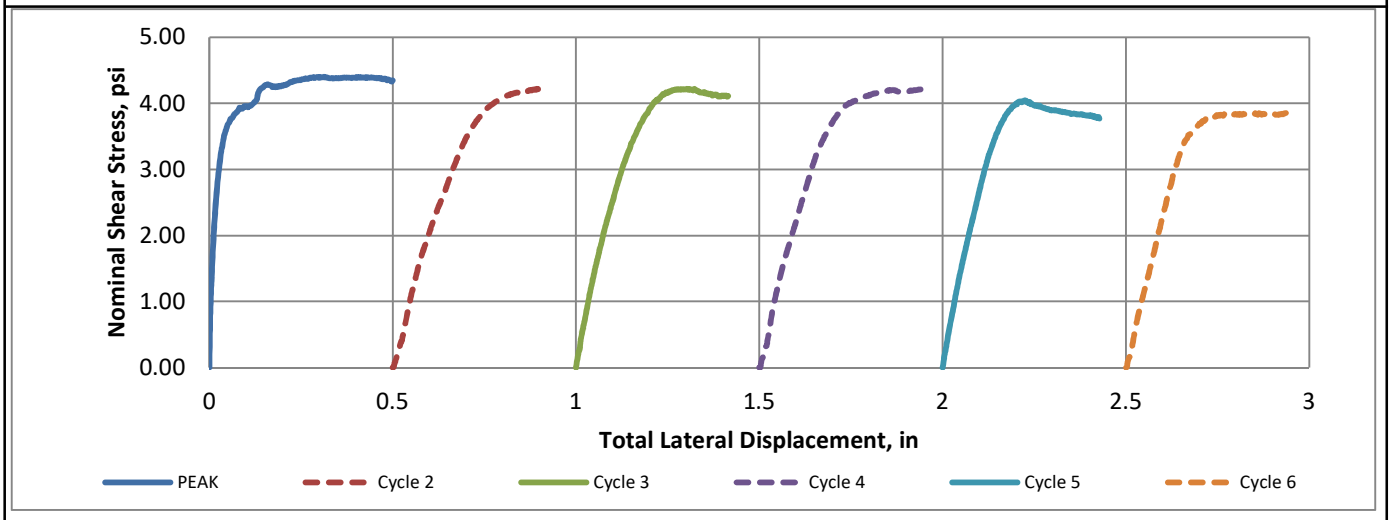
DESCRIPTION OF SAMPLE: GRAY BROWN ORGANIC SILTY CLAY, TRACE FINE SAND, FIBERS (OH)
INTACT: X REMOLDED: RECONSITUTED: OTHER:

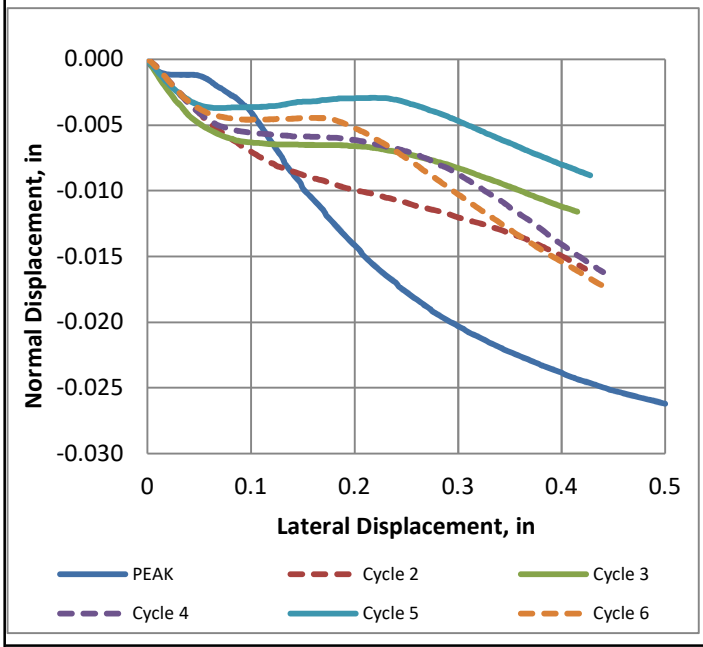
TEST CONDITIONS

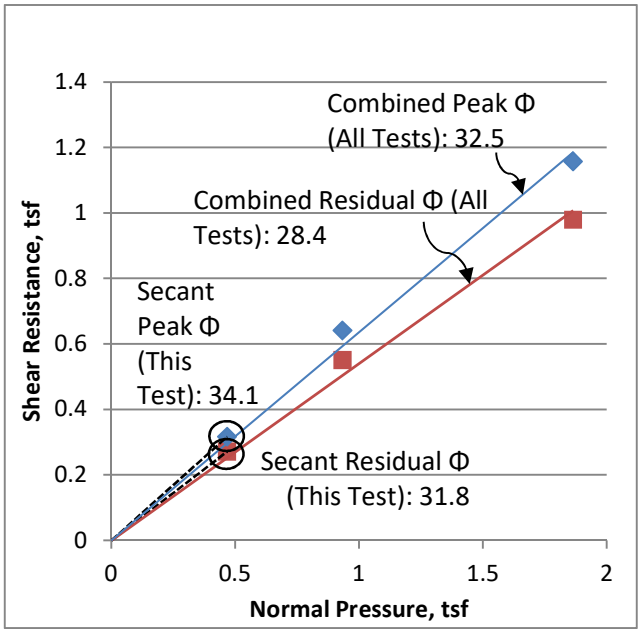
SAMPLE TYPE: INTACT: X PRESHEARED:
NOMINAL NORMAL STRESS = 935 psf
AVG. DISPLACEMENT RATE = 0.0010 in/min

SPECIMEN CONDITIONS

DIAMETER = 2.50 in
THICKNESS, h_o = 1.00 in
DRY MASS = 0.164 lb
INITIAL DRY DENSITY = 57.8 pcf
INITIAL VOID RATIO, e_0 = 1.844
INITIAL WATER CONTENT = 67.6 %
INITIAL WET DENSITY = 96.9 pcf
INITIAL DEG. OF SATURATION = 96.6 %
SPECIFIC GRAVITY, Gs = 2.63
ASSUMED: TEST: X
FINAL WATER CONTENT = 60.1 %







OBSERVATIONS OF SHEAR SURFACE:
DEPARTURE FROM PROCEDURE:

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 3080: STANDARD TEST METHOD FOR DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS

MUESER RUTLEDGE CONSULTING ENGINEERS
GEOTECHNICAL LABORATORY

FILE NO. 14123
BORING NO. PS-04A
SAMPLE NO. 10U

DIRECT SHEAR TEST

PROJECT: ALEXANDRIA VA, WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VIRGINIA

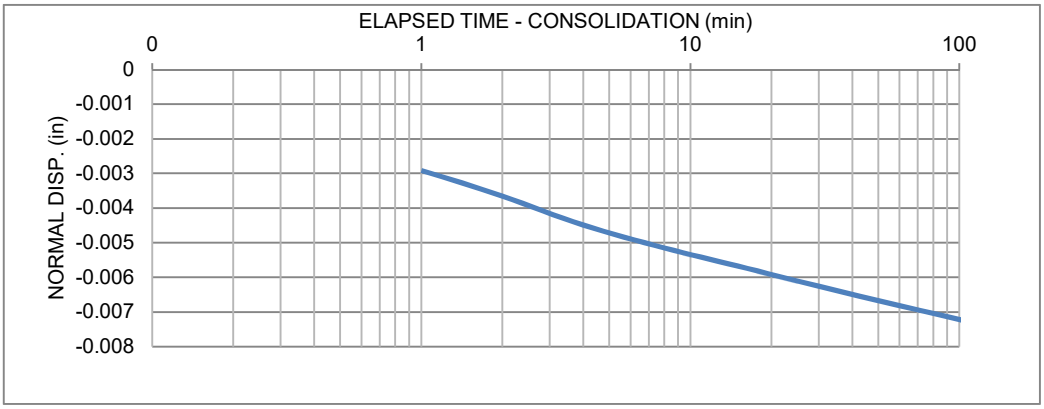
CONSOLIDATION

DATE	TIME	ELAPSED TIME (min)	LOAD (lbs)	NORMAL STRESS (psf)	LVDT READING	NORMAL DISP. (in)
12/07/21	00:00:00	0.0	30.3	890	0.3355	0
12/07/21	00:00:30	0.5	32.9	964	0.3332	-0.0023
12/07/21	00:01:00	1.0	32.9	964	0.3326	-0.0029
12/07/21	00:02:00	2.0	32.9	964	0.3318	-0.0037
12/07/21	00:04:00	4.0	32.9	964	0.3310	-0.0045
12/07/21	00:08:00	8.0	31.9	936	0.3303	-0.0052
12/07/21	00:15:00	15.0	31.9	935	0.3298	-0.0057
12/07/21	00:30:00	30.0	31.8	933	0.3292	-0.0063
12/07/21	01:00:00	60.0	31.8	932	0.3287	-0.0068
12/07/21	02:00:00	120.0	31.8	932	0.3281	-0.0074
12/07/21	04:00:00	240.0	31.8	932	0.3275	-0.0080

WATER CONTENT

AT START					
WEIGHT OF TARE + WET SOIL			=	231.22	gms
WEIGHT OF TARE#	RING		=	106.41	gms
WEIGHT OF WET SOIL			=	124.81	gms
WEIGHT OF DRY SOIL			=	74.45	gms
WEIGHT OF WATER			=	50.36	gms
INITIAL WATER CONTENT			=	67.6	%
AT END		S-19			
WEIGHT OF TARE + WET SOIL			=	165.31	gms
WEIGHT OF TARE + DRY SOIL		114.46	=	123.56	gms
WEIGHT OF FINAL WATER			=	41.75	gms
WEIGHT OF TARE#	#262	109.45	=	54.12	gms
WEIGHT OF DRY SOIL		5.01	=	69.44	gms
FINAL WATER CONTENT			=	60.1	%

INITIAL VOLUME OF SOIL, V_{tot} =	4.91	in^3
VOLUME OF SOLIDS, V_s =	1.73	in^3
INITIAL VOLUME OF VOIDS, V_v =	3.18	in^3
INITIAL VOLUME OF WATER, V_{wi} =	3.07	in^3
FINAL VOLUME OF WATER, V_{Wf} =	2.55	in^3



MUESER RUTLEDGE CONSULTING ENGINEERS
GEOTECHNICAL LABORATORY

DIRECT SHEAR TEST

FILE NO. 14123
BORING NO. BH-03
SAMPLE NO. 10U

PERFORMED BY: SJ DATE: 2/14/22
COMPUTED BY: SJ DATE: 3/1/22
CHECKED BY: HK DATE: 3/2/22

PROJECT: ALEXANDRIA WATERFRONT
LOCATION: ALEXANDRIA, VIRGINIA

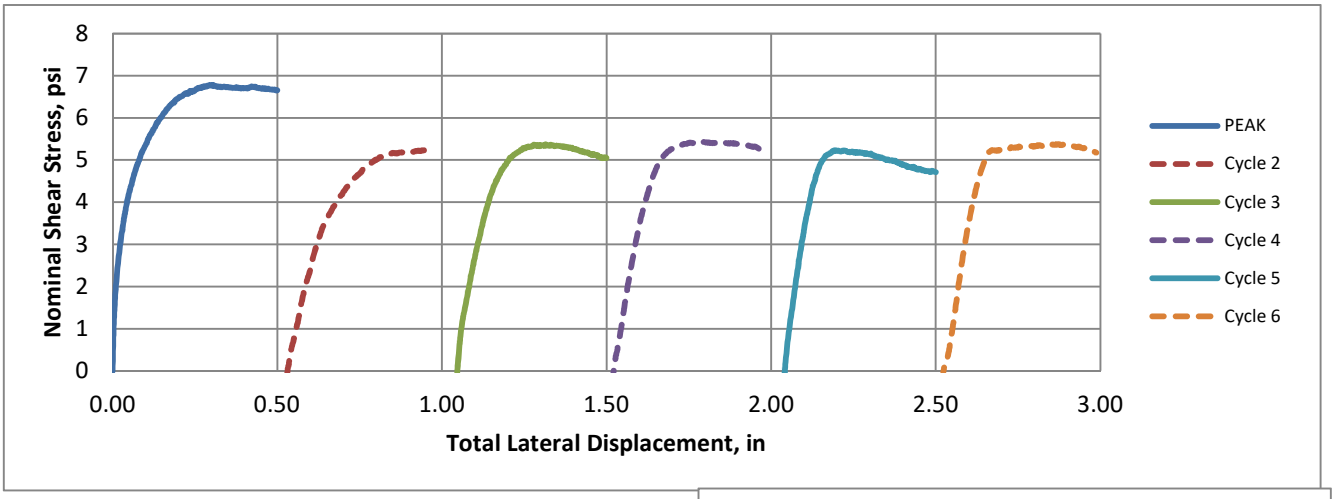
DESCRIPTION OF SAMPLE: GRAY BROWN SILTY CLAY, TRACE FINE SAND (CL)
INTACT: X REMOLDED: RECONSITUTED: OTHER:

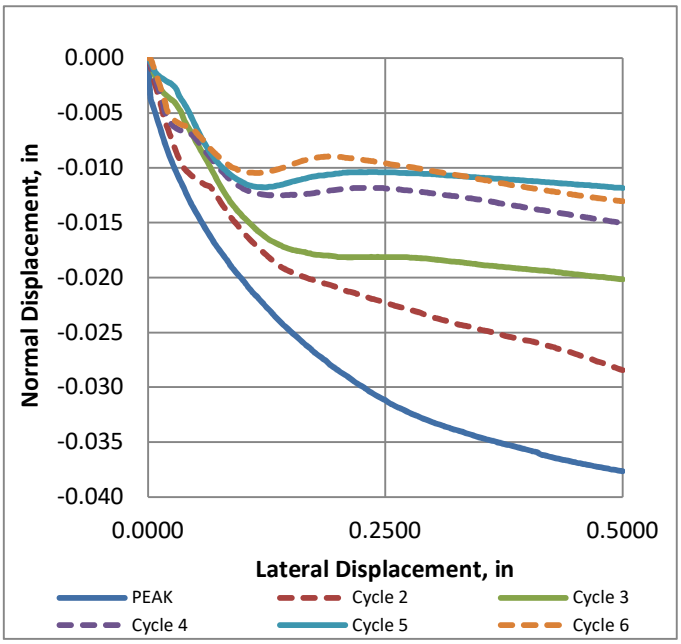
TEST CONDITIONS

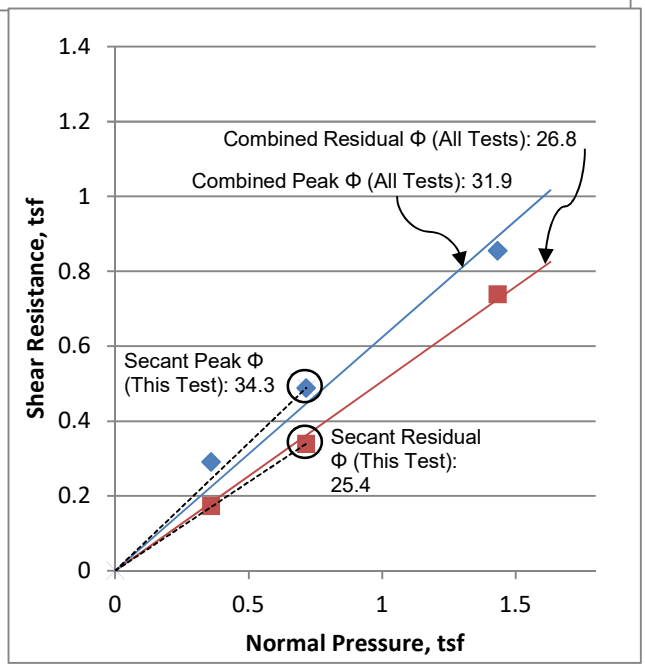
SAMPLE TYPE: INTACT: X PRESHEARED:
NOMINAL NORMAL STRESS = 1432 psf
AVG. DISPLACEMENT RATE = 0.0010 in/min

SPECIMEN CONDITIONS

DIAMETER = 2.50 in
THICKNESS, h_o = 1.00 in
DRY MASS = 0.193 lb
INITIAL DRY DENSITY = 68 pcf
INITIAL VOID RATIO, e_0 = 1.467
INITIAL WATER CONTENT = 54.6 %
INITIAL WET DENSITY = 105.1 pcf
INITIAL DEG. OF SATURATION = 100.0 %
SPECIFIC GRAVITY**, Gs = 2.69
** - ASSUMED: TEST: X
FINAL WATER CONTENT = 43.0 %







OBSERVATIONS OF SHEAR SURFACE:
DEPARTURE FROM PROCEDURE:

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 3080: STANDARD TEST METHOD FOR DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS

DRAFT

MUESER RUTLEDGE CONSULTING ENGINEERS
GEOTECHNICAL LABORATORY

FILE NO. 14123
BORING NO. BH-03
SAMPLE NO. 10U

DIRECT SHEAR TEST

PROJECT: ALEXANDRIA WATERFRONT
LOCATION: ALEXANDRIA, VIRGINIA

CONSOLIDATION

DATE	TIME	ELAPSED TIME (min)	LOAD (lbs)	NORMAL STRESS (psf)	LVDT READING	NORMAL DISP. (in)
	00:00:00	0.0	46.6	1368	-0.0887	0
	00:00:15	0.3	49.0	1437	-0.0935	-0.0048
	00:00:30	0.5	49.0	1439	-0.0962	-0.0075
	00:01:00	1.0	49.1	1441	-0.1002	-0.0115
	00:02:00	2.0	49.2	1442	-0.1057	-0.0170
	00:04:00	4.0	48.7	1428	-0.1126	-0.0240
	00:08:00	8.0	48.8	1432	-0.1190	-0.0303
	00:15:00	15.0	49.2	1442	-0.1226	-0.0339
	00:30:00	30.0	49.3	1447	-0.1248	-0.0362
	01:00:00	60.0	49.0	1438	-0.1263	-0.0376
	02:08:05	128.1	49.0	1437	-0.1276	-0.0390

WATER CONTENT

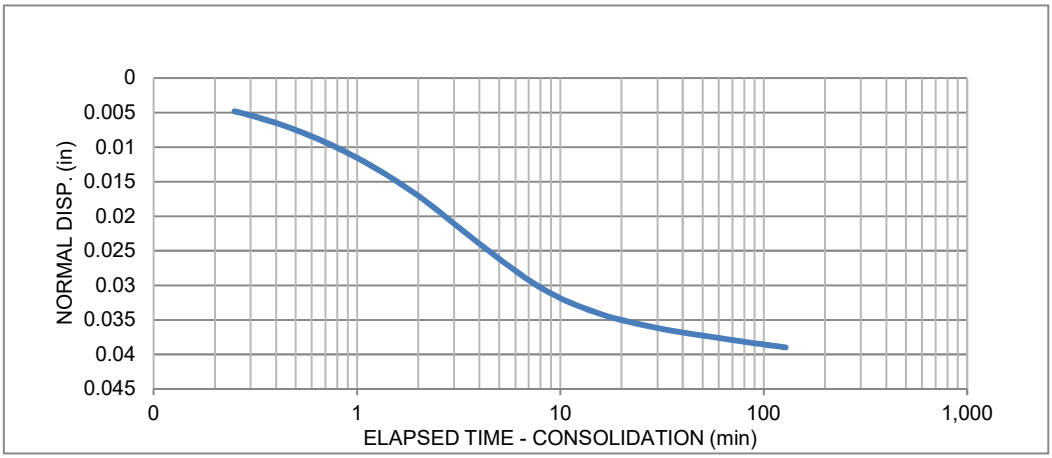
AT START

WEIGHT OF TARE + WET SOIL			=	241.88	gms
WEIGHT OF TARE#			=	106.41	gms
WEIGHT OF WET SOIL			=	135.47	gms
WEIGHT OF DRY SOIL			=	87.64	gms
WEIGHT OF WATER			=	47.83	gms
INITIAL WATER CONTENT			=	54.6	%

AT END

		EXTRA			
WEIGHT OF TARE + WET SOIL			=	163.64	gms
WEIGHT OF TARE + DRY SOIL		202.61	=	127.02	gms
WEIGHT OF FINAL WATER			=	36.62	gms
WEIGHT OF TARE#		200.2	=	41.79	gms
WEIGHT OF DRY SOIL		2.41	=	85.23	gms
FINAL WATER CONTENT			=	43.0	%

INITIAL VOLUME OF SOIL, V_{tot} =	4.91	in^3
VOLUME OF SOLIDS, V_s =	1.99	in^3
INITIAL VOLUME OF VOIDS, V_v =	2.92	in^3
INITIAL VOLUME OF WATER, V_{wi} =	2.92	in^3
FINAL VOLUME OF WATER, V_{Wf} =	2.24	in^3



DRAFT

MUESER RUTLEDGE CONSULTING ENGINEERS
GEOTECHNICAL LABORATORY

PAGE 1 OF 2

DIRECT SHEAR TEST

FILE NO. 14123
BORING NO. BH-03
SAMPLE NO. 10U

PERFORMED BY: SJ DATE: 2/14/22
COMPUTED BY: SJ DATE: 3/1/22
CHECKED BY: HK DATE: 3/2/22

PROJECT: ALEXANDRIA WATERFRONT
LOCATION: ALEXANDRIA, VIRGINIA

DESCRIPTION OF SAMPLE: GRAY BROWN SILTY CLAY, TRACE FINE SAND (CL)

INTACT: X REMOLDED: RECONSITUTED: OTHER:

TEST CONDITIONS

SAMPLE TYPE: INTACT: X (CYCLES 1-3) PRESHEARED: (CYCLES 4-6)

NOMINAL NORMAL STRESS = 2865 psf

AVG. DISPLACEMENT RATE = 0.0010 in/min

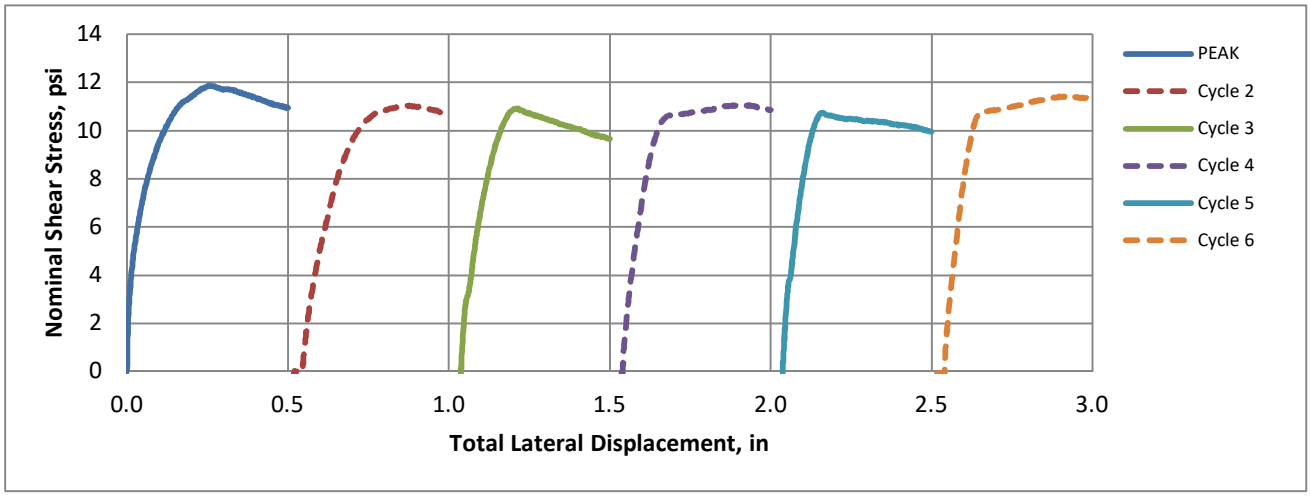
SPECIMEN CONDITIONS

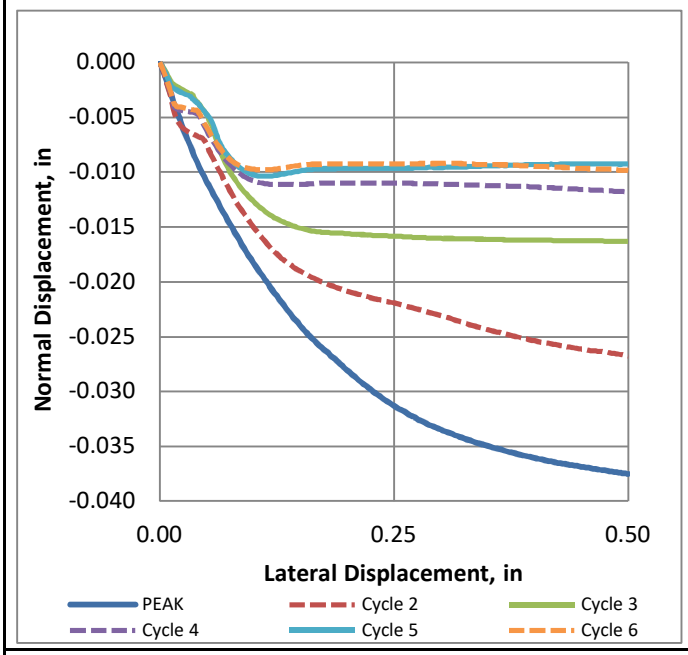
DIAMETER = 2.50 in
THICKNESS, h_o = 0.82 in
DRY MASS = 0.185 lb

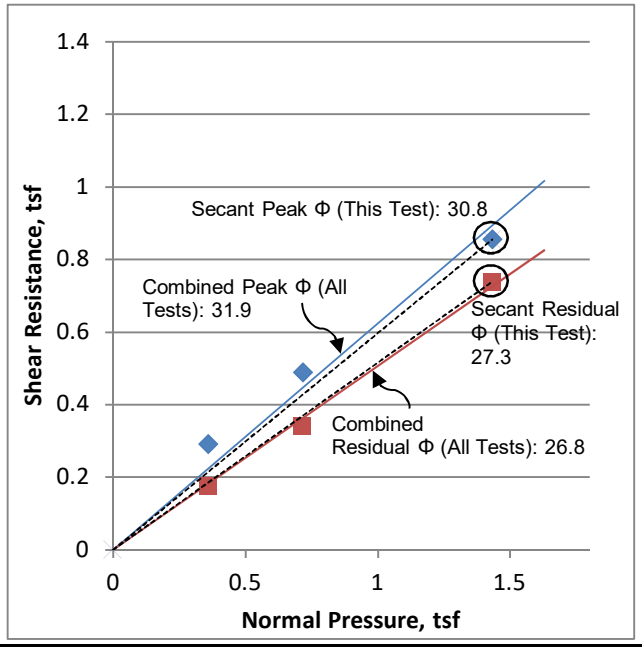
INITIAL DRY DENSITY = 80 pcf
INITIAL VOID RATIO, e_0 = 1.110
INITIAL WATER CONTENT = 59.1 %
INITIAL WET DENSITY = 126.5 pcf
INITIAL DEG. OF SATURATION = 143.2 %

SPECIFIC GRAVITY**, Gs = 2.69
** - ASSUMED: TEST: X

FINAL WATER CONTENT = 39.6 %







OBSERVATIONS OF SHEAR SURFACE:

DEPARTURE FROM PROCEDURE: INITIALLY WAS 10 PSI LOAD SAMPLE, BUT SHEAR DATA DID NOT RECORD

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 3080: STANDARD TEST METHOD FOR DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS

MUESER RUTLEDGE CONSULTING ENGINEERS
GEOTECHNICAL LABORATORY

FILE NO. 14123
BORING NO. BH-03
SAMPLE NO. 10U

DIRECT SHEAR TEST

PROJECT: ALEXANDRIA WATERFRONT
LOCATION: ALEXANDRIA, VIRGINIA

CONSOLIDATION

DATE	TIME	ELAPSED TIME (min)	LOAD (lbs)	NORMAL STRESS (psf)	LVDT READING	NORMAL DISP. (in)
	00:00:00	0	93.3	2738	-0.1802	0
	00:00:30	1	98.4	2885	-0.1841	-0.0039
	00:01:00	1	98.4	2886	-0.1860	-0.0058
	00:02:00	2	98.2	2880	-0.1888	-0.0086
	00:04:00	4	97.9	2873	-0.1925	-0.0123
	00:08:00	8	98.3	2885	-0.1968	-0.0166
	00:15:00	15	97.9	2871	-0.2001	-0.0199
	00:30:00	30	98.1	2879	-0.2028	-0.0226
	01:00:00	60	98.0	2874	-0.2048	-0.0246
	02:00:00	120	98.0	2874	-0.2067	-0.0265
	15:54:12	954	98.2	2879	-0.2118	-0.0316

WATER CONTENT

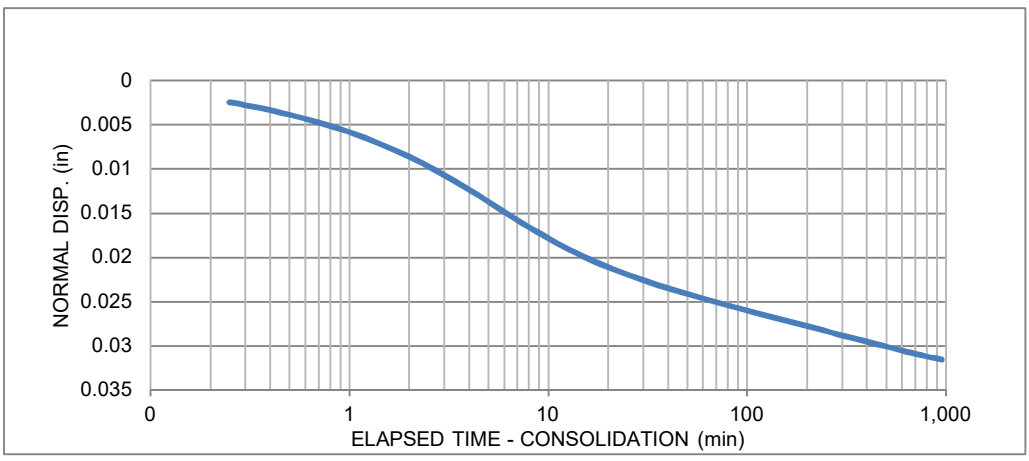
AT START

WEIGHT OF TARE + WET SOIL		=	240.14	gms
WEIGHT OF TARE#		=	106.41	gms
WEIGHT OF WET SOIL		=	133.73	gms
WEIGHT OF DRY SOIL		=	84.04	gms
WEIGHT OF WATER		=	49.69	gms
INITIAL WATER CONTENT		=	59.1	%

AT END

	EXTRA			
WEIGHT OF TARE + WET SOIL		=	156.76	gms
WEIGHT OF TARE + DRY SOIL	196.72	=	124.19	gms
WEIGHT OF FINAL WATER		=	32.57	gms
WEIGHT OF TARE#	194.92	=	41.95	gms
WEIGHT OF DRY SOIL	1.8	=	82.24	gms
FINAL WATER CONTENT		=	39.6	%

INITIAL VOLUME OF SOIL, V_{tot} =	4.03	in^3
VOLUME OF SOLIDS, V_s =	1.91	in^3
INITIAL VOLUME OF VOIDS, V_v =	2.12	in^3
INITIAL VOLUME OF WATER, V_{wi} =	3.03	in^3
FINAL VOLUME OF WATER, V_{Wf} =	1.99	in^3



DRAFT

MUESER RUTLEDGE CONSULTING ENGINEERS
GEOTECHNICAL LABORATORY

DIRECT SHEAR TEST

FILE NO. 14123
BORING NO. PS-04A
SAMPLE NO. 10U

PERFORMED BY: SJ DATE: 12/7/21
COMPUTED BY: SJ DATE: 12/13/21
CHECKED BY: HK DATE: 2/10/22

PROJECT: ALEXANDRIA VA, WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VIRGINIA

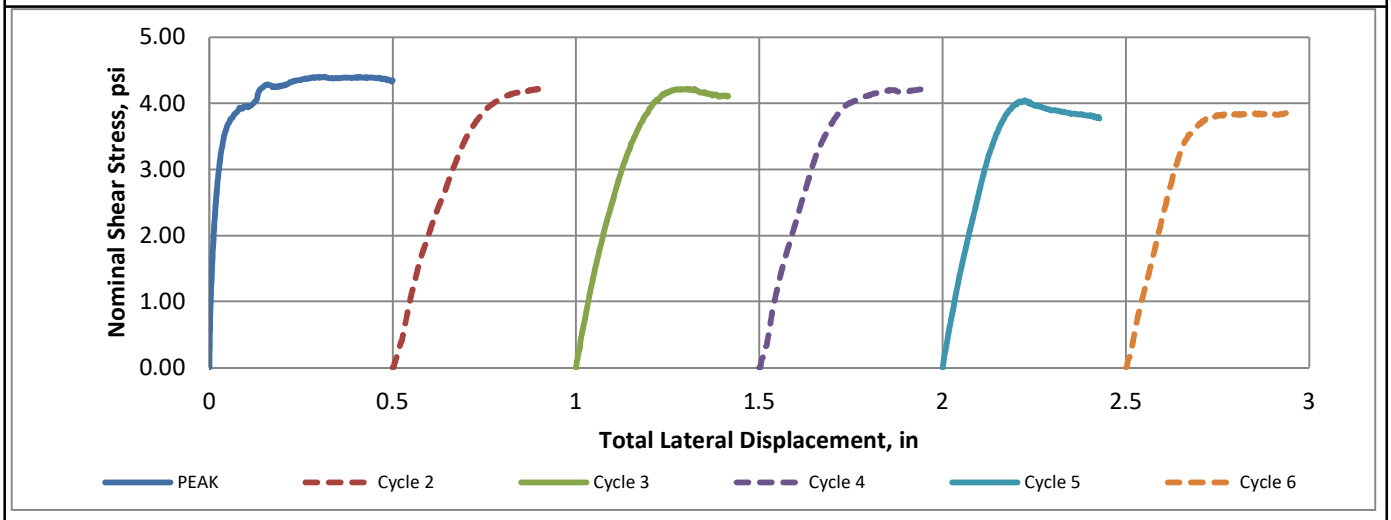
DESCRIPTION OF SAMPLE: GRAY BROWN ORGANIC SILTY CLAY, TRACE FINE SAND, FIBERS (OH)
INTACT: X REMOLDED: RECONSITUTED: OTHER:

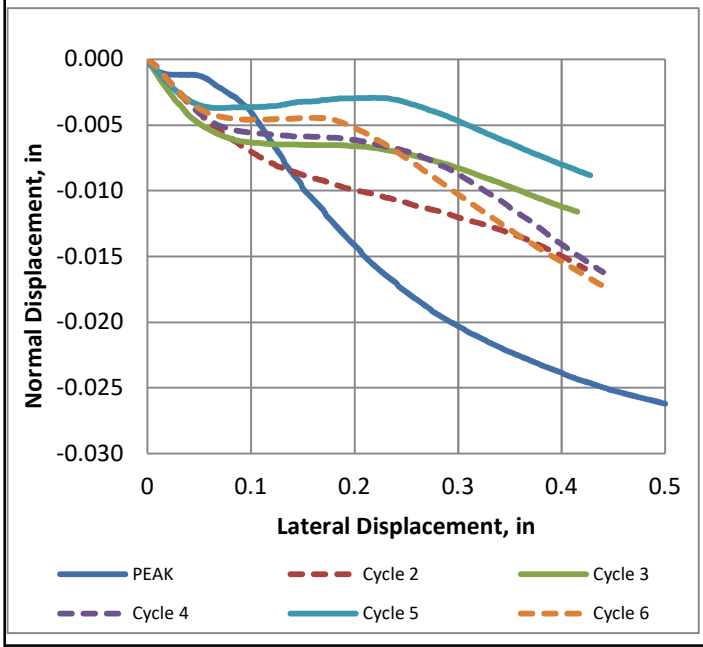
TEST CONDITIONS

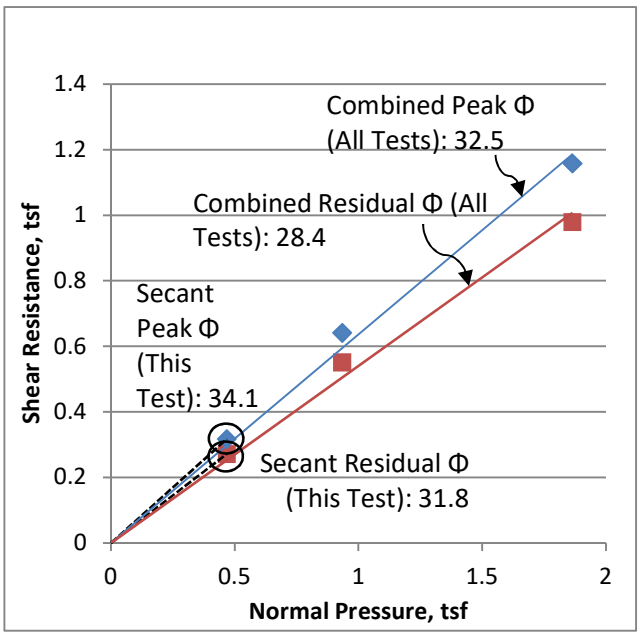
SAMPLE TYPE: INTACT: X PRESHEARED:
NOMINAL NORMAL STRESS = 935 psf
AVG. DISPLACEMENT RATE = 0.0010 in/min

SPECIMEN CONDITIONS

DIAMETER = 2.50 in
THICKNESS, h_o = 1.00 in
DRY MASS = 0.164 lb
INITIAL DRY DENSITY = 57.8 pcf
INITIAL VOID RATIO, e_0 = 1.844
INITIAL WATER CONTENT = 67.6 %
INITIAL WET DENSITY = 96.9 pcf
INITIAL DEG. OF SATURATION = 96.6 %
SPECIFIC GRAVITY, Gs = 2.63
ASSUMED: TEST: X
FINAL WATER CONTENT = 60.1 %







OBSERVATIONS OF SHEAR SURFACE:
DEPARTURE FROM PROCEDURE:

ALL TEST METHODS / RESULTS CONFORM TO ASTM D3080: "STANDARD TEST METHOD FOR DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS"

MUESER RUTLEDGE CONSULTING ENGINEERS
GEOTECHNICAL LABORATORY

FILE NO. 14123
BORING NO. PS-04A
SAMPLE NO. 10U

DIRECT SHEAR TEST

PROJECT: ALEXANDRIA VA, WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VIRGINIA

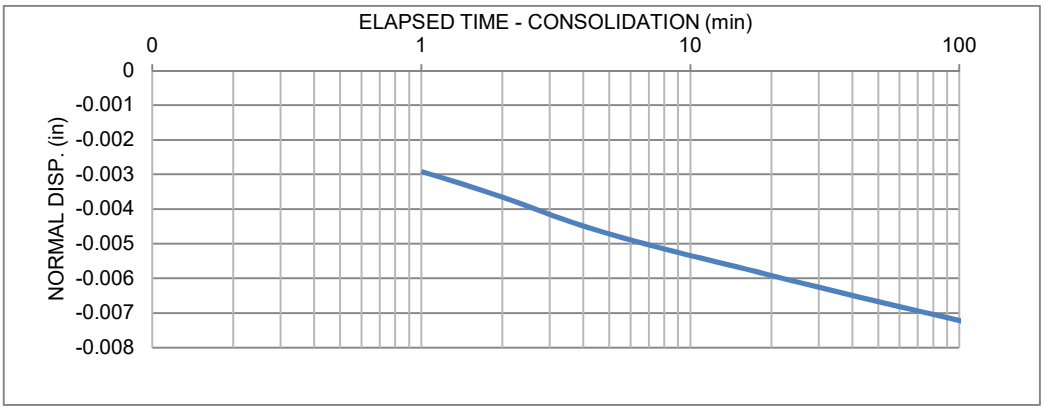
CONSOLIDATION

DATE	TIME	ELAPSED TIME (min)	LOAD (lbs)	NORMAL STRESS (psf)	LVDT READING	NORMAL DISP. (in)
12/07/21	00:00:00	0.0	30.3	890	0.3355	0
12/07/21	00:00:30	0.5	32.9	964	0.3332	-0.0023
12/07/21	00:01:00	1.0	32.9	964	0.3326	-0.0029
12/07/21	00:02:00	2.0	32.9	964	0.3318	-0.0037
12/07/21	00:04:00	4.0	32.9	964	0.3310	-0.0045
12/07/21	00:08:00	8.0	31.9	936	0.3303	-0.0052
12/07/21	00:15:00	15.0	31.9	935	0.3298	-0.0057
12/07/21	00:30:00	30.0	31.8	933	0.3292	-0.0063
12/07/21	01:00:00	60.0	31.8	932	0.3287	-0.0068
12/07/21	02:00:00	120.0	31.8	932	0.3281	-0.0074
12/07/21	04:00:00	240.0	31.8	932	0.3275	-0.0080

WATER CONTENT

AT START					
WEIGHT OF TARE + WET SOIL			=	231.22	gms
WEIGHT OF TARE#	RING		=	106.41	gms
WEIGHT OF WET SOIL			=	124.81	gms
WEIGHT OF DRY SOIL			=	74.45	gms
WEIGHT OF WATER			=	50.36	gms
INITIAL WATER CONTENT			=	67.6	%
AT END		S-19			
WEIGHT OF TARE + WET SOIL			=	165.31	gms
WEIGHT OF TARE + DRY SOIL		114.46	=	123.56	gms
WEIGHT OF FINAL WATER			=	41.75	gms
WEIGHT OF TARE#	#262	109.45	=	54.12	gms
WEIGHT OF DRY SOIL		5.01	=	69.44	gms
FINAL WATER CONTENT			=	60.1	%

INITIAL VOLUME OF SOIL, V_{tot} =	4.91	in^3
VOLUME OF SOLIDS, V_s =	1.73	in^3
INITIAL VOLUME OF VOIDS, V_v =	3.18	in^3
INITIAL VOLUME OF WATER, V_{wi} =	3.07	in^3
FINAL VOLUME OF WATER, V_{Wf} =	2.55	in^3



ALL TEST METHODS / RESULTS CONFORM TO ASTM D3080: "STANDARD TEST METHOD FOR DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS"

MUESER RUTLEDGE CONSULTING ENGINEERS
GEOTECHNICAL LABORATORY

FILE NO. 14123
BORING NO. PS-04A
SAMPLE NO. 10U

DIRECT SHEAR TEST

PERFORMED BY: SJ DATE: 12/13/21
COMPUTED BY: SJ DATE: 1/11/22
CHECKED BY: HK DATE: 2/10/22

PROJECT: ALEXANDRIA VA, WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VIRGINIA

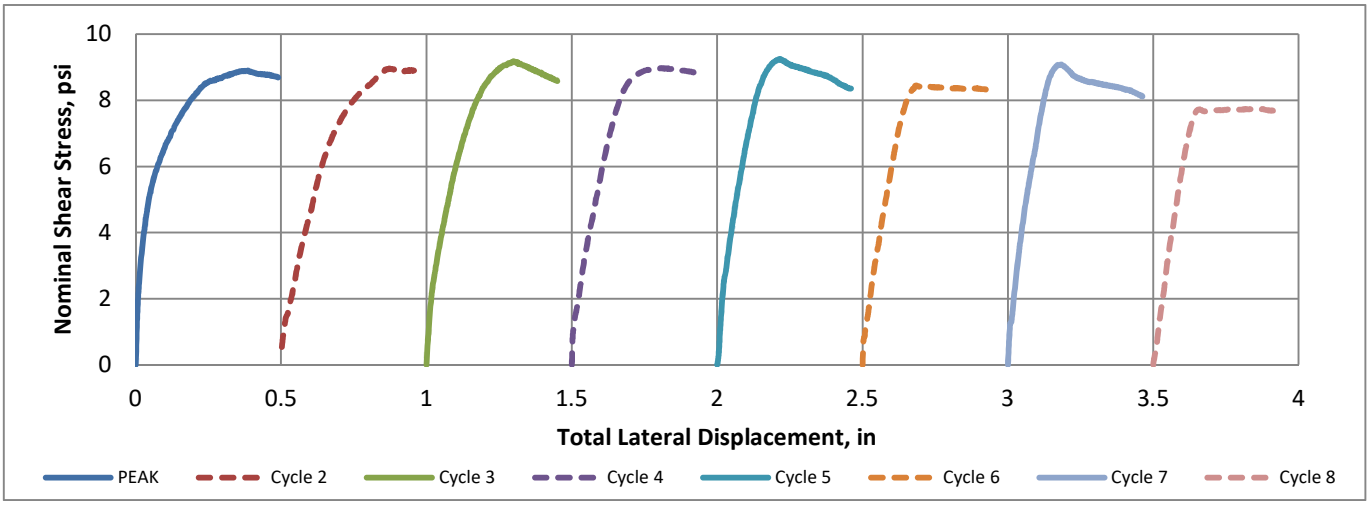
DESCRIPTION OF SAMPLE: GRAY BROWN ORGANIC SILTY CLAY, TRACE FINE SAND, FIBERS (OH)
INTACT: X REMOLDED: RECONSITUTED: OTHER:

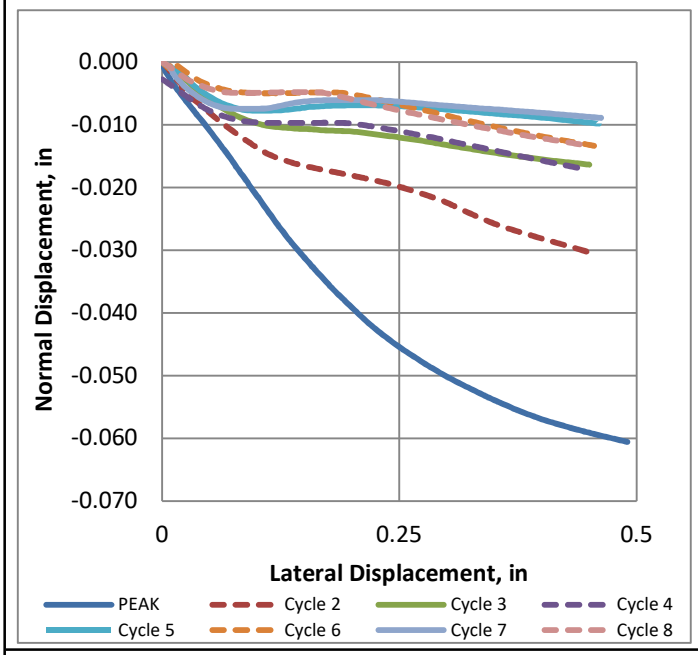
TEST CONDITIONS

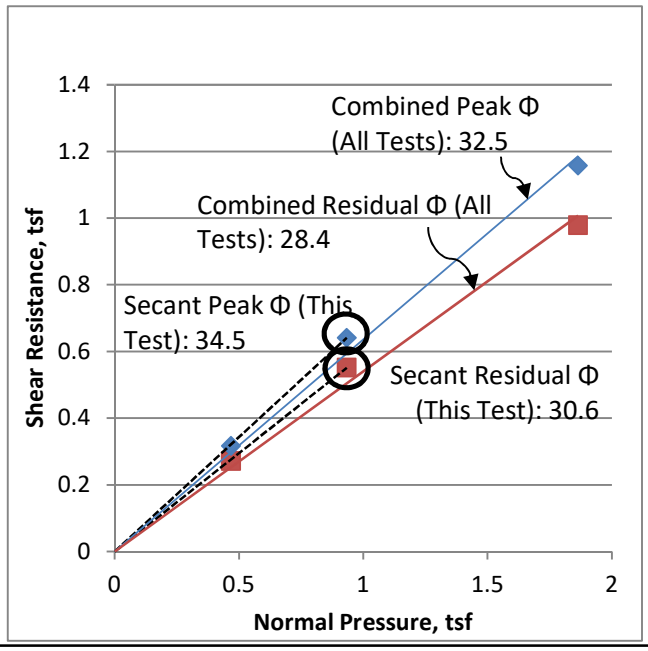
SAMPLE TYPE: INTACT: X PRESHEARED:
NOMINAL NORMAL STRESS = 1867 psf
AVG. DISPLACEMENT RATE = 0.0010 in/min

SPECIMEN CONDITIONS

DIAMETER = 2.50 in
THICKNESS, h_o = 1.00 in
DRY MASS = 0.168 lb
INITIAL DRY DENSITY = 59 pcf
INITIAL VOID RATIO, e_0 = 1.780
INITIAL WATER CONTENT = 65.4 %
INITIAL WET DENSITY = 97.8 pcf
INITIAL DEG. OF SATURATION = 96.8 %
SPECIFIC GRAVITY**, Gs = 2.63
** - ASSUMED: TEST: X
FINAL WATER CONTENT = 52.1 %







OBSERVATIONS OF SHEAR SURFACE:
DEPARTURE FROM PROCEDURE:

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 3080: STANDARD TEST METHOD FOR DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS

DRAFT

MUESER RUTLEDGE CONSULTING ENGINEERS
GEOTECHNICAL LABORATORY

FILE NO. 14123
BORING NO. PS-04A
SAMPLE NO. 10U

DIRECT SHEAR TEST

PROJECT: ALEXANDRIA VA, WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VIRGINIA

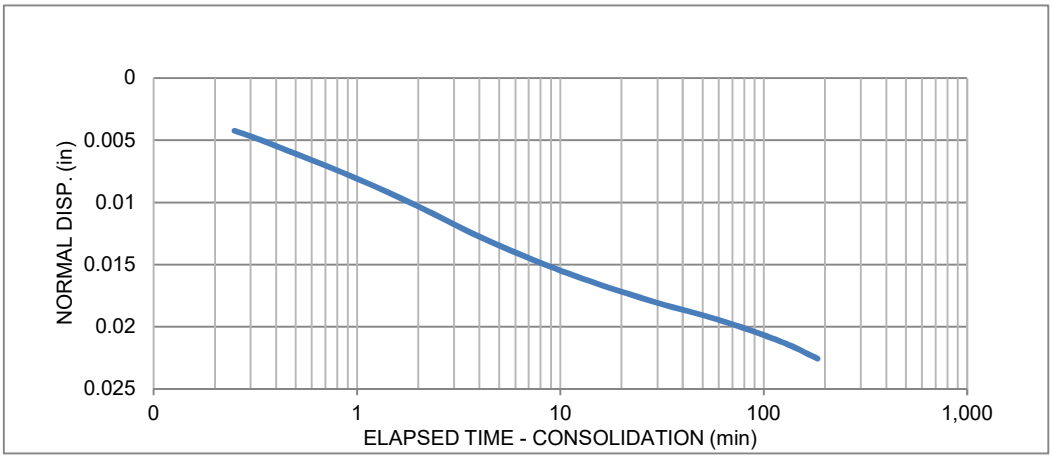
CONSOLIDATION

DATE	TIME	ELAPSED TIME (min)	LOAD (lbs)	NORMAL STRESS (psf)	LVDT READING	NORMAL DISP. (in)
12/14/21	00:00:00	0.0	60.6	1779	0.3093	0
12/14/21	00:00:30	0.5	65.5	1922	0.3032	-0.0061
12/14/21	00:01:00	1.0	63.8	1871	0.3012	-0.0081
12/14/21	00:02:00	2.0	63.8	1871	0.2990	-0.0103
12/14/21	00:04:00	4.0	63.7	1869	0.2966	-0.0127
12/14/21	00:08:00	8.0	63.0	1848	0.2945	-0.0149
12/14/21	00:15:00	15.0	63.0	1848	0.2928	-0.0165
12/14/21	00:30:00	30.0	63.0	1849	0.2912	-0.0181
12/14/21	01:00:00	60.0	63.1	1851	0.2899	-0.0194
12/14/21	02:00:00	120.0	63.8	1871	0.2882	-0.0211
12/14/21	03:03:48	183.8	63.8	1872	0.2868	-0.0226

WATER CONTENT

AT START					
WEIGHT OF TARE + WET SOIL			=	232.37	gms
WEIGHT OF TARE#	RING		=	106.41	gms
WEIGHT OF WET SOIL			=	125.96	gms
WEIGHT OF DRY SOIL			=	76.15	gms
WEIGHT OF WATER			=	49.81	gms
INITIAL WATER CONTENT			=	65.4	%
AT END		S-16			
WEIGHT OF TARE + WET SOIL			=	147.55	gms
WEIGHT OF TARE + DRY SOIL		303.5	=	111.85	gms
WEIGHT OF FINAL WATER			=	35.7	gms
WEIGHT OF TARE#	O-2	295.92	=	43.28	gms
WEIGHT OF DRY SOIL		7.58	=	68.57	gms
FINAL WATER CONTENT			=	52.1	%

INITIAL VOLUME OF SOIL, V_{tot} =	4.91	in^3
VOLUME OF SOLIDS, V_s =	1.77	in^3
INITIAL VOLUME OF VOIDS, V_v =	3.14	in^3
INITIAL VOLUME OF WATER, V_{wi} =	3.04	in^3
FINAL VOLUME OF WATER, V_{Wf} =	2.18	in^3



MUESER RUTLEDGE CONSULTING ENGINEERS
GEOTECHNICAL LABORATORY

FILE NO. 14123
BORING NO. PS-04A
SAMPLE NO. 10U

DIRECT SHEAR TEST

PERFORMED BY: SJ DATE: 12/22/21
COMPUTED BY: SJ DATE: 1/11/22
CHECKED BY: HK DATE: 2/10/22

PROJECT: ALEXANDRIA VA, WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VIRGINIA

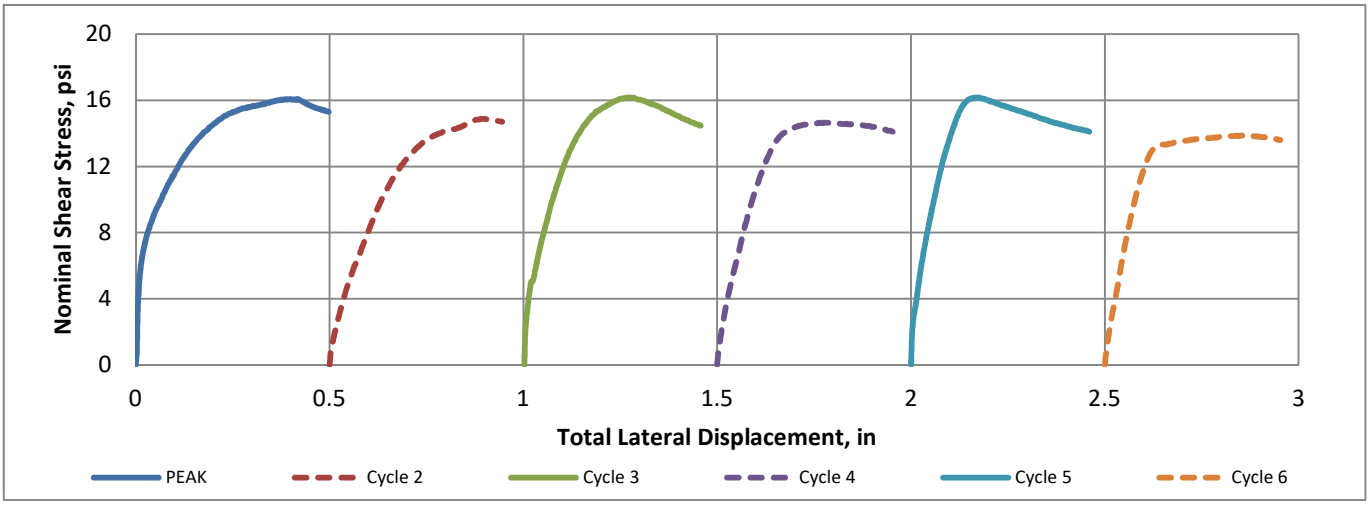
DESCRIPTION OF SAMPLE: GRAY BROWN ORGANIC SILTY CLAY, TRACE FINE SAND, FIBERS (OH)
INTACT: X REMOLDED: RECONSITUTED: OTHER:

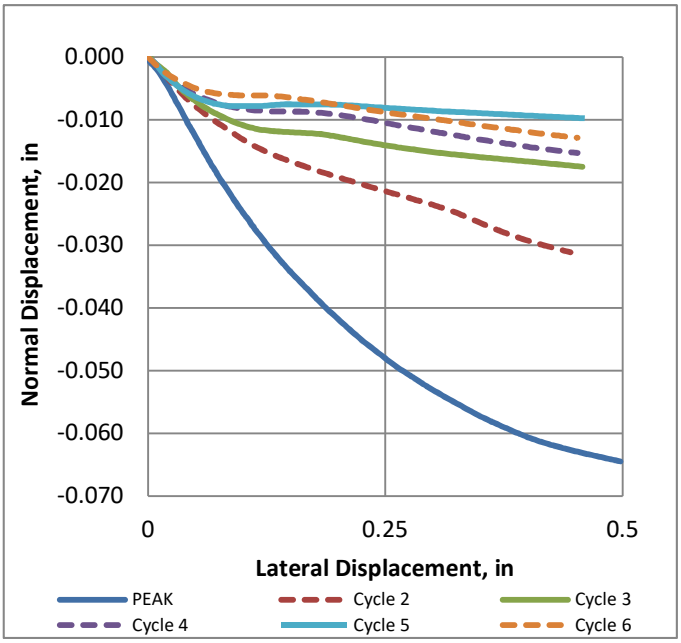
TEST CONDITIONS

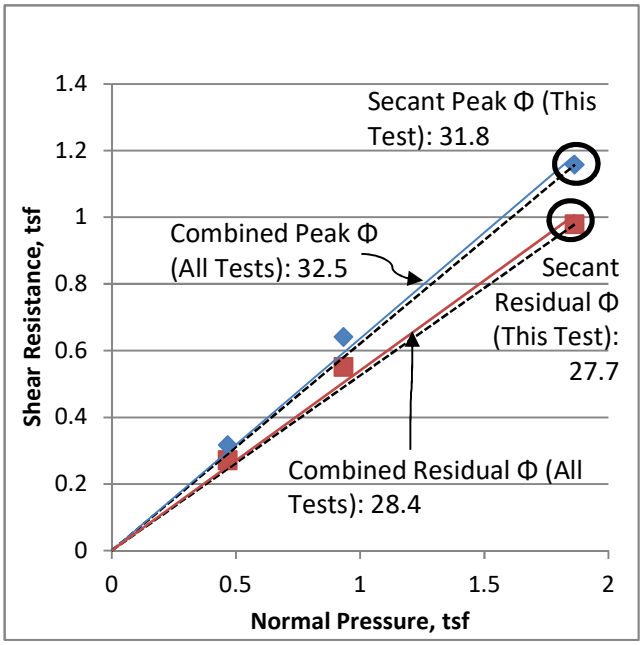
SAMPLE TYPE: INTACT: X PRESHEARED:
NOMINAL NORMAL STRESS = 3729 psf
AVG. DISPLACEMENT RATE = 0.0010 in/min

SPECIMEN CONDITIONS

DIAMETER = 2.50 in
THICKNESS, h_o = 1.00 in
DRY MASS = 0.160 lb
INITIAL DRY DENSITY = 56 pcf
INITIAL VOID RATIO, e_0 = 1.919
INITIAL WATER CONTENT = 71.5 %
INITIAL WET DENSITY = 96.5 pcf
INITIAL DEG. OF SATURATION = 98.1 %
SPECIFIC GRAVITY**, Gs = 2.63
** - ASSUMED: TEST: X
FINAL WATER CONTENT = 49.9 %







OBSERVATIONS OF SHEAR SURFACE:
DEPARTURE FROM PROCEDURE:

ALL TEST METHODS / RESULTS CONFORM TO ASTM STANDARD D 3080: STANDARD TEST METHOD FOR DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS

MUESER RUTLEDGE CONSULTING ENGINEERS
GEOTECHNICAL LABORATORY

FILE NO. 14123
BORING NO. PS-04A
SAMPLE NO. 10U

DIRECT SHEAR TEST

PROJECT: ALEXANDRIA VA, WATERFRONT IMPLEMENTATION PROJECT
LOCATION: ALEXANDRIA, VIRGINIA

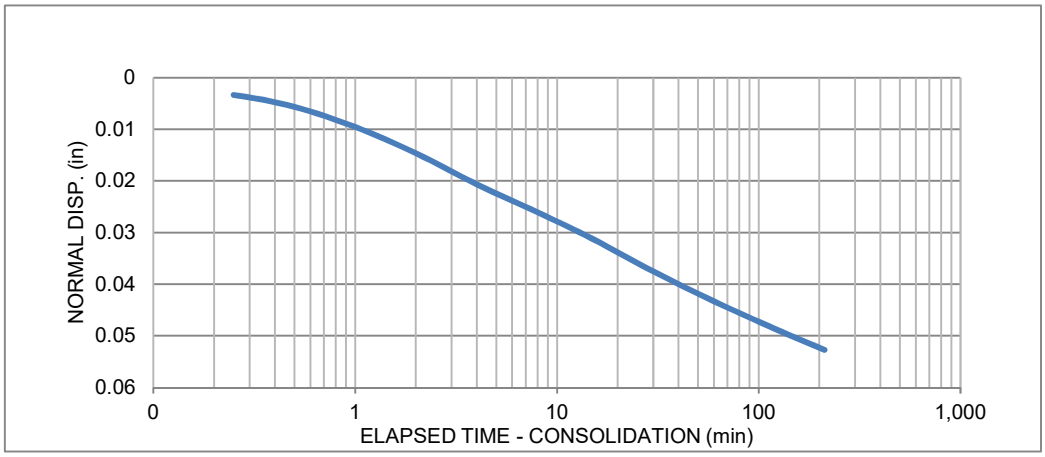
CONSOLIDATION

DATE	TIME	ELAPSED TIME (min)	LOAD (lbs)	NORMAL STRESS (psf)	LVDT READING	NORMAL DISP. (in)
12/22/21	00:00:00	0	121.3	3558	0.2852	0
12/22/21	00:00:30	1	123.6	3627	0.2795	-0.0056
12/22/21	00:01:00	1	126.7	3717	0.2756	-0.0095
12/22/21	00:02:00	2	127.1	3728	0.2705	-0.0146
12/22/21	00:04:00	4	127.7	3747	0.2645	-0.0206
12/22/21	00:08:00	8	127.5	3741	0.2591	-0.0260
12/22/21	00:15:00	15	127.2	3732	0.2540	-0.0312
12/22/21	00:30:00	30	127.3	3734	0.2476	-0.0375
12/22/21	01:00:00	60	127.1	3728	0.2419	-0.0433
12/22/21	02:00:00	120	127.1	3730	0.2365	-0.0486
12/22/21	03:31:44	212	126.4	3707	0.2325	-0.0527

WATER CONTENT

AT START					
WEIGHT OF TARE + WET SOIL			=	230.79	gms
WEIGHT OF TARE#	RING		=	106.41	gms
WEIGHT OF WET SOIL			=	124.38	gms
WEIGHT OF DRY SOIL			=	72.52	gms
WEIGHT OF WATER			=	51.86	gms
INITIAL WATER CONTENT			=	71.5	%
AT END		S-12			
WEIGHT OF TARE + WET SOIL			=	142.62	gms
WEIGHT OF TARE + DRY SOIL		303.34	=	109.05	gms
WEIGHT OF FINAL WATER			=	33.57	gms
WEIGHT OF TARE#	#254	298.14	=	41.73	gms
WEIGHT OF DRY SOIL		5.2	=	67.32	gms
FINAL WATER CONTENT			=	49.9	%

INITIAL VOLUME OF SOIL, V_{tot} =	4.91	in^3
VOLUME OF SOLIDS, V_s =	1.68	in^3
INITIAL VOLUME OF VOIDS, V_v =	3.23	in^3
INITIAL VOLUME OF WATER, V_{wi} =	3.17	in^3
FINAL VOLUME OF WATER, V_{Wf} =	2.05	in^3



Alexandria Waterfront Implementation Project

Project Number: 14123

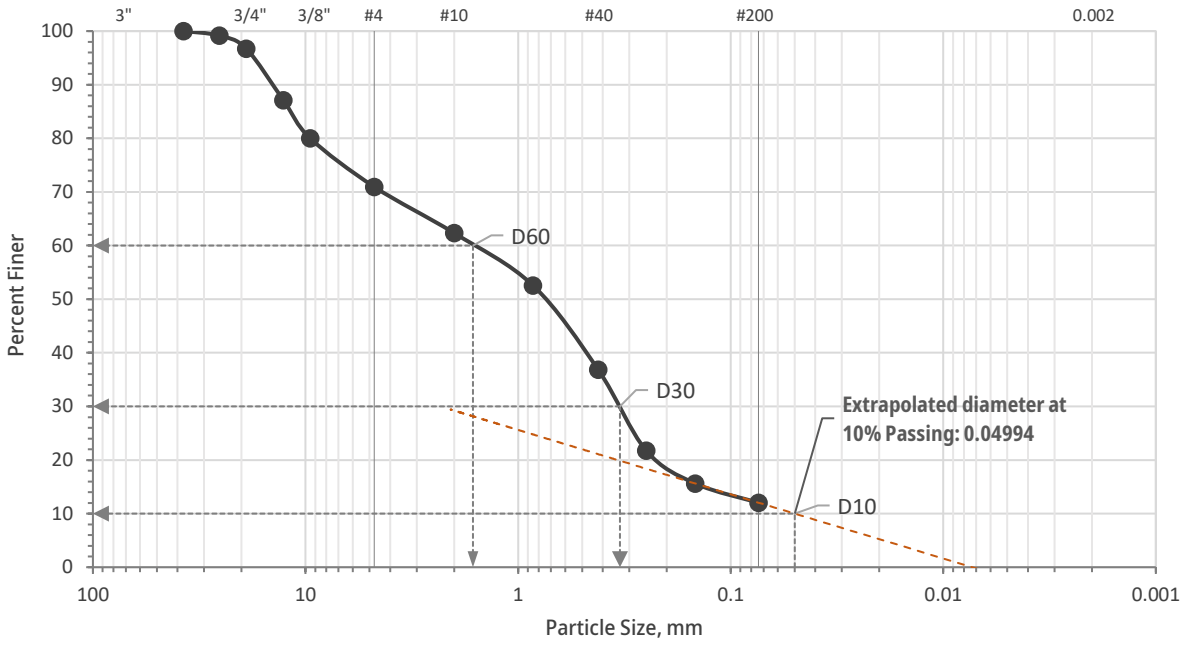
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-04	Bulk Composite	0'	8.5'

Location: -

Sample Date: -

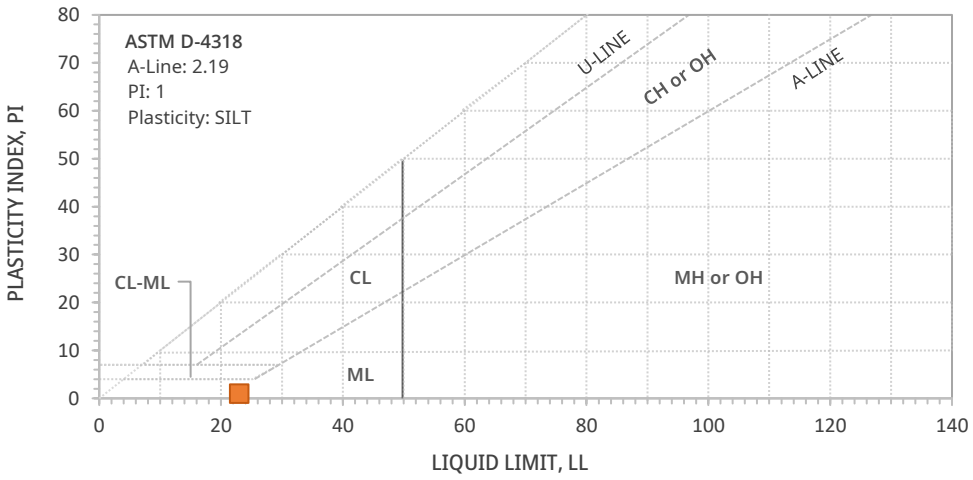


ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	100.0
1"	25.4	99.2
3/4"	19.0	96.7
1/2"	12.7	87.1
3/8"	9.51	80.0
#4	4.75	71.0
#10	2.00	62.3
#20	0.85	52.5
#40	0.42	36.8
#60	0.25	21.8
#100	0.147	15.6
#200	0.074	12.0

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
3.3	25.7	29.0	8.7	25.5	24.8	59.0	

D10	0.0499		
D30	0.3317	CC	1.352
D60	1.6303	CU	32.65



Liquid Limit, %	23
Plastic Limit, %	22
Plasticity Index, %	1

USCS (D-2487)	AASHTO M-145
SW-SM	A-1-b

Soil Description (D-2487)

Brown well-graded SAND with silt and gravel

WC	-	Data 1	-	Data 4	-
OM	-	Data 2	-	Data 5	-
		Data 3	-	Data 6	-
+ 3/8"	20.0%				

Alexandria Waterfront Implementation Project

Project Number: 14123

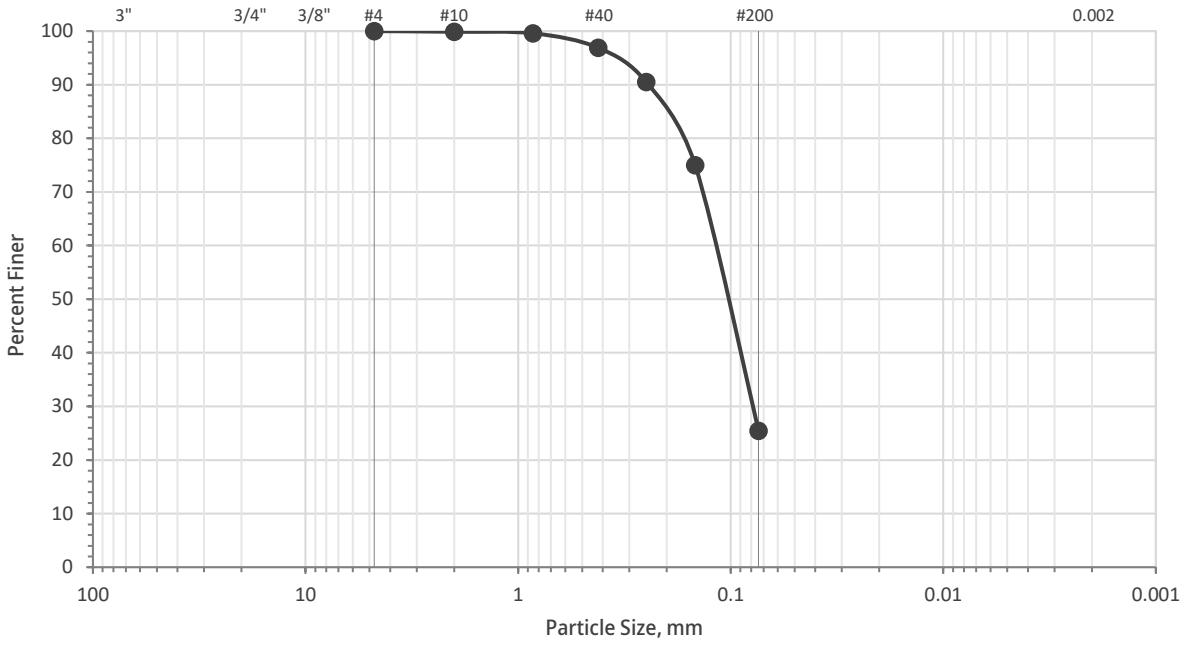
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-04	16D	64'	65.5'

Location: -

Sample Date: -



ASTM D-6913

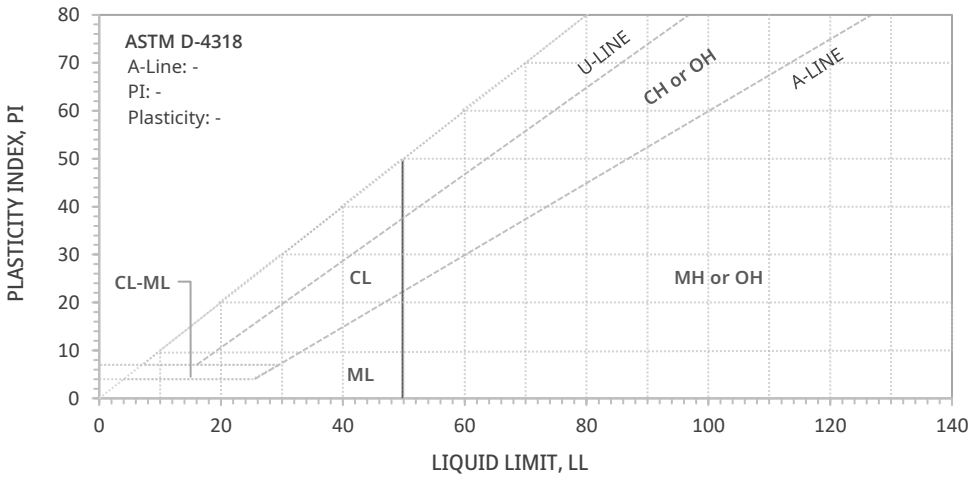
Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	99.9
#20	0.85	99.6
#40	0.42	96.9
#60	0.25	90.5
#100	0.147	75.0
#200	0.074	25.5

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
0.0	0.0	= 0.0	0.1	3.0	71.4	= 74.5	

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Dark gray silty SAND

WC -

OM -

+ 3/8" 0.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

12/27/21 Tested by: ST/JT Reviewed by: FF Jay Kay Testing, Inc.

