GEOTECHNICAL DESIGN REPORT

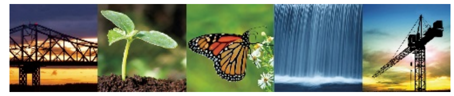
PLEASANT COVE BRIDGE
MAINE DOT WIN 23929.01
WOOLWICH, MAINE

September 2021
09.0026037.01

Prepared for:
Maine Department of Transportation
Augusta, Maine

Prepared by:
GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive | Suite 150 | South Portland, Maine 04106
207.879.9190

31 Offices Nationwide
www.gza.com



GZA
Known for excellence.
Built on trust.

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

707 Sable Oaks Drive
Suite 150
South Portland, ME 04106
T: 207.879.9190
F: 207.536.1173
www.gza.com

VIA EMAIL

September 7, 2021
File No. 09.0026037.01

Ms. Laura Krusinski
Maine Department of Transportation
16 State House Station
Augusta, Maine 04333-0016

Re: Geotechnical Design Report
Pleasant Cove Bridge
MaineDOT WIN 23148.00
U.S. Route 1, Woolwich, Maine

Dear Laura:

We are pleased to provide this Geotechnical Design Report, which includes geotechnical design recommendations for the proposed Pleasant Cove Bridge in Woolwich, Maine. Our work was completed under GZA GeoEnvironmental, Inc.'s (GZA's) June 3, 2020 General Consulting Agreement (GCA CTM202006030000000709) with the Maine Department of Transportation (MaineDOT) Bridge Program, and incorporates GZA's Proposal No. 09.P000157.21, dated March 11, 2021, and the *Limitations* Included in **Appendix A** of this report. HNTB is serving as the bridge designer for MaineDOT.

It has been a pleasure serving MaineDOT on final design of the project, and we look forward to our continued work with you through project completion. If you have any questions regarding the report, or if we can provide further assistance, please do not hesitate to contact the undersigned.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

STATE OF MAINE
CHRISTOPHER L. SNOW
No. 7275
LICENSED
PROFESSIONAL ENGINEER
09-07-2021

Blaine M. Cardali, P.E.
Assistant Project Manager

Andrew R. Blaisdell, P.E.
Consultant Reviewer

Christopher L. Snow, P.E.
Principal

BMC/ARB/CLS:erc
P:\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary Restoration\09.0026037.01 - Final Design\Report\FINAL 26037.01 Pleasant Cove Woolwich GDR 09072021.docx

Attachment: Geotechnical Design Report

TABLE OF CONTENTS

TABLE OF CONTENTS (*continued*)

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

This report presents the results of the geotechnical evaluation by GZA GeoEnvironmental, Inc. (GZA) for the replacement of Pleasant Cove Bridge in Woolwich, Maine. Our services were completed in accordance with GZA's June 3, 2020 General Consulting Agreement (GCA CTM20200603000000000709) with the Maine Department of Transportation (MaineDOT) Bridge Program, and incorporates GZA's Proposal No. 09.P000157.21, dated March 11, 2021, and the *Limitations* Included in **Appendix A** of this report. HNTB is serving as the bridge designer for MaineDOT and our geotechnical design evaluations and recommendations have been coordinated with HNTB throughout final design.

1.1 BACKGROUND

The project includes the rehabilitation of the current Route 1 causeway and George Wright Road connection which both flood during extreme tidal and storm events. The causeway near the existing station 46 Bridge was constructed in approximately 1936 with the current bridge and was connected to George Wright Road. The remainder of the embankment to the east was constructed approximately 14 years later. Tidal flow is currently passed through three culverts within the causeway across Back River Estuary. The purpose of the project is to provide resilience against flooding and future sea level rise.

The proposed construction consists of a new 85-foot-long, single-span, integral abutment bridge to replace the culverts and reduce restriction of water flow and a grade raise of approximately 5.5 feet over the 1,275-foot-long causeway. The final embankment will be widened to the south including new fill up to 8 feet. The abutments are anticipated to be supported by driven pile foundations. The wingwalls extend outward from the abutments at approximately 180 degrees and terminate in 1.75 horizontal to 1 vertical (1.75H:1V) riprap slopes. The location of the proposed baseline is shown on **Figure 2**. Beneath the bridge, a new 48-foot-wide channel will be dredged to allow for tidal and Back River flows through the causeway. The proposed bottom of the channel is approximately El. -3 and terminates at the base of 1.75H:1V riprap slope extending down in front of the abutments.

Subsurface data indicate that compressible soils are present along the proposed causeway. Based on discussions with MaineDOT, we understand that the design intent for this project is to limit post-construction settlement to 3 inches or less within each 20-year period, based on the typical repaving cycle of MaineDOT. Settlement mitigation is anticipated in areas of proposed filling to meet this intent.

1.2 OBJECTIVES AND SCOPE OF SERVICES

The objectives of our work were to evaluate subsurface conditions and to provide geotechnical design recommendations for the proposed bridge and causeway modifications. To meet these objectives, GZA completed the following Scope of Services:

- Conducted site visits to observe surficial conditions and reviewed mapped surficial and bedrock geology of the site;
- Reviewed subsurface data collected by GZA during the preliminary subsurface exploration program, which consisted of two test borings and a Cone Penetration Test (CPT);

- Coordinated and observed a supplemental subsurface exploration program, consisting of nine test borings, and one CPT, to further evaluate subsurface conditions for the proposed bridge and causeway;
- Conducted a laboratory testing program to evaluate engineering and index properties of the site soils and bedrock;
- Conducted geotechnical engineering analyses for soil and bedrock properties; stability and settlement of raised and widened embankments; frost susceptibility; AASHTO LRFD load and resistance factors associated with geotechnical design elements; nominal resistance of pile foundations; lateral pile design considerations; pile drivability; lateral earth pressures on abutments and seismic design considerations;
- Developed geotechnical engineering recommendations including foundation design recommendations for driven piles; lateral earth pressures; seismic design parameters; embankment settlement mitigation and instrumentation; geotechnical construction considerations; and
- Prepared this report summarizing our findings and design recommendations.

2.0 SUBSURFACE EXPLORATIONS

2.1 TEST BORINGS

GZA completed a preliminary design exploration program in 2019 consisting of two test borings, and a final design bridge exploration program in 2021 consisting of nine borings. The as-drilled boring locations were surveyed by MaineDOT and provided to GZA and are shown on the logs and in **Figures 2 and 3.** Elevations referenced in this report are in feet and refer to North American Vertical Datum of 1988 (NAVD 88).

Borings were drilled using 3- and 4-inch casing, and drive- or spin-and-wash drilling techniques, as noted on the boring logs. Standard penetration testing (SPT) and split spoon sampling were performed continuously in the upper portion of some borings and generally at 5-foot typical intervals using a 24-inch-long, 1-3/8-inch inside diameter sampler. The borings were generally backfilled with ¾-inch crushed stone and/or soil cuttings, and topped with asphalt cold patch in roadway areas. GZA personnel monitored the drilling work and prepared logs of each boring that are included in **Appendix B**. Additional details of each program are described below.

2.2 PRELIMINARY DESIGN BORINGS

Borings EB-KERP-101 and EB-KERP-102 were drilled between October 22 and October 26, 2019. The borings were completed using a Mobile B-53 drill carried on a track rig and were drilled to depths ranging from approximately 60 to 160 feet below ground surface (bgs). Bedrock was cored approximately 10 feet in these borings. SPTs were conducted using automatic hammer NEBC No. 2, which had a rated hammer energy transfer ratio of 0.895 at the time of drilling. Field vane shear tests were taken in pairs at 5- to 10-foot typical intervals within the silt and clay layers and a total of four thin-walled tube samples were taken from the borings for laboratory consolidation and shear strength testing.

2.3 FINAL DESIGN PHASE BORINGS

Borings BB-WPC-201 through BB-WPC-203, HB-WPC-201 through BB-WPC-205, and BB-WPC-301 were drilled between March 22 and April 7, 2021. The borings were drilled at the proposed abutment locations and approximately every 200 feet along the causeway. The borings were drilled using a track-mounted Mobile B-53 drill rig. The borings were drilled to depths of approximately 37 to 160 feet bgs and terminated approximately 5.8 to 13.3 feet into bedrock. SPTs were conducted using automatic hammers NEBC No. 1 and NEBC No. D23, which had rated hammer efficiency factors at the time of drilling of 0.852 and 0.818, respectively. Field vane shear tests were taken in pairs at approximately 5- to 10-foot typical intervals within the silt and clay layers and a total of nine thin-walled tube samples were taken between borings for laboratory consolidation and shear strength testing.

2.4 CONE PENETRATION TESTING

GZA retained Summit Geoengineering Services (SGS) to complete two CPTs. CPT-KERP-101 was performed on October 14, 2019 and was conducted adjacent to boring EB-KERP-101, during preliminary design. CPT-WSP-201 was performed on March 25, 2021 and was conducted at Abutment 1 during final design.

The as-drilled CPT locations were surveyed by MaineDOT and are shown on **Figure 2**.

The CPTs were performed in accordance with ASTM D5778. They were advanced using a truck-mounted PowerProbe 9630 Pro with a Vertek digital cone. CPT-KERP-101 was advanced to a depth of 79.7 feet bgs before anchor failure occurred and the CPT was terminated; probe refusal was not observed. CPT-WSP-201 was advanced to refusal at a depth of 92 feet bgs. Parameters obtained include cone resistance (qc), sleeve friction (fs), piezocone pore pressure (u_2), and shear wave velocity (V_s).

Data reports were prepared by SGS on November 17, 2019 for CPT-KERP-101 and on March 31, 2021 for CPT-WSP-201, and are included in **Appendix C**. SGS also provided GZA with Excel files containing the raw CPT data for use in our engineering evaluation.

GZA utilized the analytical software CPetIT by Geologismiki to develop reports of correlated soil types and engineering properties based on the raw data provided by SGS. These reports and a summary of empirical correlations associated with different properties are included in **Appendix C**.

3.0 LABORATORY TESTING

GZA retained two laboratories to complete a laboratory testing program, including Thielsch Engineering of Cranston, Rhode Island, to assess the gradation and index properties of the soil and bedrock and Soil Metrics of Cape Elizabeth, Maine to assess shear strength and compressibility of cohesive soils. The testing program included:

- Twenty-One (21) gradation analysis / MaineDOT Frost Classification / Unified Soil Classification System (USCS) assessments;
- Fifty-Seven (57) moisture content tests;

- One (1) organic content test;
- Twenty-Four (24) Atterberg limits analyses;
- Eight (8) incremental consolidation tests;
- Seven (7) K_o consolidated undrained direct simple shear tests on soil samples; and
- Seven (7) hydrometer tests.

Results of the testing are included in **Appendix D**.

4.0 SUBSURFACE CONDITIONS

4.1 SURFICIAL AND BEDROCK GEOLOGY

Based on available geologic mapping[1], the surficial units in the vicinity of the site consist of artificial fill, freshwater to saltmarsh wetland deposits, the Presumpscot formation (glaciomarine deposit), and glacial till thin-drift areas. Artificial fill was placed over the wetland and glaciomarine deposits during development of the existing bridge approaches. Freshwater and saltmarsh wetland deposits are described as muck, peat, silt, sand and clays. The Presumpscot formation consists of silty clays with distal sand deposits. Thin-drift areas are described as areas with less than 10 feet of drift (glacial till) overlying bedrock.

The available bedrock geologic mapping[2] indicates that bedrock in the vicinity of the site consists of schists with sporadic metamorphosed calc-silicate beds and is mapped as the Cape Elizabeth Formation (Oce).

4.2 SUBSURFACE PROFILE

Four soil units were encountered beneath the typical asphalt pavement thicknesses of 6 inches (where present) and above bedrock at the site: Fill, Wetland Deposit (organic silt), Marine Clay, and Glacial Till, as summarized in the table that follows.

[1] Weddle, Thomas K., 2002, Surficial geology of the Bath quadrangle, Maine: Maine Geological Survey, Open-File Map 02-145, map, scale 1:24,000.

[2] Hussey, Arthur M., II, and Marvinney, Robert G., 2002, Bedrock geology of the Bath 1:100,000 quadrangle, Maine: Maine Geological Survey, Geologic Map 02-152, 1 plate, photographs, color map, cross section, scale 1:100,000.

Soil Unit	Approximate Encountered Thickness (ft)	Generalized Description
Fill	7 to 19	Varying from brown to grey, medium dense to very dense, fine to coarse SAND, little gravel, trace to some silt to GRAVEL, trace to little fine to coarse sand, trace silt. (USCS: SM, SP-SM, GP, GW-GM, GM). Typical MaineDOT Frost Classification Range= I to III *Encountered in ALL borings.*
Wetland Deposits	5 to 37	Brown to black, soft to stiff, Organic SILT, trace to little fine to coarse sand, trace gravel, with organic fibers and wood fragments. (USCS: OH). Typical MaineDOT Frost Classification =III to IV *Encountered in ALL borings except HB-WPC-201 and HB-WPC-205.*
Marine Clay	2 to 103	Grey, very stiff to soft, Silty CLAY, trace shells, trace to little fine sand. (USCS: CL, CH). Typical MaineDOT Frost Classification Range = III to IV *Encountered in ALL borings except HB-WPC-201 and HB-WPC-205.*
Glacial Till	1 to 6.0	Grey, very dense, Gravelly fine to coarse SAND, little silt. (USCS: SM). MaineDOT Frost Classification = II *Encountered in borings EB-KERP-101, BB-WPC-203, HB-WPC-201, HB-WPC-202, HB-WPC-205, and BB-WPC-301*
Estimated Top of Bedrock	Approx. El. -4.9 to -144.2 (25.6 to 149.5 feet bgs)	

4.2.1 Bedrock

Bedrock was cored in each test boring and was identified as hard to very hard, fresh to slightly weathered, aphanitic to coarse grained, grey Schist. The primary joints are extremely close to moderately spaced, moderately dipping to high angle, planar to undulating, smooth to rough, fresh to decomposed, very tight to open, with occasional silt infilling. The secondary joints are very close to moderately spaced, low angle to moderately dipping, planar, smooth to rough, fresh, tight to moderately wide. The Rock Quality Designation (RQD) in the Schist ranged from 12 to 98 percent (average of 54 percent), corresponding to a Rock Mass Quality of Very Poor to Excellent.

4.2.2 Groundwater

The groundwater level was measured in the completed borings after drilling at depths of 1.7 to 8.9 feet bgs, corresponding approximately to El. 5.9 to 14.9. Water levels measured in the borings were likely influenced by the addition of drill water during rotary wash drilling. The groundwater level was also interpreted from the CPTs to be at depths of 2.0 and 4.2 feet bgs, corresponding approximately to El. -4.5 to El. 1.1. The CPT measurements are considered more representative of in-situ groundwater conditions than the test boring data.

Fluctuations in groundwater levels will occur due to variations in season, precipitation, and construction activity in the area. Consequently, water levels during and after construction are likely to vary from those encountered in the borings at the time the observations were made.

5.0 ENGINEERING EVALUATIONS

5.1 GENERAL

GZA conducted geotechnical engineering evaluations in accordance with *2020 AASHTO LRFD Bridge Design Specifications, 9th Edition* (herein designated as AASHTO) and the *MaineDOT Bridge Design Guide, 2003 Edition*, with updates through 2018 (MaineDOT BDG). The sections that follow describe the evaluations and the geotechnical basis for each element. Supporting calculations are included in **Appendix F**.

5.2 ROADWAY EMBANKMENTS

The proposed roadway alignment will maintain the existing alignment. The profile will be raised a maximum of 5.5 feet within the roadway limits and up to about 8 feet on the shoulders. The roadway grade raise will be negligible at Station 87+00, increase to approximately 5.5 feet at Station 91+00 and remain at approximately 5.5 feet across the new bridge, returning to existing grades at approximately Station 100+00. A new channel will be created through the causeway with a mudline elevation of approximately -3, which is approximately 10 feet below existing grade. The proposed bridge will carry the roadway over the new channel.

Permanent embankment side slopes will be constructed with an inclination of 2H:1V or less, except around abutments, where 1.75H:1V riprap-covered slopes are proposed to wrap around the sides and front of the abutments.

A contractor-designed temporary detour is anticipated on the south side of the existing alignment. The contract drawings show a feasible alignment including a temporary two-lane roadway and temporary bridge. As envisioned, the alignment would require approximately 50 feet of embankment widening to carry the temporary roadway. The drawings indicate a feasible profile with fills up to approximately 9 feet above existing ground surface. We understand that the fill placed for the temporary detour will be removed at the end of construction. We also anticipate that the embankments will be constructed per MaineDOT standard specifications and details using engineered fill placed over the existing embankment and side slope, using side slope inclinations of 2H:1V or flatter.

5.2.1 Soil Properties

The profiles considered for embankment design considerations included new engineered fill, existing fill, wetland deposits, and marine clay overlying bedrock. The strength and compressibility of the wetland and marine clay deposits are the primary contributor to the performance of the embankments. Development of the design parameters for these deposits is described below.

Strength

GZA developed shear strength profiles using the results of field vane shear testing, direct simple shear laboratory testing, correlation to CPT side friction measurements, and correlation to SPT N-values. The results are plotted on **Figure 4**. The plot shows the interpreted undrained shear strength, S_u, versus depth. Since long term embankment loads are known to enhance undrained shear strengths, the plot shows a bold black line representing the interpreted S_u beneath the embankment. Since the borings and CPTs for Pleasant Cove project were conducted through the existing embankment, the S_u outside of the embankments was estimated using direct simple shear laboratory testing, correlation to CPT side friction measurements from similar materials at the Station 46 Bridge project that are outside of embankment limits and is represented as a dashed black line on the plot. As anticipated, the wetland deposits and marine clay both have higher strength beneath the embankment due to previous consolidation and resulting strength gain in these fine-grained deposits.

Our interpretation of S_u within the wetland deposit relies more heavily on the CPT and DSS than the field vane shear results. The field vane data were judged to show possible overestimation of the undrained shear strength due to the presence of sand seams and fibrous materials in the organic silt and were not relied on for strength in this layer.

Compressibility

Eight, one-dimensional consolidation tests were completed on samples taken at the site beneath the current roadway embankment and three were completed on samples from boring BB-WS46-103 from a location beneath the Station 46 bridge where embankment loading has not occurred. The latter group of tests are considered representative of materials outside the limits of the existing embankments. The consolidation test results from El. -45 in boring EB-KERP-101 were adversely affected by the presence of sand seams. The apparent maximum past pressure from that test is judged to be non-representative of the actual condition.

The maximum past pressure results from the consolidation tests were compared to values derived from Stress History and Normalized Soil Engineering Properties based on the design undrained shear strength profile in **Figure 4**. We interpret the combined results to show that the wetland deposit outside the embankment limits is lightly overconsolidated (by approximately 400 to 600 psf) and is approximately normally consolidated under the present roadway embankment.

The wetland deposit overlies a marine clay deposit that includes an upper, over-consolidated crust layer over a normally consolidated to lightly over-consolidated clay under the current embankment. We interpret the combined results to show that the marine clay crust layer is heavily overconsolidated regardless of location, lightly overconsolidated (by approximately 400 to 600 psf) outside the embankment limits and approximately normally consolidated under the present roadway embankment.

Future settlement of overconsolidated deposits is anticipated to occur rapidly and be of moderate magnitude. Normally consolidated deposits tend to be more compressible and the settlement is expected to occur more slowly.

Based on the laboratory and in-situ testing results and our experience with similar Organic Silt and Presumpscot clay deposits in the area, GZA interpreted the index and compressibility properties as follows:

Soil Properties for Settlement Analyses			
Material Property	Soil Layers		
	Wetland Deposit	Marine Clay Crust	Marine Clay
Modified Recompression Ratio (RR)	0.03	0.019	0.021
Modified Compression Ratio (CR)	0.25	0.19	0.21
Virgin Consolidation Coefficient (Cv)	0.07 (ft^2/day)	0.1 (ft^2/day)	0.1 (ft^2/day)
Recompression Consolidation Coefficient (Cvr)	0.70 (ft^2/day)	0.70 (ft^2/day)	0.70 (ft^2/day)
Maximum Secondary Compression Coefficient (Cα)[1]	0.014	0.007	0.007
Post Surcharge Secondary Compression	.0037 - .0027	.0037 - .002	.0037 - .002
Unit Weight	90 pcf	112 pcf	112 pcf
Atterberg Limits	LL = 75-95 PI = 20-37	LL = 26-50 PI = 8-27	LL = 38-47 PI = 18-22

The boring and CPT data indicated glacial till underlying the marine clay and a desiccated marine clay crust with sand seams at the top of the marine clay, therefore, GZA considered the marine clay to have double drainage. The wetland deposit was assumed to have double drainage.

5.2.2 Settlement Modelling and Historic Embankment Construction

As previously noted, the design intent is to limit post-construction settlement to 3 inches or less over each successive 20-year period for highway embankments and bridge approaches. GZA modeled the settlement using Settle3™, starting with a relatively flat pre-construction ground profile at approximately El. +2.0 from Station 87+00 to Station 95+00, then sloping downward to El. -4 at Station 95+00 (where historic plans indicate the location of the original back river) then sloping from El. -4 to EL.+2 between Station 97+00 to 98+00. Initial embankment construction occurred in approximately 1936 in the vicinity of the Station 46 bridge approach (Station 87+00 to 92+00). GZA utilized historic drawings to estimate the original embankment top elevation. The remainder of the causeway embankment (Stations 92+00 to 100+00) appears to have been added at some point between 1945 and 1955. GZA estimated that this segment was added in 1950.

5.2.3 Previous Settlement

Once the model was established, GZA estimated the settlement that would have occurred since construction. The model predicted approximately 30 to 40 inches of settlement would have occurred near the embankment centerline. To check this result, GZA conducted a ground truthing evaluation by comparing the original ground surface, approximately El. +2, to the bottom of embankment fills encountered in borings. The boring results suggest that a similar amount of settlement, approximately 2 to 4 feet, has occurred along this location since construction in 1936 and the 1950s.

5.2.4 Analysis of Future Settlement

GZA developed the three-dimensional model for analysis of future settlement using existing grades and proposed grading supplied by HNTB, subsurface stratification based on the test boring logs, and soil properties developed from the laboratory and field testing as previously described. Where necessary, the subsurface conditions beyond the limits of the test borings were extrapolated to provide a complete subsurface model in the areas of interest.

GZA evaluated four alternatives including no-mitigation (base analysis), two lightweight-fill-mitigation schemes, and a vertical-drainage-wick-surcharge mitigation scheme. The schemes are described in more detail in the following section. All mitigation alternatives assume that embankments will be in place for approximately one year during construction and at least six additional months will pass between construction and final shimming and paving. Therefore, the first 20-year period for the 3-inch settlement criterion begins 1.5 years after completion of fill placement.

5.2.4.1 Settlement Mitigation Alternatives

No Mitigation

GZA evaluated a base model where filling is completed to design grade without lightweight materials, vertical drains or surcharge. The results indicate estimated total settlement (combined primary and secondary settlement) ranging from approximately 4 to 15 inches within 20 years in the area from Station 89+00 to 98+00. These magnitudes greatly exceed the target settlements of 3 inches or less.

Full Compensation With Lightweight Fill

GZA evaluated a second alternative which utilizes approximately 12,000 cubic yards (CY) of ultra-lightweight foamed glass aggregate (ULFGA) material placed beneath the roadway section to prevent stress increases and associated settlement. The volume of material was selected such that there would be negligible stress increase beneath the paved portion of the roadway. No mitigation was envisioned beyond the crest of slopes. This alternative is capable of mitigating settlement but would require over-excavation of up to 6 feet of existing fill and placement of approximately 1.5 to 7 feet of ULFGA. It is also noted that the bottom of the ULFGA would be below high tide in this configuration and therefore would be partially buoyant, which would require careful consideration, especially in light of sea level rise.

Tapered Lightweight Fill

Considering the potential large costs associated with the full load compensation above, GZA evaluated an alternative with a reduced volume of ULFGA, approximately 4,200 CY, that eliminates stress increases within 100 feet of the proposed bridge and tapers out to no mitigation over the next 300 feet on the west approach and over the next 50 feet on the east approach.

Similar to the first ULFGA alternative, the tapered lightweight fill alternative achieves the design settlement within 100 feet of the bridge in each direction, but 7 to 11.5 inches of settlement is anticipated between Station 89+00 and 94+00, similar to the “No Mitigation” alternative. It would be feasible to overbuild the initial profile grade in these locations such that, with settlement, the desired elevations would be expected to occur at the selected design interval. The buoyancy issue noted above would still exist at the bridge approaches.

Preload With Vertical Drainage Wicks

Based on discussions with the design team, the anticipated schedule would allow the embankment to be constructed with a surcharge fill and left in place for a preload period of approximately one year while the Station 46 bridge is constructed. Traffic would be diverted to a temporary roadway during the preload period. Therefore, GZA developed a prefabricated vertical drain/preload alternative that utilizes a 6-foot surcharge fill above the proposed roadway finish grades, with VDWs spaced at 5 feet on center in a triangular pattern.

The surcharge limits range from approximately Station 88+00 to 98+00. HNTB indicated a feasible construction timeline which includes the surcharge and VDWs being installed and in place by late fall/winter 2022 and remaining in place for 12 months. This alternative also assumes that channel excavation and construction of the Pleasant Cove Bridge do not begin until the end of the preload period to gain the full benefit of the preload at that location.

Based on our Settle3 calculations, we estimate that an average consolidation of approximately 77 percent would be required under the preload to mitigate the primary consolidation settlement plus the secondary compression over the next 75 years, as further described in **Section 5.2.4.2** below. Our evaluation suggests that approximately 80 to 90-plus percent consolidation is anticipated during the 12-month preload duration, exceeding the maximum required 77 percent at all locations.

Preferred Alternative for Settlement Mitigation

GZA evaluated the feasibility and estimated cost of the four alternatives for settlement mitigation. The No-Mitigation alternative was eliminated because it did not achieve the target settlement mitigation. The Full-Compensation-with-Lightweight-Fill alternative was eliminated due to the anticipated premium costs associated with use of ULFGA material. The Tapered-Lightweight-Fill alternative was considered feasible from a cost and performance standpoint, however, it had challenges including constructability and potential long-term impact of the buoyant ULFGA material at lower elevations, and risk associated with estimating the necessary height of overbuild required to achieve final grades.

The Preload-with-VDWs alternative was selected as the preferred alternative because it is based on techniques that have a track record of successful implementation by local contractors in the State of Maine, and the costs were similar to the Tapered-Lightweight-Fill alternative.

5.2.4.2 Estimated Settlement with Preferred Mitigation Alternative

The preload consists of the proposed fills plus an additional 6-foot surcharge between Station 88+00 to 98+00. The VDWs will be installed on a 5-foot triangular grid beneath the preload area to accelerate consolidation during the preload. The VDWs grid will extend to the limits of the proposed crest of permanent slopes (approximately 25 feet LT and 35 feet RT).

It is planned to evaluate the performance of the preload by monitoring settlement and dissipation of excess pore pressure during the preload period. These measurements are made to assess the percent consolidation that has occurred under the surcharge load and compare that to the required consolidation settlement anticipated under the surcharge load.

In order to determine the required average percent of consolidation under the preload, GZA estimated the total anticipated consolidation settlement with the surcharge load in place for 75 years (100 percent consolidation) and compared it to the consolidation of the final embankment plus secondary compression over 75 years. The maximum total consolidation at 100 percent of the surcharge was estimated to be 41 inches at Station 94+00 and the total final embankment consolidation (no surcharge and VDWs) at 75 years was 31.5 inches; therefore, the required average percent consolidation is 77 percent. The 12-month preload is estimated to have 37 inches of consolidation at 94+00 resulting in an average percent consolidation under the preload of 90 percent.

The required percent consolidation under preload is established by dividing the anticipated total settlement over 75 years under the final embankment (primary consolidation plus secondary compression) by the estimated settlement at 100 percent of consolidation under surcharge loading. We estimate that an average consolidation of approximately 77 percent would be required under the preload to mitigate the primary consolidation settlement plus the secondary compression over the next 75 years. At the time of preload removal, the effective stress corresponding to 77 percent consolidation is estimated to exceed the vertical effective stress under the final embankment configuration. Therefore, the wetland and marine clay deposits will be slightly overconsolidated. This consideration was incorporated in secondary compression estimates, as the magnitude of $C\alpha$ is reduced by a factor of approximately 4 from its maximum when the stress ratio (ratio of effective stress to maximum past stress) is less than 1 (i.e., inverse of overconsolidation ratio). The reduced $C\alpha$ values are presented in the table in **Section 5.2.1**. Our evaluation suggests that approximately 80 to 90-plus percent consolidation is anticipated during the 12-month preload duration. This corresponds to full compensation of the estimated settlement over 75 years, suggesting that post-preload settlement will be negligible. Therefore, we anticipated that post-construction settlement across the site will be less than 3 inches and will meet the target for settlement mitigation.

The calculations included in **Appendix E** and the Settlement Mitigation Alternatives Memorandum in **Appendix G** provide additional details and plotted results of the settlement analyses.

5.2.5 Embankment Slope Stability

GZA evaluated the stability of proposed embankments at critical cross-sections near the proposed abutments and in the longitudinal direction beneath each abutment. The slope geometry, stratigraphy and soil properties used in our analyses are shown in **Appendix E**. The basis for acceptable performance for embankments is specified in AASHTO Article 11.6.2.3 and is summarized as follows:

- Resistance factor of 0.75 (corresponding to a safety factor of 1.3) for slopes that do not support structures, considered for embankment areas beyond the bridges; and
- Resistance factor of 0.65 (corresponding to a safety factor of 1.5) for slopes that support structures, considered for the abutments and retaining walls.

Evaluations were conducted using the analytical software *Slope/W*, developed by GeoSlope International, based on the Morgenstern-Price method. A grid and radius search technique or the entry exit method was used to identify the slip surface with the lowest factor of safety. A 250-psf surcharge load was included within the limits of the proposed travelway. Slope/W output figures showing the minimum factor of safety for each analysis are presented in **Appendix E**. Additional details of the analyses and results are presented below.

Static Analysis

Longitudinal Profiles

The analyzed profiles considered the interpreted subsurface conditions along the project baseline. The beneficial reinforcing effect of new HP14x73 piles was modeled in Slope/W. Brom's method was used to calculate the available resistance from the piles, which is based on the stiffness of the embedded pile and the strength of the soil. Seven HP14x73 piles were modeled beneath each abutment, corresponding to a center-to-center spacing of about 8.0 feet, oriented for weak-axis bending. Brom's method pile resistance calculations are presented in **Appendix E**. The calculated lateral pile resistance was entered in Slope/W using a shear resistance value per pile and a pile spacing.

The results indicate a minimum factor of safety of 1.6 for the Abutment 1 profile and 1.7 for the Abutment 2 profile, which is greater than the required 1.5. Therefore, the global stability is acceptable in the longitudinal direction.

Transverse Profiles

Four cross-sections were selected for analysis, consisting of the highest embankment and/or steepest side slope inclinations at the new bridge location, summarized as follows:

- Station 96+00, Abutment 1 Approach: 10- to 17-foot-high embankment, 5.5-foot grade raise, left-to-right and right-to-left analyses; and
- Station 97+00, Abutment 2 Approach: 16- to 17-foot-high embankment, 4.5-foot grade raise, left-to-right and right-to-left analyses.

The results are summarized in the table below.

SUMMARY OF GLOBAL STABILITY EVALUATION		
Analysis Case	**Minimum Factor of Safety (Static)**	**Required Factor of Safety**
Sta. 96+00, Left to Right	1.7	1.3
Sta. 96+00, Right to Left	1.9	1.3
Sta. 97+00, Left to Right	1.5	1.3
Sta. 97+00, Right to Left	1.6	1.3

Abutment 1, Abutment 2, and retaining wall evaluations show that the calculated resistance to rotational failure is acceptable for the analyzed embankment sections.

Seismic Analysis

Since the site is classified as Site Class E, a pseudostatic analysis was conducted at the location where we found the lowest static factor of safety (Station 97+00). The analysis estimated k_h as half of the design peak ground acceleration (0.107 g) in accordance with AASHTO 11.6.5.2.2, because the slope will be free to move during an earthquake. The calculated pseudostatic factor of safety against rotational failure is approximately 1.1 for the critical slip surface, indicating that large slope deformations are not likely.

Temporary Detour Approaches and Preload

Planning-level stability analyses were conducted for an anticipated temporary detour embankment at the west approach for the bridge and for the proposed temporary detour preload embankment. GZA evaluated transverse sections at Station 90+00 to with the preload and widened detour, and at Station 96+00, the location of the highest temporary embankment and no temporary detour. Our analyses assume 2H:1V side slopes for all preload and temporary detour embankments. The results of our analyses indicate that the analyzed embankment configurations met AASHTO global stability criteria. If the contractor elects to utilize geometry other than what is shown in the drawings, we recommend that they be required to submit global stability calculations to justify the proposed embankment geometry.

5.3 SEISMIC DESIGN CONSIDERATIONS

The subsurface profile for seismic design includes the approach fills (including backfill behind abutments), Wetland Deposit, Marine Clay and underlying Sand overlying bedrock. Seismic site class was determined in general accordance with LRFD Table C3.10.3.1, considering the average undrained shear strength in cohesive soils encountered in the borings and the measured shear wave velocities in the CPTs. The average undrained shear strength for encountered cohesive soils is approximately 600 psf, and the average shear wave velocity ranged from 510 to 630 feet per second. Site Class E is defined as having an average undrained shear strength less than 1,000 psf or an average shear wave velocity less than 600 feet per second. Therefore, the bridge is assigned to Site Class E.

The available subsurface data indicates that the natural materials encountered at the site are sufficiently cohesive or dense that the potential for liquefaction is low.

5.4 EVALUATION OF FOUNDATIONS

5.4.1 Foundation Type Assessment

Based on the data from borings, we estimate the top of rock is approximately 71 to 90 feet below finish pavement grade in the vicinity of the abutments. A driven pile foundation was identified in preliminary design as the preferred alternative for support of the abutments based on the encountered conditions.

5.4.2 Load and Resistance Factors

AASHTO LRFD load factors should be applied to horizontal earth pressure (EH), vertical earth pressure (EV), earth surcharge (ES), and live load surcharge (LS) loads, using the load factors for permanent loads (γ_p) provided in LRFD Table 3.4.1-2 for strength limit state foundation design.