Alexandria Waterfront Implementation Project

Project Number: 14123

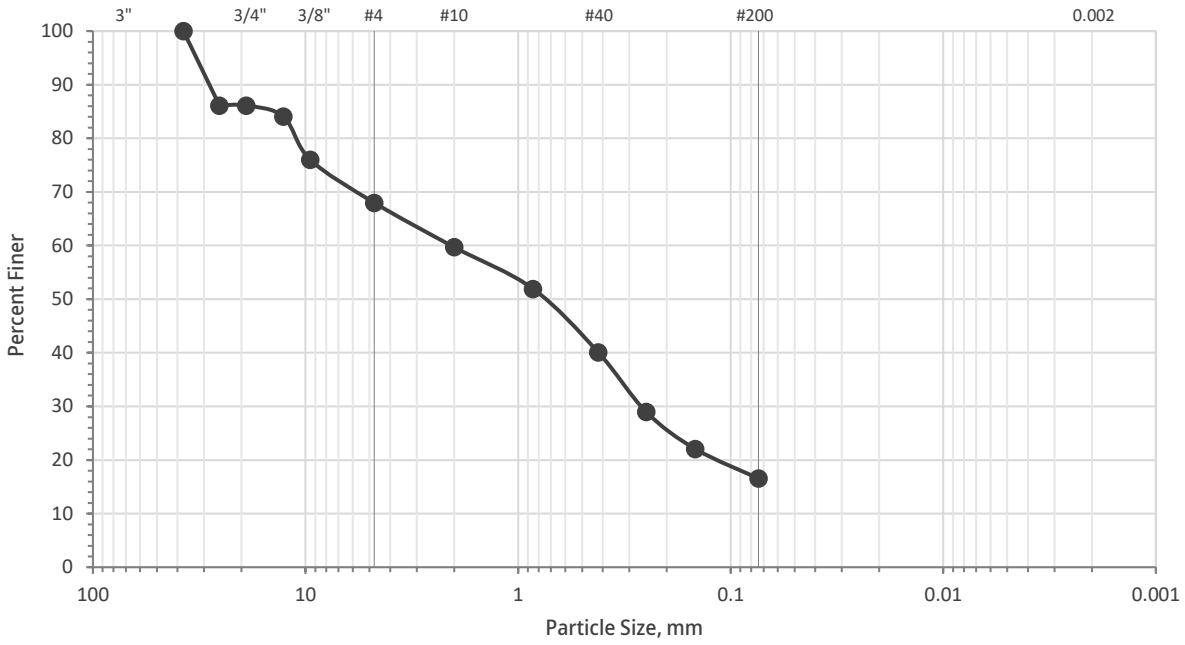
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-15	5D	8'	10'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	100.0
1"	25.4	86.1
3/4"	19.0	86.1
1/2"	12.7	84.1
3/8"	9.51	76.0
#4	4.75	68.0
#10	2.00	59.7
#20	0.85	51.9
#40	0.42	40.1
#60	0.25	29.0
#100	0.147	22.1
#200	0.074	16.6

% Gravel

Coarse	Fine		Total
13.9	18.1	=	32.0

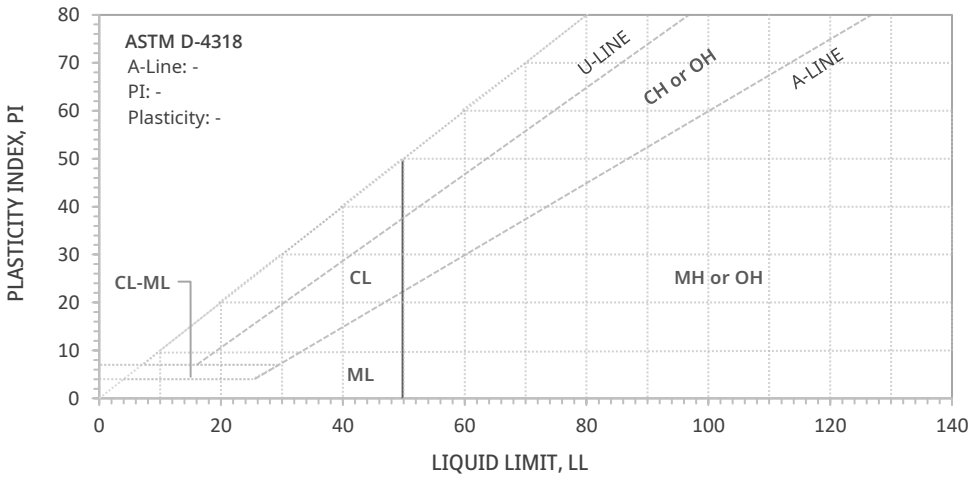
% Sand

Coarse	Medium	Fine		Total
8.3	19.6	23.5	=	51.4

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Dark gray clayey SAND with gravel

WC 15.7%

OM -

+ 3/8" 24.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

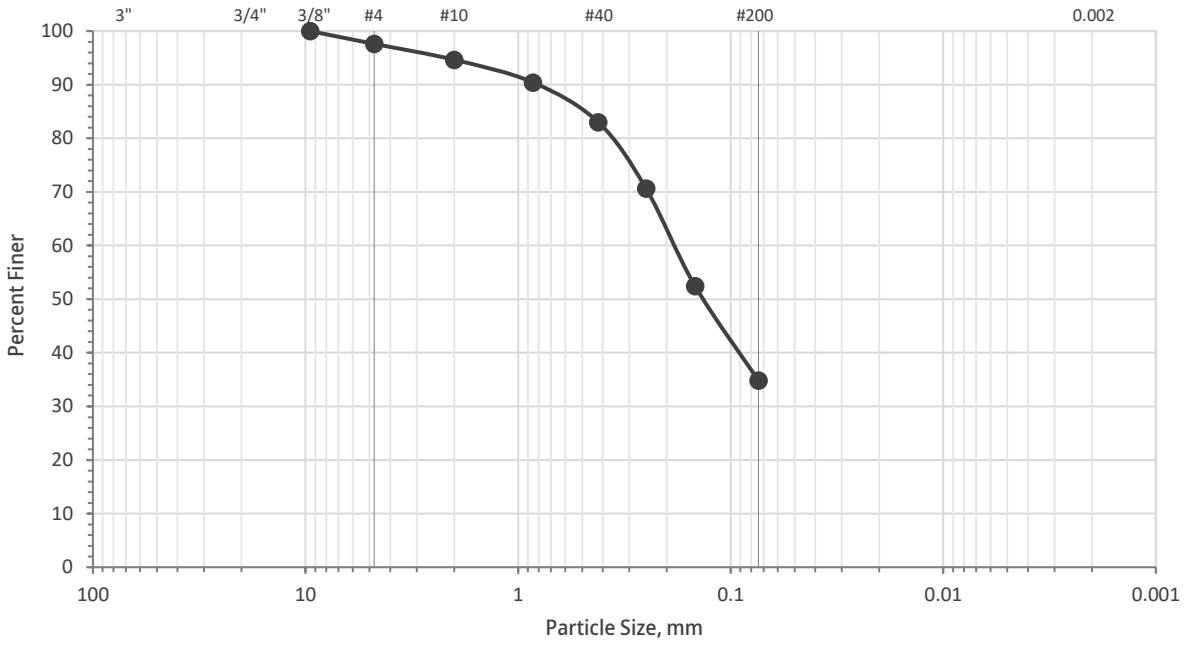
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-15	6D	13.5'	15'

Location: -

Sample Date: -



ASTM D-6913

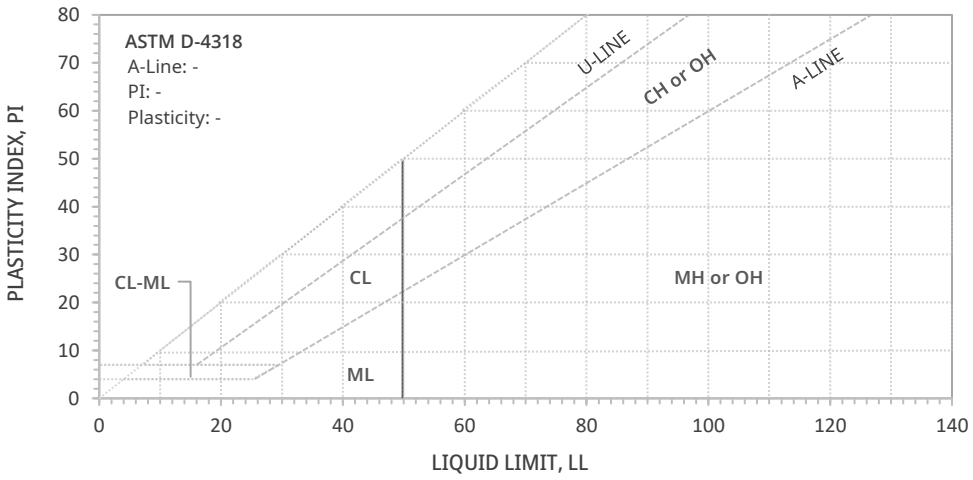
Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	100.0
#4	4.75	97.6
#10	2.00	94.7
#20	0.85	90.4
#40	0.42	83.0
#60	0.25	70.6
#100	0.147	52.4
#200	0.074	34.9

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
0.0	2.4	2.4	2.9	11.7	48.1	62.7	

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Dark gray silty clayey SAND

WC 49.5%

OM -

+ 3/8" 0.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

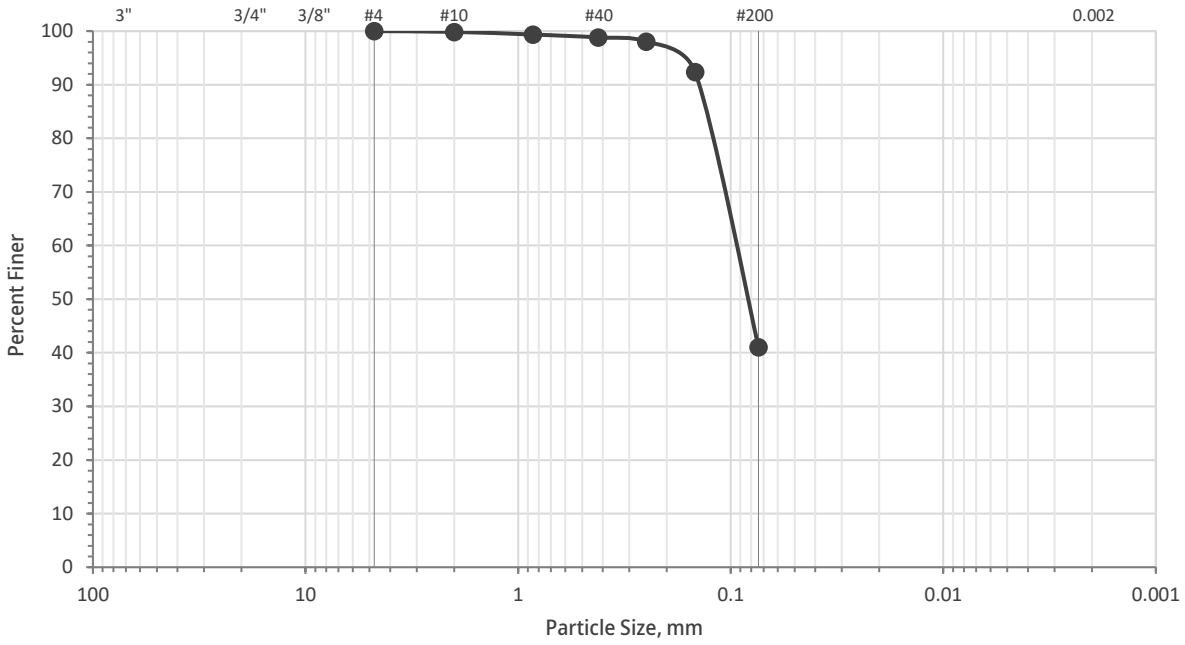
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-15	17D	64'	65.5'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	99.9
#20	0.85	99.4
#40	0.42	98.8
#60	0.25	98.0
#100	0.147	92.4
#200	0.074	41.1

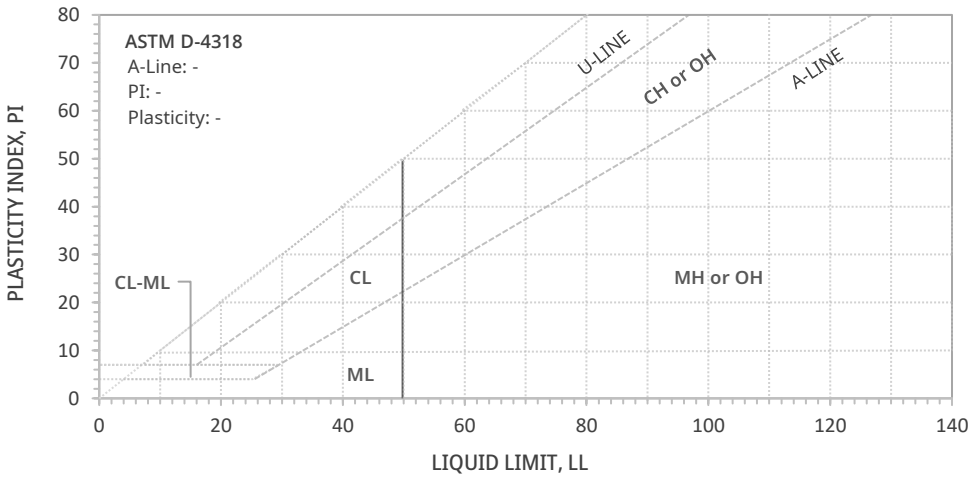
% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

% Sand

Coarse	Medium	Fine		Total
0.1	1.1	57.7	=	58.9

D10	-		
D30	-	CC	-
D60	-	CU	-



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Dark gray silty SAND

WC	-		Data 1	-	Data 4	-
OM	-		Data 2	-	Data 5	-
			Data 3	-	Data 6	-
+ 3/8"	0.0%					

Alexandria Waterfront Implementation Project

Project Number: 14123

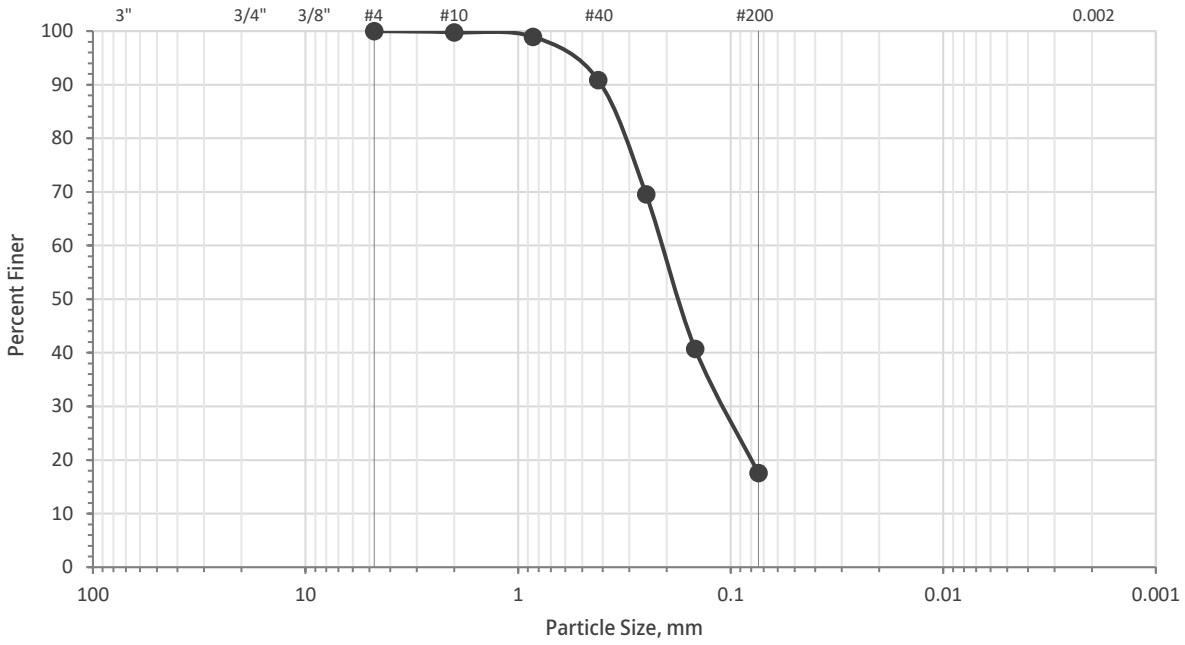
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-15	20D	74'	75.5'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	99.8
#20	0.85	99.0
#40	0.42	90.9
#60	0.25	69.6
#100	0.147	40.7
#200	0.074	17.6

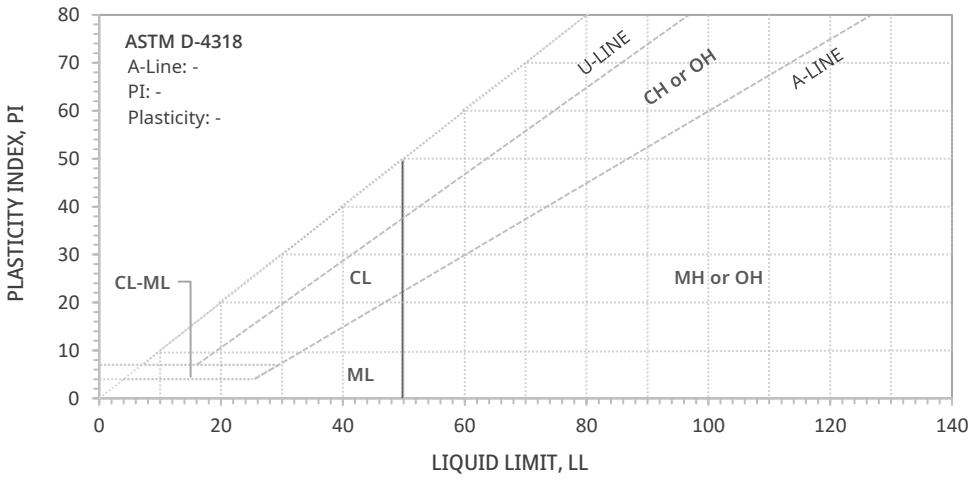
% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

% Sand

Coarse	Medium	Fine		Total
0.2	8.9	73.3	=	82.4

D10	-		
D30	-	CC	-
D60	-	CU	-



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Dark gray silty SAND

WC	-		Data 1	-	Data 4	-
OM	-		Data 2	-	Data 5	-
			Data 3	-	Data 6	-
+ 3/8"	0.0%					

Alexandria Waterfront Implementation Project

Project Number: 14123

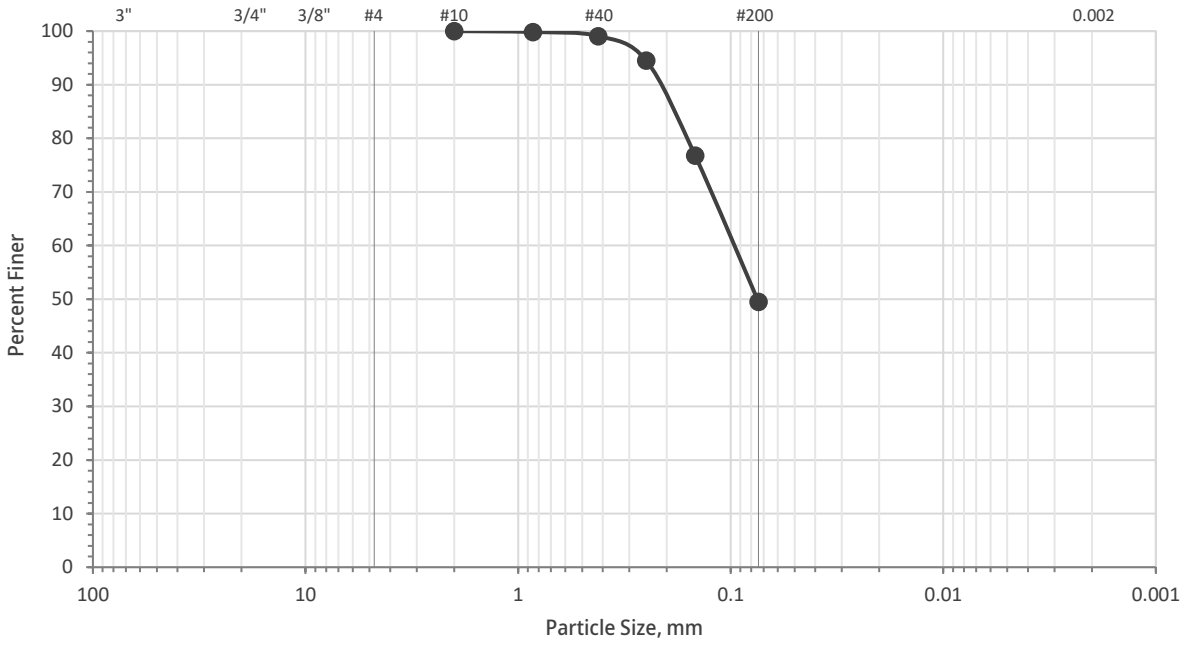
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-6	1D	0.7'	2.7'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	-
#10	2.00	100.0
#20	0.85	99.8
#40	0.42	99.1
#60	0.25	94.5
#100	0.147	76.8
#200	0.074	49.5

% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

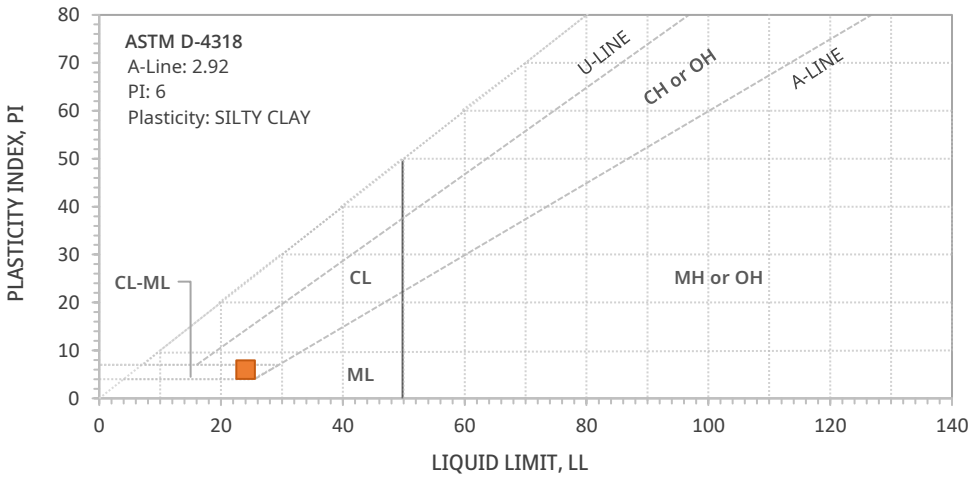
% Sand

Coarse	Medium	Fine		Total
0.0	0.9	49.6	=	50.5

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, %	24
Plastic Limit, %	18
Plasticity Index, %	6

USCS (D-2487)	AASHTO M-145
SC-SM	A-4

Soil Description (D-2487)

Brown silty clayey SAND

WC	16.2%
OM	-
+ 3/8"	0.0%

Data 1	-
Data 2	-
Data 3	-

Data 4	-
Data 5	-
Data 6	-

Alexandria Waterfront Implementation Project

Project Number: 14123

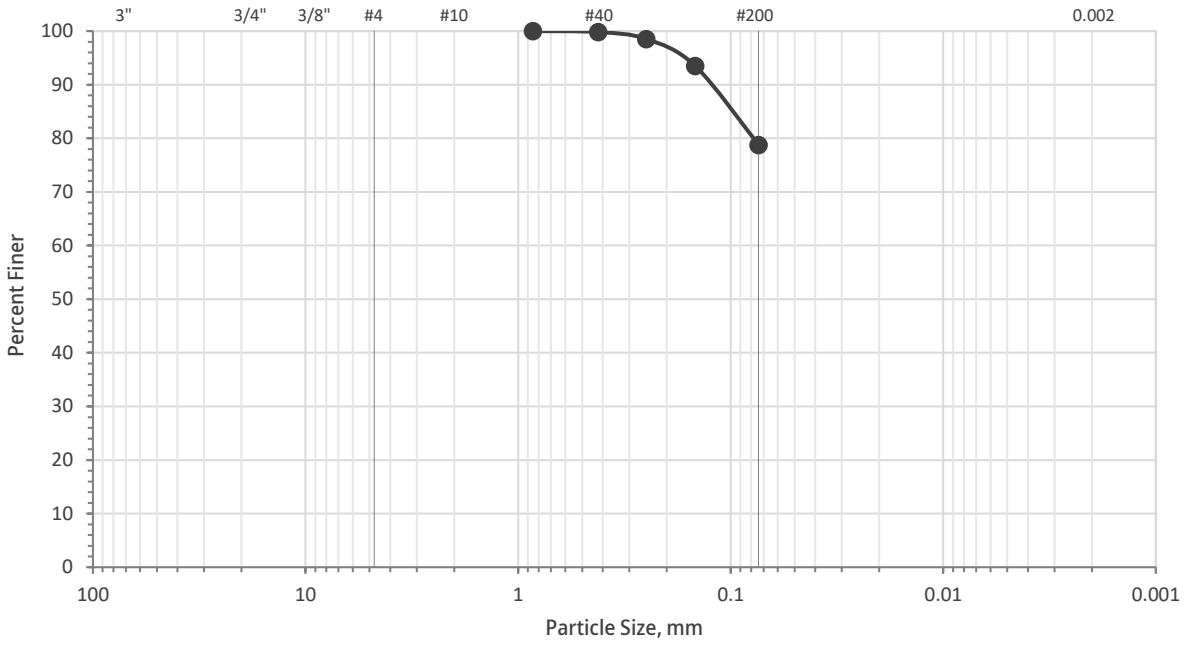
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-6	3D	4.7'	6.7'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	-
#10	2.00	-
#20	0.85	100.0
#40	0.42	99.8
#60	0.25	98.5
#100	0.147	93.5
#200	0.074	78.8

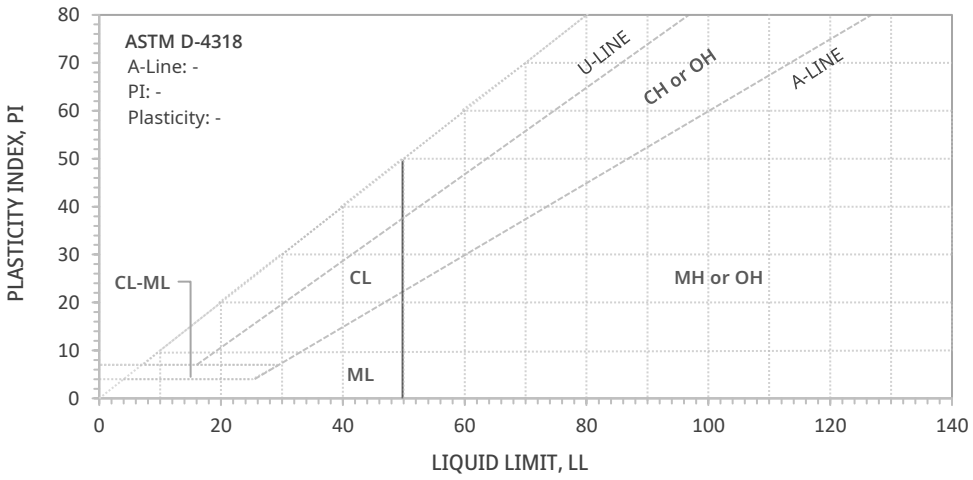
% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

% Sand

Coarse	Medium	Fine		Total
0.0	0.2	21.0	=	21.2

D10	-		
D30	-	CC	-
D60	-	CU	-



Liquid Limit, %	-
Plastic Limit, %	-
Plasticity Index, %	-

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Brown clay with sand

WC	20.5%
OM	-
+ 3/8"	0.0%

Data 1	-
Data 2	-
Data 3	-

Data 4	-
Data 5	-
Data 6	-

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

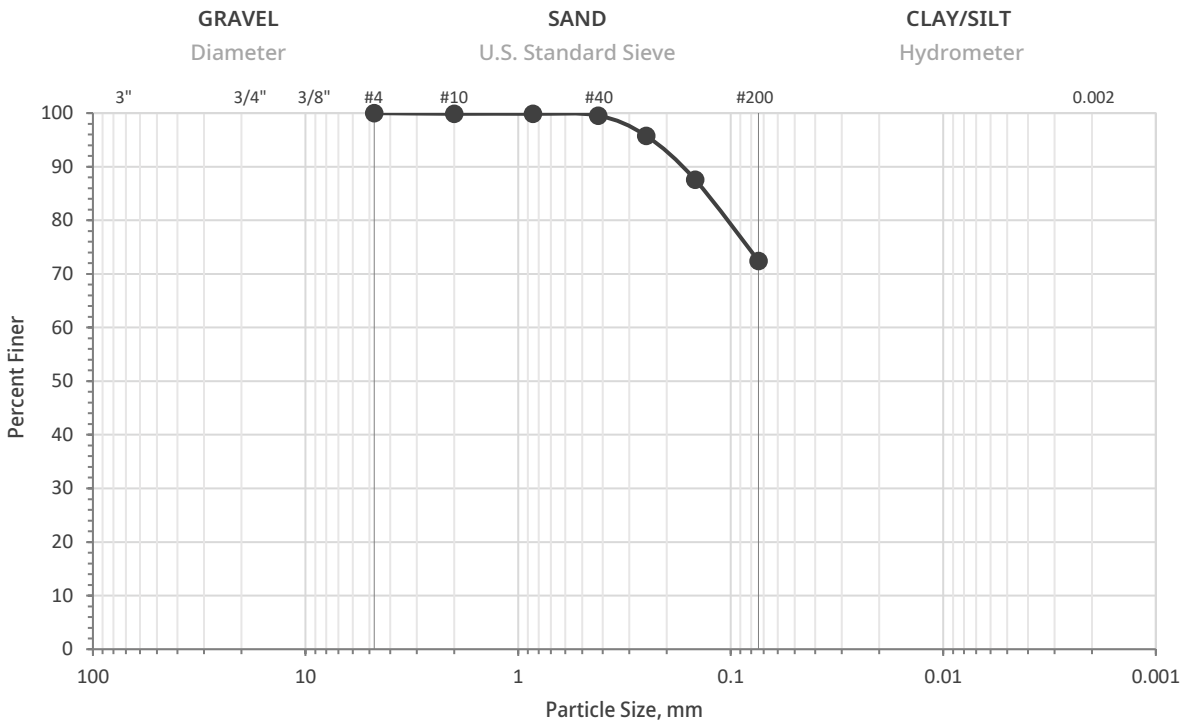
Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-6	4D	6.7'	8.7'

Location: -

Sample Date: -

ASTM D-6913



Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	99.9
#20	0.85	99.9
#40	0.42	99.5
#60	0.25	95.8
#100	0.147	87.6
#200	0.074	72.4

% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

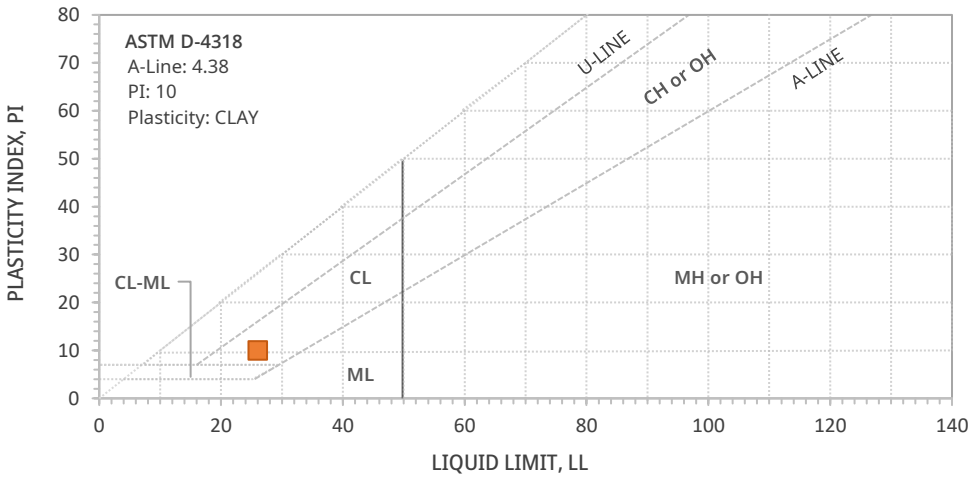
% Sand

Coarse	Medium	Fine		Total
0.1	0.4	27.1	=	27.6

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, %	26
Plastic Limit, %	16
Plasticity Index, %	10

USCS (D-2487)	AASHTO M-145
CL	A-4

Soil Description (D-2487)

Brown lean CLAY with sand

WC	17.8%		Data 1	-	Data 4	-
OM	-		Data 2	-	Data 5	-
			Data 3	-	Data 6	-
+ 3/8"	0.0%					

Alexandria Waterfront Implementation Project

Project Number: 14123

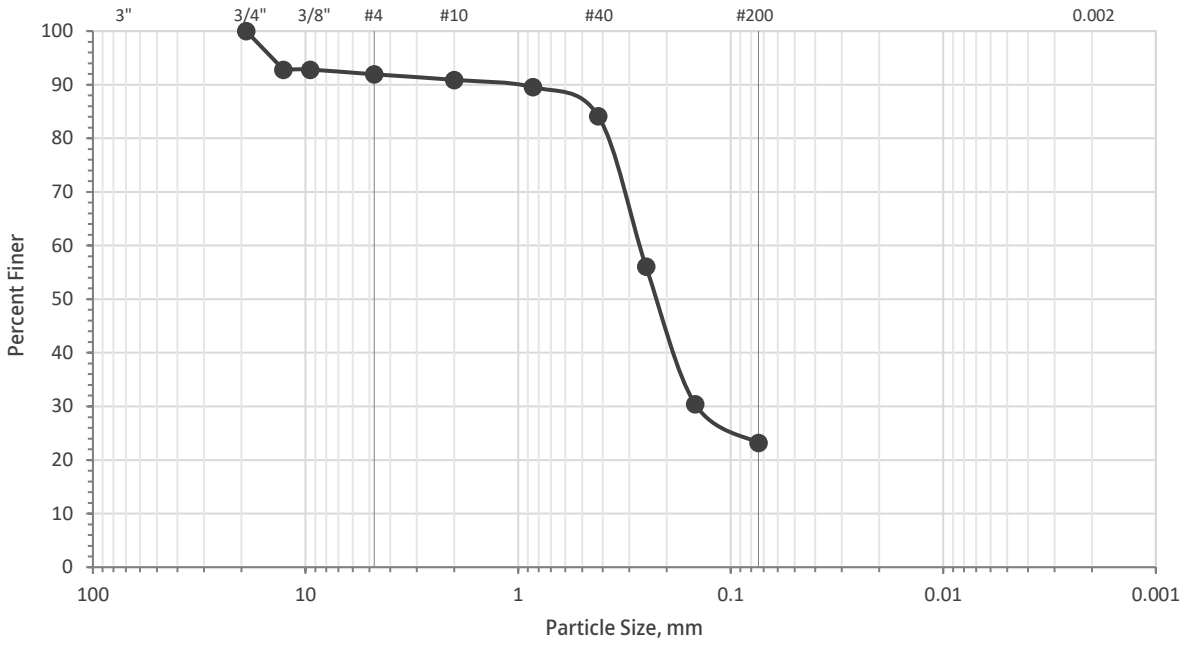
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-6	5D	8.7'	10.7'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	100.0
1/2"	12.7	92.8
3/8"	9.51	92.8
#4	4.75	91.9
#10	2.00	90.9
#20	0.85	89.6
#40	0.42	84.2
#60	0.25	56.1
#100	0.147	30.4
#200	0.074	23.2

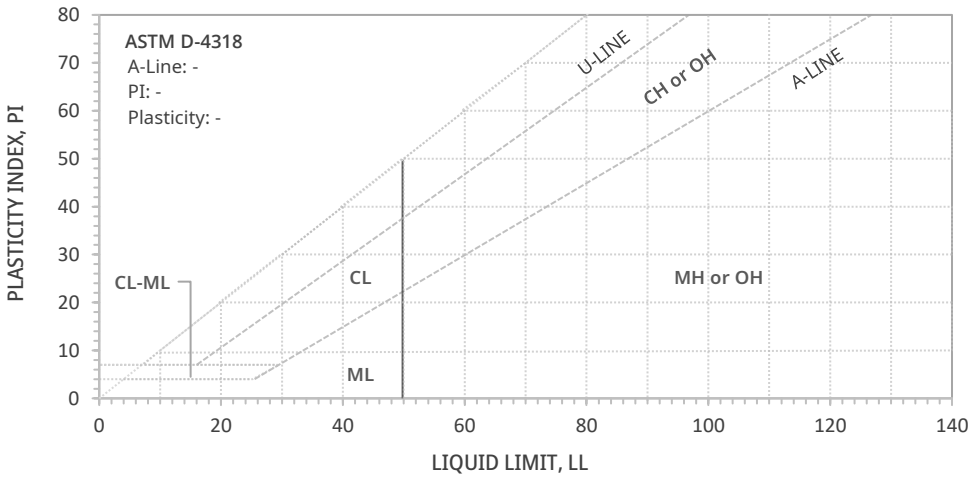
% Gravel

Coarse	Fine		Total
0.0	8.1	=	8.1

% Sand

Coarse	Medium	Fine		Total
1.0	6.7	61.0	=	68.7

D10	-		
D30	-	CC	-
D60	-	CU	-



Liquid Limit, %	-
Plastic Limit, %	-
Plasticity Index, %	-

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Brown silty SAND

WC	23.1%
OM	-
+ 3/8"	7.2%

Data 1	-
Data 2	-
Data 3	-

Data 4	-
Data 5	-
Data 6	-

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

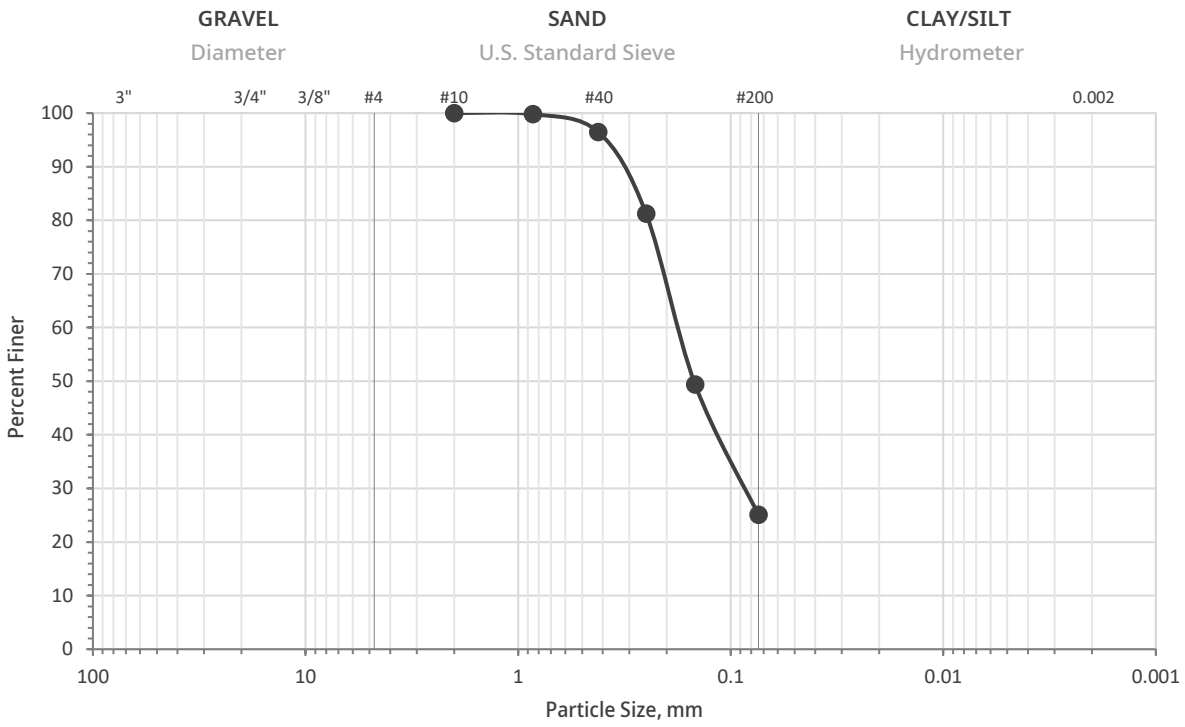
Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-6	6D	13.5'	15'

Location: -

Sample Date: -

ASTM D-6913



Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	-
#10	2.00	100.0
#20	0.85	99.8
#40	0.42	96.5
#60	0.25	81.2
#100	0.147	49.4
#200	0.074	25.1

% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

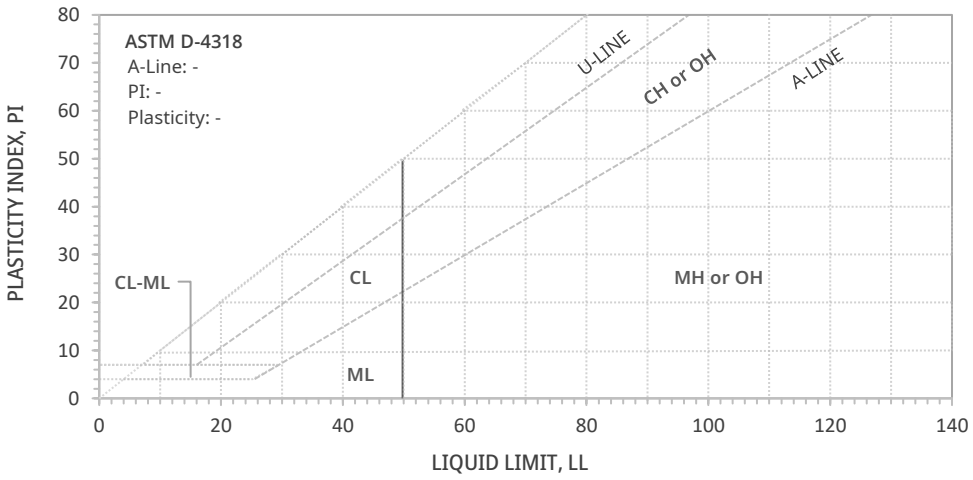
% Sand

Coarse	Medium	Fine		Total
0.0	3.5	71.4	=	74.9

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Brown silty SAND

WC -

OM -

+ 3/8" 0.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

12/27/21 Tested by: ST/JT Reviewed by: FF Jay Kay Testing, Inc.

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

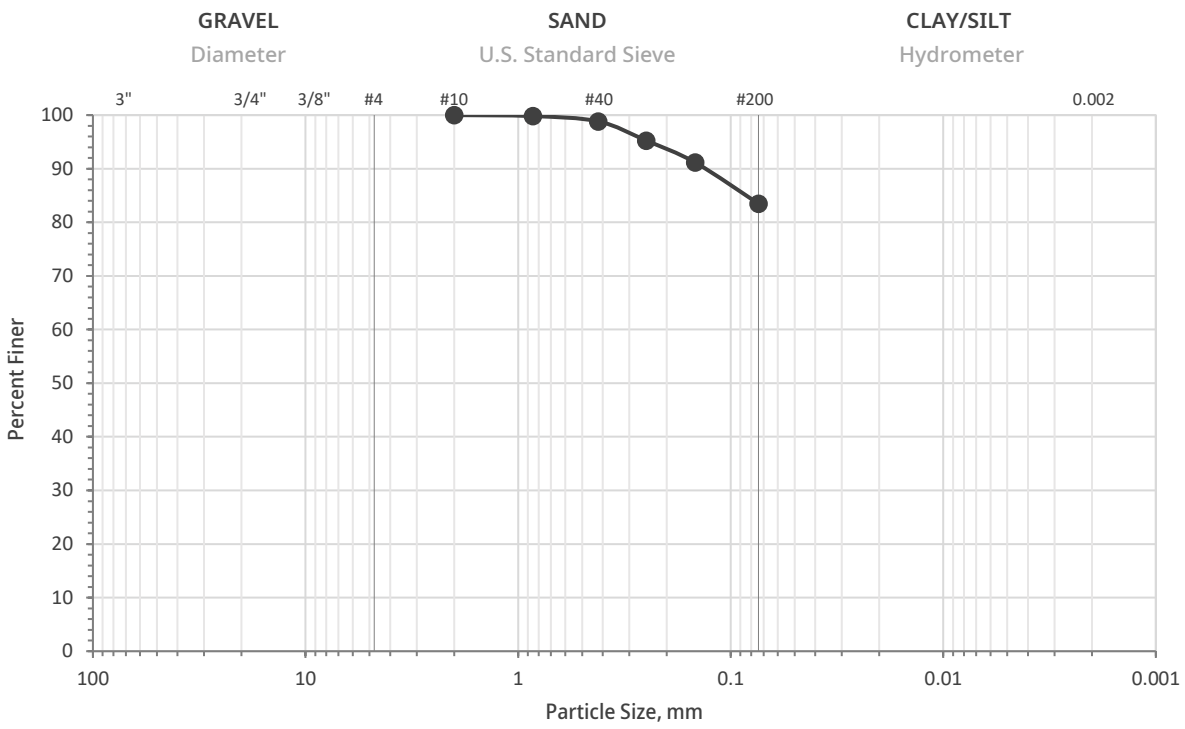
Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-8	2D	2'	4'

Location: -

Sample Date: -

ASTM D-6913



Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	-
#10	2.00	100.0
#20	0.85	99.8
#40	0.42	98.8
#60	0.25	95.3
#100	0.147	91.2
#200	0.074	83.5

% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

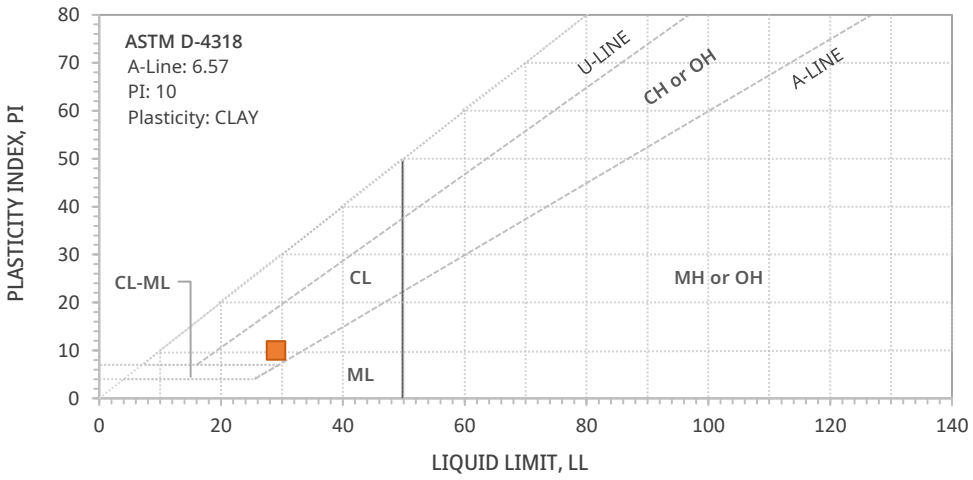
% Sand

Coarse	Medium	Fine		Total
0.0	1.2	15.3	=	16.5

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, %	29
Plastic Limit, %	19
Plasticity Index, %	10

USCS (D-2487)	AASHTO M-145
CL	A-4

Soil Description (D-2487)

Brown lean CLAY with sand

WC	23.3%
OM	-
+ 3/8"	0.0%

Data 1	-
Data 2	-
Data 3	-

Data 4	-
Data 5	-
Data 6	-

Alexandria Waterfront Implementation Project

Project Number: 14123

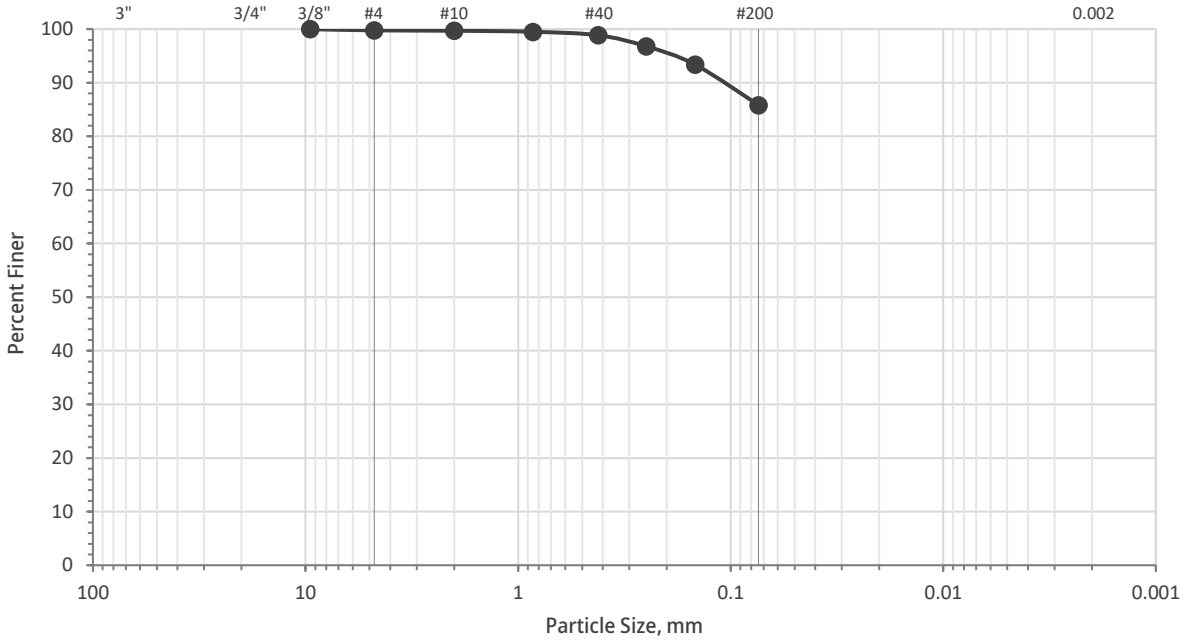
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-8	3D	4'	6'

Location: -

Sample Date: -



ASTM D-6913

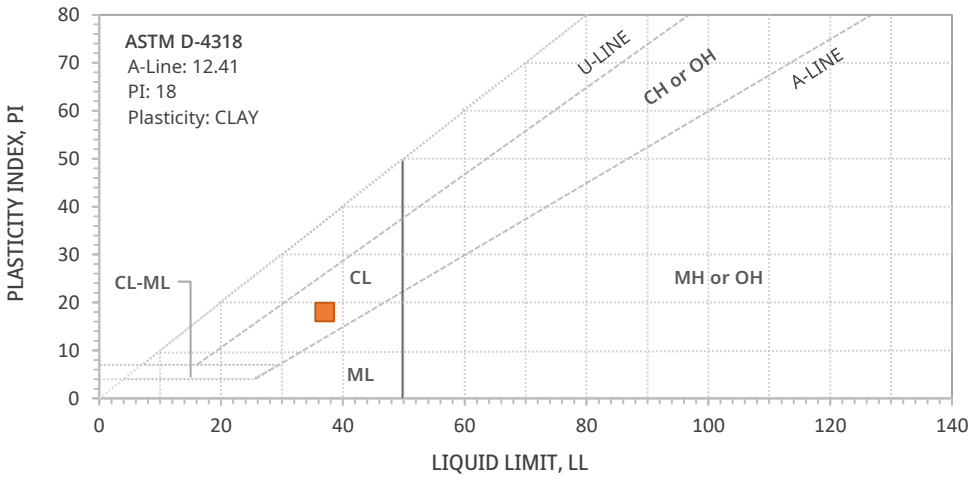
Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	100.0
#4	4.75	99.8
#10	2.00	99.7
#20	0.85	99.5
#40	0.42	98.9
#60	0.25	96.8
#100	0.147	93.4
#200	0.074	85.8

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
0.0	0.2	0.2	0.1	0.8	13.1	14.0	

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, %	37
Plastic Limit, %	19
Plasticity Index, %	18

USCS (D-2487)	AASHTO M-145
CL	A-6

Soil Description (D-2487)

Brown lean CLAY

WC	18.6%
OM	-
+ 3/8"	0.0%

Data 1	-
Data 2	-
Data 3	-

Data 4	-
Data 5	-
Data 6	-

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

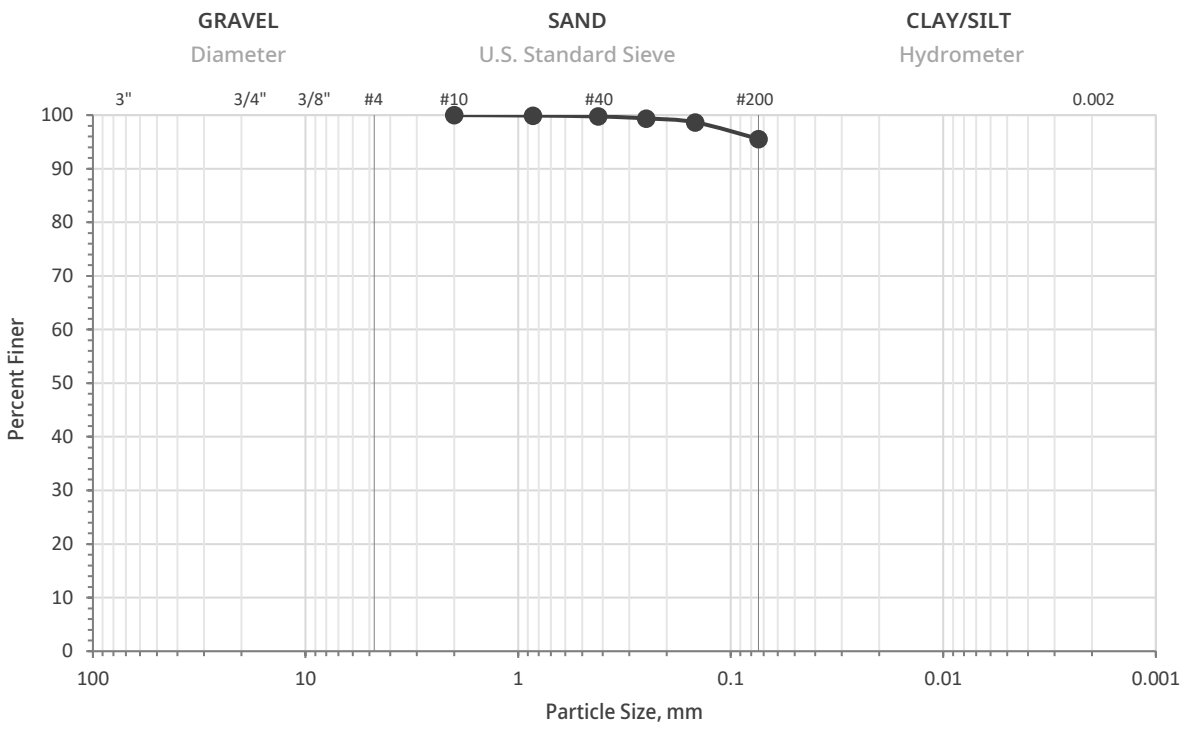
Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-8	5D	8'	10'

Location: -

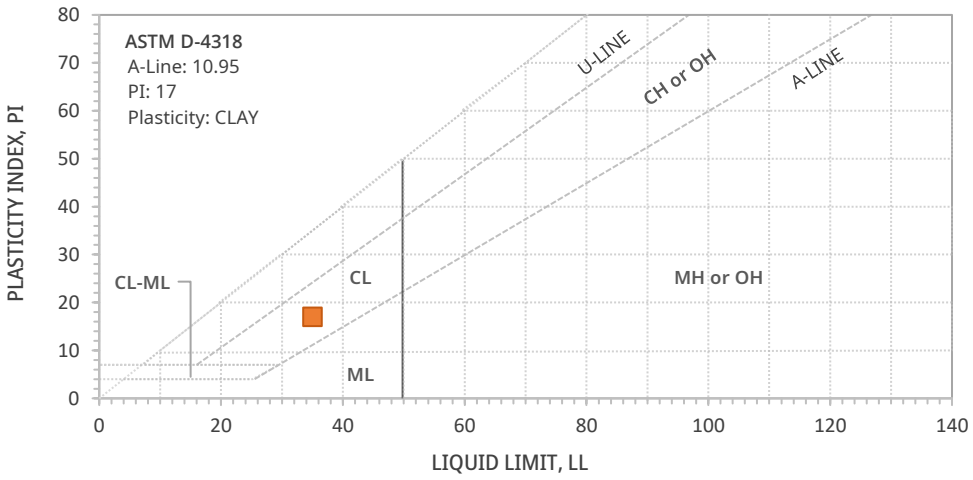
Sample Date: -

ASTM D-6913



Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	-
#10	2.00	100.0
#20	0.85	99.9
#40	0.42	99.8
#60	0.25	99.4
#100	0.147	98.7
#200	0.074	95.6

% Gravel			% Sand				D10	-		
Coarse	Fine	Total	Coarse	Medium	Fine	Total	D30	-	CC	-
0.0	0.0 =	0.0	0.0	0.2	4.2 =	4.4	D60	-	CU	-



Liquid Limit, %	35
Plastic Limit, %	18
Plasticity Index, %	17

USCS (D-2487)	AASHTO M-145
CL	A-6

Soil Description (D-2487)

Light brown lean CLAY

WC	21.5%		Data 1	-		Data 4	-
OM	-		Data 2	-		Data 5	-
			Data 3	-		Data 6	-
+ 3/8"	0.0%						

Alexandria Waterfront Implementation Project

Project Number: 14123

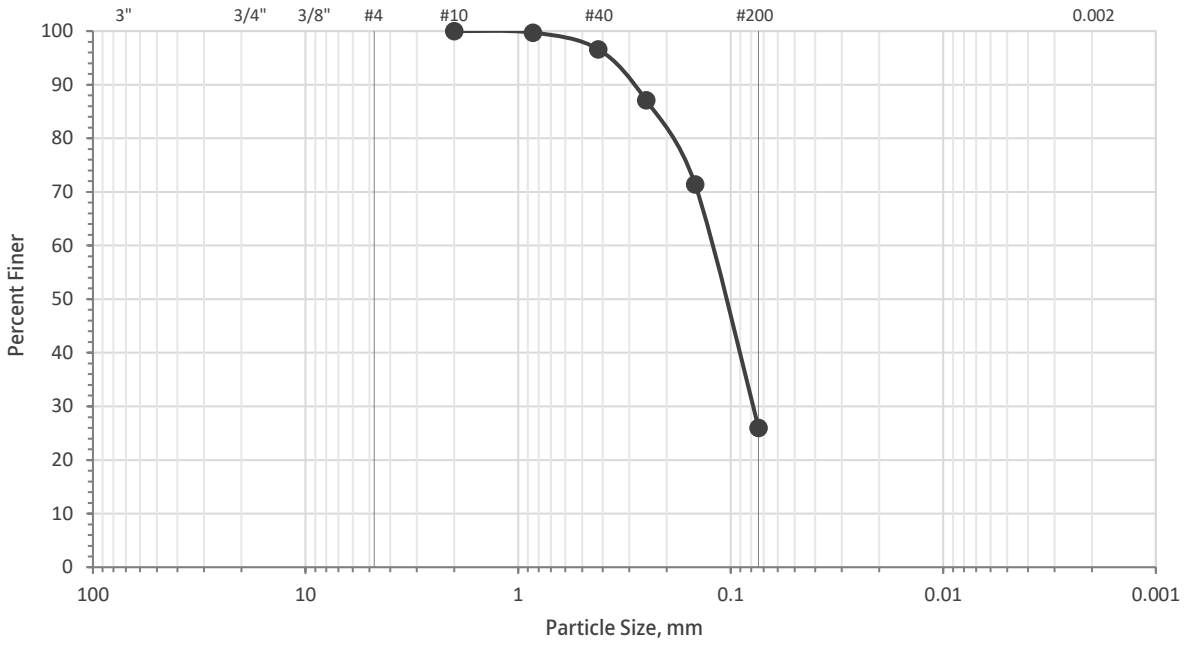
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-8	6D	13.5'	15'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	-
#10	2.00	100.0
#20	0.85	99.7
#40	0.42	96.6
#60	0.25	87.1
#100	0.147	71.4
#200	0.074	26.0

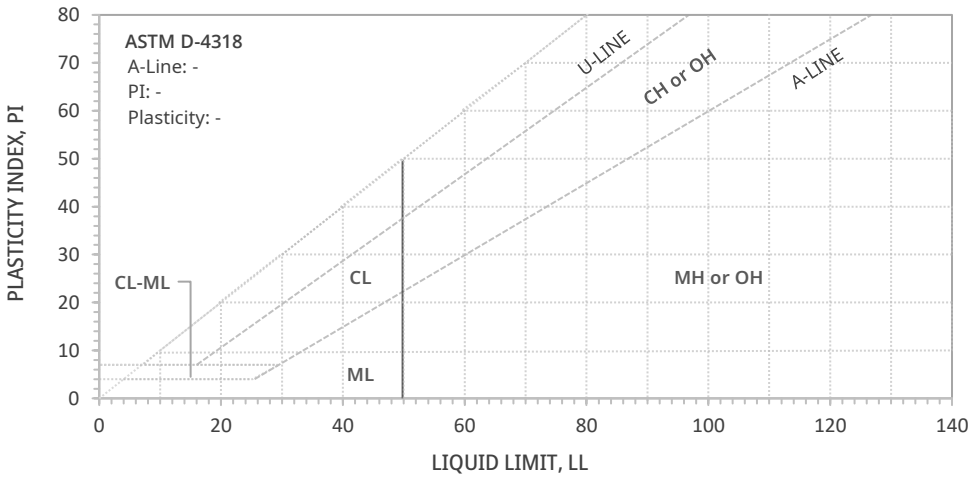
% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

% Sand

Coarse	Medium	Fine		Total
0.0	3.4	70.6	=	74.0

D10	-		
D30	-	CC	-
D60	-	CU	-



Liquid Limit, %	-
Plastic Limit, %	-
Plasticity Index, %	-

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Brown silty SAND

WC	23.2%
OM	-
+ 3/8"	0.0%

Data 1	-
Data 2	-
Data 3	-

Data 4	-
Data 5	-
Data 6	-

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

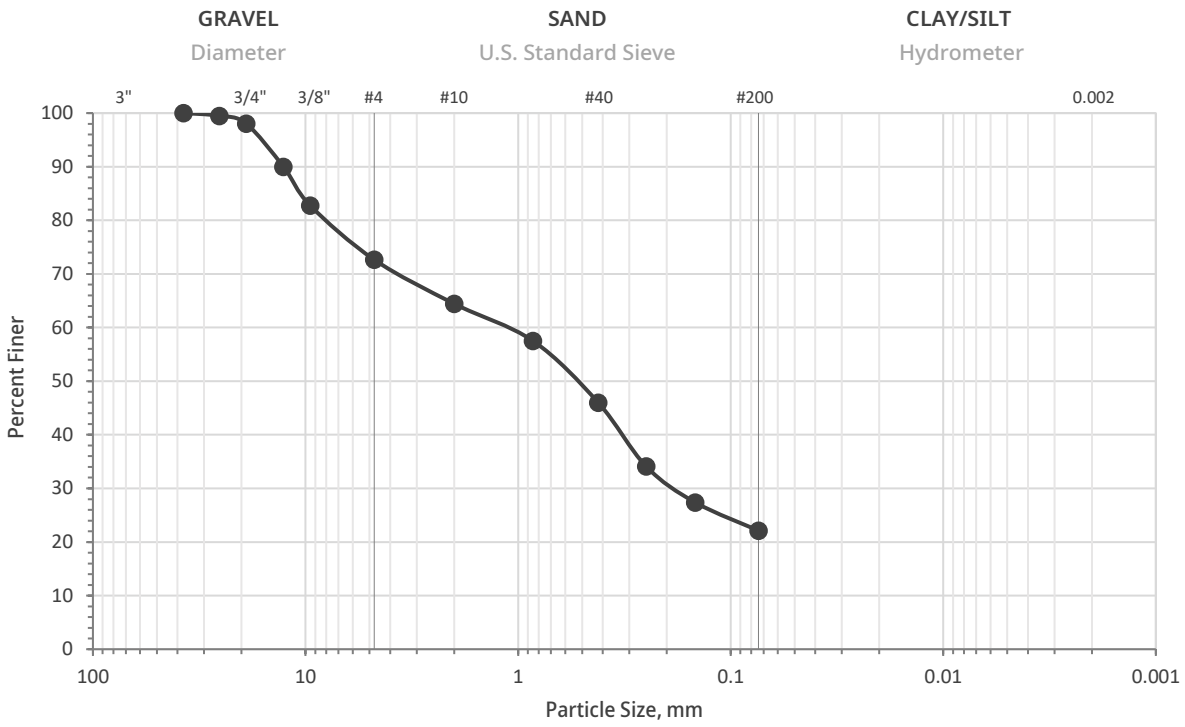
Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-10	Bulk	0'	6'

Location: -

Sample Date: -

ASTM D-6913



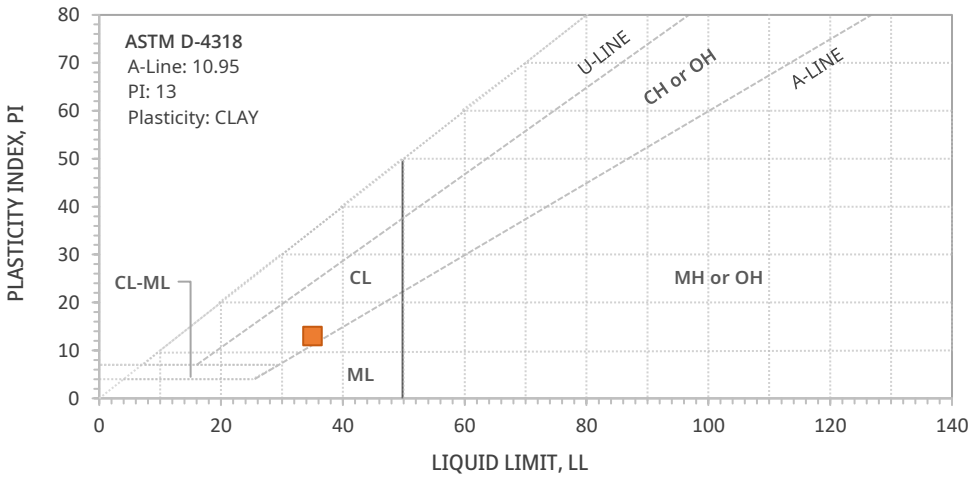
Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	100.0
1"	25.4	99.5
3/4"	19.0	98.0
1/2"	12.7	90.0
3/8"	9.51	82.8
#4	4.75	72.7
#10	2.00	64.4
#20	0.85	57.5
#40	0.42	46.0
#60	0.25	34.1
#100	0.147	27.4
#200	0.074	22.1

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
2.0	25.3	= 27.3	8.3	18.4	23.9	= 50.6	

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, %	35
Plastic Limit, %	22
Plasticity Index, %	13

USCS (D-2487)	AASHTO M-145
SC	A-2-6

Soil Description (D-2487)

Dark brown clayey SAND with gravel

WC	6.1%	Data 1	-	Data 4	-
OM	-	Data 2	-	Data 5	-
		Data 3	-	Data 6	-
+ 3/8"	17.2%				

Alexandria Waterfront Implementation Project

Project Number: 14123

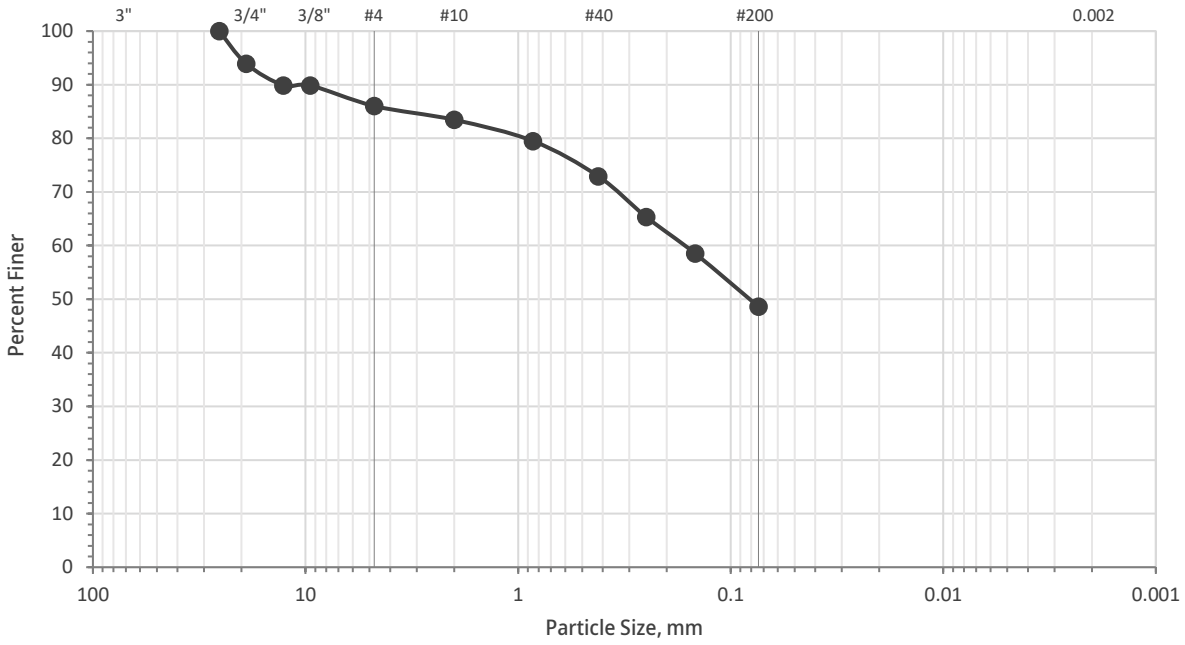
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-10	6D	13.5'	15'

Location: -

Sample Date: -



ASTM D-6913

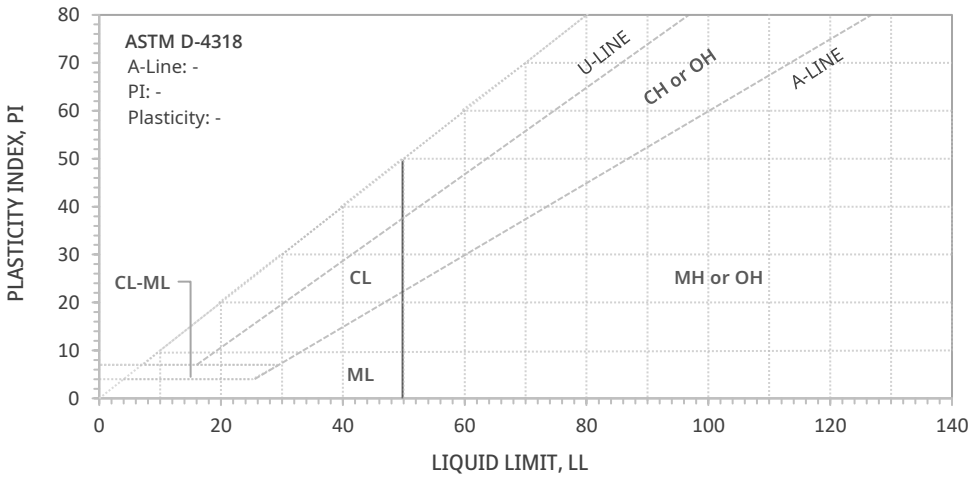
Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	100.0
3/4"	19.0	93.9
1/2"	12.7	89.9
3/8"	9.51	89.9
#4	4.75	86.0
#10	2.00	83.5
#20	0.85	79.5
#40	0.42	72.9
#60	0.25	65.4
#100	0.147	58.5
#200	0.074	48.6

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
6.1	7.9	= 14.0	2.5	10.6	24.3	= 37.4	

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Grayish-brown clayey SAND

WC -

OM -

+ 3/8" 10.1%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

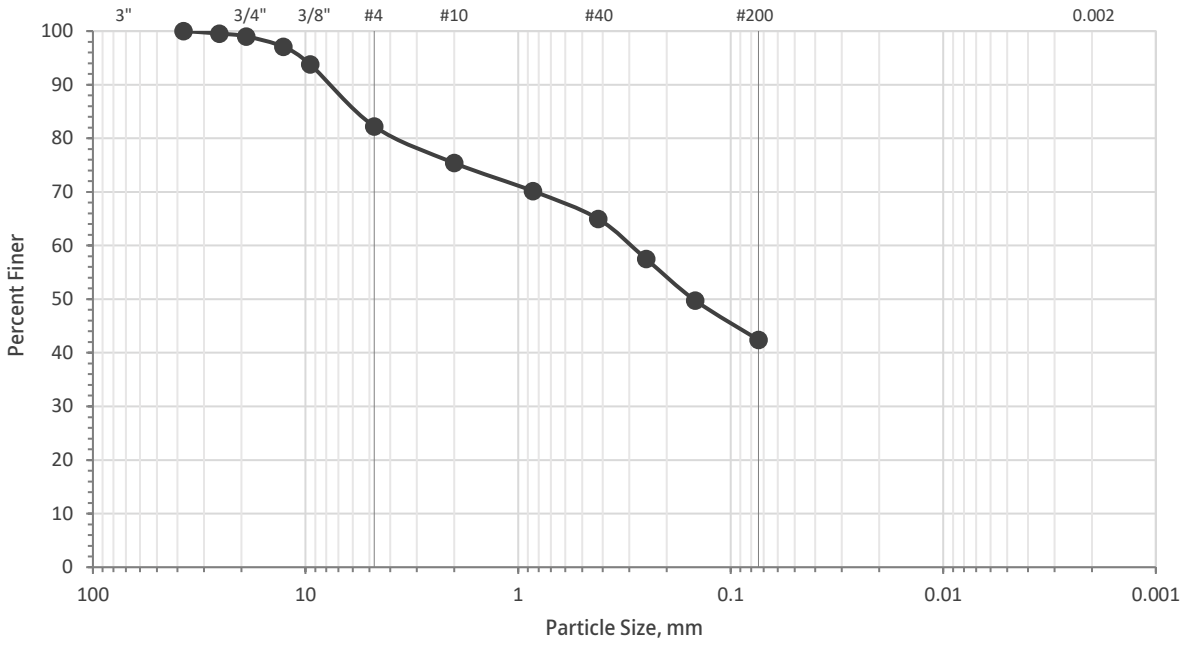
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-11	Bulk Composite	0'	8'

Location: -

Sample Date: -



ASTM D-6913

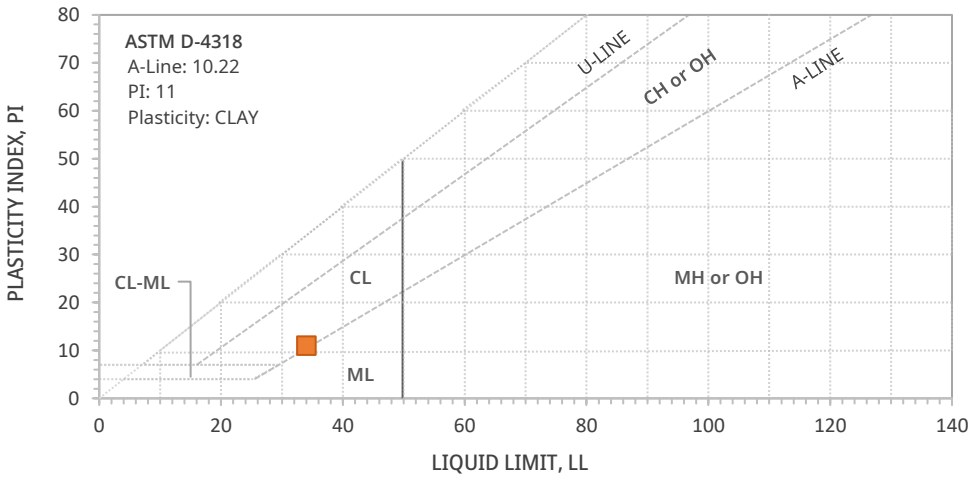
Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	100.0
1"	25.4	99.5
3/4"	19.0	99.0
1/2"	12.7	97.1
3/8"	9.51	93.8
#4	4.75	82.2
#10	2.00	75.4
#20	0.85	70.2
#40	0.42	65.0
#60	0.25	57.5
#100	0.147	49.8
#200	0.074	42.4

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
1.0	16.8	= 17.8	6.8	10.4	22.6	= 39.8	

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, %	34
Plastic Limit, %	23
Plasticity Index, %	11

USCS (D-2487)	AASHTO M-145
SC	A-6

Soil Description (D-2487)

Dark gray clayey SAND with gravel

WC	-		Data 1	-		Data 4	-
OM	-		Data 2	-		Data 5	-
			Data 3	-		Data 6	-
+ 3/8"	6.2%						

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

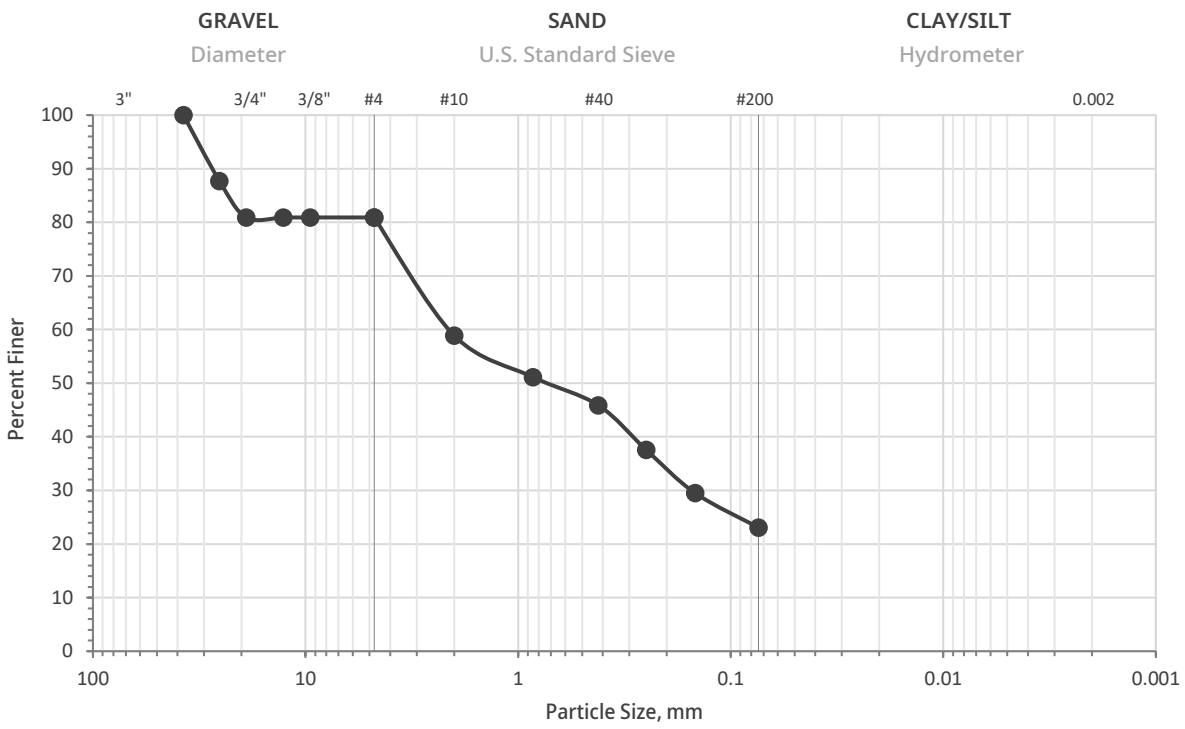
Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-12	3D	4'	6'

Location: -

Sample Date: -

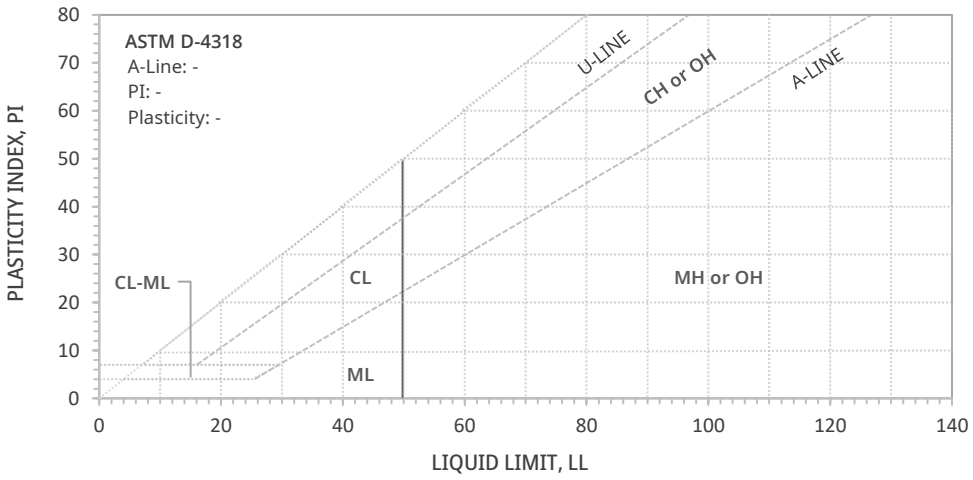
ASTM D-6913



Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	100.0
1"	25.4	87.7
3/4"	19.0	80.9
1/2"	12.7	80.9
3/8"	9.51	80.9
#4	4.75	80.9
#10	2.00	58.9
#20	0.85	51.1
#40	0.42	45.9
#60	0.25	37.6
#100	0.147	29.5
#200	0.074	23.1

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
19.1	0.0	= 19.1	22.0	13.0	22.8	= 57.8	

D10	-		
D30	-	CC	-
D60	-	CU	-



Liquid Limit, %	-
Plastic Limit, %	-
Plasticity Index, %	-

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Black/brown silty SAND with gravel

WC	-		Data 1	-		Data 4	-
OM	-		Data 2	-		Data 5	-
			Data 3	-		Data 6	-
+ 3/8"	19.1%						

Alexandria Waterfront Implementation Project

Project Number: 14123

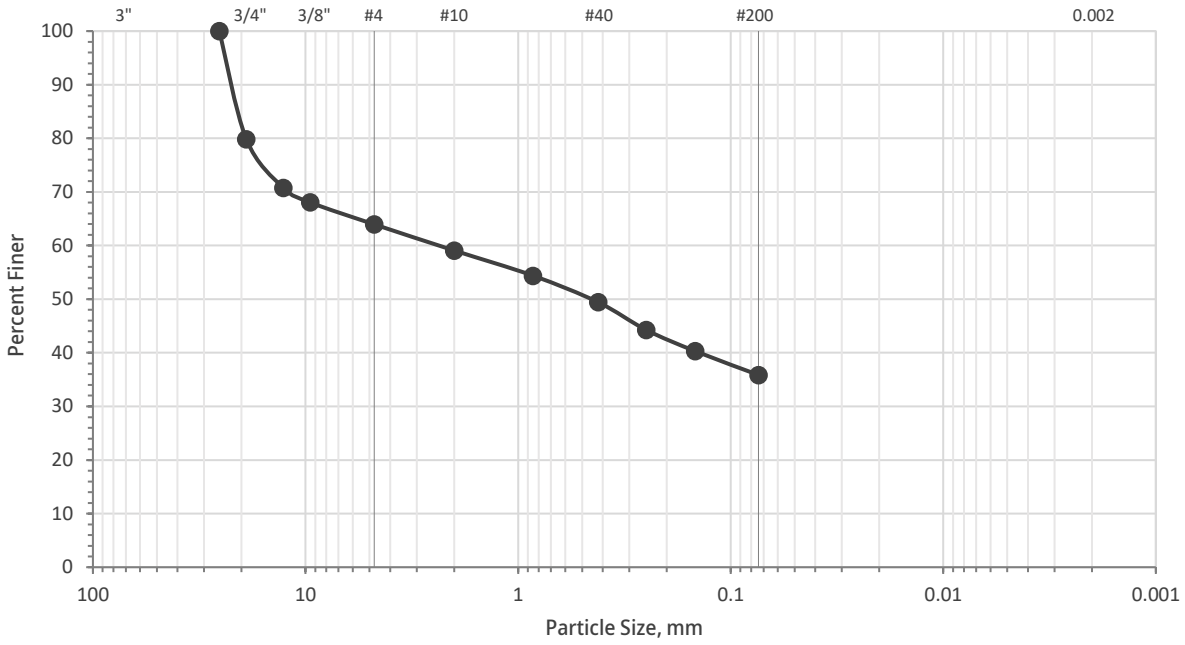
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-13P	6D	13.5'	15'

Location: -

Sample Date: -



ASTM D-6913

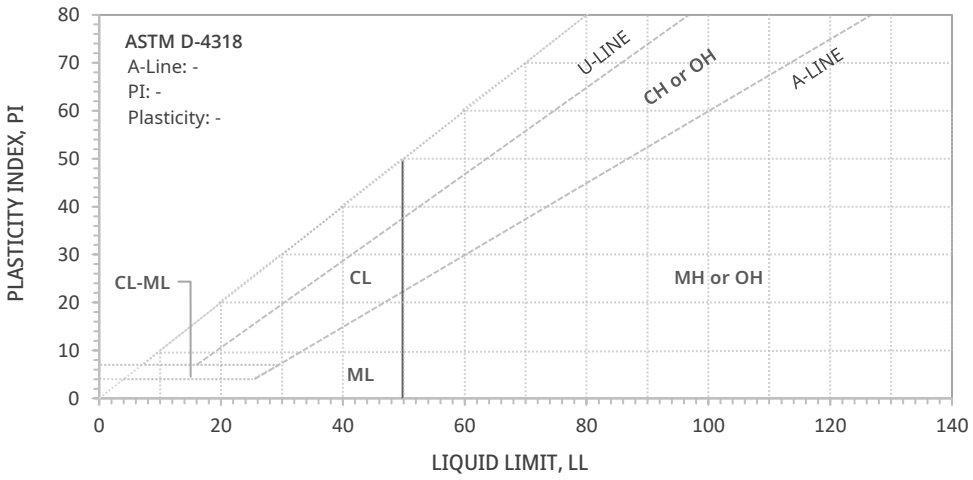
Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	100.0
3/4"	19.0	79.9
1/2"	12.7	70.7
3/8"	9.51	68.1
#4	4.75	64.0
#10	2.00	59.1
#20	0.85	54.4
#40	0.42	49.4
#60	0.25	44.3
#100	0.147	40.3
#200	0.074	35.9

% Gravel				% Sand					
Coarse	Fine		Total	Coarse	Medium	Fine		Total	
20.1	15.9	=	36.0	4.9	9.7	13.5	=	28.1	

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Dark gray clayey GRAVEL with sand

WC -

OM -

+ 3/8" 31.9%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

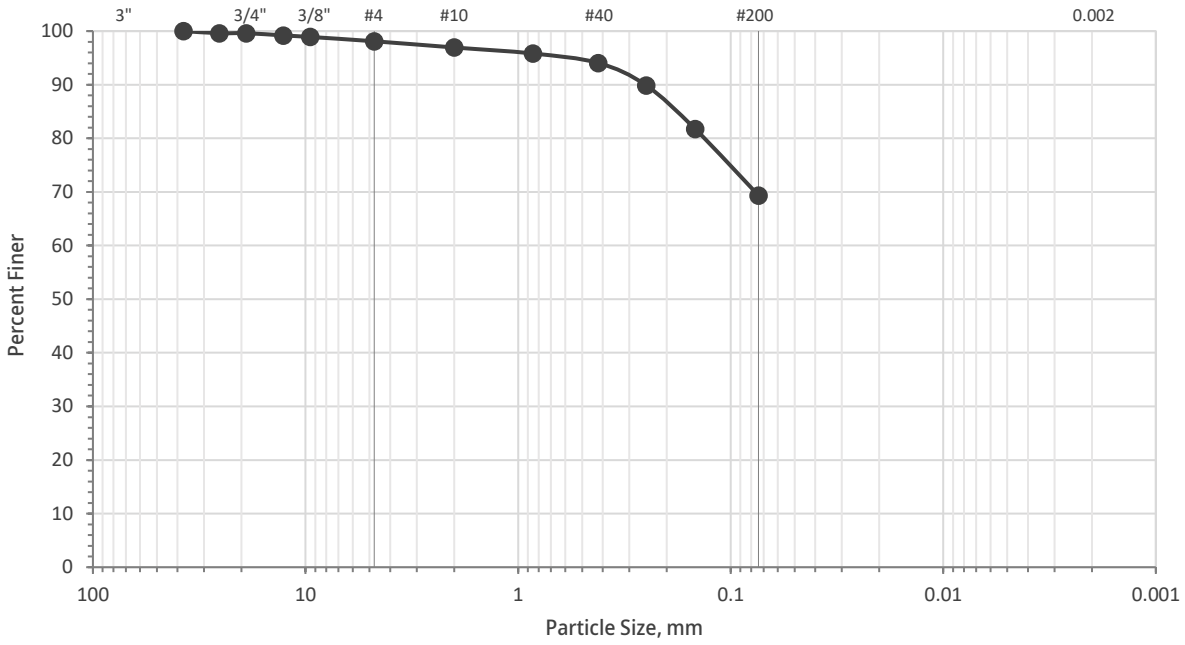
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-14A-B	Bulk-1	0'	4'

Location: -

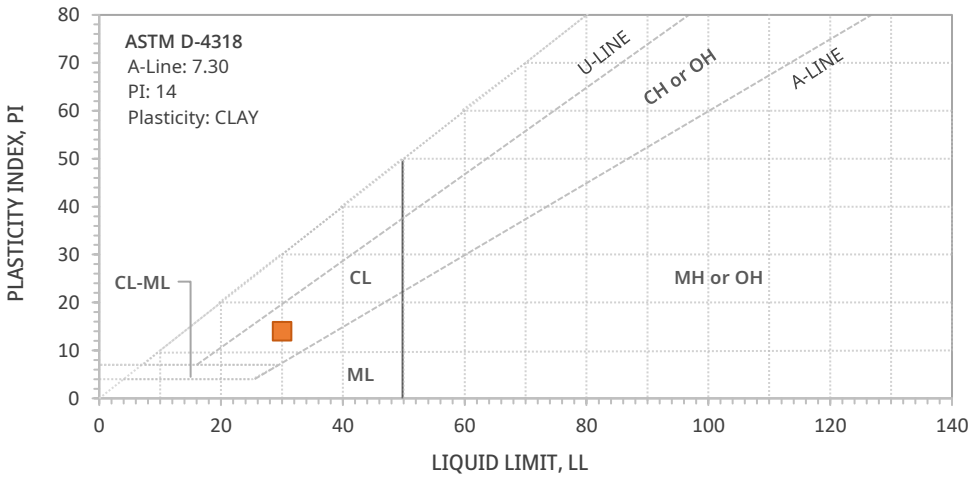
Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	100.0
1"	25.4	99.6
3/4"	19.0	99.6
1/2"	12.7	99.2
3/8"	9.51	98.9
#4	4.75	98.1
#10	2.00	96.9
#20	0.85	95.8
#40	0.42	94.1
#60	0.25	89.9
#100	0.147	81.8
#200	0.074	69.4

% Gravel			% Sand				D10	-		
Coarse	Fine	Total	Coarse	Medium	Fine	Total	D30	-	CC	-
0.4	1.5 =	1.9	1.2	2.8	24.7 =	28.7	D60	-	CU	-



Liquid Limit, %	30
Plastic Limit, %	16
Plasticity Index, %	14

USCS (D-2487)	AASHTO M-145
CL	A-6

Soil Description (D-2487)

Brown sandy lean CLAY

WC	17.0%		Data 1	-	Data 4	-
OM	-		Data 2	-	Data 5	-
			Data 3	-	Data 6	-
+ 3/8"	1.1%					

Alexandria Waterfront Implementation Project

Project Number: 14123

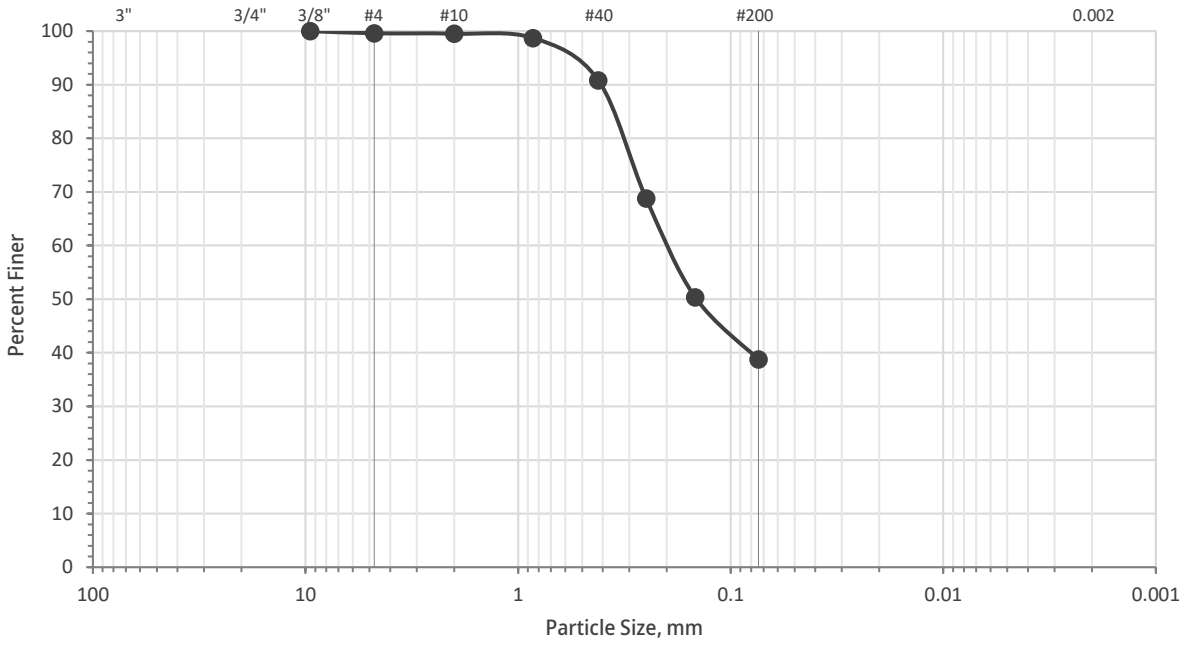
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-15P	5D	8'	10'

Location: -

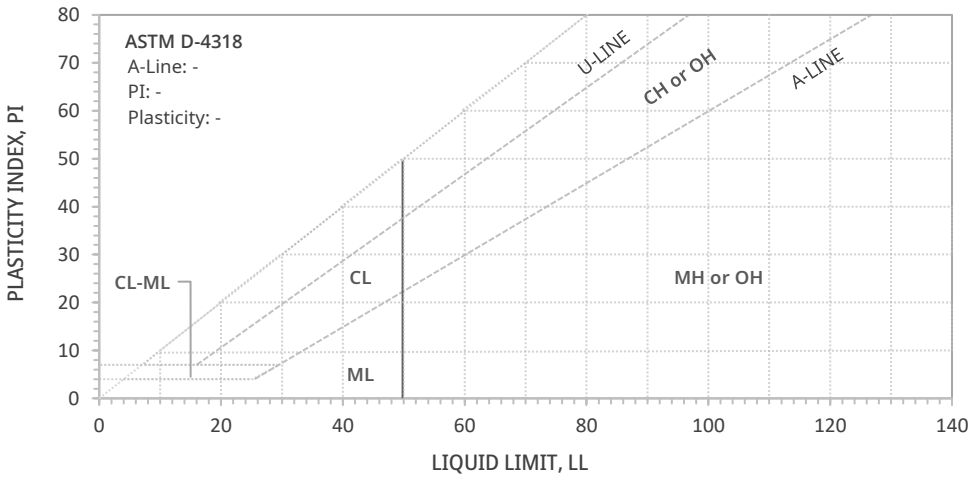
Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	100.0
#4	4.75	99.6
#10	2.00	99.5
#20	0.85	98.7
#40	0.42	90.9
#60	0.25	68.8
#100	0.147	50.4
#200	0.074	38.8

% Gravel			% Sand				D10	-		
Coarse	Fine	Total	Coarse	Medium	Fine	Total	D30	-	CC	-
0.0	0.4	0.4	0.1	8.6	52.1	60.8	D60	-	CU	-



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Grayish-brown clayey SAND

WC -

OM -

+ 3/8" 0.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

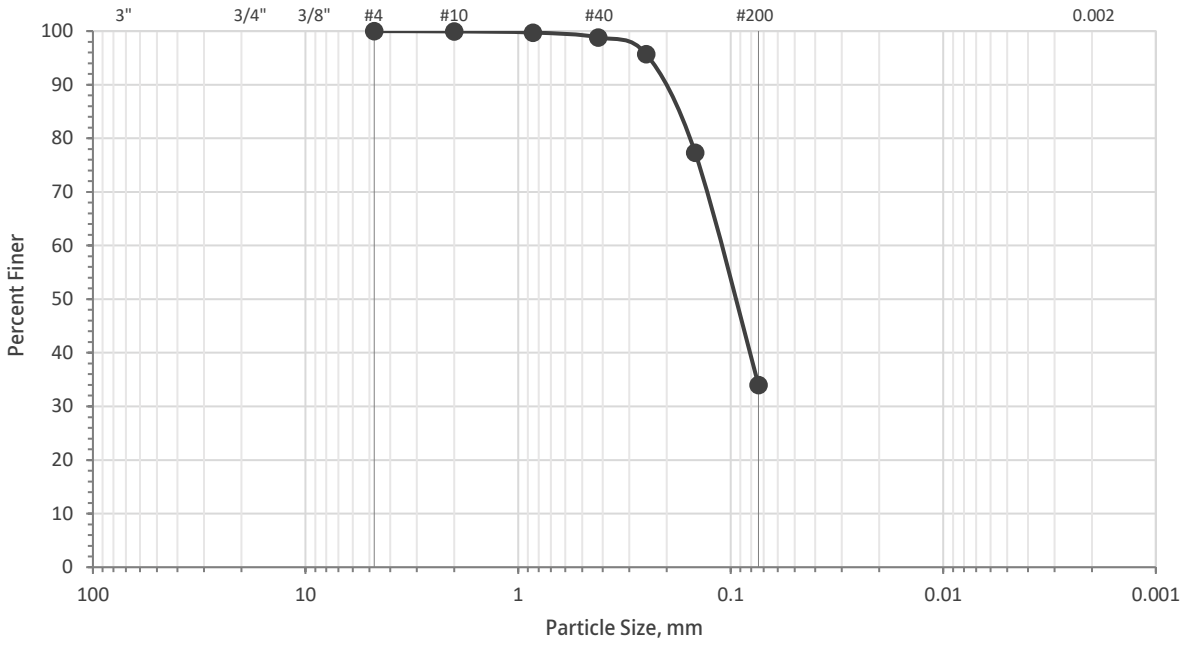
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-15P	6D	13.5'	15'

Location: -

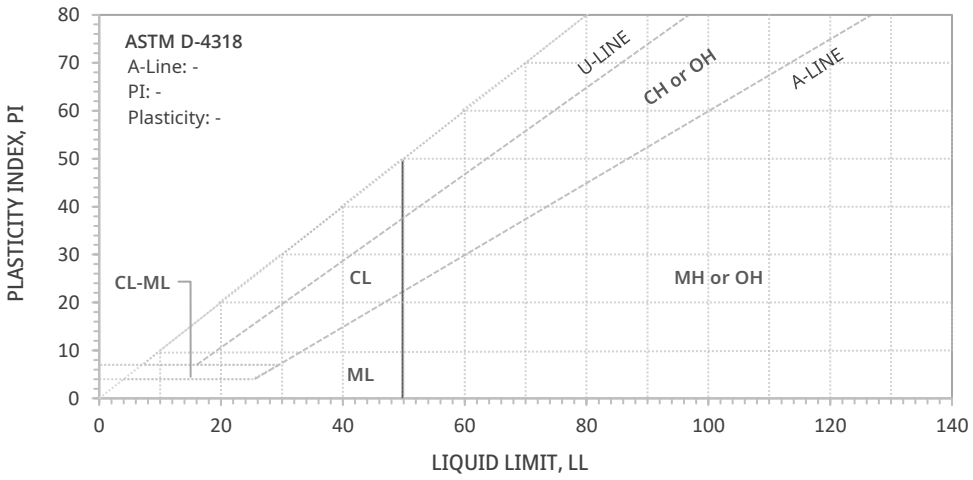
Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	99.9
#20	0.85	99.7
#40	0.42	98.8
#60	0.25	95.7
#100	0.147	77.3
#200	0.074	34.0

% Gravel			% Sand				D10	-		
Coarse	Fine	Total	Coarse	Medium	Fine	Total	D30	-	CC	-
0.0	0.0 =	0.0	0.1	1.1	64.8	= 66.0	D60	-	CU	-



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Dark grayish-brown silty clayey SAND

WC -

OM -

+ 3/8" 0.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

12/27/21 Tested by: ST/JT Reviewed by: FF Jay Kay Testing, Inc.

Alexandria Waterfront Implementation Project

Project Number: 14123

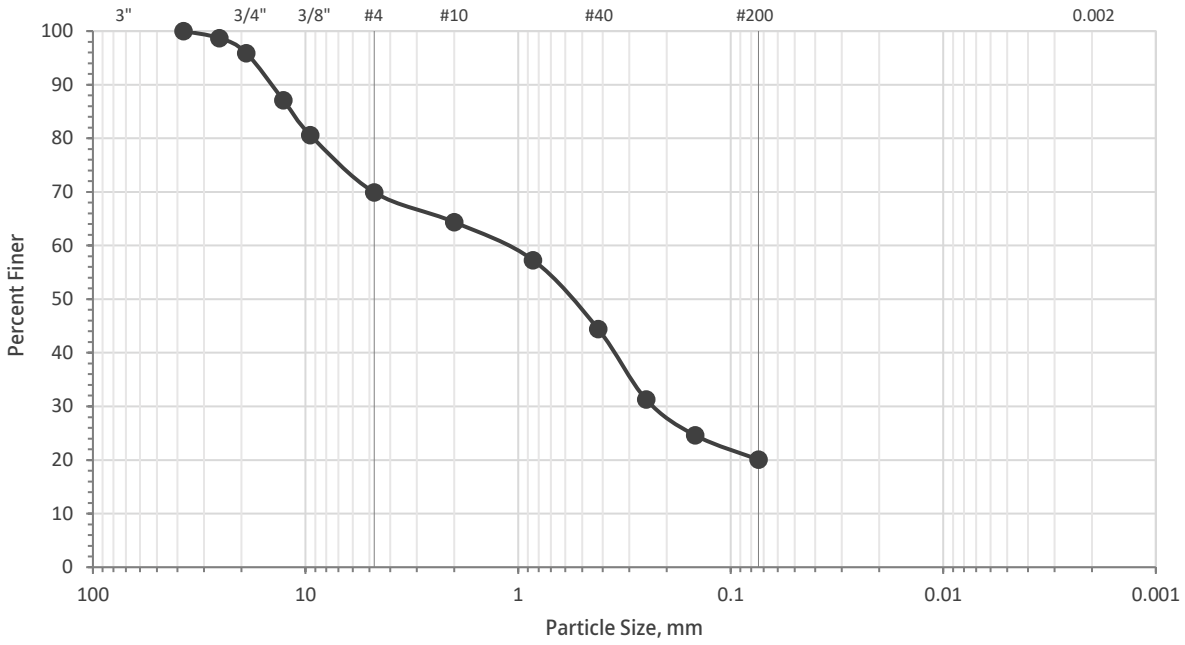
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-02	Bulk Composite	0'	8'

Location: -

Sample Date: -



ASTM D-6913

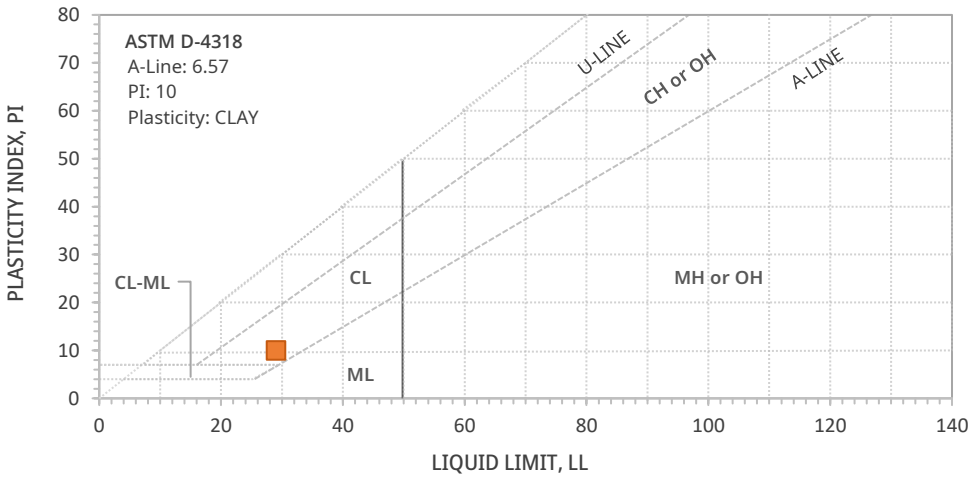
Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	100.0
1"	25.4	98.7
3/4"	19.0	95.9
1/2"	12.7	87.1
3/8"	9.51	80.6
#4	4.75	69.9
#10	2.00	64.4
#20	0.85	57.3
#40	0.42	44.4
#60	0.25	31.3
#100	0.147	24.6
#200	0.074	20.1

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
4.1	26.0	= 30.1	5.5	20.0	24.3	= 49.8	

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, %	29
Plastic Limit, %	19
Plasticity Index, %	10

USCS (D-2487)	AASHTO M-145
SC	A-2-4

Soil Description (D-2487)

Gray/black clayey SAND with gravel

WC	-		Data 1	-		Data 4	-
OM	-		Data 2	-		Data 5	-
			Data 3	-		Data 6	-
+ 3/8"	19.4%						

Alexandria Waterfront Implementation Project

Project Number: 14123

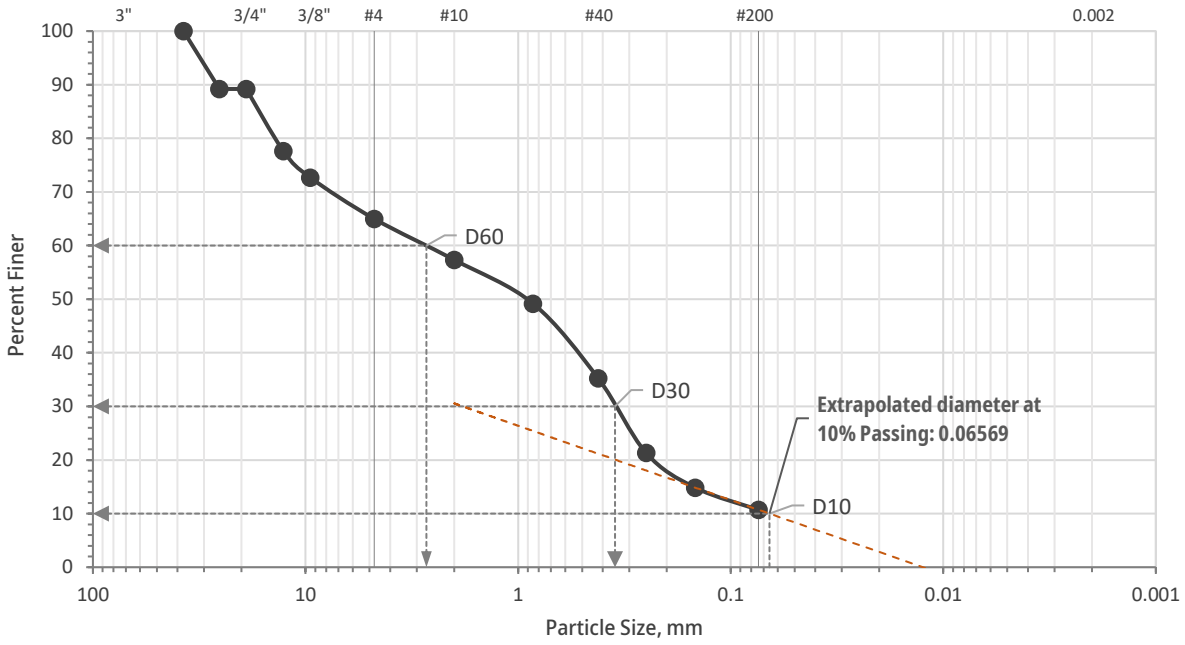
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-02	2D	2'	4'

Location: -

Sample Date: -

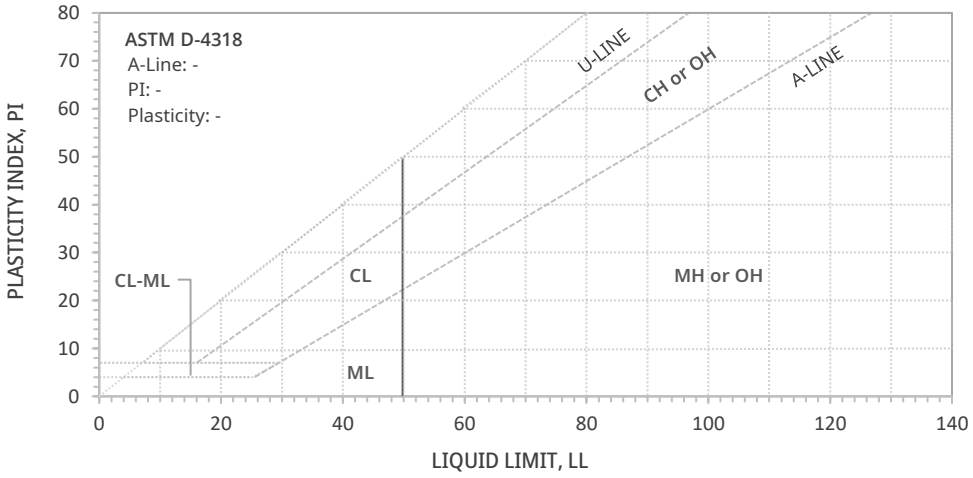


ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	100.0
1"	25.4	89.2
3/4"	19.0	89.2
1/2"	12.7	77.6
3/8"	9.51	72.7
#4	4.75	65.0
#10	2.00	57.4
#20	0.85	49.2
#40	0.42	35.2
#60	0.25	21.3
#100	0.147	14.8
#200	0.074	10.7

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
10.8	24.2	= 35.0	7.6	22.2	24.5	= 54.3	

D10	0.0657		
D30	0.3500	CC	0.691
D60	2.6992	CU	41.09



Liquid Limit, %	-
Plastic Limit, %	-
Plasticity Index, %	-

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Dark brown poorly-graded SAND with silt and gravel

WC	9.5%
OM	-
+ 3/8"	27.3%

Data 1	-
Data 2	-
Data 3	-

Data 4	-
Data 5	-
Data 6	-

Alexandria Waterfront Implementation Project

Project Number: 14123

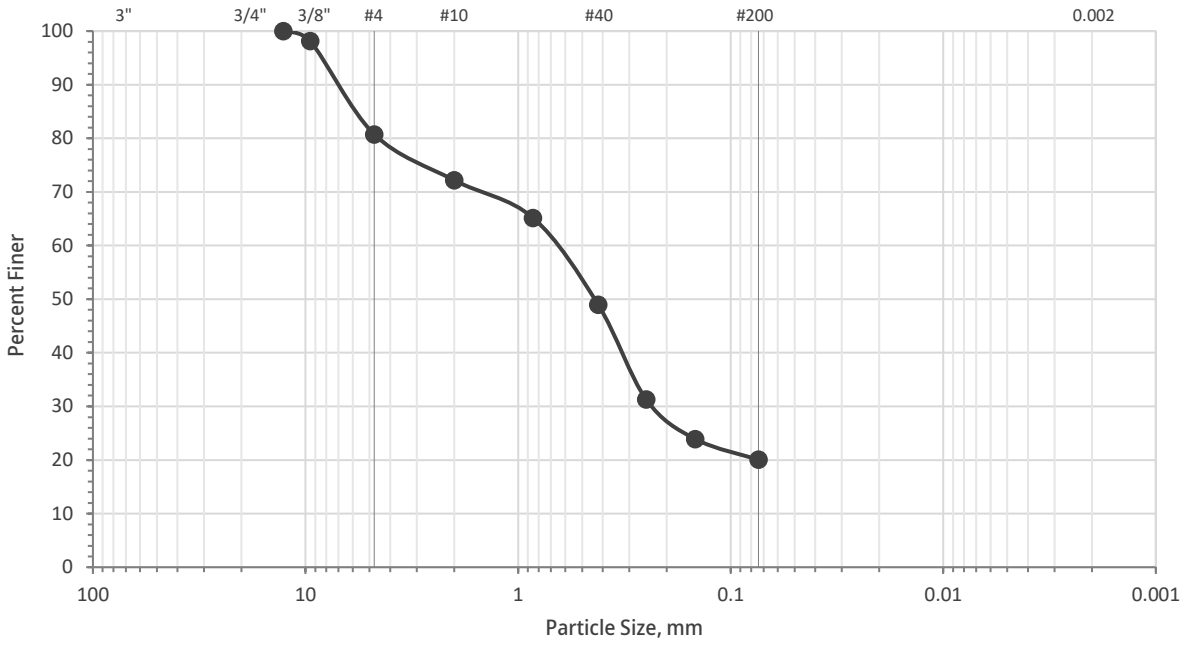
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-02	5D	8'	10'

Location: -

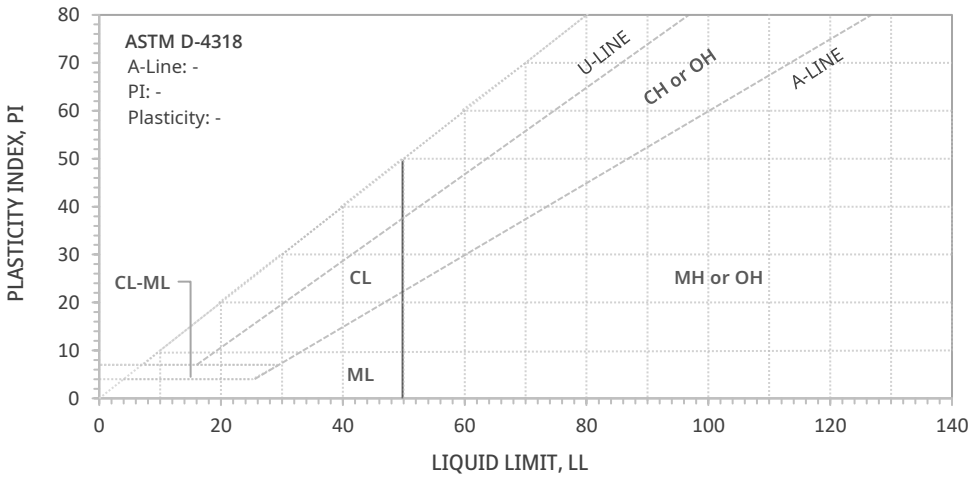
Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	100.0
3/8"	9.51	98.1
#4	4.75	80.7
#10	2.00	72.2
#20	0.85	65.2
#40	0.42	49.0
#60	0.25	31.3
#100	0.147	23.9
#200	0.074	20.1

% Gravel			% Sand				D10	-		
Coarse	Fine	Total	Coarse	Medium	Fine	Total	D30	-	CC	-
0.0	19.3 =	19.3	8.5	23.2	28.9 =	60.6	D60	-	CU	-



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Black clayey SAND with gravel

WC	47.2%		Data 1	-		Data 4	-	
OM	-		Data 2	-		Data 5	-	
			Data 3	-		Data 6	-	
+ 3/8"	1.9%							

Alexandria Waterfront Implementation Project

Project Number: 14123

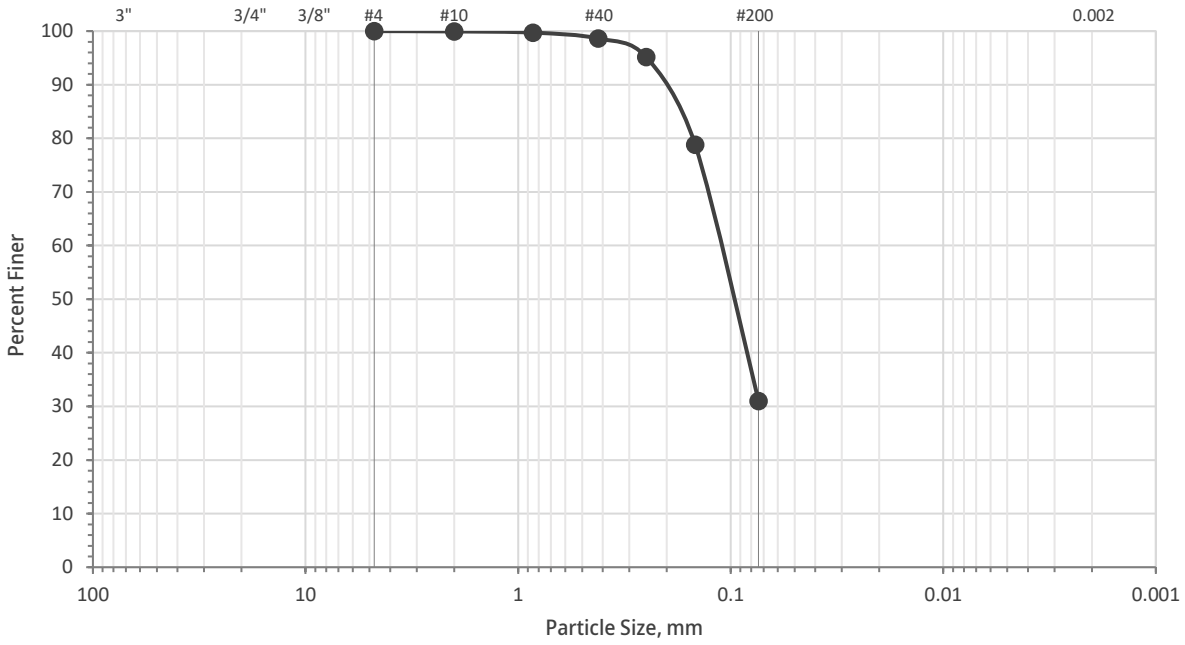
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-02	14D	49'	50.5'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	99.9
#20	0.85	99.7
#40	0.42	98.6
#60	0.25	95.2
#100	0.147	78.8
#200	0.074	31.0

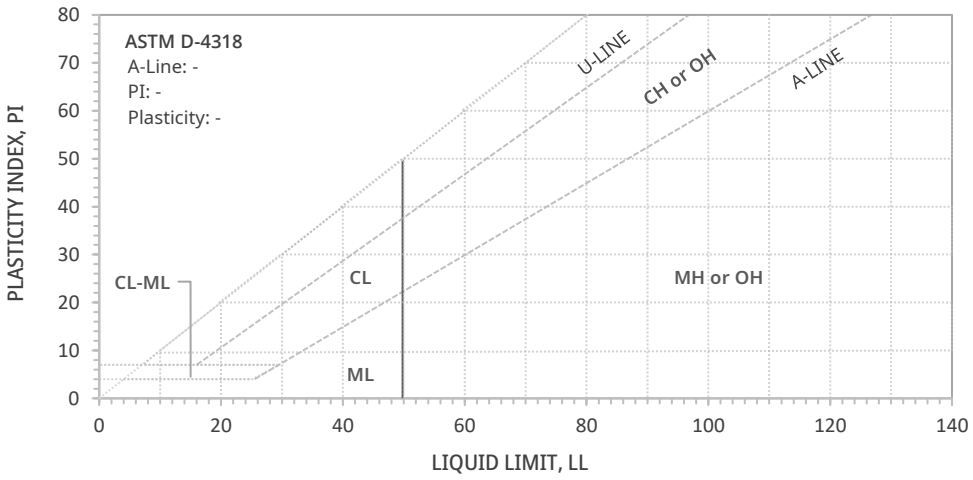
% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

% Sand

Coarse	Medium	Fine		Total
0.1	1.3	67.6	=	69.0

D10	-		
D30	-	CC	-
D60	-	CU	-



Liquid Limit, %	-
Plastic Limit, %	-
Plasticity Index, %	-

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Dark gray silty clayey SAND

WC	-
OM	-
+ 3/8"	0.0%

Data 1	-
Data 2	-
Data 3	-

Data 4	-
Data 5	-
Data 6	-

Alexandria Waterfront Implementation Project

Project Number: 14123

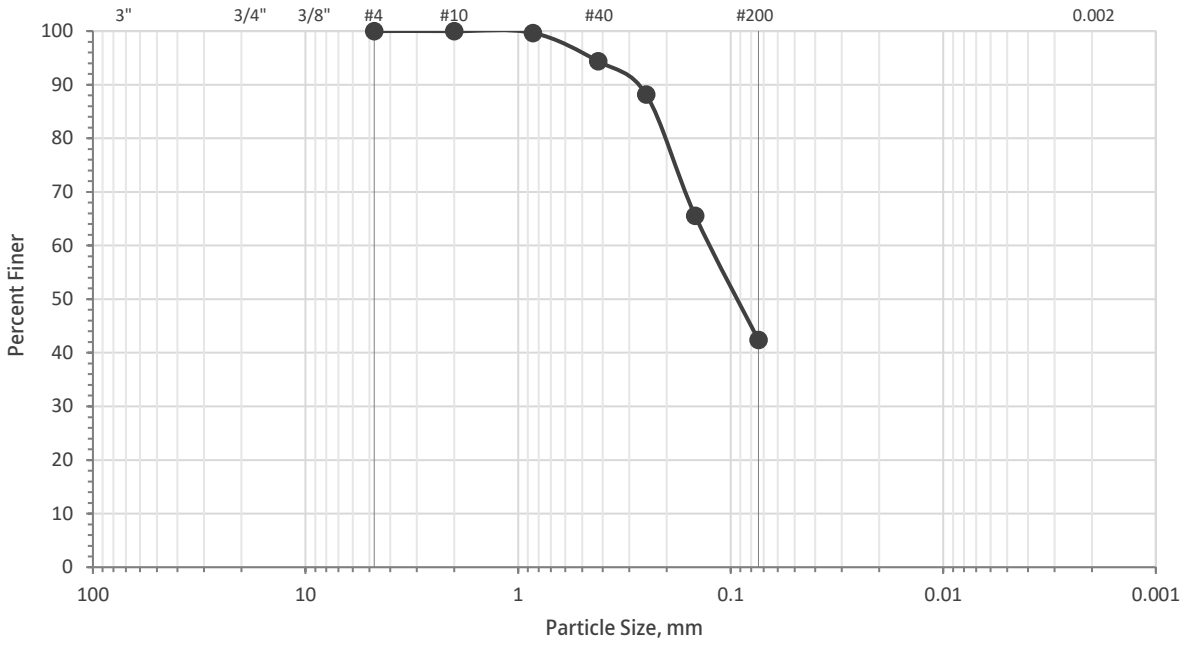
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-02	15D	54'	55.5'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	99.9
#20	0.85	99.7
#40	0.42	94.4
#60	0.25	88.2
#100	0.147	65.6
#200	0.074	42.4

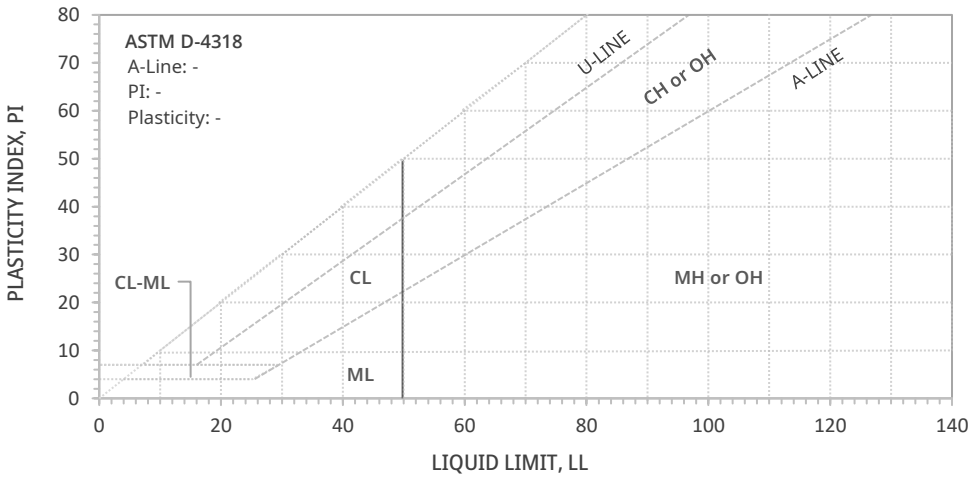
% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

% Sand

Coarse	Medium	Fine		Total
0.1	5.5	52.0	=	57.6

D10	-		
D30	-	CC	-
D60	-	CU	-



Liquid Limit, %	-
Plastic Limit, %	-
Plasticity Index, %	-

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Grayish-brown clayey SAND

WC	-
OM	-
+ 3/8"	0.0%

Data 1	-
Data 2	-
Data 3	-

Data 4	-
Data 5	-
Data 6	-

Alexandria Waterfront Implementation Project

Project Number: 14123

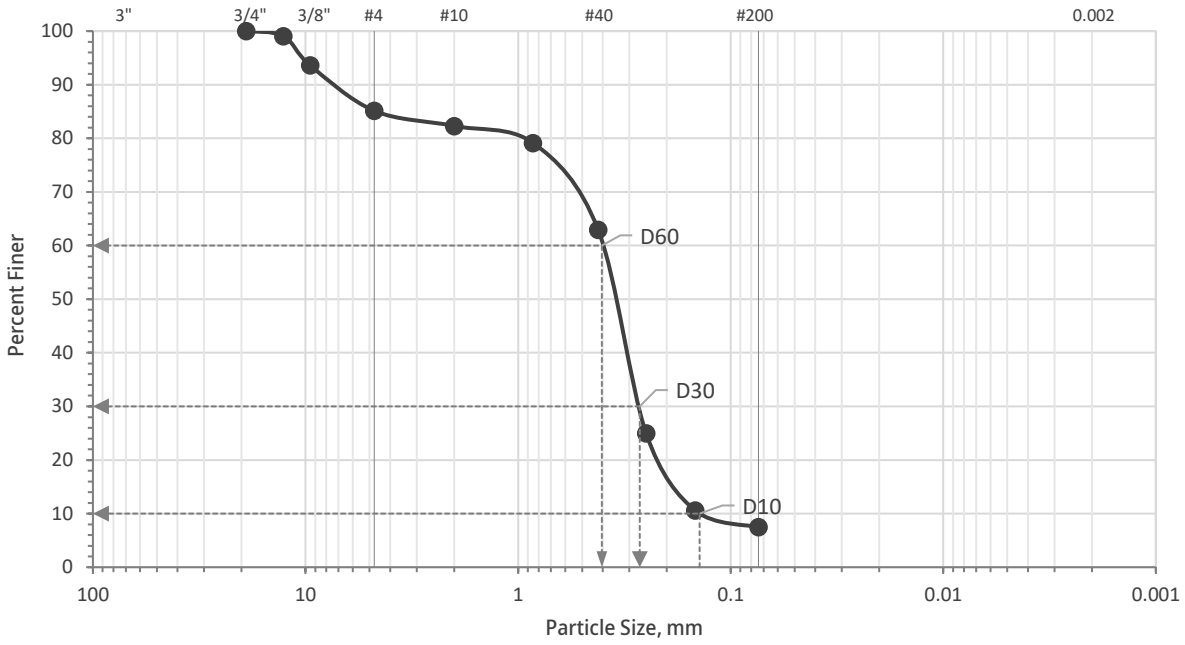
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-02	19D	74'	75.5'

Location: -

Sample Date: -

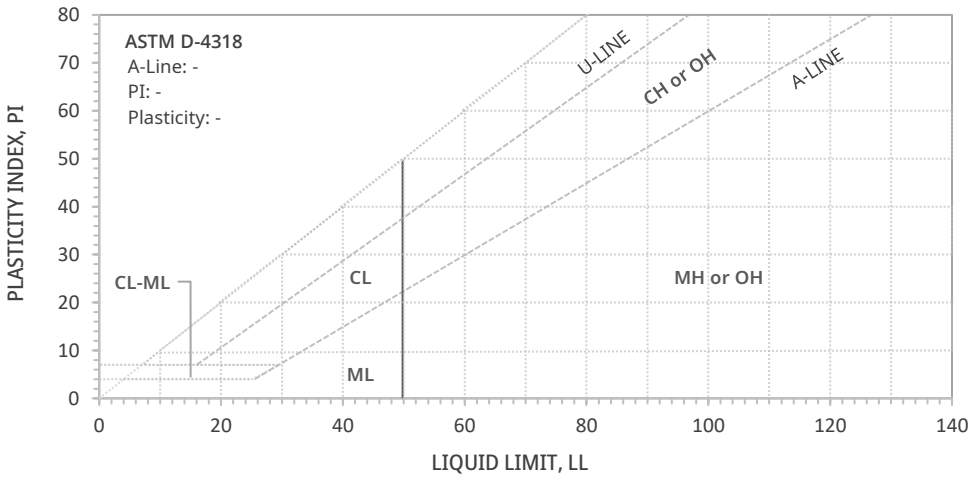


ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	100.0
1/2"	12.7	99.1
3/8"	9.51	93.6
#4	4.75	85.1
#10	2.00	82.3
#20	0.85	79.1
#40	0.42	62.9
#60	0.25	25.0
#100	0.147	10.6
#200	0.074	7.5

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
0.0	14.9	14.9	2.8	19.4	55.4	77.6	

D10	0.1400		
D30	0.2677	CC	1.269
D60	0.4035	CU	2.88



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Grayish-brown poorly-graded SAND with silt

WC -

OM -

+ 3/8" 6.4%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

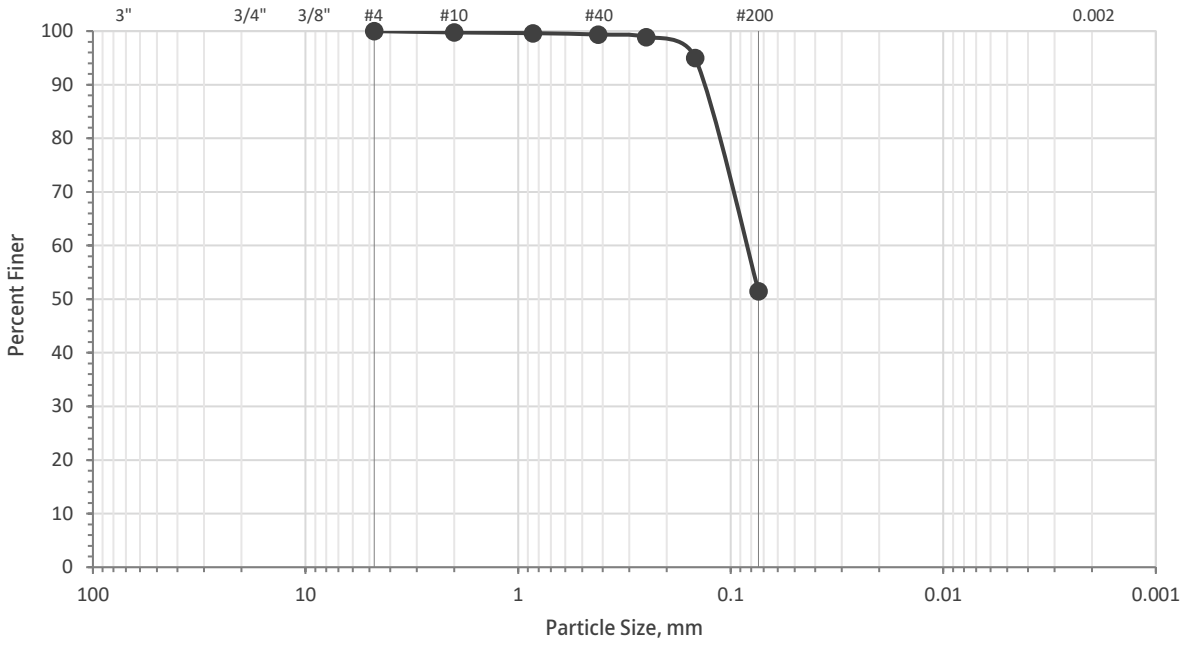
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-02	23D	89'	91'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	99.8
#20	0.85	99.6
#40	0.42	99.4
#60	0.25	98.9
#100	0.147	95.0
#200	0.074	51.5

% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

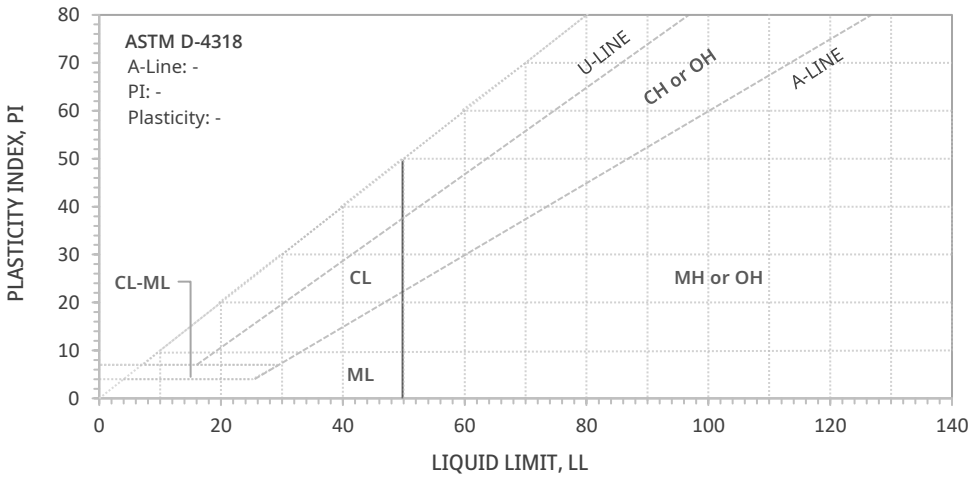
% Sand

Coarse	Medium	Fine		Total
0.2	0.4	47.9	=	48.5

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Dark gray sandy silt

WC 33.1%

OM -

+ 3/8" 0.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

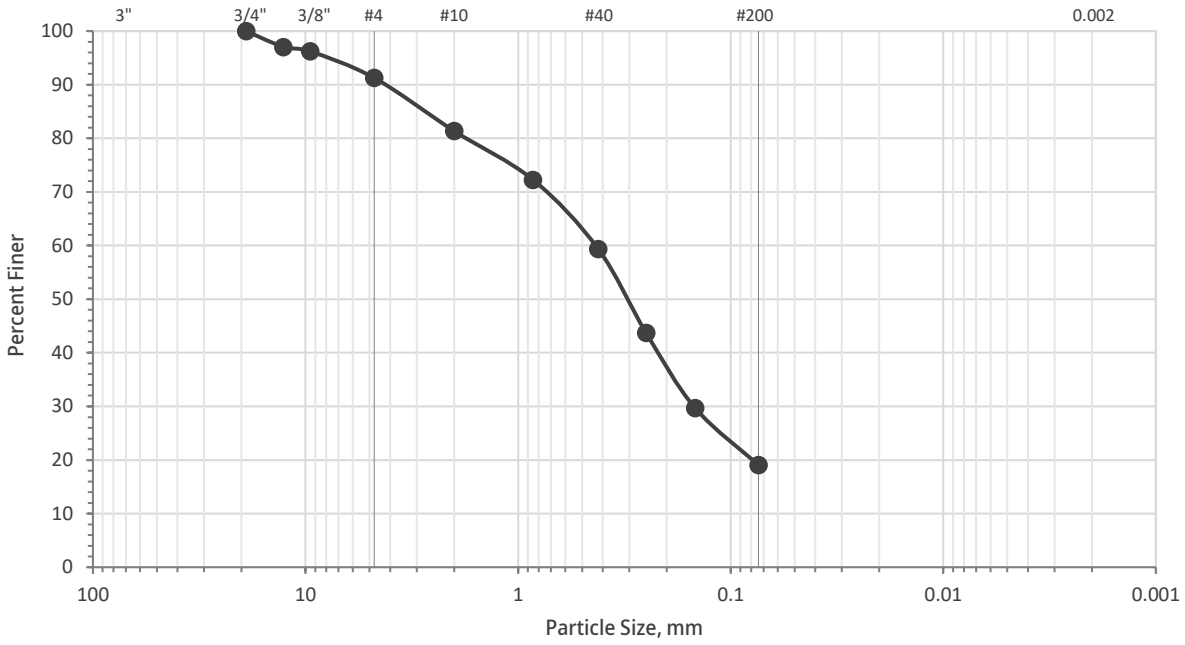
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-04A	5D	8'	10'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	100.0
1/2"	12.7	97.1
3/8"	9.51	96.2
#4	4.75	91.3
#10	2.00	81.4
#20	0.85	72.3
#40	0.42	59.4
#60	0.25	43.7
#100	0.147	29.7
#200	0.074	19.1

% Gravel

Coarse	Fine		Total
0.0	8.7	=	8.7

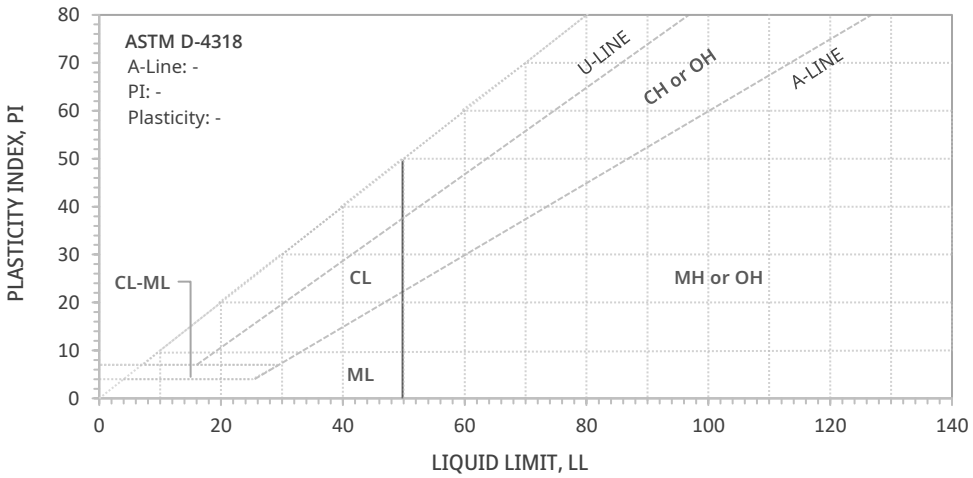
% Sand

Coarse	Medium	Fine		Total
9.9	22.0	40.3	=	72.2

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Black clayey SAND

WC 36.1%

OM -

+ 3/8" 3.8%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

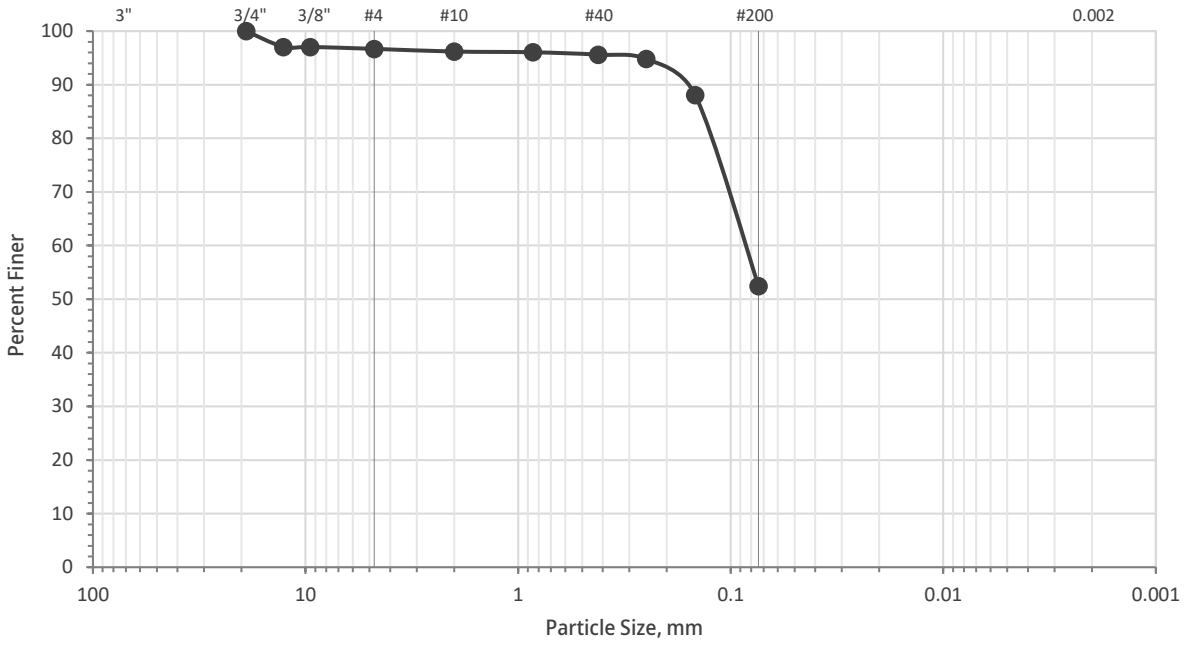
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-04A	15D	54'	55.5'