The recommended LRFD resistance factors for strength limit state design of foundations were derived from LRFD Tables 10.5.5.2.2-1, 10.5.5.2.3-1 and 10.5.5.2.4-1 and are presented in the following table.

GEOTECHNICAL RESISTANCE FACTORS – STRENGTH LIMIT STATE			
Foundation Resistance Type	**Method/Condition**	**Resistance Factor (ϕ)**	**AASHTO Reference**
DRIVEN PILES			
Nominal Geotechnical Resistance of Single Pile – Dynamic Analysis	Axial Resistance	0.65	10.5.5.2.3-1

Resistance factors for service and extreme limit state design should be taken as 1.0.

Structural resistance of the piles should be checked at the strength limit state considering a resistance factor ϕ_c=0.50, per AASHTO LRFD Article 10.7.3.2.3 for hard driving condition. Since the piles will be subject to lateral loading, the piles should also be checked for resistance to combined axial compression and flexure per AASHTO LRFD Articles 6.9.2.2 and 6.15.2. Per LRFD Article 6.5.4.2, the axial resistance factor ϕ_{cc}=0.70 and the flexural resistance factor ϕ_f=1.0 should be applied to the combined axial and flexural resistance of the pile in the interaction equation (AASHTO LRFD Eq. 6.9.2.2-1).

AASHTO LRFD load factors should be applied to EH, EV and ES loads using the load factors for permanent loads (γ_p) provided in AASHTO Table 3.4.1-2 for strength and extreme limit state design. A load factor of 1.5 may be applied to the passive pressure used to design the integral backwall (end diaphragm) to account for deformation of the backwall into the soil as a result of thermal expansion of the integral bridge deck, per MaineDOT BDG Section 5.4.2.11.

5.4.3 Pile Design Considerations

Based on our experience within similar soils, we anticipate that the proposed HP14x73 piles will be driven to refusal on or near the top of rock to achieve the required axial geotechnical resistance. The soil profile will consist of medium stiff wetland deposit and marine clay that is sensitive and will lose most of its strength temporarily during pile driving. Therefore, limited geotechnical resistance will be provided by the soil profile during driving, likely on the order of 5 to 20 percent of the required nominal resistance.

Since the piles will gain support largely in end bearing, there is no reduction for group interaction in axial compression. Axial tensile geotechnical (uplift) resistance was not evaluated because the structural loads provided by HNTB do not include uplift loading on the piles.

By utilizing steel H-piles for support of the abutments, total and differential settlement will be limited to elastic compression of the piles and should be less than ½ inch.

5.4.4 Pile Type

The abutments are planned to be supported on ASTM A572, Grade 50 (fy=50 kips per square inch [ksi]) steel HP14x73 piles. Each abutment will include seven piles. The piles should be fitted with cast steel driving shoes to limit damage during driving.

5.4.5 Downdrag

Pile installation should not occur until the preload period is complete, the surcharge fill removed, and the channel excavation completed to the bottom of pile cap level. Since post-construction settlement in the vicinity of the bridge abutments is anticipated to be less than 0.4 inch relative to the abutment piles, downdrag loading of the piles is not anticipated. A secondary benefit of completing the channel excavation to the bottom of pile cap level prior to pile driving is that it will reduce the tendency for relaxation of the embankment soils to impose lateral loading on the piles.

5.4.6 Pile Loads

HNTB provided a maximum factored axial load of 302 kips per pile for the strength condition; therefore, piles should be installed to a nominal axial resistance of at least 464 kips, calculated by dividing the maximum factored axial load by a geotechnical resistance factor of 0.65 for piles installed under hard driving conditions. The resistance factor assumes dynamic pile testing with signal matching analysis will be conducted on one pile at each abutment during construction, in accordance with AASHTO requirements, to assess nominal geotechnical pile resistance.

5.4.7 Design-Phase Pile Drivability Analysis

GZA completed preliminary wave equation analyses to assess the drivability of an HP 14x73 pile with a nominal geotechnical resistance of 464 kips at the abutments. Analyses were completed using a Delmag D19-52 diesel hammer with a ram weight of 4,000 pounds and a maximum rated energy of 47,123 foot-pounds (ft-lbs). A 76-foot-long pile was assumed to encounter a possible range of tip conditions from very hard driving conditions on bedrock to very dense soil immediately above bedrock. The results are summarized below.

SUMMARY OF WEAP ANALYSES					
Pile Analysis and Type	**Embedded Pile Length**	**Driving System**	**Required Nominal Geotechnical Resistance (kips)**	**Max Driving Stress (ksi)**	**Final Penetration Resistance (blows per inch)**
Abutment 1 HP 14x73	71 feet	Delmag D 19-52 (Fuel setting 1, 100% of maximum pressure)	464	37	9

Since the driving stresses do not exceed the limiting driving stress of 45 ksi (0.9 Fy) for ASTM A572 Grade 50 (50 ksi yield stress) steel, and the calculated penetration resistance is within the MaineDOT preferred range of 6 to 15 blows per inch, a similar hammer system is anticipated to be suitable to install the piles to the required nominal resistance noted. Results of the preliminary wave equation analyses are provided in **Appendix E**.

5.4.8 Lateral Pile Analysis

GZA's lateral pile analysis for the integral abutments was conducted in accordance with Section 5.4.2.4 of the MaineDOT BDG and the recommendations included in the "Integral Abutment Bridge Design Guidelines" by the Vermont Department of Transportation (VTrans). The analysis used ASTM A572 Grade 50, HP 14x73 piles aligned for weak-axis bending.

GZA developed the soil profiles tabulated below based on the soil conditions encountered in the test borings and laboratory testing results. The ground surface was assumed to be at the bottom of abutment for thermal contraction. The pile was an ASTM A572 Grade 50 steel HP14x73 pile oriented for weak-axis bending.

L-PILE® INPUT PARAMETERS ABUTMENT 1, TYPICAL SHORTEST PILE LENGTH APPROX. 71 FT						
Stratum	**Soil Model**	**Top of Layer Elevation (ft-NAVD 88)**	**Layer Thickness (ft)**	**k (pci) / E50**	**ϕ' (deg)/ Su (psf)**	**γ_e (pcf)**
Fill**	Reese Sand	5.3	9.3	85	32	63
Wetland Deposit	Matlock Clay	-4	11	E_{50} = 0.01	1000	48
Wetland Deposit	Matlock Clay	-21	17	E_{50} = 0.01	700	48
Marine Clay	Matlock Clay	-28	7	E_{50} = 0.007	1300	53
Marine Clay	Matlock Clay	-56	28	E_{50} = 0.008	550	53

Notes:
1. Soil strata were modelled after boring BB-WPC-201.
2. ** indicates the top of layer is the approximate ground water elevation based on the boring logs.
3. pci = pounds per cubic inch, deg = degrees, psf = pounds per square foot, γ_T = total unit weight (used above anticipated groundwater level), γ_e = effective unit weight (used below anticipated groundwater), pcf = pounds per square foot.

Initial analysis using VTrans methodology used pile head boundary conditions including a factored axial load of 302 kips, thermal deflection of 0.719 inches, and a fixed-head condition (zero slope condition). The plastic moment resistance of the pile was then calculated using unbraced lengths and effective length factors resulting from the first LPILE analysis. The structural capacity of the pile was checked to determine if a plastic hinge formed for the specified displacement and specified axial thrust load based on the provisions of Article 6 of AASHTO and as per the recommendations of Section 5.4.2.4 of the MaineDOT BDG. This involves comparing the ratios of nominal and maximum factored axial load and moment in the pile using the interaction equation presented in AASHTO 6.9.2.2. This calculation indicates that the combined stress resulting from an axial load of 302 kips and calculated pile head moment of 140 ft-kip results in formation of a plastic hinge.

The hinge allows the pile head to rotate with a constant moment (i.e., the plastic moment). The pile head transforms from a fixed connection to a pinned connection, thereby changing the effective length of the top segment for stability checks. The structural resistance of the top segment of the pile is enhanced since the plastic hinge condition is anticipated to occur.

Since the resulting moment from the first LPILE iterations exceeded the calculated plastic hinge moment, a second LPILE analysis was performed using the specified pile head displacement and moment. The pile head displacement in the second iteration remained unchanged while the specified pile head moment was set equal to the plastic moment. This change results in a reduction of the axial buckling resistance of the upper segment of the pile (Segment 1) where the plastic hinge occurs.

The results of the second analysis indicate that the demand ratio for combined bending is less than 1.0 in Segment 2, and therefore also show that with the exception of the plastic hinge location, the pile remains within the elastic range over the remainder of its length and is stable against buckling. The results also indicate that the nominal structural resistance in Segment 1 is still sufficient to support the design loads. The integral abutment pile calculations are included in **Appendix E**.

5.4.9 Lateral Earth Pressures

Thermal expansion of the bridge will cause the backwalls and wingwalls of the integral abutment to move toward the backfill, which will result in earth pressures ranging from at-rest to passive earth pressure. The material properties will be controlled by the backfill material, which is proposed to consist of BDG Type 4 soil.

HNTB provided a total expansion for use in abutment design of 0.414 inches. The abutment height is approximately 12.3 feet resulting in a calculated abutment rotation of 0.0028 feet/foot. In accordance with the requirements of the BDG Section 5.4.2.11, and since the wall rotation is less than 0.005 feet/foot, the integral abutment reinforcement may be designed using Rankine passive pressure.

Design lateral earth pressure recommendations were developed based on this equation, as presented in **Appendix E**, and are provided in **Section 6.3** of this report. AASHTO Commentary C3.10.9.1 specifies that single-span bridges are not required to include acceleration-augmented (earthquake-induced) soil pressures for design.

5.4.10 Frost Protection

Fill soils are anticipated to be present at the abutments and embankments, either as existing fill or imported backfill. Based on the MaineDOT BDG, Section 5.2.1, the Freezing Index for the site is 1,300, and with low-moisture content (<20 percent) soils, the estimated depth of frost penetration is approximately 5.3 feet. However, BDG Section 5.2.1 allows that the embedment of pile-supported integral abutments may be reduced to 4.0 feet for frost protection.

6.0 RECOMMENDATIONS

6.1 SETTLEMENT MITIGATION

We recommend that the preload-with-VDWs alternative be implemented for settlement mitigation. The VDWs should be installed on a 5-foot triangular grid spacing beneath the surcharge area to accelerate consolidation during the preload period. The wick drain grid limits should extend from approximately Station 88+00 to Station 98+00 and from approximately 25 feet left to 35 feet right.

We recommend that the preload and VDWs be constructed in the following general sequence:

1. Remove existing pavement.
2. Scarify subgrade and proof compact.
3. Place a 1-foot minimum thickness of MaineDOT Type D Aggregate for Subbase;
4. Install VDWs to the bottom of the clay, omitting VDWs at proposed piezometer locations;
5. Install piezometers and settlement platforms to monitor preload;
6. Install a tidal measuring device (i.e., tide board) to allow monitoring of river water levels for comparison to control piezometer data;

7. Record sufficient baseline measurements from instrumentation prior to placement of fill to confirm stabilized readings and document possible tidal impacts;
8. Place and compact MaineDOT Type D Aggregate for Subbase up to the bottom of the proposed pavement section elevation;
9. Construct temporary preload to design grades (final grade plus 6 feet) utilizing MaineDOT Type D Aggregate for Subbase;
10. Monitor consolidation settlement using the piezometers and settlement platforms until the preload settlement objectives are achieved (estimated to require approximately 12 months);
11. Remove preload and excavate roadways to the bottom of the pavement base level;
12. Excavate new channel to the bottom of pile cap level at the new bridge;
13. Drive proposed bridge piles and place abutment concrete;
14. Complete channel excavation, bridge deck, final grading, and pavement base layer; and
15. Allow approximately 6 months after surcharge removal, shim road base as needed and apply final course pavement.

GZA's evaluations indicate that this procedure will allow the project to meet Maine DOT's settlement criteria.

6.2 INSTRUMENTATION

Instrumentation is recommended to monitor settlement and pore pressure dissipation beneath the surcharge. The ability to meet the settlement mitigation requirement is directly dependent on the percentage of consolidation completed. In order to assess when the required amount of consolidation has been achieved, GZA plans to monitor consolidation via direct measurements of excess pore water pressures and settlement.

Settlement measurements should be made with conventional settlement platforms in fill areas. The platforms should be protected by concrete manholes during fill placement to avoid damage from construction equipment. Measurements should be taken immediately before and after addition of each segment of pipe to maintain continuous platform data during fill placement. The survey points will be located to assess settlement along the proposed embankments with a focus on the proposed bridge abutment areas.

Pore pressures should be monitored with vibrating-wire piezometers installed adjacent to the settlement platforms. The piezometers should be installed at 3-to-5-foot depths per instrument cluster location (in the upper half and lower half of the Wetland Deposits and in the upper third, middle third, and lower third of the Marine Clay). The number of piezometer depths have been developed based on the subsurface conditions represented on **Figure 3** and can be reduced with GZA's approval if the deposit thicknesses are less than anticipated. The piezometers should be read electronically and excess pore pressure plotted against time and fill height. Wiring can be encased and buried in a shallow trench extending to the adjacent settlement platform and extended up along the settlement platform piping inside the manhole for protection and to minimize interference with the filling operations. Settlement platforms should be positioned within a few feet of piezometer locations to allow the piezometer wires to be protected alongside the settlement platforms and to facilitate direct comparison of settlement and pore pressure response.

The instrumentation should be installed at locations where VDWs are intentionally omitted as agreed upon between the Geotechnical Engineer and the wick drain and earthwork contractors prior to VDW installation. Baseline data should be collected from the instrumentation until stabilized and repeatable readings are achieved, prior to fill placement. No fill placement should take place above the initial 1-foot Type D fill layer until GZA confirms that the instrumentation baseline readings are complete. Piezometer baseline data should be collected by the Geotechnical Engineer at regular intervals through several tide cycles and compared to river levels measured on a tide board in the river. These data will provide a basis for assessing the relative impact of river level on specific piezometers.

GZA should be responsible for piezometer installation, initializing the instrumentation, taking instrumentation readings, interpreting the results throughout the preload period, and determining that the preload has achieved the required consolidation objectives. The earthwork contractor should be responsible for taking settlement platform surveys. The elevation of the top of pipe and the representative ground surface elevation around the pipe should be taken at each reading interval. Surveyed elevation data should be provided to GZA electronically within 24 hours of each measurement.

The frequency of instrumentation measurements will vary over the course of fill placement and the preload period. The recommended frequency is provided in the table below. However, depending on the rate of consolidation, the frequency may be modified at GZA's recommendation.

FREQUENCY OF INSTRUMENTATION READINGS	
Construction Stage	**Frequency of Readings**
Fill Placement	One reading per foot of fill placement (approximately 12 readings); minimum one reading every day
0 to 2 weeks after Completion of Fill Placement	One reading per day
2 to 4 weeks after Completion of Fill Placement	Three readings per week
4 to 10 weeks after Completion of Fill Placement	Two readings per week
More than 10 weeks after Completion of Fill Placement	One reading per week

The recommendations discussed above provide an overview of the planned program. *SP639 – Geotechnical Instrumentation* provides detailed requirements for equipment that should be used, procedures that will be followed for installation, and procedures for monitoring of instrumentation.

The settlement platforms and piezometers should remain in place throughout the preload, pile driving operations, bridge construction and backfilling, then decommissioned just prior to final paving, since they are to be located in the travel way.

The proposed VDW grid limits and planned instrument locations are summarized in the tables below and shown in the contract drawings.

SUMMARY OF ESTIMATED VDW LENGTH AND LIMITS				
Station	**Estimated Installation Grade (ft)**	**Estimated VDW Tip Elevation (ft NAVD88)**	**Estimated VDW Length (ft)**	**Limits of VDW installation**
88+00	12	-20	32	25 LT to 35 RT
88+50	9	-37	46	25 LT to 35 RT
89+00	8	-50	58	25 LT to 35 RT
89+50	7	-70	77	25 LT to 35 RT
90+00	7	-80	87	25 LT to 35 RT
90+50	6	-83	89	25 LT to 35 RT
91+00	6	-86	92	25 LT to 35 RT
91+50	6	-89	95	25 LT to 35 RT
92+00	7	-95	102	25 LT to 35 RT
92+50	7	-107	114	25 LT to 35 RT
93+00	7	-120	127	25 LT to 35 RT
93+50	7	-133	140	25 LT to 35 RT
94+00	7	-139	146	25 LT to 35 RT
94+50	7	-123	130	25 LT to 35 RT
95+00	7	-107	114	25 LT to 35 RT
95+50	7	-90	97	25 LT to 35 RT
96+00	7	-73	80	25 LT to 35 RT
96+50	8	-73	81	25 LT to 35 RT
97+00	9	-68	77	25 LT to 30 RT
97+50	10	-45	55	25 LT to 30 RT
98+00	12	-33	45	25 LT to 30 RT

SUMMARY OF SETTLEMENT PLATFORM LOCATIONS		
Settlement Plate ID	**Station**	**Offset**
SP-1	89+00	0
SP-2	91+50	5 RT
SP-3	92+75	5 RT
SP-4	94+00	5 RT
SP-5	94+75	5 RT
SP-6	94+75	40 RT
SP-7	95+85	0
SP-8	97+25	0
SP-9	97+80	0

SUMMARY OF VIBRATING WIRE PIEZOMETER LOCATIONS			
Piezometer ID	**Station**	**Offset**	**Elevation (Ft)**
PZ-1A	89+00	0	-12
PZ-1B	89+00	0	-43
PZ-2A	91+50	5 RT	-12
PZ-2B	91+50	5 RT	-25
PZ-2C	91+50	5 RT	-60
PZ-2D	91+50	5 RT	-76
PZ-3A	92+75	5 RT	-12
PZ-3B	92+75	5 RT	-25
PZ-3C	92+75	5 RT	-60
PZ-3D	92+75	5 RT	-76
PZ-3E	92+75	5 RT	-95
PZ-4A	94+00	5 RT	-12
PZ-4B	94+00	5 RT	-25
PZ-4C	94+00	5 RT	-60
PZ-4D	94+00	5 RT	-76
PZ-4E	94+00	5 RT	-95
PZ-5A	95+85	0	-20
PZ-5B	95+85	0	-60
PZ-6A	97+25	0	-20
PZ-6B	97+25	0	-60

6.3 SEISMIC DESIGN

The peak ground acceleration coefficient, short- and long-period spectral acceleration coefficients were interpolated from the AASHTO design guide maps (3.10.2.1-1 through -21 as appropriate). Based on the site coordinates, the recommended AASHTO Response Spectra (Site Class E) for a 7 percent probability of exceedance in 75 years are summarized for the site are as follows:

SITE CLASS E SEISMIC DESIGN PARAMETERS	
Parameter	**Design Value**
Fpga	2.5
Fa	2.5
Fv	3.5
As (Period = 0.0 sec)	0.19 g
SDs (Period = 0.2 sec)	0.38 g
SD1 (Period = 1.0 sec)	0.15 g

6.4 ABUTMENT AND WINGWALL DESIGN

- Backfill between new abutments and wingwalls and a 1.5H:1V plane extending up from the bottom of the abutment to the pavement subgrade should consist of MaineDOT 703.19 Granular Borrow for

Underwater Backfill, MaineDOT BDG Type 4 soil. Recommended soil properties for Type 4 soils are as follows:

– Internal Friction Angle of Soil = 32°;

– Soil Total Unit Weight = 125 pcf; and

– Rankine Coefficient of Passive Earth Pressure, K_p = 3.25 (use for design of backwalls and wingwalls).

- Live load surcharge should be applied as a uniform lateral surcharge pressure using the equivalent fill height (H_{eq}) values developed in accordance with LRFD Section 3.11.6.4, based on the abutment/wingwall height and distance from the wall backface to the edge of traffic. A minimum H_{eq} of 2 feet is recommended.

- Foundation drainage should be provided in accordance with Section 5.4.1.9 of the MaineDOT BDG. We recommend the use of French drains on the uphill side of abutments and wing walls to prevent buildup of differential hydrostatic pressure. The drains should be sloped to drain by gravity and should outlet through a series of 4-inch-diameter weep holes, spaced approximately 10 feet center-to-center. Alternatively, prefabricated drainage geocomposite material can be placed against the uphill side of abutments, after holes have been created through the backing material at the weep hole locations.

6.5 PILE DESIGN

- The proposed abutments may be supported on HP14x73 ASTM A572, Grade 50 steel (50 ksi yield stress) H-piles driven to the required nominal resistance, anticipated to be developed through a combination of side friction and end-bearing on the bedrock surface.

- To limit driving damage, the steel H-piles should be fitted with cast steel driving tips in accordance with MaineDOT Standard Specification Section 501.10 – Pile Tips.

- Pile installation should be controlled using wave equation analysis and field logging of the pile installation with final penetration resistance based on dynamic pile testing with signal matching analysis.

- The piles should be driven to a nominal resistance of 464 kips, calculated by dividing the maximum factored pile load of 302 kips by a resistance factor of 0.65.

- Preliminary wave equation analyses indicate that the piles can be driven to the required nominal resistance using a diesel hammer with a rated energy of about 47,123 ft-lbs for the anticipated 76-foot-long, ASTM A572 Grade 50 HP14x73 piles without exceeding the allowable driving stress of 45 ksi (0.9Fy for 50 ksi steel), and with a final penetration resistance of 9 blows per inch, which is within the MaineDOT range of 6 to 15 blows per inch.

- The pile tip elevations used in the drawings should correspond to the bedrock elevations encountered in the borings (approximately El. -70 Abutment 1, and approximately El. -71 to El. -75 at Abutment 2). A provision is recommended in the drawings for extra pile length to account for variability in the top of rock surface and the potential for piles to penetrate a short distance into the bedrock.

- Piles shall be spliced in accordance with MaineDOT Section 501.047.

- Piles should be checked for resistance to combined axial compression and flexure per AASHTO LRFD Articles 6.9.2.2 and 6.15.2. Per LRFD Article 6.5.4.2, the axial resistance factor ϕ_{cc}=0.7 and the flexural resistance factor ϕ_f=1.0 should be applied to the combined axial and flexural resistance of the pile in the interaction equation (AASHTO LRFD Eq. 6.9.2.2-1).

- Approach slabs should be constructed at each abutment to smooth the transition from the approach embankment to the bridge. The slabs should be positively connected to the backwalls.

7.0 CONSTRUCTION CONSIDERATIONS

This section provides guidance regarding quality control during pile installation, excavation, dewatering, and foundation subgrade preparation and protection. These items are discussed in the paragraphs that follow.

7.1 ABUTMENT PILE INSTALLATION CONTROL

We recommend that the H-pile installation be controlled using wave equation analysis of the contractor's proposed driving system, field logging of the pile installation, and determination of final penetration resistance based on dynamic pile testing with signal matching analysis.

AASHTO Table 10.5.5.2.3-1 requires that at least one load test with signal matching be performed per substructure to use a resistance factor of 0.65. We recommend that the first pile be dynamically tested at each abutment during initial driving to assess driving stress and establish the penetration resistance criteria to achieve the required nominal resistance for the production piles. The plans should also require a 24-hour restrike test on each test pile, to assess potential relaxation.

Piles may be installed through the Marine Clay stratum by vibratory methods. Vibratory installation should be terminated when an increase in resistance is detected and the pile should be monitored dynamically throughout the remainder of the driving.

7.2 EXCAVATION, TEMPORARY LATERAL SUPPORT AND DEWATERING

Excavations for abutment foundations are anticipated to be on the order of 10 feet below existing pavement grades. It is our understanding that Route 1 will be out of service during construction of the new bridge. In areas where sufficient space is available and water conditions permit, the excavation adjacent to the approaches may be constructed with sloped, open cuts. In all cases, temporary excavations should comply with Occupational Safety and Health Administration excavation safety requirements.

Considering the proximity of the required abutment excavations to the back river water level, management of water will be related to tidal water levels. Considering bottom of abutment elevations at approximately El. 0.3, water levels may be at or above the bottom of excavation level during construction. It may be desirable to over-excavate and place an 8- to 12-inch-thick crushed stone working mat to improve accessibility and allow dewatering.

We anticipate that the inflow of groundwater or surface water to excavations could be handled by open pumping from sumps installed at the bottoms of excavations if cofferdams are installed. It may be possible to leave existing fills or wetland deposits in place or enhance those using stacked sandbags or a porta-dam type system to limit inflow of surface water in lieu of a sheet pile cofferdam, given the relatively small anticipated head. The contractor should be responsible for controlling groundwater, surface runoff, infiltration and water from all other sources by methods which preserve the subgrade and permit concrete placement in-the-dry. Discharge of pumped groundwater and river water should comply with all local, State, and federal regulations.

7.3 REUSE OF ON-SITE MATERIALS

Based on the test boring and laboratory testing results, shallow fill samples typically had more than 10 percent passing the No. 200 sieve, and the deeper fill samples contain considerable silt and clay. Consequently, the fill typically does not meet MaineDOT specifications for Granular Borrow and/or Granular Borrow for Underwater Backfill and would not be suitable for use as structural backfill. The material is considered suitable for use as Common Borrow.

If the contractor wishes to reuse excavated material as embankment fill or in other areas, we recommend that the proposed material be stockpiled and tested for grain size distribution. Stockpiled materials meeting the appropriate MaineDOT specifications may be reused on the project.

7.4 TEMPORARY BRIDGE AND APPROACH EMBANKMENTS

The Contractor is encouraged to develop their bid based on the embankment configurations shown in the drawings. If the Contractor elects to base their bid on an alternative embankment design, they should be required to submit calculations during construction showing that the design achieves the required minimum factors of safety against rotational failure of 1.3 for embankments not supporting structures, and 1.5 for embankments that support structures (i.e., the temporary bridge). The design computations should be conducted by a geotechnical consulting firm from the MaineDOT Prequalified List (Category 804.10) retained by the Contractor. The computations should be sealed by a professional engineer registered in the State of Maine. Construction of alternate embankment configurations should be contingent on prior review and acceptance of the design computations by MaineDOT.

The settlement models presented in **Section 5.2.4** included temporary detour embankments. GZA anticipates approximately 2 to 8 inches of settlement at the temporary detour fills adjacent during the construction window. Differential settlement in the transverse direction of the temporary roadway is anticipated to be up to 3 inches. Pavement shimming may be needed to maintain serviceability of the approaches to the temporary bridge if the bridge is pile supported.

TABLES

TABLE 1
Summary of Subsurface Explorations
Pleasant Cove Bridge
Woolwich, ME
WIN 23929.01

Boring ID	Station	Offset (ft)	Ground Surface El. (ft)	Top of layer Elevation							Stratum Thickness (ft)						Depth to Bedrock (ft)	Bottom of Boring Depth (ft)	Bottom of Boring El. (ft)	Groundwater	
				Pavement	Fill	Wetland Deposit	Clay Crust	Marine Clay	Glacial Till	Bedrock	Pavement	Fill	Wetland Deposit	Clay Crust	Marine Clay	Glacial Till				Depth (ft)	El. (ft)
EB-KERP-101	93+91.0	27.1 R	5.3	NE	5.3	-1.7	-38.7	-52.7	-141.7	-144.2	NE	7.0	37.0	14.0	89.0	2.5	149.5	159.5	-154.2	4.2	1.1
EB-KERP-102	97+69.7	17.8 R	10.0	10.0	9.5	-7.6	-27.5	-39.5	NE	-39.5	0.5	17.1	19.9	12.0	0.0	NE	49.5	59.5	-49.5	3.2	6.8
BB-WPC-201/201A	96+10.3	16.9 L	6.6	6.6	5.9	-9.4	-37.4	-42.4	NE	-69.9	0.7	15.3	28.0	5.0	27.5	NE	76.6	87.5	-80.9	5.3	1.3
BB-WPC-202	96+94.1	16.7 R	7.6	7.6	6.6	-12.0	-29.7	-39.4	NE	-75.2	1.0	18.6	17.7	9.7	35.8	NE	82.8	93.5	-85.9	1.7	5.9
BB-WPC-203	96+97.0	16.5 L	8.0	8.0	7.1	-4.5	-33.7	-40.0	-67.5	-71.3	0.9	11.6	29.2	6.3	27.5	3.8	79.3	90.5	-82.5	5.3	2.7
HB-WPC-201	88+12.7	27.4 R	8.6	8.6	7.6	-3.4	NE	NE	-19.4	-21.8	1.0	11.0	16.0	NE	NE	2.4	30.4	41.0	-32.4	7.4	1.2
HB-WPC-202	89+84.3	22.0 R	5.8	5.8	4.8	-4.2	-25.7	-38.2	-71.7	-77.7	1.0	9.0	21.5	12.5	33.5	6.0	84.4	94.0	-88.2	4.6	1.2
HB-WPC-203	91+86.9	21.5 R	5.4	5.4	4.4	-2.6	-34.6	-41.6	NE	-91.3	1.0	7.0	32.0	7.0	49.7	NE	96.7	108.4	-103.0	5.0	0.4
HB-WPC-204	98+93.6	16.9 R	15.2	15.2	14.7	-2.3	-8.8	-10.4	NE	-10.4	0.5	17.0	6.5	1.6	0.0	NE	25.6	37.0	-21.8	NE	NE
HB-WPC-205	100+52.2	16.4 R	23.8	23.8	22.9	3.8	NE	NE	-1.2	-4.9	0.9	19.1	5.0	NE	NE	3.7	26.7	40.0	-16.2	8.9	14.9
BB-WPC-301	501+15.4	22.0 L	4.8	NE	4.8	-7.7	-37.7	-46.2	-101.4	-102.0	NE	12.5	30.0	8.5	55.2	0.6	106.0	111.8	-107.0	3.5	1.3
CPT-KERP-101	93+96.1	29.5 R	5.3	NE	5.3	-2.7	-39.7	-46.7	NE	NE	NE	8.0	37.0	7.0	>28	NE	NE	79.7	-74.4	4.2	1.1
CPT-WPC-201	96+07.2	16.1 R	6.5	NE	6.5	-5.5	-37.5	-43.5	NE	-85.5	NE	12.0	32.0	6.0	42.0	NE	92.0	92.0	-85.5	2.0	4.5

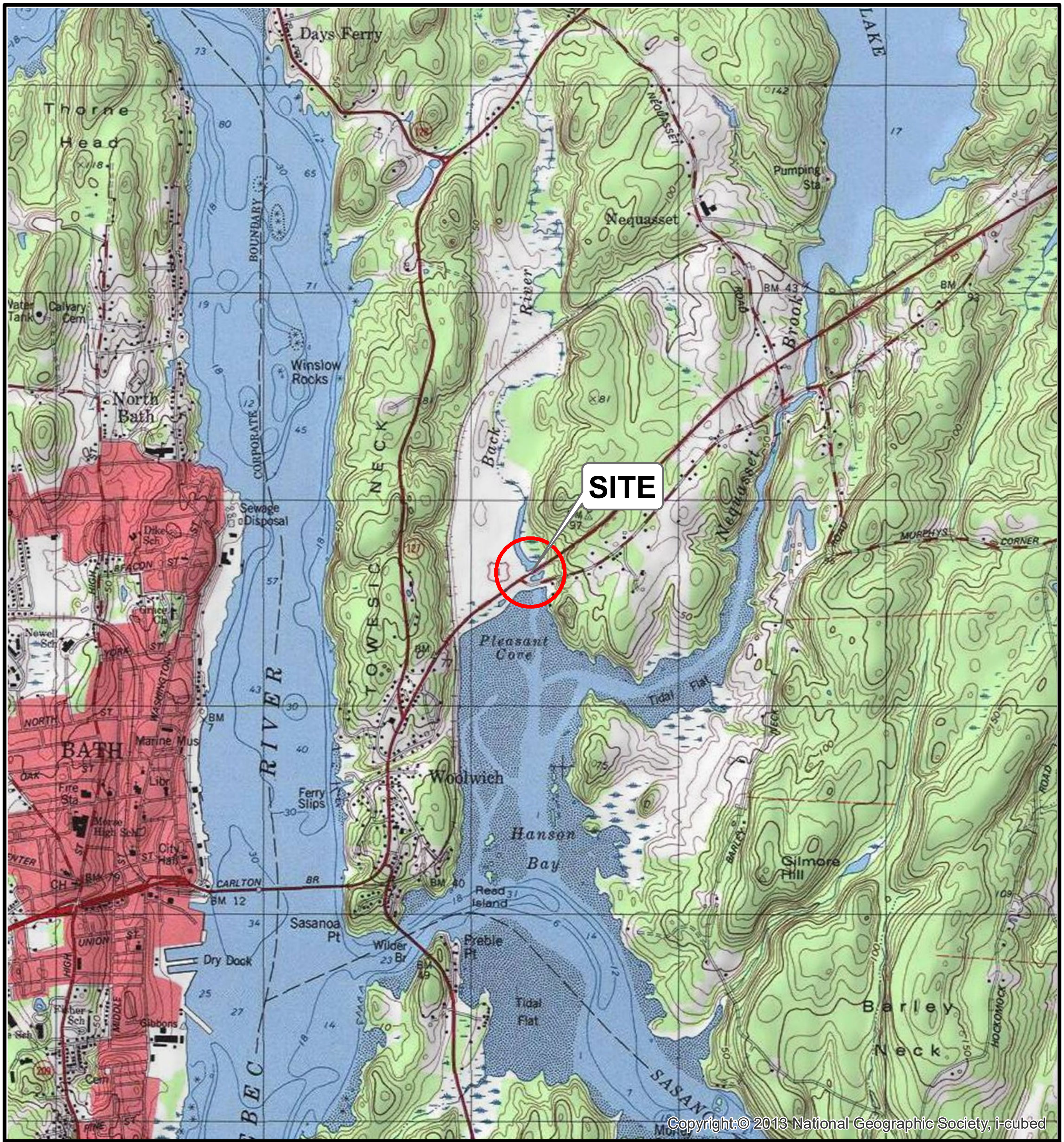
El. = Elevation, NE = Not Encountered, NM = Not Measured, NP = Not Penetrated, > = Boring Terminated in Stratum

Notes:
1. Refer to the boring logs in Appendix B for additional information.
2. Project elevation datum is North American Vertical Datum (NAVD 88), unless noted otherwise.
3. As-drilled locations were surveyed by MaineDOT and provided to GZA.
4. Stratum depths, thickness and elevations are rounded to the nearest 0.1 foot as interpreted on the boring logs, but this does not represent the precision of the data.