Location: -

Sample Date: -



ASTM D-6913

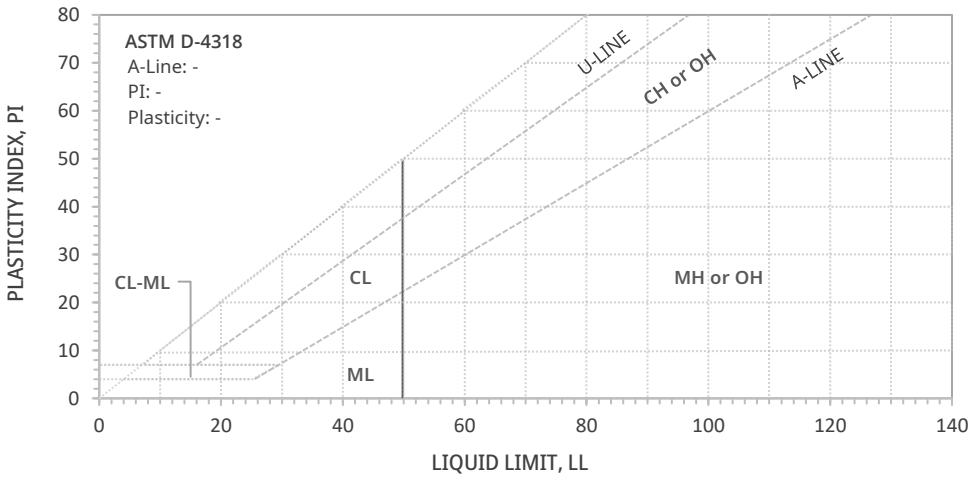
Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	100.0
1/2"	12.7	97.1
3/8"	9.51	97.1
#4	4.75	96.7
#10	2.00	96.2
#20	0.85	96.1
#40	0.42	95.6
#60	0.25	94.8
#100	0.147	88.1
#200	0.074	52.5

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
0.0	3.3	3.3	0.5	0.6	43.1	44.2	

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Dark gray sandy clay

WC -

OM -

+ 3/8" 2.9%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

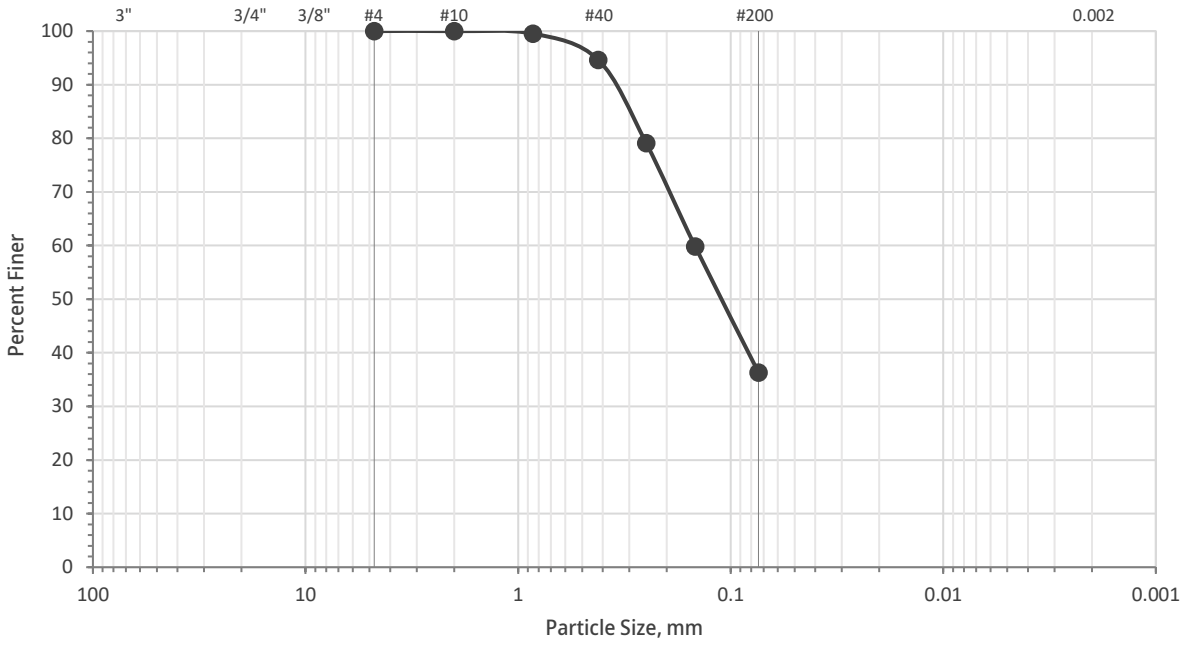
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-04A	16D	59'	60.5'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	99.9
#20	0.85	99.5
#40	0.42	94.7
#60	0.25	79.2
#100	0.147	59.9
#200	0.074	36.3

% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

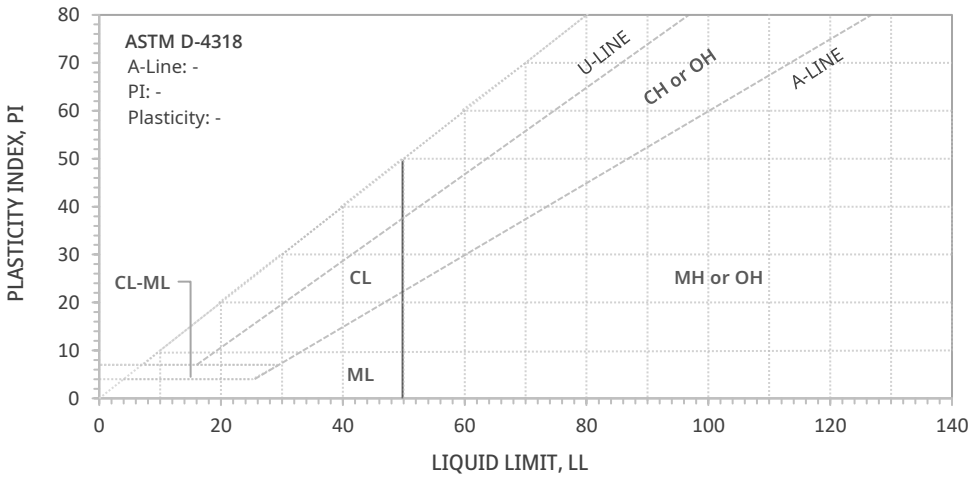
% Sand

Coarse	Medium	Fine		Total
0.1	5.2	58.4	=	63.7

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Dark green clayey SAND

WC -

OM -

+ 3/8" 0.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

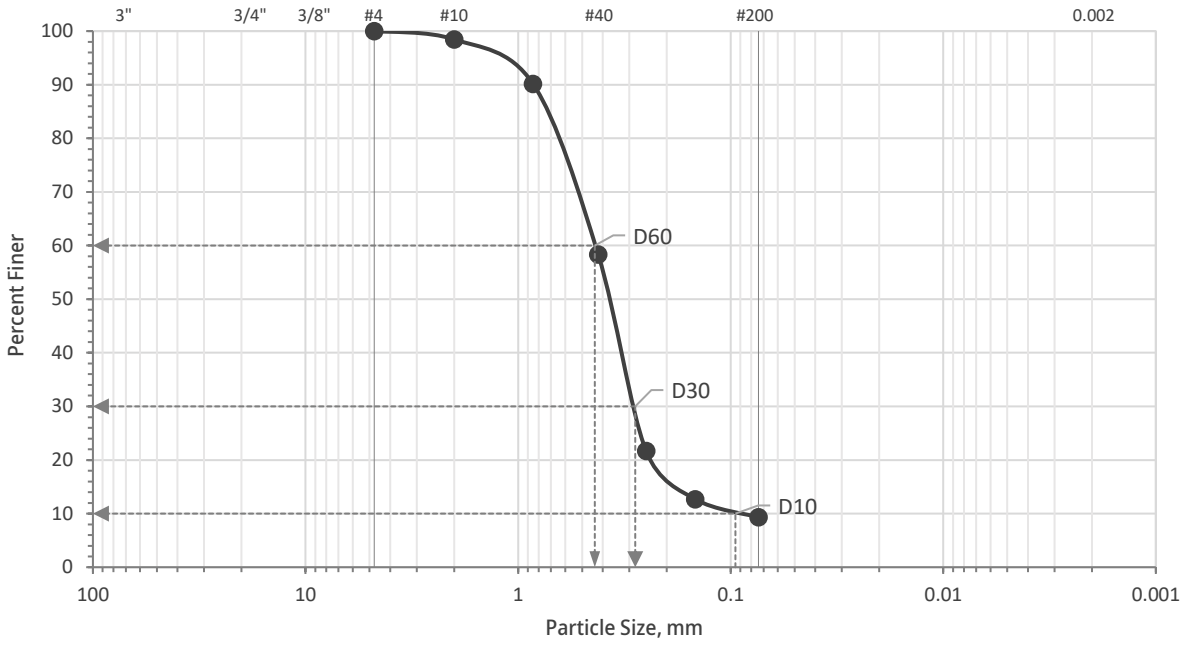
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-04A	18D	66.5'	68.5'

Location: -

Sample Date: -

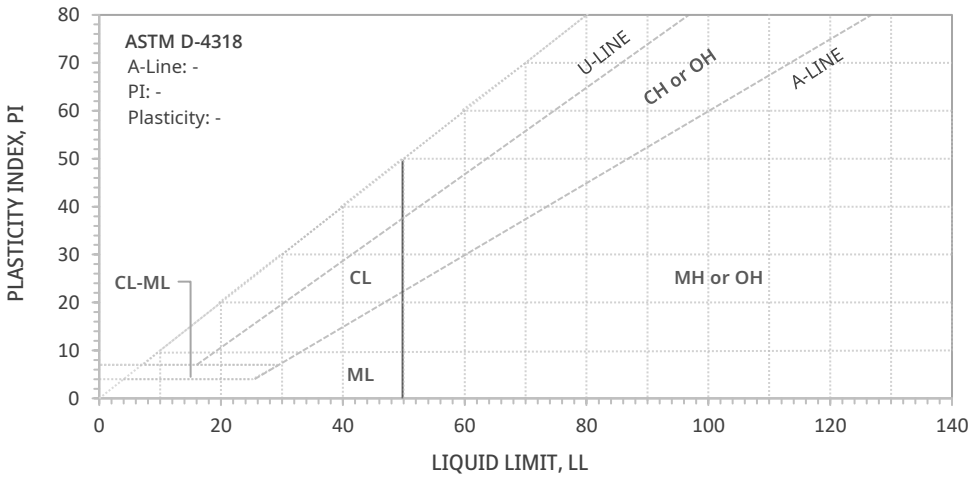


ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	98.5
#20	0.85	90.1
#40	0.42	58.3
#60	0.25	21.7
#100	0.147	12.7
#200	0.074	9.3

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
0.0	0.0	0.0	1.5	40.2	49.0	90.7	

D10	0.0950		
D30	0.2811	CC	1.910
D60	0.4357	CU	4.59



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Gray poorly-graded SAND with silt

WC -

OM -

+ 3/8" 0.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

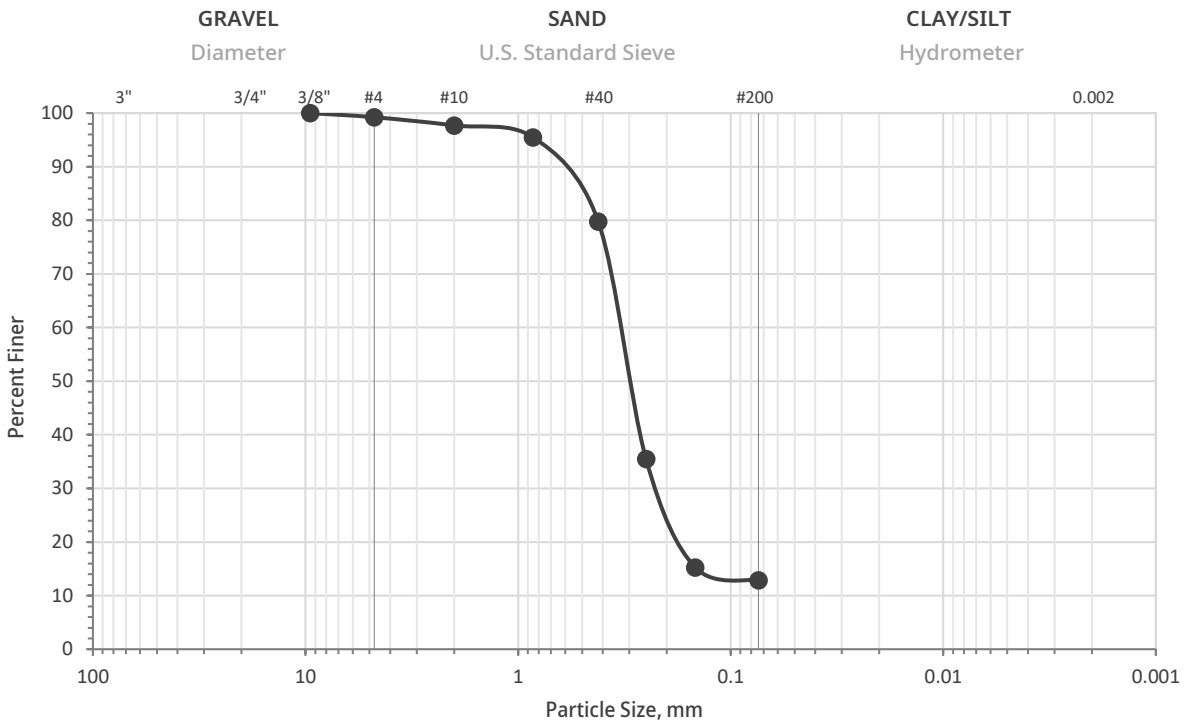
Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-03	13D	48.5'	50'

Location: -

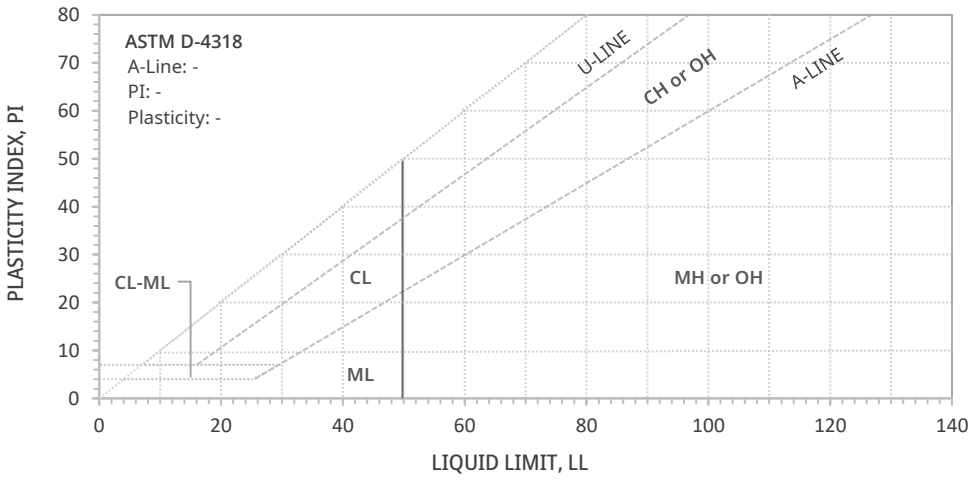
Sample Date: -

ASTM D-6913



Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	100.0
#4	4.75	99.2
#10	2.00	97.7
#20	0.85	95.5
#40	0.42	79.8
#60	0.25	35.5
#100	0.147	15.3
#200	0.074	12.9

% Gravel			% Sand				D10	-		
Coarse	Fine	Total	Coarse	Medium	Fine	Total	D30	-	CC	-
0.0	0.8	= 0.8	1.5	17.9	66.9	= 86.3	D60	-	CU	-



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Dark greenish-brown silty SAND

WC	23.3%		Data 1	-		Data 4	-
OM	-		Data 2	-		Data 5	-
			Data 3	-		Data 6	-
+ 3/8"	0.0%						

Alexandria Waterfront Implementation Project

Project Number: 14123

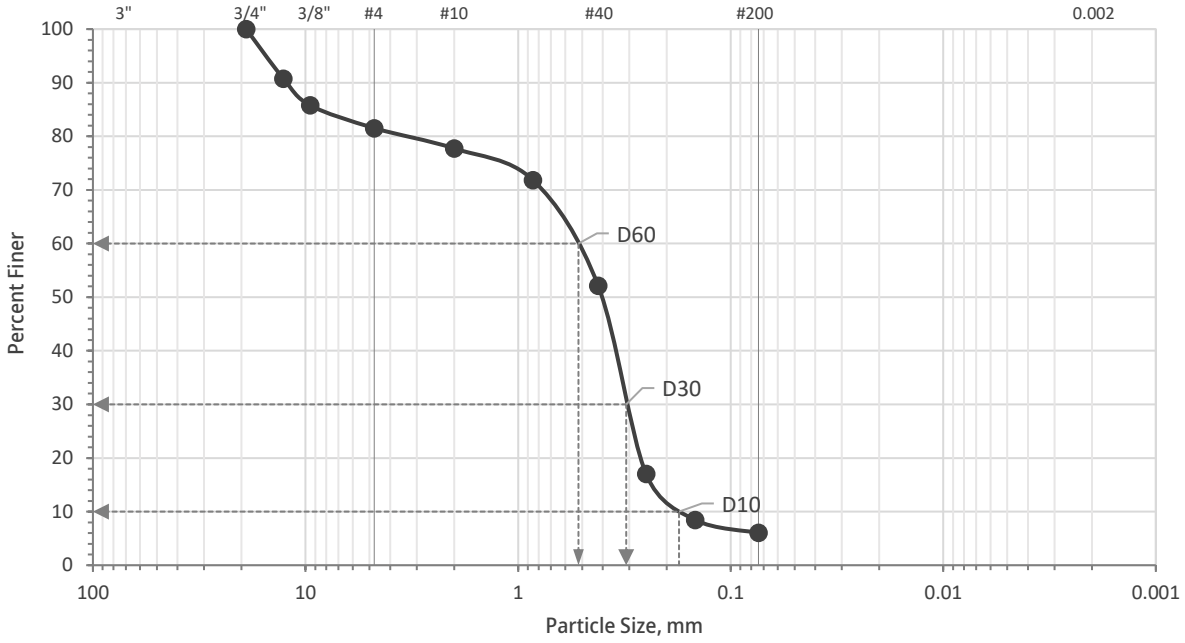
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-05	3D BTM	58.5'	60'

Location: -

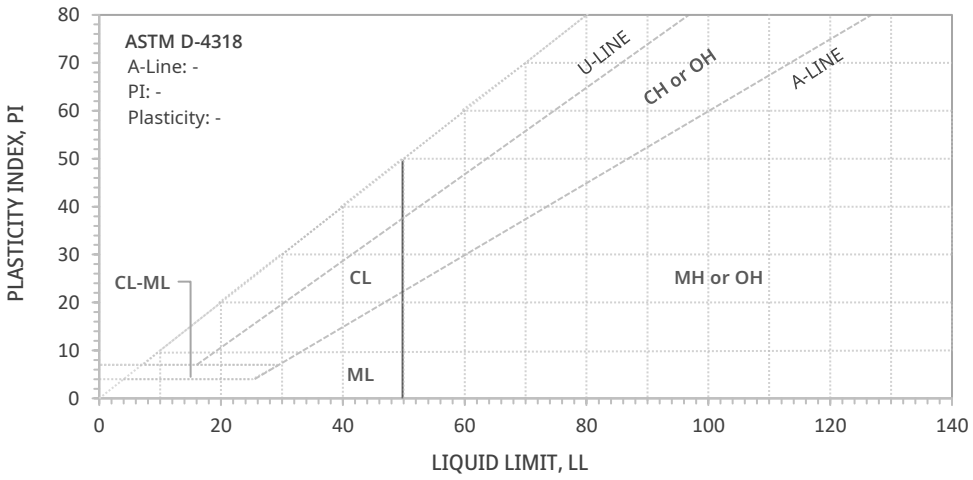
Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	100.0
1/2"	12.7	90.8
3/8"	9.51	85.8
#4	4.75	81.5
#10	2.00	77.7
#20	0.85	71.8
#40	0.42	52.1
#60	0.25	17.0
#100	0.147	8.5
#200	0.074	6.1

% Gravel			% Sand				D10	0.1750		
Coarse	Fine	Total	Coarse	Medium	Fine	Total	D30	0.3100	CC	1.056
0.0	18.5 =	18.5	3.8	25.6	46.0 =	75.4	D60	0.5200	CU	2.97



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Brown poorly-graded SAND with silt and gravel

WC -

OM -

+ 3/8" 14.2%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

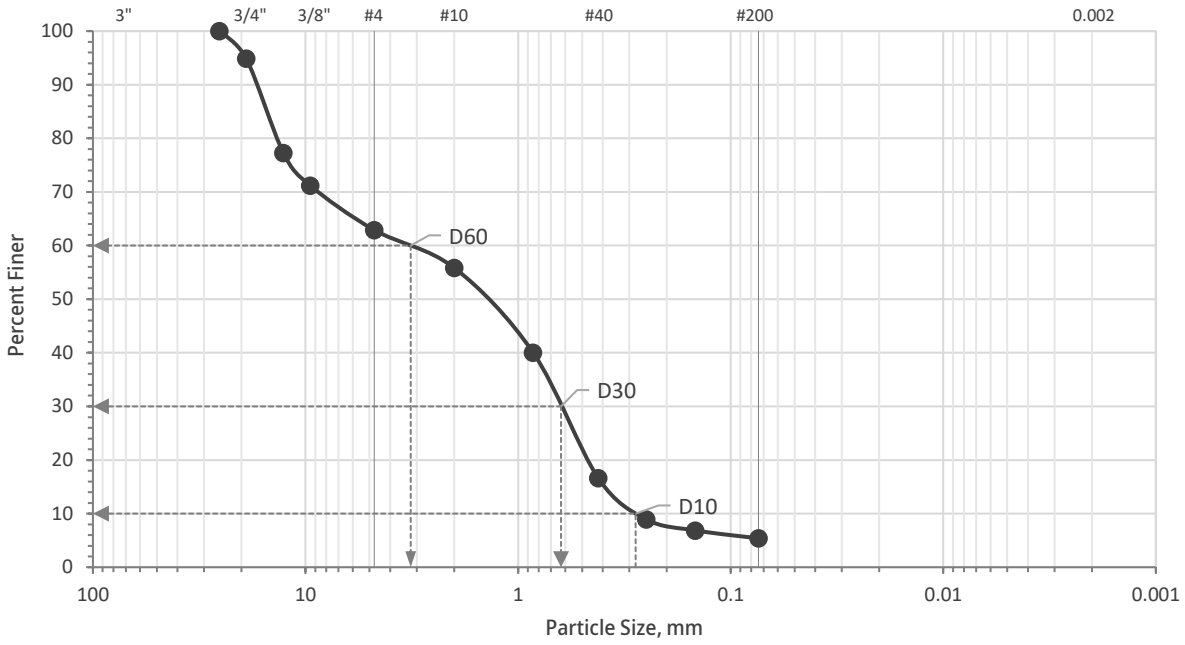
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-05	4D	63.5'	65'

Location: -

Sample Date: -

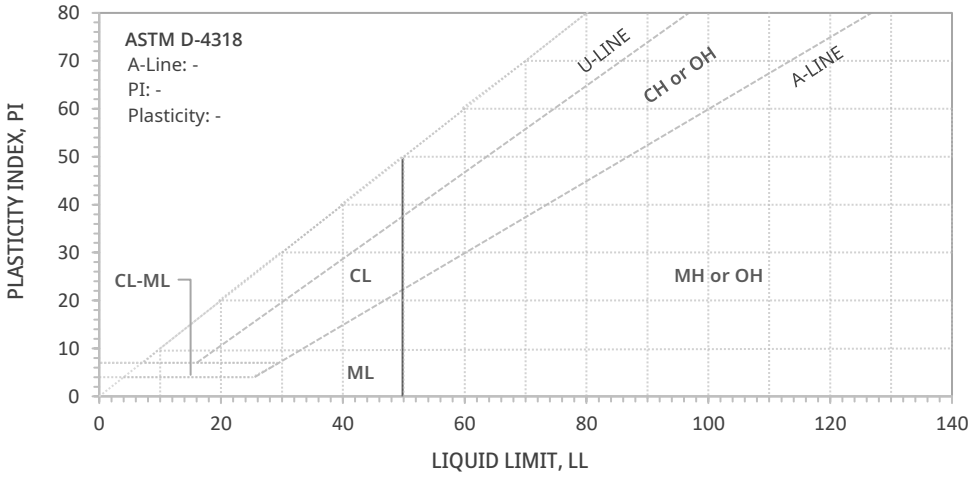


ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	100.0
3/4"	19.0	94.9
1/2"	12.7	77.3
3/8"	9.51	71.2
#4	4.75	62.9
#10	2.00	55.9
#20	0.85	40.0
#40	0.42	16.6
#60	0.25	8.9
#100	0.147	6.9
#200	0.074	5.4

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
5.1	32.0	37.1	7.0	39.3	11.2	57.5	

D10	0.2800		
D30	0.6281	CC	0.440
D60	3.2000	CU	11.43



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Brown poorly-graded SAND with silt and gravel

WC	-		Data 1	-	Data 4	-
OM	-		Data 2	-	Data 5	-
			Data 3	-	Data 6	-
+ 3/8"	28.8%					

Alexandria Waterfront Implementation Project

Project Number: 14123

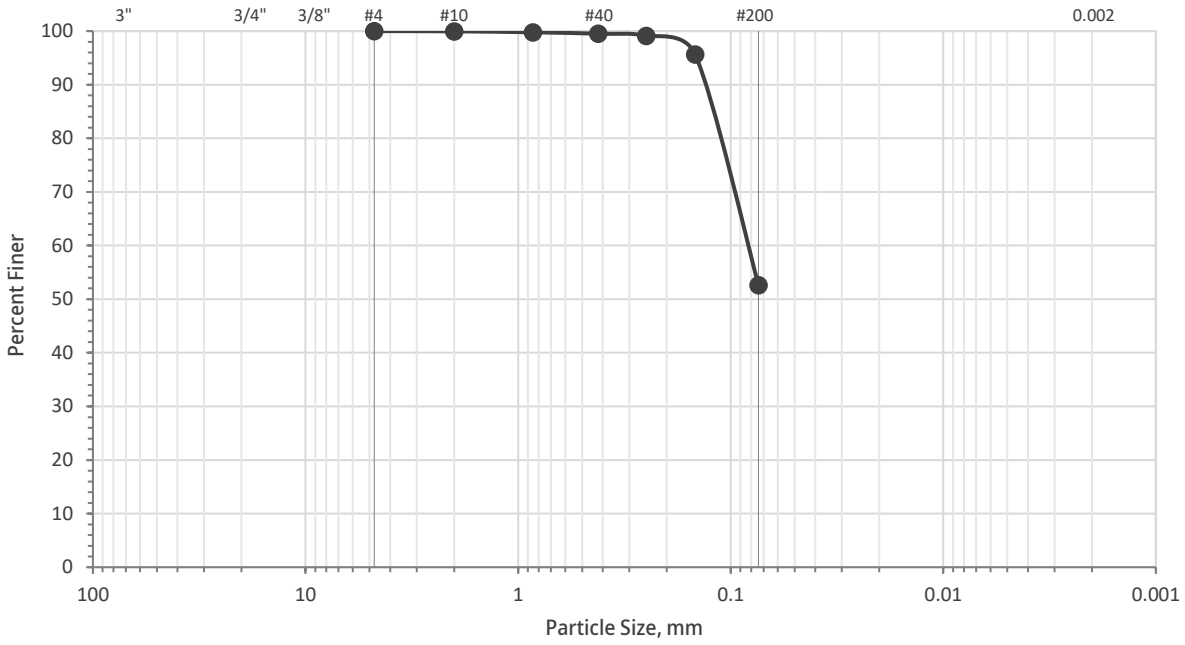
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-05	6D	74'	75.5'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	99.9
#20	0.85	99.8
#40	0.42	99.5
#60	0.25	99.1
#100	0.147	95.7
#200	0.074	52.6

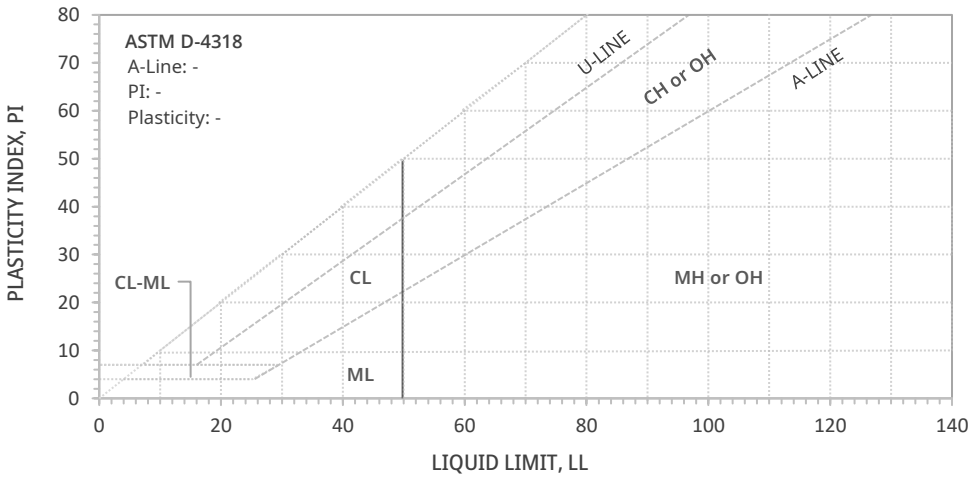
% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

% Sand

Coarse	Medium	Fine		Total
0.1	0.4	46.9	=	47.4

D10	-		
D30	-	CC	-
D60	-	CU	-



Liquid Limit, %	-
Plastic Limit, %	-
Plasticity Index, %	-

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Dark green sandy silt

WC	23.6%
OM	-
+ 3/8"	0.0%

Data 1	-
Data 2	-
Data 3	-

Data 4	-
Data 5	-
Data 6	-

Alexandria Waterfront Implementation Project

Project Number: 14123

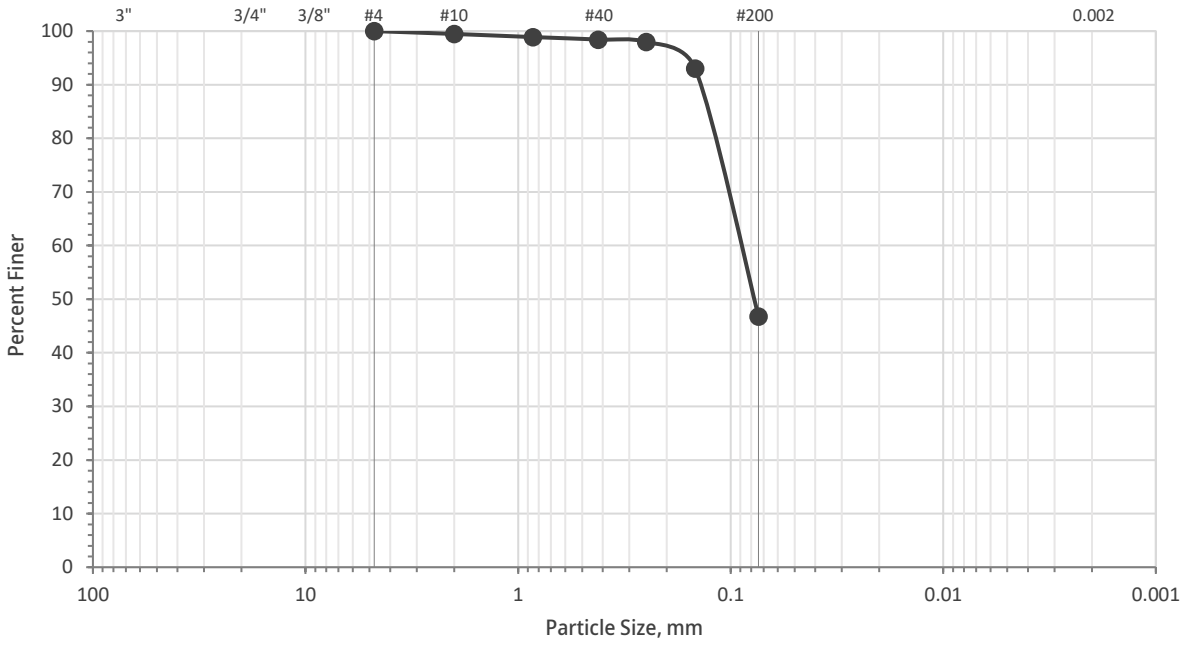
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-05	7D	79'	80.5'

Location: -

Sample Date: -



ASTM D-6913

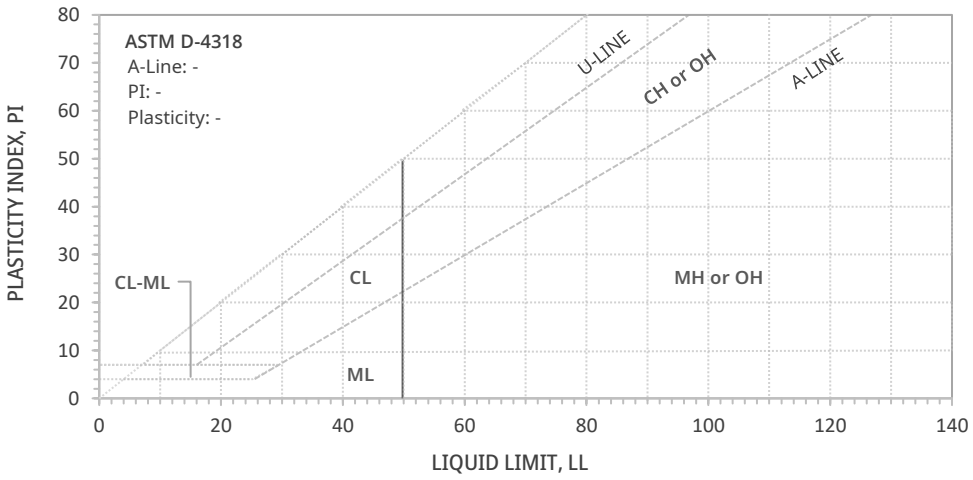
Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	99.5
#20	0.85	98.9
#40	0.42	98.4
#60	0.25	98.0
#100	0.147	93.0
#200	0.074	46.8

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
0.0	0.0	= 0.0	0.5	1.1	51.6	= 53.2	

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Dark gray silty SAND

WC 31.1%

OM -

+ 3/8" 0.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

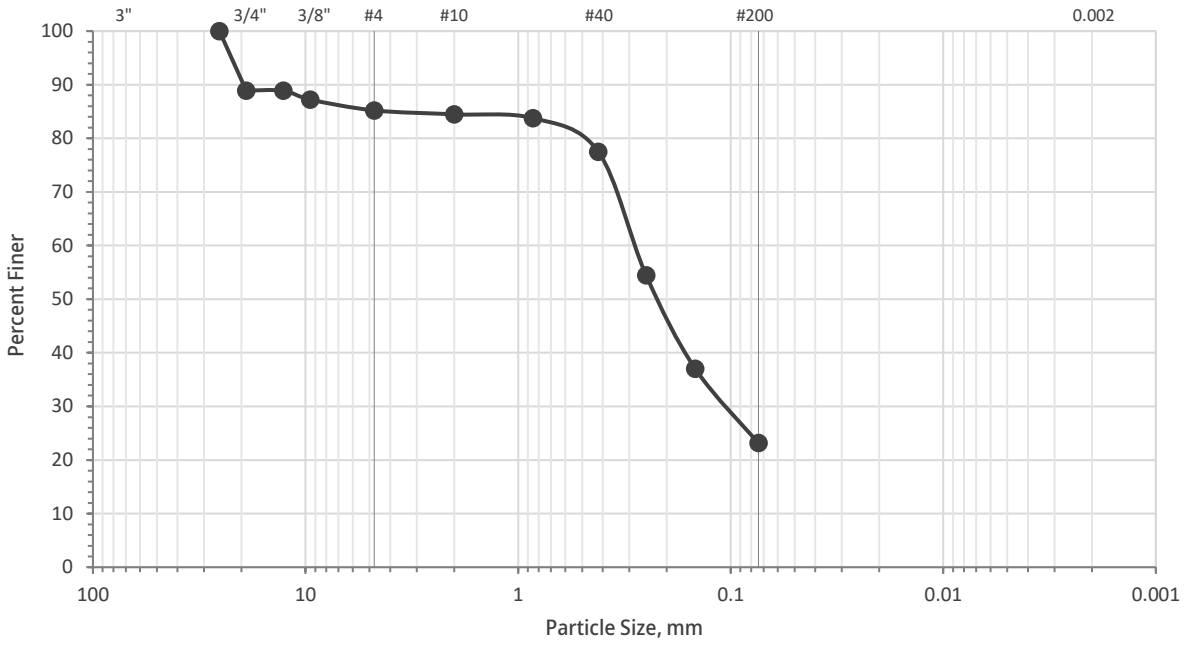
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-05	10D	98.5'	100'

Location: -

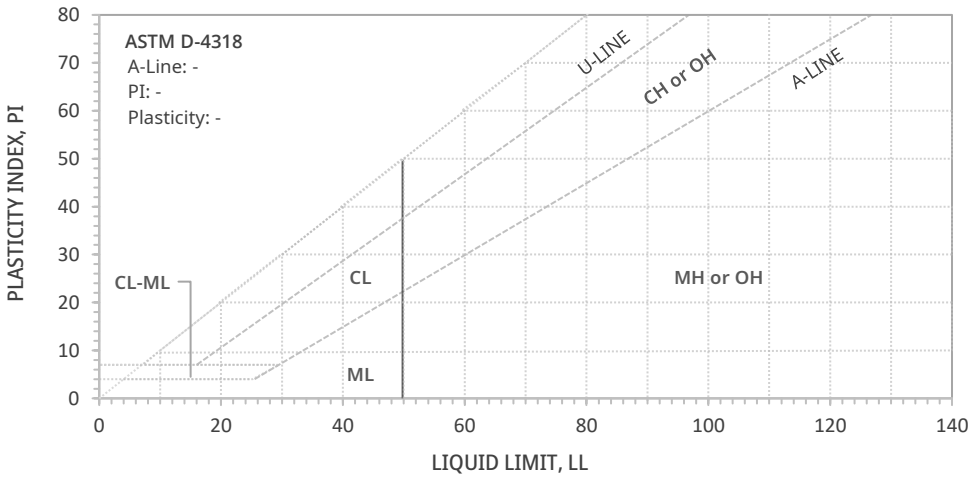
Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	100.0
3/4"	19.0	88.9
1/2"	12.7	88.9
3/8"	9.51	87.2
#4	4.75	85.2
#10	2.00	84.5
#20	0.85	83.8
#40	0.42	77.5
#60	0.25	54.5
#100	0.147	37.1
#200	0.074	23.2

% Gravel			% Sand				D10	-		
Coarse	Fine	Total	Coarse	Medium	Fine	Total	D30	-	CC	-
11.1	3.7 =	14.8	0.7	7.0	54.3 =	62.0	D60	-	CU	-



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Brown silty SAND

WC	19.9%		Data 1	-		Data 4	-	
OM	-		Data 2	-		Data 5	-	
			Data 3	-		Data 6	-	
+ 3/8"	12.8%							

Alexandria Waterfront Implementation Project

Project Number: 14123

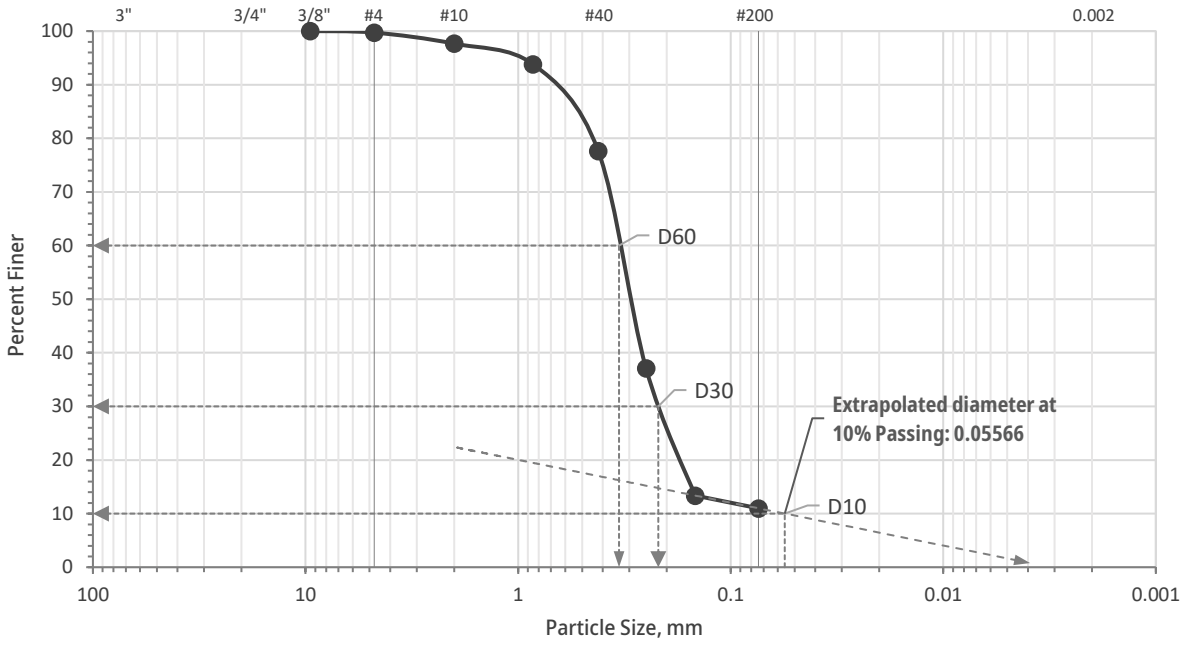
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-12	16D BTM	53.5'	55'

Location: -

Sample Date: -

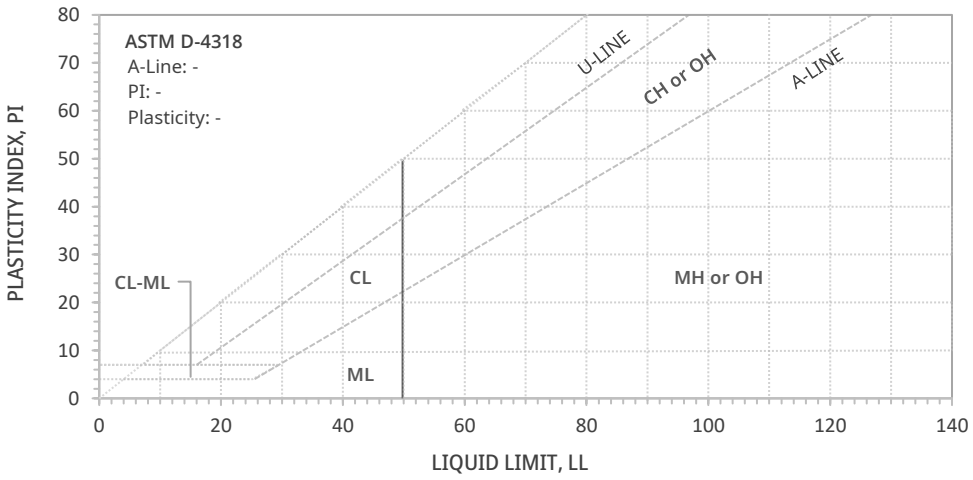


ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	100.0
#4	4.75	99.7
#10	2.00	97.7
#20	0.85	93.8
#40	0.42	77.7
#60	0.25	37.1
#100	0.147	13.4
#200	0.074	11.0

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
0.0	0.3	0.3	2.0	20.0	66.7	88.7	

D10	0.0557		
D30	0.2190	CC	2.571
D60	0.3351	CU	6.02



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Dark green well-graded SAND with silt

WC -

OM -

+ 3/8" 0.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

05/31/21 Tested by: ST/JT Reviewed by: FF Jay Kay Testing, Inc.

Alexandria Waterfront Implementation Project

Project Number: 14123

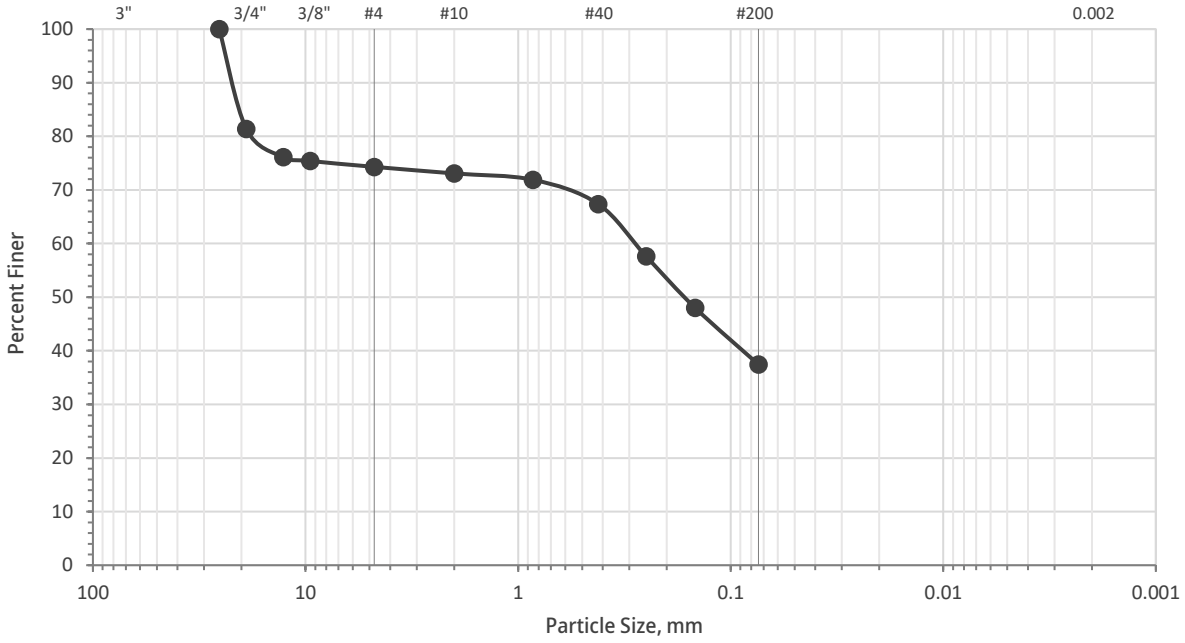
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-12	20D BTM	68'	70'

Location: -

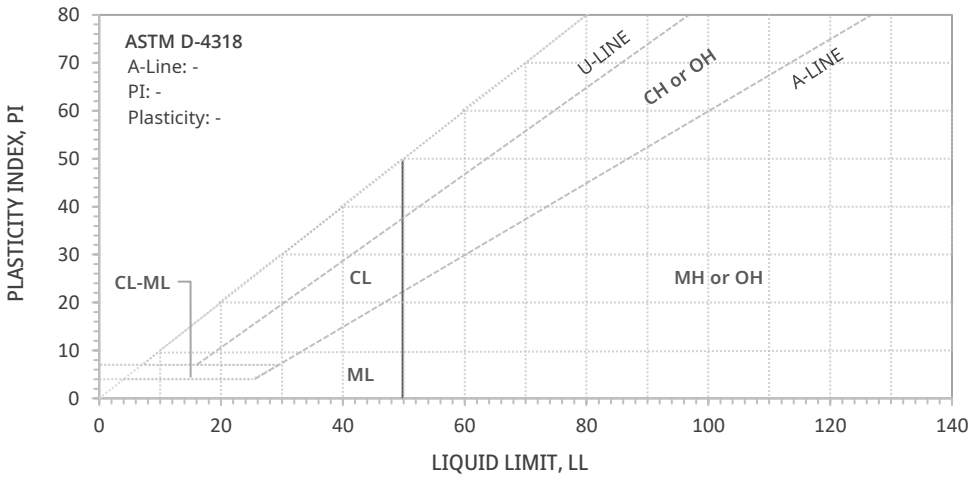
Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	100.0
3/4"	19.0	81.4
1/2"	12.7	76.1
3/8"	9.51	75.4
#4	4.75	74.3
#10	2.00	73.1
#20	0.85	71.9
#40	0.42	67.4
#60	0.25	57.6
#100	0.147	48.0
#200	0.074	37.4

% Gravel			% Sand				D10	-		
Coarse	Fine	Total	Coarse	Medium	Fine	Total	D30	-	CC	-
18.6	7.1 =	25.7	1.2	5.7	30.0 =	36.9	D60	-	CU	-



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Brown clayey SAND with gravel

WC	14.3%	Data 1	-	Data 4	-
OM	-	Data 2	-	Data 5	-
		Data 3	-	Data 6	-
+ 3/8"	24.6%				

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

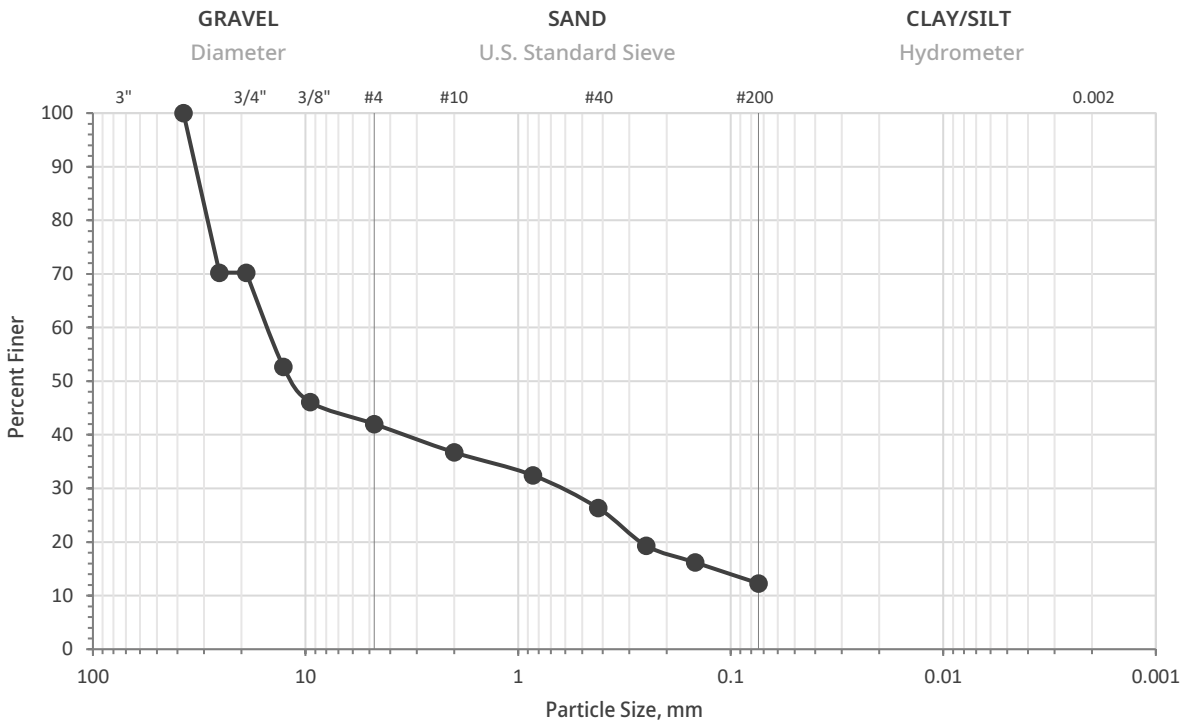
Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-16A	15D	53.5'	55'

Location: -

Sample Date: -

ASTM D-6913



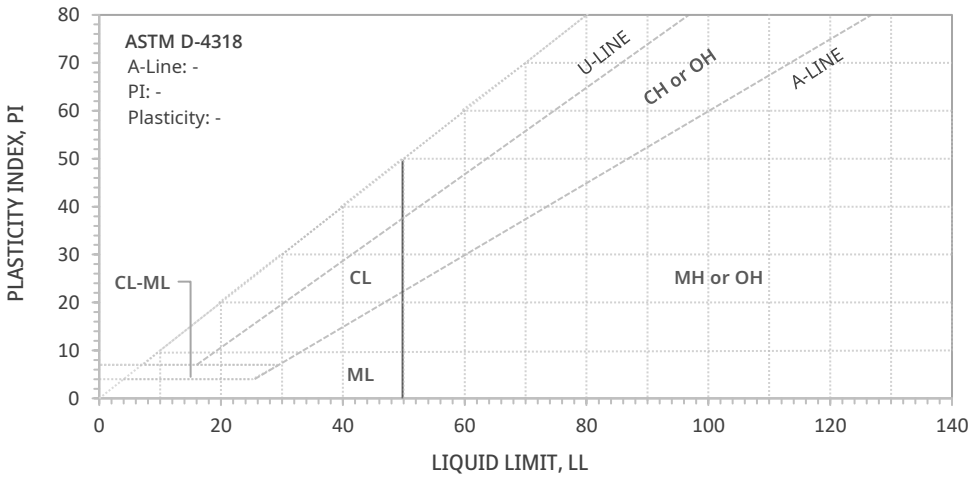
Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	100.0
1"	25.4	70.2
3/4"	19.0	70.2
1/2"	12.7	52.7
3/8"	9.51	46.1
#4	4.75	42.0
#10	2.00	36.7
#20	0.85	32.4
#40	0.42	26.3
#60	0.25	19.3
#100	0.147	16.2
#200	0.074	12.3

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
29.8	28.2	= 58.0	5.3	10.4	14.0	= 29.7	

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Brown clayey GRAVEL with sand

WC -

OM -

+ 3/8" 53.9%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

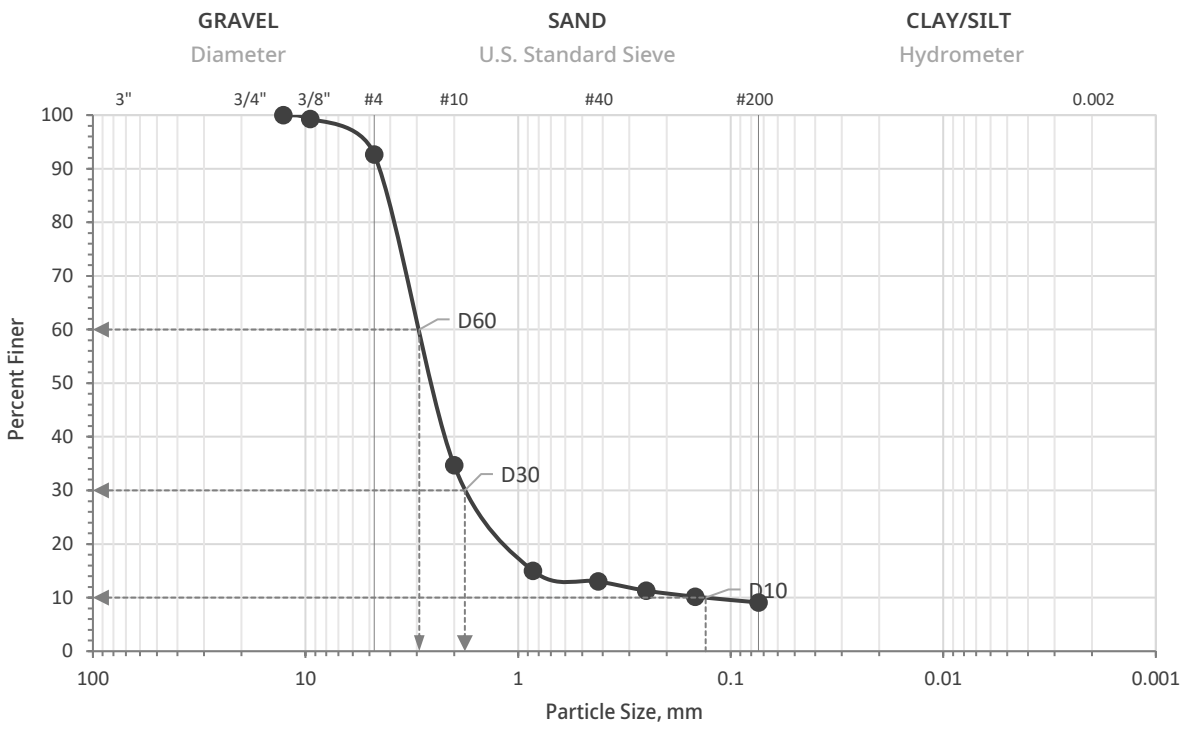
Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-16A	16D TOP	59.5'	61'

Location: -

Sample Date: -

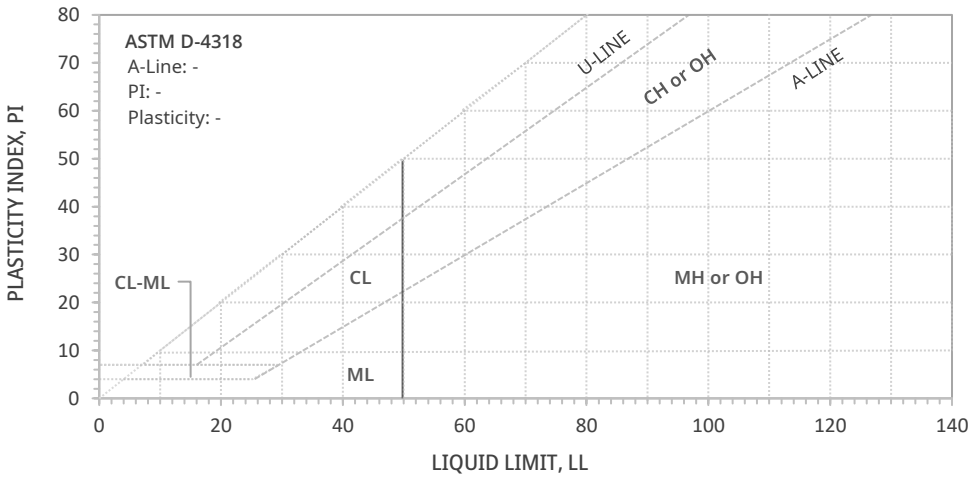
ASTM D-6913



Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	100.0
3/8"	9.51	99.3
#4	4.75	92.7
#10	2.00	34.7
#20	0.85	15.0
#40	0.42	13.0
#60	0.25	11.3
#100	0.147	10.2
#200	0.074	9.1

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
0.0	7.3	7.3	58.0	21.7	3.9	83.6	

D10	0.1311		
D30	1.7800	CC	8.286
D60	2.9164	CU	22.24



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487)	AASHTO M-145
-	-

Visual Soil Description

Brown poorly-graded SAND with silt

WC	-	Data 1	-	Data 4	-
OM	-	Data 2	-	Data 5	-
		Data 3	-	Data 6	-
+ 3/8"	0.7%				

Alexandria Waterfront Implementation Project

Project Number: 14123

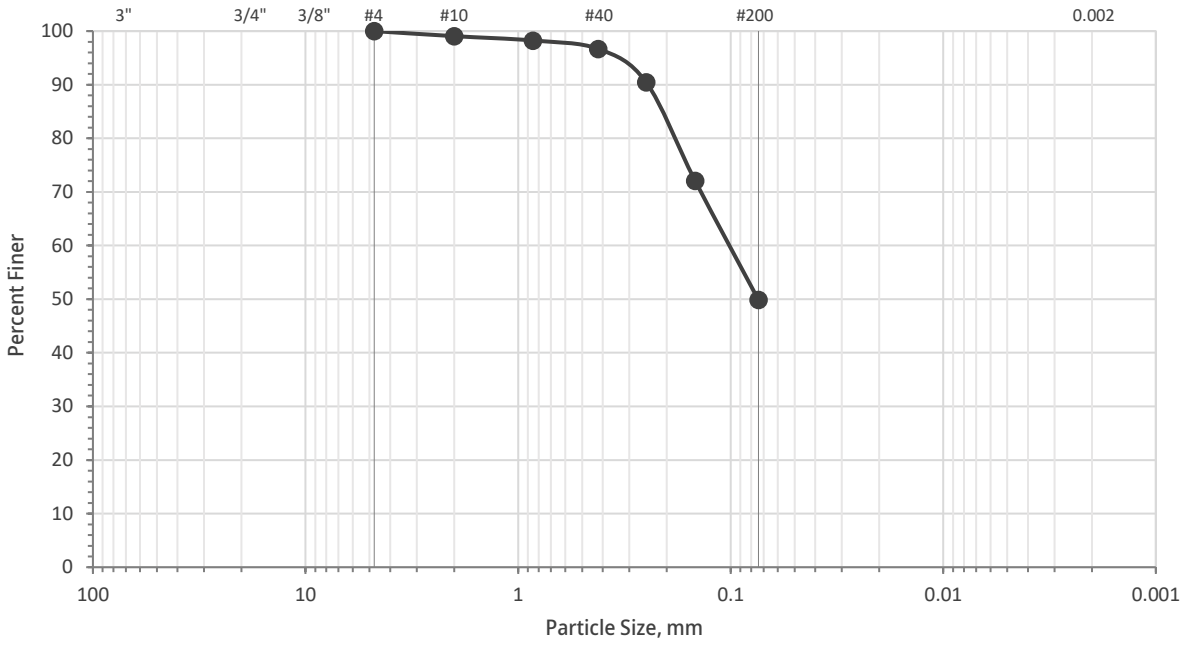
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-20	16D	63.5'	65'

Location: -

Sample Date: -



ASTM D-6913

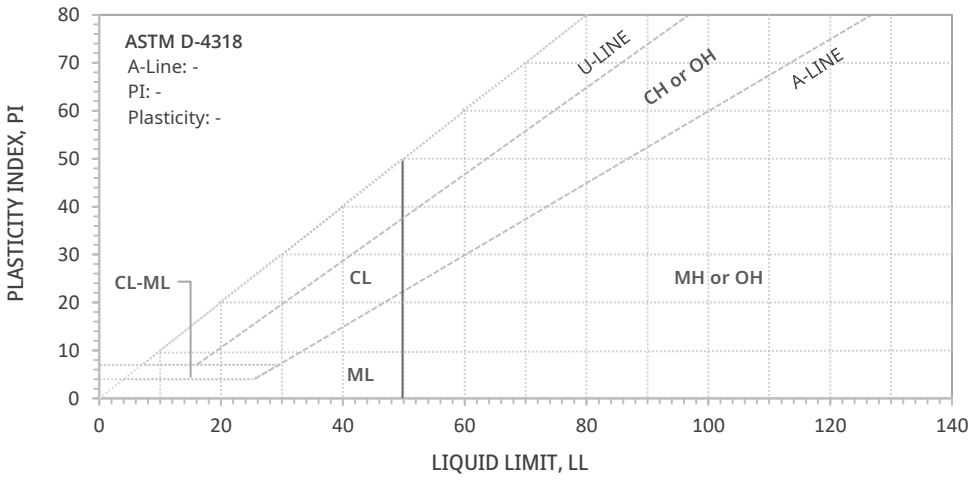
Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	99.1
#20	0.85	98.2
#40	0.42	96.7
#60	0.25	90.5
#100	0.147	72.1
#200	0.074	49.9

% Gravel			% Sand				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	
0.0	0.0	= 0.0	0.9	2.4	46.8	= 50.1	

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Dark green silty SAND

WC 23.3%

OM -

+ 3/8" 0.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

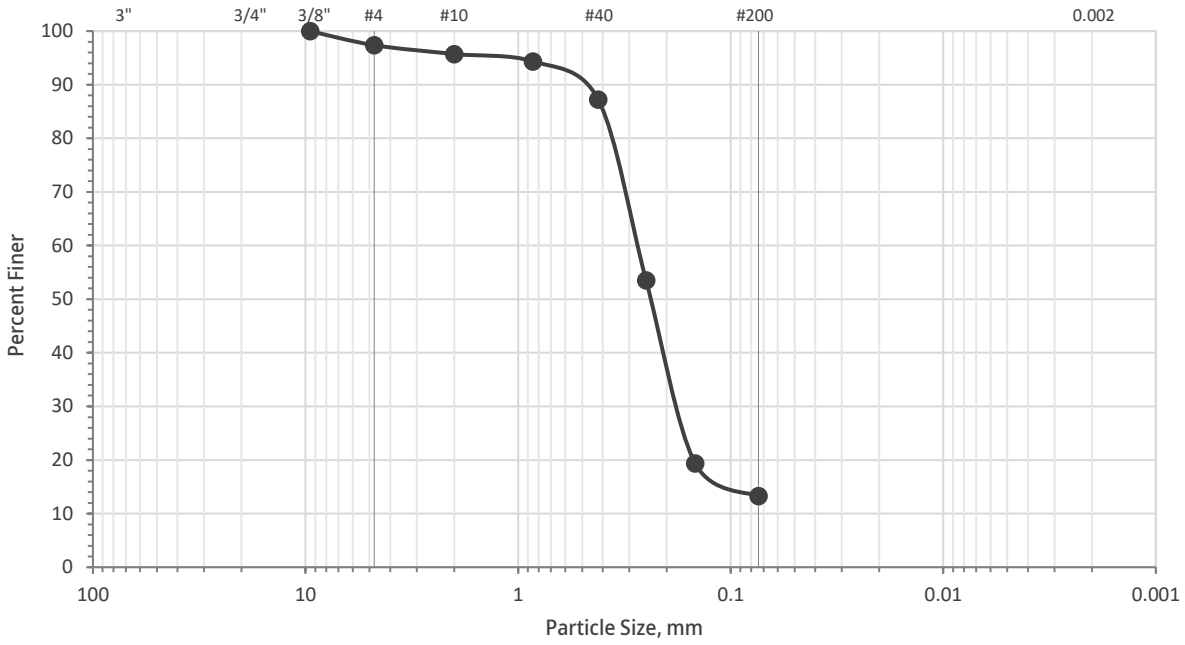
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-20	17D	68.5'	70'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	100.0
#4	4.75	97.4
#10	2.00	95.7
#20	0.85	94.3
#40	0.42	87.2
#60	0.25	53.5
#100	0.147	19.4
#200	0.074	13.3

% Gravel

Coarse	Fine		Total
0.0	2.6	=	2.6

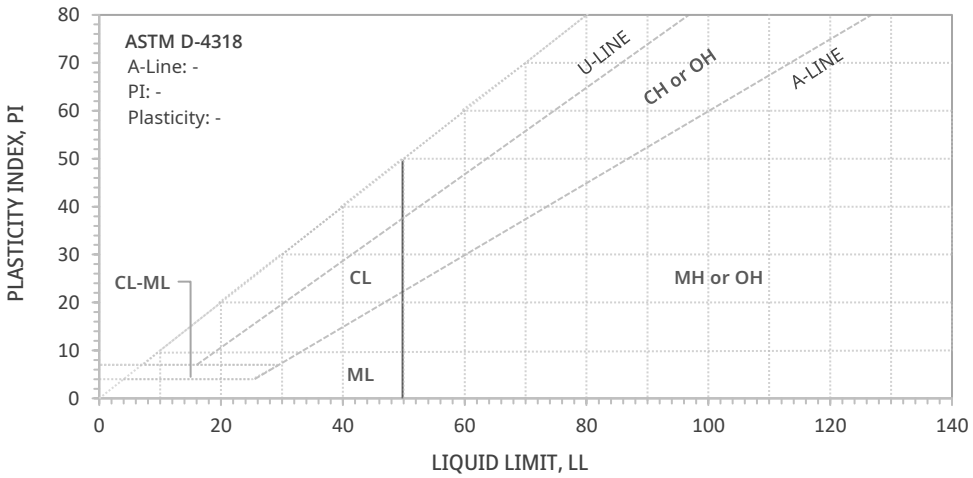
% Sand

Coarse	Medium	Fine		Total
1.7	8.5	73.9	=	84.1

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Dark greenish-brown silty SAND

WC 24.7%

OM -

+ 3/8" 0.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

05/31/21 Tested by: ST/JT Reviewed by: FF Jay Kay Testing, Inc.

Alexandria Waterfront Implementation Project

Project Number: 14123

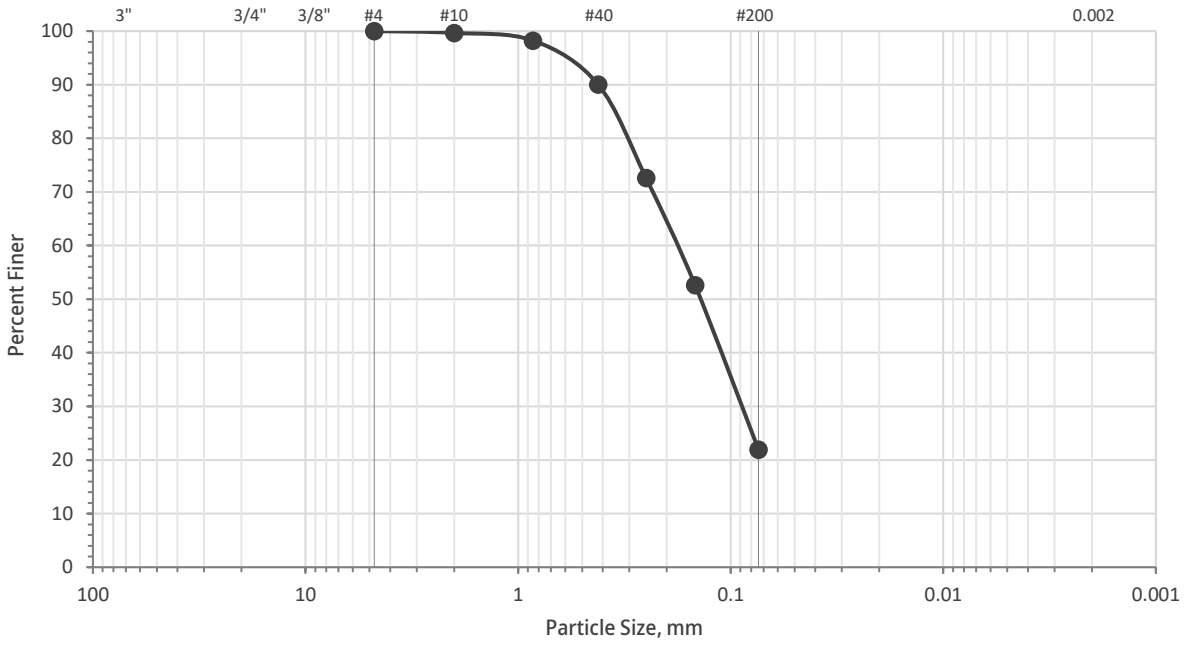
DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-04	16D	63.5'	65'

Location: -

Sample Date: -



ASTM D-6913

Sieve	Size	Pass, %
-	*mm*	%
6"	150.0	-
3"	75.0	-
2"	50.8	-
1.5"	37.5	-
1"	25.4	-
3/4"	19.0	-
1/2"	12.7	-
3/8"	9.51	-
#4	4.75	100.0
#10	2.00	99.7
#20	0.85	98.2
#40	0.42	90.0
#60	0.25	72.6
#100	0.147	52.6
#200	0.074	21.9

% Gravel

Coarse	Fine		Total
0.0	0.0	=	0.0

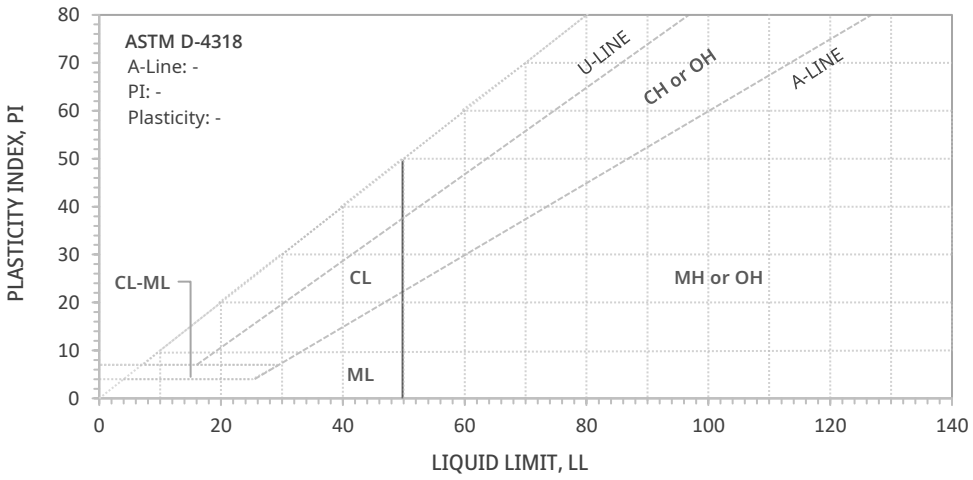
% Sand

Coarse	Medium	Fine		Total
0.3	9.7	68.1	=	78.1

D10 -

D30 - CC -

D60 - CU -



Liquid Limit, % -

Plastic Limit, % -

Plasticity Index, % -

USCS (D-2487): -

AASHTO M-145: -

Visual Soil Description

Brown silty SAND

WC -

OM -

+ 3/8" 0.0%

Data 1 -

Data 2 -

Data 3 -

Data 4 -

Data 5 -

Data 6 -

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
BH-04	Bulk Composite	0'	8.5'

Location: -

Sample Date: -

Moisture-Density Relationship of Soils

STANDARD PROCTOR

Test Method: ASTM D-698 (B)

Percent oversize particles: 20.0%

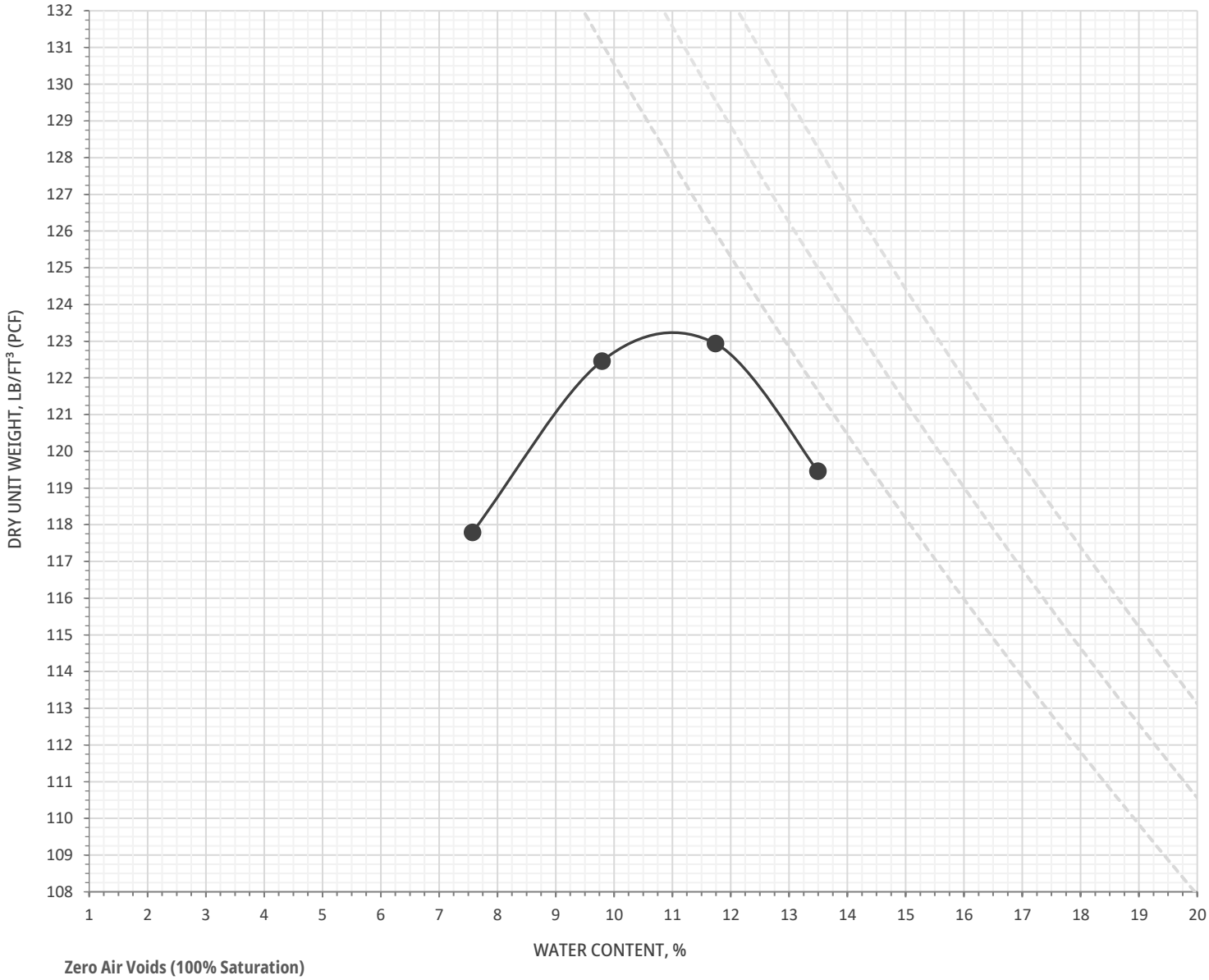
Oversized particles sieve: 3/8-in.

Threshold for correction: > 5.0%

	Uncorrected	*Corrected**
Maximum dry unit weight, lb/ft³	123.2	129.4
Optimum water content	11.0%	9.2%

*Corrected for 20.0% oversized particles retained on the 3/8-in. sieve

Maximum Dry Unit Weight	Optimum Water Content
129.4	9.2%
lb/ft³ (PCF)	



Zero Air Voids (100% Saturation)

Zero air voids curves 2.65, 2.75, 2.85

WC	LL	PL	PI	% Fines	USCS	AASHTO	Soil Description (D-2487)
-	23%	22%	1%	12.0	SW-SM	A-1-b	Brown well-graded SAND with silt and gravel

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-10	Bulk	0'	6'

Location: -

Sample Date: -

Moisture-Density Relationship of Soils

STANDARD PROCTOR

Test Method: ASTM D-698 (B)

Percent oversize particles: 17.2%

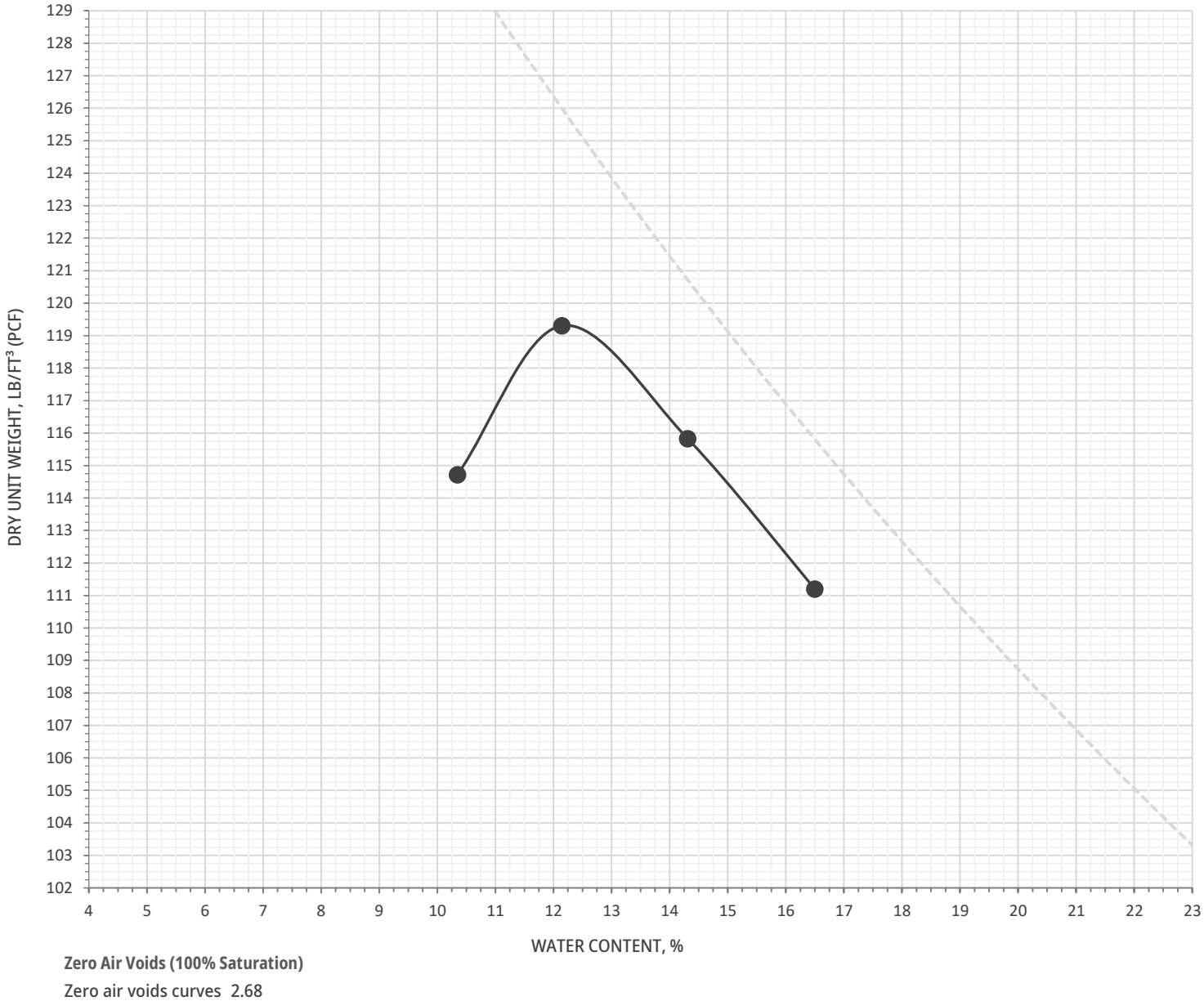
Oversized particles sieve: 3/8-in.

Threshold for correction: > 5.0%

	Uncorrected	*Corrected**
Maximum dry unit weight, lb/ft³	119.3	125.0
Optimum water content	12.1%	10.4%

*Corrected for 17.2% oversized particles retained on the 3/8-in. sieve

Maximum Dry Unit Weight	Optimum Water Content
125.0 lb/ft³ (PCF)	10.4%



Zero Air Voids (100% Saturation)

Zero air voids curves 2.68

WC	LL	PL	PI	% Fines	USCS	AASHTO	Soil Description (D-2487)
6.1%	35%	22%	13%	22.1	SC	A-2-6	Dark brown clayey SAND with gravel

12/27/21 Tested by: ST/JT Reviewed by: FF Jay Kay Testing, Inc.

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-11	Bulk Composite	0'	8'

Location: -

Sample Date: -

Moisture-Density Relationship of Soils

STANDARD PROCTOR

Test Method: ASTM D-698 (B)

Percent oversize particles: 6.2%

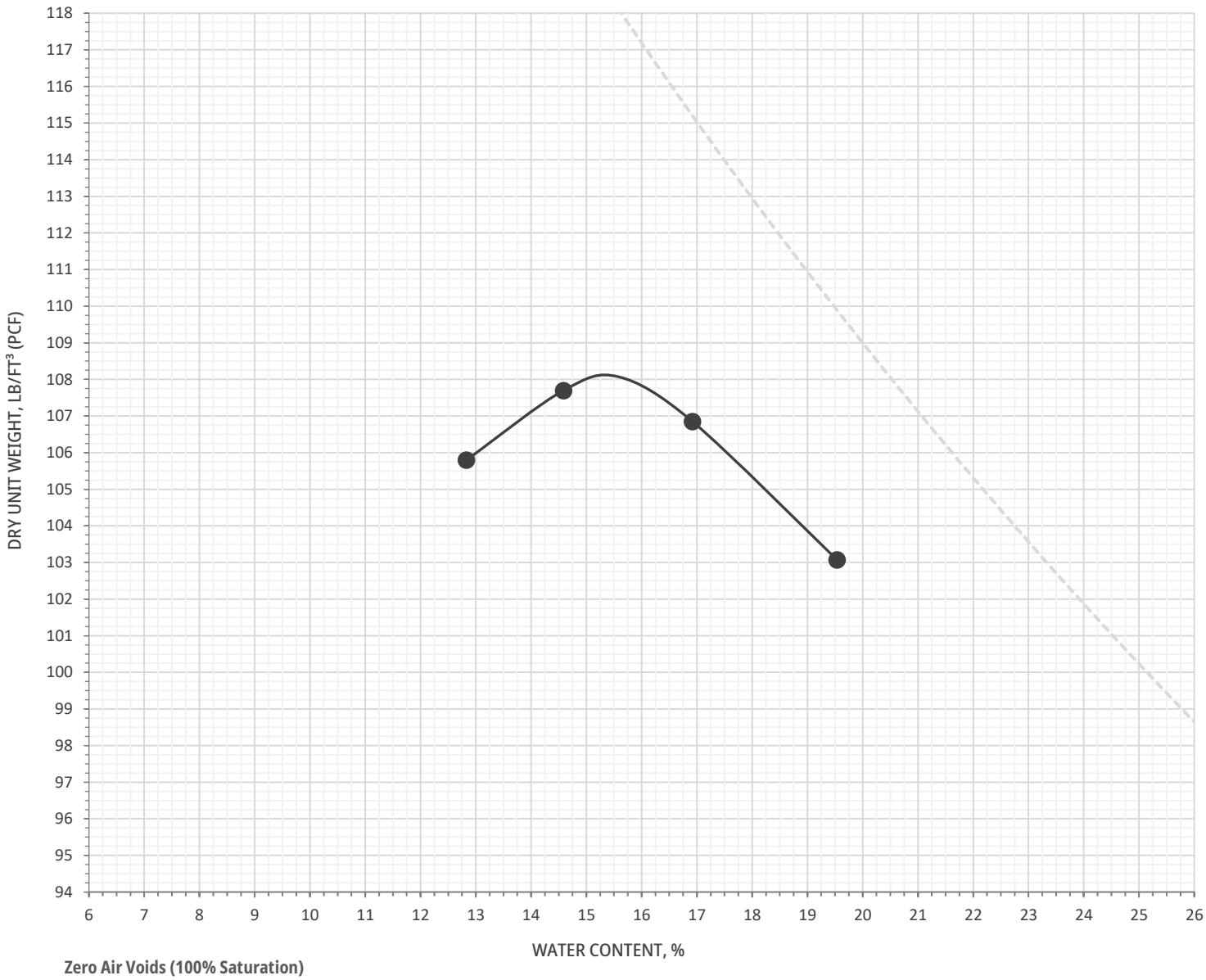
Oversized particles sieve: 3/8-in.

Threshold for correction: > 5.0%

	Uncorrected	*Corrected**
Maximum dry unit weight, lb/ft³	108.1	110.4
Optimum water content	15.3%	14.5%

*Corrected for 6.2% oversized particles retained on the 3/8-in. sieve

Maximum Dry Unit Weight	Optimum Water Content
110.4	14.5%
lb/ft³ (PCF)	



Zero Air Voids (100% Saturation)

Zero air voids curves 2.69

WC	LL	PL	PI	% Fines	USCS	AASHTO	Soil Description (D-2487)
-	34%	23%	11%	42.4	SC	A-6	Dark gray clayey SAND with gravel

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
GI-14A-B	Bulk-1	0'	4'

Location: -

Sample Date: -

Moisture-Density Relationship of Soils

STANDARD PROCTOR

Test Method: ASTM D-698 (B)

Percent oversize particles: 1.1%

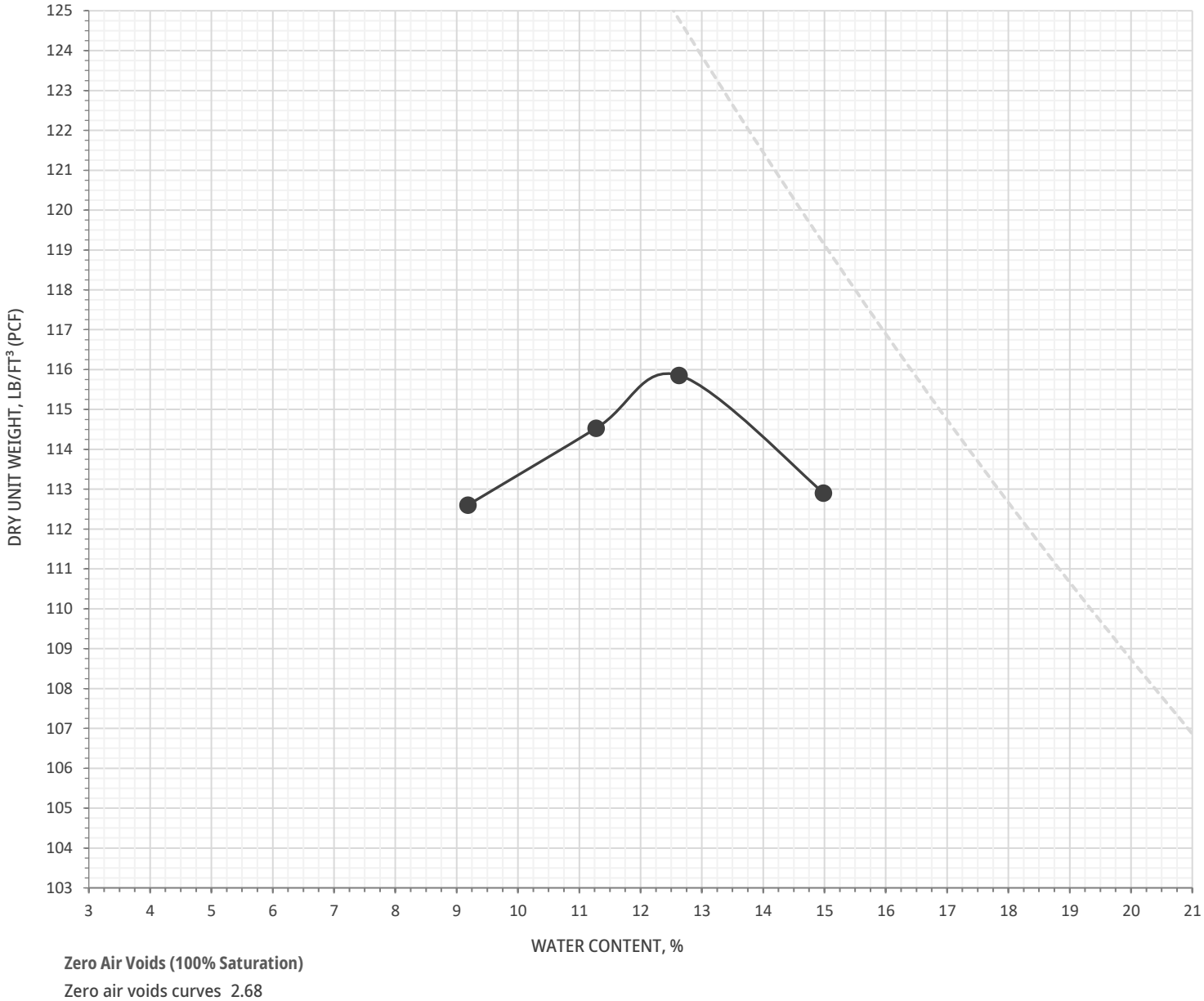
Oversized particles sieve: 3/8-in.

Threshold for correction: > 5.0%

	Uncorrected	*Corrected**
Maximum dry unit weight, lb/ft³	115.9	-
Optimum water content	12.4%	-

*Threshold not met for oversized particle correction

Maximum Dry Unit Weight	Optimum Water Content
115.9	12.4%
lb/ft³ (PCF)	



Zero Air Voids (100% Saturation)

Zero air voids curves 2.68

WC	LL	PL	PI	% Fines	USCS	AASHTO	Soil Description (D-2487)
17.0%	30%	16%	14%	69.4	CL	A-6	Brown sandy lean CLAY

Alexandria Waterfront Implementation Project

Project Number: 14123

DRAFT

Jay Kay Testing, Inc.

Boring ID	Sample ID	Top	Btm
PS-02	Bulk Composite	0'	8'

Location: -

Sample Date: -

Moisture-Density Relationship of Soils

STANDARD PROCTOR

Test Method: ASTM D-698 (B)

Percent oversize particles: 19.4%

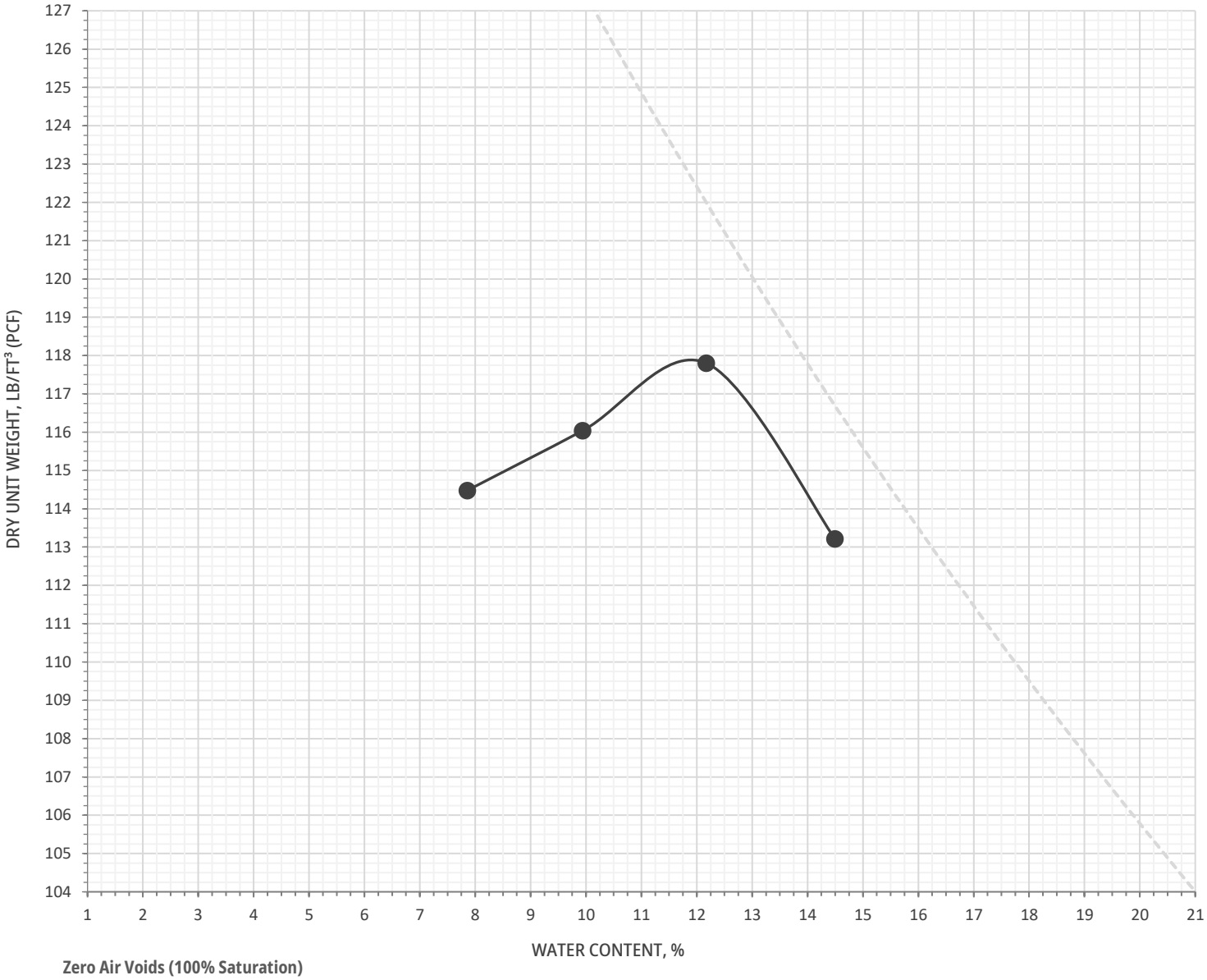
Oversized particles sieve: 3/8-in.

Threshold for correction: > 5.0%

	Uncorrected	*Corrected**
Maximum dry unit weight, lb/ft³	117.9	124.5
Optimum water content	11.9%	10.0%

*Corrected for 19.4% oversized particles retained on the 3/8-in. sieve

Maximum Dry Unit Weight	Optimum Water Content
124.5	10.0%
lb/ft³ (PCF)	



Zero Air Voids (100% Saturation)

Zero air voids curves 2.57

WC	LL	PL	PI	% Fines	USCS	AASHTO	Soil Description (D-2487)
-	29%	19%	10%	20.1	SC	A-2-4	Gray/black clayey SAND with gravel

MUESER RUTLEDGE CONSULTING ENGINEERS

DRAFT

File	14123
Boring No.	BH-15
Sample No.	9U

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

Perf by:	SJ	Date: 11/23/21
Calc by:	SJ	Date: 11/24/21
Ch'kd by:	YO	Date: 11/24/21

TEST SUMMARY

Compressive Strength =	**0.39 tsf**	**5.5 psi**	
Strain at Failure =	**12.5 %**		
Cell Pressure =	**8.12 psi**	**0.58 tsf**	**56 kPa**
Dry Density =	**69.43**	**pcf**	

USC Group Symbol = **OH**

In Situ Density = **104.78** **pcf**

SAMPLE DATA

Initial Height =	5.54 in
Initial Diameter =	2.84 in
Initial Area =	6.35 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012	in
Weight of piston+gage+clamp =	352.00	gm
Weight of end cap =	108.83	gm
Correction for membrane =	-0.019	tsf
Correction for end cap+assembly =	0.003	tsf

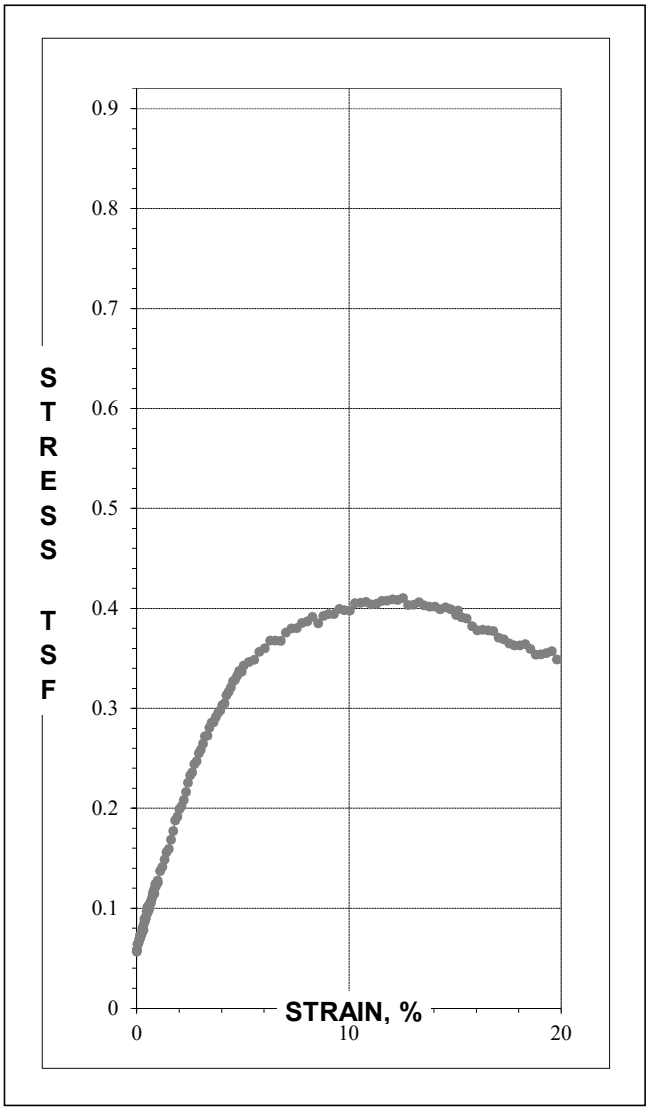
TEST CONSTANTS

Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		BBB
Wet + Tare	968.66	1067.92
Dry + Tare		742.84
Water	326.83	325.08
Tare		101.01
Sample Dry	641.83	641.83
Water Content	50.9%	50.6%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	9.08	0.00	0.00	0.06
0.03	9.21	0.00	0.02	0.06
0.05	9.71	0.00	0.04	0.06
0.08	9.74	0.00	0.07	0.06
0.12	9.98	0.01	0.11	0.07
0.13	10.23	0.01	0.13	0.07
0.17	10.54	0.01	0.15	0.07
0.18	10.29	0.01	0.18	0.07
0.22	10.49	0.01	0.20	0.07
0.23	10.69	0.01	0.23	0.07
0.27	10.76	0.01	0.25	0.08
0.28	11.13	0.02	0.28	0.08
0.32	11.22	0.02	0.30	0.08
0.33	11.02	0.02	0.33	0.08
0.37	11.60	0.02	0.35	0.08
0.38	11.98	0.02	0.38	0.09
0.42	11.83	0.02	0.40	0.09
0.43	12.05	0.02	0.43	0.09
0.47	12.20	0.03	0.45	0.09
0.48	12.67	0.03	0.48	0.10
0.52	13.03	0.03	0.50	0.10
0.53	12.55	0.03	0.53	0.10
0.57	13.15	0.03	0.55	0.10
0.58	12.85	0.03	0.58	0.10
0.62	13.01	0.03	0.60	0.10
0.63	13.33	0.03	0.63	0.10
0.67	13.51	0.04	0.65	0.11
0.68	13.42	0.04	0.68	0.10
0.72	13.70	0.04	0.70	0.11
0.73	13.90	0.04	0.73	0.11
0.77	14.21	0.04	0.76	0.11
0.80	14.49	0.04	0.79	0.12
0.82	14.40	0.04	0.81	0.12
0.85	14.27	0.05	0.83	0.11
0.87	14.78	0.05	0.86	0.12
0.90	15.12	0.05	0.88	0.12



ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.92	14.94	0.05	0.91	0.12
0.95	15.18	0.05	0.93	0.12
0.97	15.24	0.05	0.96	0.13
1.00	15.45	0.05	0.98	0.13
1.02	15.28	0.06	1.01	0.13
1.12	16.33	0.06	1.12	0.14
1.22	16.71	0.07	1.21	0.14
1.32	17.37	0.07	1.32	0.15
1.42	18.05	0.08	1.41	0.16
1.52	18.34	0.08	1.52	0.16
1.62	19.19	0.09	1.61	0.17
1.72	19.98	0.10	1.72	0.18
1.83	20.95	0.10	1.82	0.19
1.93	21.32	0.11	1.92	0.19
2.03	22.00	0.11	2.02	0.20
2.13	22.31	0.12	2.12	0.20
2.23	22.87	0.12	2.22	0.21
2.33	23.62	0.13	2.32	0.22
2.43	24.47	0.13	2.42	0.23
2.53	25.16	0.14	2.53	0.23
2.63	25.44	0.15	2.62	0.24
2.73	26.21	0.15	2.73	0.24
2.83	26.52	0.16	2.82	0.25
2.93	27.26	0.16	2.93	0.25
3.03	27.59	0.17	3.02	0.26
3.13	28.18	0.17	3.13	0.26
3.23	28.86	0.18	3.22	0.27
3.33	28.97	0.18	3.33	0.27
3.43	29.73	0.19	3.43	0.28
3.53	30.23	0.20	3.53	0.29
3.63	30.28	0.20	3.63	0.29
3.73	30.77	0.21	3.74	0.29
3.83	31.18	0.21	3.83	0.30
3.95	31.46	0.22	3.94	0.30
4.05	31.94	0.22	4.03	0.30
4.15	32.15	0.23	4.14	0.30
4.25	32.93	0.23	4.23	0.31
4.35	33.27	0.24	4.34	0.32
4.45	33.72	0.25	4.43	0.32
4.55	34.32	0.25	4.54	0.33
4.65	34.48	0.26	4.64	0.33
4.75	34.90	0.26	4.75	0.33
4.85	35.34	0.27	4.84	0.34
4.95	35.33	0.27	4.95	0.34
5.05	35.93	0.28	5.04	0.34
5.30	36.33	0.29	5.29	0.35
5.55	36.64	0.31	5.54	0.35
5.80	37.48	0.32	5.79	0.36
6.05	37.89	0.33	6.04	0.36
6.30	38.71	0.35	6.29	0.37
6.55	38.79	0.36	6.54	0.37
6.80	38.86	0.38	6.79	0.37
7.05	39.73	0.39	7.04	0.38
7.30	40.22	0.40	7.29	0.38
7.55	40.36	0.42	7.54	0.38
7.80	40.94	0.43	7.79	0.39
8.05	41.22	0.45	8.04	0.39

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
8.30	41.73	0.46	8.29	0.39
8.55	41.21	0.47	8.55	0.38
8.80	42.03	0.49	8.80	0.39
9.05	42.34	0.50	9.05	0.39
9.30	42.43	0.52	9.30	0.39
9.55	43.04	0.53	9.55	0.40
9.80	43.01	0.54	9.80	0.40
10.05	43.11	0.56	10.05	0.40
10.30	43.92	0.57	10.30	0.40
10.55	44.08	0.58	10.55	0.41
10.80	44.28	0.60	10.80	0.41
11.05	44.13	0.61	11.05	0.40
11.32	44.33	0.63	11.31	0.40
11.57	44.71	0.64	11.55	0.41
11.82	44.88	0.65	11.80	0.41
12.07	45.11	0.67	12.05	0.41
12.32	45.15	0.68	12.30	0.41
12.57	45.49	0.70	12.55	0.41
12.82	44.88	0.71	12.80	0.40
13.07	45.04	0.72	13.05	0.40
13.32	45.40	0.74	13.30	0.41
13.57	45.19	0.75	13.55	0.40
13.82	45.20	0.77	13.81	0.40
14.07	45.32	0.78	14.06	0.40
14.32	45.18	0.79	14.31	0.40
14.57	45.50	0.81	14.56	0.40
14.82	45.40	0.82	14.81	0.40
15.07	44.92	0.83	15.06	0.39
15.15	45.43	0.84	15.15	0.40
15.32	44.81	0.85	15.30	0.39
15.57	44.80	0.86	15.56	0.39
15.82	44.13	0.88	15.81	0.38
16.07	43.81	0.89	16.05	0.38
16.32	43.98	0.90	16.30	0.38
16.57	44.04	0.92	16.56	0.38
16.82	44.11	0.93	16.81	0.38
17.07	43.50	0.95	17.06	0.37
17.32	43.43	0.96	17.31	0.37
17.57	43.11	0.97	17.56	0.36
17.82	43.05	0.99	17.81	0.36
18.07	43.16	1.00	18.06	0.36
18.32	43.40	1.01	18.31	0.36
18.57	43.02	1.03	18.55	0.36
18.82	42.50	1.04	18.80	0.35
19.07	42.64	1.06	19.06	0.35
19.32	42.93	1.07	19.31	0.36
19.57	43.24	1.08	19.56	0.36
19.82	42.44	1.10	19.81	0.35
20.02	42.76	1.11	20.01	0.35

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

MUESER RUTLEDGE CONSULTING ENGINEERS

DRAFT

File	14123
Boring No.	BH-15
Sample No.	11U

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

Perf by:	SJ	Date:	11/23/21
Calc by:	SJ	Date:	11/24/21
Ch'kd by:	YO	Date:	11/24/21

TEST SUMMARY

Compressive Strength =	**0.55 tsf**	**7.7 psi**	
Strain at Failure =	**10.1 %**		
Cell Pressure =	**10.49 psi**	**0.75 tsf**	**72 kPa**
Dry Density =	**66.02**	**pcf**	

USC Group Symbol = **OH**

In Situ Density = **103.69** **pcf**

SAMPLE DATA

Initial Height =	5.55	in
Initial Diameter =	2.83	in
Initial Area =	6.31	sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012	in
Weight of piston+gage+clamp =	352.00	gm
Weight of end cap =	109.15	gm
Correction for membrane =	-0.015	tsf
Correction for end cap+assembly =	0.003	tsf

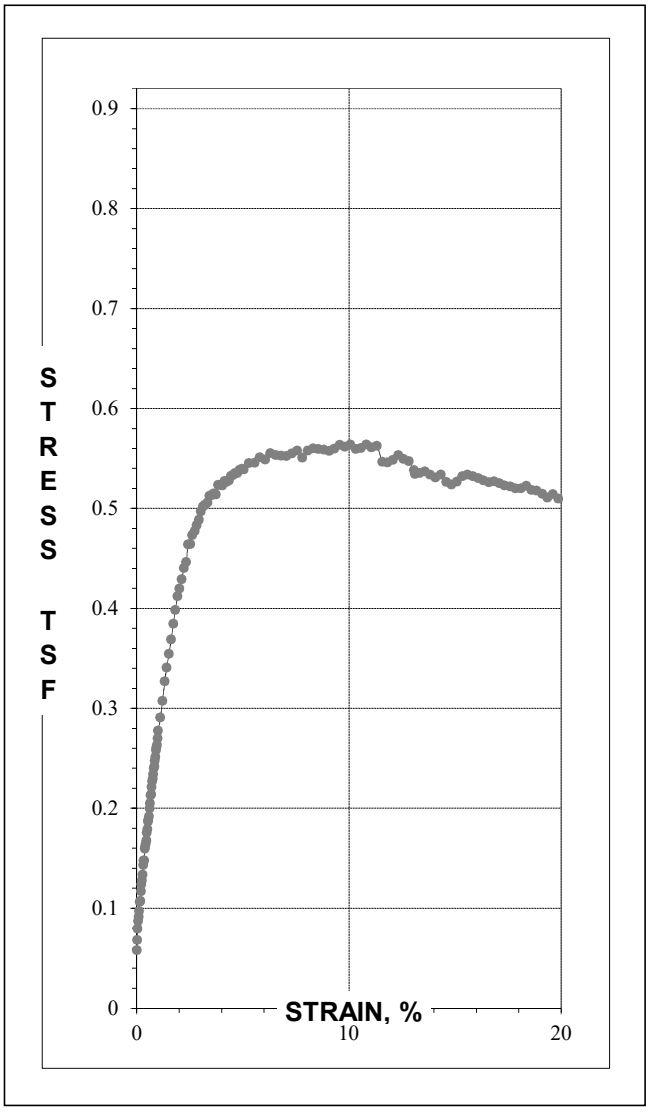
TEST CONSTANTS

Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		Y
Wet + Tare	952.45	1048.15
Dry + Tare		703.46
Water	345.96	344.69
Tare		96.97
Sample Dry	606.49	606.49
Water Content	57.0%	56.8%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	7.92	0.00	0.00	0.06
0.03	8.83	0.00	0.02	0.07
0.07	9.82	0.00	0.05	0.08
0.08	10.50	0.00	0.07	0.09
0.12	10.86	0.01	0.09	0.09
0.13	11.36	0.01	0.12	0.10
0.17	12.17	0.01	0.15	0.11
0.18	12.26	0.01	0.17	0.11
0.22	13.11	0.01	0.20	0.12
0.23	13.73	0.01	0.22	0.12
0.27	14.07	0.01	0.25	0.13
0.28	14.58	0.02	0.28	0.13
0.32	15.43	0.02	0.31	0.14
0.35	15.82	0.02	0.33	0.15
0.37	15.83	0.02	0.35	0.15
0.40	16.87	0.02	0.38	0.16
0.42	17.07	0.02	0.40	0.16
0.45	17.32	0.02	0.43	0.16
0.47	17.63	0.03	0.46	0.17
0.50	18.30	0.03	0.48	0.18
0.52	18.63	0.03	0.51	0.18
0.55	19.29	0.03	0.53	0.19
0.57	19.46	0.03	0.56	0.19
0.60	19.76	0.03	0.58	0.19
0.62	20.47	0.03	0.61	0.20
0.65	20.93	0.04	0.63	0.21
0.67	21.63	0.04	0.66	0.21
0.70	21.73	0.04	0.68	0.21
0.72	22.39	0.04	0.71	0.22
0.75	22.88	0.04	0.73	0.23
0.77	23.13	0.04	0.76	0.23
0.80	23.52	0.04	0.78	0.23
0.82	24.07	0.04	0.81	0.24
0.85	24.22	0.05	0.83	0.24
0.87	24.71	0.05	0.86	0.25
0.90	25.07	0.05	0.88	0.25



ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.92	25.68	0.05	0.91	0.26
0.95	25.90	0.05	0.93	0.26
0.97	26.15	0.05	0.96	0.26
1.00	26.73	0.05	0.98	0.27
1.02	27.42	0.06	1.01	0.28
1.12	28.61	0.06	1.11	0.29
1.22	30.12	0.07	1.21	0.31
1.33	31.88	0.07	1.32	0.33
1.43	33.12	0.08	1.41	0.34
1.53	34.39	0.08	1.52	0.35
1.63	35.69	0.09	1.61	0.37
1.73	37.13	0.10	1.72	0.38
1.83	38.39	0.10	1.81	0.40
1.93	39.67	0.11	1.92	0.41
2.03	40.40	0.11	2.02	0.42
2.13	41.25	0.12	2.12	0.43
2.23	42.30	0.12	2.22	0.44
2.33	42.90	0.13	2.33	0.45
2.43	44.51	0.13	2.42	0.46
2.53	44.59	0.14	2.53	0.46
2.63	45.45	0.15	2.62	0.47
2.73	45.86	0.15	2.73	0.48
2.83	46.42	0.16	2.82	0.48
2.93	46.94	0.16	2.93	0.49
3.03	47.76	0.17	3.03	0.50
3.13	48.27	0.17	3.13	0.50
3.23	48.45	0.18	3.23	0.50
3.35	48.70	0.18	3.33	0.51
3.45	49.37	0.19	3.43	0.51
3.55	49.47	0.20	3.54	0.51
3.65	49.66	0.20	3.63	0.51
3.75	49.63	0.21	3.74	0.51
3.85	50.56	0.21	3.83	0.52
3.95	50.61	0.22	3.94	0.52
4.05	50.59	0.22	4.03	0.52
4.15	51.04	0.23	4.14	0.53
4.25	51.03	0.23	4.23	0.53
4.35	51.21	0.24	4.34	0.53
4.45	51.67	0.25	4.44	0.53
4.55	51.82	0.25	4.54	0.53
4.65	52.04	0.26	4.64	0.54
4.75	52.11	0.26	4.75	0.54
4.85	52.44	0.27	4.84	0.54
4.95	52.58	0.27	4.95	0.54
5.05	52.58	0.28	5.04	0.54
5.30	53.29	0.29	5.29	0.55
5.57	53.47	0.31	5.55	0.55
5.82	54.10	0.32	5.80	0.55
6.07	54.03	0.34	6.05	0.55
6.32	54.76	0.35	6.30	0.56
6.57	54.72	0.36	6.55	0.55
6.82	54.81	0.38	6.81	0.55
7.07	54.93	0.39	7.06	0.55
7.32	55.31	0.41	7.30	0.55
7.57	55.71	0.42	7.56	0.56
7.82	55.20	0.43	7.81	0.55
8.07	56.02	0.45	8.06	0.56

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
8.32	56.38	0.46	8.32	0.56
8.57	56.44	0.47	8.56	0.56
8.82	56.55	0.49	8.81	0.56
9.08	56.57	0.50	9.07	0.56
9.33	56.94	0.52	9.32	0.56
9.58	57.45	0.53	9.56	0.56
9.83	57.42	0.54	9.81	0.56
10.08	57.80	0.56	10.07	0.56
10.33	57.50	0.57	10.31	0.56
10.58	57.74	0.59	10.56	0.56
10.83	58.25	0.60	10.81	0.56
11.08	58.11	0.61	11.06	0.56
11.33	58.44	0.63	11.32	0.56
11.58	57.01	0.64	11.57	0.55
11.83	57.10	0.66	11.82	0.55
12.08	57.50	0.67	12.07	0.55
12.33	58.16	0.68	12.33	0.55
12.58	57.93	0.70	12.57	0.55
12.83	57.85	0.71	12.82	0.55
13.08	57.12	0.72	13.07	0.54
13.12	56.75	0.73	13.11	0.53
13.33	56.97	0.74	13.33	0.54
13.58	57.29	0.75	13.58	0.54
13.83	57.11	0.77	13.82	0.53
14.08	56.97	0.78	14.07	0.53
14.35	57.46	0.80	14.34	0.53
14.60	56.84	0.81	14.58	0.53
14.85	56.74	0.82	14.83	0.52
15.10	57.21	0.84	15.09	0.53
15.35	57.92	0.85	15.34	0.53
15.60	58.24	0.86	15.58	0.53
15.85	58.25	0.88	15.84	0.53
16.10	58.21	0.89	16.09	0.53
16.35	58.16	0.91	16.34	0.53
16.60	58.12	0.92	16.59	0.53
16.85	58.37	0.93	16.83	0.53
17.10	58.34	0.95	17.09	0.53
17.35	58.27	0.96	17.33	0.52
17.60	58.33	0.98	17.60	0.52
17.85	58.32	0.99	17.84	0.52
18.12	58.47	1.00	18.10	0.52
18.37	58.94	1.02	18.35	0.52
18.62	58.64	1.03	18.60	0.52
18.87	58.76	1.05	18.85	0.52
19.12	58.60	1.06	19.11	0.51
19.37	58.33	1.07	19.36	0.51
19.62	58.89	1.09	19.60	0.51
19.87	58.59	1.10	19.86	0.51
20.03	58.39	1.11	20.03	0.51

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

MUESER RUTLEDGE CONSULTING ENGINEERS

DRAFT

File	14123
Boring No.	BH-15
Sample No.	15U

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

Perf by:	SJ	Date: 11/23/21
Calc by:	SJ	Date: 11/24/21
Ch'kd by:	YO	Date: 11/24/21

TEST SUMMARY

Compressive Strength =	**0.78 tsf**	**10.9 psi**	
Strain at Failure =	**11.0 %**		
Cell Pressure =	**15.21 psi**	**1.10 tsf**	**105 kPa**
Dry Density =	**78.17**	**pcf**	

USC Group Symbol = **OL-CL**

In Situ Density = **110.54** **pcf**

SAMPLE DATA

Initial Height =	5.57 in
Initial Diameter =	2.85 in
Initial Area =	6.39 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012 in
Weight of piston+gage+clamp =	352.00 gm
Weight of end cap =	108.83 gm
Correction for membrane =	-0.017 tsf
Correction for end cap+assembly =	0.003 tsf

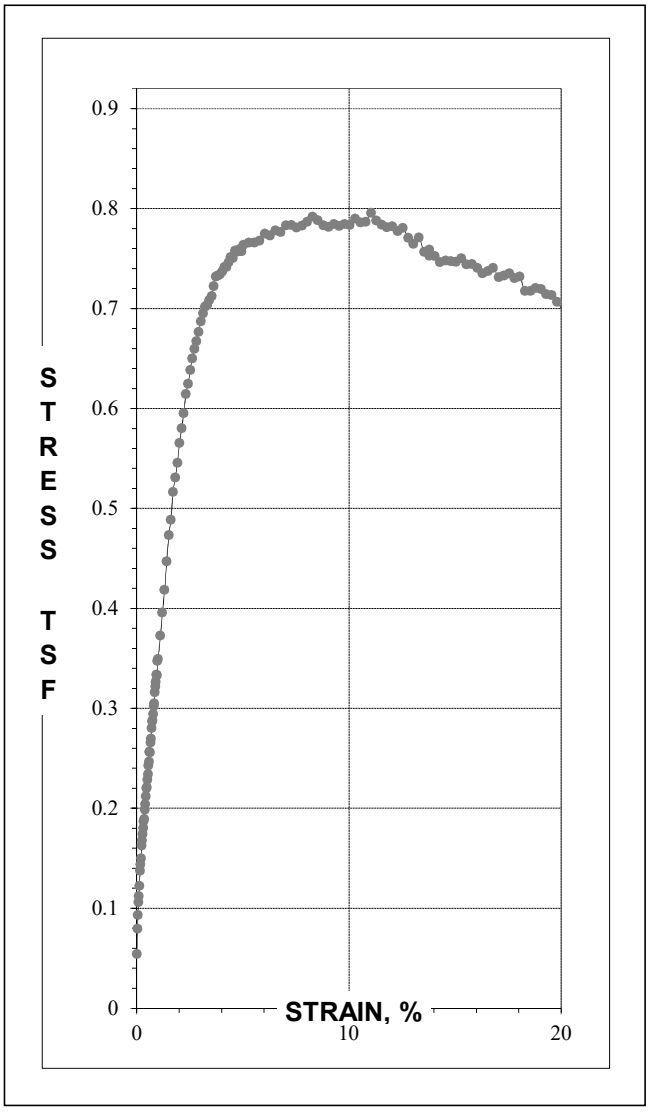
TEST CONSTANTS

Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		ZX
Wet + Tare	1032.31	1129.11
Dry + Tare		828.36
Water	302.28	300.75
Tare		98.33
Sample Dry	730.03	730.03
Water Content	41.4%	41.2%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	7.66	0.00	0.00	0.05
0.03	9.91	0.00	0.03	0.08
0.07	11.13	0.00	0.06	0.09
0.08	12.26	0.00	0.08	0.11
0.12	12.82	0.01	0.11	0.11
0.13	13.73	0.01	0.13	0.12
0.17	15.05	0.01	0.15	0.14
0.18	15.63	0.01	0.18	0.14
0.22	16.16	0.01	0.20	0.15
0.23	17.32	0.01	0.23	0.16
0.27	17.78	0.01	0.25	0.17
0.28	18.34	0.02	0.28	0.17
0.32	18.89	0.02	0.30	0.18
0.33	19.51	0.02	0.33	0.19
0.37	19.70	0.02	0.35	0.19
0.38	20.53	0.02	0.38	0.20
0.42	21.01	0.02	0.40	0.20
0.43	21.74	0.02	0.43	0.21
0.47	22.46	0.03	0.45	0.22
0.48	22.56	0.03	0.48	0.22
0.52	23.24	0.03	0.50	0.23
0.53	23.72	0.03	0.53	0.23
0.57	24.50	0.03	0.55	0.24
0.58	24.85	0.03	0.58	0.25
0.62	25.76	0.03	0.60	0.26
0.63	25.69	0.03	0.63	0.26
0.67	26.59	0.04	0.65	0.27
0.68	26.94	0.04	0.68	0.27
0.72	27.87	0.04	0.70	0.28
0.73	28.50	0.04	0.73	0.29
0.77	28.60	0.04	0.75	0.29
0.78	29.17	0.04	0.78	0.29
0.82	29.89	0.04	0.80	0.30
0.83	30.13	0.05	0.83	0.30
0.87	31.14	0.05	0.85	0.32
0.88	31.66	0.05	0.88	0.32



ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.92	32.10	0.05	0.90	0.33
0.93	32.73	0.05	0.93	0.33
0.97	32.69	0.05	0.95	0.33
0.98	33.97	0.05	0.98	0.35
1.02	34.15	0.06	1.00	0.35
1.12	36.29	0.06	1.11	0.37
1.22	38.38	0.07	1.20	0.40
1.32	40.46	0.07	1.31	0.42
1.42	43.06	0.08	1.41	0.45
1.52	45.49	0.08	1.51	0.47
1.62	46.90	0.09	1.61	0.49
1.72	49.47	0.10	1.72	0.52
1.82	50.81	0.10	1.81	0.53
1.92	52.21	0.11	1.92	0.55
2.02	54.04	0.11	2.01	0.57
2.12	55.43	0.12	2.12	0.58
2.22	56.85	0.12	2.21	0.60
2.32	58.65	0.13	2.32	0.61
2.42	59.63	0.13	2.41	0.62
2.52	60.97	0.14	2.52	0.64
2.62	62.06	0.15	2.61	0.65
2.72	63.00	0.15	2.72	0.66
2.82	63.76	0.16	2.82	0.67
2.92	64.69	0.16	2.92	0.68
3.02	65.71	0.17	3.02	0.69
3.12	66.52	0.17	3.12	0.70
3.23	67.19	0.18	3.22	0.70
3.33	67.41	0.19	3.33	0.70
3.43	67.92	0.19	3.42	0.71
3.53	68.36	0.20	3.53	0.71
3.63	69.34	0.20	3.62	0.72
3.73	70.31	0.21	3.73	0.73
3.83	70.45	0.21	3.82	0.73
3.93	70.65	0.22	3.93	0.73
4.03	70.98	0.22	4.03	0.74
4.13	71.46	0.23	4.13	0.74
4.23	71.54	0.24	4.23	0.74
4.33	72.07	0.24	4.34	0.75
4.43	72.60	0.25	4.43	0.75
4.53	72.60	0.25	4.54	0.75
4.63	73.36	0.26	4.63	0.76
4.73	73.35	0.26	4.74	0.76
4.83	73.62	0.27	4.83	0.76
4.93	73.53	0.28	4.94	0.76
5.03	74.19	0.28	5.03	0.76
5.28	74.59	0.29	5.28	0.77
5.53	74.77	0.31	5.53	0.77
5.78	75.16	0.32	5.78	0.77
6.03	76.01	0.34	6.03	0.77
6.28	76.02	0.35	6.28	0.77
6.53	76.70	0.36	6.53	0.78
6.78	76.76	0.38	6.78	0.78
7.03	77.60	0.39	7.03	0.78
7.28	77.82	0.41	7.28	0.78
7.53	77.78	0.42	7.53	0.78
7.78	78.17	0.43	7.78	0.78
8.03	78.76	0.45	8.03	0.79

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
8.28	79.44	0.46	8.28	0.79
8.53	79.32	0.48	8.53	0.79
8.80	79.03	0.49	8.80	0.78
9.05	79.09	0.50	9.04	0.78
9.30	79.57	0.52	9.29	0.78
9.55	79.61	0.53	9.54	0.78
9.80	80.00	0.55	9.79	0.78
10.05	80.11	0.56	10.04	0.78
10.30	80.97	0.57	10.29	0.79
10.55	80.80	0.59	10.54	0.79
10.80	81.10	0.60	10.79	0.79
11.05	82.20	0.61	11.04	0.80
11.30	81.67	0.63	11.29	0.79
11.55	81.46	0.64	11.54	0.78
11.80	81.42	0.66	11.79	0.78
12.05	81.74	0.67	12.04	0.78
12.30	81.47	0.68	12.29	0.78
12.55	82.05	0.70	12.54	0.78
12.80	81.27	0.71	12.79	0.77
13.05	80.86	0.73	13.04	0.76
13.30	81.74	0.74	13.29	0.77
13.55	80.50	0.75	13.54	0.76
13.78	80.95	0.77	13.79	0.76
13.80	80.33	0.77	13.79	0.75
14.05	80.52	0.78	14.04	0.75
14.30	80.11	0.80	14.29	0.75
14.55	80.50	0.81	14.55	0.75
14.80	80.65	0.82	14.80	0.75
15.05	80.83	0.84	15.05	0.75
15.30	81.42	0.85	15.29	0.75
15.55	81.03	0.87	15.54	0.74
15.80	81.27	0.88	15.79	0.74
16.05	81.10	0.89	16.04	0.74
16.30	80.76	0.91	16.29	0.74
16.55	81.24	0.92	16.54	0.74
16.80	81.81	0.94	16.79	0.74
17.05	81.09	0.95	17.06	0.73
17.30	81.47	0.96	17.30	0.73
17.55	81.97	0.98	17.55	0.74
17.80	81.66	0.99	17.80	0.73
18.05	82.09	1.01	18.05	0.73
18.30	80.75	1.02	18.30	0.72
18.55	80.99	1.03	18.55	0.72
18.80	81.55	1.05	18.80	0.72
19.05	81.68	1.06	19.05	0.72
19.30	81.38	1.07	19.30	0.71
19.55	81.51	1.09	19.55	0.71
19.80	81.01	1.10	19.80	0.71
20.00	80.52	1.11	20.00	0.70

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

MUESER RUTLEDGE CONSULTING ENGINEERS

DRAFT

File	14123
Boring No.	BH-20
Sample No.	6U

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

Perf by:	YO	Date: 02/08/22
Calc by:	SJ	Date: 02/09/22
Ch'kd by:	YO	Date: 02/09/22

TEST SUMMARY

Compressive Strength =	**0.06 tsf**	**0.8 psi**	
Strain at Failure =	**19.4 %**		
Cell Pressure =	**3.31 psi**	**0.24 tsf**	**23 kPa**
Dry Density =	**50.33**	**pcf**	

USC Group Symbol =	**OH**
In Situ Density =	**92.49** **pcf**

SAMPLE DATA

Initial Height =	5.41 in
Initial Diameter =	2.87 in
Initial Area =	6.46 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012	in
Weight of piston+gage+clamp =	352.00	gm
Weight of end cap =	135.76	gm
Correction for membrane =	-0.026	tsf
Correction for end cap+assembly =	0.005	tsf

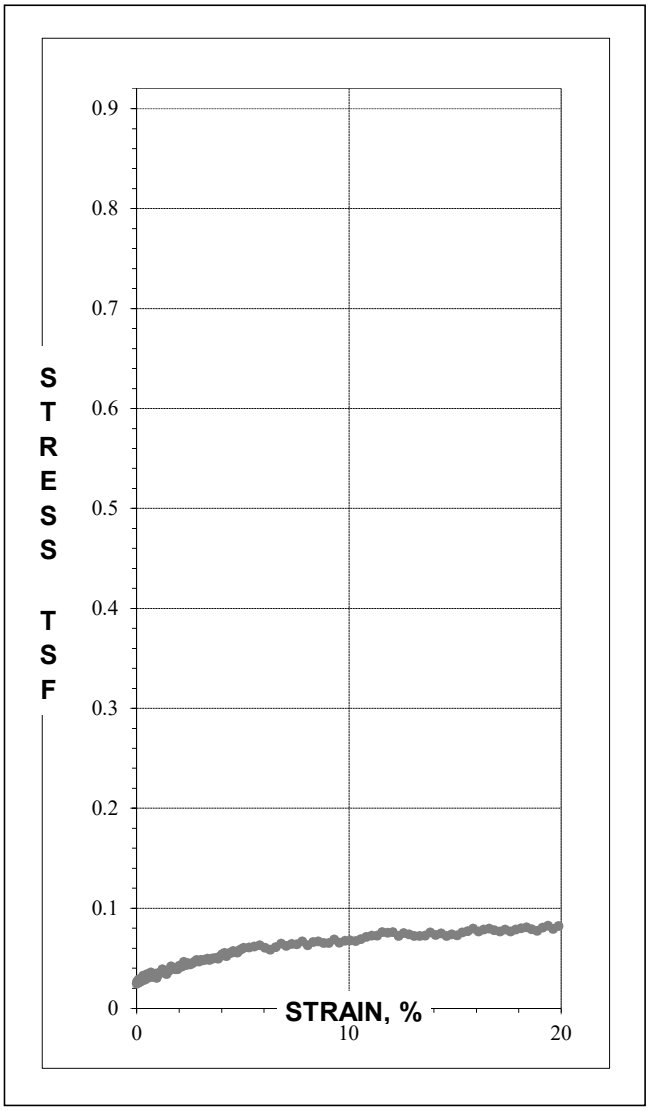
TEST CONSTANTS

Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		BP-2
Wet + Tare	848.69	1234.81
Dry + Tare		849.75
Water	386.90	385.06
Tare		387.96
Sample Dry	461.79	461.79
Water Content	83.8%	83.4%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	4.18	0.00	0.00	0.02
0.02	4.38	0.00	0.02	0.03
0.05	4.40	0.00	0.04	0.03
0.07	4.28	0.00	0.07	0.03
0.10	4.57	0.01	0.09	0.03
0.12	4.52	0.01	0.12	0.03
0.15	4.35	0.01	0.14	0.03
0.17	4.40	0.01	0.17	0.03
0.20	4.64	0.01	0.19	0.03
0.22	4.57	0.01	0.22	0.03
0.25	4.54	0.01	0.26	0.03
0.28	4.50	0.02	0.28	0.03
0.30	4.94	0.02	0.30	0.03
0.33	4.70	0.02	0.33	0.03
0.35	4.79	0.02	0.35	0.03
0.38	4.65	0.02	0.38	0.03
0.40	4.68	0.02	0.40	0.03
0.42	4.57	0.02	0.40	0.03
0.43	4.76	0.02	0.43	0.03
0.45	4.92	0.02	0.45	0.03
0.48	4.83	0.03	0.48	0.03
0.50	5.06	0.03	0.50	0.03
0.53	4.73	0.03	0.53	0.03
0.55	4.98	0.03	0.55	0.03
0.58	4.99	0.03	0.58	0.03
0.60	4.86	0.03	0.60	0.03
0.63	4.85	0.03	0.63	0.03
0.65	5.07	0.04	0.65	0.03
0.68	5.23	0.04	0.68	0.04
0.70	4.88	0.04	0.70	0.03
0.73	4.89	0.04	0.74	0.03
0.77	4.83	0.04	0.76	0.03
0.78	4.92	0.04	0.78	0.03
0.82	5.01	0.04	0.81	0.03
0.83	4.98	0.05	0.83	0.03
0.87	5.09	0.05	0.86	0.03



ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.88	5.11	0.05	0.89	0.03
0.92	4.89	0.05	0.92	0.03
0.93	4.75	0.05	0.94	0.03
0.97	5.03	0.05	0.96	0.03
0.98	5.15	0.05	0.99	0.03
1.02	5.03	0.05	1.01	0.03
1.12	5.25	0.06	1.12	0.04
1.22	5.54	0.07	1.21	0.04
1.32	5.35	0.07	1.32	0.04
1.42	5.11	0.08	1.41	0.03
1.52	5.40	0.08	1.52	0.04
1.62	5.80	0.09	1.62	0.04
1.72	5.64	0.09	1.72	0.04
1.82	5.57	0.10	1.82	0.04
1.92	5.56	0.10	1.92	0.04
2.02	5.88	0.11	2.02	0.04
2.12	5.81	0.12	2.13	0.04
2.22	6.25	0.12	2.22	0.05
2.32	5.94	0.13	2.33	0.04
2.42	6.13	0.13	2.42	0.04
2.53	6.03	0.14	2.53	0.04
2.63	6.14	0.14	2.63	0.04
2.73	6.31	0.15	2.74	0.05
2.83	6.46	0.15	2.83	0.05
2.93	6.31	0.16	2.94	0.05
3.03	6.45	0.16	3.03	0.05
3.13	6.42	0.17	3.14	0.05
3.23	6.48	0.17	3.23	0.05
3.33	6.59	0.18	3.34	0.05
3.43	6.48	0.19	3.43	0.05
3.53	6.61	0.19	3.54	0.05
3.63	6.63	0.20	3.63	0.05
3.73	6.66	0.20	3.74	0.05
3.83	6.63	0.21	3.83	0.05
3.93	6.85	0.21	3.94	0.05
4.03	7.04	0.22	4.03	0.05
4.13	7.17	0.22	4.14	0.06
4.23	6.88	0.23	4.23	0.05
4.33	7.14	0.24	4.34	0.05
4.43	7.19	0.24	4.44	0.06
4.53	7.36	0.25	4.54	0.06
4.63	7.30	0.25	4.64	0.06
4.73	7.22	0.26	4.74	0.06
4.83	7.43	0.26	4.84	0.06
4.93	7.57	0.27	4.95	0.06
5.03	7.71	0.27	5.04	0.06
5.30	7.75	0.29	5.30	0.06
5.55	7.87	0.30	5.54	0.06
5.80	8.00	0.31	5.79	0.06
6.05	7.75	0.33	6.05	0.06
6.30	7.61	0.34	6.30	0.06
6.55	7.84	0.35	6.55	0.06
6.80	8.20	0.37	6.80	0.06
7.05	8.01	0.38	7.05	0.06
7.30	8.22	0.40	7.31	0.06
7.55	8.20	0.41	7.55	0.06
7.80	8.50	0.42	7.81	0.07

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
8.05	8.14	0.44	8.05	0.06
8.30	8.45	0.45	8.31	0.07
8.57	8.53	0.46	8.56	0.07
8.82	8.41	0.48	8.81	0.07
9.07	8.43	0.49	9.06	0.07
9.32	8.80	0.50	9.31	0.07
9.57	8.49	0.52	9.56	0.07
9.82	8.71	0.53	9.82	0.07
10.07	8.76	0.54	10.06	0.07
10.32	8.69	0.56	10.32	0.07
10.57	8.91	0.57	10.57	0.07
10.82	9.15	0.59	10.82	0.07
11.07	9.32	0.60	11.07	0.07
11.32	9.34	0.61	11.33	0.07
11.58	9.71	0.63	11.57	0.08
11.83	9.66	0.64	11.83	0.08
12.08	9.77	0.65	12.08	0.08
12.33	9.39	0.67	12.33	0.07
12.58	9.69	0.68	12.58	0.07
12.83	9.60	0.69	12.84	0.07
13.08	9.44	0.71	13.08	0.07
13.33	9.46	0.72	13.33	0.07
13.58	9.51	0.74	13.59	0.07
13.83	9.89	0.75	13.84	0.08
14.08	9.63	0.76	14.09	0.07
14.33	9.83	0.78	14.34	0.07
14.60	9.57	0.79	14.60	0.07
14.85	9.79	0.80	14.84	0.07
15.10	9.71	0.82	15.10	0.07
15.35	10.03	0.83	15.35	0.08
15.60	10.20	0.84	15.60	0.08
15.85	10.47	0.86	15.85	0.08
16.10	10.18	0.87	16.11	0.08
16.35	10.43	0.89	16.35	0.08
16.60	10.56	0.90	16.61	0.08
16.87	10.40	0.91	16.86	0.08
17.12	10.29	0.93	17.12	0.08
17.37	10.51	0.94	17.36	0.08
17.62	10.36	0.95	17.62	0.08
17.87	10.58	0.97	17.86	0.08
18.12	10.74	0.98	18.11	0.08
18.37	10.88	0.99	18.37	0.08
18.62	10.71	1.01	18.62	0.08
18.87	10.54	1.02	18.87	0.08
19.12	10.94	1.04	19.12	0.08
19.38	11.18	1.05	19.38	0.08
19.63	10.86	1.06	19.63	0.08
19.88	11.18	1.08	19.88	0.08
20.02	10.92	1.08	20.01	0.08

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

MUESER RUTLEDGE CONSULTING ENGINEERS

DRAFT

File	14123
Boring No.	BH-20
Sample No.	8U

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

Perf by:	YO	Date: 02/08/22
Calc by:	SJ	Date: 02/09/22
Ch'kd by:	YO	Date: 02/09/22

TEST SUMMARY

Compressive Strength =	**0.33 tsf**	**4.6 psi**	
Strain at Failure =	**9.3 %**		
Cell Pressure =	**5.66 psi**	**0.41 tsf**	**39 kPa**
Dry Density =	**65.32** pcf		

USC Group Symbol = **OH**

In Situ Density = **103.69** pcf

SAMPLE DATA

Initial Height =	5.54 in
Initial Diameter =	2.84 in
Initial Area =	6.33 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012 in
Weight of piston+gage+clamp =	352.00 gm
Weight of end cap =	182.13 gm
Correction for membrane =	-0.014 tsf
Correction for end cap+assembly =	0.005 tsf