TABLE 2
Summary of Bedrock Data
Pleasant Cove Estuary Restoration
Woolwich, Maine

Boring ID	Core Run	Ground Surface El. (ft)	Depth of Core Run below GS (ft)			Depth to Rock (ft)	Depth Below Top of Rock (ft)			Length of Core Run (in)	Rec (in)	Rec (%)	RQD (in)	RQD %	Joint Spacing (in)	Joint Aperture (in)	Elev. (ft)		Rock Type
			Top		Bottom		Top		Bottom								Top	Bottom	
EB-KERP-101	R-1	5.3	149.5	-	154.5	149.5	0.0	-	5.0	60.0	60	100%	55	92%	2.5-8	0.01-0.1	-144.2	-149.2	SCHIST
EB-KERP-101	R-2	5.3	154.5	-	159.5	149.5	5.0	-	10.0	60.0	60	100%	56	93%	2.5	0.01-0.1	-149.2	-154.2	SCHIST
EB-KERP-102	R-1	10.0	49.5	-	54.5	49.5	0.0	-	5.0	60.0	60	100%	47	78%	2.5	0.01-0.02	-39.5	-44.5	SCHIST
EB-KERP-102	R-2	10.0	54.5	-	59.5	49.5	5.0	-	10.0	60.0	60	100%	47	78%	2.5-8	0.004-0.1	-44.5	-49.5	SCHIST
BB-WPC-201A	R-1	6.6	76.7	-	79.5	76.6	0.1	-	2.9	33.6	34	100%	4	12%	<0.75-8	<0.004-0.4	-70.1	-72.9	SCHIST
BB-WPC-201A	R-2	6.6	79.5	-	84.0	76.6	2.9	-	7.4	54.0	51	94%	42	78%	2.5-8	0.004-0.02	-72.9	-77.4	SCHIST
BB-WPC-201A	R-3	6.6	84.0	-	87.5	76.6	7.4	-	10.9	42.0	41	98%	37	88%	2.5-8	0.004-0.01	-77.4	-80.9	SCHIST
BB-WPC-202	R-1	7.6	84.0	-	88.4	82.8	1.2	-	5.6	52.8	41	77%	31	59%	0.75-2.5	0.02-0.1	-76.4	-80.8	SCHIST
BB-WPC-202	R-2	7.6	88.4	-	93.5	82.8	5.6	-	10.7	61.2	61	100%	38	62%	0.75-8	0.02-0.1	-80.8	-85.9	SCHIST
BB-WPC-203	R-1	8.0	79.8	-	84.5	79.3	0.5	-	5.2	56.4	56	99%	6	11%	0.75-2.5	0.02-0.1	-71.8	-76.5	SCHIST
BB-WPC-203	R-2	8.0	84.5	-	87.5	79.3	5.2	-	8.2	36.0	36	100%	19	53%	0.75-2.5	0.02-0.1	-76.5	-79.5	SCHIST
BB-WPC-203	R-3	8.0	87.5	-	90.5	79.3	8.2	-	11.2	36.0	36	100%	16	44%	2.5	0.02-0.1	-79.5	-82.5	SCHIST
HB-WPC-202	R-1	5.8	84.5	-	89.5	84.4	0.1	-	5.1	60.0	60	100%	28	47%	0.75-8	<0.004-0.1	-78.7	-83.7	SCHIST
HB-WPC-202	R-2	5.8	89.5	-	94.0	84.4	5.1	-	9.6	54.0	50	93%	19	36%	0.75-8	<0.004-0.1	-83.7	-88.2	SCHIST
HB-WPC-203	R-1	5.4	98.0	-	101.6	97.1	0.9	-	4.5	43.2	43	100%	15	35%	<0.75-8	<0.004-0.01	-92.6	-96.2	SCHIST
HB-WPC-203	R-2	5.4	101.6	-	105.5	97.1	4.5	-	8.4	46.8	46	98%	18	38%	0.75-2.5	0.004-0.01	-96.2	-100.1	SCHIST
HB-WPC-203	R-3	5.4	105.5	-	108.4	97.1	8.4	-	11.3	34.8	34	97%	15	44%	0.75-2.5	0.004-0.01	-100.1	-103.0	SCHIST
HB-WPC-204	R-1	15.2	27.0	-	32.0	25.8	1.2	-	6.2	60.0	59	98%	59	98%	2.5-24	0.02-0.1	-11.8	-16.8	SCHIST
HB-WPC-204	R-2	15.2	32.0	-	37.0	25.8	6.2	-	11.2	60.0	60	100%	44	73%	0.75-24	0.02-0.1	-16.8	-21.8	SCHIST
HB-WPC-205	R-1	23.8	30.0		35.0	26.7	3.3	-	8.3	60.0	60	100%	22	37%	<0.75-8	0.02-0.1	-6.2	-11.2	SCHIST
HB-WPC-205	R-2	23.8	35.0		40.0	26.7	8.3	-	13.3	60.0	48	80%	35	58%	2.5-8	0.02-0.1	-11.2	-16.2	SCHIST
BB-WPC-301	R-1	4.8	106.8		111.8	106.2	0.6	-	5.6	60.0	60	100%	20	34%	<0.75-2.5	<0.004-0.01	-102.0	-107.0	SCHIST

FIGURES



USGS QUADRANGLE LOCATION

SOURCE : THIS MAP CONTAINS THE ESRI ARCGIS ONLINE USA TOPOGRAPHIC MAP SERVICE, PUBLISHED DECEMBER 12, 2009 BY ESRI ARCIMS SERVICES AND UPDATED AS NEEDED. THIS SERVICE USES UNIFORM NATIONALLY RECOGNIZED DATUM AND CARTOGRAPHY STANDARDS AND A VARIETY OF AVAILABLE SOURCES FROM SEVERAL DATA PROVIDERS. THIS MAP ALSO CONTAINS THE ESRI ARCGIS ONLINE USA COUNTIES WHICH PROVIDES DETAILED BOUNDARIES THAT ARE CONSISTENT WITH THE TRACT, BLOCK GROUP, AND STATE DATA SETS AND ARE EFFECTIVE AT REGIONAL AND STATE LEVELS.

0 1,000 2,000 4,000 6,000

SCALE IN FEET

Data Supplied by :

esri

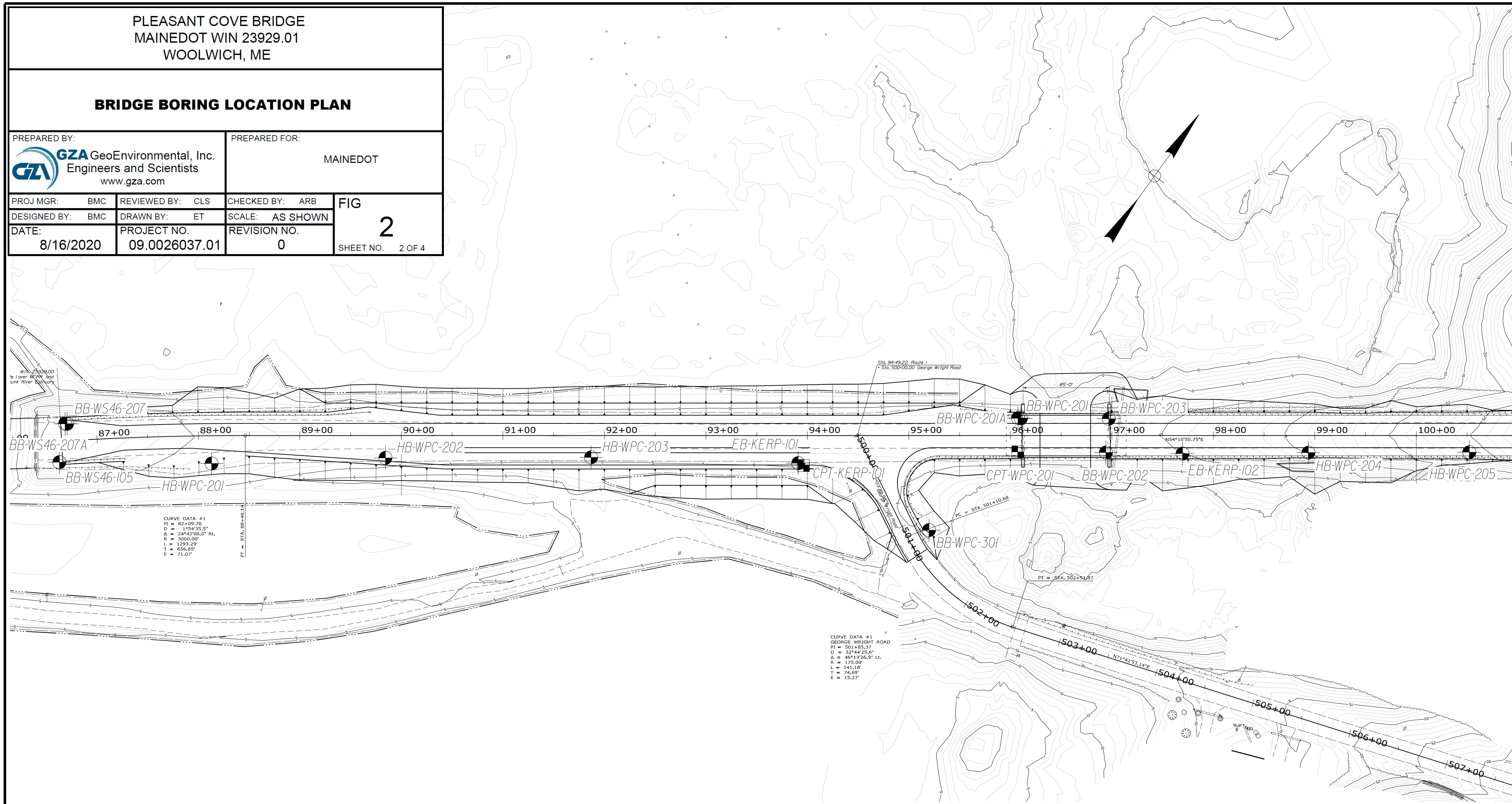
USGS science for a changing world

PROJ. MGR.: BMC DESIGNED BY: ADM REVIEWED BY: CLS OPERATOR: LCN DATE: 07-22-2021	LOCUS PLAN PLEASANT COVE BRIDGE WOOLWICH, ME	JOB NO. 09.0026037.01 FIGURE NO. 1

PLEASANT COVE BRIDGE
MAINEDOT WIN 23929.01
WOOLWICH, ME

BRIDGE BORING LOCATION PLAN

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: MAINEDOT	
PROJ MGR: BMC	REVIEWED BY: CLS	CHECKED BY: ARB	FIG 2
DESIGNED BY: BMC	DRAWN BY: ET	SCALE: AS SHOWN	
DATE: 8/16/2020	PROJECT NO. 09.0026037.01	REVISION NO. 0	SHEET NO. 2 OF 4



NOTES

1) Base map developed from electronic files (3DTopo_21dec09.dgn, Contours.dgn, and Alignments.dgn) provided by HNTB on April 27, 2021 and from electronic file (Bridge.dgn) provided by HNTB on May 27, 2021.

2) The as-drilled locations of the EB-KERP-100 series test borings, BB-WS46-105 test boring, and CPT-KERP-100 series cone penetration tests were surveyed and provided by MaineDOT in an electronic file (001_Borings_28 OCTOBER 19.dgn).

3) The as-drilled locations of the BB-WPC-200, BB-WPC-300, and HB-WPC-200 series test borings and the CPT-WPC-200 series cone penetration test were surveyed and provided by MaineDOT in an electronic file (WOOLWICH 23929.00 BORINGS 19 MAY 21.DGN).

BORING LOCATION PLAN LEGEND

EB-KERP-102	Locations and designations of 100 series borings performed by New England Boring Contractors of Hermon, Maine between October 22 and October 26, 2019.
BB-WPC-203	Locations and designations of 200 series bridge borings performed by New England Boring Contractors of Hermon, Maine between March 31 and April 7, 2021.
BB-WPC-301	Locations and designations of 300 series bridge borings performed by New England Boring Contractors of Hermon, Maine between March 31 and April 7, 2021.
HB-WPC-205	Locations and designations of 200 series highway borings performed by New England Boring Contractors of Hermon, Maine between March 31 and April 1, 2021.
CPT-KERP-101	Location and designation of 100 series Cone Penetrometer Test (CPT) performed by Summit Geoengineering Services, Inc. of Rockland, Maine on October 14, 2019.
CPT-WPC-201	Location and designation of 200 series Cone Penetrometer Test (CPT) performed by Summit Geoengineering Services, Inc. of Rockland, Maine on March 25, 2021.

PLAN

50 0 50 100
Scale in Feet

PREPARED BY: GZA

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2392901

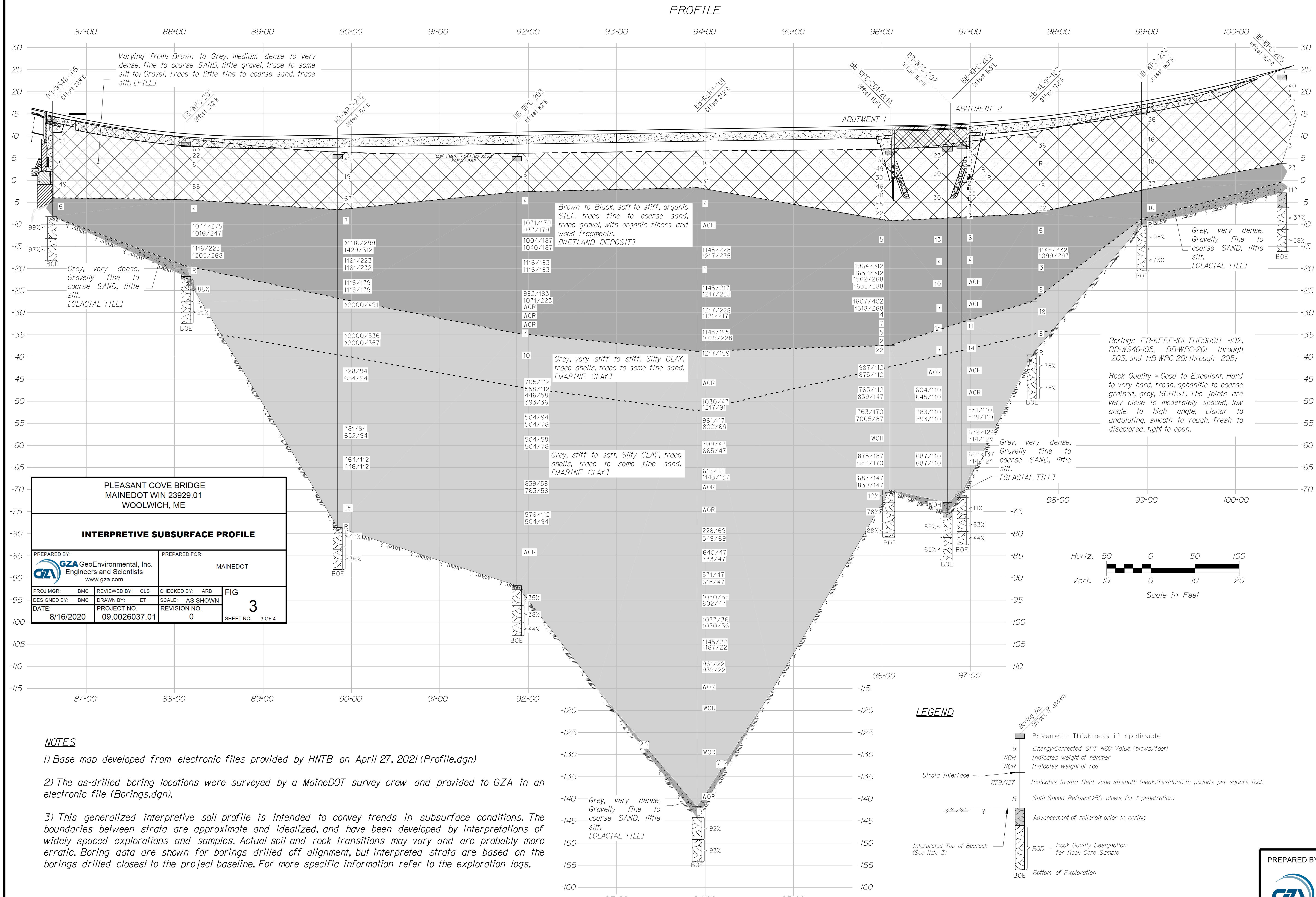
WIN 23929.01

BRIDGE PLANS

PLEASANT COVE BRIDGE
KENNEBEC RIVER ESTUARY
WOOLWICH SAGADAHOC COUNTY

EXPLORATION LOCATION PLAN

SHEET NUMBER
24



PLEASANT COVE BRIDGE MAINEDOT WIN 23929.01 WOOLWICH, ME	
INTERPRETIVE SUBSURFACE PROFILE	
PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com	PREPARED FOR: MAINEDOT
PROJ MGR: BMC / REVIEWED BY: CLS / CHECKED BY: ARB	FIG 3
DESIGNED BY: BMC / DRAWN BY: ET / SCALE: AS SHOWN	
DATE: 8/16/2020 / PROJECT NO. 09.0026037.01 / REVISION NO. 0	SHEET NO. 3 OF 4

NOTES

1) Base map developed from electronic files provided by HNTB on April 27, 2021 (Profile.dgn)

2) The as-drilled boring locations were surveyed by a MaineDOT survey crew and provided to GZA in an electronic file (Borings.dgn).

3) This generalized interpretive soil profile is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and have been developed by interpretations of widely spaced explorations and samples. Actual soil and rock transitions may vary and are probably more erratic. Boring data are shown for borings drilled off alignment, but interpreted strata are based on the borings drilled closest to the project baseline. For more specific information refer to the exploration logs.

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2392901

WIN 23929.01

BRIDGE PLANS

Bridge No. 3039

	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	E. TOME	B. CARDALI 05/2021
CHECKED-REVIEWED	C. SNOW	A. BLASDELL 05/2021
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

PLEASANT COVE BRIDGE
KENNEBEC RIVER ESTUARY
WOOLWICH SAGADAHOC COUNTY

INTERPRETIVE SUBSURFACE PROFILE

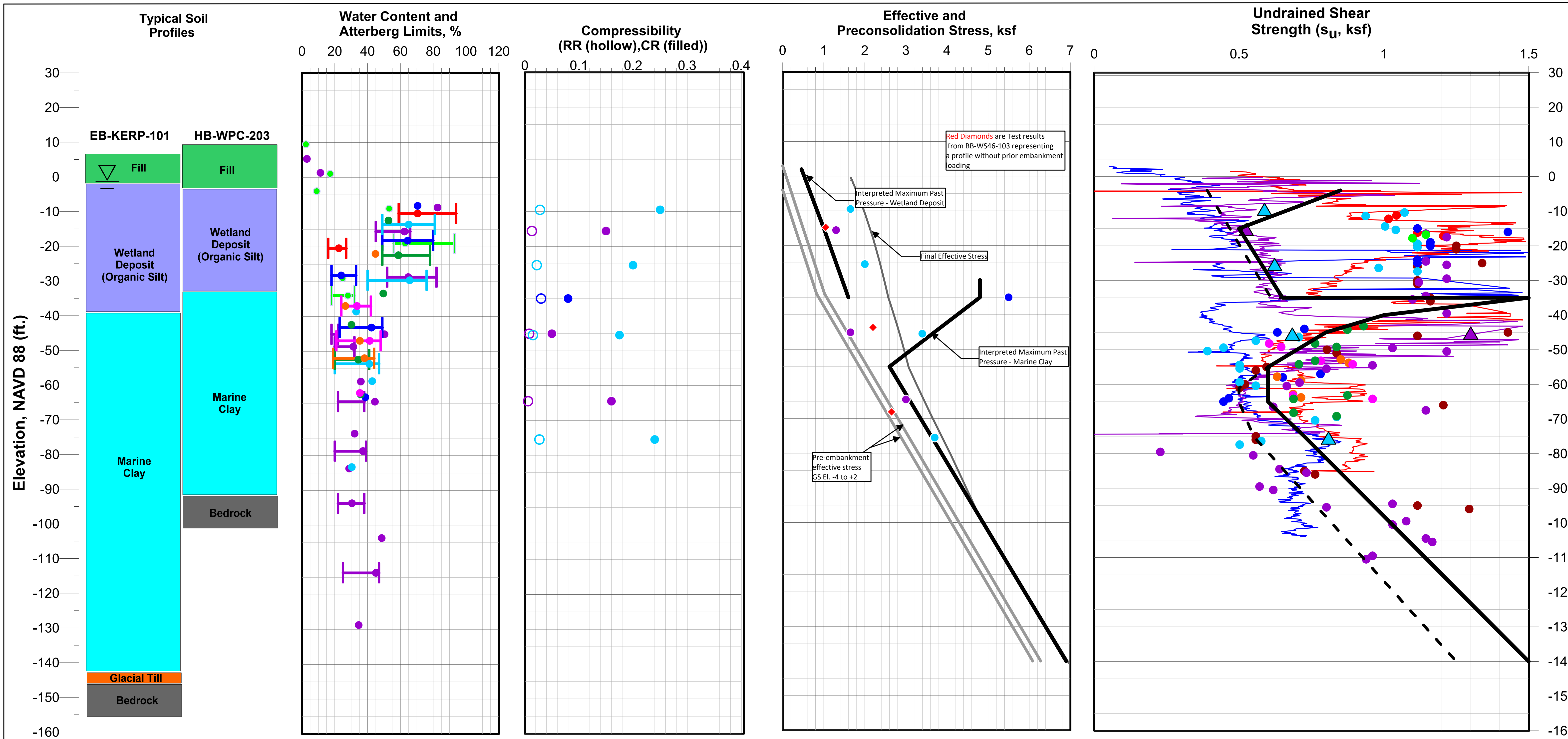
SHEET NUMBER

25

PREPARED BY: GZA

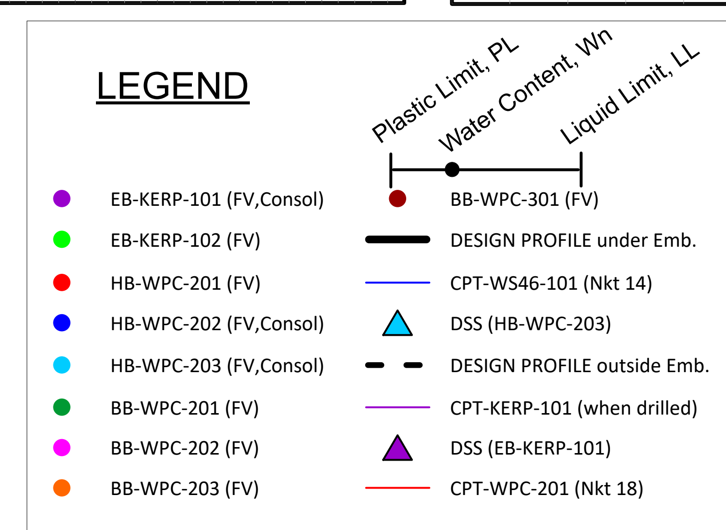
Division: Bridge
Filename: ...\ISP\Woolwich_ISP - Scaled.dgn

Date: 8/6/2021
Username: BMC



NOTES:

1. DATA BASED ON TEST BORINGS (EB-KERP-101 AND -102, HB-WPC-201 THROUGH -205, BB-WPC-201 THROUGH -203, AND BB-WPC-301) PERFORMED BY NEW ENGLAND BORING CONTRACTORS OF HERMON, MAINE BETWEEN OCTOBER 22 AND 26, 2019 AND MARCH 25 AND APRIL 7, 2021 . BORINGS PERFORMED BY NEW ENGLAND BORING CONTRACTPRS WERE OBSERVED AND LOGGED BY GZA PERSONNEL.
2. CPT EXPLORATIONS (CPT-KERP-101 & CPT-WPC-201) PERFORMED BY SUMMIT GEOENGINEERING OF ROCKLAND, MAINE ON OCTOBER 14, 2019 AND MARCH 30, 2021.
3. TYPICAL SOIL PROFILE BASED ON BORING EB-KERP-101 AND HB-WPC-203.
4. WATER CONTENTS BASED ON LABORATORY TESTS PERFORMED ON SAMPLES TAKEN FROM RECENT BORINGS.
5. EFFECTIVE STRESS BASED ON CALCULATED INITIAL AND FINAL EFFECTIVE STRESS FROM SETTLE3D AT EB-KERP-101 LOCATION.
6. PRECONSOLIDATION PRESSURE BASED ON LABORATORY CONSOLIDATION TESTS AND GZA INTERPRETATIONS. CONSOLIDATION TEST SAMPLE AT EL.-45 WAS LOW QUALITY DUE TO SAND SEAMS.
7. CORRELATED UNDRAINED SHEAR STRENGTHS FROM CPT-KERP-101 AND CPT-WPC-201 DATA ARE BASED ON N_{kt}=14 AND 18, RESPECTIVELY. Nkt VALUES ARE BASED ON LABORATORY TESTING AND FIELD VANE SHEAR STRENGTHS.
8. BORINGS AND CPTS CONDUCTED AT PLEASANT COVE WERE THROUGH THE EXISTING FILLS, TO EVALUATE SHEAR STRENGTHS OUTSIDE OF EMBANKMENT LIMITS GZA UTILIZED DATA FROM BB-WS46-104 AND CPT-WS46-101 (NKT=14).
9. FIELD VANE SHEAR TESTS IN ORGANIC SILT AT EL. -15 TO -35 FEET MAY BE HIGHER THAN ACTUAL UNDRAINED SHEAR STRENGTHS DUE TO THE PRESENCE OF ORGANIC FIBERS. CPT AND LABORATORY DATA WERE USED AS THE BASIS FOR THE DESIGN PROFILE.
10. IN LEGEND, FV=UNDRAINED SHEAR STRENGTH FROM IN-SITU FIELD VANE, CONSOL=LAB DATA FROM CONSOLIDATION TEST. DSS TEST PERFORMED ON SAMPLE WITH APPLIED VERTICAL STRESS CALCULATED AS THE INSITU EFFECTIVE STRESS.



PLEASANT COVE BRIDGE
WOOLWICH, ME

IN-SITU SOIL CONDITIONS VS. ELEVATION

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers & Scientists www.gza.com

PREPARED FOR: MAINE DEPARTMENT OF TRANSPORTATION

PROJ MGR: BMC	REVIEWED BY: CLS	CHECKED BY: --	FIGURE 4
DESIGNED BY: BMC	DRAWN BY: BMC	SCALE: N/A	
DATE: 8/25/2021	PROJECT NUMBER: 09.0026037.01	REVISION NUMBER: 0	

APPENDIX A – LIMITATIONS

GEOTECHNICAL LIMITATIONS

Use of Report

1. GZA GeoEnvironmental, Inc. (GZA) prepared this report on behalf of, and for the exclusive use of our Client for the stated purpose(s) and location(s) identified in the Proposal for Services and/or Report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not expressly identified in the contract documents, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

Standard of Care

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in Proposal for Services and/or Report, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. If conditions other than those described in this report are found at the subject location(s), or the design has been altered in any way, GZA shall be so notified and afforded the opportunity to revise the report, as appropriate, to reflect the unanticipated changed conditions.

3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

4. In conducting our work, GZA relied upon certain information made available by public agencies, Client and/or others. GZA did not attempt to independently verify the accuracy or completeness of that information. Inconsistencies in this information which we have noted, if any, are discussed in the Report.

Subsurface Conditions

5. The generalized soil profile(s) provided in our Report are based on widely-spaced subsurface explorations and are intended only to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs. The nature and extent of variations between these explorations may not become evident until further exploration or construction. If variations or other latent conditions then become evident, it will be necessary to reevaluate the conclusions and recommendations of this report.

6. In preparing this report, GZA relied on certain information provided by the Client, state and local officials, and other parties referenced therein which were made available to GZA at the time of our evaluation. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

7. Water level readings have been made in test holes (as described in this Report) and monitoring wells at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this Report. Fluctuations in the level of the groundwater however occur due to

temporal or spatial variations in areal recharge rates, soil heterogeneities, the presence of subsurface utilities, and/or natural or artificially induced perturbations. The water table encountered in the course of the work may differ from that indicated in the Report.

8. GZA's services did not include an assessment of the presence of oil or hazardous materials at the property. Consequently, we did not consider the potential impacts (if any) that contaminants in soil or groundwater may have on construction activities, or the use of structures on the property.

9. Recommendations for foundation drainage, waterproofing, and moisture control address the conventional geotechnical engineering aspects of seepage control. These recommendations may not preclude an environment that allows the infestation of mold or other biological pollutants.

Compliance with Codes and Regulations

10. We used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

Cost Estimates

11. Unless otherwise stated, our cost estimates are only for comparative and general planning purposes. These estimates may involve approximate quantity evaluations. Note that these quantity estimates are not intended to be sufficiently accurate to develop construction bids, or to predict the actual cost of work addressed in this Report. Further, since we have no control over either when the work will take place or the labor and material costs required to plan and execute the anticipated work, our cost estimates were made by relying on our experience, the experience of others, and other sources of readily available information. Actual costs may vary over time and could be significantly more, or less, than stated in the Report.

Additional Services

12. GZA recommends that we be retained to provide services during any future: site observations, design, implementation activities, construction and/or property development/redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.

APPENDIX B – RECENT TEST BORINGS

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS (more than half of material is larger than No. 200 sieve size)	GRAVELS (more than half of coarse fraction is larger than No. 4 sieve size)	CLEAN GRAVELS (little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel sand mixtures, little or no fines.
		GRAVEL WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (more than half of coarse fraction is smaller than No. 4 sieve size)	CLEAN SANDS (little or no fines)	SW	Well-graded sands, Gravelly sands, little or no fines
			SP	Poorly-graded sands, Gravelly sand, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (more than half of material is smaller than No. 200 sieve size)	SILTS AND CLAYS (liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, Silty or Clayey fine sands, or Clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, Gravelly clays, Sandy clays, Silty clays, lean clays.
			OL	Organic silts and organic Silty clays of low plasticity.
	SILTS AND CLAYS (liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine Sandy or Silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
	HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.

Desired Soil Observations (in this order, if applicable):

Color (Munsell color chart)
Moisture (dry, damp, moist, wet)
Density/Consistency (from above right hand side)
Texture (fine, medium, coarse, etc.)
Name (Sand, Silty Sand, Clay, etc., including portions - trace, little, etc.)
Gradation (well-graded, poorly-graded, uniform, etc.)
Plasticity (non-plastic, slightly plastic, moderately plastic, highly plastic)
Structure (layering, fractures, cracks, etc.)
Bonding (well, moderately, loosely, etc.,)
Cementation (weak, moderate, or strong)
Geologic Origin (till, marine clay, alluvium, etc.)
Groundwater level

MODIFIED BURMISTER SYSTEM

Descriptive Term	Portion of Total (%)
trace	0 - 10
little	11 - 20
some	21 - 35
adjective (e.g. Sandy, Clayey)	36 - 50

TERMS DESCRIBING DENSITY/CONSISTENCY

Coarse-grained soils (more than half of material is larger than No. 200 sieve): Includes (1) clean gravels; (2) Silty or Clayey gravels; and (3) Silty, Clayey or Gravelly sands. Density is rated according to standard penetration resistance (N-value).

Density of Cohesionless Soils	Standard Penetration Resistance N-Value (blows per foot)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

Fine-grained soils (more than half of material is smaller than No. 200 sieve): Includes (1) inorganic and organic silts and clays; (2) Gravelly, Sandy or Silty clays; and (3) Clayey silts. Consistency is rated according to undrained shear strength as indicated.

Consistency of Cohesive soils	SPT N-Value (blows per foot)	Approximate Undrained Shear Strength (psf)	Field Guidelines
Very Soft	WOH, WOR, WOP, <2	0 - 250	Fist easily penetrates
Soft	2 - 4	250 - 500	Thumb easily penetrates
Medium Stiff	5 - 8	500 - 1000	Thumb penetrates with moderate effort
Stiff	9 - 15	1000 - 2000	Indented by thumb with great effort
Very Stiff	16 - 30	2000 - 4000	Indented by thumbnail
Hard	>30	over 4000	Indented by thumbnail with difficulty

Rock Quality Designation (RQD):

$$\text{RQD (\%)} = \frac{\text{sum of the lengths of intact pieces of core* > 4 inches}}{\text{length of core advance}}$$

*Minimum NQ rock core (1.88 in. OD of core)

Rock Quality Based on RQD

Rock Quality	RQD (%)
Very Poor	≤25
Poor	26 - 50
Fair	51 - 75
Good	76 - 90
Excellent	91 - 100

Desired Rock Observations (in this order, if applicable):

Color (Munsell color chart)
Texture (aphanitic, fine-grained, etc.)
Rock Type (granite, schist, sandstone, etc.)
Hardness (very hard, hard, mod. hard, etc.)
Weathering (fresh, very slight, slight, moderate, mod. severe, severe, etc.)
Geologic discontinuities/jointing:
- -dip (horiz - 0-5 deg., low angle - 5-35 deg., mod. dipping - 35-55 deg., steep - 55-85 deg., vertical - 85-90 deg.)
- -spacing (very close - <2 inch, close - 2-12 inch, mod. close - 1-3 feet, wide - 3-10 feet, very wide >10 feet)
- -tightness (tight, open, or healed)
- -infilling (grain size, color, etc.)