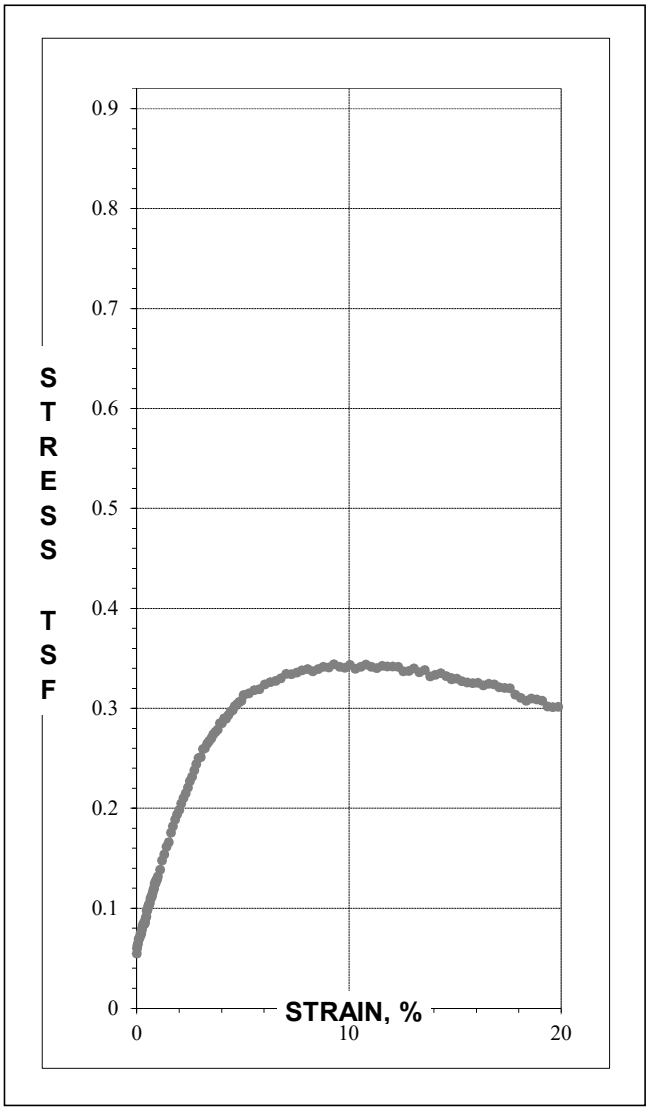
TEST CONSTANTS

Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		BP-3
Wet + Tare	954.12	1346.53
Dry + Tare		995.04
Water	353.05	351.49
Tare		393.97
Sample Dry	601.07	601.07
Water Content	58.7%	58.5%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	5.74	0.00	0.00	0.05
0.03	6.17	0.00	0.02	0.06
0.05	6.44	0.00	0.04	0.06
0.08	6.63	0.00	0.07	0.06
0.10	6.99	0.01	0.09	0.07
0.13	7.07	0.01	0.12	0.07
0.15	7.14	0.01	0.14	0.07
0.18	7.31	0.01	0.17	0.07
0.20	7.53	0.01	0.19	0.07
0.23	7.49	0.01	0.22	0.07
0.25	7.83	0.01	0.24	0.08
0.28	8.01	0.02	0.27	0.08
0.30	8.28	0.02	0.30	0.08
0.33	8.31	0.02	0.33	0.08
0.37	8.52	0.02	0.36	0.09
0.38	8.42	0.02	0.38	0.08
0.42	8.55	0.02	0.40	0.09
0.43	8.92	0.02	0.43	0.09
0.47	9.04	0.03	0.45	0.09
0.48	9.53	0.03	0.48	0.10
0.52	9.56	0.03	0.50	0.10
0.53	9.72	0.03	0.53	0.10
0.57	9.97	0.03	0.55	0.10
0.58	10.06	0.03	0.58	0.10
0.62	10.17	0.03	0.60	0.10
0.63	10.23	0.03	0.63	0.11
0.67	10.64	0.04	0.65	0.11
0.68	10.73	0.04	0.68	0.11
0.72	10.75	0.04	0.70	0.11
0.73	10.94	0.04	0.73	0.11
0.77	11.08	0.04	0.75	0.11
0.78	11.31	0.04	0.78	0.12
0.82	11.53	0.04	0.80	0.12
0.83	11.54	0.05	0.83	0.12
0.87	11.95	0.05	0.85	0.12
0.88	12.12	0.05	0.88	0.13



ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.92	12.03	0.05	0.90	0.12
0.93	12.29	0.05	0.93	0.13
0.97	12.34	0.05	0.95	0.13
0.98	12.47	0.05	0.98	0.13
1.02	12.62	0.06	1.00	0.13
1.12	13.24	0.06	1.11	0.14
1.22	14.07	0.07	1.20	0.15
1.32	14.64	0.07	1.31	0.15
1.42	15.32	0.08	1.40	0.16
1.52	15.75	0.08	1.51	0.17
1.62	16.61	0.09	1.62	0.18
1.72	17.20	0.09	1.71	0.18
1.82	17.83	0.10	1.82	0.19
1.92	18.30	0.11	1.91	0.19
2.02	18.72	0.11	2.02	0.20
2.12	19.32	0.12	2.11	0.20
2.22	19.82	0.12	2.22	0.21
2.32	20.28	0.13	2.31	0.21
2.42	20.81	0.13	2.42	0.22
2.52	21.40	0.14	2.51	0.23
2.62	21.83	0.14	2.62	0.23
2.72	22.45	0.15	2.72	0.24
2.82	23.00	0.16	2.81	0.24
2.92	23.58	0.16	2.92	0.25
3.02	23.69	0.17	3.02	0.25
3.12	24.43	0.17	3.12	0.26
3.22	24.56	0.18	3.22	0.26
3.32	25.00	0.18	3.32	0.26
3.42	25.24	0.19	3.42	0.27
3.52	25.53	0.20	3.52	0.27
3.62	25.91	0.20	3.62	0.27
3.72	26.17	0.21	3.72	0.28
3.82	26.39	0.21	3.82	0.28
3.92	27.00	0.22	3.92	0.28
4.02	27.05	0.22	4.02	0.29
4.13	27.52	0.23	4.12	0.29
4.23	27.50	0.23	4.22	0.29
4.33	27.85	0.24	4.32	0.29
4.43	28.23	0.25	4.43	0.30
4.53	28.38	0.25	4.53	0.30
4.63	28.76	0.26	4.63	0.30
4.73	28.97	0.26	4.73	0.30
4.83	29.21	0.27	4.84	0.31
4.93	29.36	0.27	4.93	0.31
5.03	29.94	0.28	5.04	0.31
5.28	30.16	0.29	5.29	0.31
5.55	30.52	0.31	5.54	0.32
5.80	30.70	0.32	5.78	0.32
6.05	31.23	0.33	6.04	0.32
6.30	31.52	0.35	6.29	0.33
6.55	31.71	0.36	6.55	0.33
6.80	32.05	0.38	6.79	0.33
7.05	32.56	0.39	7.05	0.33
7.30	32.61	0.40	7.29	0.33
7.55	32.84	0.42	7.55	0.34
7.80	33.15	0.43	7.79	0.34
8.05	33.35	0.45	8.05	0.34

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
8.30	33.23	0.46	8.30	0.34
8.55	33.53	0.47	8.56	0.34
8.80	33.83	0.49	8.80	0.34
9.07	33.88	0.50	9.06	0.34
9.32	34.26	0.52	9.30	0.34
9.57	34.11	0.53	9.56	0.34
9.82	34.11	0.54	9.81	0.34
10.07	34.47	0.56	10.05	0.34
10.32	34.21	0.57	10.30	0.34
10.57	34.50	0.59	10.56	0.34
10.82	34.78	0.60	10.81	0.34
11.07	34.69	0.61	11.07	0.34
11.32	34.64	0.63	11.31	0.34
11.57	34.98	0.64	11.57	0.34
11.82	35.01	0.65	11.82	0.34
12.07	35.10	0.67	12.06	0.34
12.32	35.15	0.68	12.32	0.34
12.57	34.82	0.70	12.57	0.34
12.83	34.93	0.71	12.82	0.34
13.08	35.29	0.72	13.07	0.34
13.33	35.02	0.74	13.33	0.34
13.58	35.34	0.75	13.57	0.34
13.83	34.78	0.77	13.83	0.33
14.08	35.04	0.78	14.08	0.33
14.33	35.31	0.79	14.34	0.33
14.58	35.11	0.81	14.58	0.33
14.83	35.02	0.82	14.83	0.33
14.85	34.90	0.82	14.84	0.33
15.08	35.05	0.84	15.09	0.33
15.33	34.87	0.85	15.33	0.33
15.58	34.85	0.86	15.58	0.33
15.83	34.90	0.88	15.84	0.33
16.08	35.01	0.89	16.09	0.33
16.35	34.86	0.91	16.34	0.32
16.60	35.12	0.92	16.59	0.32
16.85	35.16	0.93	16.85	0.32
17.10	34.95	0.95	17.09	0.32
17.35	34.98	0.96	17.35	0.32
17.60	35.05	0.97	17.60	0.32
17.85	34.49	0.99	17.85	0.31
18.10	34.25	1.00	18.10	0.31
18.35	34.03	1.02	18.35	0.31
18.60	34.38	1.03	18.60	0.31
18.85	34.38	1.04	18.86	0.31
19.12	34.32	1.06	19.10	0.31
19.37	33.81	1.07	19.36	0.30
19.62	33.85	1.09	19.61	0.30
19.87	33.98	1.10	19.86	0.30
20.02	33.62	1.11	20.02	0.30

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

MUESER RUTLEDGE CONSULTING ENGINEERS

DRAFT

File	14123
Boring No.	BH-20
Sample No.	12U

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

Perf by:	YO	Date: 02/08/22
Calc by:	SJ	Date: 02/09/22
Ch'kd by:	YO	Date: 02/09/22

TEST SUMMARY

Compressive Strength =	**0.80 tsf**	**11.2 psi**	
Strain at Failure =	**6.0 %**		
Cell Pressure =	**10.41 psi**	**0.75 tsf**	**72 kPa**
Dry Density =	**52.57**	**pcf**	

USC Group Symbol =	**OH**	
In Situ Density =	**94.09**	**pcf**

SAMPLE DATA

Initial Height =	5.58	in
Initial Diameter =	2.86	in
Initial Area =	6.42	sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012	in
Weight of piston+gage+clamp =	352.00	gm
Weight of end cap =	182.13	gm
Correction for membrane =	-0.010	tsf
Correction for end cap+assembly =	0.004	tsf

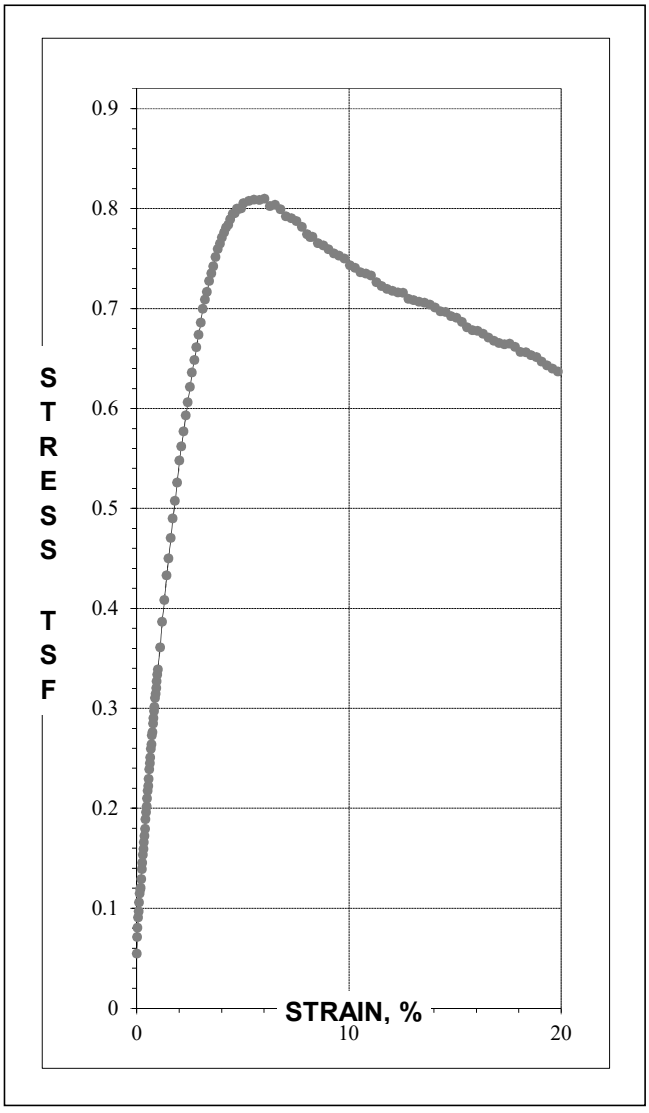
TEST CONSTANTS

Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		XXV
Wet + Tare	884.89	1422.08
Dry + Tare		1028.97
Water	390.47	393.11
Tare		534.55
Sample Dry	494.42	494.42
Water Content	79.0%	79.5%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	6.88	0.00	0.00	0.05
0.03	8.35	0.00	0.02	0.07
0.07	9.20	0.00	0.04	0.08
0.08	10.10	0.00	0.07	0.09
0.12	10.66	0.01	0.09	0.10
0.13	11.47	0.01	0.12	0.11
0.17	12.26	0.01	0.14	0.11
0.18	12.63	0.01	0.17	0.12
0.22	12.78	0.01	0.19	0.12
0.23	13.55	0.01	0.22	0.13
0.27	14.45	0.01	0.24	0.14
0.28	15.02	0.02	0.27	0.15
0.32	15.76	0.02	0.29	0.15
0.33	16.27	0.02	0.32	0.16
0.37	16.87	0.02	0.34	0.17
0.38	17.45	0.02	0.37	0.17
0.42	18.09	0.02	0.39	0.18
0.43	18.95	0.02	0.42	0.19
0.47	19.58	0.02	0.44	0.20
0.48	20.11	0.03	0.47	0.20
0.52	20.83	0.03	0.49	0.21
0.53	21.53	0.03	0.52	0.22
0.57	21.95	0.03	0.54	0.22
0.58	22.59	0.03	0.57	0.23
0.62	23.46	0.03	0.59	0.24
0.63	24.02	0.03	0.62	0.25
0.67	24.52	0.04	0.64	0.25
0.68	25.33	0.04	0.67	0.26
0.72	25.72	0.04	0.69	0.26
0.73	26.54	0.04	0.72	0.27
0.77	26.84	0.04	0.74	0.28
0.78	27.60	0.04	0.77	0.28
0.82	28.12	0.04	0.79	0.29
0.83	28.76	0.05	0.82	0.30
0.87	29.14	0.05	0.84	0.30
0.88	29.93	0.05	0.87	0.31



ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.92	30.33	0.05	0.90	0.31
0.93	30.85	0.05	0.92	0.32
0.97	31.48	0.05	0.95	0.33
0.98	32.09	0.05	0.97	0.33
1.02	32.54	0.06	1.00	0.34
1.12	34.59	0.06	1.10	0.36
1.22	36.91	0.07	1.20	0.39
1.32	38.93	0.07	1.30	0.41
1.42	41.19	0.08	1.41	0.43
1.52	42.76	0.08	1.50	0.45
1.62	44.68	0.09	1.61	0.47
1.72	46.49	0.09	1.70	0.49
1.82	48.13	0.10	1.81	0.51
1.92	49.85	0.11	1.90	0.53
2.02	51.92	0.11	2.01	0.55
2.12	53.23	0.12	2.10	0.56
2.22	54.66	0.12	2.21	0.58
2.32	56.19	0.13	2.31	0.59
2.42	57.43	0.13	2.41	0.61
2.52	58.91	0.14	2.51	0.62
2.62	60.27	0.15	2.61	0.64
2.72	61.48	0.15	2.71	0.65
2.83	62.74	0.16	2.82	0.66
2.93	63.93	0.16	2.91	0.67
3.03	65.13	0.17	3.02	0.69
3.13	66.45	0.17	3.11	0.70
3.23	67.39	0.18	3.22	0.71
3.33	68.16	0.18	3.31	0.72
3.43	69.22	0.19	3.42	0.73
3.53	70.02	0.20	3.52	0.74
3.63	70.73	0.20	3.62	0.74
3.73	71.66	0.21	3.72	0.75
3.83	72.47	0.21	3.82	0.76
3.93	73.05	0.22	3.92	0.76
4.03	73.70	0.22	4.02	0.77
4.13	74.24	0.23	4.12	0.78
4.23	74.77	0.24	4.22	0.78
4.33	75.11	0.24	4.32	0.78
4.43	75.69	0.25	4.42	0.79
4.53	76.30	0.25	4.52	0.79
4.63	76.43	0.26	4.62	0.80
4.73	76.92	0.26	4.73	0.80
4.83	76.97	0.27	4.82	0.80
4.93	77.12	0.27	4.93	0.80
5.03	77.67	0.28	5.02	0.81
5.28	78.08	0.29	5.28	0.81
5.53	78.39	0.31	5.53	0.81
5.80	78.58	0.32	5.78	0.81
6.05	78.89	0.34	6.03	0.81
6.30	78.41	0.35	6.28	0.80
6.55	78.73	0.36	6.53	0.80
6.80	78.53	0.38	6.78	0.80
7.05	78.05	0.39	7.03	0.79
7.30	78.07	0.41	7.29	0.79
7.55	78.00	0.42	7.53	0.79
7.80	77.65	0.43	7.79	0.78
8.05	77.13	0.45	8.03	0.77

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
8.18	76.96	0.46	8.17	0.77
8.30	77.10	0.46	8.29	0.77
8.55	76.66	0.48	8.54	0.77
8.80	76.66	0.49	8.79	0.76
9.05	76.48	0.50	9.04	0.76
9.30	76.28	0.52	9.30	0.75
9.55	76.28	0.53	9.54	0.75
9.80	76.18	0.55	9.79	0.75
10.05	75.74	0.56	10.05	0.74
10.30	75.67	0.57	10.29	0.74
10.55	75.45	0.59	10.54	0.74
10.82	75.52	0.60	10.80	0.73
11.07	75.55	0.62	11.05	0.73
11.32	75.06	0.63	11.30	0.73
11.57	74.89	0.64	11.55	0.72
11.82	74.81	0.66	11.81	0.72
12.07	74.83	0.67	12.05	0.72
12.32	74.85	0.69	12.31	0.72
12.57	75.05	0.70	12.56	0.72
12.82	74.62	0.71	12.81	0.71
13.07	74.71	0.73	13.06	0.71
13.32	74.75	0.74	13.31	0.71
13.57	74.86	0.76	13.56	0.71
13.82	74.89	0.77	13.82	0.70
14.07	74.78	0.78	14.06	0.70
14.33	74.61	0.80	14.32	0.70
14.58	74.76	0.81	14.56	0.70
14.83	74.54	0.83	14.82	0.69
15.08	74.56	0.84	15.06	0.69
15.33	74.35	0.85	15.32	0.69
15.58	73.99	0.87	15.57	0.68
15.83	73.90	0.88	15.83	0.68
16.08	74.04	0.90	16.07	0.68
16.33	73.95	0.91	16.33	0.67
16.58	73.77	0.92	16.57	0.67
16.83	73.63	0.94	16.83	0.67
17.08	73.61	0.95	17.07	0.67
17.35	73.68	0.97	17.33	0.66
17.60	73.97	0.98	17.58	0.66
17.85	73.85	0.99	17.84	0.66
18.10	73.53	1.01	18.08	0.66
18.35	73.69	1.02	18.34	0.66
18.60	73.60	1.04	18.58	0.65
18.85	73.64	1.05	18.84	0.65
19.10	73.33	1.06	19.09	0.65
19.35	73.14	1.08	19.34	0.64
19.60	73.02	1.09	19.59	0.64
19.85	72.92	1.11	19.85	0.64
20.02	72.50	1.12	20.01	0.63

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

MUESER RUTLEDGE CONSULTING ENGINEERS

DRAFT

File	14123
Boring No.	PS-02
Sample No.	11U

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

Perf by:	YO	Date: 11/30/21
Calc by:	SJ	Date: 12/01/21
Ch'kd by:	YO	Date: 12/02/21

TEST SUMMARY

Compressive Strength =	**0.76 tsf**	**10.5 psi**	
Strain at Failure =	**5.8 %**		
Cell Pressure =	**11.05 psi**	**0.80 tsf**	**76 kPa**
Dry Density =	**66.67**	**pcf**	

USC Group Symbol = **CH-OH**

In Situ Density = **103.96** **pcf**

SAMPLE DATA

Initial Height =	5.60 in
Initial Diameter =	2.84 in
Initial Area =	6.35 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012	in
Weight of piston+gage+clamp =	352.00	gm
Weight of end cap =	108.81	gm
Correction for membrane =	-0.009	tsf
Correction for end cap+assembly =	0.003	tsf

TEST CONSTANTS

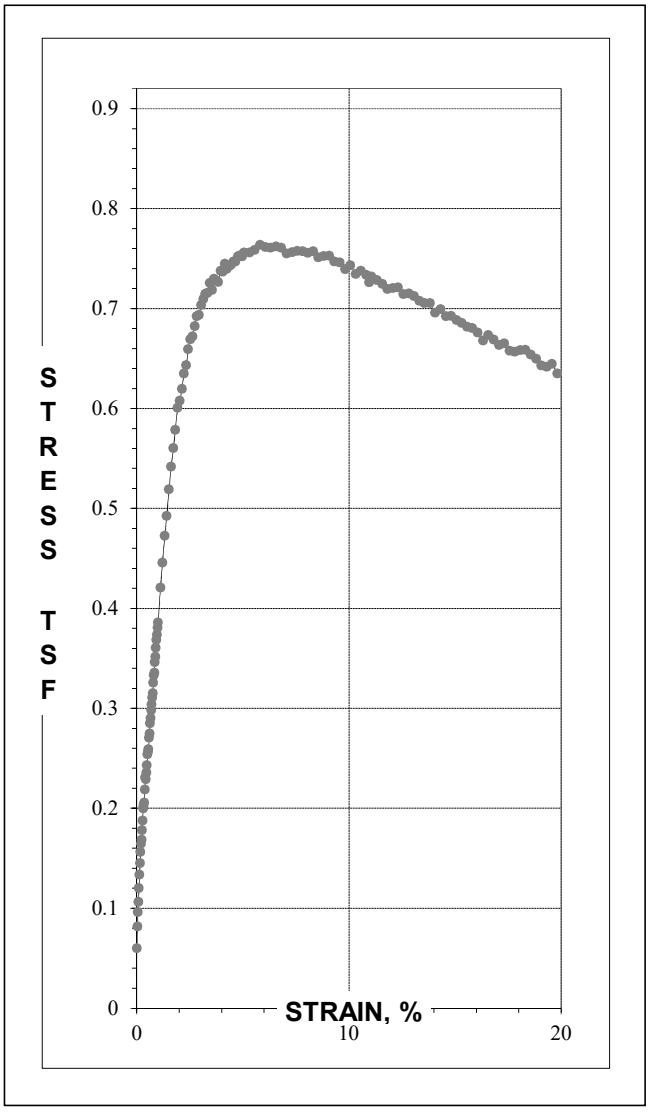
Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		V
Wet + Tare	969.76	1195.76
Dry + Tare		847.53
Water	347.85	348.23
Tare		225.62
Sample Dry	621.91	621.91
Water Content	55.9%	56.0%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	4.85	0.00	0.00	0.06
0.03	6.78	0.00	0.03	0.08
0.05	8.05	0.00	0.06	0.10
0.08	8.95	0.00	0.08	0.11
0.10	10.17	0.01	0.10	0.12
0.13	11.37	0.01	0.13	0.13
0.15	12.39	0.01	0.15	0.15
0.18	13.38	0.01	0.18	0.16
0.20	14.12	0.01	0.20	0.16
0.23	14.46	0.01	0.23	0.17
0.25	15.32	0.01	0.25	0.18
0.28	16.18	0.02	0.28	0.19
0.30	17.23	0.02	0.30	0.20
0.33	17.51	0.02	0.33	0.20
0.35	17.77	0.02	0.35	0.21
0.38	18.92	0.02	0.38	0.22
0.40	20.00	0.02	0.40	0.23
0.43	19.85	0.02	0.43	0.23
0.45	20.46	0.03	0.45	0.24
0.48	21.11	0.03	0.48	0.24
0.50	22.08	0.03	0.50	0.25
0.53	22.32	0.03	0.53	0.26
0.55	22.54	0.03	0.55	0.26
0.58	23.57	0.03	0.58	0.27
0.60	23.95	0.03	0.60	0.27
0.63	24.86	0.04	0.63	0.28
0.65	25.31	0.04	0.65	0.29
0.68	26.04	0.04	0.68	0.30
0.70	26.56	0.04	0.70	0.30
0.73	27.17	0.04	0.73	0.31
0.75	27.55	0.04	0.75	0.31
0.78	28.51	0.04	0.78	0.33
0.80	29.17	0.05	0.80	0.33
0.83	29.42	0.05	0.83	0.34
0.85	30.35	0.05	0.85	0.35
0.88	30.84	0.05	0.88	0.35

NOTE: CHAMBER PRESSURE THROUGHOUT TEST SUPPLIED BY AUTOMATED FLOW PUMP.



ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.92	31.66	0.05	0.90	0.36
0.93	32.37	0.05	0.93	0.37
0.97	32.83	0.05	0.96	0.37
0.98	33.46	0.05	0.98	0.38
1.02	33.95	0.06	1.01	0.39
1.12	37.10	0.06	1.12	0.42
1.22	39.37	0.07	1.21	0.45
1.32	41.81	0.07	1.32	0.47
1.42	43.61	0.08	1.41	0.49
1.52	46.06	0.09	1.52	0.52
1.62	48.14	0.09	1.62	0.54
1.72	49.85	0.10	1.72	0.56
1.82	51.55	0.10	1.82	0.58
1.92	53.58	0.11	1.93	0.60
2.02	54.28	0.11	2.02	0.61
2.12	55.39	0.12	2.13	0.62
2.22	56.82	0.12	2.22	0.63
2.32	57.64	0.13	2.33	0.64
2.43	59.14	0.14	2.42	0.66
2.53	60.13	0.14	2.53	0.67
2.63	60.43	0.15	2.63	0.67
2.73	61.44	0.15	2.74	0.68
2.83	62.39	0.16	2.83	0.69
2.93	62.58	0.16	2.94	0.69
3.03	63.54	0.17	3.03	0.70
3.13	64.18	0.18	3.14	0.71
3.23	64.69	0.18	3.24	0.71
3.33	64.85	0.19	3.34	0.72
3.43	65.84	0.19	3.44	0.73
3.55	65.26	0.20	3.55	0.72
3.65	66.34	0.20	3.64	0.73
3.75	66.26	0.21	3.75	0.73
3.85	66.19	0.22	3.84	0.73
3.95	67.30	0.22	3.95	0.74
4.05	67.27	0.23	4.05	0.74
4.15	68.10	0.23	4.16	0.74
4.25	67.70	0.24	4.25	0.74
4.35	68.04	0.24	4.36	0.74
4.45	68.24	0.25	4.45	0.74
4.57	68.60	0.26	4.56	0.75
4.67	68.67	0.26	4.66	0.75
4.77	69.20	0.27	4.77	0.75
4.87	69.36	0.27	4.86	0.75
4.97	69.35	0.28	4.97	0.75
5.07	69.80	0.28	5.06	0.76
5.32	69.96	0.30	5.31	0.76
5.57	70.40	0.31	5.56	0.76
5.82	71.06	0.33	5.81	0.76
6.07	71.05	0.34	6.06	0.76
6.32	71.17	0.35	6.31	0.76
6.57	71.50	0.37	6.56	0.76
6.82	71.57	0.38	6.81	0.76
7.07	71.22	0.40	7.06	0.76
7.32	71.54	0.41	7.31	0.76
7.57	71.84	0.42	7.56	0.76
7.82	72.02	0.44	7.81	0.76
8.07	72.04	0.45	8.06	0.76

NOTE: CHAMBER PRESSURE THROUGHOUT TEST SUPPLIED BY AUTOMATED FLOW PUMP.

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
8.32	72.39	0.47	8.31	0.76
8.57	72.01	0.48	8.56	0.75
8.82	72.35	0.49	8.81	0.75
9.07	72.56	0.51	9.06	0.75
9.32	72.21	0.52	9.32	0.75
9.57	72.30	0.54	9.57	0.75
9.82	71.86	0.55	9.82	0.74
10.07	72.43	0.56	10.07	0.74
10.32	71.80	0.58	10.31	0.73
10.57	72.30	0.59	10.57	0.74
10.82	72.12	0.61	10.82	0.73
10.95	71.50	0.61	10.96	0.73
11.07	72.15	0.62	11.07	0.73
11.32	72.00	0.63	11.32	0.73
11.57	71.83	0.65	11.57	0.72
11.82	71.52	0.66	11.82	0.72
12.07	71.82	0.68	12.07	0.72
12.32	72.09	0.69	12.32	0.72
12.57	71.62	0.70	12.57	0.71
12.82	71.88	0.72	12.82	0.71
13.07	71.82	0.73	13.07	0.71
13.32	71.54	0.75	13.32	0.71
13.57	71.53	0.76	13.57	0.71
13.82	71.76	0.77	13.81	0.71
14.07	70.97	0.79	14.06	0.70
14.32	71.53	0.80	14.32	0.70
14.57	71.02	0.82	14.57	0.69
14.82	71.27	0.83	14.82	0.69
15.07	71.04	0.84	15.07	0.69
15.32	70.95	0.86	15.32	0.69
15.57	70.77	0.87	15.57	0.68
15.82	70.84	0.89	15.82	0.68
16.07	70.57	0.90	16.07	0.68
16.32	69.96	0.91	16.32	0.67
16.57	70.75	0.93	16.57	0.67
16.82	70.47	0.94	16.82	0.67
17.07	70.10	0.96	17.07	0.66
17.32	70.48	0.97	17.32	0.66
17.57	69.92	0.98	17.57	0.66
17.82	70.03	1.00	17.82	0.66
18.07	70.42	1.01	18.07	0.66
18.32	70.69	1.03	18.32	0.66
18.57	70.38	1.04	18.57	0.65
18.82	70.14	1.05	18.82	0.65
19.07	69.64	1.07	19.07	0.64
19.32	69.72	1.08	19.32	0.64
19.57	70.23	1.10	19.57	0.64
19.82	69.40	1.11	19.82	0.63
20.02	69.18	1.12	20.01	0.63

NOTE: CHAMBER PRESSURE THROUGHOUT TEST SUPPLIED BY AUTOMATED FLOW PUMP.

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

MUESER RUTLEDGE CONSULTING ENGINEERS

DRAFT

File	14123
Boring No.	PS-02
Sample No.	13U

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

Perf by:	SJ	Date: 11/23/21
Calc by:	SJ	Date: 11/24/21
Ch'kd by:	YO	Date: 11/24/21

TEST SUMMARY

Compressive Strength =	**0.33 tsf**	**4.6 psi**	
Strain at Failure =	**14.9 %**		
Cell Pressure =	**13.57 psi**	**0.98 tsf**	**94 kPa**
Dry Density =	**61.27**	**pcf**	

USC Group Symbol =	**OH**	
In Situ Density =	**98.67**	**pcf**

SAMPLE DATA

Initial Height =	5.56	in
Initial Diameter =	2.86	in
Initial Area =	6.41	sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012	in
Weight of piston+gage+clamp =	352.00	gm
Weight of end cap =	108.76	gm
Correction for membrane =	-0.021	tsf
Correction for end cap+assembly =	0.003	tsf

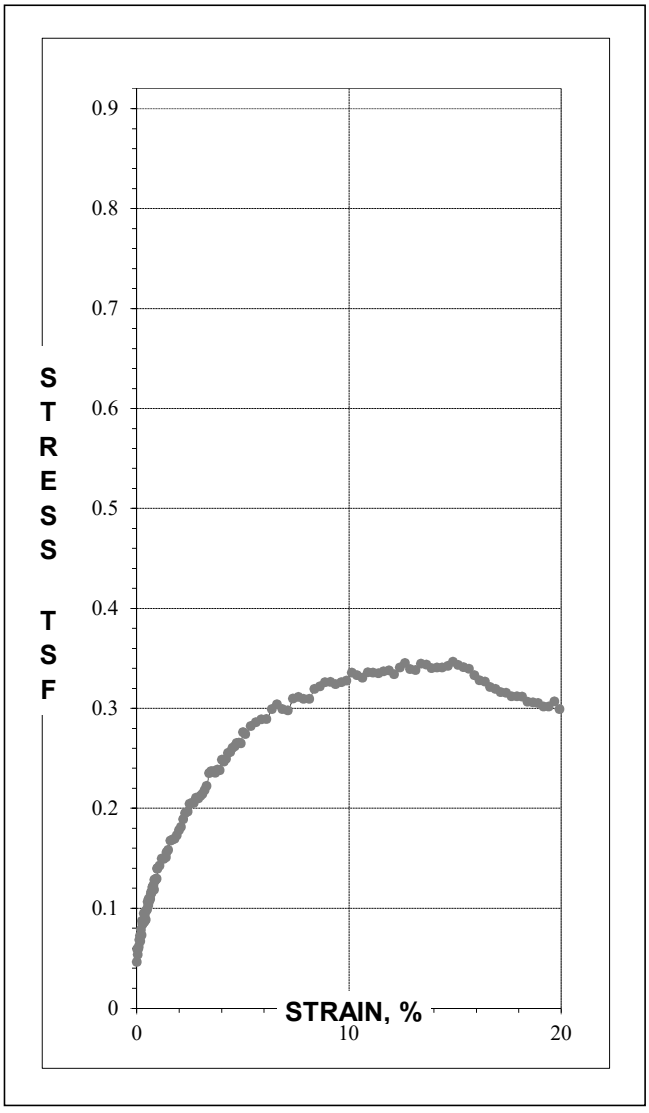
TEST CONSTANTS

Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		#4
Wet + Tare	923.89	1283.18
Dry + Tare		934.14
Water	350.26	349.04
Tare		360.51
Sample Dry	573.63	573.63
Water Content	61.1%	60.8%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	6.49	0.00	0.00	0.05
0.03	7.62	0.00	0.03	0.06
0.07	7.17	0.00	0.05	0.05
0.08	7.70	0.00	0.08	0.06
0.12	7.88	0.01	0.10	0.06
0.13	8.46	0.01	0.13	0.07
0.17	8.83	0.01	0.15	0.07
0.18	8.37	0.01	0.18	0.07
0.22	9.40	0.01	0.20	0.08
0.23	8.91	0.01	0.23	0.07
0.27	10.17	0.01	0.25	0.09
0.28	9.89	0.02	0.28	0.08
0.32	10.01	0.02	0.30	0.09
0.35	10.86	0.02	0.34	0.09
0.37	10.13	0.02	0.36	0.09
0.40	10.72	0.02	0.39	0.09
0.42	11.03	0.02	0.41	0.10
0.45	10.28	0.02	0.43	0.09
0.48	11.14	0.03	0.47	0.10
0.50	11.24	0.03	0.50	0.10
0.53	11.90	0.03	0.52	0.11
0.55	11.59	0.03	0.54	0.10
0.58	12.17	0.03	0.57	0.11
0.60	11.97	0.03	0.59	0.11
0.63	12.17	0.03	0.62	0.11
0.65	12.17	0.04	0.64	0.11
0.68	12.61	0.04	0.67	0.11
0.70	12.81	0.04	0.69	0.12
0.73	12.79	0.04	0.72	0.12
0.75	13.24	0.04	0.74	0.12
0.78	13.26	0.04	0.77	0.12
0.80	13.43	0.04	0.79	0.12
0.83	13.02	0.05	0.82	0.12
0.85	13.91	0.05	0.84	0.13
0.90	13.90	0.05	0.87	0.13
0.90	13.83	0.05	0.87	0.13



ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.93	14.02	0.05	0.92	0.13
0.95	14.03	0.05	0.95	0.13
1.07	14.97	0.05	0.97	0.14
1.07	14.92	0.05	0.97	0.14
1.08	15.21	0.06	1.08	0.14
1.18	15.85	0.07	1.19	0.15
1.28	15.84	0.07	1.28	0.15
1.40	16.00	0.08	1.38	0.15
1.42	16.48	0.08	1.41	0.16
1.50	16.70	0.08	1.48	0.16
1.60	17.55	0.09	1.59	0.17
1.70	17.65	0.09	1.68	0.17
1.80	17.75	0.10	1.79	0.17
1.90	18.08	0.10	1.89	0.17
2.00	18.56	0.11	1.99	0.18
2.10	18.87	0.12	2.09	0.18
2.20	19.58	0.12	2.20	0.19
2.30	20.16	0.13	2.29	0.20
2.40	20.33	0.13	2.40	0.20
2.50	21.03	0.14	2.50	0.20
2.60	21.15	0.14	2.60	0.21
2.70	21.17	0.15	2.70	0.21
2.80	21.66	0.16	2.80	0.21
2.92	21.62	0.16	2.90	0.21
3.02	21.89	0.17	3.01	0.21
3.12	22.08	0.17	3.10	0.21
3.22	22.44	0.18	3.21	0.22
3.32	22.85	0.18	3.30	0.22
3.42	24.05	0.19	3.41	0.23
3.52	24.25	0.19	3.50	0.24
3.62	24.27	0.20	3.61	0.24
3.72	24.17	0.21	3.70	0.24
3.82	24.48	0.21	3.81	0.24
3.92	24.43	0.22	3.91	0.24
4.02	25.45	0.22	4.01	0.25
4.12	25.28	0.23	4.11	0.25
4.22	25.58	0.23	4.22	0.25
4.32	26.15	0.24	4.31	0.26
4.42	26.25	0.25	4.42	0.26
4.52	26.67	0.25	4.51	0.26
4.62	26.83	0.26	4.62	0.26
4.72	27.18	0.26	4.71	0.27
4.82	27.23	0.27	4.82	0.27
4.93	27.18	0.27	4.91	0.26
5.03	28.26	0.28	5.02	0.28
5.13	28.12	0.28	5.12	0.27
5.38	28.93	0.30	5.37	0.28
5.63	29.36	0.31	5.62	0.29
5.88	29.72	0.33	5.87	0.29
6.13	29.80	0.34	6.12	0.29
6.38	30.84	0.35	6.37	0.30
6.63	31.36	0.37	6.62	0.30
6.88	30.98	0.38	6.87	0.30
7.13	30.95	0.40	7.12	0.30
7.38	32.16	0.41	7.37	0.31
7.63	32.39	0.42	7.62	0.31
7.88	32.28	0.44	7.87	0.31

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
8.13	32.37	0.45	8.13	0.31
8.38	33.41	0.47	8.38	0.32
8.63	33.75	0.48	8.62	0.32
8.88	34.23	0.49	8.88	0.33
9.13	34.35	0.51	9.13	0.33
9.38	34.21	0.52	9.37	0.32
9.65	34.51	0.54	9.64	0.33
9.90	34.76	0.55	9.89	0.33
10.15	35.63	0.56	10.13	0.34
10.40	35.49	0.58	10.38	0.33
10.65	35.32	0.59	10.64	0.33
10.90	35.96	0.61	10.89	0.34
11.15	36.02	0.62	11.14	0.34
11.40	36.05	0.63	11.39	0.33
11.65	36.33	0.65	11.64	0.34
11.90	36.53	0.66	11.89	0.34
12.15	36.24	0.68	12.13	0.33
12.40	37.03	0.69	12.40	0.34
12.65	37.59	0.70	12.64	0.35
12.90	37.06	0.72	12.89	0.34
13.15	37.05	0.73	13.14	0.34
13.40	37.82	0.75	13.40	0.34
13.65	37.81	0.76	13.65	0.34
13.90	37.55	0.77	13.90	0.34
14.15	37.71	0.79	14.14	0.34
14.40	37.81	0.80	14.40	0.34
14.67	38.10	0.82	14.66	0.34
14.92	38.64	0.83	14.90	0.35
15.17	38.40	0.84	15.15	0.34
15.42	38.29	0.86	15.40	0.34
15.67	38.22	0.87	15.66	0.34
15.92	37.65	0.88	15.91	0.33
16.17	37.21	0.90	16.16	0.33
16.42	37.17	0.91	16.41	0.33
16.67	36.71	0.93	16.65	0.32
16.92	36.58	0.94	16.90	0.32
17.17	36.36	0.95	17.15	0.32
17.42	36.39	0.97	17.40	0.32
17.67	36.11	0.98	17.67	0.31
17.92	36.21	1.00	17.91	0.31
18.17	36.31	1.01	18.16	0.31
18.42	35.84	1.02	18.41	0.31
18.67	35.86	1.04	18.67	0.31
18.92	35.91	1.05	18.92	0.31
19.18	35.63	1.07	19.17	0.30
19.43	35.73	1.08	19.42	0.30
19.68	36.38	1.09	19.68	0.31
19.93	35.66	1.11	19.93	0.30
20.03	35.80	1.11	20.02	0.30

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

MUESER RUTLEDGE CONSULTING ENGINEERS

DRAFT

File	14123
Boring No.	PS-04
Sample No.	8U

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

Perf by:	SJ	Date:	01/26/22
Calc by:	SJ	Date:	01/27/22
Ch'kd by:	YO	Date:	01/27/22

TEST SUMMARY

Compressive Strength =	**0.47 tsf**	**6.5 psi**	
Strain at Failure =	**12.1 %**		
Cell Pressure =	**5.68 psi**	**0.41 tsf**	**39 kPa**
Dry Density =	**69.60**	**pcf**	

USC Group Symbol =	**CL**	
In Situ Density =	**106.17**	**pcf**

SAMPLE DATA

Initial Height =	5.57	in
Initial Diameter =	2.83	in
Initial Area =	6.31	sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012	in
Weight of piston+gage+clamp =	352.00	gm
Weight of end cap =	108.84	gm
Correction for membrane =	-0.018	tsf
Correction for end cap+assembly =	0.003	tsf

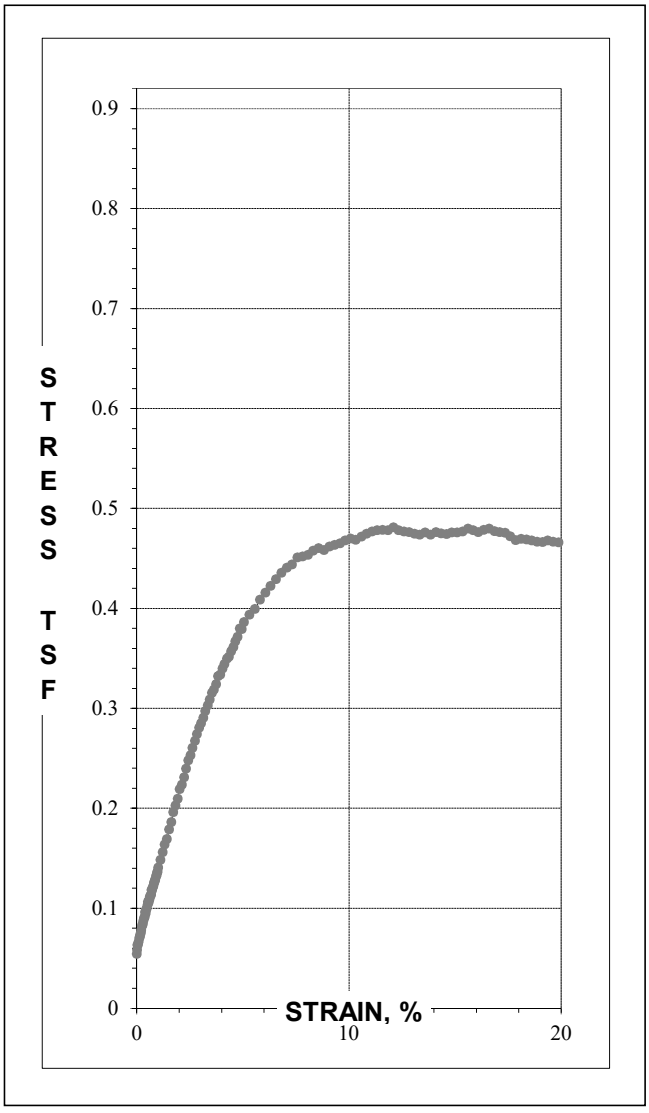
TEST CONSTANTS

Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		Y
Wet + Tare	978.45	1074.14
Dry + Tare		738.38
Water	337.01	335.76
Tare		96.94
Sample Dry	641.44	641.44
Water Content	52.5%	52.3%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	5.45	0.00	0.00	0.05
0.02	5.81	0.00	0.02	0.06
0.05	6.24	0.00	0.04	0.06
0.07	6.30	0.00	0.07	0.06
0.10	6.56	0.01	0.09	0.07
0.13	6.86	0.01	0.13	0.07
0.15	7.01	0.01	0.15	0.07
0.18	7.19	0.01	0.18	0.07
0.20	7.36	0.01	0.20	0.08
0.23	7.57	0.01	0.23	0.08
0.25	7.91	0.01	0.25	0.08
0.28	8.04	0.02	0.28	0.08
0.30	8.19	0.02	0.30	0.09
0.33	8.43	0.02	0.33	0.09
0.35	8.66	0.02	0.35	0.09
0.38	8.73	0.02	0.38	0.09
0.40	9.17	0.02	0.40	0.10
0.43	9.05	0.02	0.43	0.09
0.45	9.39	0.03	0.45	0.10
0.48	9.50	0.03	0.48	0.10
0.52	9.82	0.03	0.51	0.10
0.53	10.07	0.03	0.54	0.11
0.57	10.03	0.03	0.56	0.11
0.58	10.21	0.03	0.58	0.11
0.62	10.34	0.03	0.61	0.11
0.63	10.54	0.04	0.63	0.11
0.67	10.65	0.04	0.66	0.11
0.68	10.73	0.04	0.68	0.11
0.72	11.14	0.04	0.71	0.12
0.73	11.16	0.04	0.73	0.12
0.77	11.38	0.04	0.76	0.12
0.78	11.51	0.04	0.79	0.12
0.82	11.79	0.05	0.82	0.13
0.85	11.87	0.05	0.84	0.13
0.87	12.02	0.05	0.86	0.13
0.90	12.13	0.05	0.89	0.13



ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.92	12.44	0.05	0.92	0.13
0.95	12.46	0.05	0.95	0.13
0.97	12.77	0.05	0.97	0.14
1.00	12.78	0.06	0.99	0.14
1.02	13.17	0.06	1.02	0.14
1.12	13.84	0.06	1.12	0.15
1.23	14.56	0.07	1.23	0.16
1.33	15.26	0.07	1.32	0.16
1.43	15.76	0.08	1.43	0.17
1.53	16.61	0.08	1.52	0.18
1.63	17.29	0.09	1.63	0.19
1.73	18.19	0.10	1.73	0.20
1.83	18.80	0.10	1.83	0.20
1.93	19.41	0.11	1.93	0.21
2.03	20.30	0.11	2.03	0.22
2.13	20.73	0.12	2.13	0.22
2.23	21.39	0.12	2.24	0.23
2.33	22.20	0.13	2.33	0.24
2.43	22.97	0.14	2.44	0.25
2.55	23.45	0.14	2.54	0.25
2.65	24.14	0.15	2.64	0.26
2.75	24.80	0.15	2.74	0.27
2.85	25.43	0.16	2.84	0.27
2.95	26.03	0.16	2.94	0.28
3.05	26.47	0.17	3.04	0.29
3.15	27.00	0.18	3.15	0.29
3.25	27.61	0.18	3.24	0.30
3.35	28.19	0.19	3.35	0.30
3.45	28.74	0.19	3.44	0.31
3.55	29.36	0.20	3.55	0.32
3.65	29.69	0.20	3.64	0.32
3.75	30.20	0.21	3.75	0.32
3.85	30.98	0.21	3.84	0.33
3.95	31.14	0.22	3.95	0.33
4.05	31.74	0.23	4.05	0.34
4.15	32.19	0.23	4.14	0.34
4.25	32.71	0.24	4.25	0.35
4.35	32.93	0.24	4.35	0.35
4.45	33.47	0.25	4.45	0.36
4.55	33.88	0.25	4.56	0.36
4.65	34.43	0.26	4.65	0.37
4.75	34.89	0.26	4.76	0.37
4.87	35.68	0.27	4.86	0.38
4.97	35.67	0.28	4.95	0.38
5.07	36.34	0.28	5.06	0.39
5.32	37.14	0.30	5.31	0.39
5.57	37.75	0.31	5.56	0.40
5.82	38.73	0.32	5.81	0.41
6.07	39.49	0.34	6.07	0.42
6.32	40.21	0.35	6.31	0.42
6.57	40.95	0.37	6.57	0.43
6.82	41.67	0.38	6.82	0.44
7.07	42.26	0.39	7.07	0.44
7.32	42.66	0.41	7.32	0.44
7.57	43.46	0.42	7.57	0.45
7.82	43.65	0.44	7.82	0.45
8.07	43.92	0.45	8.08	0.45

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
8.32	44.44	0.46	8.32	0.46
8.58	44.82	0.48	8.58	0.46
8.83	44.75	0.49	8.82	0.46
9.08	45.20	0.51	9.08	0.46
9.33	45.49	0.52	9.33	0.46
9.58	45.78	0.53	9.58	0.47
9.83	46.16	0.55	9.82	0.47
10.08	46.49	0.56	10.08	0.47
10.33	46.49	0.57	10.33	0.47
10.58	46.93	0.59	10.59	0.47
10.83	47.33	0.60	10.83	0.47
11.08	47.71	0.62	11.09	0.48
11.33	47.97	0.63	11.34	0.48
11.58	48.13	0.65	11.59	0.48
11.83	48.22	0.66	11.84	0.48
12.08	48.66	0.67	12.09	0.48
12.33	48.50	0.69	12.34	0.48
12.58	48.51	0.70	12.59	0.48
12.85	48.59	0.71	12.84	0.48
13.10	48.56	0.73	13.10	0.47
13.35	48.60	0.74	13.34	0.47
13.60	48.95	0.76	13.60	0.48
13.85	48.86	0.77	13.84	0.47
14.10	49.27	0.78	14.10	0.48
14.35	49.27	0.80	14.34	0.47
14.60	49.38	0.81	14.60	0.47
14.85	49.67	0.83	14.85	0.48
15.10	49.81	0.84	15.10	0.48
15.35	50.07	0.85	15.35	0.48
15.60	50.53	0.87	15.61	0.48
15.85	50.50	0.88	15.85	0.48
16.10	50.44	0.90	16.10	0.48
16.35	50.84	0.91	16.36	0.48
16.60	51.11	0.92	16.60	0.48
16.85	51.01	0.94	16.86	0.48
17.10	51.04	0.95	17.11	0.48
17.37	51.14	0.97	17.36	0.48
17.62	50.89	0.98	17.61	0.47
17.87	50.65	0.99	17.86	0.47
18.12	50.95	1.01	18.11	0.47
18.37	51.03	1.02	18.37	0.47
18.62	51.07	1.04	18.61	0.47
18.87	51.11	1.05	18.87	0.47
19.12	51.21	1.06	19.12	0.47
19.37	51.54	1.08	19.37	0.47
19.62	51.57	1.09	19.62	0.47
19.87	51.65	1.11	19.88	0.47
20.00	51.43	1.11	20.00	0.46

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

MUESER RUTLEDGE CONSULTING ENGINEERS

DRAFT

File	14123-2C
Boring No.	PS-04
Sample No.	10U

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

Perf by:	YO	Date: 01/24/22
Calc by:	YO	Date: 01/26/22
Ch'kd by:	SJ	Date: 01/27/22

TEST SUMMARY

Compressive Strength =	**0.59 tsf**	**8.2 psi**	
Strain at Failure =	**8.7 %**		
Cell Pressure =	**7.94 psi**	**0.57 tsf**	**55 kPa**
Dry Density =	**71.54**	**pcf**	

USC Group Symbol = **OH-CH**

In Situ Density = **107.37** **pcf**

SAMPLE DATA

Initial Height =	5.43 in
Initial Diameter =	2.82 in
Initial Area =	6.25 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012	in
Weight of piston+gage+clamp =	352.00	gm
Weight of end cap =	175.01	gm
Correction for membrane =	-0.014	tsf
Correction for end cap+assembly =	0.004	tsf

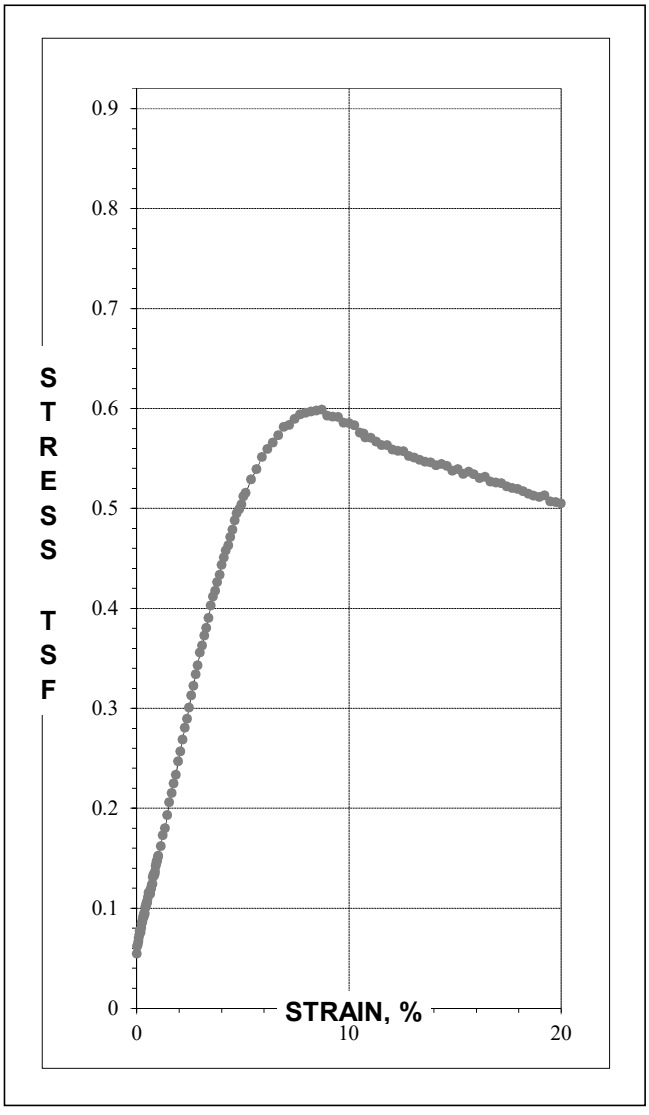
TEST CONSTANTS

Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		V
Wet + Tare	957.00	1188.70
Dry + Tare		863.15
Water	319.37	325.55
Tare		225.52
Sample Dry	637.63	637.63
Water Content	50.1%	51.1%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	6.51	0.00	0.00	0.05
0.03	7.15	0.00	0.03	0.06
0.07	7.30	0.00	0.05	0.06
0.08	7.57	0.00	0.08	0.07
0.12	7.89	0.01	0.10	0.07
0.13	8.16	0.01	0.12	0.07
0.17	8.50	0.01	0.15	0.08
0.18	8.39	0.01	0.19	0.08
0.22	8.78	0.01	0.21	0.08
0.25	9.13	0.01	0.23	0.08
0.27	9.27	0.01	0.26	0.09
0.30	9.42	0.02	0.28	0.09
0.32	9.75	0.02	0.31	0.09
0.35	9.77	0.02	0.33	0.09
0.37	10.06	0.02	0.36	0.10
0.40	10.02	0.02	0.39	0.09
0.42	10.64	0.02	0.41	0.10
0.45	10.57	0.02	0.44	0.10
0.47	10.94	0.03	0.46	0.10
0.50	10.96	0.03	0.49	0.11
0.52	11.17	0.03	0.51	0.11
0.55	11.48	0.03	0.54	0.11
0.57	11.89	0.03	0.56	0.12
0.60	11.77	0.03	0.59	0.11
0.62	11.86	0.03	0.61	0.12
0.65	11.78	0.03	0.64	0.11
0.67	12.26	0.04	0.67	0.12
0.70	12.26	0.04	0.69	0.12
0.72	12.60	0.04	0.72	0.12
0.75	12.64	0.04	0.74	0.12
0.77	13.23	0.04	0.77	0.13
0.80	13.46	0.04	0.79	0.13
0.82	13.39	0.04	0.82	0.13
0.85	13.53	0.05	0.85	0.13
0.87	13.75	0.05	0.87	0.14
0.90	14.24	0.05	0.90	0.14



ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.92	14.44	0.05	0.92	0.14
0.95	14.68	0.05	0.95	0.15
0.97	14.72	0.05	0.97	0.15
1.00	15.03	0.05	1.00	0.15
1.02	15.17	0.06	1.02	0.15
1.12	16.01	0.06	1.13	0.16
1.22	16.97	0.07	1.23	0.17
1.32	17.62	0.07	1.34	0.18
1.42	18.78	0.08	1.44	0.19
1.52	19.95	0.08	1.54	0.21
1.62	20.77	0.09	1.65	0.22
1.72	21.63	0.09	1.74	0.22
1.82	22.45	0.10	1.85	0.23
1.92	23.65	0.11	1.96	0.25
2.03	24.55	0.11	2.06	0.26
2.13	25.63	0.12	2.16	0.27
2.23	26.69	0.12	2.26	0.28
2.33	27.54	0.13	2.37	0.29
2.43	28.55	0.13	2.47	0.30
2.53	29.68	0.14	2.57	0.31
2.63	30.55	0.14	2.67	0.32
2.73	31.62	0.15	2.78	0.33
2.83	32.45	0.16	2.87	0.34
2.93	33.62	0.16	2.98	0.36
3.03	34.30	0.17	3.08	0.36
3.13	35.20	0.17	3.19	0.37
3.23	35.94	0.18	3.28	0.38
3.33	36.88	0.18	3.39	0.39
3.43	38.02	0.19	3.50	0.40
3.53	38.86	0.20	3.59	0.41
3.63	39.43	0.20	3.70	0.42
3.73	40.24	0.21	3.80	0.43
3.83	40.97	0.21	3.91	0.43
3.93	41.91	0.22	4.00	0.44
4.03	42.60	0.22	4.11	0.45
4.13	43.27	0.23	4.20	0.46
4.23	43.81	0.23	4.31	0.46
4.33	44.61	0.24	4.41	0.47
4.43	45.31	0.25	4.52	0.48
4.53	46.20	0.25	4.62	0.49
4.63	46.90	0.26	4.72	0.50
4.73	47.34	0.26	4.82	0.50
4.83	47.82	0.27	4.93	0.50
4.93	48.59	0.27	5.03	0.51
5.03	48.97	0.28	5.14	0.52
5.28	50.34	0.29	5.39	0.53
5.55	51.40	0.31	5.64	0.54
5.80	52.68	0.32	5.91	0.55
6.05	53.55	0.33	6.16	0.56
6.30	54.27	0.35	6.42	0.57
6.55	55.12	0.36	6.68	0.57
6.80	56.03	0.38	6.94	0.58
7.05	56.35	0.39	7.18	0.58
7.30	57.08	0.40	7.44	0.59
7.55	57.65	0.42	7.70	0.59
7.80	57.96	0.43	7.95	0.60
8.05	58.26	0.45	8.22	0.60

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
8.30	58.51	0.46	8.46	0.60
8.55	58.75	0.47	8.73	0.60
8.80	58.32	0.49	8.98	0.59
9.05	58.41	0.50	9.24	0.59
9.32	58.52	0.52	9.49	0.59
9.57	58.13	0.53	9.75	0.59
9.82	58.27	0.54	10.00	0.59
10.07	58.20	0.56	10.26	0.58
10.32	57.63	0.57	10.51	0.58
10.48	57.67	0.58	10.69	0.57
10.57	57.35	0.59	10.78	0.57
10.82	57.48	0.60	11.03	0.57
11.07	57.25	0.61	11.29	0.57
11.32	57.08	0.63	11.54	0.56
11.57	57.24	0.64	11.80	0.56
11.82	56.95	0.65	12.05	0.56
12.07	57.00	0.67	12.31	0.56
12.32	57.11	0.68	12.57	0.56
12.57	56.78	0.70	12.82	0.55
12.82	56.81	0.71	13.08	0.55
13.07	56.73	0.72	13.34	0.55
13.33	56.71	0.74	13.60	0.55
13.58	56.82	0.75	13.85	0.55
13.83	56.68	0.77	14.11	0.54
14.08	56.98	0.78	14.36	0.54
14.33	56.95	0.79	14.62	0.54
14.58	56.61	0.81	14.87	0.54
14.83	56.94	0.82	15.13	0.54
15.08	56.62	0.84	15.38	0.53
15.33	57.04	0.85	15.64	0.54
15.58	56.93	0.86	15.89	0.53
15.83	56.71	0.88	16.15	0.53
16.08	56.99	0.89	16.41	0.53
16.33	56.66	0.91	16.67	0.53
16.58	56.74	0.92	16.92	0.53
16.83	56.83	0.93	17.18	0.52
17.10	56.67	0.95	17.44	0.52
17.35	56.67	0.96	17.69	0.52
17.60	56.73	0.97	17.95	0.52
17.85	56.68	0.99	18.20	0.52
18.10	56.58	1.00	18.46	0.51
18.35	56.56	1.02	18.71	0.51
18.60	56.57	1.03	18.97	0.51
18.85	56.91	1.04	19.22	0.51
19.10	56.45	1.06	19.48	0.51
19.35	56.55	1.07	19.74	0.51
19.60	56.60	1.09	19.99	0.51
19.85	56.26	1.10	20.25	0.50
20.02	56.80	1.11	20.42	0.50

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

MUESER RUTLEDGE CONSULTING ENGINEERS

DRAFT

File	14123
Boring No.	PS-04A
Sample No.	12U

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION

Perf by:	YO	Date: 11/30/21
Calc by:	SJ	Date: 12/01/21
Ch'kd by:	YO	Date: 12/02/21

TEST SUMMARY

Compressive Strength =	**0.74 tsf**	**10.3 psi**	
Strain at Failure =	**7.1 %**		
Cell Pressure =	**12.57 psi**	**0.90 tsf**	**87 kPa**
Dry Density =	**57.82**	**pcf**	

USC Group Symbol =	**OH**
In Situ Density =	**98.19** **pcf**

SAMPLE DATA

Initial Height =	5.59 in
Initial Diameter =	2.83 in
Initial Area =	6.29 sq in

STRENGTH CORRECTIONS

Thickness of membrane =	0.012	in
Weight of piston+gage+clamp =	352.00	gm
Weight of end cap =	109.15	gm
Correction for membrane =	-0.011	tsf
Correction for end cap+assembly =	0.003	tsf

TEST CONSTANTS

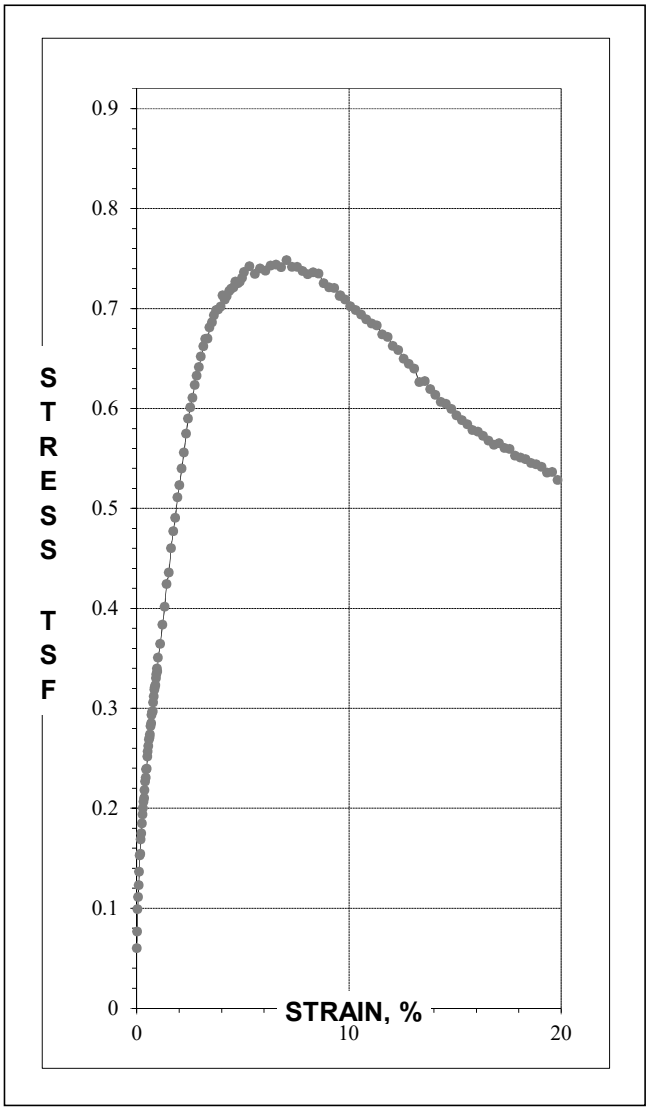
Strain Rate = 1.00 %/min

WATER CONTENT

	START	END
Tare No.		LP-E
Wet + Tare	904.89	1019.77
Dry + Tare		649.58
Water	372.03	370.19
Tare		116.72
Sample Dry	532.86	532.86
Water Content	69.8%	69.5%

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.00	3.52	0.00	0.00	0.06
0.03	4.98	0.00	0.02	0.08
0.05	6.93	0.00	0.05	0.10
0.08	8.00	0.00	0.07	0.11
0.10	9.04	0.01	0.09	0.12
0.13	10.21	0.01	0.12	0.14
0.15	11.65	0.01	0.14	0.15
0.18	11.78	0.01	0.17	0.15
0.20	13.04	0.01	0.19	0.17
0.23	13.59	0.01	0.22	0.17
0.25	14.47	0.01	0.25	0.18
0.28	15.25	0.02	0.27	0.19
0.30	15.83	0.02	0.30	0.20
0.33	16.39	0.02	0.32	0.21
0.35	16.71	0.02	0.35	0.21
0.38	17.40	0.02	0.37	0.22
0.40	18.17	0.02	0.40	0.23
0.43	18.51	0.02	0.42	0.23
0.45	19.25	0.03	0.45	0.24
0.48	19.29	0.03	0.47	0.24
0.50	20.38	0.03	0.50	0.25
0.53	20.82	0.03	0.53	0.26
0.57	21.32	0.03	0.55	0.26
0.58	21.88	0.03	0.58	0.27
0.62	22.08	0.03	0.60	0.27
0.63	22.33	0.04	0.63	0.27
0.67	23.08	0.04	0.65	0.28
0.68	23.33	0.04	0.68	0.28
0.72	24.09	0.04	0.70	0.29
0.73	24.38	0.04	0.73	0.30
0.77	24.41	0.04	0.76	0.30
0.78	25.21	0.04	0.78	0.31
0.82	25.75	0.04	0.81	0.31
0.83	26.35	0.05	0.83	0.32
0.87	26.53	0.05	0.86	0.32
0.88	26.75	0.05	0.88	0.32

NOTE: CHAMBER PRESSURE THROUGHOUT TEST SUPPLIED BY AUTOMATED FLOW PUMP.



ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
0.92	27.38	0.05	0.91	0.33
0.93	27.71	0.05	0.93	0.33
0.97	28.24	0.05	0.96	0.34
0.98	28.00	0.05	0.98	0.34
1.02	29.21	0.06	1.01	0.35
1.12	30.46	0.06	1.11	0.36
1.22	32.18	0.07	1.21	0.38
1.32	33.80	0.07	1.31	0.40
1.42	35.86	0.08	1.41	0.42
1.52	36.93	0.08	1.52	0.44
1.62	39.13	0.09	1.61	0.46
1.72	40.68	0.10	1.72	0.48
1.82	41.91	0.10	1.81	0.49
1.92	43.79	0.11	1.92	0.51
2.02	44.91	0.11	2.02	0.52
2.12	46.44	0.12	2.12	0.54
2.23	47.94	0.12	2.22	0.56
2.33	49.66	0.13	2.33	0.57
2.43	51.05	0.14	2.42	0.59
2.53	52.12	0.14	2.53	0.60
2.63	53.03	0.15	2.62	0.61
2.73	54.25	0.15	2.73	0.62
2.83	55.14	0.16	2.83	0.63
2.93	55.97	0.16	2.94	0.64
3.03	57.00	0.17	3.03	0.65
3.13	57.99	0.18	3.14	0.66
3.23	58.71	0.18	3.23	0.67
3.35	58.80	0.19	3.34	0.67
3.45	59.86	0.19	3.44	0.68
3.55	60.39	0.20	3.55	0.69
3.65	61.09	0.20	3.64	0.69
3.75	61.64	0.21	3.75	0.70
3.85	61.76	0.21	3.84	0.70
3.95	62.08	0.22	3.95	0.70
4.05	63.18	0.23	4.05	0.71
4.15	62.86	0.23	4.16	0.71
4.25	63.24	0.24	4.25	0.71
4.37	63.78	0.24	4.36	0.72
4.47	64.06	0.25	4.45	0.72
4.57	64.26	0.25	4.56	0.72
4.67	64.84	0.26	4.66	0.73
4.77	64.77	0.27	4.77	0.73
4.87	64.98	0.27	4.86	0.73
4.97	65.41	0.28	4.97	0.73
5.07	66.01	0.28	5.06	0.74
5.32	66.74	0.30	5.32	0.74
5.57	66.19	0.31	5.57	0.73
5.82	66.88	0.32	5.82	0.74
6.07	66.84	0.34	6.07	0.74
6.32	67.52	0.35	6.31	0.74
6.57	67.79	0.37	6.56	0.74
6.82	67.73	0.38	6.81	0.74
7.07	68.59	0.39	7.06	0.75
7.32	68.16	0.41	7.31	0.74
7.57	68.34	0.42	7.56	0.74
7.82	68.11	0.44	7.81	0.74
8.07	68.02	0.45	8.06	0.73

NOTE: CHAMBER PRESSURE THROUGHOUT TEST SUPPLIED BY AUTOMATED FLOW PUMP.

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

DRAFT

ELAPSED TIME (min.)	VERTICAL LOAD (lbs)	VERTICAL DISP. (inch)	STRAIN (%)	STRESS (tsf)
8.32	68.40	0.46	8.31	0.74
8.57	68.45	0.48	8.56	0.73
8.82	67.74	0.49	8.81	0.73
9.07	67.51	0.51	9.06	0.72
9.32	67.65	0.52	9.32	0.72
9.57	67.07	0.53	9.57	0.71
9.60	67.14	0.54	9.59	0.71
9.82	66.93	0.55	9.82	0.71
10.07	66.47	0.56	10.07	0.70
10.33	66.27	0.58	10.32	0.70
10.58	66.02	0.59	10.57	0.69
10.83	65.75	0.60	10.82	0.69
11.08	65.54	0.62	11.07	0.69
11.33	65.53	0.63	11.32	0.68
11.58	64.85	0.65	11.57	0.67
11.83	64.77	0.66	11.82	0.67
12.08	64.06	0.67	12.07	0.66
12.33	63.85	0.69	12.33	0.66
12.58	63.17	0.70	12.58	0.65
12.83	62.83	0.72	12.83	0.64
13.08	62.54	0.73	13.08	0.64
13.33	61.38	0.74	13.33	0.63
13.58	61.67	0.76	13.58	0.63
13.83	61.02	0.77	13.83	0.62
14.08	60.62	0.79	14.08	0.61
14.33	60.09	0.80	14.33	0.61
14.58	60.07	0.81	14.58	0.60
14.83	59.73	0.83	14.83	0.60
15.08	59.27	0.84	15.08	0.59
15.33	58.93	0.86	15.33	0.59
15.58	58.68	0.87	15.58	0.58
15.83	58.28	0.88	15.83	0.58
16.08	58.29	0.90	16.08	0.58
16.33	58.04	0.91	16.33	0.57
16.58	57.71	0.93	16.58	0.57
16.83	57.43	0.94	16.83	0.56
17.08	57.81	0.95	17.08	0.57
17.33	57.46	0.97	17.33	0.56
17.58	57.55	0.98	17.58	0.56
17.83	57.00	1.00	17.83	0.55
18.08	56.98	1.01	18.08	0.55
18.33	56.98	1.02	18.33	0.55
18.58	56.77	1.04	18.58	0.55
18.83	56.82	1.05	18.83	0.54
19.08	56.70	1.07	19.08	0.54
19.33	56.28	1.08	19.33	0.54
19.58	56.53	1.09	19.58	0.54
19.83	55.83	1.11	19.83	0.53
20.00	55.91	1.12	20.00	0.53

NOTE: CHAMBER PRESSURE THROUGHOUT TEST SUPPLIED BY AUTOMATED FLOW PUMP.

ALL TEST METHODS / RESULTS CONFORM TO ASTM D2850: "STANDARD TEST METHOD FOR UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS"

APPENDIX I

Historic Geotechnical Data

Appendix I-1

Phase I Geotechnical Investigation Data Report

Not attached; posted separately on City of Alexandria Waterfront Implementation Project website.

Appendix I-2

RiverRenew Boring Logs (Land)

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,980,129.8/11,899,181.4
LATITUDE/LONGITUDE (ft): 38.806657/-77.039183
GROUND SURFACE EL. (ft): 5.7
DATE START/END: 8/28/2018 - 9/4/2018
VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF
DRILLING COMPANY: Connelly & Associates, Inc
TOTAL DEPTH (ft): 155.0
DRILLER NAME: Curtis Wolfe
LOGGED BY: Martin Guay
RIG TYPE: CME 75 Truck Rig

Final Boring Log

C12-02

DRILLING INFORMATION

SPT HAMMER TYPE: Automatic
CASING I.D./O.D.: NA/NA
DRILLING FLUID: Water, Bentonite, EZ Mud
AUGER I.D./O.D.: 6.25 inches/11 inches
DRILL ROD O.D.: 2.625 inches
DRILL BIT DIAMETER: 5 inches
DRILLING METHOD: 11-inch OD hollow stem auger with pilot bit used to a depth of 70 feet with water added during drilling. Switched to open hole mud rotary below HSA with a 5-inch Chevron bit with EZ Mud drilling fluid.
WATER LEVEL: ▽ - At Time of Drilling: El. -6.3 ft on August 28, 2018

ABBREVIATIONS

PEN = Penetration Length
REC = Recovery Length
HSA = Hollow-Stem Auger
I.D. = Inside Diameter
O.D. = Outside Diameter
S-# = Split Spoon Sample and Number
U-# = Undisturbed Sample and Number
SC-# = Sonic Core and Number
WOR = Weight of Rods
WOH = Weight of Hammer
VOC = Volatile Organic Carbon
CO = Carbon Monoxide
H_2S = Hydrogen Sulfide
O_2 = Oxygen
LEL = Lower Explosive Limit
ppm = parts per million
NA = Not Applicable
NM = Not Measured
bgs = below ground surface
bpf = blows per foot
N_{field} = Uncorrected SPT N-Value
LL = Liquid Limit
PL = Plastic Limit
MC = Moisture Content
$S_{u,pp}$ = Undrained Strength from Pocket Penetrometer
$S_{u,tv}$ = Undrained Strength from Pocket Torvane
USCS = Unified Soil Classification System

Elev. (ft) +5.7	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Well Diagram	Drilling and Other Remarks
	0				Fill			0'- Advanced with soft dig techniques to 5 ft. Drilled to 8 ft before starting sampling. No samples collected in this zone.		Protective Casing
	5									
	10	S-01	8/24 33%	1-1-2-3 (3)			SC	8'- CLAYEY SAND (SC): Some fines with high plasticity; some fine to coarse sand; trace gravel (max. gravel size 0.3 in); very loose, brown, black, gray, moist		8'- VOC=308ppm
	15	S-02	6/24 25%	2-2-2-2 (4)				13'- Similar to Sample @8'	▽	13'- VOC=253ppm
	20	S-03	20/24 83%	WOH-WOH-WOH-WOH (WOH)	Alluvium		CH	18'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine to medium sand; very soft, black, gray, moist, shells		18'- VOC=192ppm
	25	S-04	24/24 100%	WOH-WOH-WOH-WOH (WOH)				23'- Similar to Sample @18'		23'- VOC=136ppm
	30	S-05	24/24 100%	WOR-WOR-WOR-				28'- Similar to Sample @18'		28'- VOC=97ppm

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project
CITY/STATE: Alexandria, VA
GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,980,129.8/11,899,181.4 **LATITUDE/LONGITUDE (ft):** 38.806657/-77.039183

GROUND SURFACE EL. (ft): 5.7 **DATE START/END:** 8/28/2018 - 9/4/2018

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-02

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Well Diagram	Drilling and Other Remarks
-25				WOR (WOR)	Alluvium		CH			
		S-06	24/24 100%	WOH-WOH-WOH-WOH (WOH)				33'- FAT CLAY WITH SAND (CH): Mostly fines with high plasticity; little fine sand; very soft, moist		33'- VOC=76ppm
-30	35									
		S-07	24/24 100%	WOH-WOH-WOH-WOH (WOH)				38'- Similar to Sample @33'		38'- VOC=58ppm
-35	40									
		S-08	24/24 100%	WOH-WOH-WOH-WOH (WOH)				43'- Similar to Sample @33'		43'- VOC=41ppm, CO=2ppm
-40	45									Cement-Bentonite Grout
		S-09	19/24 79%	WOH-WOH-1-1 (1)			SM	48'- SILTY SAND (SM): Mostly fine sand; little fines with low plasticity; very loose, gray, moist		48'- VOC=28ppm
-45	50									
		S-10	24/24 100%	2-6-7-9 (13)				53'- Similar to Sample @48'		53'- O2=20.6%
-50	55									
		S-11	24/24 100%	2-5-7-11 (12)				58'- Similar to Sample @48'		58'- O2=20.6%
		S-12					SW-SM	59'- WIDELY GRADED SAND WITH SILT (SW-SM): Mostly fine to coarse sand; few nonplastic fines; (max. gravel size 1 in); gray, moist		59'- O2=20.6%
-55	60									
		S-13	24/24 100%	3-4-5-6 (9)				63'- Similar to Sample @59'		63'- O2=20.7%
		S-14					CL	64'- LEAN CLAY (CL): Mostly fines with medium plasticity; trace fine to medium sand; gray, moist		64'- O2=20.7%
-60	65									
		S-15	24/24 100%	5-8-9-7 (17)				68'- SANDY LEAN CLAY (CL): Mostly fines with medium plasticity; some fine to coarse sand; trace gravel (max. gravel size 0.25 in); very stiff, gray, moist		68'- VOC=2ppm
		S-16					SM			69'- VOC=2ppm

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,980,129.8/11,899,181.4 **LATITUDE/LONGITUDE (ft):** 38.806657/-77.039183

GROUND SURFACE EL. (ft): 5.7 **DATE START/END:** 8/28/2018 - 9/4/2018

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-02

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Well Diagram	Drilling and Other Remarks
-65		S-16				SM	69'- SILTY SAND (SM): Mostly fine to medium sand; little nonplastic fines; gray, moist		
		S-17	24/24 100%	3-5-8-10 (13)		CL	73'- LEAN CLAY (CL): Mostly fines with medium plasticity; trace fine to medium sand; stiff, gray, moist		73'- VOC=2ppm
-70	75								
	80	S-18	17/24 71%	5-10-12-14 (22)	Potomac	CH	80'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine to medium sand; very stiff, gray, light brown, moist, (G1)		80'- VOC=4ppm
-75		S-19	24/24 100%	9-13-15-20 (28)			82'- Similar to Sample @80' except gray, red, mottled		82'- VOC=5ppm
	85	S-20	24/24 100%	11-16-20-24 (36)			84'- Similar to Sample @80'		84'- VOC=6ppm
-80		S-21	21/24 88%	10-13-16-24 (29)			86'- FAT CLAY (CH): Mostly fines with high plasticity; few fine to medium sand; very stiff, brown, gray, moist, mottled, (G1)		86'- O2=20.6%
		S-22	24/24 100%	13-19-22-21 (41)			88'- Similar to Sample @86' except red, light brown, gray		88'- O2=20.7%
	90								90'- O2=20.7% Bentonite Pellets
-85		S-23	24/24 100%	13-17-20-25 (37)			90'- SANDY FAT CLAY (CH): Mostly fines with high plasticity; some fine to medium sand; hard, gray, light brown, dry to the touch, lensed with 3" of gray clayey sand near middle of sample, (G1)		92'- O2=20.7% Gravel Well Pack
		S-24	24/24 100%	13-19-21-24 (40)			92'- Similar to Sample @90' except CH		94'- O2=20.7%
	95	S-25	21/24 88%	13-15-19-23 (34)			94'- Similar to Sample @90' except CH		
-90		S-26	22/24 92%	10-14-18-21 (32)		SC	96'- CLAYEY SAND (SC): Mostly fine to medium sand; some fines with high plasticity; dense, gray, brown, dry to the touch, (G3A)		97.3'- O2=20.6%
		S-27 S-28	24/24 100%	14-18-19-21 (37)		CH	97.3'- FAT CLAY WITH SAND (CH): Mostly fines with high plasticity; little fine to medium sand; gray, light brown, dry to the touch, mottled, (G1) 98'- Similar to Sample @97.3' except lensed with 3" of sand near middle of sample, CH		98'- O2=20.6% 0.010" Slotted PVC Screen
	100								100'- VOC=2ppm
-95		S-29	22/24 92%	13-18-23-27 (41)			100'- SANDY FAT CLAY (CH): Mostly fines with high plasticity; some fine to medium sand; hard, gray, light brown, moist, lensed with 1" of sand near middle of sample; mottled, (G1)		102'- VOC=1ppm
		S-30	19/24 79%	9-18-28-26 (46)			102'- FAT CLAY WITH SAND (CH): Mostly fines with high plasticity; little fine to medium sand; hard, gray, light brown, dry to the touch, mottled, (G1)		Gravel Well Pack 104'- O2=20.8%, VOC=2ppm
	105	S-31	24/24 100%	14-20-21-24 (41)			104'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; hard, gray, light brown, moist, mottled, (G1)		105.5'- VOC=3ppm Gravel Well Pack
-100		S-32 U-01	20/30 67%	PUSH		CL	105.5'- SANDY LEAN CLAY (CL): Mostly fines with medium plasticity; some fine sand; gray, moist, (G2) 106'- Similar to Sample @105.5' except gray, light brown		106'- VOC=4ppm
		S-33	18/18 100%	14-20-25 (45)			108.5'- LEAN CLAY WITH SAND (CL): Mostly fines with medium plasticity; little fine to medium sand; hard, gray, light brown, moist, (G2)		108.5'- O2=20.5% 108.6'- O2=20.5% 110'- O2=20.6%

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,980,129.8/11,899,181.4 **LATITUDE/LONGITUDE (ft):** 38.806657/-77.039183

GROUND SURFACE EL. (ft): 5.7 **DATE START/END:** 8/28/2018 - 9/4/2018

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-02

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Well Diagram	Drilling and Other Remarks
-105		S-34 S-35	21/24 88%	12-21-25-30 (46)				108.6'- Similar to Sample @108.5' except light brown, gray		111'- Clay collar observed during drilling
								110'- SANDY LEAN CLAY (CL): Mostly fines with medium plasticity; some fine sand; hard, light brown, red, gray, olive, brown, moist, (G2)		112'- O2=20.6%
		S-36	21/24 88%	12-19-30-32 (49)				112'- Similar to Sample @110' except light brown, gray		
										114'- O2=20.7%
	115	S-37	24/24 100%	16-22-36-40 (58)				114'- LEAN CLAY WITH SAND (CL): Mostly fines with medium plasticity; little fine sand; hard, gray, light brown, moist, mottled, (G2)		115.5'- O2=20.5%
-110		S-38 S-39	24/24 100%	20-23-33-34 (56)			SC CL	115.5'- CLAYEY SAND (SC): Mostly fine sand; some fines with medium plasticity; light brown, gray, moist, (G3A)		116'- O2=20.7%, VOC=1ppm
		S-40	20/24 83%	16-21-30-31 (51)			CH	116'- SANDY LEAN CLAY (CL): Mostly fines with medium plasticity; some fine sand; hard, gray, light brown, moist, (G2)		118'- O2=20.7%, Env. sample collected
	120							118'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; hard, gray, light brown, red, moist, (G1)		120'- VOC=1ppm
-115		S-41	24/24 100%	11-15-20-28 (35)				120'- Similar to Sample @118' except gray		121'- VOC=1ppm
		S-42						121'- FAT CLAY (CH): Mostly fines with high plasticity; trace sand; gray, red, dry to the touch, mottled, (G1)		122'- VOC=2ppm
		S-43	19/24 79%	15-17-28-34 (45)				122'- Similar to Sample @121'		
										124'- VOC=3ppm
	125	S-44	24/24 100%	15-19-27-26 (46)				124'- Similar to Sample @121'		
-120										
										128'- O2=20.4%
		S-45	22/24 92%	11-15-16-23 (31)				128'- Similar to Sample @121' except brown, gray		
	130									
-125										Cement-Bentonite Grout
										133'- VOC=2ppm
		U-02	12/24 50%	PUSH				133'- Similar to Sample @121' except gray, light brown, mottled		
	135									135'- VOC=2ppm
-130		S-46	24/24 100%	9-17-19-19 (36)				135'- Similar to Sample @121' except reddish brown, gray		
										138'- VOC=2ppm
		S-47	21/24 88%	9-12-15-20 (27)				138'- FAT CLAY (CH): Mostly fines with high plasticity; few sand; very stiff, red, gray, dry to the touch, lensed with 2" of red silt near center of sample, (G1)		
	140									
-135										
										143'- VOC=4ppm
		S-48	24/24 100%	11-16-24-26 (40)				143'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine to medium sand; hard, reddish brown, gray, moist, mottled, (G1)		
	145									
-140										
										148'- VOC=4ppm
		S-49	24/24 100%	11-14-18-20 (32)				148'- Similar to Sample @143'		

Sample Information; N_{field} (bpf) 20 40 60 80; PL (%) MC (%) LL (%) 20 40 60 80; Δ $S_{u,pp}$ (ksf) $\square$ $S_{u,tv}$ (ksf) 2 4 6 8

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,980,129.8/11,899,181.4 **LATITUDE/LONGITUDE (ft):** 38.806657/-77.039183

GROUND SURFACE EL. (ft): 5.7 **DATE START/END:** 8/28/2018 - 9/4/2018

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-02

Elev. (ft)	Depth (ft)	Sample Information: Sample Type-No.	Sample Information: REC/PEN (in) REC%	Sample Information: Blows per 6 in. (N_{field})	N_{field} (bpf) 20 40 60 80; PL (%) MC (%) LL (%) 20 40 60 80; $\Delta S_{u,pp}$ (ksf) $\square S_{u,tv}$ (ksf) 2 4 6 8	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Well Diagram	Drilling and Other Remarks
-145											
		S-50	24/24 100%	13-19-25-32 (44)					153'- Similar to Sample @143' except reddish brown		153'- VOC=4ppm
	155								**BORING TERMINATED AT 155 FT (EL. -149.3 FT) OBSERVATION WELL C12-02 INSTALLED UPON COMPLETION.**		
-150											
	160										
-155											
	165										
-160											
	170										
-165											
	175										
-170											
	180										
-175											
	185										
-180											

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,978,910.0/11,899,219.0
LATITUDE/LONGITUDE (ft): 38.803306/-77.039119
GROUND SURFACE EL. (ft): 4.8
DATE START/END: 12/6/2018 - 12/18/2018
VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF
DRILLING COMPANY: Connelly & Associates, Inc
TOTAL DEPTH (ft): 160.0
DRILLER NAME: Sam Lind
LOGGED BY: Michael Johnescu
RIG TYPE: CME 75 Truck Rig

Final Boring Log

C12-03

DRILLING INFORMATION

SPT HAMMER TYPE: Automatic
CASING I.D./O.D.: NA/NA
DRILLING FLUID: Water, Bentonite, EZ Mud
AUGER I.D./O.D.: 6.25 inches/11 inches
DRILL ROD O.D.: 2.625 inches
DRILL BIT DIAMETER: 5 inches
DRILLING METHOD: 11-inch OD hollow stem auger with pilot bit used to a depth of 93 feet with water added during drilling. Switched to open hole mud rotary below HSA with a 5-inch Chevron bit with EZ Mud drilling fluid.
WATER LEVEL: ▽ - At Time of Drilling: El. +1.4 ft on December 10, 2018

ABBREVIATIONS

PEN = Penetration Length
REC = Recovery Length
HSA = Hollow-Stem Auger
I.D. = Inside Diameter
O.D. = Outside Diameter
S-# = Split Spoon Sample and Number
U-# = Undisturbed Sample and Number
SC-# = Sonic Core and Number
WOR = Weight of Rods
WOH = Weight of Hammer
VOC = Volatile Organic Carbon
CO = Carbon Monoxide
H_2S = Hydrogen Sulfide
O_2 = Oxygen
LEL = Lower Explosive Limit
ppm = parts per million
NA = Not Applicable
NM = Not Measured
bgs = below ground surface
bpf = blows per foot
N_{field} = Uncorrected SPT N-Value
LL = Liquid Limit
PL = Plastic Limit
MC = Moisture Content
$S_{u,pp}$ = Undrained Strength from Pocket Penetrometer
$S_{u,tv}$ = Undrained Strength from Pocket Torvane
USCS = Unified Soil Classification System

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Well Diagram	Drilling and Other Remarks
+4.8					Fill			0'- Advanced with soft dig techniques to 3 ft. No samples collected in this zone.		Protective Casing
0	5	S-01	18/24 75%	3-6-4-4 (10)			SW-SM	3'- WIDELY GRADED SAND WITH SILT AND GRAVEL (SW-SM): Mostly fine to coarse sand; some coarse angular gravel; few nonplastic fines; loose, gray, brown, moist	▽	
										7'- Rig chatter, strong odor
-5	10	S-02	15/24 63%	4-3-4-4 (7)				8'- Similar to Sample @3' except gray, porcelain in cuttings		
-10	15	S-03	20/24 83%	WOH-WOH-WOH-1 (WOH)			MH	13'- ELASTIC SILT WITH SAND (MH): Mostly fines with medium plasticity; little fine to medium sand; fine; very soft, gray, brown, moist, trace mica		
		S-04	20/24 83%	WOR-WOR-WOH-1 (WOH)	Alluvium		SW	18'- WIDELY GRADED SAND WITH GRAVEL (SW): Mostly fine to coarse sand; little fine gravel; trace fines; very loose, gray, wet, trace mica		
-15	20									
-20	25	S-05	20/24 83%	WOH-WOH-WOH-WOH (WOH)			CH	23'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine to medium sand; very soft, brown, moist, black wood fragments		28'- LEL=10%
		S-06	24/24 100%	WOR-WOH-WOH-				28'- Similar to Sample @23' except brown, light brown		
-25										

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project
CITY/STATE: Alexandria, VA
GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,978,910.0/11,899,219.0 **LATITUDE/LONGITUDE (ft):** 38.803306/-77.039119

GROUND SURFACE EL. (ft): 4.8 **DATE START/END:** 12/6/2018 - 12/18/2018

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log
C12-03

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
				WOH (WOH)	CH		
		S-07	24/24 100%	WOH-WOH-WOH-WOH (WOH)		33'- Similar to Sample @23'	33'- LEL=29%
-30	35						
		S-08	24/24 100%	WOH-WOH-WOH-WOH (WOH)		38'- Similar to Sample @23'	38'- O2=20.3%, LEL=38%
-35	40						
		S-09	24/24 100%	WOR-WOH-WOH-WOH (WOH)		43'- Similar to Sample @23'	43'- Drilling stopped briefly to allow gas to dissipate; O2=20.1%, LEL=53%
-40	45						Cement-Bentonite Grout
		S-10	24/24 100%	WOH-WOH-WOH-WOH (WOH)		48'- Similar to Sample @23' except brown, gray, oyster shells in sample at 18"	48'- Drilling stopped briefly to allow gas to dissipate; O2=19.6%, LEL=99%
-45	50						
		S-11	24/24 100%	WOH-WOH-WOH-WOH (WOH)		53'- FAT CLAY WITH SAND (CH): Mostly fines with high plasticity; little fine sand; very soft, gray, black, moist, trace mica, sample becomes more granular with depth	53'- O2=20.3%, LEL=39%
-50	55						58'- O2=20.2%, LEL=50%
		S-12 S-12A	24/24 100%	WOH-WOH-3-15 (3)	SM	58'- Similar to Sample @53' 59'- SILTY SAND (SM): Mostly fine to medium sand; some fines with low plasticity; trace gravel (max. gravel size 0.25 in); moist, trace mica	
-55	60						
		S-13	24/24 100%	WOH-WOH-1-3 (1)		63'- Similar to Sample @59' except gray	63'- Drilling stopped briefly to allow gas to dissipate; O2=19.9%, LEL=73%
-60	65						
		S-14	24/24 100%	3-5-6-6 (11)		68'- Similar to Sample @59' except brown, gray	68'- O2=20.3%, LEL=35%
-65							

Sample Information; N_{field} (bpf) 20 40 60 80; PL (%) MC (%) LL (%) 20 40 60 80; Δ $S_{u,pp}$ (ksf) $\square$ $S_{u,tv}$ (ksf) 2 4 6 8; Layer Name; Graphic Log; Well Diagram

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,978,910.0/11,899,219.0 **LATITUDE/LONGITUDE (ft):** 38.803306/-77.039119

GROUND SURFACE EL. (ft): 4.8 **DATE START/END:** 12/6/2018 - 12/18/2018

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-03

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
						SM	73'- Similar to Sample @59' except wet	73'- LEL=15%
-70	75	S-15	19/24 79%	2-4-3-5 (7)				
					Potomac	CH	78'- FAT CLAY (CH): Mostly fines with high plasticity; few fine gravel; few fine to medium sand; very stiff, brown, light brown, gray, moist, trace mica (G1)	78'- Switch to mayhey jr. rods.
-75	80	S-16	4/24 17%	5-6-9-11 (15)				
		S-17	22/24 92%	3-4-7-10 (11)			83'- Similar to Sample @78'	
-80	85	S-18	24/24 100%	4-4-5-6 (9)			85'- FAT CLAY (CH): Mostly fines with high plasticity; few fine to medium sand; stiff, brown, gray, light brown, moist, (G1)	
		S-19	24/24 100%	3-5-5-8 (10)			87'- Similar to Sample @85' except brown, gray, light brown, red	
-85	90	S-20	24/24 100%	6-6-10-10 (16)			89'- Similar to Sample @85' except gray, red	
		S-21	24/24 100%	6-9-7-10 (16)			91'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine sand; very stiff, gray, red, moist, (G1)	
		S-22	24/24 100%	5-7-8-9 (15)			93'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; very stiff, gray, red, moist, (G1)	Bentonite Pellets
-90	95	U-01	19/24 79%	PUSH			95'- Similar to Sample @93' except brown, gray	
		S-23	24/24 100%	3-5-7-9 (12)			97'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine sand; stiff, brown, reddish brown, gray, moist, (G1)	Gravel Well Pack
-95	100	S-24	24/24 100%	4-5-6-8 (11)			99'- Similar to Sample @97' except brown, gray	
		S-25	22/24 92%	3-4-5-8 (9)			101'- Similar to Sample @97' except gray, red, brown	
		S-26	24/24 100%	5-8-11-11 (19)			103'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; very stiff, red, gray, brown, moist, lensed with 1/2" of mica near center of sample, (G1)	103'- VOC=1ppm, CO=10ppm
-100	105	S-27	0/24 0%	4-8-11-10 (19)			105'- No Recovery	0.010" Slotted PVC Screen
		S-28	3/24 13%	3-7-8-10 (15)			107'- Similar to Sample @103'	
-105		S-29	22/24	4-7-9-10			109'- Similar to Sample @103' except gray, light brown	109'- VOC=2ppm, CO=15ppm, Env. sample collected

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 02/04/20

DRAFT

BORING INFORMATION

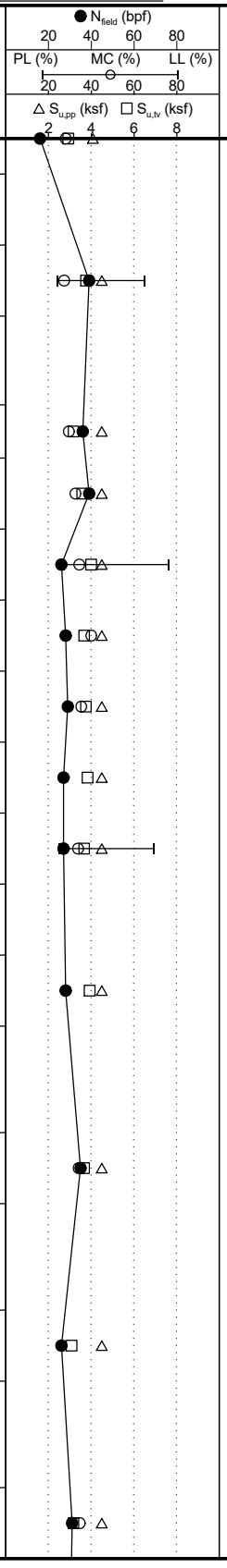
NORTHING/EASTING (ft): 6,978,910.0/11,899,219.0 **LATITUDE/LONGITUDE (ft):** 38.803306/-77.039119

GROUND SURFACE EL. (ft): 4.8 **DATE START/END:** 12/6/2018 - 12/18/2018

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-03

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
		S-29	92%	(16)		Gravel Well Pack
		U-02	15/24 63%	PUSH	111'- Similar to Sample @103' except brown, gray	
		S-30	24/24 100%	8-16-23-26 (39)	113'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine sand; hard, brown, gray, reddish brown, moist, trace mica (G1)	Gravel Well Pack
-110	115	U-03	23/30 77%	PUSH	115'- Similar to Sample @113'	
		S-31	18/18 100%	10-15-21 (36)	117.5'- Similar to Sample @113' except brown, white specs	117.5'- VOC=1ppm, CO=7ppm
-115	120	S-32	24/24 100%	9-17-22-21 (39)	119'- Similar to Sample @113' except slickensided at 120.5 ft, 10 degrees	
		S-33	24/24 100%	8-11-15-19 (26)	121'- Similar to Sample @113' except red, gray, brown	121'- VOC=2ppm, CO=21ppm Cement-Bentonite Grout
-120	125	S-34	19/24 79%	4-12-16-17 (28)	123'- Similar to Sample @113'	123'- VOC=3ppm, CO=11ppm
		S-35	24/24 100%	9-13-16-20 (29)	125'- Similar to Sample @113' except brown, gray, red, light brown	
		S-36	24/24 100%	6-12-15-16 (27)	127'- Similar to Sample @113' except gray, brown	127'- VOC=2ppm, CO=17ppm
-125	130	S-37	24/24 100%	9-11-16-22 (27)	129'- Similar to Sample @113' except brown, gray, red, slickensided at 129.4 ft and 130 ft, 45 degrees	129'- VOC=2ppm, CO=16ppm
		S-38	24/24 100%	8-12-16-19 (28)	133'- Similar to Sample @113' except slickensided at 134.6 ft, 45 degrees	133'- O2=20.5%, VOC=3ppm, CO=30ppm
-130	135					
		S-39	24/24 100%	9-15-20-23 (35)	138'- Similar to Sample @113' except brown, gray	138'- VOC=2ppm, CO=12ppm
-135	140					
		S-40	24/24 100%	9-12-14-20 (26)	143'- Similar to Sample @113' except slickensided at 144.5 ft, 45 degrees	Cement-Bentonite Grout 125'- VOC=1ppm, CO=9ppm
-140	145					
		S-41	24/24 100%	8-12-19-20 (31)	148'- Similar to Sample @113' except slickensided at 148.3 ft, 148.6 ft, and 149.2 ft, 45 degrees	
-145						



Layer Name | Graphic Log | USCS | Well Diagram

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,978,910.0/11,899,219.0 **LATITUDE/LONGITUDE (ft):** 38.803306/-77.039119

GROUND SURFACE EL. (ft): 4.8 **DATE START/END:** 12/6/2018 - 12/18/2018

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-03

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Well Diagram	Drilling and Other Remarks
-150	155	S-42	24/24 100%	10-13-17-22 (30)				153'- Similar to Sample @113' except brown, gray, trace mica		153'- VOC=1ppm, CO=5ppm
-155	160	S-43	24/24 100%	10-15-22-23 (37)				158'- Similar to Sample @113'		158'- VOC=2ppm, CO=4ppm
								BORING TERMINATED AT 160 FT (EL. -155.2 FT) OBSERVATION WELL C12-03 INSTALLED UPON COMPLETION.		
-160	165									
-165	170									
-170	175									
-175	180									
-180	185									
-185										

N_{field} (bpf) 20 40 60 80

PL (%) MC (%) LL (%) 20 40 60 80

Δ $S_{u,pp}$ (ksf) $\square$ $S_{u,tv}$ (ksf) 2 4 6 8

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

Appendix I-3

RiverRenew Boring Logs (Water)

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,979,903.2/11,899,479.8
LATITUDE/LONGITUDE (ft): 38.806022/-77.038149
GROUND SURFACE EL. (ft): -11.5
DATE START/END: 6/28/2019 - 7/15/2019
VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF
DRILLING COMPANY: Connelly & Associates, Inc
TOTAL DEPTH (ft): 140.0
DRILLER NAME: Kevin Kersh
LOGGED BY: Michael Johnescu
RIG TYPE: CME 55 LCX (Barge)

Final Boring Log

C12-15

DRILLING INFORMATION

SPT HAMMER TYPE: Automatic
CASING I.D./O.D.: 5 inches/5.5 inches
DRILLING FLUID: Water, Bentonite, EZ Mud
AUGER I.D./O.D.: NA/NA
DRILL ROD O.D.: 2.625 inches
DRILL BIT DIAMETER: 5 inches
DRILLING METHOD: 5.5-inch OD casing with casing advancer and wireline used to a depth of 70 feet with water added during drilling. Switched to open hole mud rotary below casing with a 5-inch bit with EZ Mud and bentonite drilling fluid.
WATER LEVEL: ▽ - At Time of Drilling: El. ft on

ABBREVIATIONS

PEN = Penetration Length
REC = Recovery Length
HSA = Hollow-Stem Auger
I.D. = Inside Diameter
O.D. = Outside Diameter
S-# = Split Spoon Sample and Number
U-# = Undisturbed Sample and Number
SC-# = Sonic Core and Number
WOR = Weight of Rods
WOH = Weight of Hammer
VOC = Volatile Organic Carbon
CO = Carbon Monoxide
H_2S = Hydrogen Sulfide
O_2 = Oxygen
LEL = Lower Explosive Limit
ppm = parts per million
NA = Not Applicable
NM = Not Measured
bgs = below ground surface
bpf = blows per foot
N_{field} = Uncorrected SPT N-Value
LL = Liquid Limit
PL = Plastic Limit
MC = Moisture Content
$S_{u,pp}$ = Undrained Strength from Pocket Penetrometer
$S_{u,tv}$ = Undrained Strength from Pocket Torvane
USCS = Unified Soil Classification System

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
-11.5					Alluvium			0'- Guide casing seated approximately 13 feet below the mudline prior to drilling. No samples collected in this zone.	
		S-01	22/24 92%	WOH-WOH-WOH-WOH (WOH)			MH	13'- ELASTIC SILT WITH SAND (MH): Mostly fines with medium plasticity; little fine sand; very soft, gray, wet, trace mica, organic odor	13'- LEL=4%, VOC=0.5ppm
		S-02	24/24 100%	WOH-WOH-WOH-WOH (WOH)			CL	18'- SANDY LEAN CLAY (CL): Mostly fines with medium plasticity; some fine sand; very soft, gray, moist, trace mica, organic odor	18'- LEL=5%
		S-03	0/24 0%	WOR-WOR-WOR-WOR (WOH)				23'- No Recovery	23'- LEL=3%
		S-04	18/24 75%	WOH-WOH-1-2			MH	28'- SANDY ELASTIC SILT (MH): Mostly fines with medium plasticity; some fine sand; very soft, gray, wet	28'- LEL=8%, VOC=1.4ppm

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project
CITY/STATE: Alexandria, VA
GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,979,903.2/11,899,479.8 **LATITUDE/LONGITUDE (ft):** 38.806022/-77.038149

GROUND SURFACE EL. (ft): -11.5 **DATE START/END:** 6/28/2019 - 7/15/2019

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-15

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
				(1)			MH		
-45	35	S-05	24/24 100%	WOH-WOH-3-4 (3)				33'- Similar to Sample @28' except roots, trace mica, wood fragments, and organic odor	33'- LEL=4%, VOC=0.5ppm
-50	40	S-06	21/24 88%	1-2-4-3 (6)				38'- ELASTIC SILT WITH SAND (MH): Mostly fines with medium plasticity; little fine sand; medium stiff, gray, moist, trace mica	38'- LEL=3%, VOC=0.2ppm
-55	45	S-07	24/24 100%	WOH-WOH-2-3 (2)				43'- ELASTIC SILT WITH SAND (MH): Mostly fines with medium plasticity; little fine sand; soft, gray, moist, trace mica and seashells	43'- LEL=5%, VOC=0.2ppm
-60	50	S-08	24/24 100%	1-5-6-6 (11)				48'- Similar to Sample @43' except no mica and shells	48'- LEL=10%, VOC=0.8ppm
		S-08A					SM	49.7'- SILTY SAND (SM): Mostly fine to medium sand; little nonplastic fines; moist, trace mica	
-65	55	S-09	24/24 100%	WOH-WOH-1-2 (1)			MH	53'- SANDY ELASTIC SILT (MH): Mostly fines with medium plasticity; some fine sand; very soft, gray, moist, trace mica	53'- VOC=0.2ppm
-70	60	S-10	24/24 100%	WOH-WOH-2-3 (2)				58'- Similar to Sample @53' except trace mica, wood fragments	
-75	65	S-11	22/24 92%	6-7-6-7 (13)				63'- Similar to Sample @53' except no wood fragments	
		S-11A S-12	12/24 50%	5-1-2-6 (3)			SM	64.3'- SILTY SAND (SM): Mostly fine sand; some nonplastic fines; trace gravel; brown, moist, trace mica, wood fragments 65'- Similar to Sample @64.3'	65'- Switched to mud rotary.
-80		S-13	13/24 54%	6-8-10-13 (18)	Potomac		CH	67'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; very stiff, brown, gray, moist, trace mica (G1)	
		S-14	18/24					69'- FAT CLAY (CH): Mostly fines with high plasticity; few fine	

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,979,903.2/11,899,479.8 **LATITUDE/LONGITUDE (ft):** 38.806022/-77.038149

GROUND SURFACE EL. (ft): -11.5 **DATE START/END:** 6/28/2019 - 7/15/2019

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-15

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
		S-14	75%	9-11-13-17 (24)				sand; very stiff, red, gray, moist, (G1)	
		S-15	18/24 75%	11-14-14-20 (28)				71'- Similar to Sample @69' except reddish brown	
-85		S-16	20/24 83%	20-23-17-25 (40)				73'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; hard, brown, gray, moist, (G1)	
	75	S-17	21/24 88%	16-20-18-29 (38)				75'- Similar to Sample @73'	
-90		S-18	23/24 96%	22-23-27-32 (50)				77'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine sand; hard, brown, gray, red, dry to the touch, trace mica (G1)	
	80	S-19	17/24 71%	11-15-15-25 (30)				79'- Similar to Sample @77' except gray, brown	
		S-20	21/24 88%	8-12-15-17 (27)				81'- Similar to Sample @77'	
-95		S-21	22/24 92%	10-13-15-19 (28)				83'- Similar to Sample @77' except trace mica	
	85	U-01	27/30 90%	PUSH				85'- FAT CLAY WITH SAND (CH): Mostly fines with high plasticity; little fine to medium sand; brown, gray, dry to the touch, trace mica (G1)	
-100		S-22	12/18 67%	18-19-21 (40)			SC	87.5'- SANDY FAT CLAY (CH): Mostly fines with high plasticity; some fine to medium sand; hard, gray, dry to the touch, stratified with layers of fat clay and sand, trace mica (G1)	
		S-22A					CH	88'- CLAYEY SAND (SC): Mostly fine to medium sand; little fines with high plasticity; gray, dry to the touch, trace mica (G3A)	
	90	S-23	21/24 88%	10-13-13-14 (26)				89'- FAT CLAY WITH SAND (CH): Mostly fines with high plasticity; little fine to medium sand; very stiff, gray, moist, stratified with layers of sandy fat clay and clayey sand, trace mica (G1)	
		S-24	18/24 75%	10-19-23-30 (42)				91'- Similar to Sample @89' except gray, brown, trace mica	
-105		S-25	24/24 100%	13-19-25-27 (44)				93'- SANDY FAT CLAY (CH): Mostly fines with high plasticity; some fine sand; hard, gray, brown, reddish brown, moist, trace mica (G1)	
	95	S-26	18/24 75%	20-24-35-43 (59)				95'- Similar to Sample @93' except brown, gray, blocky	
		S-27	19/24 79%	20-25-36-45 (61)			SC	97'- CLAYEY SAND (SC): Mostly fine to medium sand; little fines with medium plasticity; very dense, brown, gray, moist, trace mica (G3A)	
-110		S-28	17/24 71%	14-27-24-36 (51)				99'- CLAYEY SAND (SC): Mostly fine to medium sand; little fines with medium plasticity; very dense, brown, gray, moist, trace mica (G3A)	
	100	S-29	22/24 92%	9-17-22-30 (39)				101'- Similar to Sample @99' except blocky, trace mica	
-115		S-30	23/24 96%	15-24-26-28 (50)				103'- Similar to Sample @99'	
	105	S-31	20/24 83%	16-28-29-35 (57)				105'- Similar to Sample @99' except gray, brown, light brown, trace mica	105'- LEL=7%, VOC=2.5ppm, CO=42ppm, H2S=0.7ppm
		S-32	15/24 63%	13-22-28-37 (50)				107'- Similar to Sample @99' except methane odor	107'- LEL=3%, VOC=0.1ppm
-120		S-33	19/24					109'- Similar to Sample @99'	109'- VOC=0.3ppm

N_{field} (bpf) 20 40 60 80

PL (%) MC (%) LL (%) 20 40 60 80

Δ $S_{u,pp}$ (ksf) $\square$ $S_{u,tv}$ (ksf) 2 4 6 8

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,979,903.2/11,899,479.8 **LATITUDE/LONGITUDE (ft):** 38.806022/-77.038149

GROUND SURFACE EL. (ft): -11.5 **DATE START/END:** 6/28/2019 - 7/15/2019

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-15

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/ PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
		S-33	79%	21-31-35-41 (66)					
-125	115	S-34	21/24 88%	15-17-19-24 (36)			CH	113'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; hard, brown, gray, dry to the touch, trace mica (G1)	113'- VOC=1.2ppm, CO=5ppm
		U-02	29/30 97%	PUSH				115'- Similar to Sample @113'	
-130	120	S-35	16/18 89%	16-19-20 (39)				117.5'- Similar to Sample @113' except slickensided at 118.1 ft, 45 degrees	120'- Lots of rig chatter and heavy mud loss.
-135	125	S-36	24/24 100%	25-27-22-30 (49)				123'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine sand; hard, brown, gray, red, dry to the touch, slickensided at 123.6 ft, 40 degrees, (G1)	
-140	130	S-37	24/24 100%	9-12-14-17 (26)				128'- Similar to Sample @123' except olive, red, brown, gray, slickensided at 129.7 ft, 70 degrees and at 128.7 ft, 25 degrees	
-145	135	S-38	24/24 100%	12-14-17-23 (31)				133'- Similar to Sample @123' except gray, brown, reddish brown, trace mica	133'- VOC=1.5ppm
-150	140	S-39	24/24 100%	10-15-15-21 (30)				138'- Similar to Sample @123' except gray, brown, reddish brown, slickensided at 138.6 ft, 60 degrees and at 138.8 ft, 60 degrees	
-155	145							**BORING TERMINATED AT 140 FT (EL. -151.5 FT)** **BORING GROUTED FULL DEPTH WITH CEMENT-BENTONITE GROUT UPON COMPLETION**	
-160									

N_{field} (bpf): 20 40 60 80

PL (%) MC (%) LL (%): 20 40 60 80

$\Delta S_{u,pp}$ (ksf) $\square S_{u,tv}$ (ksf): 2 4 6 8

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,979,176.8/11,899,377.7
LATITUDE/LONGITUDE (ft): 38.804032/-77.038548
GROUND SURFACE EL. (ft): -5.5
DATE START/END: 7/17/2019 - 7/26/2019
VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF
DRILLING COMPANY: Connelly & Associates, Inc
TOTAL DEPTH (ft): 145.0
DRILLER NAME: Kevin Kersh
LOGGED BY: Michael Johnescu
RIG TYPE: CME 55 LCX (Barge)

Final Boring Log

C12-16

DRILLING INFORMATION

SPT HAMMER TYPE: Automatic
CASING I.D./O.D.: 5 inches/5.5 inches
DRILLING FLUID: Water, Bentonite, EZ Mud
AUGER I.D./O.D.: NA/NA
DRILL ROD O.D.: 2.625 inches
DRILL BIT DIAMETER: 5 inches
DRILLING METHOD: 5.5-inch OD casing with casing advancer and wireline used to a depth of 82 feet with water added during drilling. Switched to open hole mud rotary below casing with a 5-inch bit with EZ Mud and bentonite drilling fluid.
WATER LEVEL: ▽ - At Time of Drilling: El. ft on

ABBREVIATIONS

PEN = Penetration Length
REC = Recovery Length
HSA = Hollow-Stem Auger
I.D. = Inside Diameter
O.D. = Outside Diameter
S-# = Split Spoon Sample and Number
U-# = Undisturbed Sample and Number
SC-# = Sonic Core and Number
WOR = Weight of Rods
WOH = Weight of Hammer
VOC = Volatile Organic Carbon
CO = Carbon Monoxide
H_2S = Hydrogen Sulfide
O_2 = Oxygen
LEL = Lower Explosive Limit
ppm = parts per million
NA = Not Applicable
NM = Not Measured
bgs = below ground surface
bpf = blows per foot
N_{field} = Uncorrected SPT N-Value
LL = Liquid Limit
PL = Plastic Limit
MC = Moisture Content
$S_{u,pp}$ = Undrained Strength from Pocket Penetrometer
$S_{u,tv}$ = Undrained Strength from Pocket Torvane
USCS = Unified Soil Classification System

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
-5.5					Alluvium			0'- Guide casing seated approximately 13 feet below the mudline prior to drilling. No samples collected in this zone.	
		S-01	24/24 100%	WOH-WOH-WOH-WOH (WOH)			ML	13'- SILT (ML): Mostly nonplastic fines; few fine sand; very soft, gray, wet	
		S-02	24/24 100%	WOR-WOR-WOH-WOH (WOH)			CH	18'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; very soft, gray, moist, trace mica	
		S-03	24/24 100%	WOH-WOH-WOH-WOH (WOH)				23'- Similar to Sample @18'	
		S-04	24/24 100%	WOH-WOH-WOH-				28'- Similar to Sample @18'	28'- VOC=0.4ppm

-10 / 5
-15 / 10
-20 / 15
-25 / 20
-30 / 25
-35

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project
CITY/STATE: Alexandria, VA
GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,979,176.8/11,899,377.7
LATITUDE/LONGITUDE (ft): 38.804032/-77.038548
GROUND SURFACE EL. (ft): -5.5
DATE START/END: 7/17/2019 - 7/26/2019
VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF
DRILLING COMPANY: Connelly & Associates, Inc

Final Boring Log
C12-16

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/ PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
				WOH (WOH)			CH		
-40	35	S-05	24/24 100%	WOH-WOH-WOH-WOH (WOH)				33'- Similar to Sample @18' except trace mica and seashells	33'- LEL=14%, VOC=0.1ppm
-45	40	S-06	24/24 100%	WOH-WOH-WOH-WOH (WOH)				38'- Similar to Sample @18'	38'- LEL=12%, VOC=0.5ppm
-50	45	S-07	24/24 100%	WOH-WOH-WOH-3 (WOH)				43'- Similar to Sample @18'	43'- LEL=8%
-55	50	S-08	24/24 100%	WOH-2-2-3 (4)				48'- Similar to Sample @18' except gray, light brown	48'- LEL=10%
-60	55								53'- High methane levels exceeding the 99% lel and oxygen content of only 1.7%. drilling stopped to allow gas to dissipate.
-65	60								58'- Continuous elevated gas readings were observed after several days. driller pushed 5-in casing to 63' below mud line. typical gas readings were measured at this depth and sampling continued.
-70	65	S-09 S-09A	14/24 58%	4-5-WOH-WOH (5)			SP-SC SM	63'- NARROWLY GRADED SAND (SP-SC): Mostly fine sand; few fines; trace fine subrounded gravel; loose, gray, wet 63.8'- SILTY SAND (SM): Mostly fine sand; some nonplastic fines; moist, trace mica	
-75		S-10	22/24 92%	3-1-2-3 (3)			SP-SM	68'- NARROWLY GRADED SAND WITH SILT (SP-SM): Mostly fine to medium sand; few nonplastic fines; very loose, gray, moist, trace mica	70'- VOC=0.1ppm

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project
CITY/STATE: Alexandria, VA
GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,979,176.8/11,899,377.7 **LATITUDE/LONGITUDE (ft):** 38.804032/-77.038548

GROUND SURFACE EL. (ft): -5.5 **DATE START/END:** 7/17/2019 - 7/26/2019

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-16

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
							SM	70'- SILTY SAND WITH GRAVEL (SM): Mostly fine to coarse sand; little coarse subrounded gravel (max. gravel size 1 in); little nonplastic fines; medium dense, gray, light brown, brown, moist, stratified with layers of silty sand with no gravel, trace mica and wood fragments	
		S-11	21/24 88%	6-6-5-4 (11)			SP-SM	72'- NARROWLY GRADED SAND WITH SILT (SP-SM): Mostly fine to medium sand; few fine to coarse subrounded gravel (max. gravel size 1.5 in); few nonplastic fines; loose, gray, brown, moist, trace mica	
		S-12	24/24 100%	7-2-4-8 (6)			SC	73.3'- CLAYEY SAND (SC): Mostly fine sand; some fines with medium plasticity; brown, moist, trace mica	
-80	75	S-12A S-13	15/24 63%	11-12-15-12 (27)			SM	74'- SILTY SAND (SM): Mostly fine to medium sand; little nonplastic fines; few coarse subrounded gravel (max. gravel size 1.2 in); medium dense, brown, gray, moist, trace mica	76'- Heavy rig chatter, coarse gravel in return.; CO=8ppm
		S-14 S-14A	17/24 71%	4-3-6-9 (9)			SW-SM	76'- Similar to Sample @74'	
		S-15	6/24 25%	13-20-15-12 (35)			GP	76.7'- WIDELY GRADED SAND WITH SILT AND GRAVEL (SW-SM): Mostly fine to coarse sand; some fine to coarse subrounded gravel (max. gravel size 1.5 in); few nonplastic fines; brown, wet, trace mica	
-85	80	S-16	24/24 100%	29-36-37-46 (73)				78'- NARROWLY GRADED GRAVEL WITH SAND (GP): Mostly fine to coarse subrounded gravel (max. gravel size 1.25 in); some medium to coarse subrounded sand; trace nonplastic fines; dense, brown, gray, wet	
		S-17	10/24 42%	7-9-11-13 (20)	Potomac		CH	80'- Similar to Sample @78' except max. gravel size=1.5", GP	82'- Switched to open hole mud rotary at a depth of 82 feet below mudline.
-90	85	S-18	12/24 50%	20-21-19-16 (40)				82'- FAT CLAY WITH SAND (CH): Mostly fines with high plasticity; little fine sand; very stiff, gray, dry to the touch, (G1)	
		S-19	7/24 29%	7-8-6-9 (14)				84'- Similar to Sample @82'	
		S-20	19/24 79%	8-10-11-9 (21)				86'- Similar to Sample @82'	88'- VOC=0.5ppm, CO=21ppm
-95	90	U-01	14/30 47%	PUSH				88'- FAT CLAY WITH SAND (CH): Mostly fines with high plasticity; little fine sand; very stiff, gray, brown, moist, slickensided at 88.3 ft, 40 degrees, trace mica (G1)	
		S-21	18/18 100%	6-8-13 (21)				90'- Similar to Sample @88' except gray	
		S-22	8/24 33%	8-9-11-9 (20)				92.5'- Similar to Sample @88' except gray, brown, red	
-100	95	S-23	23/24 96%	6-8-9-16 (17)				94'- Similar to Sample @88' except gray, brown, red	
		S-24	18/24 75%	10-14-12-15 (26)				96'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; very stiff, brown, gray, red, moist, stratified with pockets of red blocky clay, (G1)	
-105	100	S-25	20/24 83%	6-8-10-11 (18)				98'- Similar to Sample @96' except stratified with pockets of red blocky clay	
		S-26	10/24 42%	4-8-11-10 (19)				100'- Similar to Sample @96' except stratified with pockets of red blocky clay	102'- VOC=0.1ppm, CO=15ppm
-110	105	U-02	23/30 77%	PUSH				102'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine sand; very stiff, brown, red, gray, moist, (G1)	
		S-27	18/18 100%	14-19-18 (37)				104'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine sand; brown, moist, (G1)	106.5'- VOC=0.3ppm
		S-28	24/24 100%	7-9-12-20 (21)			SC	106.5'- CLAYEY SAND (SC): Mostly fine to medium sand; some fines with medium plasticity; dense, gray, brown, moist, stratified with fat clay, trace mica (G3A)	
-115							CL	108'- SANDY LEAN CLAY (CL): Mostly fines with medium plasticity; some fine to medium sand; very stiff, gray, moist, stratified with fat clay, trace mica (G2)	

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,979,176.8/11,899,377.7 **LATITUDE/LONGITUDE (ft):** 38.804032/-77.038548

GROUND SURFACE EL. (ft): -5.5 **DATE START/END:** 7/17/2019 - 7/26/2019

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-16

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
							SP-SC	110'- NARROWLY GRADED SAND WITH CLAY (SP-SC): Mostly fine to medium sand; few fines with medium plasticity; dense, gray, brown, light brown, moist, trace mica (G4)	
		S-29	19/24 79%	12-22-25-30 (47)					
							SC	112'- CLAYEY SAND (SC): Mostly fine to medium sand; little fines with medium plasticity; very dense, gray, moist, trace mica (G3A)	
		S-30	17/24 71%	16-25-28-32 (53)					
-120	115							114'- Similar to Sample @112' except gray, brown	
		S-31	18/24 75%	17-16-19-21 (35)			CL	114.8'- SANDY LEAN CLAY (CL): Mostly fines with medium plasticity; some fine sand; gray, dry to the touch, laminated with sand, trace mica (G2)	
		S-31A							118'- CO=9ppm
		S-32	24/24 100%	10-11-13-19 (24)			CH	118'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine sand; very stiff, red, brown, gray, dry to the touch, slickensided at 118.2 ft, 40 degrees, at 119.8 ft, 60 degrees, and at 118.5 ft, 50 degrees, trace mica (G1)	
-125	120								
									123'- O2=20.7%, CO=11ppm
		S-33	24/24 100%	16-20-21-24 (41)				123'- Similar to Sample @118' except slickensided at 123.2 ft, 50 degrees, at 123.3 ft, 70 degrees, and at 123.8 ft, 40 degrees	
-130	125								
		S-34	23/24 96%	11-14-17-21 (31)				128'- Similar to Sample @118'	
-135	130								
		S-35	24/24 100%	8-14-15-18 (29)				133'- Similar to Sample @118' except slickensided at 133.3 ft, 40 degrees, at 133.5 ft, 50 degrees, and at 134.2 ft, 50 degrees	
-140	135								
		S-36	24/24 100%	8-11-13-17 (24)				138'- Similar to Sample @118'	
-145	140								
		S-37	24/24 100%	16-20-24-24 (44)				143'- Similar to Sample @118' except brown, gray, slickensided at 143.2 ft, 50 degrees	
-150	145							**BORING TERMINATED AT 145 FT (EL. -150.5 FT)** **BORING GROUTED FULL DEPTH WITH CEMENT-BENTONITE GROUT UPON COMPLETION**	
-155									

N_{field} (bpf): 20 40 60 80

PL (%) MC (%) LL (%): 20 40 60 80

Δ $S_{u,pp}$ (ksf) $\square$ $S_{u,tv}$ (ksf): 2 4 6 8

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,978,386.5/11,899,272.1
LATITUDE/LONGITUDE (ft): 38.801867/-77.038962
GROUND SURFACE EL. (ft): -6
DATE START/END: 6/11/2019 - 6/17/2019
VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF
DRILLING COMPANY: Connelly & Associates, Inc
TOTAL DEPTH (ft): 145.0
DRILLER NAME: Kevin Kersh
LOGGED BY: Martin Guay/Dave Froster
RIG TYPE: CME 55 LCX (Barge)

Final Boring Log

C12-17

DRILLING INFORMATION

SPT HAMMER TYPE: Automatic
CASING I.D./O.D.: 5 inches/5.5 inches
DRILLING FLUID: Water, Bentonite, EZ Mud
AUGER I.D./O.D.: NA/NA
DRILL ROD O.D.: 2.625 inches
DRILL BIT DIAMETER: 5 inches
DRILLING METHOD: 5.5-inch OD casing with casing advancer and wireline used to a depth of 57 feet with water added during drilling. Switched to open hole mud rotary below casing with a 5-inch bit with EZ Mud and bentonite drilling fluid.
WATER LEVEL: ▽ - At Time of Drilling: El. ft on

ABBREVIATIONS

PEN = Penetration Length
REC = Recovery Length
HSA = Hollow-Stem Auger
I.D. = Inside Diameter
O.D. = Outside Diameter
S-# = Split Spoon Sample and Number
U-# = Undisturbed Sample and Number
SC-# = Sonic Core and Number
WOR = Weight of Rods
WOH = Weight of Hammer
VOC = Volatile Organic Carbon
CO = Carbon Monoxide
H_2S = Hydrogen Sulfide
O_2 = Oxygen
LEL = Lower Explosive Limit
ppm = parts per million
NA = Not Applicable
NM = Not Measured
bgs = below ground surface
bpf = blows per foot
N_{field} = Uncorrected SPT N-Value
LL = Liquid Limit
PL = Plastic Limit
MC = Moisture Content
$S_{u,pp}$ = Undrained Strength from Pocket Penetrometer
$S_{u,tv}$ = Undrained Strength from Pocket Torvane
USCS = Unified Soil Classification System

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
-6.0					Alluvium			0'- Guide casing seated approximately 10 feet below the mudline prior to drilling. No samples collected in this zone.	
	10	S-01	8/24 33%	WOR-WOR-WOR-WOR (WOR)			ML	10'- SILT (ML): Mostly fines with low plasticity; few fine sand; very soft, gray, black, wet, organics	10'- LEL=22%, VOC=0.1ppm, CO=5ppm
	15	S-02	24/24 100%	WOR-WOR-WOR-WOR (WOR)			CL	15'- LEAN CLAY (CL): Mostly fines with medium plasticity; trace fine sand; very soft, gray, black, moist, organics	15'- O2=20.4%, LEL=40%, VOC=0.1ppm, CO=4ppm
	20	S-03	24/24 100%	WOR-WOR-WOR-WOH (WOR)			MH	20'- ELASTIC SILT (MH): Mostly fines with medium plasticity; trace fine sand; very soft, gray, black, wet, lensed with 1" of fine sand near center of sample	20'- LEL=18%, VOC=0.3ppm
	25	S-04	24/24 100%	WOH-WOH-WOH-1 (WOH)				25'- Similar to Sample @20'	25'- LEL=5%, VOC=0.2ppm
									30'- VOC=0.2ppm

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project
CITY/STATE: Alexandria, VA
GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,978,386.5/11,899,272.1 **LATITUDE/LONGITUDE (ft):** 38.801867/-77.038962

GROUND SURFACE EL. (ft): -6 **DATE START/END:** 6/11/2019 - 6/17/2019

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-17

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
		S-05	21/24 88%	WOH-WOH-WOH-WOH (WOH)			MH	30'- Similar to Sample @20' except moist	
-40	35	S-06	24/24 100%	WOH-WOH-WOH-WOH (WOH)			CH	35'- FAT CLAY (CH): Mostly fines with high; trace fine sand; very soft, gray, moist, 0	35'- O2=21.4%, LEL=30%, VOC=0.4ppm
-45	40	S-07	24/24 100%	WOH-WOH-WOH-WOH (WOH)				40'- Similar to Sample @35' except 1-inch wood fragment, shell fragments	40'- O2=21.6%, LEL=20%, VOC=1.7ppm
-50	45	S-08	24/24 100%	WOH-3-2-1 (5)			ML	45'- SANDY SILT (ML): Mostly fines with low plasticity; some fine to medium sand; medium stiff, gray, black, wet, wood, shell fragments, organic fibers	45'- O2=21.8%, LEL=17%, VOC=0.7ppm
-55	50	S-09 S-09A	13/24 54%	11-5-7-10 (12)	Potomac		SP-SM	50'- SAND WITH SILT AND GRAVEL (SP-SM): Mostly fine to coarse sand; some fine gravel (max. gravel size 0.7 in); few nonplastic fines; medium dense, gray, red, light brown, moist, 0	50'- LEL=11%, VOC=0.1ppm
							CL	50.6'- LEAN CLAY WITH SAND (CL): Mostly fines with medium plasticity; little fine sand; gray, dry to the touch, (G2)	
-60	55	S-10	23/24 96%	6-9-8-10 (17)			CH	55'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; very stiff, gray, red, dry to the touch, stratified with 2" layers of red clay throughout, (G1)	55'- O2=21.8%, LEL=4%, VOC=0.5ppm
-65	60	S-11	22/24 92%	7-11-10-13 (21)				60'- Similar to Sample @55' except stratified with 1" layers of red clay throughout	60'- O2=22%, LEL=5%, VOC=0.5ppm
-70	65	S-12	24/24 100%	9-10-12-16 (22)				65'- Similar to Sample @55' except red, mottled	65'- LEL=2%
-75									70'- LEL=1%, VOC=0.2ppm

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,978,386.5/11,899,272.1 **LATITUDE/LONGITUDE (ft):** 38.801867/-77.038962

GROUND SURFACE EL. (ft): -6 **DATE START/END:** 6/11/2019 - 6/17/2019

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-17

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
		S-13	24/24 100%	17-27-32-31 (59)			CH	70'- Similar to Sample @55' except gray, light brown, mottled	
								72'- Similar to Sample @55' except gray, reddish brown	72'- VOC=0.4ppm
-80	75	S-14	24/24 100%	10-15-15-18 (30)				74'- Similar to Sample @55' except slickensided at 74.8 ft, 60 degrees, and at 75.4 ft, 30 degrees; mottled	
		S-15	24/24 100%	7-12-11-14 (23)				76'- Similar to Sample @55' except gray, reddish brown, slickensided at 77 ft, 60 degrees; mottled	
		S-16	22/24 92%	24-29-31-31 (60)				78'- Similar to Sample @55' except gray, light brown, red, mottled	
-85	80	S-17	22/24 92%	7-9-10-15 (19)				80'- Similar to Sample @55' except gray, light brown, mottled	
		S-18	24/24 100%	10-15-14-17 (29)				82'- Similar to Sample @55' except gray, light brown, slickensided at 82.1 ft, 60 degrees; mottled	
-90	85	S-19	24/24 100%	9-15-14-16 (29)				84'- Similar to Sample @55' except slickensided at 85.5 ft, 30 degrees; mottled	
		S-20	24/24 100%	9-12-13-16 (25)				86'- Similar to Sample @55' except gray, slickensided at 86.5 ft, 45 degrees, and 87.9 ft, 30 degrees; lens of yellow blocky clay near middle of sample	
		S-21	24/24 100%	10-15-14-16 (29)				88'- Similar to Sample @55' except red, gray, light brown, mottled	
-95	90	S-22	22/24 92%	7-11-11-12 (22)				90'- Similar to Sample @55' except gray	90'- VOC=0.1ppm
		U-01	18/30 60%	PUSH				92.5'- Similar to Sample @55' except brown, gray	
-100	95	S-23	18/18 100%	12-21-21 (42)				94'- Similar to Sample @55' except brown, gray, red	
		S-24	24/24 100%	14-21-19-18 (40)				96'- Similar to Sample @55' except brown, gray, slickensided at 96.2 ft, 45 degrees	
-105	100	S-25	24/24 100%	8-17-17-23 (34)				98'- Similar to Sample @55'	
		S-26	24/24 100%	10-19-17-21 (36)				100'- Similar to Sample @55' except brown, gray, light brown, red	
		S-27	24/24 100%	10-14-16-20 (30)				102'- FAT CLAY WITH SAND (CH): Mostly fines with high plasticity; little fine sand; hard, gray, brown, light brown, dry to the touch, (G1)	
-110	105	S-28	24/24 100%	20-29-36-40 (65)				104'- Similar to Sample @102' except brown, gray	
		S-29	22/22 100%	19-29-43-50/4" (72)			CL	105.5'- LEAN CLAY WITH SAND (CL): Mostly fines with medium plasticity; little fine sand; gray, dry to the touch, blocky, trace mica (G2)	
		S-29A S-30	21/24 88%	12-33-40-50 (73)				106'- Similar to Sample @105.5' except gray, brown, blocky	
-115		U-02	29/30 97%	PUSH			CH	108'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine sand; gray, light brown, dry to the touch, (G1)	

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,978,386.5/11,899,272.1 **LATITUDE/LONGITUDE (ft):** 38.801867/-77.038962

GROUND SURFACE EL. (ft): -6 **DATE START/END:** 6/11/2019 - 6/17/2019

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly & Associates, Inc

Final Boring Log C12-17

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/ PEN (in) REC%	Blows per 6 in. (N_{field})	Layer Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
		S-31	18/18 100%	23-34-35 (69)			CH	110.5'- Similar to Sample @108' except mottled	
		S-32	24/24 100%	26-37-31-38 (68)				112'- FAT CLAY WITH SAND (CH): Mostly fines with high plasticity; little fine sand; hard, gray, light brown, moist, laminated with fine sand throughout, (G1)	
-120	115	S-33	24/24 100%	15-26-29-39 (55)				114'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; hard, gray, reddish brown, dry to the touch, mottled, (G1)	
-125	120	S-34	24/24 100%	15-25-27-28 (52)				118'- Similar to Sample @114' except light brown, gray, mottled	
-130	125	S-35	24/24 100%	17-25-22-29 (47)				123'- Similar to Sample @114' except brown, gray, trace mica	
-135	130	S-36	24/24 100%	11-14-18-20 (32)				128'- Similar to Sample @114' except gray, brown, light brown	128'- VOC=1ppm
-140	135	S-37	24/24 100%	13-19-17-21 (36)				133'- Similar to Sample @114' except red, reddish brown, light brown, gray, brown	
		U-03	25/30 83%	PUSH				135'- Similar to Sample @114' except brown, gray	
-145	140	S-38	18/18 100%	16-23-25 (48)				137.5'- Similar to Sample @114' except brown, gray, reddish brown, trace mica	
-150	145	S-39	24/24 100%	14-21-23-25 (44)				143'- Similar to Sample @114' except red, reddish brown, brown, gray, slickensided at 144 ft, 45 degrees	
-155								**BORING TERMINATED AT 145 FT (EL. -151.0 FT)** **BORING GROUTED FULL DEPTH WITH CEMENT-BENTONITE GROUT UPON COMPLETION**	

N_{field} (bpf): 20 40 60 80

PL (%) MC (%) LL (%): 20 40 60 80

Δ $S_{u,pp}$ (ksf) $\square$ $S_{u,tv}$ (ksf): 2 4 6 8

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RIVERRENEW-PLOT-FINAL GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 2/4/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,978,613.6/11,899,416.3
LATITUDE/LONGITUDE (ft): 38.802484/-77.038444
GROUND SURFACE EL. (ft): -21.5
DATE START/END: 7/20/2020 - 7/23/2020
VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF
DRILLING COMPANY: Connelly and Associates
TOTAL DEPTH (ft): 124.0
DRILLER NAME: Rob Mohler
LOGGED BY: Elgin Burton
RIG TYPE: TerraSonic TSi 150CC

Final Boring Log

C12-103S

DRILLING INFORMATION

SPT HAMMER TYPE: NA
CASING I.D./O.D.: NA/8 inches
DRILLING FLUID: Water
AUGER I.D./O.D.: NA/NA
DRILL ROD O.D.: NA
DRILL BIT DIAMETER: NA
DRILLING METHOD: Sonic drilling using 6-inch OD steel drill casing and 4-inch OD sampling barrel with water added during vibratory advancement.

WATER LEVEL: ▽ - After Drilling: El. +1.5 ft on July 23, 2020

ABBREVIATIONS

PEN = Penetration Length
REC = Recovery Length
HSA = Hollow-Stem Auger
I.D. = Inside Diameter
O.D. = Outside Diameter
S-# = Split Spoon Sample and Number
U-# = Undisturbed Sample and Number
SC-# = Sonic Core and Number
WOR = Weight of Rods
WOH = Weight of Hammer
VOC = Volatile Organic Carbon
CO = Carbon Monoxide
H_2S = Hydrogen Sulfide
O_2 = Oxygen
LEL = Lower Explosive Limit
ppm = parts per million
NA = Not Applicable
NM = Not Measured
bgs = below ground surface
bpf = blows per foot
N_{field} = Uncorrected SPT N-Value
LL = Liquid Limit
PL = Plastic Limit
MC = Moisture Content
$S_{u,pp}$ = Undrained Strength from Pocket Penetrometer
$S_{u,tv}$ = Undrained Strength from Pocket Torvane
USCS = Unified Soil Classification System

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Stratum Name	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
-21.5					Alluvium		0'- Guide casing seated approximately 60 feet below the mudline prior to drilling. Sampling began approximately 4 feet below the mudline.	
-25	5					MH	4'- ELASTIC SILT (MH): Mostly fines with medium plasticity; trace fine sand; gray, wet, sheen, slight petroleum-like odor	
-30	10	S-01	75/120 63%	NM				
-35	15						14'- Similar to Sample @4' except gray, wood, no odor	
-40	20	S-02	75/120 63%	NM				
-45	25						24'- Similar to Sample @4' except gray, organics present from 33 to 34 ft, no odor	24'- O2=21.3%
-50		S-03	79/120 66%	NM				

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project
CITY/STATE: Alexandria, VA
GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RR-STRATUM GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 10/21/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,978,613.6/11,899,416.3 **LATITUDE/LONGITUDE (ft):** 38.802484/-77.038444

GROUND SURFACE EL. (ft): -21.5 **DATE START/END:** 7/20/2020 - 7/23/2020

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly and Associates

Final Boring Log C12-103S

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	N_{field} (bpf) 20 40 60 80	PL (%) MC (%) LL (%) 20 40 60 80	$\Delta S_{u,pp}$ (ksf) $\square S_{u,tv}$ (ksf) 2 4 6 8	Stratum Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
-55	35	S-03	79/120 66%	NM						MH	34'- Similar to Sample @4' except gray, lensed with 8 inches of sand at 41 ft, wood and mica, no odor	34'- O2=21.3%, CO=5ppm
-60	40	S-04	120/120 100%	NM			□					
-65	45	S-05	100/120 83%	NM			□			CL	44'- LEAN CLAY WITH SAND (CL): Mostly fines with medium plasticity; little fine to medium sand; gray, brown, moist	44'- O2=21.4%
-70	50											
-75	55									CH	54'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; brown, gray, light brown, moist	
										SC	55.3'- CLAYEY SAND (SC): Mostly fine sand; little fines with medium plasticity; brown, gray, moist	
-80	60	S-06A S-06B S-06	120/120 100%	NM			⊠				57'- CLAYEY SAND (SC): Mostly fine sand; some fines with medium plasticity; gray, brown, moist	
-85	65	S-07	120/120 100%	NM							64'- CLAYEY SAND (SC): Mostly fine sand; some fines with medium plasticity; trace fine to coarse rounded gravel (max. gravel size 3 in); gray, brown, moist	
-90											69.1'- WIDELY GRADED SAND WITH CLAY (SW-SC): Mostly	

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RR-STRATUM GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 10/21/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,978,613.6/11,899,416.3 **LATITUDE/LONGITUDE (ft):** 38.802484/-77.038444

GROUND SURFACE EL. (ft): -21.5 **DATE START/END:** 7/20/2020 - 7/23/2020

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly and Associates

Final Boring Log C12-103S

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Stratum Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
					Terrace		SW-SC	fine sand; few fines with medium plasticity; few coarse subangular gravel; brown, gray, moist	
-95	75	S-07 S-07A S-07A S-07B	120/120 100%	NM	Potomac		CH	71.3'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; reddish brown, brown, gray, moist, (G1)	
		S-08A						74'- GRAVELLY FAT CLAY (CH): Mostly fines with high plasticity; little coarse angular gravel (max. gravel size 1 in); few fine sand; brown, reddish brown, red, light brown, gray, moist, (G1)	
-100	80	S-08	100/120 83%	NM				76'- FAT CLAY (CH): Mostly fines with high plasticity; trace fine sand; brown, gray, reddish brown, red, moist, (G1)	
-105	85	S-09	110/120 92%	NM				84'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; brown, red, moist, slickensided at 90.3ft, 45 degrees, (G1)	
-110	90								
-115	95	S-10	120/120 100%	NM				94'- Similar to Sample @84' except brown, gray, reddish brown, red, light brown, slickensided at 103 ft, 20 degrees	
-120	100								
-125	105	S-11	120/120 100%	NM				104'- Similar to Sample @84' except brown, gray, reddish brown, red, light brown, slickensided at 112 ft, 20 degrees, trace fine sand	
-130									

Sample Information

N_{field} (bpf): 20 40 60 80

PL (%) MC (%) LL (%): 20 40 60 80

$S_{u,pp}$ (ksf) $S_{u,tv}$ (ksf): 2 4 6 8

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RR-STRATUM GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 10/21/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,978,613.6/11,899,416.3 **LATITUDE/LONGITUDE (ft):** 38.802484/-77.038444

GROUND SURFACE EL. (ft): -21.5 **DATE START/END:** 7/20/2020 - 7/23/2020

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly and Associates

Final Boring Log
C12-103S

Elev. (ft)	Depth (ft)	Sample Information: Sample Type-No.	Sample Information: REC/PEN (in) REC%	Sample Information: Blows per 6 in. (N_{field})	N_{field} (bpf) 20 40 60 80; PL (%) MC (%) LL (%) 20 40 60 80; $\Delta S_{u,pp}$ (ksf) $\square S_{u,tv}$ (ksf) 2 4 6 8	Stratum Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
-135	115	S-11	120/120 100%	NM		Potomac		CH		
									114'- Similar to Sample @84' except brown, gray, slickensided 123.5 ft, 45 degrees	
-140	120	S-12	120/120 100%	NM						
-145										
	125								**BORING TERMINATED AT 124 FT (EL. -145.5 FT)** **BORING GROUTED FULL DEPTH WITH CEMENT-BENTONITE GROUT UPON COMPLETION**	
-150										
	130									
-155										
	135									
-160										
	140									
-165										
	145									
-170										

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,979,292.8/11,899,506.8
LATITUDE/LONGITUDE (ft): 38.804345/-77.038088
GROUND SURFACE EL. (ft): -22
DATE START/END: 8/5/2020 - 8/6/2020
VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF
DRILLING COMPANY: Connelly and Associates
TOTAL DEPTH (ft): 123.0
DRILLER NAME: Gerald
LOGGED BY: Marla Hart
RIG TYPE: TerraSonic TSi 150CC

Final Boring Log

C12-104S

DRILLING INFORMATION

SPT HAMMER TYPE: NA
CASING I.D./O.D.: NA/6 inches
DRILLING FLUID: Water
AUGER I.D./O.D.: NA/NA
DRILL ROD O.D.: NA
DRILL BIT DIAMETER: NA
DRILLING METHOD: Sonic drilling using 6-inch OD steel drill casing and 4-inch OD sampling barrel with water added during vibratory advancement.