Formation (Waterville, Ellsworth, Cape Elizabeth, etc.)
RQD and correlation to rock quality (very poor, poor, etc.)
ref: ASTM D6032 and FHWA NHI-16-072 GEC 5 - Geotechnical Site Characterization, Table 4-12
Recovery (inch/inch and percentage)
Rock Core Rate (X.X ft - Y.Y ft (min:sec))

Maine Department of Transportation
Geotechnical Section
Key to Soil and Rock Descriptions and Terms
Field Identification Information

Sample Container Labeling Requirements:

WIN	Blow Counts
Bridge Name / Town	Sample Recovery
Boring Number	Date
Sample Number	Personnel Initials
Sample Depth	

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: EB-KERP-101
WIN: 23148.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.3	**Auger ID/OD:**	4.25" OD SSA
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track Mobile B-53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/23/19-10/26/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 93+91.0, 27.1' Rt	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	4.2'
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/12	0.0 - 2.0	3-4-7-2	11	16	SSA			Brown, wet, medium dense, GRAVEL, trace fine to coarse sand, trace silt, (Fill).	G#19-S-2823 A-1-a, GP WC=3.0
	2D	24/12	4.0 - 6.0	14-14-7-10	21	31				Brown, wet, dense, Sandy GRAVEL, trace silt, (Fill).	G#19-S-2824 A-1-a, GW-GM WC=11.3
5							RC				
								-1.7		7.0	
	3D	24/15	9.0 - 11.0	3-1-2-2	3	4				Black, wet, Organic SILT, trace fine to coarse sand, trace gravel, with organic fibers, (Wetland Deposit).	
10							35				
							40				
							38				
							35				
	4D	24/18	14.0 - 16.0	WOH-WOH-WOH-2			PUSH			Black, wet, Organic SILT, trace fine sand, with organic fibers, with wood fragments, (Wetland Deposit).	
15											
	1U	24/24	19.0 - 21.0	PUSH						Black, wet, medium stiff, Organic SILT, trace fine sand, with organic fibers, with wood fragments, (Wetland Deposit). 65x130mm vane raw torque readings: V1: 500/100 in-lbs V2: 540/120 in-lbs	S_u(DSS)=525 psf
20											
	V1		21.6 - 22.0	S_u=1145/228 psf							
	V2		22.6 - 23.0	S_u=1217/275 psf							
	5D	24/24	24.0 - 26.0	WOH-WOH-1-2	1	1				Black, wet, stiff, Organic SILT, trace fine sand, with organic fibers, (Wetland Deposit).	
25											

Remarks:

1. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterberg Limit tests if available, rather than the MaineDOT Standard based on percentages passing specific grain sizes.
2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: EB-KERP-101
WIN: 23148.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.3	**Auger ID/OD:**	4.25" OD SSA
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track Mobile B-53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/23/19-10/26/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 93+91.0, 27.1' Rt	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	4.2'
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25											
	MV		26.0 - 26.2							Could not advance vane.	
	6D	24/19	29.0 - 31.0	Push thru vane						Dark brown, wet, stiff, Organic SILT, trace fine sand, with organic fibers, (Wetland Deposit).	
30	V3		29.6 - 30.0	S_u=1145/217 psf						65x130mm vane raw torque readings:	
	V4		30.6 - 31.0	S_u=1217/228 psf						V3: 500/95 in-lbs V4: 570/100 in-lbs	
	7D	24/24	34.0 - 36.0	Push thru vane						Dark brown, wet, stiff, Organic SILT, trace fine sand, with organic fibers, (Wetland Deposit).	P1=30
35	V5		34.6 - 35.0	S_u=1217/228 psf						65x130mm vane raw torque readings:	LL=82 PL=52
	V6		35.6 - 36.0	S_u=1121/217 psf						V5: 540/100 in-lbs V6: 490/95 in-lbs	A-7, OH WC=64.8
	8D	24/24	39.0 - 41.0	Push thru vane						Dark brown, wet, stiff, Organic SILT, little fine sand, with organic fibers, (Wetland Deposit).	
40	V7		39.6 - 40.0	S_u=1145/195 psf						65x130mm vane raw torque readings:	
	V8		40.6 - 41.0	S_u=1099/228 psf						V7: 500/85 in-lbs V8: 480/100 in-lbs	
								-38.7		44.0	
	9D	24/24	44.0 - 46.0	Push thru vane			236			Grey, wet, stiff, Clayey SILT, some fine sand, (Marine Clay).	
45	V9		44.6 - 45.0	S_u=1217/159 psf						65x130mm vane raw torque readings:	
	MV		45.0 - 45.2				170			V9: 570/70 in-lbs	
							145				
							153				
							RC				
	2U	24/24	49.0 - 51.0	PUSH						Grey, wet, stiff, Clayey SILT, trace fine sand, (Marine Clay).	S_u(DSS)= 1,300 psf
50											

Remarks:

1. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterberg Limit tests if available, rather than the MaineDOT Standard based on percentages passing specific grain sizes.
2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.3	**Auger ID/OD:**	4.25" OD SSA
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track Mobile B-53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/23/19-10/26/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 93+91.0, 27.1' Rt	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	4.2'
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
50											
	10D	24/24	51.0 - 53.0	WOR-WOR-WOR-WOR						Grey, wet, Silty CLAY, some fine sand, (Marine Clay).	
	11D	24/24	54.0 - 56.0	Push thru vane						Brown, wet, stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V10: 450/20 in-lbs V11: 540/40 in-lbs	P1=12 LL=32 PL=20 A-6, CL WC=31.3
55	V10		54.6 - 55.0	S_u=1030/47 psf							
	V11		55.6 - 56.0	S_u=1217/91 psf							
								-52.7		58.0	
	12D	24/24	59.0 - 61.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V12: 420/20 in-lbs V13: 350/30 in-lbs	
60	V12		59.6 - 60.0	S_u=961/47 psf							
	V13		60.6 - 61.0	S_u=802/69 psf							
	13D	24/14	64.0 - 66.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V14: 310/20 in-lbs V15: 290/20 in-lbs	
65	V14		64.6 - 65.0	S_u=709/47 psf							
	V15		65.6 - 66.0	S_u=665/47 psf							
	3U	24/24	69.0 - 71.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay).	
70											
	V16		71.6 - 72.0	S_u=618/69 psf						65x130mm vane raw torque readings: V16: 270/30 in-lbs V17: 500/60 in-lbs	
	V17		72.6 - 73.0	S_u=1145/137 psf							
	14D	24/24	74.0 - 76.0	WOR-WOR-WOR-WOR							
75											

Remarks:

1. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterberg Limit tests if available, rather than the MaineDOT Standard based on percentages passing specific grain sizes.
2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: EB-KERP-101
WIN: 23148.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.3	**Auger ID/OD:**	4.25" OD SSA
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track Mobile B-53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/23/19-10/26/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 93+91.0, 27.1' Rt	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	4.2'
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
75											
	15D	24/24	79.0 - 81.0	WOR-WOR-WOR-WOR						Grey, wet, medium stiff, Silty CLAY, (Marine Clay).	
80											
	16D	24/24	84.0 - 86.0	Push thru vane						Brown, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings:	P1=19
85	V18		84.6 - 85.0	S_u=228/69 psf						V18: 100/30 in-lbs	LL=39 PL=20
	V19		85.6 - 86.0	S_u=549/69 psf						V19: 240/30 in-lbs	A-6, CL WC=37.2
	17D	24/24	89.0 - 91.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings:	
90	V20		89.6 - 90.0	S_u=640/47 psf						V20: 280/20 in-lbs	
	V21		90.6 - 91.0	S_u=733/47 psf						V21: 320/20 in-lbs	
	18D	24/24	94.0 - 96.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings:	
95	V22		94.6 - 95.0	S_u=571/47 psf						V22: 250/20 in-lbs	
	V23		95.6 - 96.0	S_u=618/47 psf						V23: 270/20 in-lbs	
	19D	24/24	99.0 - 101.0	Push thru vane						Grey, wet, medium stiff to stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings:	P1=16 LL=38
100											

Remarks:

1. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterberg Limit tests if available, rather than the MaineDOT Standard based on percentages passing specific grain sizes.
2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: EB-KERP-101
WIN: 23148.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.3	**Auger ID/OD:**	4.25" OD SSA
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track Mobile B-53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/23/19-10/26/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 93+91.0, 27.1' Rt	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	4.2'
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
100	V24 V25		99.6 - 100.0 100.6 - 101.0	S_u=1030/58 psf S_u=802/47 psf						V24: 450/25 in-lbs V25: 350/20 in-lbs	PL=22 A-6, CL WC=30.5
	20D V26 V27	24/24	104.0 - 106.0 104.6 - 105.0 105.6 - 106.0	Push thru vane S_u=1077/36 psf S_u=1030/36 psf						Dark grey, wet, stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V26: 470/15 in-lbs V27: 450/15 in-lbs	
105											
	21D V28 V29	24/24	109.0 - 111.0 109.6 - 110.0 110.6 - 111.0	Push thru vane S_u=1145/22 psf S_u=1167/22 psf						Dark grey, wet, stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V28: 500/10 in-lbs V29: 510/10 in-lbs	
110											
	22D V30 V31	24/24	114.0 - 116.0 114.6 - 115.0 115.6 - 116.0	Push thru vane S_u=961/22 psf S_u=939/22 psf						Dark grey, wet, medium stiff, Silty CLAY trace shells, (Marine Clay). 65x130mm vane raw torque readings: V30: 420/10 in-lbs V31: 410/10 in-lbs	
115											
	23D	24/24	119.0 - 121.0	WOR-WOR-WOR-WOR						Grey, wet, medium stiff, Silty CLAY trace shells, (Marine Clay).	P1=22 LL=47 PL=25 A-7, CL WC=45.1
120											
125	24D	24/24	124.0 - 126.0	WOR-WOR-WOR-WOR						Dark grey, wet, soft, Silty CLAY trace shells, (Marine Clay).	

Remarks:

1. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterberg Limit tests if available, rather than the MaineDOT Standard based on percentages passing specific grain sizes.
2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: EB-KERP-101
WIN: 23148.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.3	**Auger ID/OD:**	4.25" OD SSA
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track Mobile B-53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/23/19-10/26/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 93+91.0, 27.1' Rt	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	4.2'
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
125											
130											
	25D	24/24	134.0 - 136.0	WOR-WOR-WOR-WOR						Grey, wet, medium stiff, Silty CLAY, (Marine Clay).	
135											
140											
	26D	24/24	144.0 - 146.0	WOR-WOR-WOR-WOR						Grey, wet, medium stiff, Silty CLAY, (Marine Clay).	
145											
								-141.7		147.0 Drill action suggests sand and gravel encountered at 147.0'.	
	27D	6/6	149.0 - 149.5	12-79/0"			NX	-144.2		Grey, wet, very dense, Gravelly fine to coarse SAND, little silt, (Glacial Till).	
150											

Remarks:

1. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterberg Limit tests if available, rather than the MaineDOT Standard based on percentages passing specific grain sizes.
2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: EB-KERP-101
WIN: 23148.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.3	**Auger ID/OD:**	4.25" OD SSA
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track Mobile B-53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/23/19-10/26/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 93+91.0, 27.1' Rt	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	4.2'
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
150	R1	60/60	149.5 - 154.5	RQD = 92%						Splitspoon refusal at 149.5', probable top of rock. Advance roller bit to 149.5' and set up to core.	
										149.5	
										R1: Hard, fresh, aphanitic to coarse grained, grey, SCHIST. Joints are close to moderately spaced, moderately dipping, undulating to planar, rough to smooth, fresh, partially open to open. Rock Quality = Excellent Recovery = 100% Rock Core Times (min:sec): 149.5-150.5' (1:44), 150.5-151.5' (1:39), 151.5-152.5' (1:11), 152.5-153.5' (1:27), 153.5-154.5' (1:44)	
155	R2	60/60	154.5 - 159.5	RQD = 93%						R2: Hard, fresh, aphanitic to coarse grained, grey, SCHIST. Joints are close, low angle, planar, smooth, discolored, partially open to open. Rock Quality = Excellent Recovery = 100% Rock Core Times (min:sec): 154.5-155.5' (1:15), 155.5-156.5' (1:26), 156.5-157.5' (1:19), 157.5-158.5' (1:33), 158.5-159.5' (1:42)	
								-154.2		159.5	
160										**Bottom of Exploration at 159.5 feet below ground surface.**	
165											
170											
175											

Remarks:

1. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterberg Limit tests if available, rather than the MaineDOT Standard based on percentages passing specific grain sizes.
2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: EB-KERP-102
WIN: 23148.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	10.0	**Auger ID/OD:**	4.25" OD SSA
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track Mobile B-53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/22/19-10/23/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 97+69.7, 17.8' Rt	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	3.2'
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/8	0.5 - 2.5	9-12-12-11	24	36	SSA	9.5		ASPHALT 0.5	
										Brown, dry, dense, Sandy GRAVEL, trace silt, (Fill).	G#19-S-2836 A-1-a, GP-GM WC=2.4
	2D	12/8	4.0 - 5.0	2-50/6"	--					Brown, moist, very dense, fine to coarse SAND, some silt, little fine gravel, (Fill).	G#19-2-2837 A-2-4(o), SM WC=17.2
5							SPIN				
	3D	24/9	9.0 - 11.0	5-6-4-6	10	15				Brown, wet, medium dense, Sandy GRAVEL, trace silt, (Fill).	G#19-S-2838 A-1-a, GP-GM WC=9.0
10											
										Roller bit action indicates gravel and cobbles from 12.0'-17.6'.	
	4D	24/6	14.0 - 16.0	21-8-7-11	15	22				Grey-orange, wet, medium dense, GRAVEL, little fine to coarse sand, (Fill).	
15											
								-7.6		17.6	
	5D	24/10	19.0 - 21.0	7-2-2-2	4	6				Black, wet, stiff, Organic SILT, trace fine sand, (Wetland Deposit).	
20											
	1U	24/24	24.0 - 26.0	PUSH						Black, wet, stiff, Organic SILT, trace fine sand, with organic fibers, (Wetland Deposit).	
25											

Remarks:

1. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterberg Limit tests if available, rather than the MaineDOT Standard based on percentages passing specific grain sizes.
2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: EB-KERP-102
WIN: 23148.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	10.0	**Auger ID/OD:**	4.25" OD SSA
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track Mobile B-53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/22/19-10/23/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 97+69.7, 17.8' Rt	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	3.2'
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25											
	V1		26.6 - 27.0	S_u=1145/332 psf						65x130mm raw vane torque readings: V1: 500/145 in-lbs V2: 480/130 in-lbs	
	V2		27.6 - 28.0	S_u=1099/297 psf							
	6D	24/24	29.0 - 31.0	WOH-WOH-2-3	2	3				Brown, wet, stiff, Organic SILT, trace fine sand, with organic fibers, (Wetland Deposit).	P1=37 LL=93 PL=56 A-7, OH WC=62.9
30											
	~~MV1~~ 7D	24/24	~~34.0 - 34.1~~ 34.0 - 36.0	WOH-1-3-3	4	6				Black, wet, stiff, Organic SILT, trace fine sand, with organic fibers, (Wetland Deposit). Wood fragment in spoon tip.	
35											
								-27.5		37.5	
	8D ~~MV2~~	24/21	39.0 - 41.0 ~~39.0 - 39.1~~	3-5-7-7	12	18				Grey, wet, very stiff, Silty CLAY, (Marine Clay).	
40											
								-34.0		44.0	
	9D	24/24	44.0 - 46.0	1-1-3-1	4	6				Grey, wet, medium stiff, Silty CLAY, (Marine Clay).	P1=14 LL=32 PL=18 A-6, CL WC=28
45											
	MV3	3/3	49.0 - 49.3	1-50/0"			RC	-39.5		Hammer action indicates bedrock at 49.5'. Set up to core at 49.5'. 49.5	
50											

Remarks:

1. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterberg Limit tests if available, rather than the MaineDOT Standard based on percentages passing specific grain sizes.
2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: EB-KERP-102
WIN: 23148.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	10.0	**Auger ID/OD:**	4.25" OD SSA
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track Mobile B-53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/22/19-10/23/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 97+69.7, 17.8' Rt	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	3.2'
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
50	10D R1	6/6 60/60	49.0 - 49.5 49.5 - 54.5	RQD = 78%			NX			R1: Very hard, fresh, aphanitic to coarse grained, grey, SCHIST. Primary joints are close, low angle, undulating, rough, fresh, partially open. Secondary joint is moderately dipping, planar, smooth, fresh, partially open. Rock Mass Quality = Good Recovery = 100% Rock Core Times (min:sec): 49.5-50.5' (1:56), 50.5-51.5' (1:48), 51.5-52.5' (1:07), 52.5-53.5' (1:50), 53.5-54.5' (1:26)	
	R2	60/60	54.5 - 59.5	RQD = 78%						R2: Very hard, fresh, aphanitic to coarse grained, grey, SCHIST. Joints are close to moderately spaced, moderately dipping, planar, smooth, fresh to discolored, tight to open. Rock Quality = Good Recovery = 100% Rock Core Times (min:sec): 54.5-55.5' (2:00), 55.5-56.5' (1:29), 56.5-57.5' (1:03), 57.5-58.5' (1:26), 58.5-59.5' (1:16)	
55											
								-49.5		59.5 **Bottom of Exploration at 59.5 feet below ground surface.**	
60											
65											
70											
75											

Remarks:

1. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterberg Limit tests if available, rather than the MaineDOT Standard based on percentages passing specific grain sizes.
2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-201
WIN: 23929.01

Driller:	New England Boring Contractor	**Elevation (ft.)**	6.6	**Auger ID/OD:**	4"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/16/2021-04/17/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 96+10.3, 16.9' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	5.3
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	5.9		7": Asphalt 0.7	
	1D	24/12	1.0 - 3.0	21-26-19-12	45	61				Brown, dry, very dense, fine to coarse SAND, some gravel, little silt, (Fill).	
	2D	24/12	3.0 - 5.0	15-12-24-36	36	49				Brown, dry, medium dense, gravelly fine to coarse SAND, little silt, (Fill). (Bottom 4" wet)	#21-S-1531 A-1-b, SM WC=9.2
5	3D	24/11	5.0 - 7.0	30-11-11-9	22	30	62			Brown, wet, dense, fine to coarse SAND, some gravel, little silt, (Fill).	
							80				
	4D	24/9	7.0 - 9.0	7-16-18-11	34	46	134			Brown, wet, dense, fine to coarse SAND, little gravel, little silt, (Fill).	
							114				
	5D	24/9	9.0 - 11.0	10-14-16-11	30	41	70			Grey, wet, dense, fine to coarse SAND, little gravel, little silt, (Fill).	
10							50				
	6D	24/7	11.0 - 13.0	12-17-23-8	40	55	120			Black/grey, wet, very dense, sandy GRAVEL, trace silt, (Fill).	#21-S-1532 A-1-a, GP-GM WC=10.1
							60				
	7D	24/10	13.0 - 15.0	14-8-8-15	16	22	90			Black/grey, wet, medium dense, fine to coarse SAND, little gravel, little silt, (Fill).	
							82				
15							40	-9.4		16.0	
							88			Roller bit advancement increased from 15.0'-15.8', probable cobbles. Probable transition to organic silt at 16.0'.	
							30				
							50				
	8D	24/16	19.0 - 21.0	2-1-3-3	4	5	46			Black, wet, medium stiff, Organic SILT, some fine sand, trace organic fibers, (Wetland Deposit).	#21-S-1533 A-4(0) WC=52.7
20							RC				
25	1U	24/24	24.0 - 26.0	PUSH						1U: Black, wet, stiff, organic SILT 55x110 mm vane raw torque reading:	

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-201

WIN: 23929.01

Driller:	New England Boring Contractor	**Elevation (ft.)**	6.6	**Auger ID/OD:**	4"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/16/2021-04/17/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 96+10.3, 16.9' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	5.3
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25											
	V1		26.6 - 27.0	S_u=1964/312 psf						V1: 44/7/ft-lbs	
	V2		27.6 - 28.0	S_u=1652/312 psf						V2: 37/7 ft-lbs	
	9D	24/19	29.0 - 31.0	Push thru vane						Black, wet, stiff, Organic SILT, some fine sand, little organic fibers, (Wetland Deposit). 55x110 mm vane raw torque reading:	#21-S-1534 OH PI=29 LL=78 PL=49 WC=58.8
30	V3		29.6 - 30.0	S_u=1562/268 psf						V3: 35/6 ft-lbs	
	V4		30.6 - 31.0	S_u=1652/268 psf						V4: 37/6 ft-lbs	
	10D	24/24	34.0 - 36.0	Push thru vane	-					Black, wet, stiff, Organic SILT, some fine sand, little organic fibers, (Wetland Deposit). 55x110 mm vane raw torque reading:	
35	V5		34.6 - 35.0	S_u=1667/402 psf						V5: 36/9 ft-lbs	
	V6		35.6 - 36.0	S_u=1518/268 psf	-					V6: 34/6 ft-lbs	
	11D	24/24	36.0 - 38.0	WOR-1-2-2	3	4				Black, wet, Organic SILT, some fine sand, little organic fibers, (Wetland Deposit).	
	12D	24/7	38.0 - 40.0	WOR-3-2-1	5	7				Grey, wet, medium stiff, organic CLAYEY SILT, trace fine sand, trace wood fragments, (Wetland Deposit).	
40	13D	24/24	40.0 - 42.0	1-2-2-2	4	5				Grey, wet, organic CLAYEY SILT, some to little fine sand, trace organic fibers, trace wood fragments, (Wetland Deposit).	#21-S-1535 WC=49.6
	14D	24/0	42.0 - 44.0	WOH-WOH-1-2						No Recovery	
								-37.4		44.0	
45	15D	24/16	44.0 - 46.0	8-4-12-10	16	22				Grey, wet, very stiff, Silty CLAY, little fine sand, trace wood fragments, (Marine Clay).	#21-S-1536 A-4(0)
								-42.4		49.0	
50	16D	24/24	49.0 - 51.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, trace wood fragments, (Marine	G#21-S-1537 WC=30.2

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-201
WIN: 23929.01

Driller:	New England Boring Contractor	**Elevation (ft.)**	6.6	**Auger ID/OD:**	4"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/16/2021-04/17/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 96+10.3, 16.9' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	5.3
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
50	V7 V8		49.6 - 50.0 50.6 - 51.0	S_u=987/112 psf S_u=875/112 psf						Clay). 55x110 mm vane raw torque reading: V7: 265/30 in-lbs V8: 235/30 in-lbs	
55	2U V9 V10	24/24	54.0 - 56.0 54.6 - 55.0 55.6 - 56.0	PUSH S_u=763/112 psf S_u=839/147 psf						2U: Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V9: 205/30 in-lbs V10: 225/40 in-lbs	
60	17D V11 V12	24/24	59.0 - 61.0 59.6 - 60.0 60.6 - 61.0	Push thru vane S_u=763/170 psf S_u=705/87 psf						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V11: 205/45 in-lbs V12: 190/50 in-lbs	#21-S-1538 CL PI=21 LL=41 PL=20 WC=34.4
65	18D MV1	24/24	64.0 - 66.0	WOH-WOH-WOH-WOH	-					Grey, wet, Silty CLAY, (Marine Clay). MV1: Could not shear vane (Probable high sand content.)	
70	19D V13 V14	24/24	69.0 - 71.0 69.6 - 70.0 70.6 - 71.0	Push thru vane S_u=875/187 psf S_u=687/170 psf	- -					Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V13: 235/50 in-lbs V14: 687/170 in-lbs	#21-S-1539 WC=35.8
75	20D	24/24	74.0 - 76.0	Push thru vane			RC			Grey, wet, medium stiff, Silty CLAY, trace fine sand, (Marine Clay). Note: 1/8" fine sand seam in bottom 2" of spoon.	

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-201
WIN: 23929.01

Driller:	New England Boring Contractor	**Elevation (ft.)**	6.6	**Auger ID/OD:**	4"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/16/2021-04/17/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 96+10.3, 16.9' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	5.3
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
75	V15		74.6 - 75.0	S_u=687/147 psf						55x110 mm vane raw torque reading: V15: 185/40 in-lbs	
	V16		75.6 - 76.0	S_u=839/147 psf						V16: 225/40 in-lbs	
								-69.9		76.5	
										Increased roller bit resistance at 76.5'. Advanced roller bit to 79.0'. During advancement of 3" casing, casing sheared and could not be retrieved. Offset 5' and advanced roller bit to depth. See BB-WPC-201A log for details.	
								-72.4		79.0	
										Bottom of Exploration at 79.0 feet below ground surface.	
80											
85											
90											
95											
100											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-201A
WIN: 23929.01

Driller:	New England Contractor	**Elevation (ft.)**	6.6	**Auger ID/OD:**	
Operator:		**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/07/2021-04/08/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 96+10.3, 16.9' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	5.3
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
75							RC			See BB-WPC-201 for soil descriptions from 0-76.5' bgs. Advanced Roller bit to 76.6'; roller cone resistance increased. Dark grey rock in wash. advanced roller cone to 76.7'. Set up to core at 76.7	
	R1	33/33	76.6 - 79.4	RQD = 12%	-		NQ	-70.0		76.6	
										R1: from 76.7 to 78.8: Hard, fresh to slightly weathered aphanitic to medium grained, grey, SCHIST. Primary joints are extremely close to close, moderately dipping, planar, rough to smooth, fresh to decomposed, very tight to tight. Secondary joints are very close to moderately spaced low angle, undulating, rough, fresh, tight to moderately wide, grey, SCHIST. From 78.8' to 79.1': Rock is fractured to gravel and coarse sand size pieces. From 79.1' to 79.5': Hard, fresh, aphanitic to fine grained, grey, SCHIST. Joints are close, low angle to moderately dipping, planar, rough, tight. Rock Quality = Very Poor Recovery = 100% Rock Core time (min:sec): 76.7'-77.7' (01:23), 77.7'-78.7'(01:19), 78.7'-79.5' (03:30)	
	R2	54/51	79.5 - 84.0	RQD = 78%	-					R2: Hard, fresh, aphanitic to fine grained, grey, SCHIST. Primary joints are close, moderately dipping, planar, smooth, fresh tight. Secondary joints are close to moderately spaced, low angle, indulating to planar, rough to smooth, tight to partially open. Rock Quality = Good Recovery = 93% Rock Core time (min:sec): 79.5'-80.5' (01:02), 80.5'-81.5' (01:46), 81.5'-82.5' (01:47), 82.5'-83.5' (02:13), 83.5'-84.0' (0:43)	
80											
	R3	42/41	84.0 - 87.5	RQD = 88%	-					R3: Hard, fresh, aphanitic to fine grained, grey, SCHIST. Joints are close to moderately spaced, moderately dipping to high angle, planar, smooth, fresh, tight. Rock Quality = Good Recovery = 98% Rock Core time (min:sec): 84.0'-85.0' (01:54), 85.0'-86.0' (02:06), 86.0'-87.0' (02:00), 87.0'-87.5' (01:30)	
85											
								-80.9		87.5	
										Bottom of Exploration at 87.5 feet below ground surface.	
90											
95											
100											

Remarks:

1. Offset of BB-WPC-201
2. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-202
WIN: 23929.01

Driller:	New England Contractor	**Elevation (ft.)**	7.6	**Auger ID/OD:**	4.25"
Operator:	Matt Grass	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/31/2021-04/02/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 96+94.1, 16.7' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.7'
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA			Asphalt	
	1D	24/12	1.0 - 3.0	9-8-8-7	16	23		6.6		1.0 Brown, dry, medium dense, fine to coarse SAND, little gravel, trace silt, (Fill).	
5	2D	24/14	5.0 - 7.0	10-11-10-22	21	30	13			Brown, dry, medium dense, gravelly fine to coarse SAND, trace silt, (Fill).	G#21-S-1540 A-1-a, SP-SM WC=6.4
							19				
							21				
							119/5				
							SPIN				
10	3D	24/7	10.5 - 12.5	9-6-15-9	21	30				Brown, wet, medium dense, fine to coarse SAND, little gravel, trace silt, (Fill).	
										Intermittent roller bit resistance from 12.5'-19.6' indicating probable cobbles and boudlers.	
15											
							RC	-12.0		19.6	
20	4D	24/0	20.0 - 22.0	1-5-4-4	9	13				Based on roller bit advancement and change in wash return color from brown to black, probable strata change at 19.6'. No Recovery.	
25											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#1, energy transfer ratio = 0.852
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-202
WIN: 23929.01

Driller:	New England Contractor	**Elevation (ft.)**	7.6	**Auger ID/OD:**	4.25"
Operator:	Matt Grass	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/31/2021-04/02/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 96+94.1, 16.7' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.7'
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	5D	24/24	25.0 - 27.0	1-1-2-3	3	4				Dark brown, moist, medium stiff to stiff, sandy Organic SILT, (Wetland Deposit).	G#21-S-1541 A-5
30	6D	24/3	30.0 - 32.0	3-3-4-3	7	10				Dark brown, moist, loose, sandy Organic SILT, (Wetland Deposit).	
35	7D	24/24	35.5 - 37.5	WOH-2-3-5	5	7				Top 22": Dark brown, moist, loose, sandy Organic SILT, (Wetland Deposit).	
								-29.7		37.3 Bottom 2": Grey, moist, medium stiff, Silty CLAY, little fine sand, (Marine Clay).	
40	8D	24/24	40.0 - 42.0	5-7-6-10	13	18				Grey, moist, very stiff, Silty CLAY, little fine sand, (Marine Clay).	
45	9D	24/24	45.0 - 47.0	WOH-1-4-3	5	7				Grey, moist, medium stiff, Silty CLAY, little fine sand (Marine Clay).	#21-S-1542 CL PI=18 LL=42 PL=24 WC=33.5
								-39.4		47.0	
50											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#1, energy transfer ratio = 0.852
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-202
WIN: 23929.01

Driller:	New England Contractor	**Elevation (ft.)**	7.6	**Auger ID/OD:**	4.25"
Operator:	Matt Grass	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/31/2021-04/02/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 96+94.1, 16.7' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.7'
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
50	10D	24/24	50.0 - 52.0	WOR-WOR-WOR-WOR						Grey, moist, medium stiff, Silty CLAY, (Marine Clay).	
55	11D	24/24	55.0 - 57.0	Push thru vane						Grey, moist, medium stiff, Silty Clay, (Marine Clay). 65x130 mm vane raw torque reading:	#21-S-1543 CL PI=27 LL=48 PL=21 WC=41.3
	V1		55.6 - 56.0	S_u=604/110 psf						V1: 28.5/4 ft-lbs	
	V2		56.6 - 57.0	S_u=645/110 psf						V2: 32.5/4 ft-lbs.	
60	12D		60.6 - 61.0	Push thru vane						Grey, moist, medium stiff, Silty CLAY, (Marine Clay) 65x130 mm vane raw torque reading:	
	V3			S_u=783/110 psf						V3: 25/4 ft-lbs	
	V4		61.6 - 62.0	S_u=892/110 psf						V4: 25/4 ft-lbs	
65											
70	13D	24/24	70.0 - 72.0	Push thru vane						Grey, moist, medium stiff, Silty CLAY, (Marine Clay) 65x130 mm vane raw torque readings:	#21-S-1544 WC=35.3
	V5		70.6 - 71.0	S_u=687/110 psf						V5: 25/4 ft-lbs	
	V6		71.6 - 72.0	S_u=687/110 psf						V6: 25/4 ft-lbs	
75											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#1, energy transfer ratio = 0.852
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-202
WIN: 23929.01

Driller:	New England Contractor	**Elevation (ft.)**	7.6	**Auger ID/OD:**	4.25"
Operator:	Matt Grass	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/31/2021-04/02/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 96+94.1, 16.7' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.7'
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_V = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
75											
80	14D	24/14	80.0 - 82.0	WOH-WOH-WOH-WOH						Top 6": Grey, moist, Silty CLAY, (Marine Clay). Bottom 18": Grey, moist, Silty CLAY, some fine sand, (Marine Clay).	#21-S-1545 A-4(0)
							NQ	-75.2		82.8 Increased roller bit resistance at 82.8'. Probable top of rock. Advanced roller bit to 84' and set up to core.	
85	R1	41/48	85.0 - 88.4	RQD = 59%						R1: Hard, fresh to slightly weathered, fine to medium grained, grey and black, SCHIST with quartz. Joints are very close to close, moderately dipping to high angle, undulating, rough, open with silt infilling. Recovery = 91% Rock Quality = Fair Rock Core Times (min:sec): 84-85' (2:28), 85-86' (1:38), 86-87' (1:58), 87-88' (2:24), 88-88.4' (1:04)	
	R2	61/61	88.4 - 93.5	RQD = 62%						R2: Hard, fresh to slightly weathered, fine to medium grained, SCHIST with quartz. Joints are very close to moderately spaced, undulating, rough, open. Recovery = 100% Rock Quality = Fair Rock Core Times (min:sec): 88.4-89.4' (2:09), 89.4-90.4' (2:12), 90.4-91.4' (1:25), 91.4-92.4' (1:50), 92.4-93.4' (1:46), 93.4-93.5' (0:10)	
90											
								-85.9		93.5 **Bottom of Exploration at 93.5 feet below ground surface.**	
95											
100											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#1, energy transfer ratio = 0.852
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	**Project:** Pleasant Cove Bridge (Kennebec Estuary Project) **Location:** Woolwich, Maine	**Boring No.:** BB-WPC-203 **WIN:** 23929.01

Driller:	New England Contractor	**Elevation (ft.)**	8.0	**Auger ID/OD:**	
Operator:	Tom Schaffer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/06/2021-04/07/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 96+97.0, 16.5' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	5.3
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SPIN			Asphalt	
								7.1		0.9	
	1D	16/10	1.0 - 2.3	71-62-76/4"	-					Brown, dry, fine to coarse SAND, some gravel, trace silt, with probable cobbles, (Fill).	G#21-S-1546 A-1-b, SM WC=3.2
	2D	3/3	3.0 - 3.3	52/3"	-					Brown, dry, fine to coarse SAND, some gravel, trace silt, with probable cobbles, (Fill).	
5	3D	8/6	5.5 - 6.2	107-35/2"	-					Brown, dry, fine to coarse SAND, some gravel, trace silt, with probable cobbles, (Fill).	
								1.5		6.5 Intermittent roller bit resistance from 6.5'-8.0' indicating probable cobbles and boulders.	
								0.0		8.0	
	4D	24/7	8.0 - 10.0	8-7-8-6	15	21				Brown, wet, medium dense, fine to coarse SAND, some gravel, trace silt, (Fill).	
10	5D	24/0	10.0 - 12.0	4-16-7-3	23	33				Black/brown, wet, medium dense, GRAVEL, (Fill).	
								-4.5		12.5	
	6D	24/3	13.0 - 15.0	5-1-1-3	2	3				Dark brown, wet, soft, organic SILT, little sand, (Wetland Deposit).	
							RC				
15	7D	24/6	15.0 - 17.0	5-1-1-1	2	3				Dark brown, wet, soft, organic SILT, little sand, little gravel, (Wetland Deposit).	
20	8D	24/10	20.0 - 22.0	3-2-2-1	4	6				Dark brown, moist, medium stiff, Sandy SILT, little organics, (Wetland Deposit).	G#21-S-1547 A-5
25											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#1, energy transfer ratio = 0.852
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-203
WIN: 23929.01

Driller:	New England Contractor	**Elevation (ft.)**	8.0	**Auger ID/OD:**	
Operator:	Tom Schaffer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/06/2021-04/07/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 96+97.0, 16.5' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	5.3
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	9D	24/16	25.0 - 27.0	WOH-WOH-3-2						Dark brown, moist, soft, Sandy SILT, some organic fibers, with wood fragments from 25.9'-26.2', (Wetland Deposit).	
30	10D	24/9	30.0 - 32.0	WOH-WOH-WOH-1	-					Dark brown, moist, soft, Sandy SILT, trace organics, (Wetland Deposit).	#21-S-1546 ML PI=NP WC=44.8
35	11D	24/24	35.0 - 37.0	WOH-WOH-WOH-1						Dark brown, moist, soft, Sandy SILT, trace organic fibers, (Wetland Deposit).	
40	12D	24/24	40.0 - 42.0	2-2-6-4	8	11				Top 21": Dark brown to grey, wet, stiff, Sandy SILT, trace organic fibers, (Wetland Deposit).	
								-33.7		41.7	
										Bottom 3": Grey, wet, Silty CLAY, trace fine sand, (Marine Clay).	
45	13D	24/24	45.0 - 47.0	WOH-5-5-6	10	14				Grey, wet, stiff, Silty CLAY, trace fine sand, (Marine Clay)	#21-S-1549 WC=26.5
50											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#1, energy transfer ratio = 0.852
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-203
WIN: 23929.01

Driller:	New England Contractor	**Elevation (ft.)**	8.0	**Auger ID/OD:**	
Operator:	Tom Schaffer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/06/2021-04/07/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 96+97.0, 16.5' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	5.3
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
50	14D	24/24	50.0 - 52.0	WOH-WOH-WOH-4	-					Grey, moist, Silty CLAY, trace gravel, (Marine Clay).	
								-46.0		54.0	
55	15D	24/24	55.0 - 57.0	WOR-WOR-WOR-WOR	-					Grey, wet, Silty CLAY, (Marine Clay).	#21-S-1550 WC=35.3
60	16D	24/24	60.0 - 62.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130 mm raw vane torque reading:	#21-S-1551 CL PI=25 LL=44 PL=19 WC=38.1
	V1		60.6 - 61.0	S_u=851/110 psf						V1:31/4 ft-lbs.	
	V2		61.6 - 62.0	S_u=879/110 psf						V2: 32/4 ft-lbs.	
65	17D	24/24	65.0 - 67.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130 mm vane raw torque reading:	
	V3		65.6 - 66.0	S_u=632/124 psf						V3:23/4.5 ft-lbs.	
	V4		66.6 - 67.0	S_u=714/124 psf						V4: 26/4.5 ft-lbs.	
70	18D	24/24	70.0 - 72.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130 mm vane raw torque reading:	
	V5		70.6 - 71.0	S_u=687/137 psf						V5: 25/5 ft-lbs.	
	V6		71.6 - 72.0	S_u=714/124 psf						V6: 26/4.5 ft-lbs.	
75											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#1, energy transfer ratio = 0.852
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-203
WIN: 23929.01

Driller:	New England Contractor	**Elevation (ft.)**	8.0	**Auger ID/OD:**	
Operator:	Tom Schaffer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/06/2021-04/07/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 96+97.0, 16.5' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	5.3
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
75								-67.5		75.5 Increased roller bit resistance at 75.5' indicates strata break, probable Glacial Till.	
	R1	56/56	79.8 - 84.5	RQD = 11%			NX	-71.3		79.3 Increased roller bit resistance at 79.3', probable top of rock. Roller cone to 79.8'. Set up to core at 79.8'. R1: Hard, fresh to slightly weathered, fine to medium grained, grey, SCHIST with quartz. Joints are very close to close, moderately dipping to high angle, undulating, rough, open. Rock Quality = Very Poor Recovery = 100% Rock Core time (min:sec): 79.8'-80.8' (2:51), 80.8'-81.8' (1:30), 81.8'-82.8' (1:50), 82.8'-83.8' (1:41), 83.8'-84.5' (2:01)	
80											
	R2	36/36	84.5 - 87.5	RQD = 53%						R2: Hard, fresh to slightly weathered, fine to medium grained, SCHIST with quartz. Joints are very close to close, moderately dipping, undulating, rough, open, with some silt infilling. Rock Quality = Fair Recovery = 100% Rock Core time (min:sec): 84.5-85.5' (1:46), 85.5-86.5' (1:54), 86.5-87.5' (1:34)	
85											
	R3	36/36	87.5 - 90.5	RQD=44%						R3: Hard, fresh to slightly weathered, fine to medium grained, grey, SCHIST with quartz.Joints are close, low angle to moderately dipping, undulating, rough, open. Rock Quality = Poor Recovery = 100% Rock Core time (min:sec): 87.5'-88.5' (1:30), 88.5'-89.5' (1:43), 89.5'-90.5' (1:30)	
90								-82.5		90.5	
										Bottom of Exploration at 90.5 feet below ground surface.	
95											
100											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#1, energy transfer ratio = 0.852
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-301
WIN: 23929.01

Driller:	New England Boring	**Elevation (ft.)**	4.8	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Truck B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/31/2021 - 04/01/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 501+15.4, 22.0' LT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	3.5
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/6	0.0 - 2.0	1-3-5-4	8	11	SSA			Brown, moist, medium dense, silty, fine to coarse SAND, trace gravel, some organic fibers, (Fill).	
	2D	24/7	4.0 - 6.0	2-10-7-9	17	23				Brown, wet, medium dense, GRAVEL, some fine to coarse sand, some silt, (Fill).	
5											
							170				
							195				
							123				
	3D	24/6	9.0 - 11.0	14-36-10-4	46	63	16			Grey, wet, dense, fine to coarse SAND, little gravel, little silt, (Fill).	
10							26				
							17				
							20	-7.7		12.5 Interpreted change in material based on wash return and roller bit advancement.	
							28				
	MV1 4D	24/0	14.0 - 14.0 14.0 - 16.0	2-1-1-1	2	3	RC			MV1: Could not advance vane. No Recovery.	
15											
	5D V1	24/24	19.0 - 21.0 19.6 - 20.0	Push thru Vane S_u=1562/312 psf	-					Black, wet, stiff, organic SILT, little to trace fine sand, little organic fibers, (Wetland Deposit). 65x110 mm vane raw torque reading: V1: 35/7 ft-lbs V2: 37/6 ft-lbs	
20	V2		20.6 - 21.0	S_u=1652/268 psf							
	6D		24.0 - 26.0	Push thru Vane						Black, wet, stiff, organic SILT, little to trace, fine sand, little organic fibers, (Wetland Deposit).	
25											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-301
WIN: 23929.01

Driller:	New England Boring	**Elevation (ft.)**	4.8	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Truck B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/31/2021 - 04/01/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 501+15.4, 22.0' LT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	3.5
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	V3 V4		24.6 - 25.0 25.6 - 26.0	S_u=1250/223 psf S_u=1250/223 psf						65x110 mm vane raw torque reading: V3: 28/5 ft-lbs V4: 25/4 ft-lbs	
	7D V5 V6	24/24	29.0 - 31.0 29.6 - 30.0 30.6 - 31.0	Push thru Vane S_u=1339/179 psf S_u=1116/223 psf						Black, wet, stiff, organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit). 55x110 mm vane raw torque reading: V5: 30/5 ft-lbs V6: 25/4 ft-lbs	
30											
	8D V7 V7 V8	24/24	34.0 - 36.0 34.1 - 34.5 34.6 - 35.0 35.6 - 36.0	Push thru Vane S_u=1116/223 psf S_u=1116/223 psf						Black, wet, stiff, organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit). 55x110 mm vane raw torque reading. V7: 25/4 ft-lbs V8: 25/4 ft-lbs	
35											
	9D V9 V10	24/24	39.0 - 41.0 39.6 - 40.0 40.6 - 41.0	Push thru Vane S_u=1161/223 psf S_u=1161/223 psf						Dark grey, stiff, organic SILT, trace fine sand, (Wetland Deposit). 55x110 mm vane raw torque reading: V9: 26/4 ft-lbs V10: 26/4 ft-lbs	
40											
								-37.7		42.5	
	10D V11 MV2		44.0 - 44.4 44.6 - 45.0	WOH-2-6-5 S_u=1652/357 psf						Grey, wet, stiff, Silty CLAY, trace organic fibers, (Marine Clay). 55x110 mm vane raw torque reading: V11: 37/8 ft-lbs MV2: Could not advance vane.	
45											
	11D	24/24	49.0 - 51.0	Push thru Vane						Grey, wet, stiff, Silty CLAY, trace fine sand, trace organic fibers, (Marine Clay).	
50											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-301
WIN: 23929.01

Driller:	New England Boring	**Elevation (ft.)**	4.8	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Truck B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/31/2021 - 04/01/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 501+15.4, 22.0' LT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	3.5
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
50	V12		49.6 - 50.0	S_u=1429/223 psf						55x110 mm vane raw torque reading: V12: 32/4 ft-lbs	
	V13		50.6 - 51.0	S_u=1116/223 psf						V13: 25/4 ft-lbs	
	12D	24/17	54.0 - 56.0	Push thru Vane						Grey, wet, medium stiff, Silty CLAY, trace fine sand, (Marine Clay).	
55	V14		54.6 - 55.0	S_u=804/89 psf						55x110 mm vane raw torque reading: V14 18/2 ft-lbs	
	V15		55.6 - 56.0	S_u=839/94 psf						V15: 225/25 in-lbs	
	13D	24/24	59.0 - 61.0	Push thru Vane						Dark grey, wet, medium stiff, Silty CLAY, (Marine Clay).	
60	V16		59.6 - 60.0	S_u=594/94 psf						55x110 mm vane raw torque reading: V16: 160/25 in-lbs	
	V17		60.6 - 61.0	S_u=558/76 psf						V17: 150/20 in-lbs	
	14D	24/24	64.0 - 66.0	Push thru Vane						Dark grey, wet, medium stiff, Silty CLAY, (Marine Clay).	
65	V18		64.6 - 65.0	S_u=522/76 psf						55x110 mm vane raw torque reading: V18: 140/20 in-lbs	
	V19		65.6 - 66.0	S_u=504/94 psf						V19: 135/25 in-lbs	
	15D	24/24	69.0 - 71.0	Push thru Vane						Dark grey, wet, stiff, Silty CLAY, with occasional sand seams, (Marine Clay).	
70	V20		69.6 - 70.0	S_u=1920/268 psf						55x110 mm vane raw torque reading: V20: 43/6 ft-lbs	
	V21		70.6 - 71.0	S_u=1205/268 psf						V21: 27/6 ft-lbs	
75											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-301
WIN: 23929.01

Driller:	New England Boring	**Elevation (ft.)**	4.8	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Truck B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/31/2021 - 04/01/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 501+15.4, 22.0' LT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	3.5
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
75											
	16D	24/24	79.0 - 81.0	Push thru Vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay).	
80	V22		79.6 - 80.0	S_u=558/112 psf						55x110 mm vane raw torque reading: V22: 150/30 in-lbs	
	V23		80.6 - 81.0	S_u=558/94 psf						V23: 150/25 in-lbs	
85											
	17D	24/24	89.0 - 91.0	Push thru Vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay).	
90	V24		89.6 - 90.0	S_u=778/76 psf						55x110 mm vane raw torque reading: V24: 195/20 in-lbs	
	V25		90.6 - 91.0	S_u=763/58 psf						V25: 205/15 in-lbs	
95											
100	18D	24/24	99.0 - 101.0	Push thru Vane						Dark grey, wet, stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: BB-WPC-301
WIN: 23929.01

Driller:	New England Boring	**Elevation (ft.)**	4.8	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Truck B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/31/2021 - 04/01/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 501+15.4, 22.0' LT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	3.5
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
100	V26		99.6 - 100.0	S_u=1116/58 psf						V26: 300/15 in-lbs	
	V27		100.6 - 101.0	S_u=1295/45 psf						V27: 29/1 ft-lbs	
105											
								-101.4		Top 2": grey, wet, Silty CLAY, (Marine Clay). 106.2	
	19D	9/9	106.0 - 106.8	20-50/3"	R		NX	-102.0		Bottom 7": Grey, wet, sandy GRAVEL, trace silt, (Glacial Till). 106.8	
	R1	60/60	106.8 - 111.8	RQD = 34%						Splitspoon refusal at 106.8'. Probable top of rock. R1: Hard, fresh to slightly weathered, aphanitic to medium grained, grey, SCHIST. Primary joints are extremely close to close, moderately dipping to high angle, planar, rough to smooth, fresh to decomposed, very tight to tight. Secondary joints are very close, low angle, indulating to planar, rough to smooth, fresh, tight. One vertical joint, joint is indulating, discolored, tight. Rock Rating = Poor Recovery = 108% Rock Core Times (min:sec): 106.8-107.8' (07:16), 107.8-108.8' (05:05), 108.8-109.8' (03:24), 109.8-110.8' (03:35), 110.8-111.0' (03:49)	
110											
								-107.0		111.8	
										Bottom of Exploration at 111.8 feet below ground surface.	
115											
120											
125											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Pleasant Cove Bridge (Kennebec Estuary Project) Location: Woolwich, Maine	Boring No.: HB-WPC-201 WIN: 23929.01

Driller:	New England Boring	**Elevation (ft.)**	8.6	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Truck B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	3/25/2021 - 3/25/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 88+12.7, 27.4' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	7.4
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/15	0.0 - 2.0	30-31-16-12	47	64	SSA			Top 12": Asphalt	
							RC	7.6		1.0 Bottom 6": Brown, dry, fine coarse SAND, little silt, trace gravel, (Fill).	
	2D	24/12	2.0 - 4.0	9-8-8-8	16	22				Brown, dry, medium dense, fine coarse SAND, little gravel, little silt, trace asphalt pieces, (Fill).	G#21-S-1511 A-1-b, SP-SM WC=6.0
	3D	24/10	4.0 - 6.0	1-4-2-2	6	8				Top 5": Brown, moist, fine to coarse SAND, little silt, little gravel, (Fill). Bottom 5": Grey, moist, fine to medium SAND, some silt,(Wetland Deposit).	
5											
	4D	24/6	9.0 - 11.0	8-4-59-15	63	86	164			Brown, wet, Sandy GRAVEL, trace silt, (Fill).	#21-S-1512 A-1-a, GP-GM
10							180				
							110				
							52	-3.4		12.0	
							41				
	5D	24/1	14.0 - 16.0	2-2-1-2	3	4	91			Brown, wet, stiff, gravelly SILT, (Wetland Deposit).	
15	MV1						46				
							48				
							73				
							RC				#21-S-1513 OH PI=35 LL=94 PL=59 WC=70.6
	6D	24/24	19.0 - 21.0	Push thru Vane						Black, wet, stiff, organic SILT, trace organic fibers, (Wetland Deposit). 65x130 mm vane raw torque reading: V1: 38/10 ft-lbs V2: 37/9 ft-lbs	
20	V1		19.6 - 20.0	S_u=1044/275 psf							
	V2		20.6 - 21.0	S_u=1016/247 psf							
	7D	24/24	24.0 - 26.0	Push thru Vane						Black, wet, stiff, organic SILT, trace fine sand, trace organic fibers (Wetland Deposit).	
25											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. 65x130 mm had one upper corner ____ during V1 & V2.
5. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)	**Location:** Woolwich, Maine	**Boring No.:** HB-WPC-201	**WIN:** 23929.01

Driller:	New England Boring	**Elevation (ft.)**	8.6	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Truck B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	3/25/2021 - 3/25/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 88+12.7, 27.4' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	7.4
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	V3 V4		24.6 - 25.0 25.6 - 26.0	S_u=1116/223 psf S_u=1205/268psf						55x110 mm vane raw torque reading: V3: 25/5 ft-lbs V4: 27/6 ft-lbs Wash return indicates at 28.0 and color change to grey increased gravel content.	
								-19.4		28.0	
30	8D ~~V5~~	17/14	29.0 - 30.4 ~~29.6 - 30.0~~	4-6-34/5"	R					Grey, wet, very stiff, Silty CLAY, trace gravel, (Glacial Till). 55x110 mm vane raw torque reading: Could not turn.	#21-S-1514 CL PI=11 LL=27 PL=16 WC=22.5
								-21.8		30.4	
	R1	60/60	31.0 - 36.0	RQD = 88%			NX			Refusal at 30.4', probable top of rock, roller cone to 31.0'. Consistent dark greyrock in wash, set up to core at 31.0'. R1: Very hard to hard, fresh aphanitic to medium gravel, grey, SCHIST. Primary joints are very close to moderately spaced, moderately dipping, planar, smooth, fresh, tight with silt infilling secondary joints are close to moderately spaced, low angle, planar, rough, fresh, tight to partially open. One vertical joint. Joint is planar, fresh, very tight. Rock Quality = Good Recovery = 100% Rock Core Times (min:sec): 31-32' (02:04), 32-33' (01:56), 33-34' (02:40), 34-35' (01:40), 35-36' (03:43)	
35											
	R2	60/60	36.0 - 41.0	RQD = 95%						R2: Very hard to hard, fresh, aphanitic to medium grained, grey, SCHIST. Joints are very close to moderately spaced, planar, smooth, fresh, tight. Rock Quality = Excellent Recovery = 100% Rock Core Times (min;sec): 36-37' (3:13), 37-38' (3:52), 38-39' (1:56), 39-40' (2:20), 40-41' (2:33).	
40											
								-32.4		41.0	
										Bottom of Exploration at 41.0 feet below ground surface.	
45											
50											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. 65x130 mm had one upper corner ____ during V1 & V2.
5. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: HB-WPC-202
WIN: 23929.01

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.8	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Truck B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	3/25/2021 - 3/25/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 89+84.3, 22.0' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	4.6
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/19	0.0 - 2.0	24-18-18-19	36	49	RC			Top 12": Asphalt	
								4.8		1.0 Bottom 7": Brown, wet, gravelly fine to coarse SAND, trace silt, (Fill).	G#21-S-1515 A-1-a, SP-SM WC=3.4
	2D	24/18	4.0 - 6.0	3-5-9-11	14	19				Brown, dry, medium dense, fine to coarse SAND, little silt (Fill). Bottom 2": grey, wet, Silty CLAY.	
5											
							62			Intermittent roller bit resistance from 6.0'-9.0' indicating probable cobbles and boulders.	
							70				
							67				
	3D	24/8	9.0 - 11.0	157-47-2-3	49	67	43			Grey/brown, wet, dense, GRAVEL, some fine to coarse sand, little silt, with probable cobbles, (Fill).	
10							40	-4.2		10.0 Inferred transition to Wetland Deposit based on reduced blow counts.	
							50				
							93				
							93				
	4D	24/24	14.0 - 16.0	WOH-WOH-2-4	2	3	RC			Black, wet, soft, organic SILT, trace fine sand, little organic fibers, (Wetland Deposit).	#21-S-1516 WC=70.5
15											
	1U	24/23	18.0 - 20.0	PUSH						Black, wet, stiff, organic SILT, (Wetland Deposit).	
20	V1		20.6 - 21.0	S_u=>1116/299psf						55x110 mm vane raw torque reading: V1: >300/80 in-lbs.	
	V2		21.6 - 22.0	S_u=1429/312 psf						V2: 32/7 ft-lbs.	
25	5D	24/24	24.0 - 26.0	Push thru vane						Black, wet, stiff, organic SILT, trace fine to coarse SAND, little organic fibers, (Wetland Deposit).	#21-S-1517 OH PI=31

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. 65x130 mm had one upper corner bent during V1 & V2.
5. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Pleasant Cove Bridge (Kennebec Estuary Project) Location: Woolwich, Maine	Boring No.: HB-WPC-202 WIN: 23929.01

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.8	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Truck B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	3/25/2021 - 3/25/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 89+84.3, 22.0' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	4.6
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	V3 V4		24.6 - 25.0 25.6 - 26.0	S_u=1161/223 psf S_u=1161/223 psf						55x110 mm vane raw torque reading: V3: 26/5 ft-lbs. V4: 26/5 ft-lbs.	LL=80 PL=49 WC=64.5
	6D V5 V6	24/24	29.0 - 31.0 29.6 - 30.0 30.6 - 31.0	Push thru vane S_u=1116/179 S_u=1116/179 psf			RC			Black, wet, stiff, organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit). 55x110 mm vane raw torque reading: V5: 25/4 ft-lbs. V6: 25/4 ft-lbs	
30											
								-26.7		32.5	
	7D V7 MV1	24/24	34.0 - 36.0 34.6 - 35.0 35.0 - 36.1	Push thru vane S_u>2000/491psf -	2	3				Grey, wet, very stiff, Silty CLAY, trace fine sand, (Marine Clay). 55x110 mm vane raw torque reading: V7: >49/11 ft-lbs.	#21-S-1518 CL PI=15 LL=33 PL=18 WC=23.9
35											
	2U	24/24	39.0 - 41.0	PUSH						Grey, wet, very stiff, Silty CLAY, (Marine Clay).	
40											
	8D V8 V9	24/24	41.0 - 43.0 41.6 - 42.0 42.6 - 43.0	Push thru vane S_u>2000/536psf S_u>2000/357psf						Grey, wet, stiff to very stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V8: 50/12 ft-lbs. V9: 47.5/8 ft-lbs.	
45								-39.2		45.0	
	9D		49.0 - 51.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	#21-S-1519 CL PI=26
50											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. 65x130 mm had one upper corner bent during V1 & V2.
5. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: HB-WPC-202
WIN: 23929.01

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.8	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Truck B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	3/25/2021 - 3/25/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 89+84.3, 22.0' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	4.6
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
50	V10		49.6 - 50.0	S_u=728/94 psf						V10: 195/25 in-lbs.	LL=49
	V11		50.6 - 51.0	S_u=634/94 psf						V11: 170/25 in-lbs.	PL=23 WC=42.2
55											
	3U	24/24	59.0 - 61.0	PUSH						Grey, wet, medium stiff, Silty CLAY, (Marine Clay).	
60											
	10D		62.0 - 64.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	
	V12		62.6 - 63.0	S_u=781/94 psf						V12: 210/25 in-lbs.	
	V13		63.6 - 64.0	S_u=652/94 psf						V13: 175/25 in-lbs.	
65											
	11D		69.0 - 71.0	Push thru vane						Grey, wet, soft, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	#21-S-1520 WC=38.7
70	V14		69.6 - 70.0	S_u=464/112 psf						V14: 125/30 in-lbs.	
	V15		70.6 - 71.0	S_u=446/112 psf						V15: 120/30 in-lbs.	
75											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. 65x130 mm had one upper corner bent during V1 & V2.
5. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Pleasant Cove Bridge (Kennebec Estuary Project) Location: Woolwich, Maine	Boring No.: HB-WPC-202 WIN: 23929.01

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.8	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Truck B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	3/25/2021 - 3/25/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 89+84.3, 22.0' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	4.6
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
75											
								-72.7		78.5 Interpreted strata change at 78.5' based on increased roller bit resistance and wash return. Grey, wet, medium dense, fine to medium SAND, some gravel, some silt, (Glacial Till).	
	12D	24/5	79.0 - 81.0	8-8-10-8	18	25					G#21-S-1521 A-2-4(0), SM
80											
	13D	5/5	84.0 - 84.4	100/5"	R		NX	-78.6		Grey, wet, fine to coarse SAND, some gravel, some silt, (Glacial Till). 84.4	
85	R1	60/60	84.5 - 89.5	RQD = 47%						Splitspoon refusal at 84.4'. Roller cone to 84.5', probable top of rock. Consistent dark grey rock in wash. Set up to core at 84.5'. R1: Very hard to hard, fresh, aphanitic to coarse grained, grey, SCHIST. Primary joints are very close to close, moderately dipping to planar, rough to smooth, fresh, tight to partially open, with silt in filling. Secondary joints are close to moderately spaced, planar, rough, fresh, very tight to open, with silt in filling. One vertical joint is stepped, smooth, fresh, tight. Rock Quality = Poor Recovery = 100% Rock Core time (min:sec): 84.5-85.5' (01:49), 85.5-86.5' (01:53), 86.5-87.5 (02:09), 87.5-88.5' (02:14), 88.5-89.5' (02:45)	
	R2	54/50	89.5 - 94.0	RQD = 36%						R2: Very hard to hard, fresh to slightly weathered, aphanitic to medium grained, grey, SCHIST. Primary joints are very close to moderately spaced, Undulating to planar, smooth, fresh, tight. Secondary joints are very close to moderately spaced, low angle, undulating, rough, fresh to decomposed, very tight to open, with silt and sand in filling. Rock Quality = Poor Recovery = 93% Rock Core Time (min:sec):89.5-90.5' (01:54), 90.5-91.5' (01:48), 91.5-92.5' (01:46), 92.5-93.5' (03:31), 93.5-94.0' (0: 51)	
90											
								-88.2		94.0 **Bottom of Exploration at 94.0 feet below ground surface.**	
95											
100											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. 65x130 mm had one upper corner bent during V1 & V2.
5. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: HB-WPC-203
WIN: 23929.01

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.4	**Auger ID/OD:**	
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	3/29/2021 - 3/31/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 91+86.9, 21.5' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA			Top 12": Asphalt	
	1D	24/14	1.0 - 3.0	14-10-9-7	19	26		4.4		1.0 Brown, damp, medium dense, Sandy GRAVEL, trace silt, (Fill).	G#21-S-1522 A-1-a, GP-GM WC=2.3
5	2D	11/7	4.0 - 4.9	23-51/3"	-					Brown, wet, very dense, GRAVEL, some fine to coarse sand, little silt, (Fill). Note: Auger action, indicates splitspoon refusal on probable cobble.	
								-2.6		8.0	
10	3D	24/1	9.0 - 11.0	WOR-1-2-2	3	4	RC			Black, wet, soft, organic SILT, (Wetland Deposit).	
	1U	24/23.5	13.0 - 15.0	PUSH	-					Black, wet, medium stiff, organic SILT, (Wetland Deposit).	S_u(DSS)= 588 psf
15	4D V1 V2	24/24	15.0 - 17.0 15.6 - 16.0 16.6 - 17.0	Push thru vane S_u=1071/179 S_u=937/179 psf						Black, wet, stiff, organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit). 55x110 mm raw vane torque reading: V1: 24/4 ft-lbs. V2: 21/4 ft-lbs.	
20	5D V3 V4	24/20	19.0 - 21.0 19.6 - 20.0 20.6 - 21.0	WOR-WOR-WOH-1 Push thru vane S_u=1004/187 psf S_u=1040/187 psf						Black, wet, stiff, organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit). 55x110 mm vane raw torque reading: V3: 270/50 in-lbs. V4: 280/50 in-lbs.	#21-S-1523 OH PI=32 LL=81 PL=49 WC=65.1
25	6D	24/20	24.0 - 26.0	Push thru vane						Black, wet, stiff, organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit).	

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)		**Location:** Woolwich, Maine		**Boring No.:** HB-WPC-203	**WIN:** 23929.01
Driller:	New England Boring Contractors	**Elevation (ft.)**	5.4	**Auger ID/OD:**	
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	3/29/2021 - 3/31/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 91+86.9, 21.5' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	V5 V6		24.6 - 25.0 25.6 - 26.0	S_u=1116/179 psf S_u=1116/179 psf						55x110 mm vane raw torque reading: V5: 25/4 ft-lbs. V6: 25/4 ft-lbs.	
	2U	24/21	29.0 - 31.0	PUSH						Black, wet, organic SILT, (Wetland Deposit).	
30											
	7D V7	24/17	31.0 - 33.0 31.6 - 32.0	Push thru vane S_u=982/179 psf						Black, wet, organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit). 55x110 mm vane raw torque reading: V7: 22/4 ft-lbs.	S_u(DSS)= 623 psf
	V8		32.6 - 33.0	S_u=1116/223 psf						V8: 25/5 ft-lbs.	
	8D	24/21	33.0 - 35.0	WOR-WOR-WOH-WOH						Black, wet, organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit).	
35	9D	24/24	35.0 - 37.0	WOR-WOR-WOR-2						Black, wet, organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit).	#21-S-1524 OH PI=36 LL=76 PL=40 WC=65.7
	10D	24/22	37.0 - 39.0	WOR-WOR-WOH-WOH						Black, wet, organic Clayey SILT, trace fine sand, trace organic fibers, (Wetland Deposit).	
	11D	24/19	39.0 - 41.0	WOR-WOH-5-6	5	7				Top 12": Black, wet, organic SILT, trace organic fibers, (Wetland Deposit).	
40								-34.6		40.0 Bottom 12": Grey, wet, Silty CLAY, (Marine Clay).	
	12D	24/24	44.0 - 46.0	1-3-4-5	7	10				Grey, wet, stiff, Silty CLAY, (Marine Clay).	#21-S-1525 WC=33.0
45											
								-41.6		47.0	
	3U	24/24	49.0 - 51.0	PUSH						Grey, wet, Silty CLAY, (Marine Clay).	S_u(DSS)= 684 psf
50											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: HB-WPC-203
WIN: 23929.01

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.4	**Auger ID/OD:**	
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	3/29/2021 - 3/31/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 91+86.9, 21.5' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
50											
	13D	24/24	51.0 - 53.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V9: 190/30 in-lbs	
	V9		51.6 - 52.0	S_u=705/112 psf							
	V10		52.6 - 53.0	S_u=558/112 psf						V10: 150/30 in-lbs.	
	14D	24/24	54.0 - 56.0	Push thru vane						Grey, wet, soft, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V11: 120/15 in-lbs.	
55	V11		54.6 - 55.0	S_u=446/58 psf							
	V12		55.6 - 56.0	S_u=393/36 psf						V12: 105/10 in-lbs.	
	15D	24/24	59.0 - 61.0	Push thru vane	-					Dark, grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V13: 135/25 in-lbs.	#21-S-1526 CL PI=27 LL=47 PL=20 WC=41.0
60	V13		59.6 - 60.0	S_u=504/94 psf							
	V14		60.6 - 61.0	S_u=504/74 psf						V14: 135/20 in-lbs.	
	16D	24/24	64.0 - 66.0	Push thru vane						Dark grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V15: 135/15 in-lbs.	#21-S-1527 WC=42.8
65	V15		64.6 - 65.0	S_u=504/58 psf							
	V16		65.6 - 66.0	S_u=558/76 psf						V16: 150/20 in-lbs.	
70											
	17D	24/24	74.0 - 76.0	Push thru vane						Dark grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	
75											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: HB-WPC-203
WIN: 23929.01

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.4	**Auger ID/OD:**	
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	3/29/2021 - 3/31/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 91+86.9, 21.5' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
75	V17 V18		74.6 - 75.0 75.6 - 76.0	S_u=839/58 psf S_u=763/58 psf						V17: 225/15 in-lbs. V18: 205/15 in-lbs.	
	4U	24/24	79.0 - 81.0	PUSH						Dark grey, wet, medium stiff, Silty CLAY, (Marine Clay).	S_u(DSS)= 809 psf
80											
	18D ~~V19~~ V20		81.0 - 83.0 ~~81.6 - 82.0~~ 82.6 - 83.0	Push thru vane ~~S_u=576/112 psf~~ S_u=504/94 psf						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V19: 155/30 in-lbs. V20: 135/25 in-lbs.	
85											
	19D	24/24	88.7 - 90.7	WOR-WOR-WOR-WOR						Dark grey, wet, medium stiff, Silty CLAY, (Marine Clay).	#21-S-1528 WC=30.4
90											
95											
								-91.3		96.7 Increased roller bit resistance at 96.7', probable top of rock. Roller cone increased in resistance at 97.1'. Dark grey rock in wash return. Advanced roller cone to 98.0', set up to core.	
	R1	43/43	98.0 - 101.6	RQD = 35%			NX			R1: Hard, fresh to slightly weathered, aphanitic to fine grained, grey, SCHIST. Primary joints are extremely close to moderately spaced high angle to vertical, planar, smooth, fresh, very tight to tight with silt in	
100											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: HB-WPC-203
WIN: 23929.01

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.4	**Auger ID/OD:**	
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	3/29/2021 - 3/31/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 91+86.9, 21.5' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
100										filling. Secondary joints are very close to close, low angle to moderately dipping planar, rough, fresh, tight with silt infilling. Rock Quality = Poor Recovery = 100% Rock Core Time (min:sec): 98-99' (01:52), 99-100' (02:23), 100-101' (02:40), 101-101.6' (02:14)	
	R2	47/46	101.6 - 105.5	RQD = 38%						R2: Hard, fresh, aphanitic to fine grained, grey, SCHIST. Primary joints are very close to close, low angle to moderately dipping, planar, rough to smooth, fresh to decomposed, tight, with silt in filling. One vertical joint, joint is indulating to planar, smooth, fresh to decomposed, tight, with silt infilling. Rock Quality = Poor Recovery = 98% Rock Core Times (min:sec): 101.6-102.6' (01:52), 102.6-103.6' (02:22), 103.6-104.6' (02:21), 104.6-105.5' (02:05)	
105	R3	35/33.6	105.5 - 108.4	RQD = 44%						R3: Hard, fresh, aphanitic to fine grained, grey, SCHIST. Primary joints are very close to close, low angle, planar, rough to smooth, fresh, tight, with silt infilling. One high angle joint; joint is stepped to planar, smooth, fresh, tight, with silt infilling. Rock Quality = Poor Recovery = 96% Rock Core Times (min:sec): 105.5-106.5' (02:19), 106.5-107.5' (01:21), 107.5-108.4' (03:46)	
								-103.0		108.4	
										Bottom of Exploration at 108.4 feet below ground surface.	
110											
115											
120											
125											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: HB-WPC-204
WIN: 23929.01

Driller:	New England Contractor	**Elevation (ft.)**	15.2	**Auger ID/OD:**	4"
Operator:	Matt Grass	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/30/2021-03/31/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 98+93.6, 16.9' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	NA
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/14	0.5 - 2.5	10-13-15-18	18	26	SSA	14.7		Asphalt 0.5 / Brown, dry, medium dense, fine to coarse SAND, some gravel, little silt, (Fill).	G#21-S-1529 A-1-b, SM WC=4.0
5	2D	24/19	5.0 - 7.0	4-4-7-10	11	16	24			Brown, dry, medium dense, fine to coarse SAND, little gravel, little silt, (Fill).	
							52				
							62				
							65				
							93				
10	3D	24/7	10.0 - 12.0	16-7-6-8	13	18	28			Brown and light brown, wet, medium dense, fine to coarse SAND, some gravel, trace silt, (Fill).	
							87				
							132/1			Intermittent roller bit resistance from 12.6'-13.8' indicating probable cobbles and boulders.	
							RC				
15	4D	24/9	15.0 - 17.0	5-7-19-24	26	37				Brown, wet, dense, fine to coarse SAND, some silt, little gravel, (Fill).	
							29	-2.3		17.5 Interpreted strata change at 17.5' based on increased roller bit advancement and change in wash return.	
							75				
							112				
20	5D	24/14	20.5 - 22.5	5-4-3-5	7	10	21			Dark brown, moist, stiff, Sandy organic SILT, (Wetland Deposit).	
							33				
							23				
							25				
							31	-8.8		24.0 Interpreted strata change at 24.0' based on change in wash return color	
25											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#1, energy transfer ratio = 0.852
3. Water level not observed.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: HB-WPC-204
WIN: 23929.01