WATER LEVEL: ▽ - After Drilling: El. +1.5 ft on August 6, 2020

ABBREVIATIONS

PEN = Penetration Length
REC = Recovery Length
HSA = Hollow-Stem Auger
I.D. = Inside Diameter
O.D. = Outside Diameter
S-# = Split Spoon Sample and Number
U-# = Undisturbed Sample and Number
SC-# = Sonic Core and Number
WOR = Weight of Rods
WOH = Weight of Hammer
VOC = Volatile Organic Carbon
CO = Carbon Monoxide
H_2S = Hydrogen Sulfide
O_2 = Oxygen
LEL = Lower Explosive Limit
ppm = parts per million
NA = Not Applicable
NM = Not Measured
bgs = below ground surface
bpf = blows per foot
N_{field} = Uncorrected SPT N-Value
LL = Liquid Limit
PL = Plastic Limit
MC = Moisture Content
$S_{u,pp}$ = Undrained Strength from Pocket Penetrometer
$S_{u,tv}$ = Undrained Strength from Pocket Torvane
USCS = Unified Soil Classification System

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Stratum Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
-22.0					Alluvium			0'- Guide casing seated approximately 30 feet below the mudline prior to drilling. Sampling began approximately 3 feet below the mudline.	
-25	5						MH	3'- ELASTIC SILT (MH): Mostly fines with medium plasticity; trace fine sand; light brown, brown, moist	
-30	10	S-01	120/120 100%	NM					
-35	15							13'- Similar to Sample @3' except light brown, brown	
-40	20	S-02	110/120 92%	NM					
-45	25							23'- Similar to Sample @3' except light brown, brown, trace shells	
-50		S-03	107/120 89%	NM					

N_{field} (bpf) 20 40 60 80
PL (%) MC (%) LL (%) 20 40 60 80
$\triangle S_{u,pp}$ (ksf) $\square S_{u,tv}$ (ksf) 2 4 6 8

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project
CITY/STATE: Alexandria, VA
GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RR-STRATUM GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 10/21/20

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,979,292.8/11,899,506.8 **LATITUDE/LONGITUDE (ft):** 38.804345/-77.038088

GROUND SURFACE EL. (ft): -22 **DATE START/END:** 8/5/2020 - 8/6/2020

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly and Associates

Final Boring Log
C12-104S

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/ PEN (in) REC%	Blows per 6 in. (N_{field})	N_{field} (bpf) 20 40 60 80	PL (%) MC (%) LL (%) 20 40 60 80	$\Delta S_{u,pp}$ (ksf) $\square S_{u,tv}$ (ksf) 2 4 6 8	Stratum Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
-55	35	S-03	107/120 89%	NM				Alluvium			33'- Similar to Sample @3' except brown, black, gray, organic material and wood	
-60	40	S-04	120/120 100%	NM								
-65	45										43'- ELASTIC SILT WITH SAND (MH): Mostly fines with medium plasticity; few fine to coarse subrounded sand; trace fine gravel (max. gravel size 0.375 in); brown, light brown, gray, moist	
-70	50	S-05	102/120 85%	NM								
-75	55										53'- Similar to Sample @43' except light brown, gray, brown	
-80	60	S-06	60/120 50%	NM								
-85	65										63'- Similar to Sample @43' except gray, brown	
-90		S-07	105/120 88%	NM								
		S-07A					△□			CH	68'- FAT CLAY (CH): Mostly fines with medium plasticity; few fine sand; reddish brown, red, brown, dry to the touch, slickensided at 71.8 ft, 15 degrees, (G1)	

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,979,292.8/11,899,506.8 **LATITUDE/LONGITUDE (ft):** 38.804345/-77.038088

GROUND SURFACE EL. (ft): -22 **DATE START/END:** 8/5/2020 - 8/6/2020

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly and Associates

Final Boring Log
C12-104S

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	Stratum Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
-95	75	S-07	105/120 88%	NM	Potomac		CH		
-100	80	S-08	120/120 100%	NM				73'- Similar to Sample @68' except reddish brown, red, yellow, slickensided at 74.2 ft, 75 ft, 75.7 ft and 79.3 ft, 10 degrees; and 80.5 ft, 20 degrees	
-105	85	S-09	120/120 100%	NM				83'- Similar to Sample @68' except brown, reddish brown, red, olive, slickensided at 84.5 ft and 89.5 ft, 10 degrees	
-110	90	S-09A					SC	89.7'- CLAYEY SAND (SC): Mostly fine to coarse rounded sand; little fines with medium plasticity; gray, moist, (G3A)	
-115	95	S-10	88/120 73%	NM				93'- Similar to Sample @89.7'	
-120	100								
-125	105	S-11	95/120 79%	NM				103'- Similar to Sample @89.7' except gray, brown	
-130									

Sample Information

N_{field} (bpf): 20 40 60 80

PL (%) MC (%) LL (%): 20 40 60 80

$\Delta S_{u,pp}$ (ksf) $\square S_{u,tv}$ (ksf): 2 4 6 8

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

DRAFT

BORING INFORMATION

NORTHING/EASTING (ft): 6,979,292.8/11,899,506.8 **LATITUDE/LONGITUDE (ft):** 38.804345/-77.038088

GROUND SURFACE EL. (ft): -22 **DATE START/END:** 8/5/2020 - 8/6/2020

VERTICAL/HORIZONTAL DATUM: NAVD88/VA83-NF **DRILLING COMPANY:** Connelly and Associates

Final Boring Log
C12-104S

Elev. (ft)	Depth (ft)	Sample Type-No.	REC/PEN (in) REC%	Blows per 6 in. (N_{field})	N_{field} (bpf) 20 40 60 80; PL (%) MC (%) LL (%) 20 40 60 80; $\Delta S_{u,pp}$ (ksf) $\square S_{u,tv}$ (ksf) 2 4 6 8	Stratum Name	Graphic Log	USCS	Soil Description (Per ASTM D2488 - updated with lab data where available)	Drilling and Other Remarks
-135	115	S-11 S-11A S-11A	95/120 79%	NM				CH	109.7'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; reddish brown, brown, olive, red, dry to the touch, slickensided at 109.6 ft, and 110.9 ft, 10 degrees, and 111.8 ft, 20 degrees, (G1)	
		S-12A							113'- FAT CLAY WITH SAND (CH): Mostly fines with high plasticity; little fine sand; gray, reddish brown, moist, (G1)	
-140	120	S-12	104/120 87%	NM					115'- FAT CLAY (CH): Mostly fines with high plasticity; few fine sand; red, reddish brown, gray, dry to the touch, slickensided at 116.3 ft, 30 degrees and 120.3 ft, 10 degrees, (G1)	
-145									**BORING TERMINATED AT 123 FT (EL. -145.0 FT)** **BORING GROUTED FULL DEPTH WITH CEMENT-BENTONITE GROUT UPON COMPLETION**	
-150	125									
-155	130									
-160	135									
-165	140									
-170	145									

NOTES:
Unless noted otherwise in remarks, O2=20.9% and VOC, LEL, CO, and H2S = 0ppm

PROJECT NAME: RiverRenew Tunnel System Project

CITY/STATE: Alexandria, VA

GEI PROJECT NUMBER: 1705271

RiverRenew
INVESTING IN HEALTHIER WATERWAYS FOR ALEXANDRIA

RR-STRATUM GINT PROJECT RIVERRENEW-FASTFIELD-REV.GDT 10/21/20

APPENDIX J

Soil Drum Characterization and Disposal Documentation

Profile Number: _____

DRAFT

jgenvironmental
responsible safe solutions

GENERATOR WASTE PROFILE SHEET

Section 1 – General Information

Generator Name: City of Alexandria		
Site Address: - 1 Oronoco Street,		
Town, State, Zip: Alexandria VA 22314		
Mail Address:		
Town, State, Zip:		
Facility Contact/Title:		
Email Address:		
Phone:	Fax:	EIN #

Section 2 – Billing Information

Name: Aegis Resource Management		
Mail Address:1675 Old Trail Road		
Town, State, Zip:Etters, PA 17319		
Contact/Title:Nancy Douthit		
Email Address:ndouthit@aegisresource.com		
Phone: 717-825-1322	Fax:	EPA ID# NONEREQUIRED

Section 3 – Waste Composition

Name and Description of Material: Soil Cuttings
Process Generating Waste: Clean Up
Estimated Annual Volume: 48 Drums
Quantity: 48
Type of Shipment: Bulk ☐ Drums ☑ Other ☐

Waste Description (Chemical Composition):
Soil Cutting 100%

Section 4 – Material Properties

Total Metals		Yes	No
Arsenic	> 10 ppm	☐	☑
Barium	> 2000 ppm	☐	☑
Cadmium	> 20 ppm	☐	☑
Chromium	> 100 ppm	☐	☑
Lead	> 100 ppm	☐	☑
Mercury	> 4 ppm	☐	☑
Selenium	> 20 ppm	☐	☑
Silver	> 100 ppm	☐	☑
Other Metals (List above)		☐	☑

Section 4 – Material Properties Cont.

Compounds		Yes	No
Sulfur	> 1.5%	☐	☑
Nitrogen	> 20%	☐	☑
Chlorine	> 0.3%	☐	☑
Flourine	> 738 ppm	☐	☑
Bromine	> 300 ppm	☐	☑
Iodine	> 50 ppm	☐	☑
Flashpoint	< 140°F	☐	☑

This determination was based upon: ☑ Analytical Data ☑ Generator Knowledge

Section 4 – Material Properties Continued

Physical State: ☑ Solid ☐ Liquid ☐ Sludge

Reactivity: ☐ Water Reactive ☐ Acid Reactive ☐ Alkaline Reactive
☐ Oxidizer ☑ None

Color: Varies

Odor: ☑ None ☐ Mild ☐ Strong ☐ Other: _____

pH: ☐ <2 ☐ >2-6 ☑ >6-9 ☐ >9-12.5 ☐ >12.5 ☐ NA

Section 5 – Regulatory Waste Classification

Is this waste an EPA Listed Waste per 40 CFR 261? ☐ Yes ☑ No

Is this waste an EPA Characteristic Hazardous Waste per 40 CFR 261? ☐ Yes ☑ No

The regulatory classifications above were based upon:

- ☐ Analytical Data (attach all relevant analysis)
- ☑ Generator Knowledge (check all that apply):
  - ☑ Knowledge of the waste regulations
  - ☐ MSDS provided for material(s)
  - ☐ Information describing the process and materials generating the waste

Proper DOT Shipping Description:
Shipping Name: Non Regulated Materials, DOT Non Regulated, None
UN/NA: _____ PG: _____ Waste Codes: _____

Attach all relevant Material Safety Data Sheets, Laboratory Analyses, Waste Sampling Plans, Flow Chart or Process Schematic if available. Attach separate sheets to disclose all known and suspected hazards, special handling precautions and additional comments.

Desired Destruction Method: ☐ Waste to Energy ☑ Landfill ☐ Recycling/Treatment

Section 6 – Certifications

GENERATOR'S CERTIFICATIONS

I hereby certify the above information is correct to the best of my knowledge. I further certify that JG Environmental will be notified in writing of any process change, which could significantly alter the composition and/or chemical/physical properties of the waste described above.

Print Name: ESAYAS KETEMA Title: Inspector-II

Generator Signature: Esayas Ketema Date: 03/16/2022

(Must be signed)

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins Pittsburgh
301 Alpha Drive
RIDC Park
Pittsburgh, PA 15238
Tel: (412)963-7058

Laboratory Job ID: 180-133342-1
Client Project/Site: Alexandria Water Front

For:
Mueser Rutledge Consulting Engineers
515 M St SE
Suite 210
Washington, Washington, DC 20003

Attn: Christopher Lidh

Authorized for release by:
2/17/2022 1:08:34 PM

Samantha Bayura, Project Manager I
(412)963-7058
samantha.bayura@eurofinset.com

PA Lab ID: 02-00416

Table of Contents

Job ID: 180-133342-1

Laboratory: Eurofins Pittsburgh

Narrative

CASE NARRATIVE

Client: Mueser Rutledge Consulting Engineers

Project: Alexandria Water Front

Report Number: 180-133342-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

The samples were received on 2/8/2022 10:30 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 5.6º C.

The Field Sampler was not listed on the Chain of Custody.

A trip blank was submitted for analysis with these samples; however, it was not listed on the Chain of Custody (COC).

VOC

The laboratory control sample (LCS) for analytical batch 180-388238 recovered outside control limits for the following analytes: Benzene, Bromomethane, Chloroethane, cis-1,2-Dichloroethene, trans-1,2-Dichloroethene and Trichlorofluoromethane. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

The continuing calibration verification (CCV) analyzed in batch 180-387626 was outside the method criteria for the following analyte(s): Bromomethane, Chloroethane, Chloromethane, Dichlorodifluoro-methane, Methyl Acetate RF, Trichlorofluoromethane, and Vinyl Chloride. A CCV standard at or below the reporting limit (RL) was analyzed with the affected samples and found to be acceptable. As indicated in the reference method, sample analysis may proceed; however, any detection for the affected analyte(s) is considered estimated.

The continuing calibration verification (CCV) analyzed in 180-387626 was outside the method criteria for the following analyte(s): 4-Methyl-2-Pentanone. As indicated in the reference method, sample analysis may proceed; however, any detection for the affected analyte(s) is considered estimated.

The continuing calibration verification (CCV) analyzed in batch 180-388238 was outside the method criteria for the following surrogate: 1,2-Dichloroethane-d4 (LOW). All samples recovered this surrogate within QC criteria.

The continuing calibration verification (CCV) analyzed in batch 180-388238 was outside the method criteria for the following analyte(s): 1,1,1-Trichloroethane, 4-Methyl-2-pentanone, Carbon disulfide, Chloromethane, Methyl acetate, trans-1,3-Dichloropropene, 1,1-Dichloroethane, Acetone and Methyl tert-butyl ether. (LOW). A CCV standard at or below the reporting limit (RL) was analyzed with the affected samples and found to be acceptable. As indicated in the reference method, sample analysis may proceed; however, any detection for the affected analyte(s) is considered estimated.

The continuing calibration verification (CCV) associated with batch 180-388238 recovered above the upper control limit for 1,2,4-Trichlorobenzene, Bromomethane, Chloroethane and Trichlorofluoromethane. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported.

Job ID: 180-133342-1 (Continued)

Laboratory: Eurofins Pittsburgh (Continued)

GRO
Sample ALEXANDRIA (180-133342-1) required dilution prior to analysis. The reporting limits have been adjusted accordingly.

DRO
No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

PCB
No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

METALS
No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GENERAL CHEMISTRY
No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: Mueser Rutledge Consulting Engineers
Project/Site: Alexandria Water Front

Job ID: 180-133342-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Accreditation/Certification Summary

Client: Mueser Rutledge Consulting Engineers
Job ID: 180-133342-1
Project/Site: Alexandria Water Front

Laboratory: Eurofins Pittsburgh

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Virginia	NELAP	10043	09-15-22

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
2540G		Solid	Percent Moisture
2540G		Solid	Percent Solids

Laboratory: Eurofins Pensacola

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Virginia	NELAP	460166	06-14-22

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
8015D		Water	C6-C10

Sample Summary

DRAFT

Client: Mueser Rutledge Consulting Engineers
Project/Site: Alexandria Water Front

Job ID: 180-133342-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
180-133342-1	ALEXANDRIA	Solid	02/03/22 13:00	02/08/22 10:30
180-133342-2	TRIP BLANK	Water	02/03/22 00:00	02/08/22 10:30

Method Summary

Client: Mueser Rutledge Consulting Engineers
Project/Site: Alexandria Water Front

Job ID: 180-133342-1

Method	Method Description	Protocol	Laboratory
EPA 8260D	Volatile Organic Compounds by GC/MS	SW846	TAL PIT
8015C	Gasoline Range Organics (GRO) (GC)	SW846	TAL PEN
8015D	Gasoline Range Organics (GRO) (GC)	SW846	TAL PEN
8015C	Diesel Range Organics (DRO) (GC)	EPA	TAL PEN
EPA 8082A	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	SW846	TAL PIT
EPA 6010D	Metals (ICP)	SW846	TAL PIT
EPA 7470A	Mercury (CVAA)	SW846	TAL PIT
2540G	SM 2540G	SM22	TAL PIT
EPA 9045D	pH	SW846	TAL PIT
EPA 9095B	Paint Filter	SW846	TAL PIT
3010A	Preparation, Total Metals	SW846	TAL PIT
3541	Automated Soxhlet Extraction	SW846	TAL PIT
3546	Microwave Extraction	SW846	TAL PEN
3660B	Sulfur Cleanup	SW846	TAL PIT
3665A	Sulfuric Acid/Permanganate Cleanup	SW846	TAL PIT
5030C	Purge and Trap	SW846	TAL PEN
5030C	Purge and Trap	SW846	TAL PIT
5035	Closed System Purge and Trap	SW846	TAL PEN
5035	Closed System Purge and Trap	SW846	TAL PIT
7470A	Preparation, Mercury	SW846	TAL PIT
EPA 1311	TCLP Extraction	SW846	TAL PIT

Protocol References:

EPA = US Environmental Protection Agency

SM22 = Standard Methods For The Examination Of Water And Wastewater, 22nd Edition

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PEN = Eurofins Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

TAL PIT = Eurofins Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Client Sample ID: ALEXANDRIA
Date Collected: 02/03/22 13:00
Date Received: 02/08/22 10:30

Lab Sample ID: 180-133342-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	EPA 1311			100.24 g	2000 mL	387724	02/09/22 14:45	MRS	TAL PIT
TCLP	Prep	3010A			5 mL	50 mL	387857	02/10/22 10:53	KFS	TAL PIT
TCLP	Analysis	EPA 6010D		1			388091	02/11/22 16:47	RJR	TAL PIT
	Instrument ID: C									
TCLP	Leach	EPA 1311			100.24 g	2000 mL	387724	02/09/22 14:45	MRS	TAL PIT
TCLP	Prep	7470A			25 mL	25 mL	387844	02/10/22 10:18	RJR	TAL PIT
TCLP	Analysis	EPA 7470A		1			387921	02/10/22 17:33	RJR	TAL PIT
	Instrument ID: HGZ									
Total/NA	Analysis	2540G		1			387696	02/09/22 10:56	NAF	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	EPA 9045D		1	19.93 g	20 mL	387706	02/09/22 11:18	NAF	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	EPA 9095B		1			388533	02/16/22 15:27	NAF	TAL PIT
	Instrument ID: NOEQUIP									

Client Sample ID: ALEXANDRIA
Date Collected: 02/03/22 13:00
Date Received: 02/08/22 10:30

Lab Sample ID: 180-133342-1
Matrix: Solid
Percent Solids: 55.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			4.8787 g	5 mL	387651	02/09/22 06:00	KLG	TAL PIT
Total/NA	Analysis	EPA 8260D		1	5 mL	5 mL	387626	02/09/22 14:22	KLG	TAL PIT
	Instrument ID: CHHP3									
Total/NA	Prep	5035			11.941 g	5.00 g	566448	02/14/22 10:30	NTH	TAL PEN
Total/NA	Analysis	8015C		50	5 mL	5 mL	566450	02/14/22 15:18	NTH	TAL PEN
	Instrument ID: CH_RITA									
Total/NA	Prep	3546			15.43 g	1 mL	566437	02/14/22 11:29	NGB	TAL PEN
Total/NA	Analysis	8015C		1			566560	02/15/22 12:45	JAS	TAL PEN
	Instrument ID: Eva									
Total/NA	Prep	3541			15.1 g	20.0 mL	387793	02/10/22 11:45	CBY	TAL PIT
Total/NA	Cleanup	3665A			2 mL	2 mL	387937	02/11/22 05:11	JMO	TAL PIT
Total/NA	Cleanup	3660B			2 mL	2 mL	387938	02/11/22 05:12	JMO	TAL PIT
Total/NA	Analysis	EPA 8082A		1			387931	02/11/22 11:52	JMO	TAL PIT
	Instrument ID: CHGC16									

Client Sample ID: TRIP BLANK
Date Collected: 02/03/22 00:00
Date Received: 02/08/22 10:30

Lab Sample ID: 180-133342-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 8260D		1	5 mL	5 mL	388238	02/15/22 16:44	PJJ	TAL PIT
	Instrument ID: CHHP10									
Total/NA	Analysis	8015D		1	5 mL	5 mL	566446	02/14/22 13:07	NTH	TAL PEN
	Instrument ID: CH_PAULA									

Lab Chronicle

Client: Mueser Rutledge Consulting Engineers
Project/Site: Alexandria Water Front

Job ID: 180-133342-1

Laboratory References:

TAL PEN = Eurofins Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

TAL PIT = Eurofins Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Analyst References:

Lab: TAL PEN
- Batch Type: Prep
  - NGB = Natalie Barrow
  - NTH = Nicholas Hughes
- Batch Type: Analysis
  - JAS = Jared Serrato
  - NTH = Nicholas Hughes

Lab: TAL PIT
- Batch Type: Cleanup
  - JMO = John Oravec
  - MRS = Michael Serpa
- Batch Type: Prep
  - CBY = Charles Yushinski
  - KFS = Kelly Shannon
  - KLG = Kathy Gordon
  - RJR = Ron Rosenbaum
- Batch Type: Analysis
  - JMO = John Oravec
  - KLG = Kathy Gordon
  - NAF = Nicholas Frankos
  - PJJ = Patrick Journet
  - RJR = Ron Rosenbaum

Client Sample ID: ALEXANDRIA

Date Collected: 02/03/22 13:00
Date Received: 02/08/22 10:30

Lab Sample ID: 180-133342-1

Matrix: Solid
Percent Solids: 55.4

Method: EPA 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		9.2	3.1	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
1,1,2,2-Tetrachloroethane	ND		9.2	2.8	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		9.2	3.7	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
1,1,2-Trichloroethane	ND		9.2	1.8	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
1,1-Dichloroethane	ND		9.2	3.0	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
1,1-Dichloroethene	ND		9.2	4.2	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
1,2-Dibromo-3-Chloropropane	ND		9.2	6.0	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
1,2-Dichlorobenzene	ND		9.2	3.1	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
1,2-Dichloroethane	ND		9.2	2.7	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
1,2-Dichloropropane	ND		9.2	2.5	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
1,2,4-Trichlorobenzene	ND		9.2	4.7	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
1,3-Dichlorobenzene	ND		9.2	5.7	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
1,4-Dichlorobenzene	ND		9.2	2.8	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
2-Butanone (MEK)	ND		9.2	4.7	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
2-Hexanone	ND		9.2	2.9	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
4-Methyl-2-pentanone (MIBK)	ND		9.2	3.4	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Acetone	ND		37	7.2	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Benzene	ND		9.2	2.6	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Bromoform	ND		9.2	4.7	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Bromomethane	ND		9.2	4.2	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Carbon disulfide	ND		9.2	7.4	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Carbon tetrachloride	ND		9.2	3.8	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Chlorobenzene	ND		9.2	2.4	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Chlorodibromomethane	ND		9.2	4.6	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Chloroform	ND		9.2	3.0	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Chloromethane	ND		9.2	3.7	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Chloroethane	ND		9.2	5.4	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
cis-1,2-Dichloroethene	ND		9.2	2.8	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
cis-1,3-Dichloropropene	ND		9.2	4.1	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Dichlorobromomethane	ND		9.2	4.3	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Dichlorodifluoromethane	ND		9.2	4.6	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Ethylbenzene	ND		9.2	3.4	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
1,2-Dibromoethane	ND		9.2	2.5	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Cyclohexane	ND		9.2	4.4	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Isopropylbenzene	ND		9.2	4.8	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Methyl acetate	ND		46	14	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Methyl tert-butyl ether	ND		9.2	2.7	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Methylcyclohexane	ND		9.2	4.5	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Methylene Chloride	ND		9.2	8.3	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Styrene	ND		9.2	2.8	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Tetrachloroethene	ND		9.2	3.7	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Toluene	ND		9.2	2.7	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
trans-1,2-Dichloroethene	ND		9.2	3.2	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
trans-1,3-Dichloropropene	ND		9.2	4.2	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Trichloroethene	ND		9.2	2.9	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Trichlorofluoromethane	ND		9.2	7.7	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Vinyl chloride	ND		9.2	6.7	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1
Xylenes, Total	ND		18	13	ug/Kg	☼	02/09/22 06:00	02/09/22 14:22	1

Client Sample ID: ALEXANDRIA

Date Collected: 02/03/22 13:00
Date Received: 02/08/22 10:30

Lab Sample ID: 180-133342-1

Matrix: Solid
Percent Solids: 55.4

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*84*		*73 - 135*	*02/09/22 06:00*	*02/09/22 14:22*	*1*
4-Bromofluorobenzene (Surr)	*92*		*60 - 124*	*02/09/22 06:00*	*02/09/22 14:22*	*1*
Dibromofluoromethane (Surr)	*100*		*69 - 126*	*02/09/22 06:00*	*02/09/22 14:22*	*1*
Toluene-d8 (Surr)	*115*		*67 - 134*	*02/09/22 06:00*	*02/09/22 14:22*	*1*

Method: 8015C - Gasoline Range Organics (GRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6-C10	**5900**	**J**	7800	3900	ug/Kg	☼	02/14/22 10:30	02/14/22 15:18	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene (fid)	*101*		*65 - 125*	*02/14/22 10:30*	*02/14/22 15:18*	*50*

Method: 8015C - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C10-C28	**12**		8.8	3.5	mg/Kg	☼	02/14/22 11:29	02/15/22 12:45	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*100*		*27 - 150*	*02/14/22 11:29*	*02/15/22 12:45*	*1*

Method: EPA 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	ND		30	9.7	ug/Kg	☼	02/10/22 11:45	02/11/22 11:52	1
PCB-1221	ND		30	11	ug/Kg	☼	02/10/22 11:45	02/11/22 11:52	1
PCB-1232	ND		30	7.3	ug/Kg	☼	02/10/22 11:45	02/11/22 11:52	1
PCB-1242	ND		30	4.4	ug/Kg	☼	02/10/22 11:45	02/11/22 11:52	1
PCB-1248	ND		30	7.2	ug/Kg	☼	02/10/22 11:45	02/11/22 11:52	1
PCB-1254	ND		30	9.0	ug/Kg	☼	02/10/22 11:45	02/11/22 11:52	1
PCB-1260	ND		30	8.5	ug/Kg	☼	02/10/22 11:45	02/11/22 11:52	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene (Surr)	*95*		*55 - 135*	*02/10/22 11:45*	*02/11/22 11:52*	*1*
Tetrachloro-m-xylene (Surr)	*96*		*55 - 135*	*02/10/22 11:45*	*02/11/22 11:52*	*1*
DCB Decachlorobiphenyl (Surr)	*103*		*63 - 138*	*02/10/22 11:45*	*02/11/22 11:52*	*1*
DCB Decachlorobiphenyl (Surr)	*99*		*63 - 138*	*02/10/22 11:45*	*02/11/22 11:52*	*1*

Method: EPA 6010D - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.50	0.083	mg/L		02/10/22 10:53	02/11/22 16:47	1
Barium	**1.2**	**J**	2.0	0.063	mg/L		02/10/22 10:53	02/11/22 16:47	1
Cadmium	ND		0.50	0.0030	mg/L		02/10/22 10:53	02/11/22 16:47	1
Chromium	ND		0.50	0.016	mg/L		02/10/22 10:53	02/11/22 16:47	1
Lead	ND		0.50	0.044	mg/L		02/10/22 10:53	02/11/22 16:47	1
Selenium	ND		0.50	0.037	mg/L		02/10/22 10:53	02/11/22 16:47	1
Silver	ND		0.50	0.0091	mg/L		02/10/22 10:53	02/11/22 16:47	1

Method: EPA 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		02/10/22 10:18	02/10/22 17:33	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**44.6**		0.1	0.1	%			02/09/22 10:56	1

Client Sample ID: ALEXANDRIA

Lab Sample ID: 180-133342-1
Date Collected: 02/03/22 13:00
Matrix: Solid
Date Received: 02/08/22 10:30
Percent Solids: 55.4

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	55.4		0.1	0.1	%			02/09/22 10:56	1
pH	8.5	HF	0.1	0.1	SU			02/09/22 11:18	1
Free Liquid	cfl		0.10	0.10	NONE			02/16/22 15:27	1

Client Sample ID: TRIP BLANK

Lab Sample ID: 180-133342-2
Date Collected: 02/03/22 00:00
Matrix: Water
Date Received: 02/08/22 10:30

Method: EPA 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	2.5	ug/L			02/15/22 16:44	1
1,1,2,2-Tetrachloroethane	ND		5.0	3.0	ug/L			02/15/22 16:44	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		5.0	1.9	ug/L			02/15/22 16:44	1
1,1,2-Trichloroethane	ND		5.0	2.4	ug/L			02/15/22 16:44	1
1,1-Dichloroethane	ND		5.0	1.8	ug/L			02/15/22 16:44	1
1,1-Dichloroethene	ND		5.0	2.9	ug/L			02/15/22 16:44	1
1,2,4-Trichlorobenzene	ND		5.0	3.7	ug/L			02/15/22 16:44	1
1,2-Dibromo-3-Chloropropane	ND		5.0	3.1	ug/L			02/15/22 16:44	1
1,2-Dichlorobenzene	ND		5.0	2.0	ug/L			02/15/22 16:44	1
1,2-Dichloroethane	ND		5.0	1.5	ug/L			02/15/22 16:44	1
1,2-Dichloropropane	ND		5.0	2.5	ug/L			02/15/22 16:44	1
1,3-Dichlorobenzene	ND		5.0	1.6	ug/L			02/15/22 16:44	1
1,4-Dichlorobenzene	ND		5.0	1.0	ug/L			02/15/22 16:44	1
2-Butanone (MEK)	ND		5.0	2.9	ug/L			02/15/22 16:44	1
2-Hexanone	ND		5.0	4.2	ug/L			02/15/22 16:44	1
4-Methyl-2-pentanone (MIBK)	ND		5.0	1.9	ug/L			02/15/22 16:44	1
Acetone	ND		20	5.5	ug/L			02/15/22 16:44	1
Benzene	ND	*+	5.0	2.0	ug/L			02/15/22 16:44	1
Bromoform	ND		5.0	2.6	ug/L			02/15/22 16:44	1
Bromomethane	ND	*+	5.0	4.5	ug/L			02/15/22 16:44	1
Carbon disulfide	ND		5.0	3.0	ug/L			02/15/22 16:44	1
Carbon tetrachloride	ND		5.0	3.3	ug/L			02/15/22 16:44	1
Chlorobenzene	ND		5.0	1.6	ug/L			02/15/22 16:44	1
Chlorodibromomethane	ND		5.0	2.4	ug/L			02/15/22 16:44	1
Chloroethane	ND	*+	5.0	2.6	ug/L			02/15/22 16:44	1
Chloroform	ND		5.0	2.1	ug/L			02/15/22 16:44	1
Chloromethane	ND		5.0	3.9	ug/L			02/15/22 16:44	1
cis-1,2-Dichloroethene	ND	*+	5.0	1.6	ug/L			02/15/22 16:44	1
cis-1,3-Dichloropropene	ND		5.0	1.6	ug/L			02/15/22 16:44	1
Cyclohexane	ND		5.0	1.2	ug/L			02/15/22 16:44	1
Dichlorobromomethane	ND		5.0	2.4	ug/L			02/15/22 16:44	1
Dichlorodifluoromethane	ND		5.0	2.9	ug/L			02/15/22 16:44	1
Ethylbenzene	ND		5.0	2.2	ug/L			02/15/22 16:44	1
1,2-Dibromoethane	ND		5.0	2.7	ug/L			02/15/22 16:44	1
Isopropylbenzene	ND		5.0	2.3	ug/L			02/15/22 16:44	1
Methyl acetate	ND		25	5.9	ug/L			02/15/22 16:44	1
Methyl tert-butyl ether	ND		5.0	3.7	ug/L			02/15/22 16:44	1
Methylcyclohexane	ND		5.0	2.1	ug/L			02/15/22 16:44	1
Methylene Chloride	ND		5.0	3.9	ug/L			02/15/22 16:44	1
Styrene	ND		5.0	1.3	ug/L			02/15/22 16:44	1

Client Sample ID: TRIP BLANK
Lab Sample ID: 180-133342-2

Date Collected: 02/03/22 00:00
Matrix: Water
Date Received: 02/08/22 10:30

Method: EPA 8260D - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	ND		5.0	2.0	ug/L			02/15/22 16:44	1
Toluene	ND		5.0	1.7	ug/L			02/15/22 16:44	1
trans-1,2-Dichloroethene	ND	*+	5.0	2.5	ug/L			02/15/22 16:44	1
trans-1,3-Dichloropropene	ND		5.0	1.7	ug/L			02/15/22 16:44	1
Trichloroethene	ND		5.0	1.5	ug/L			02/15/22 16:44	1
Trichlorofluoromethane	ND	*+	5.0	1.5	ug/L			02/15/22 16:44	1
Vinyl chloride	ND		5.0	3.7	ug/L			02/15/22 16:44	1
Xylenes, Total	ND		10	4.3	ug/L			02/15/22 16:44	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*70*		*52 - 151*		*02/15/22 16:44*	*1*
4-Bromofluorobenzene (Surr)	*82*		*49 - 118*		*02/15/22 16:44*	*1*
Dibromofluoromethane (Surr)	*78*		*60 - 132*		*02/15/22 16:44*	*1*
Toluene-d8 (Surr)	*69*		*53 - 124*		*02/15/22 16:44*	*1*

Method: 8015D - Gasoline Range Organics (GRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6-C10	ND		100	47	ug/L			02/14/22 13:07	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene (fid)	*81*		*69 - 147*		*02/14/22 13:07*	*1*

Method: EPA 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 180-387626/6
Matrix: Solid
Analysis Batch: 387626

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	1.7	ug/Kg			02/09/22 09:20	1
1,1,2,2-Tetrachloroethane	ND		5.0	1.5	ug/Kg			02/09/22 09:20	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		5.0	2.0	ug/Kg			02/09/22 09:20	1
1,1,2-Trichloroethane	ND		5.0	0.99	ug/Kg			02/09/22 09:20	1
1,1-Dichloroethane	ND		5.0	1.6	ug/Kg			02/09/22 09:20	1
1,1-Dichloroethene	ND		5.0	2.3	ug/Kg			02/09/22 09:20	1
1,2-Dibromo-3-Chloropropane	ND		5.0	3.2	ug/Kg			02/09/22 09:20	1
1,2-Dichlorobenzene	ND		5.0	1.7	ug/Kg			02/09/22 09:20	1
1,2-Dichloroethane	ND		5.0	1.4	ug/Kg			02/09/22 09:20	1
1,2,4-Trichlorobenzene	ND		5.0	2.5	ug/Kg			02/09/22 09:20	1
1,2-Dichloropropane	ND		5.0	1.3	ug/Kg			02/09/22 09:20	1
1,3-Dichlorobenzene	ND		5.0	3.1	ug/Kg			02/09/22 09:20	1
1,4-Dichlorobenzene	ND		5.0	1.5	ug/Kg			02/09/22 09:20	1
2-Butanone (MEK)	ND		5.0	2.5	ug/Kg			02/09/22 09:20	1
2-Hexanone	ND		5.0	1.6	ug/Kg			02/09/22 09:20	1
4-Methyl-2-pentanone (MIBK)	ND		5.0	1.8	ug/Kg			02/09/22 09:20	1
Acetone	ND		20	3.9	ug/Kg			02/09/22 09:20	1
Benzene	ND		5.0	1.4	ug/Kg			02/09/22 09:20	1
Bromoform	ND		5.0	2.5	ug/Kg			02/09/22 09:20	1
Bromomethane	ND		5.0	2.3	ug/Kg			02/09/22 09:20	1
Carbon disulfide	ND		5.0	4.0	ug/Kg			02/09/22 09:20	1
Carbon tetrachloride	ND		5.0	2.0	ug/Kg			02/09/22 09:20	1
Chlorobenzene	ND		5.0	1.3	ug/Kg			02/09/22 09:20	1
Chlorodibromomethane	ND		5.0	2.5	ug/Kg			02/09/22 09:20	1
Chloroethane	ND		5.0	2.9	ug/Kg			02/09/22 09:20	1
Chloroform	ND		5.0	1.6	ug/Kg			02/09/22 09:20	1
Chloromethane	ND		5.0	2.0	ug/Kg			02/09/22 09:20	1
cis-1,2-Dichloroethene	ND		5.0	1.5	ug/Kg			02/09/22 09:20	1
cis-1,3-Dichloropropene	ND		5.0	2.2	ug/Kg			02/09/22 09:20	1
Cyclohexane	ND		5.0	2.4	ug/Kg			02/09/22 09:20	1
Dichlorobromomethane	ND		5.0	2.3	ug/Kg			02/09/22 09:20	1
Dichlorodifluoromethane	ND		5.0	2.5	ug/Kg			02/09/22 09:20	1
Ethylbenzene	ND		5.0	1.9	ug/Kg			02/09/22 09:20	1
1,2-Dibromoethane	ND		5.0	1.4	ug/Kg			02/09/22 09:20	1
Isopropylbenzene	ND		5.0	2.6	ug/Kg			02/09/22 09:20	1
Methyl acetate	ND		25	7.4	ug/Kg			02/09/22 09:20	1
Methyl tert-butyl ether	ND		5.0	1.5	ug/Kg			02/09/22 09:20	1
Methylcyclohexane	ND		5.0	2.4	ug/Kg			02/09/22 09:20	1
Methylene Chloride	ND		5.0	4.5	ug/Kg			02/09/22 09:20	1
Styrene	ND		5.0	1.5	ug/Kg			02/09/22 09:20	1
Tetrachloroethene	ND		5.0	2.0	ug/Kg			02/09/22 09:20	1
Toluene	ND		5.0	1.4	ug/Kg			02/09/22 09:20	1
trans-1,2-Dichloroethene	ND		5.0	1.8	ug/Kg			02/09/22 09:20	1
trans-1,3-Dichloropropene	ND		5.0	2.3	ug/Kg			02/09/22 09:20	1
Trichloroethene	ND		5.0	1.6	ug/Kg			02/09/22 09:20	1
Trichlorofluoromethane	ND		5.0	4.2	ug/Kg			02/09/22 09:20	1
Vinyl chloride	ND		5.0	3.6	ug/Kg			02/09/22 09:20	1
Xylenes, Total	ND		10	7.2	ug/Kg			02/09/22 09:20	1

Method: EPA 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 180-387626/6
Matrix: Solid
Analysis Batch: 387626

Client Sample ID: Method Blank
Prep Type: Total/NA

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	*97*		*73 - 135*		*02/09/22 09:20*	*1*
4-Bromofluorobenzene (Surr)	*89*		*60 - 124*		*02/09/22 09:20*	*1*
Dibromofluoromethane (Surr)	*102*		*69 - 126*		*02/09/22 09:20*	*1*
Toluene-d8 (Surr)	*108*		*67 - 134*		*02/09/22 09:20*	*1*

Lab Sample ID: LCS 180-387626/4
Matrix: Solid
Analysis Batch: 387626

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,1-Trichloroethane	40.0	37.1		ug/Kg		93	72 - 134
1,1,2,2-Tetrachloroethane	40.0	34.2		ug/Kg		86	36 - 170
1,1,2-Trichloro-1,2,2-trifluoroethane	40.0	41.0		ug/Kg		103	59 - 135
1,1,2-Trichloroethane	40.0	37.9		ug/Kg		95	66 - 128
1,1-Dichloroethane	40.0	38.9		ug/Kg		97	73 - 124
1,1-Dichloroethene	40.0	41.2		ug/Kg		103	55 - 136
1,2-Dibromo-3-Chloropropane	40.0	35.9		ug/Kg		90	30 - 163
1,2-Dichlorobenzene	40.0	39.6		ug/Kg		99	76 - 120
1,2-Dichloroethane	40.0	38.7		ug/Kg		97	64 - 140
1,2,4-Trichlorobenzene	40.0	50.0		ug/Kg		125	22 - 170
1,2-Dichloropropane	40.0	39.3		ug/Kg		98	77 - 119
1,3-Dichlorobenzene	40.0	41.2		ug/Kg		103	77 - 121
1,4-Dichlorobenzene	40.0	39.6		ug/Kg		99	79 - 120
2-Butanone (MEK)	40.0	42.8		ug/Kg		107	39 - 157
2-Hexanone	40.0	40.1		ug/Kg		100	42 - 152
4-Methyl-2-pentanone (MIBK)	40.0	43.7		ug/Kg		109	51 - 147
Acetone	40.0	39.3		ug/Kg		98	23 - 170
Benzene	40.0	38.1		ug/Kg		95	77 - 120
Bromoform	40.0	33.2		ug/Kg		83	37 - 147
Bromomethane	40.0	23.7		ug/Kg		59	47 - 149
Carbon disulfide	40.0	45.9		ug/Kg		115	40 - 156
Carbon tetrachloride	40.0	36.0		ug/Kg		90	73 - 130
Chlorobenzene	40.0	39.3		ug/Kg		98	79 - 122
Chlorodibromomethane	40.0	34.2		ug/Kg		85	60 - 134
Chloroethane	40.0	31.0		ug/Kg		78	37 - 159
Chloroform	40.0	35.3		ug/Kg		88	73 - 126
Chloromethane	40.0	35.3		ug/Kg		88	46 - 151
cis-1,2-Dichloroethene	40.0	39.7		ug/Kg		99	77 - 118
cis-1,3-Dichloropropene	40.0	37.3		ug/Kg		93	73 - 127
Cyclohexane	40.0	45.8		ug/Kg		114	63 - 143
Dichlorobromomethane	40.0	33.8		ug/Kg		85	75 - 123
Dichlorodifluoromethane	40.0	18.0		ug/Kg		45	26 - 149
Ethylbenzene	40.0	38.7		ug/Kg		97	79 - 119
1,2-Dibromoethane	40.0	38.1		ug/Kg		95	59 - 137
Isopropylbenzene	40.0	40.3		ug/Kg		101	70 - 125
Methyl acetate	80.0	93.4		ug/Kg		117	20 - 170
Methyl tert-butyl ether	40.0	33.5		ug/Kg		84	58 - 132
Methylcyclohexane	40.0	39.7		ug/Kg		99	70 - 125

Method: EPA 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 180-387626/4
Matrix: Solid
Analysis Batch: 387626

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methylene Chloride	40.0	39.9		ug/Kg		100	67 - 131
m-Xylene & p-Xylene	40.0	38.9		ug/Kg		97	77 - 120
o-Xylene	40.0	36.9		ug/Kg		92	78 - 118
Styrene	40.0	37.3		ug/Kg		93	80 - 120
Tetrachloroethene	40.0	46.5		ug/Kg		116	71 - 121
Toluene	40.0	39.0		ug/Kg		98	76 - 120
trans-1,2-Dichloroethene	40.0	38.2		ug/Kg		96	75 - 122
trans-1,3-Dichloropropene	40.0	37.3		ug/Kg		93	68 - 133
Trichloroethene	40.0	40.6		ug/Kg		102	69 - 118
Trichlorofluoromethane	40.0	25.8		ug/Kg		65	32 - 149
Vinyl chloride	40.0	33.5		ug/Kg		84	64 - 134
Xylenes, Total	80.0	75.8		ug/Kg		95	78 - 118

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*95*		*73 - 135*
4-Bromofluorobenzene (Surr)	*98*		*60 - 124*
Dibromofluoromethane (Surr)	*104*		*69 - 126*
Toluene-d8 (Surr)	*108*		*67 - 134*

Lab Sample ID: MB 180-388238/8
Matrix: Water
Analysis Batch: 388238

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	2.5	ug/L			02/15/22 11:26	1
1,1,2,2-Tetrachloroethane	ND		5.0	3.0	ug/L			02/15/22 11:26	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		5.0	1.9	ug/L			02/15/22 11:26	1
1,1,2-Trichloroethane	ND		5.0	2.4	ug/L			02/15/22 11:26	1
1,1-Dichloroethane	ND		5.0	1.8	ug/L			02/15/22 11:26	1
1,1-Dichloroethene	ND		5.0	2.9	ug/L			02/15/22 11:26	1
1,2-Dibromo-3-Chloropropane	ND		5.0	3.1	ug/L			02/15/22 11:26	1
1,2-Dichlorobenzene	ND		5.0	2.0	ug/L			02/15/22 11:26	1
1,2-Dichloroethane	ND		5.0	1.5	ug/L			02/15/22 11:26	1
1,2,4-Trichlorobenzene	ND		5.0	3.7	ug/L			02/15/22 11:26	1
1,2-Dichloropropane	ND		5.0	2.5	ug/L			02/15/22 11:26	1
1,3-Dichlorobenzene	ND		5.0	1.6	ug/L			02/15/22 11:26	1
1,4-Dichlorobenzene	ND		5.0	1.0	ug/L			02/15/22 11:26	1
2-Butanone (MEK)	ND		5.0	2.9	ug/L			02/15/22 11:26	1
2-Hexanone	ND		5.0	4.2	ug/L			02/15/22 11:26	1
4-Methyl-2-pentanone (MIBK)	ND		5.0	1.9	ug/L			02/15/22 11:26	1
Acetone	ND		20	5.5	ug/L			02/15/22 11:26	1
Benzene	ND		5.0	2.0	ug/L			02/15/22 11:26	1
Bromoform	ND		5.0	2.6	ug/L			02/15/22 11:26	1
Bromomethane	ND		5.0	4.5	ug/L			02/15/22 11:26	1
Carbon disulfide	ND		5.0	3.0	ug/L			02/15/22 11:26	1
Carbon tetrachloride	ND		5.0	3.3	ug/L			02/15/22 11:26	1
Chlorobenzene	ND		5.0	1.6	ug/L			02/15/22 11:26	1
Chlorodibromomethane	ND		5.0	2.4	ug/L			02/15/22 11:26	1

Method: EPA 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 180-388238/8
Matrix: Water
Analysis Batch: 388238

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloroethane	ND		5.0	2.6	ug/L			02/15/22 11:26	1
Chloroform	ND		5.0	2.1	ug/L			02/15/22 11:26	1
Chloromethane	ND		5.0	3.9	ug/L			02/15/22 11:26	1
cis-1,2-Dichloroethene	ND		5.0	1.6	ug/L			02/15/22 11:26	1
cis-1,3-Dichloropropene	ND		5.0	1.6	ug/L			02/15/22 11:26	1
Cyclohexane	ND		5.0	1.2	ug/L			02/15/22 11:26	1
Dichlorobromomethane	ND		5.0	2.4	ug/L			02/15/22 11:26	1
Dichlorodifluoromethane	ND		5.0	2.9	ug/L			02/15/22 11:26	1
Ethylbenzene	ND		5.0	2.2	ug/L			02/15/22 11:26	1
1,2-Dibromoethane	ND		5.0	2.7	ug/L			02/15/22 11:26	1
Isopropylbenzene	ND		5.0	2.3	ug/L			02/15/22 11:26	1
Methyl acetate	ND		25	5.9	ug/L			02/15/22 11:26	1
Methyl tert-butyl ether	ND		5.0	3.7	ug/L			02/15/22 11:26	1
Methylcyclohexane	ND		5.0	2.1	ug/L			02/15/22 11:26	1
Methylene Chloride	ND		5.0	3.9	ug/L			02/15/22 11:26	1
Styrene	ND		5.0	1.3	ug/L			02/15/22 11:26	1
Tetrachloroethene	ND		5.0	2.0	ug/L			02/15/22 11:26	1
Toluene	ND		5.0	1.7	ug/L			02/15/22 11:26	1
trans-1,2-Dichloroethene	ND		5.0	2.5	ug/L			02/15/22 11:26	1
trans-1,3-Dichloropropene	ND		5.0	1.7	ug/L			02/15/22 11:26	1
Trichloroethene	ND		5.0	1.5	ug/L			02/15/22 11:26	1
Trichlorofluoromethane	ND		5.0	1.5	ug/L			02/15/22 11:26	1
Vinyl chloride	ND		5.0	3.7	ug/L			02/15/22 11:26	1
Xylenes, Total	ND		10	4.3	ug/L			02/15/22 11:26	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*61*		*52 - 151*		*02/15/22 11:26*	*1*
4-Bromofluorobenzene (Surr)	*65*		*49 - 118*		*02/15/22 11:26*	*1*
Dibromofluoromethane (Surr)	*76*		*60 - 132*		*02/15/22 11:26*	*1*
Toluene-d8 (Surr)	*79*		*53 - 124*		*02/15/22 11:26*	*1*

Lab Sample ID: LCS 180-388238/7
Matrix: Water
Analysis Batch: 388238

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,1-Trichloroethane	10.0	9.15		ug/L		92	64 - 133
1,1,2,2-Tetrachloroethane	10.0	8.18		ug/L		82	47 - 147
1,1,2-Trichloro-1,2,2-trifluoroethane	10.0	12.0		ug/L		120	48 - 134
1,1,2-Trichloroethane	10.0	8.39		ug/L		84	59 - 137
1,1-Dichloroethane	10.0	10.8		ug/L		108	59 - 125
1,1-Dichloroethene	10.0	13.2		ug/L		132	49 - 132
1,2-Dibromo-3-Chloropropane	10.0	7.66		ug/L		77	10 - 170
1,2-Dichlorobenzene	10.0	8.03		ug/L		80	68 - 116
1,2-Dichloroethane	10.0	9.29		ug/L		93	57 - 149
1,2,4-Trichlorobenzene	10.0	15.2		ug/L		152	15 - 169
1,2-Dichloropropane	10.0	9.11		ug/L		91	65 - 129
1,3-Dichlorobenzene	10.0	8.41		ug/L		84	70 - 119

Method: EPA 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 180-388238/7
Matrix: Water
Analysis Batch: 388238

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,4-Dichlorobenzene	10.0	8.07		ug/L		81	74 - 117
2-Butanone (MEK)	20.0	17.7		ug/L		89	35 - 158
2-Hexanone	20.0	14.6		ug/L		73	38 - 157
4-Methyl-2-pentanone (MIBK)	20.0	10.0		ug/L		50	29 - 167
Acetone	20.0	12.7	J	ug/L		63	29 - 163
Benzene	10.0	12.5	*+	ug/L		125	68 - 122
Bromoform	10.0	8.51		ug/L		85	31 - 164
Bromomethane	10.0	17.3	*+	ug/L		173	20 - 170
Carbon disulfide	10.0	8.81		ug/L		88	32 - 139
Carbon tetrachloride	10.0	9.91		ug/L		99	60 - 135
Chlorobenzene	10.0	9.19		ug/L		92	72 - 123
Chlorodibromomethane	10.0	8.13		ug/L		81	51 - 144
Chloroethane	10.0	24.6	*+	ug/L		246	10 - 170
Chloroform	10.0	10.7		ug/L		107	62 - 121
Chloromethane	10.0	5.47		ug/L		55	37 - 170
cis-1,2-Dichloroethene	10.0	13.0	*+	ug/L		130	64 - 122
cis-1,3-Dichloropropene	10.0	8.99		ug/L		90	53 - 140
Cyclohexane	10.0	13.4		ug/L		134	50 - 161
Dichlorobromomethane	10.0	8.25		ug/L		83	63 - 132
Dichlorodifluoromethane	10.0	11.0		ug/L		110	21 - 165
Ethylbenzene	10.0	9.84		ug/L		98	66 - 122
1,2-Dibromoethane	10.0	8.91		ug/L		89	55 - 146
Isopropylbenzene	10.0	9.39		ug/L		94	54 - 130
Methyl acetate	20.0	16.3	J	ug/L		82	10 - 170
Methyl tert-butyl ether	10.0	8.74		ug/L		87	36 - 141
Methylcyclohexane	10.0	10.9		ug/L		109	60 - 127
Methylene Chloride	10.0	10.2		ug/L		102	51 - 137
m-Xylene & p-Xylene	10.0	9.30		ug/L		93	61 - 128
o-Xylene	10.0	9.91		ug/L		99	64 - 120
Styrene	10.0	10.6		ug/L		106	68 - 127
Tetrachloroethene	10.0	10.9		ug/L		109	60 - 129
Toluene	10.0	9.03		ug/L		90	67 - 128
trans-1,2-Dichloroethene	10.0	12.8	*+	ug/L		128	62 - 126
trans-1,3-Dichloropropene	10.0	7.34		ug/L		73	57 - 137
Trichloroethene	10.0	11.8		ug/L		118	67 - 121
Trichlorofluoromethane	10.0	17.2	*+	ug/L		172	32 - 157
Vinyl chloride	10.0	9.04		ug/L		90	47 - 147
Xylenes, Total	20.0	19.2		ug/L		96	64 - 123

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*96*		*52 - 151*
4-Bromofluorobenzene (Surr)	*100*		*49 - 118*
Dibromofluoromethane (Surr)	*116*		*60 - 132*
Toluene-d8 (Surr)	*91*		*53 - 124*

Method: 8015C - Gasoline Range Organics (GRO) (GC)

Lab Sample ID: MB 400-566448/2-A
Matrix: Solid
Analysis Batch: 566450

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 566448

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6-C10	ND		100	50	ug/Kg		02/14/22 10:30	02/14/22 13:11	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene (fid)	*97*		*65 - 125*	*02/14/22 10:30*	*02/14/22 13:11*	*1*

Lab Sample ID: LCS 400-566448/1-A
Matrix: Solid
Analysis Batch: 566450

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 566448

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
C6-C10	1000	1050		ug/Kg		105	62 - 141

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
a,a,a-Trifluorotoluene (fid)	*102*		*65 - 125*

Method: 8015D - Gasoline Range Organics (GRO) (GC)

Lab Sample ID: MB 400-566446/3
Matrix: Water
Analysis Batch: 566446

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6-C10	ND		100	47	ug/L			02/14/22 12:15	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene (fid)	*80*		*69 - 147*		*02/14/22 12:15*	*1*

Lab Sample ID: LCS 400-566446/1002
Matrix: Water
Analysis Batch: 566446

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
C6-C10	1000	995		ug/L		99	85 - 115

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
a,a,a-Trifluorotoluene (fid)	*79*		*69 - 147*

Method: 8015C - Diesel Range Organics (DRO) (GC)

Lab Sample ID: MB 400-566437/1-A
Matrix: Solid
Analysis Batch: 566560

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 566437

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C10-C28	ND		5.0	2.0	mg/Kg		02/14/22 11:29	02/15/22 10:40	1

Method: 8015C - Diesel Range Organics (DRO) (GC) (Continued)

Lab Sample ID: MB 400-566437/1-A
Matrix: Solid
Analysis Batch: 566560

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 566437

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	100		27 - 150	02/14/22 11:29	02/15/22 10:40	1

Lab Sample ID: LCS 400-566437/2-A
Matrix: Solid
Analysis Batch: 566560

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 566437

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
C10-C28	276	217		mg/Kg		79	38 - 116

Surrogate	LCS %Recovery	LCS Qualifier	Limits
o-Terphenyl	104		27 - 150

Method: EPA 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Lab Sample ID: MB 180-387793/1-A
Matrix: Solid
Analysis Batch: 387931

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 387793

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	ND		17	5.4	ug/Kg		02/10/22 11:45	02/11/22 10:02	1
PCB-1221	ND		17	5.9	ug/Kg		02/10/22 11:45	02/11/22 10:02	1
PCB-1232	ND		17	4.1	ug/Kg		02/10/22 11:45	02/11/22 10:02	1
PCB-1242	ND		17	2.4	ug/Kg		02/10/22 11:45	02/11/22 10:02	1
PCB-1248	ND		17	4.0	ug/Kg		02/10/22 11:45	02/11/22 10:02	1
PCB-1254	ND		17	5.0	ug/Kg		02/10/22 11:45	02/11/22 10:02	1
PCB-1260	ND		17	4.7	ug/Kg		02/10/22 11:45	02/11/22 10:02	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Tetrachloro-m-xylene (Surr)	84		55 - 135	02/10/22 11:45	02/11/22 10:02	1
Tetrachloro-m-xylene (Surr)	85		55 - 135	02/10/22 11:45	02/11/22 10:02	1
DCB Decachlorobiphenyl (Surr)	93		63 - 138	02/10/22 11:45	02/11/22 10:02	1
DCB Decachlorobiphenyl (Surr)	88		63 - 138	02/10/22 11:45	02/11/22 10:02	1

Lab Sample ID: LCS 180-387793/2-A
Matrix: Solid
Analysis Batch: 387931

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 387793

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
PCB-1016	1330	1180		ug/Kg		89	43 - 136
PCB-1260	1330	1370		ug/Kg		103	55 - 128

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Tetrachloro-m-xylene (Surr)	98		55 - 135
Tetrachloro-m-xylene (Surr)	100		55 - 135
DCB Decachlorobiphenyl (Surr)	110		63 - 138
DCB Decachlorobiphenyl (Surr)	104		63 - 138

Method: EPA 6010D - Metals (ICP)

Lab Sample ID: MB 180-387857/1-A
Matrix: Solid
Analysis Batch: 388091

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 387857

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.050	0.0083	mg/L		02/10/22 10:53	02/11/22 15:34	1
Barium	ND		0.20	0.0063	mg/L		02/10/22 10:53	02/11/22 15:34	1
Cadmium	ND		0.050	0.00030	mg/L		02/10/22 10:53	02/11/22 15:34	1
Chromium	ND		0.050	0.0016	mg/L		02/10/22 10:53	02/11/22 15:34	1
Lead	ND		0.050	0.0044	mg/L		02/10/22 10:53	02/11/22 15:34	1
Selenium	ND		0.050	0.0037	mg/L		02/10/22 10:53	02/11/22 15:34	1
Silver	ND		0.050	0.00091	mg/L		02/10/22 10:53	02/11/22 15:34	1

Lab Sample ID: LCS 180-387857/2-A
Matrix: Solid
Analysis Batch: 388091

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 387857

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	1.00	1.02		mg/L		102	80 - 120
Barium	1.00	0.989		mg/L		99	80 - 120
Cadmium	0.500	0.503		mg/L		101	80 - 120
Chromium	0.500	0.499		mg/L		100	80 - 120
Lead	0.500	0.498		mg/L		100	80 - 120
Selenium	1.00	1.00		mg/L		100	80 - 120
Silver	0.250	0.253		mg/L		101	80 - 120

Lab Sample ID: LB 180-387724/1-C
Matrix: Solid
Analysis Batch: 388091

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 387857

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.50	0.083	mg/L		02/10/22 10:53	02/11/22 15:43	1
Barium	ND		2.0	0.063	mg/L		02/10/22 10:53	02/11/22 15:43	1
Cadmium	ND		0.50	0.0030	mg/L		02/10/22 10:53	02/11/22 15:43	1
Chromium	ND		0.50	0.016	mg/L		02/10/22 10:53	02/11/22 15:43	1
Lead	ND		0.50	0.044	mg/L		02/10/22 10:53	02/11/22 15:43	1
Selenium	ND		0.50	0.037	mg/L		02/10/22 10:53	02/11/22 15:43	1
Silver	ND		0.50	0.0091	mg/L		02/10/22 10:53	02/11/22 15:43	1

Method: EPA 7470A - Mercury (CVAA)

Lab Sample ID: MB 180-387844/1-A
Matrix: Solid
Analysis Batch: 387921

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 387844

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		02/10/22 10:18	02/10/22 17:22	1

Lab Sample ID: LCS 180-387844/2-A
Matrix: Solid
Analysis Batch: 387921

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 387844

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00250	0.00260		mg/L		104	80 - 120

Method: EPA 7470A - Mercury (CVAA) (Continued)

Lab Sample ID: LB 180-387724/1-B
Matrix: Solid
Analysis Batch: 387921

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 387844

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00013	mg/L		02/10/22 10:18	02/10/22 17:24	1

Method: EPA 9045D - pH

Lab Sample ID: LCS 180-387706/1
Matrix: Solid
Analysis Batch: 387706

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
pH			7.00	7.0		SU		101	99 - 101		

GC/MS VOA

Analysis Batch: 387626

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	Total/NA	Solid	EPA 8260D	387651
MB 180-387626/6	Method Blank	Total/NA	Solid	EPA 8260D	
LCS 180-387626/4	Lab Control Sample	Total/NA	Solid	EPA 8260D	

Prep Batch: 387651

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	Total/NA	Solid	5035	

Analysis Batch: 388238

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-2	TRIP BLANK	Total/NA	Water	EPA 8260D	
MB 180-388238/8	Method Blank	Total/NA	Water	EPA 8260D	
LCS 180-388238/7	Lab Control Sample	Total/NA	Water	EPA 8260D	

GC VOA

Analysis Batch: 566446

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-2	TRIP BLANK	Total/NA	Water	8015D	
MB 400-566446/3	Method Blank	Total/NA	Water	8015D	
LCS 400-566446/1002	Lab Control Sample	Total/NA	Water	8015D	

Prep Batch: 566448

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	Total/NA	Solid	5035	
MB 400-566448/2-A	Method Blank	Total/NA	Solid	5035	
LCS 400-566448/1-A	Lab Control Sample	Total/NA	Solid	5035	

Analysis Batch: 566450

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	Total/NA	Solid	8015C	566448
MB 400-566448/2-A	Method Blank	Total/NA	Solid	8015C	566448
LCS 400-566448/1-A	Lab Control Sample	Total/NA	Solid	8015C	566448

GC Semi VOA

Prep Batch: 387793

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	Total/NA	Solid	3541	
MB 180-387793/1-A	Method Blank	Total/NA	Solid	3541	
LCS 180-387793/2-A	Lab Control Sample	Total/NA	Solid	3541	

Analysis Batch: 387931

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	Total/NA	Solid	EPA 8082A	387938
MB 180-387793/1-A	Method Blank	Total/NA	Solid	EPA 8082A	387793
LCS 180-387793/2-A	Lab Control Sample	Total/NA	Solid	EPA 8082A	387793

Cleanup Batch: 387937

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	Total/NA	Solid	3665A	387793

GC Semi VOA

Cleanup Batch: 387938

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	Total/NA	Solid	3660B	387937

Prep Batch: 566437

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	Total/NA	Solid	3546	
MB 400-566437/1-A	Method Blank	Total/NA	Solid	3546	
LCS 400-566437/2-A	Lab Control Sample	Total/NA	Solid	3546	

Analysis Batch: 566560

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	Total/NA	Solid	8015C	566437
MB 400-566437/1-A	Method Blank	Total/NA	Solid	8015C	566437
LCS 400-566437/2-A	Lab Control Sample	Total/NA	Solid	8015C	566437

Metals

Leach Batch: 387724

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	TCLP	Solid	EPA 1311	
LB 180-387724/1-B	Method Blank	TCLP	Solid	EPA 1311	
LB 180-387724/1-C	Method Blank	TCLP	Solid	EPA 1311	

Prep Batch: 387844

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	TCLP	Solid	7470A	387724
LB 180-387724/1-B	Method Blank	TCLP	Solid	7470A	387724
MB 180-387844/1-A	Method Blank	Total/NA	Solid	7470A	
LCS 180-387844/2-A	Lab Control Sample	Total/NA	Solid	7470A	

Prep Batch: 387857

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	TCLP	Solid	3010A	387724
LB 180-387724/1-C	Method Blank	TCLP	Solid	3010A	387724
MB 180-387857/1-A	Method Blank	Total/NA	Solid	3010A	
LCS 180-387857/2-A	Lab Control Sample	Total/NA	Solid	3010A	

Analysis Batch: 387921

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	TCLP	Solid	EPA 7470A	387844
LB 180-387724/1-B	Method Blank	TCLP	Solid	EPA 7470A	387844
MB 180-387844/1-A	Method Blank	Total/NA	Solid	EPA 7470A	387844
LCS 180-387844/2-A	Lab Control Sample	Total/NA	Solid	EPA 7470A	387844

Analysis Batch: 388091

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	TCLP	Solid	EPA 6010D	387857
LB 180-387724/1-C	Method Blank	TCLP	Solid	EPA 6010D	387857
MB 180-387857/1-A	Method Blank	Total/NA	Solid	EPA 6010D	387857
LCS 180-387857/2-A	Lab Control Sample	Total/NA	Solid	EPA 6010D	387857

QC Association Summary

Client: Mueser Rutledge Consulting Engineers
Project/Site: Alexandria Water Front

Job ID: 180-133342-1

General Chemistry

Analysis Batch: 387696

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	Total/NA	Solid	2540G	

Analysis Batch: 387706

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	Total/NA	Solid	EPA 9045D	
LCS 180-387706/1	Lab Control Sample	Total/NA	Solid	EPA 9045D	

Analysis Batch: 388533

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-133342-1	ALEXANDRIA	Total/NA	Solid	EPA 9095B	

Eurofins Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax: 412-963-2468

Chain of Custody Record

Baltimore #201

eurofins DRAFT Environment Testing America

Client Information	Sampler:	Lab PM: Bayura, Samantha M	Carrier Tracking No(s):	COC No: 180-78486-14908.1
Client Contact: Christopher Lidh	Phone:	E-Mail: samantha.bayura@eurofinset.com	State of Origin:	Page: Page 1 of 1
Company: Mueser Rutledge Consulting Engineers	PWSID:			Job #:
Address: 515 M St SE Suite 210	Due Date Requested:			
City: Washington	TAT Requested (days):			
State, Zip: DC, 20003	Compliance Project: Δ Yes Δ No			
Phone: 917-339-9457(Tel)	PO #: Purchase Order not required			
Email: clidh@mrce.com	WO #:			
Project Name: Alexandria Water Front	Project #: 18025087			
Site:	SSOW#:			

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)		8260D - TCL 4.2 GC/MS Volatile	6010D TCLP Metals 9045D 9045B 7470A 8082A	8015C DRO	8015C GRO	Total Number of containers	Special Instructions/Note
				Preservation Code:								
Alexandria	2/3/2022	13:06	C	S			X	X	X	X		

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

180-133342 Chain of Custody

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: [signature]	Date/Time: 2/3/2022 14:00	Company: MRCE	Received by: [signature]	Date/Time: 14:43 2/3/22	Company: FET
Relinquished by: [signature]	Date/Time: 2/3/22 1700	Company: EBT	Received by: J. Watson	Date/Time: 2-8-22 10:30	Company: EETAPitt
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021 2/17/2022

UPS GROUND
TRACKING #: 1Z 428 614 03 9039 6376
PA 152
180-133342 Waybill

Eurofins Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax: 412-963-2468

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Bayura, Samantha M	Carrier Tracking No(s):	COC No: 180-454701.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: samantha.bayura@eurofinset.com	State of Origin: Virginia	Page: Page 1 of 1
Company: Eurofins Environment Testing Southeast,		Accreditations Required (See note): NELAP - Virginia		Job #: 180-133342-1
Address: 3355 McLemore Drive, ,	Due Date Requested: 2/21/2022			
City: Pensacola	TAT Requested (days):			
State, Zip: FL, 32514				
Phone: 850-474-1001(Tel) 850-478-2671(Fax)	PO #:			
Email:	WO #:			
Project Name: Alexandria Water Front	Project #: 18025087			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015C_DRO/3546 TPH DRO (C10-C28)	8015C_GRO/5035A_FP TPH-GRO (C6-C10)	8015C_GRO/5035A_FM TPH-GRO (C6-C10)	8015D_GRO/5030C TPH-GRO (C6-C10)	Total Number of containers	Special Instructions/Note:
			Preservation Code:									
ALEXANDRIA (180-133342-1)	2/3/22	13:00 Eastern		Solid			X	X	X		4	
TRIP BLANK (180-133342-2)	2/3/22	Eastern		Water						X	2	

Note: Since laboratory accreditations are subject to change, Eurofins Pittsburgh places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Pittsburgh laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Pittsburgh attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Pittsburgh.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		2-1-22 1400				
2	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time: 2.1.22 13:45	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 2.3°C 4.7% IR9

Ver: 06/08/2021

Page 29 of 31

2/17/2022

DRAFT

Login Sample Receipt Checklist

Client: Mueser Rutledge Consulting Engineers

Job Number: 180-133342-1

Login Number: 133342
List Number: 1
Creator: Watson, Debbie

List Source: Eurofins Pittsburgh

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	
There are no discrepancies between the containers received and the COC.	False	Received Trip Blank(s) not listed on COC.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Mueser Rutledge Consulting Engineers

Job Number: 180-133342-1

Login Number: 133342
List Number: 2
Creator: Whitley, Adrian

List Source: Eurofins Pensacola
List Creation: 02/12/22 03:10 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	2.3, 4.7°C IR9
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

DRAFT

Environmental Waste Specialists, Inc.
Transport & Dispose / Recycle of Hazardous Waste, Asbestos and Universal Waste

Corporate Offices:
9625 Surveyor Ct., Suite 110
Manassas, VA 20110

Local: (703) 502-0100
Fax: (703) 502-1796
Web: www.EWSIhazmat.com

May 17, 2022

Mr. Fred Falcone
Mueser Rutledge Consulting Engineers
14 Penn Plaza
2555 West 34th Street
New York, N.Y. 10122

RE: Certificate of Disposal (C.O.D.)

As part of our continued service, please find enclosed a copy of your C.O.D., also known as the Certificate of Disposal for your waste picked up at the listed project site.

The C.O.D. is a very important part of the paperwork trail, establishing "Cradle to Grave". Please note the "Manifest In" date listed on your C.O.D. should be matched with your shipping document(s) that were provided at the time of the shipment and/or provided with the invoices at an earlier date. Make a copy of the C.O.D. for your client, if applicable, and send to them for their records.

If you have any questions please feel free to contact me.

Thank you for your business! It has been a pleasure working with you! Please do not hesitate to give us a call if we can be of further service to you.

Sincerely,
Environmental Waste Specialists, Inc.

Laurie M. Glass
Administrative Manager

DRAFT

jgenvironmental
responsible safe solutions

April 6, 2022

Mr. John Woloson
AEGIS Resource Management LLC
1765 Hilltop Drive
York, PA 17406

FILE: City of Alexandria VA (AEGIS) (Manifest #032422-634-1)
RE: Certificate of Disposal

Dear Mr. Woloson,

This serves as notification that the Soil Cuttings Waste received from City of Alexandria VA on March 24, 2022, was processed at our Municipal Waste Processing Facility (PADEP #101712) and disposed at Modern Landfill, York, PA (PADEP #100113) on the dates below.

DATE	DESCRIPTION OF WASTE	VOLUME
3/24 & 3/25/22	Non-Hazardous Soil Cuttings Waste	11.72 Tons

Sincerely,

Leigh A. Waite

Leigh Waite
Lab Technician