Driller:	New England Contractor	**Elevation (ft.)**	15.2	**Auger ID/OD:**	4"
Operator:	Matt Grass	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/30/2021-03/31/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 98+93.6, 16.9' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	NA
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	6D	7/5	25.4 - 26.0	5-37/1"			RC	-10.4		from dark brown to grey. Grey, wet, Silty CLAY, (Glacial Till). Splitspoon refusal at 25.6'. Probable top of rock. 25.6	
	R1	60/59	27.0 - 32.0	RQD = 98%			NX			Roller cone to 25.8'. Based on roller cone resistance, bedrock appears highly fractured. Advanced roller bit to 27'. Set up to core at 27'. R1: Hard, fresh to slightly weathered, fine grained, grey, SCHIST. Joints are close to widely spaced, moderately dipping, undulating, rough, open. Rock Quality = Excellent Recovery = 98% Rock Core Times (min:sec): 27-28' (1:37), 28-29' (1:38), 29-30' (1:44), 30-31' (1:43), 31-32' (1:32)	
30											
	R2	60/60	32.0 - 37.0	RQD = 73%						R2: Hard, fresh to slightly weathered, fine to medium grained, grey, SCHIST. Joints are very close to wide, moderately dipping, undulating, rough, open, with little silt infilling. Rock Quality = Fair Recovery = 100% Rock Core Times (min:sec): 32-33' (0:50), 33-34' (1:29), 34-35' (1:31), 35-36' (2:16), 36-37' (1:49)	
35											
								-21.8		37.0 **Bottom of Exploration at 37.0 feet below ground surface.**	
40											
45											
50											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#1, energy transfer ratio = 0.852
3. Water level not observed.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: HB-WPC-205
WIN: 23929.01

Driller:	New England Boring Contractor	**Elevation (ft.)**	23.8	**Auger ID/OD:**	-
Operator:	Matt Grass	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-93 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/29/2021-03/30/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 100+52.2, 16.4' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	8.9
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA		Asphalt	
	1D	24/6	1.5 - 3.5	11-12-16-11	28	40		22.9	0.9 — Brown, dry, dense, fine to coarse SAND, little gravel, trace silt, (Fill).	
5	2D	24/9	5.0 - 7.0	8-16-17-15	33	47	67		Brown, moist, dense, gravelly fine to coarse SAND, some silt, (Fill).	G#21-S-1530 A-1-b, SM WC=6.6
							68			
							14			
							17			
							20			
10	3D	24/6	10.0 - 12.0	2-1-1-1	2	3	28		Olive-brown, moist, very loose, Silty fine to coarse SAND, some clay, trace gravel, (Fill).	
							22			
							25			
							25			
							26			
15	4D	24/5	15.0 - 17.0	WOH-WOH-2-5	-		29		Olive-brown, wet, very soft, Silty CLAY, some medium to coarse sand, trace gravel, (Fill).	
							42			
							47			
							40			
							60			
20	5D	24/8	20.0 - 22.0	7-8-8-8	16	23	76	3.8	20.0 — Olive-brown, moist, stiff, Clayey SILT, trace fine sand, trace gravel, (Wetland Deposit).	
							66			
							64			
							88			
							125			
25										

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#1, energy transfer ratio = 0.852
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Pleasant Cove Bridge (Kennebec Estuary Project)
Location: Woolwich, Maine

Boring No.: HB-WPC-205
WIN: 23929.01

Driller:	New England Boring Contractor	**Elevation (ft.)**	23.8	**Auger ID/OD:**	-
Operator:	Matt Grass	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-93 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/29/2021-03/30/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 100+52.2, 16.4' RT	**Casing ID/OD:**	4"/4.5"	**Water Level*:**	8.9
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	6D	24/17	25.0 - 27.0	33-38-41-29	79	112	RC	-1.2		25.0 Olive-brown, moist, very dense, fine to coarse SAND, some silt, trace gravel, (Glacial Till).	
								-4.9		28.7 Roller cone resistance increased at 28.7'. Probable top of rock. Rig chatter indicates highly fractured rock. Roller cone to 30'. Set up to core at 30'.	
30	R1	60/60	30.0 - 35.0	RQD = 37%			NX			R1: Hard, fresh to slightly weathered, fine to coarse grained, white and grey, SCHIST. Joints are extremely close to moderately spaced, low angle to moderately dipping, undulating, rough, open, with some silt infilling. Rock Quality = Poor Recovery = 100% Rock Core Times (min:sec): 30-31' (1:20), 31-32' (1:24), 32-33' (1:28), 33-34' (1:21), 34-35' (1:16)	
35	R2	60/48	35.0 - 40.0	RQD = 58%						R2: Hard, fresh to slightly weathered, fine to coarse grained, white and grey, SCHIST. Joints are close to moderately spaced, low angle to moderately dipping, undulating, rough, open, with sand and silt infilling Rock Quality = Fair Recovery = 80% Rock Core Times (min:sec): 35-36' (0:43), 36-37' (1:00), 37-38' (1:12), 38-39' (1:04), 39-40' (1:10)	
40								-16.2		40.0 **Bottom of Exploration at 40.0 feet below ground surface.**	
45											
50											

Remarks:

1. Fine Grained Soil Descriptions on this log are based on plasticity estimated using visual manual classification techniques or laboratory Atterberg Limit tests if available, rather than the Maine DOT Standard based percentages passing specific grain sizes.
2. Automatic hammer NEBC#1, energy transfer ratio = 0.852
3. Water level measured immediately after removal of casing.
4. Field Vane Shear Tests in Organic SILT may be higher than the actual undrained shear strengths due to the presence of organic fibers.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

APPENDIX C – CONE PENETRATION TEST REPORT

APPENDIX C.1 – CPT INTERPRETATION REPORT BY GZA

GZA GeoEnvironmental, Inc

CPT: CPT-KERP-101

Total depth: 79.73 ft, Date: 1/29/2020

Surface Elevation: 5.30 ft

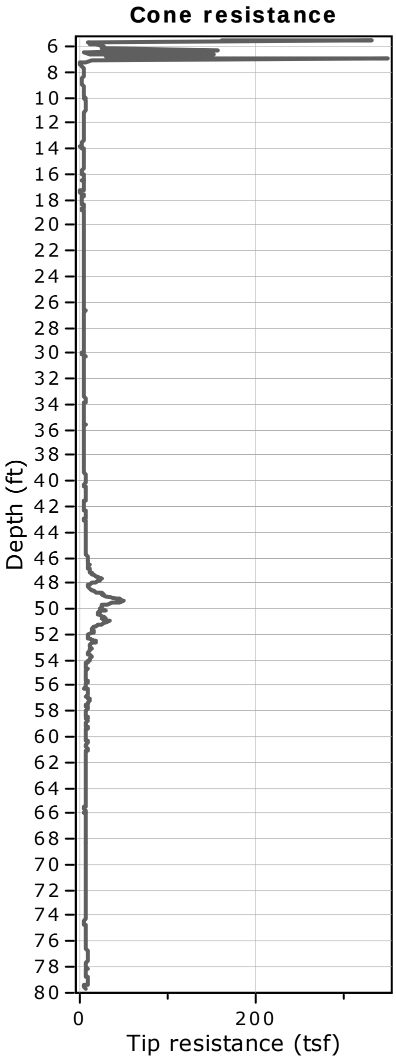
Coords: X:0.00, Y:0.00

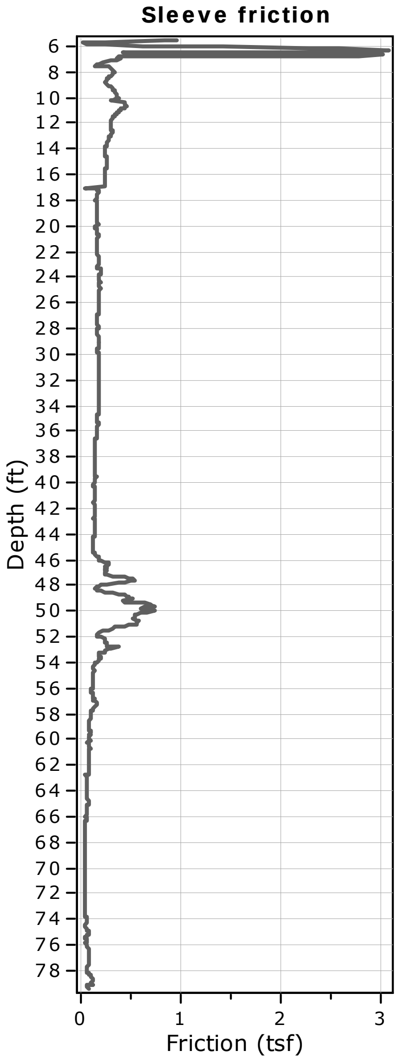
Cone Type:

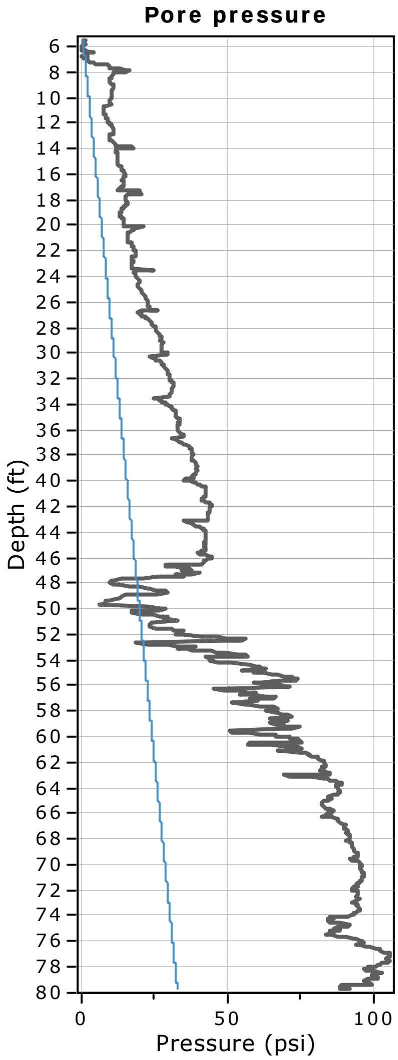
Cone Operator:

Project:

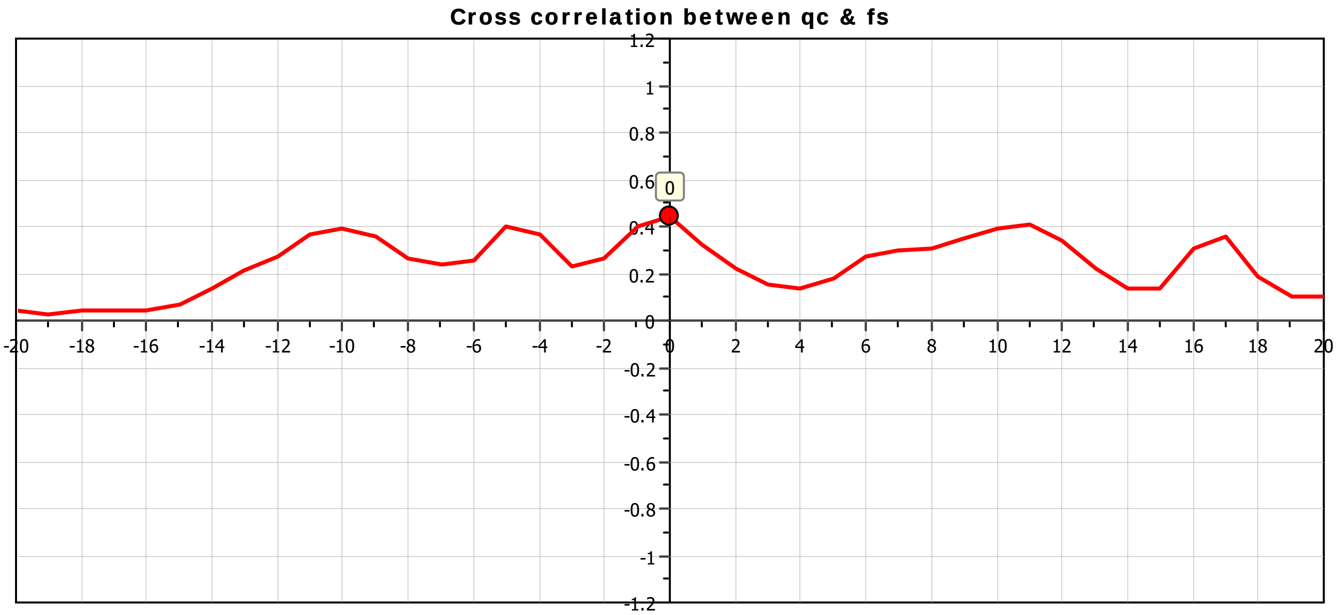
Location:







The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).

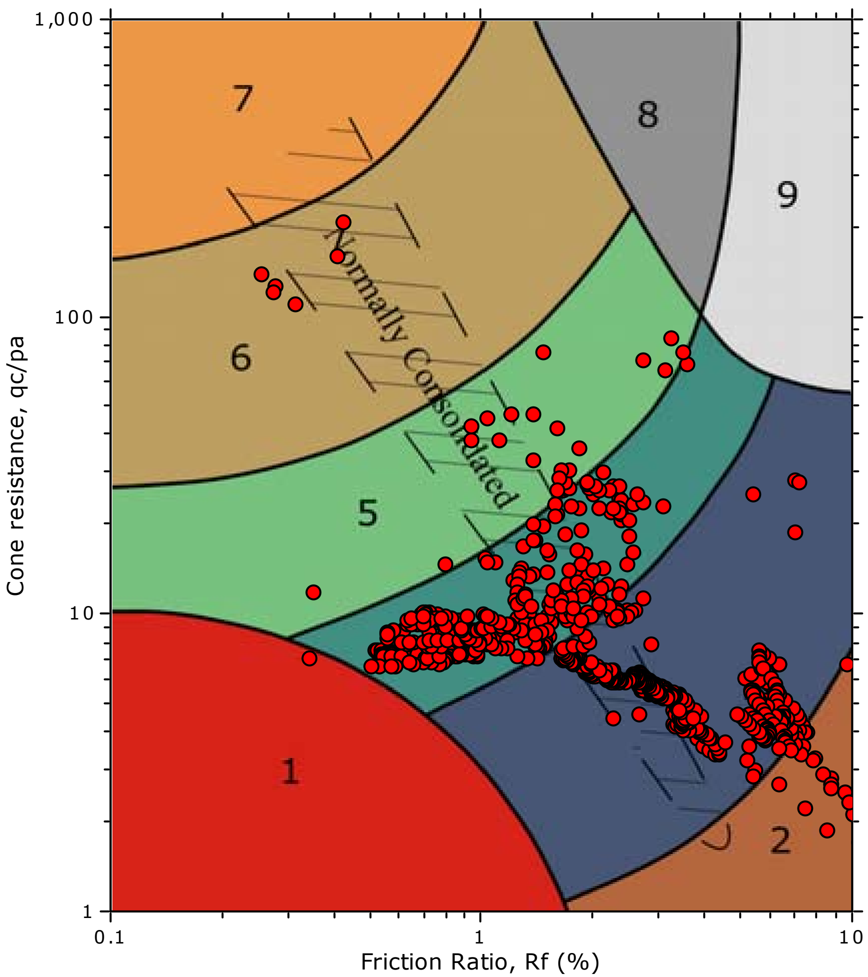


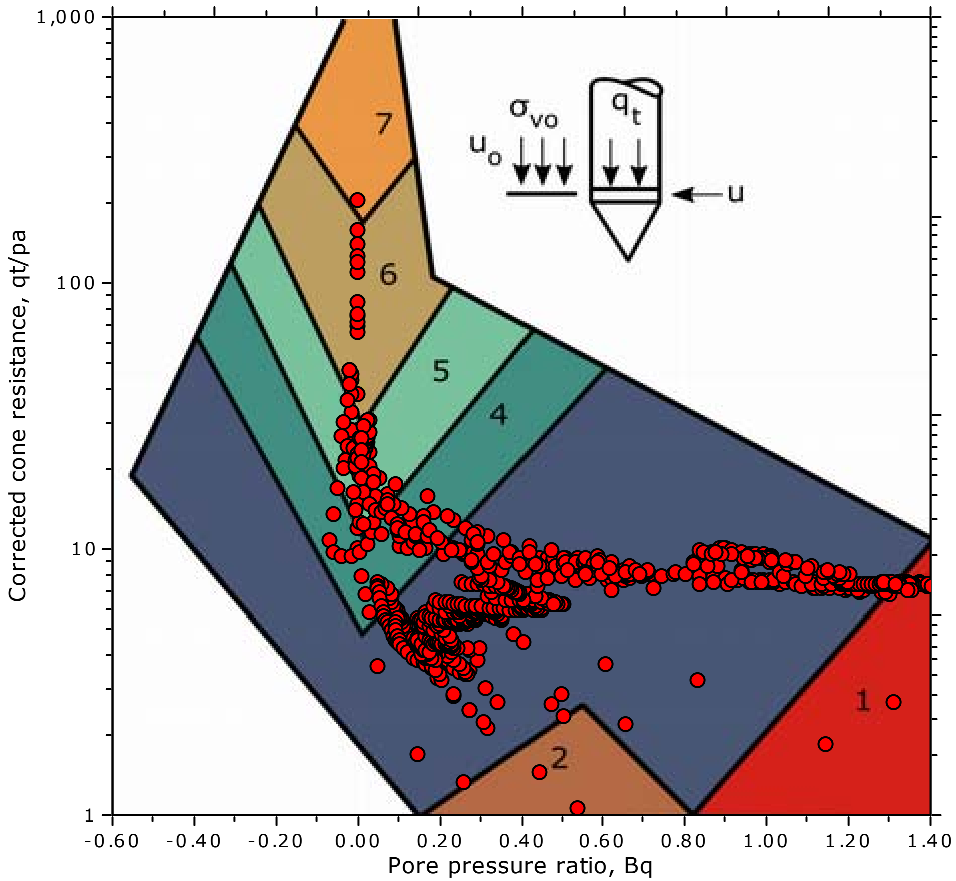
GZA GeoEnvironmental, Inc

CPT: CPT-KERP-101
Total depth: 79.73 ft, Date: 1/29/2020
Surface Elevation: 5.30 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:

SBT - Bq plots

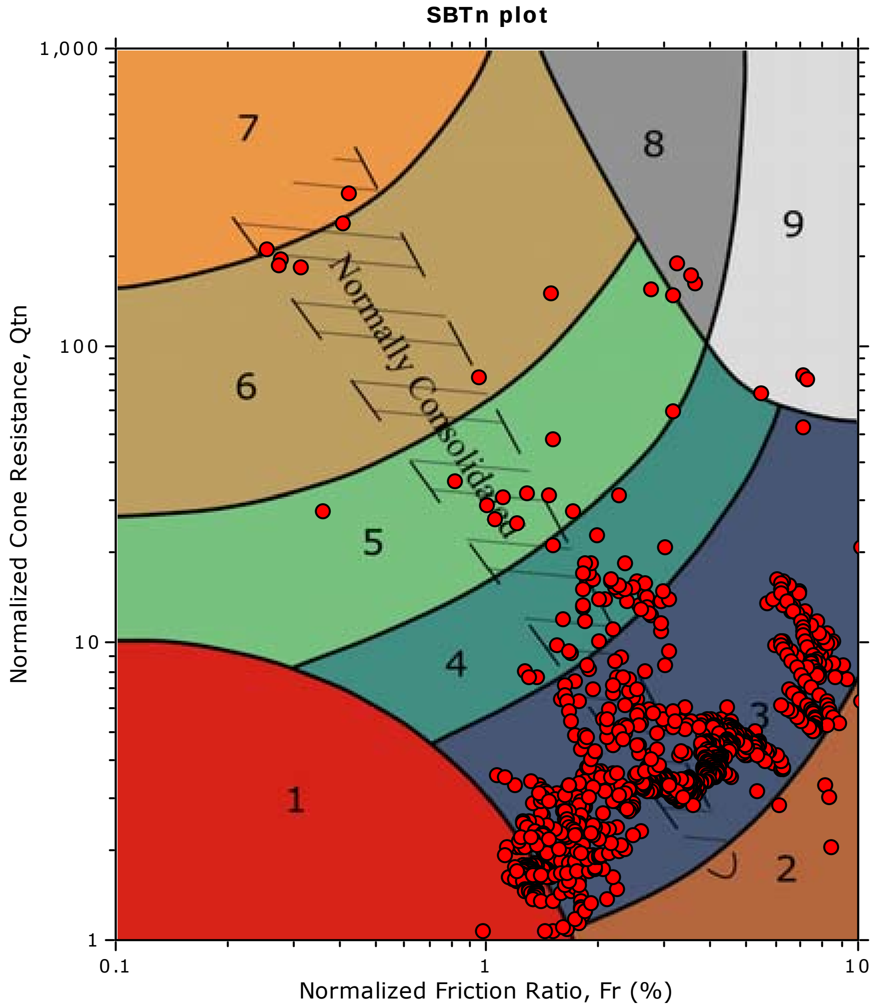


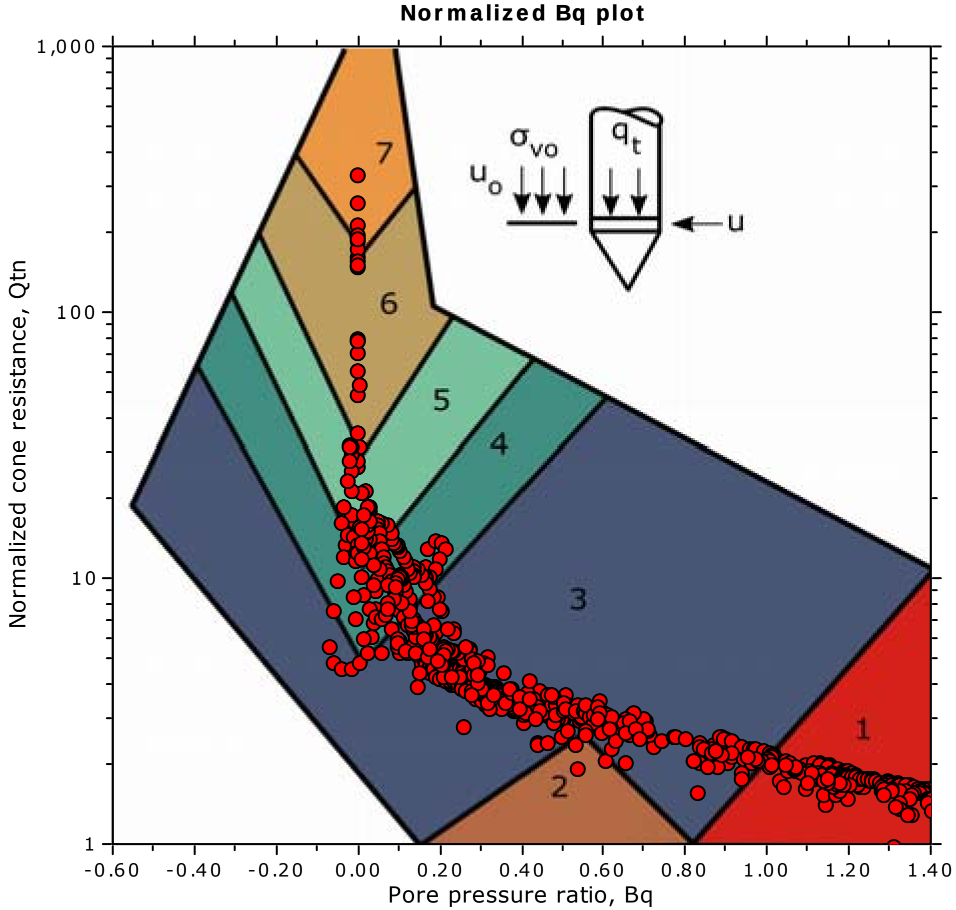


SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

SBT - Bq plots (normalized)

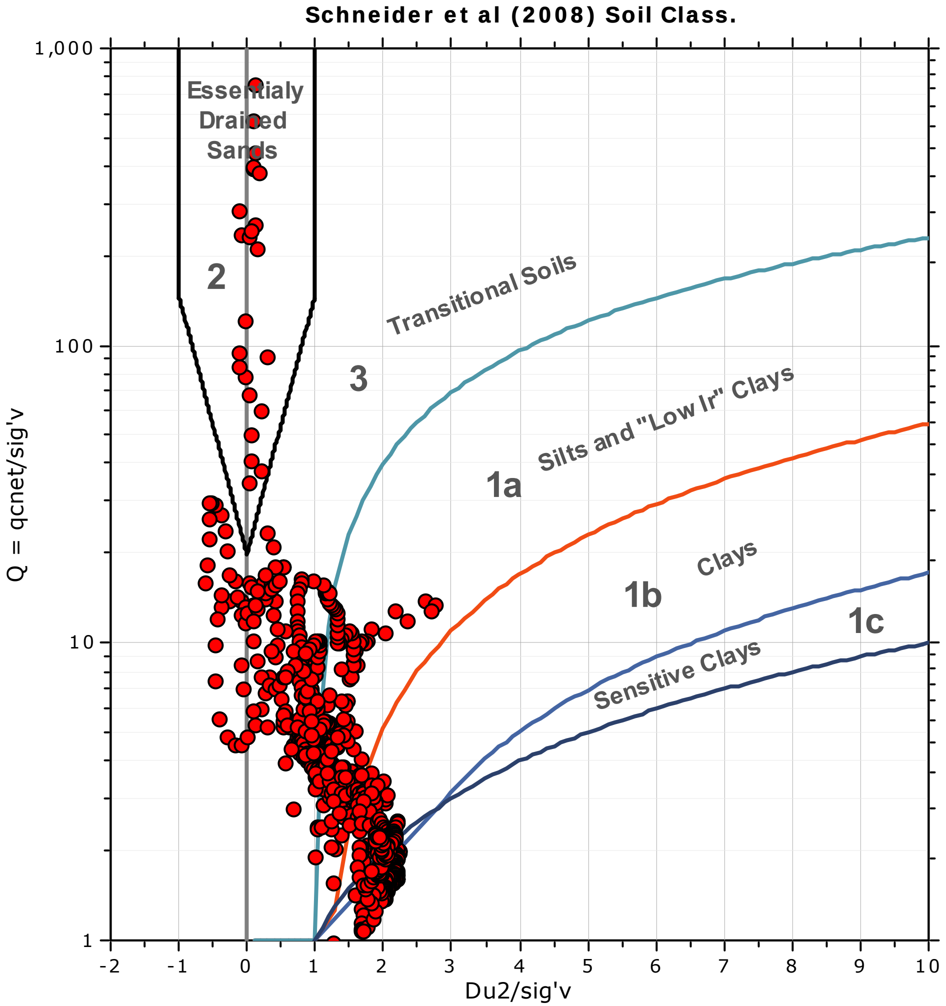


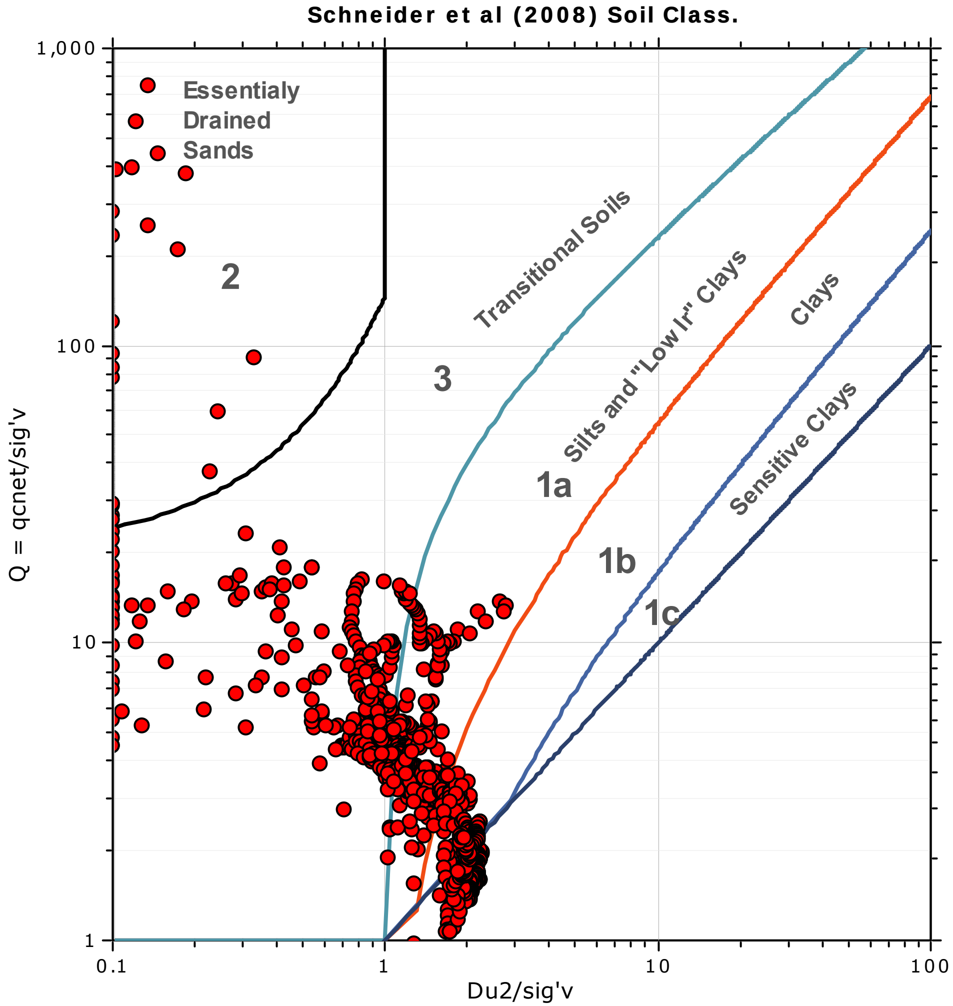


SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Bq plots (Schneider)





GZA GeoEnvironmental, Inc

CPT: CPT-KERP-101

Total depth: 79.73 ft, Date: 1/29/2020

Surface Elevation: 5.30 ft

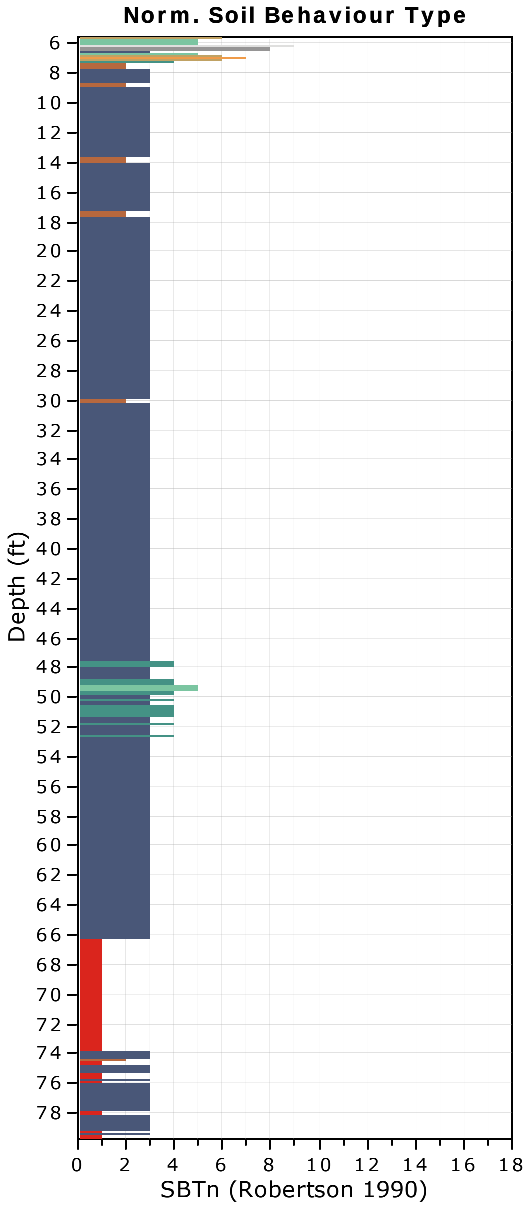
Coords: X:0.00, Y:0.00

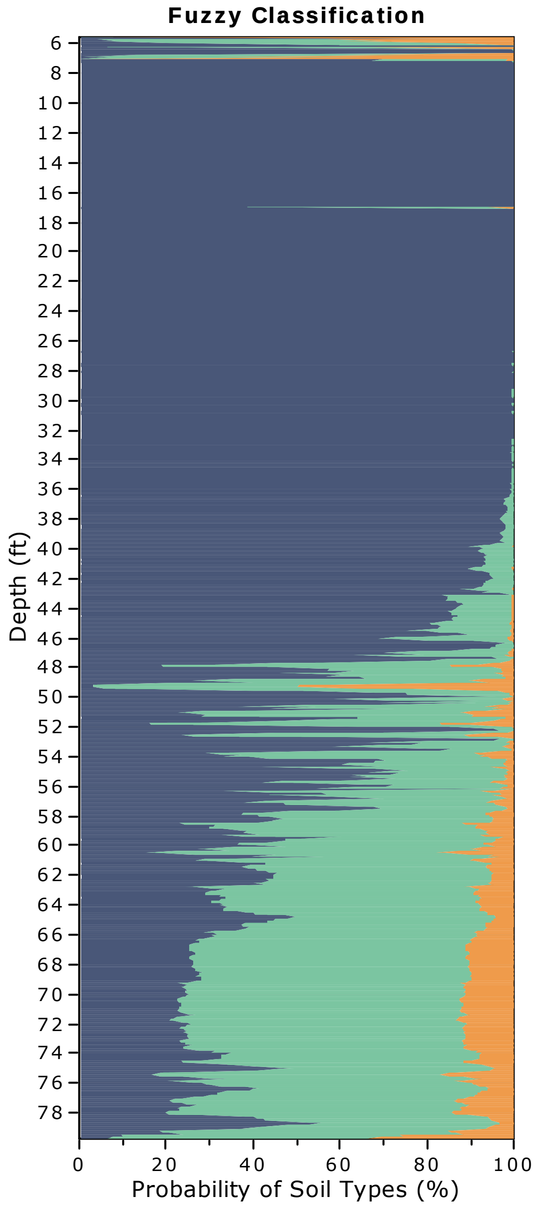
Cone Type:

Cone Operator:

Project:

Location:



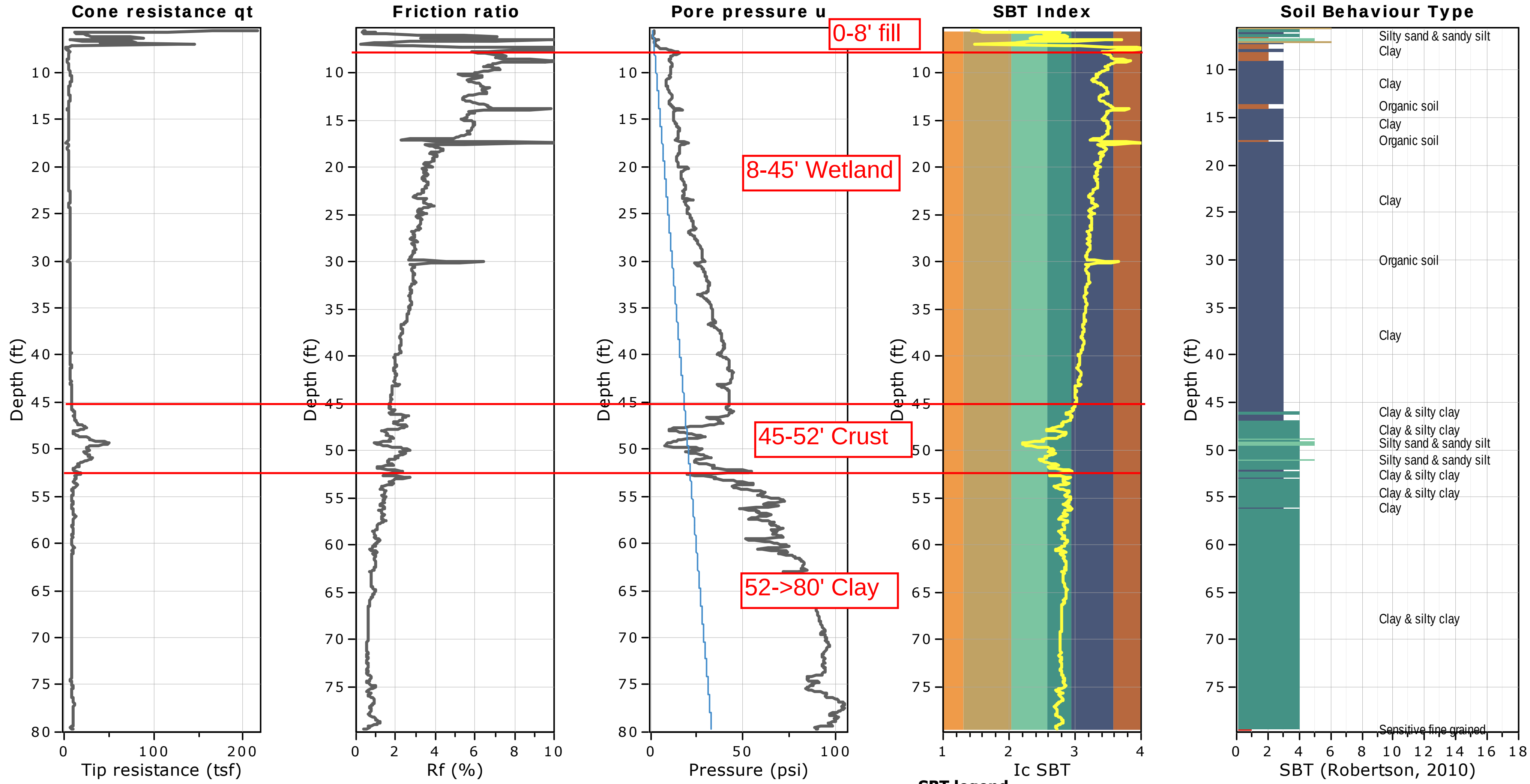


GZA GeoEnvironmental, Inc

CPT: CPT-KERP-101

Total depth: 79.73 ft, Date: 1/29/2020
Surface Elevation: 5.30 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



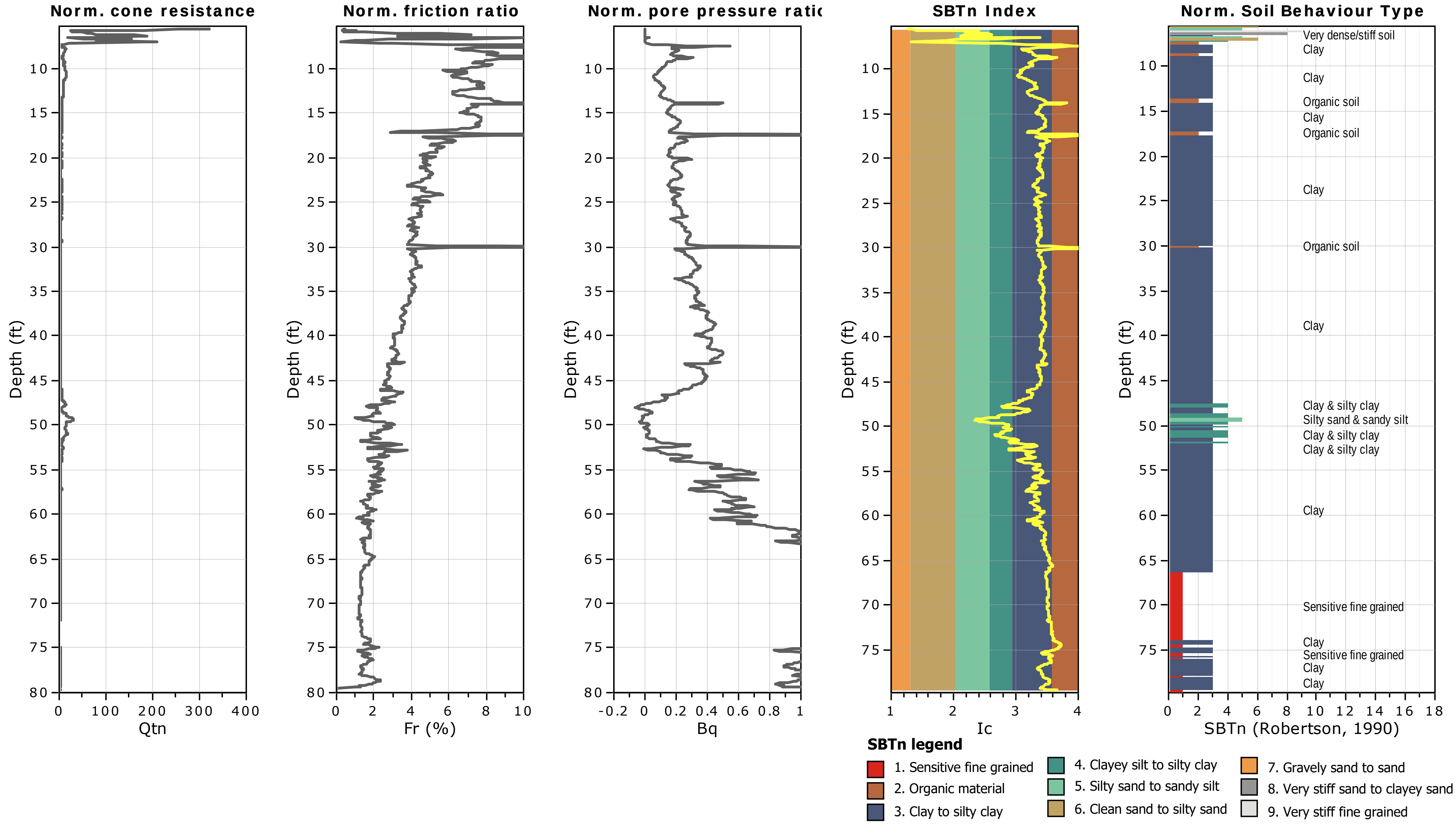
SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

GZA GeoEnvironmental, Inc

CPT: CPT-KERP-101
Total depth: 79.73 ft, Date: 1/29/2020
Surface Elevation: 5.30 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

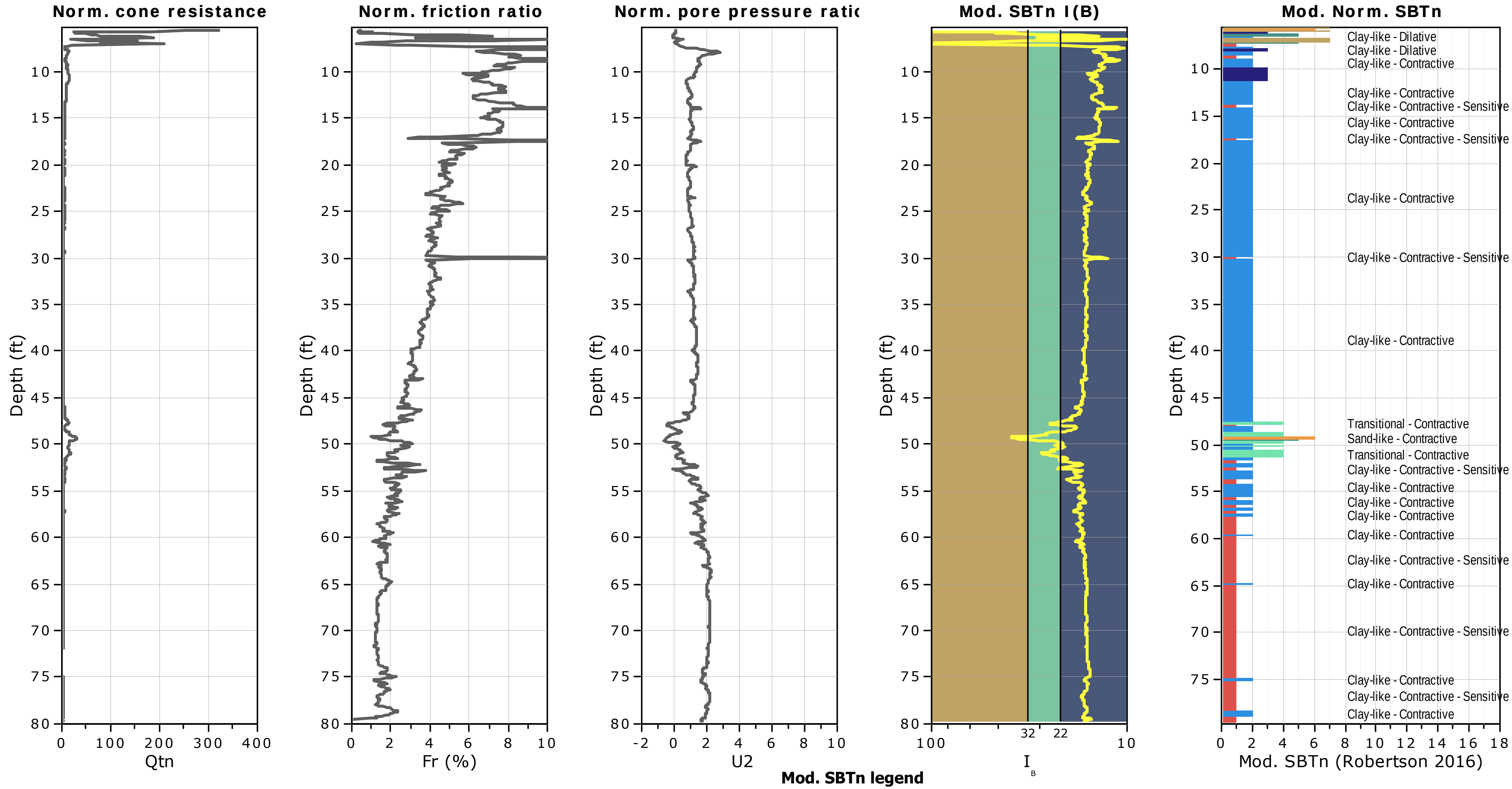
Project:
Location:



GZA GeoEnvironmental, Inc

CPT: CPT-KERP-101
Total depth: 79.73 ft, Date: 1/29/2020
Surface Elevation: 5.30 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



Mod. SBTn legend

1. CCS: ClayLike - Contractive, Sensitive
2. CC: Clay-like - Contractive
3. CD: Clay-Like: Dilative
4. TC: Transitional - Contractive
5. TD: Transitional - Dilative
6. SC: Sand-like - Contractive
7. SD: Sand-like - Dilative

GZA GeoEnvironmental, Inc

CPT: CPT-KERP-101

Total depth: 79.73 ft, Date: 1/29/2020

Surface Elevation: 5.30 ft

Coords: X:0.00, Y:0.00

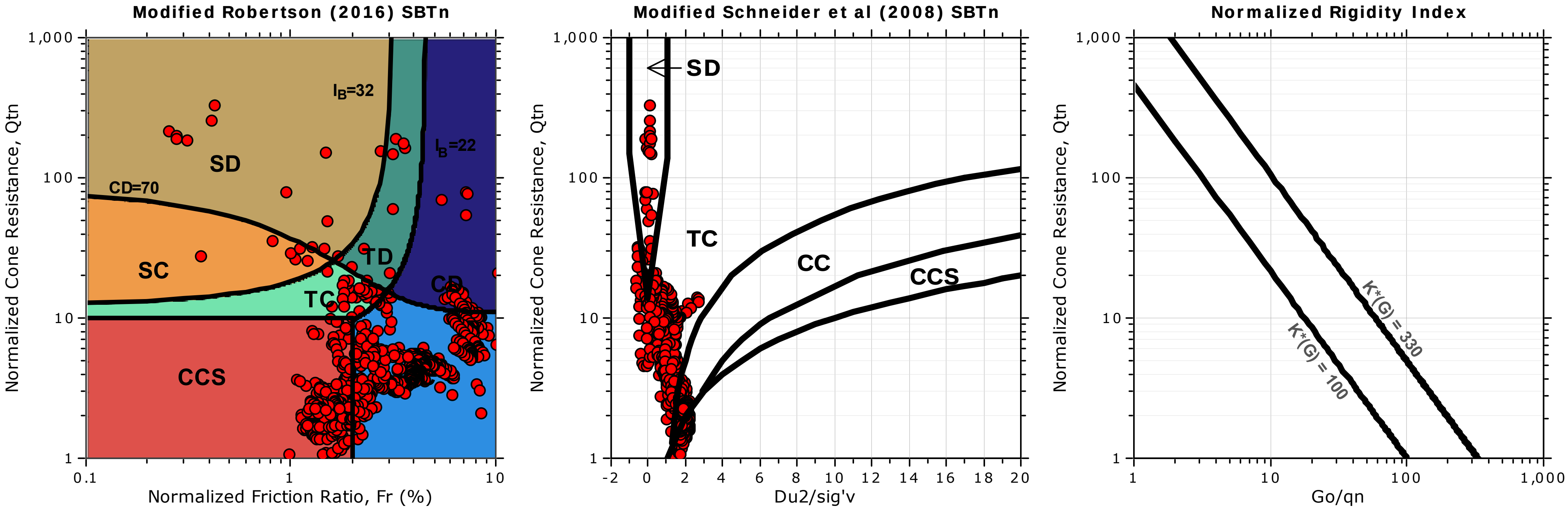
Cone Type:

Cone Operator:

Project:

Location:

Updated SBTn plots



CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
TD: Transitional - Dilative
SC: Sand-like - Contractive
SD: Sand-like - Dilative

K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

GZA GeoEnvironmental, Inc

CPT: CPT-KERP-101

Total depth: 79.73 ft, Date: 1/29/2020

Surface Elevation: 5.30 ft

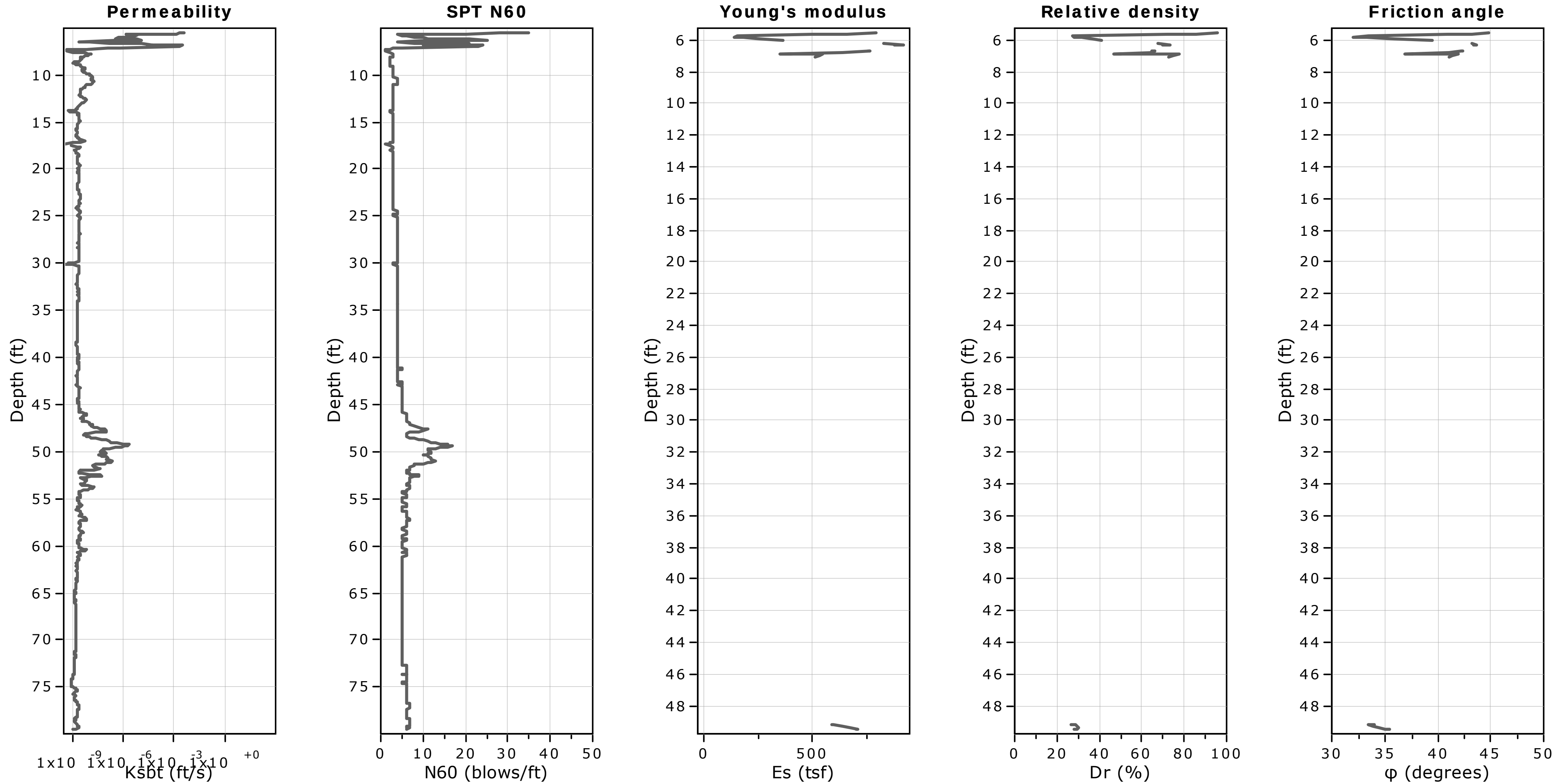
Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Project:

Location:



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60}: Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

Relative density constant, C_{Dr}: 350.0

Phi: Based on Kulhawy & Mayne (1990)

User defined estimation data

GZA GeoEnvironmental, Inc

CPT: CPT-KERP-101

Total depth: 79.73 ft, Date: 1/29/2020

Surface Elevation: 5.30 ft

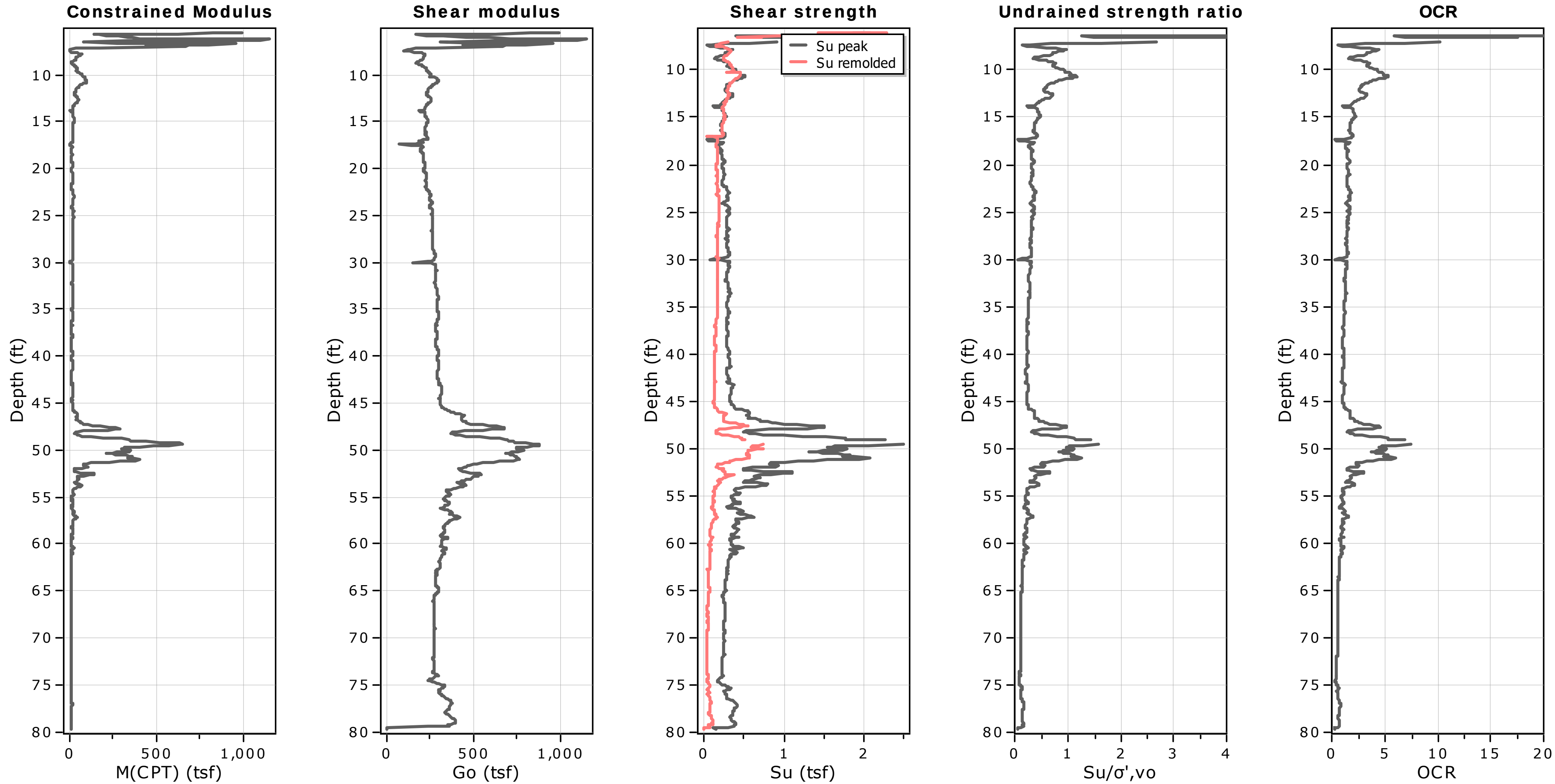
Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Project:

Location:



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt}: 14

OCR factor for clays, N_{kt}: 0.33

User defined estimation data

Flat Dilatometer Test data

GZA GeoEnvironmental, Inc

CPT: CPT-KERP-101

Total depth: 79.73 ft, Date: 1/29/2020

Surface Elevation: 5.30 ft

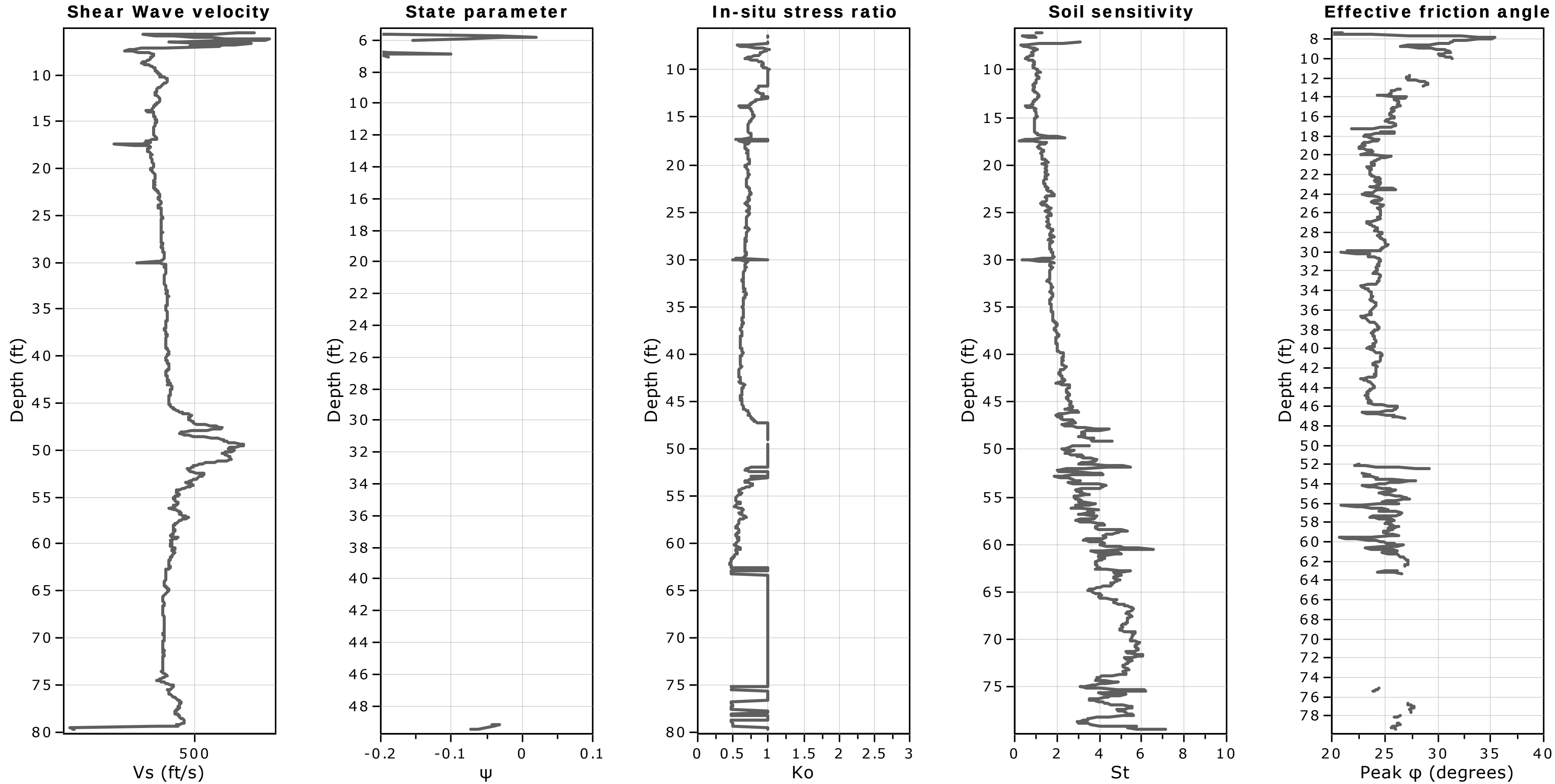
Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Project:

Location:



Calculation parameters

Soil Sensitivity factor, N_S: 7.00

User defined estimation data

GZA GeoEnvironmental, Inc

CPT: CPT-WPC-201

Total depth: 92.00 ft, Date: 5/12/2021

Surface Elevation: 0.00 ft

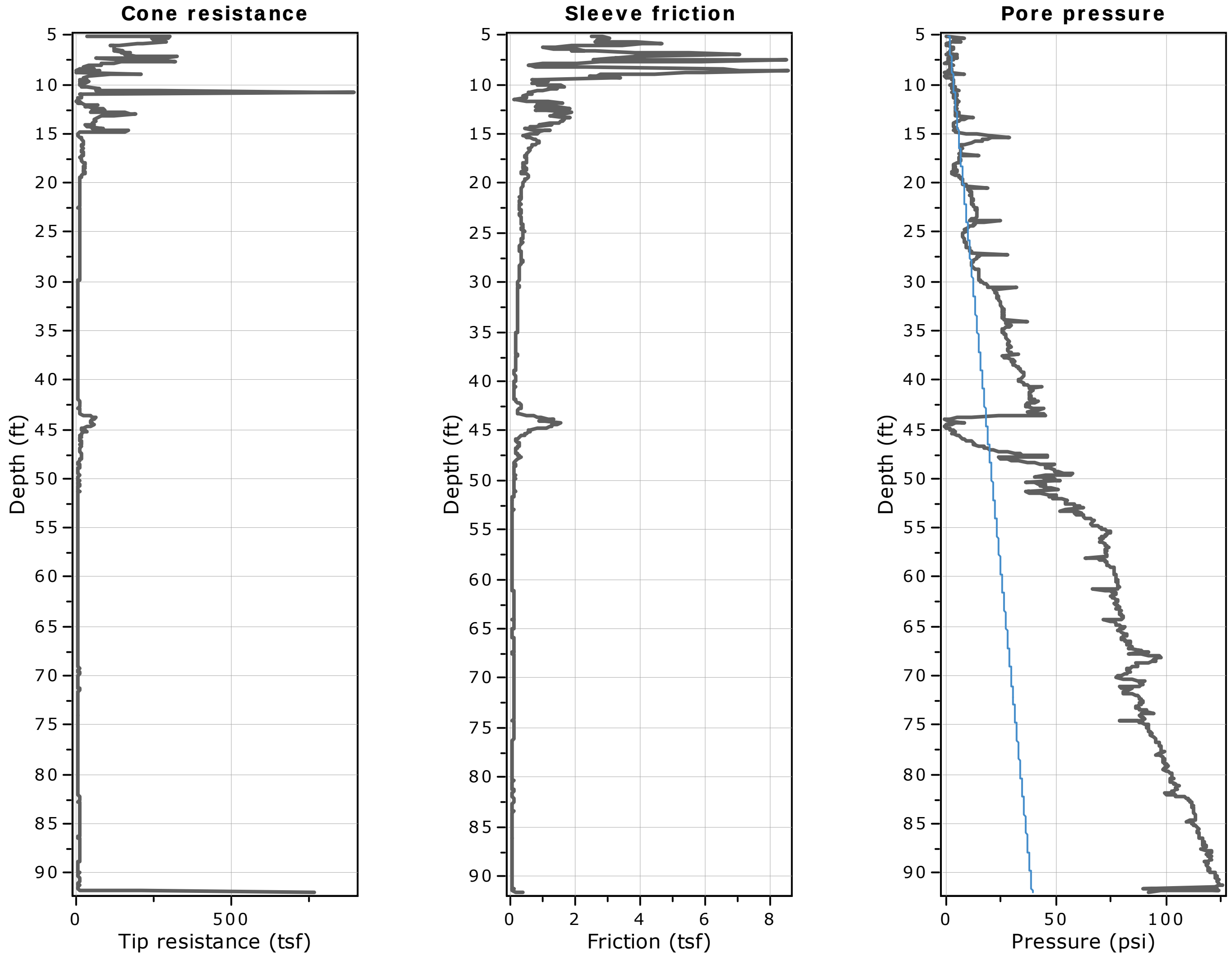
Coords: X:0.00, Y:0.00

Cone Type:

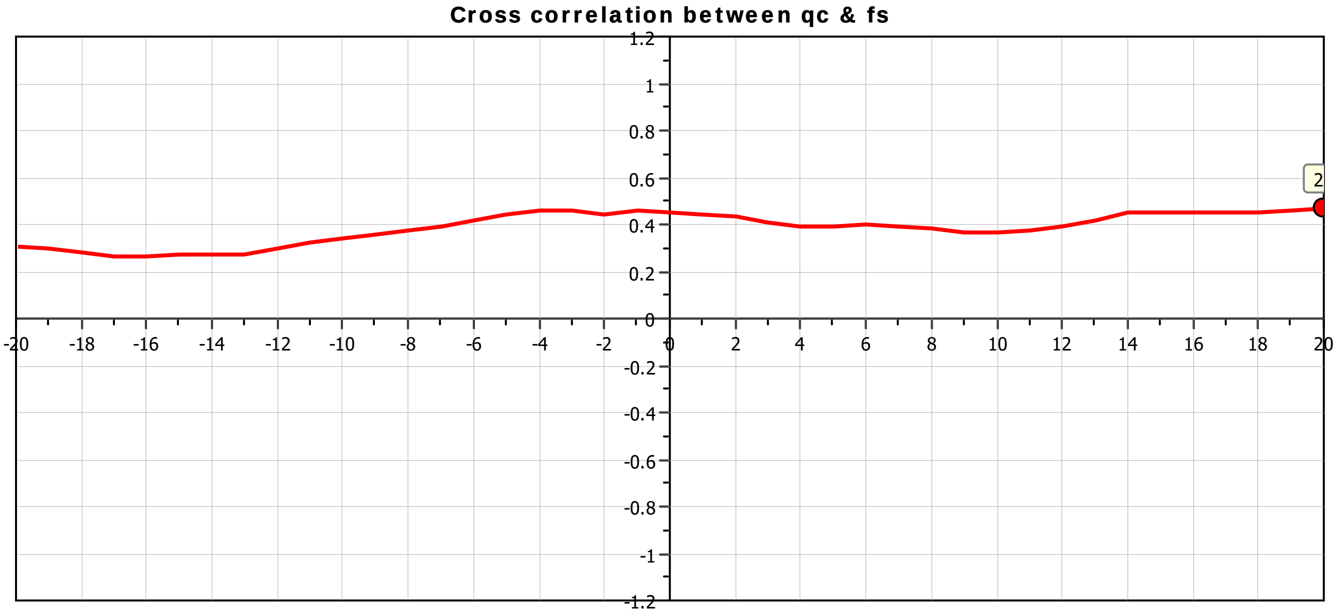
Cone Operator:

Project:

Location:



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).

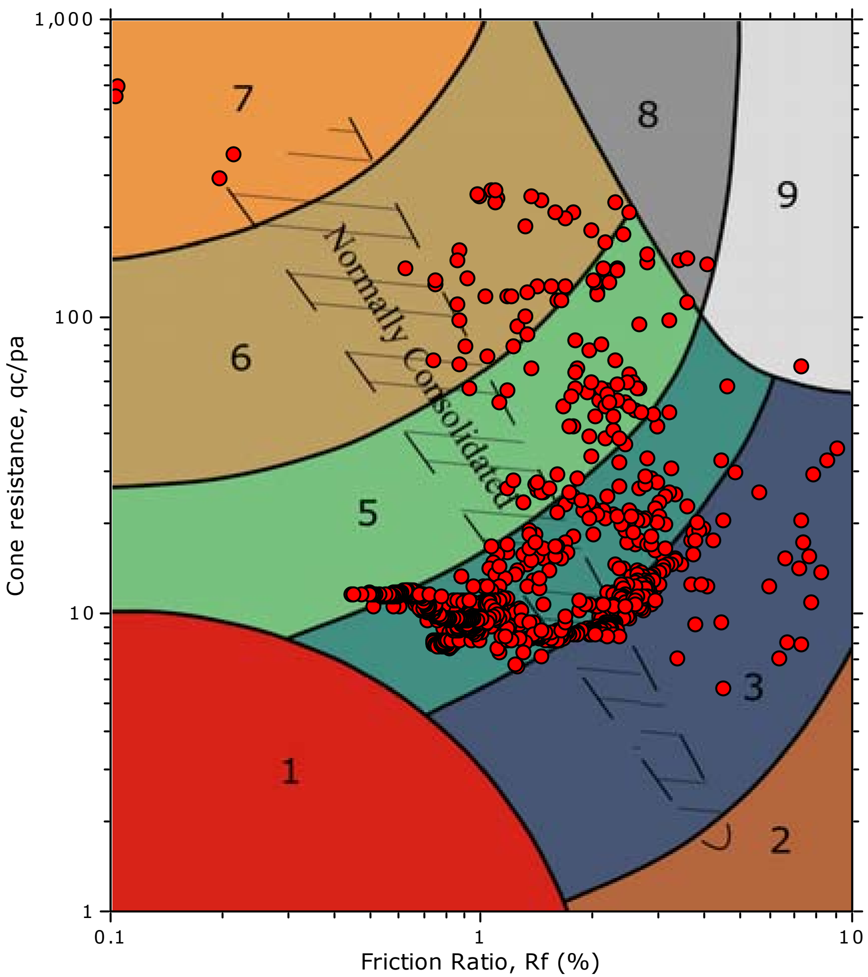


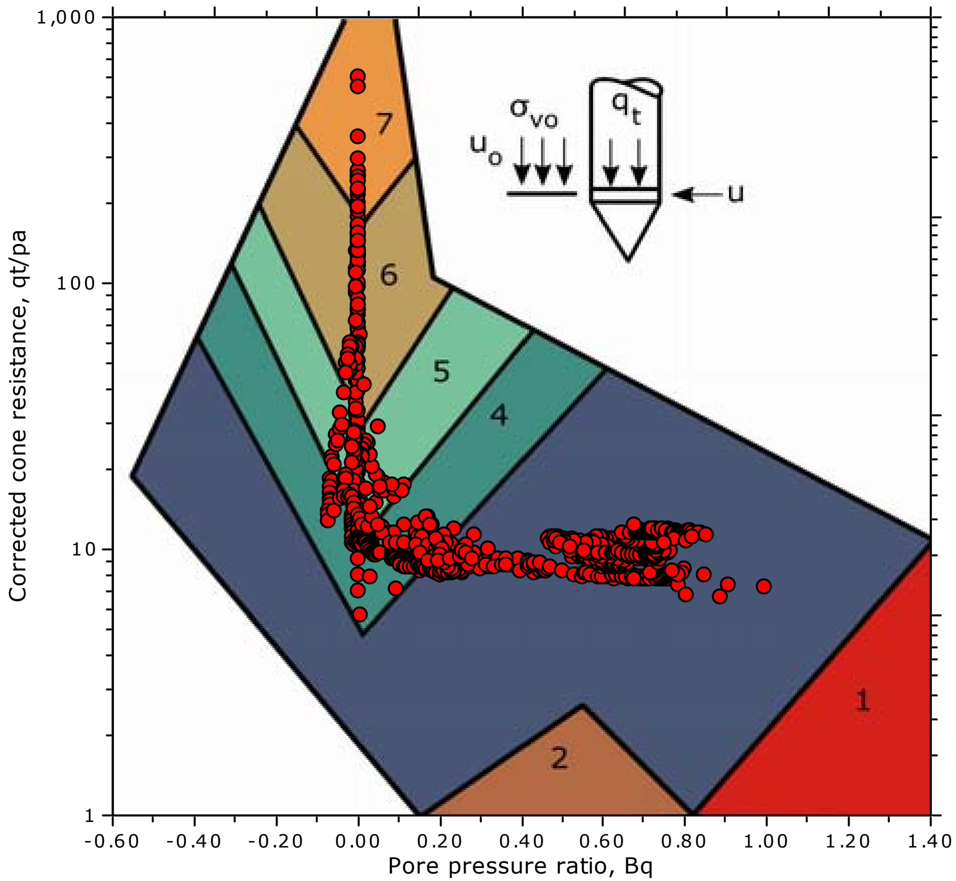
GZA GeoEnvironmental, Inc

CPT: CPT-WPC-201
Total depth: 92.00 ft, Date: 5/12/2021
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:

SBT - Bq plots





SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

GZA GeoEnvironmental, Inc

CPT: CPT-WPC-201

Total depth: 92.00 ft, Date: 5/12/2021

Surface Elevation: 0.00 ft

Coords: X:0.00, Y:0.00

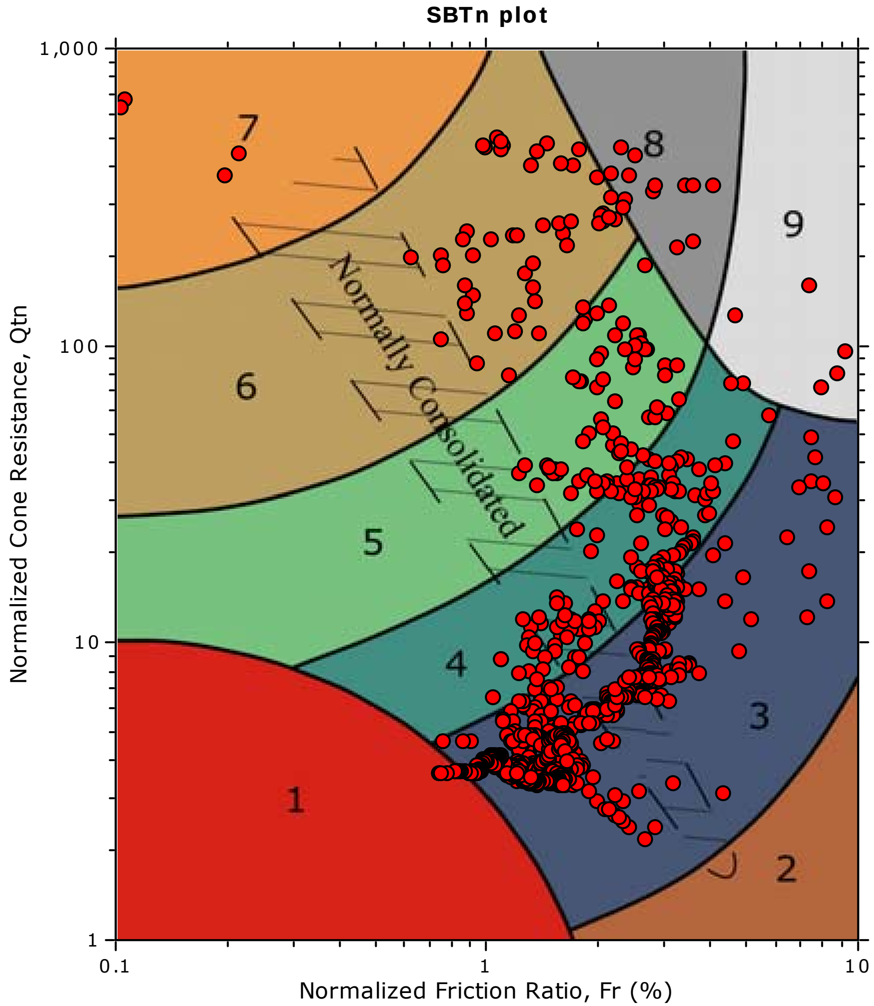
Cone Type:

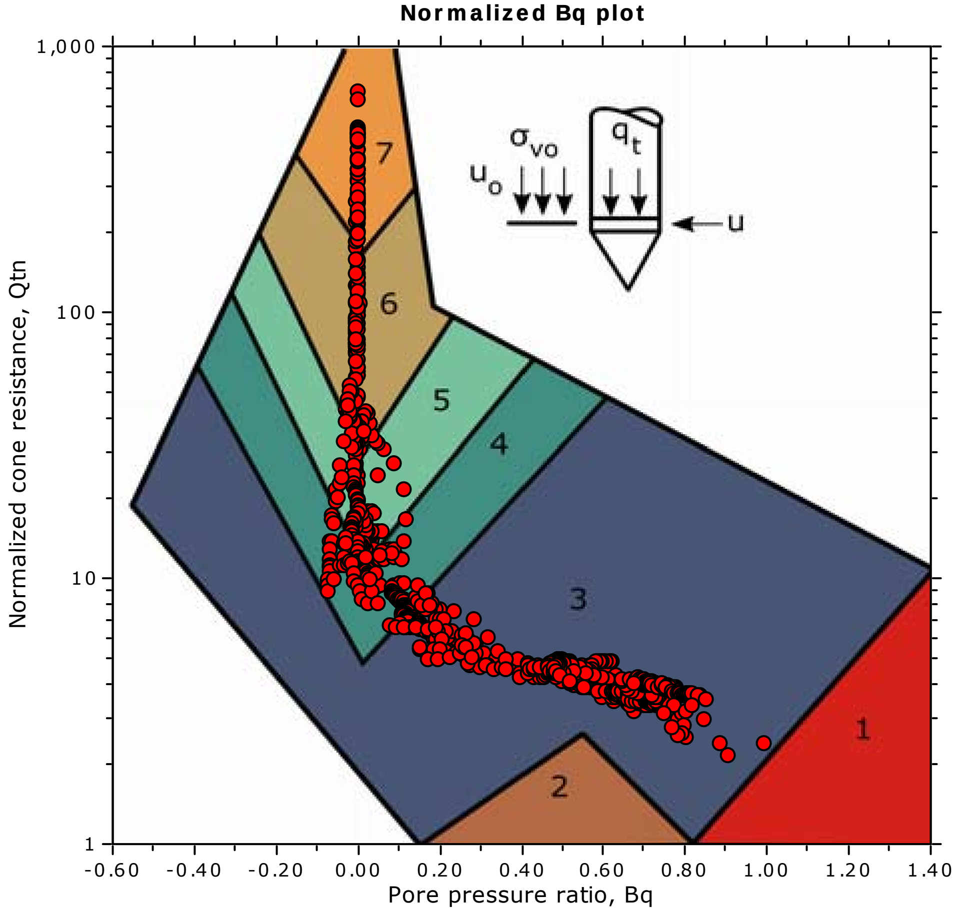
Cone Operator:

Project:

Location:

SBT - Bq plots (normalized)





SBTn legend

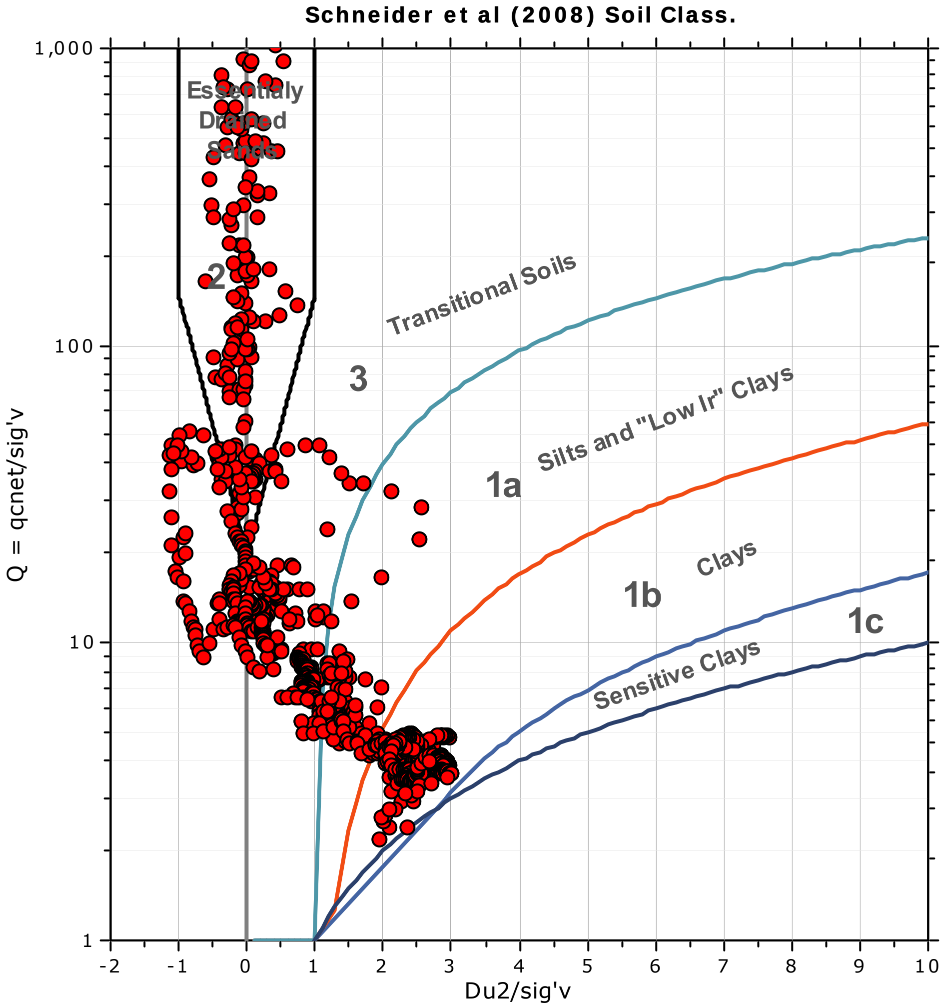
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

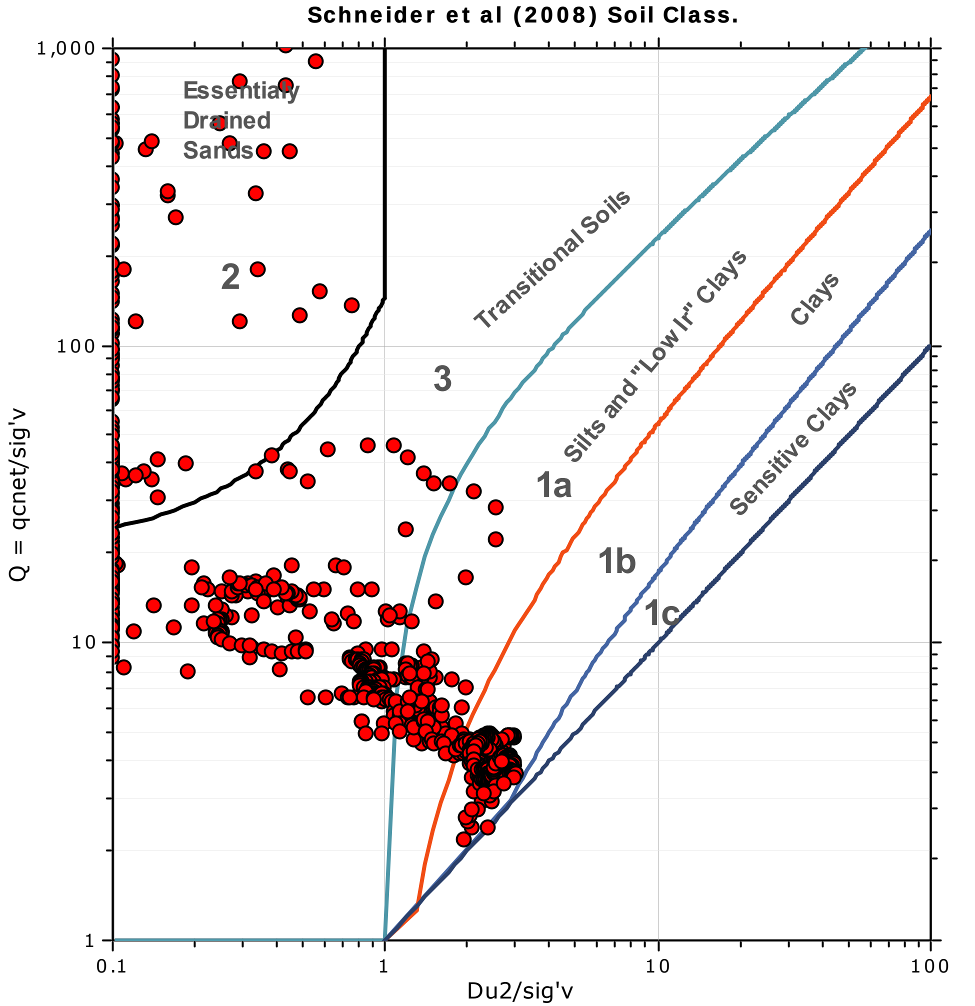
GZA GeoEnvironmental, Inc

CPT: CPT-WPC-201
Total depth: 92.00 ft, Date: 5/12/2021
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:

Bq plots (Schneider)



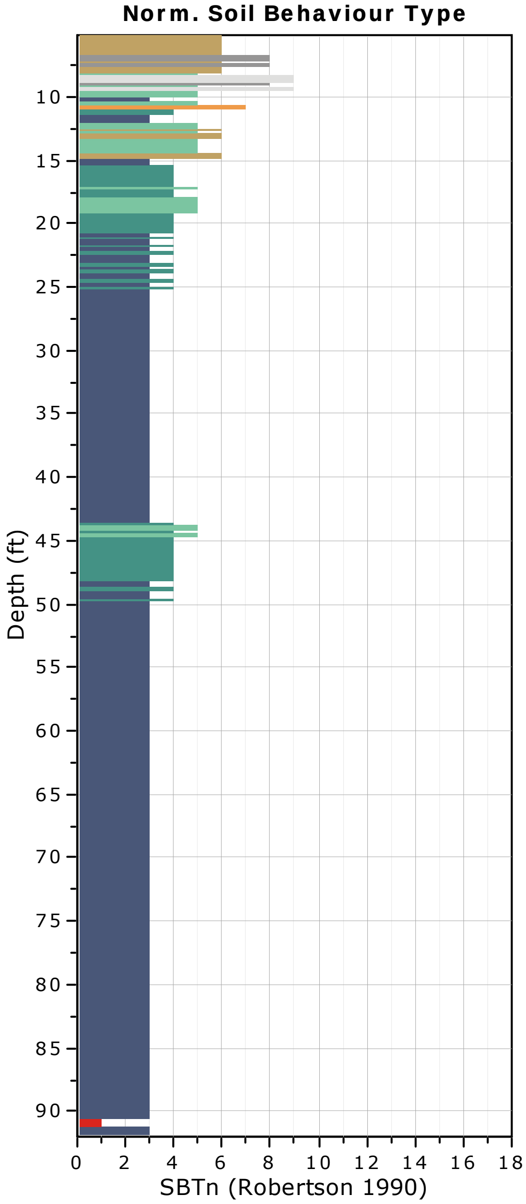


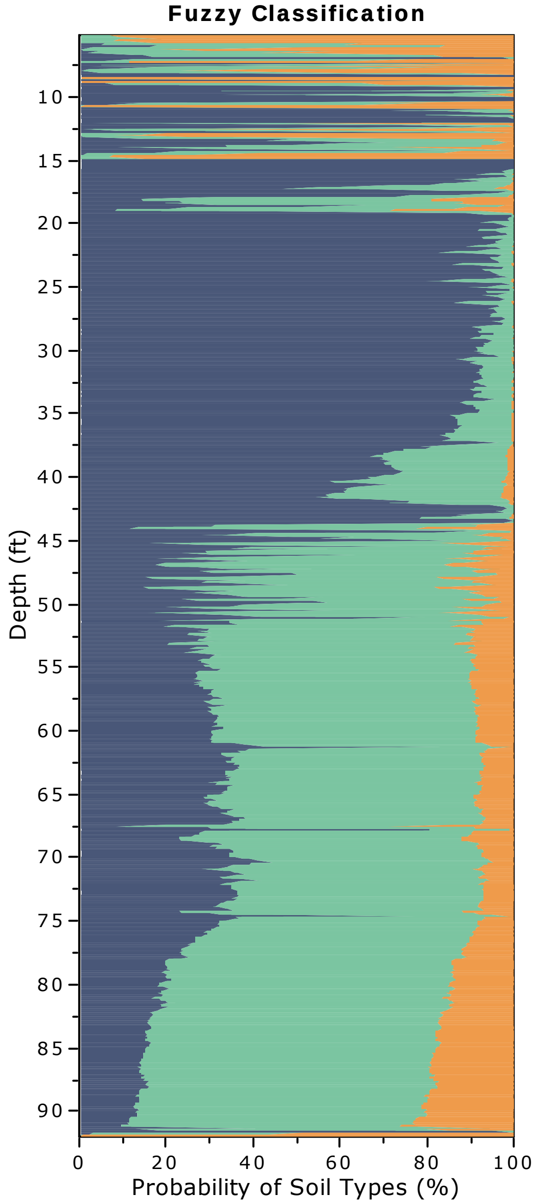
GZA GeoEnvironmental, Inc

CPT: CPT-WPC-201

Total depth: 92.00 ft, Date: 5/12/2021
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:





GZA GeoEnvironmental, Inc

CPT: CPT-WPC-201

Total depth: 92.00 ft, Date: 5/12/2021

Surface Elevation: 0.00 ft

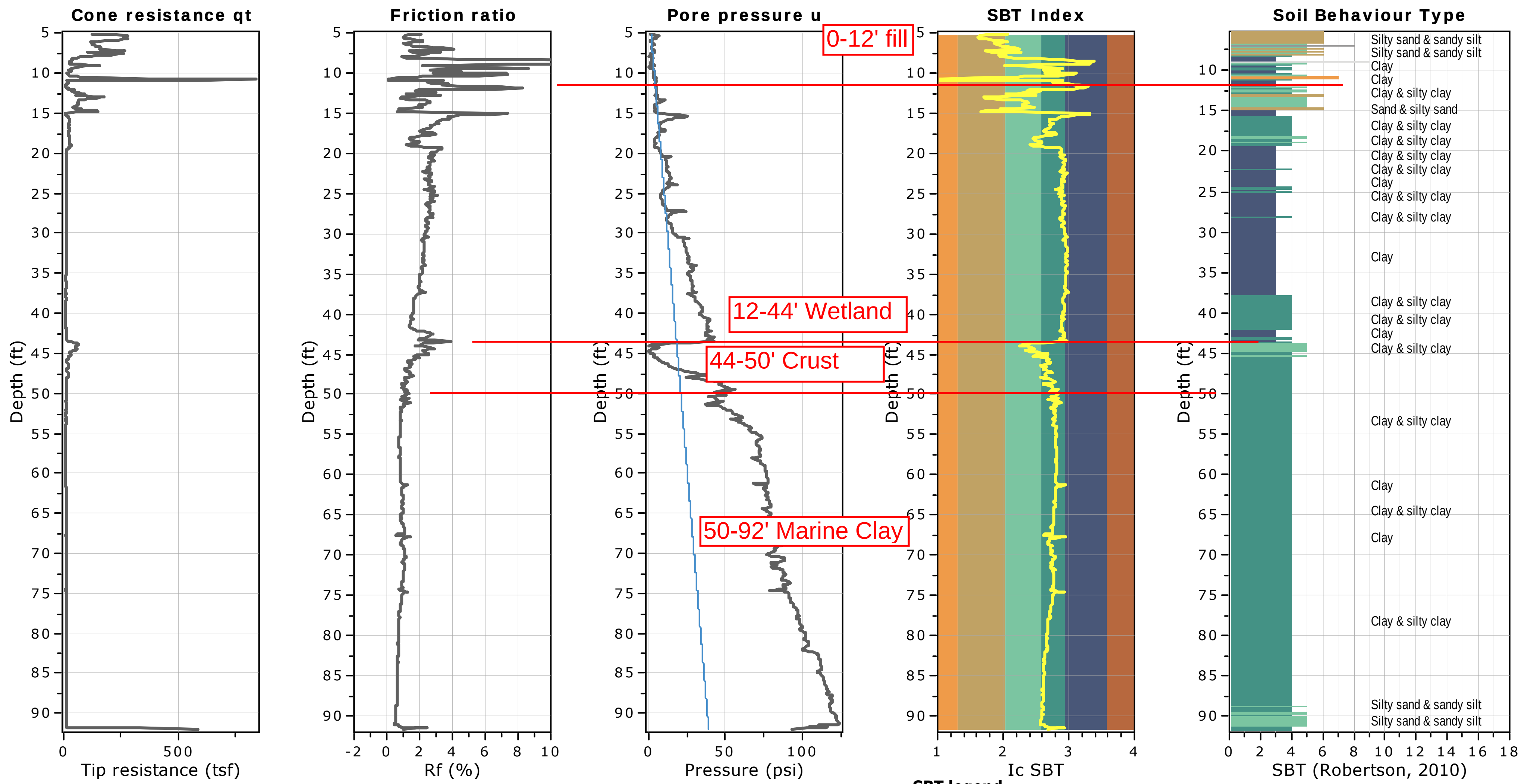
Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Project:

Location:



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

GZA GeoEnvironmental, Inc

CPT: CPT-WPC-201

Total depth: 92.00 ft, Date: 5/12/2021

Surface Elevation: 0.00 ft

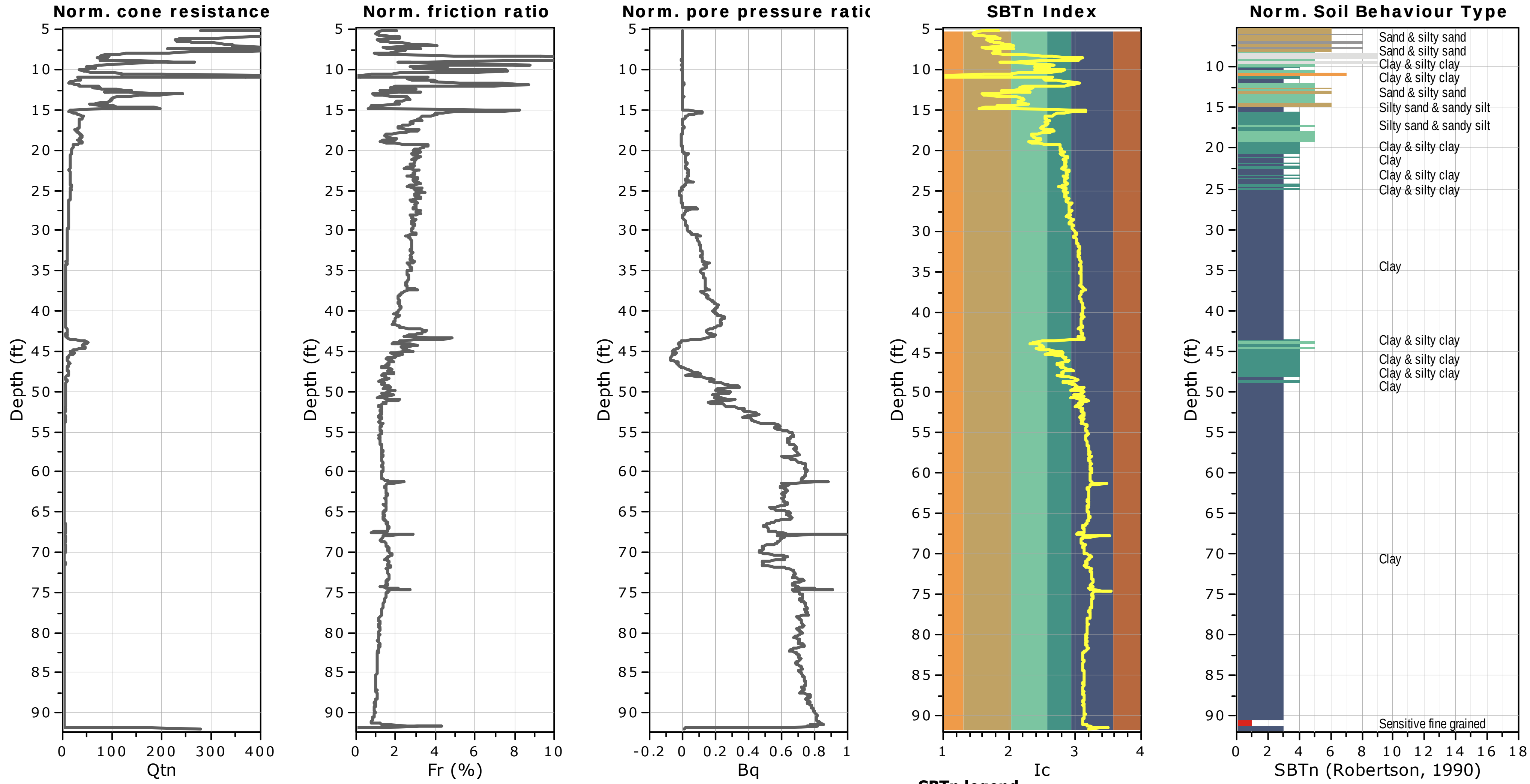
Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Project:

Location:



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

GZA GeoEnvironmental, Inc

CPT: CPT-WPC-201

Total depth: 92.00 ft, Date: 5/12/2021

Surface Elevation: 0.00 ft

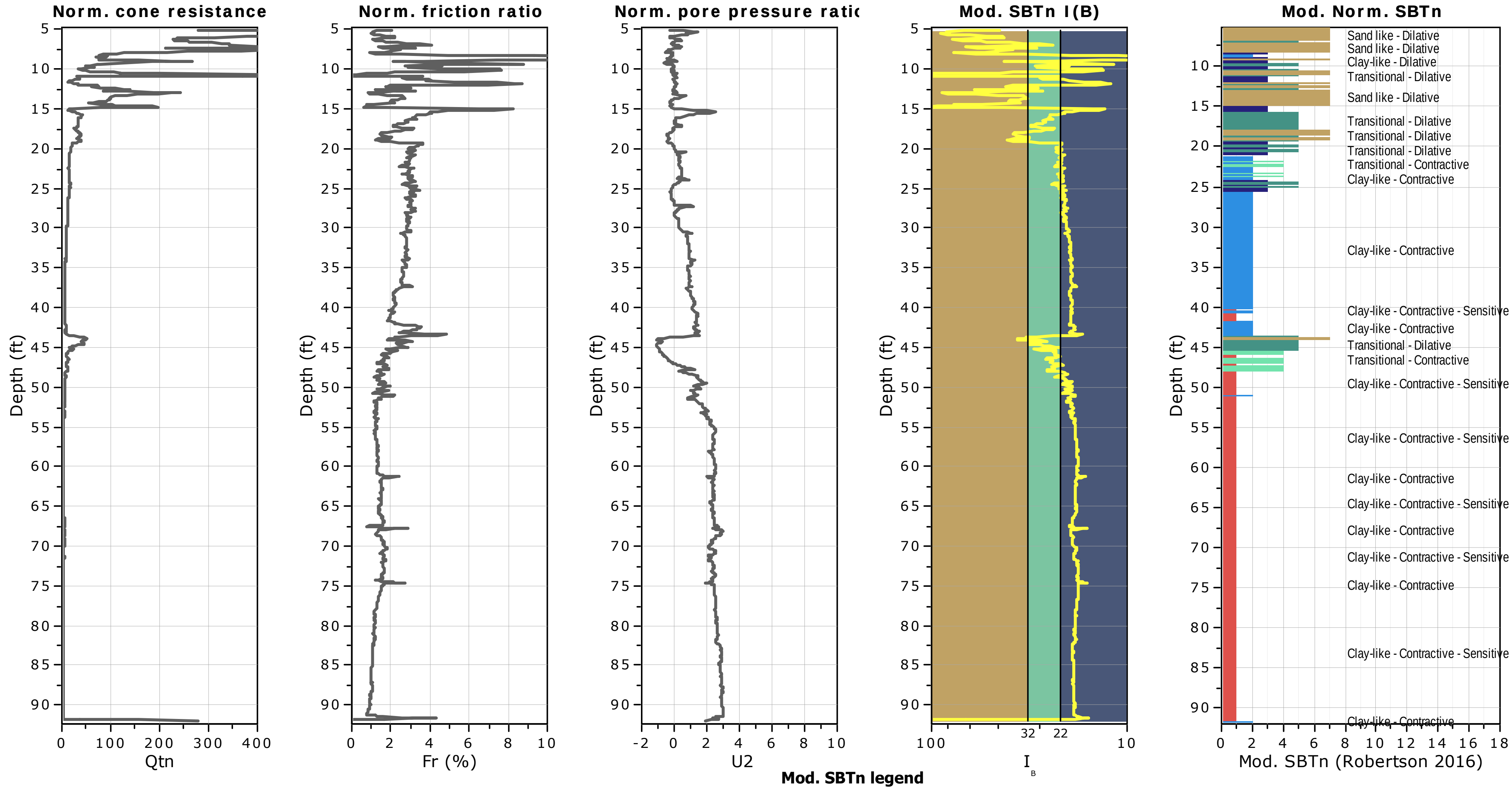
Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Project:

Location:



Mod. SBTn legend

- 1. CCS: ClayLike - Contractive, Sensitive
- 2. CC: Clay-like - Contractive
- 3. CD: Clay-Like: Dilative
- 4. TC: Transitional - Contractive
- 5. TD: Transitional - Dilative
- 6. SC: Sand-like - Contractive
- 7. SD: Sand-like - Dilative

GZA GeoEnvironmental, Inc

CPT: CPT-WPC-201

Total depth: 92.00 ft, Date: 5/12/2021

Surface Elevation: 0.00 ft

Coords: X:0.00, Y:0.00

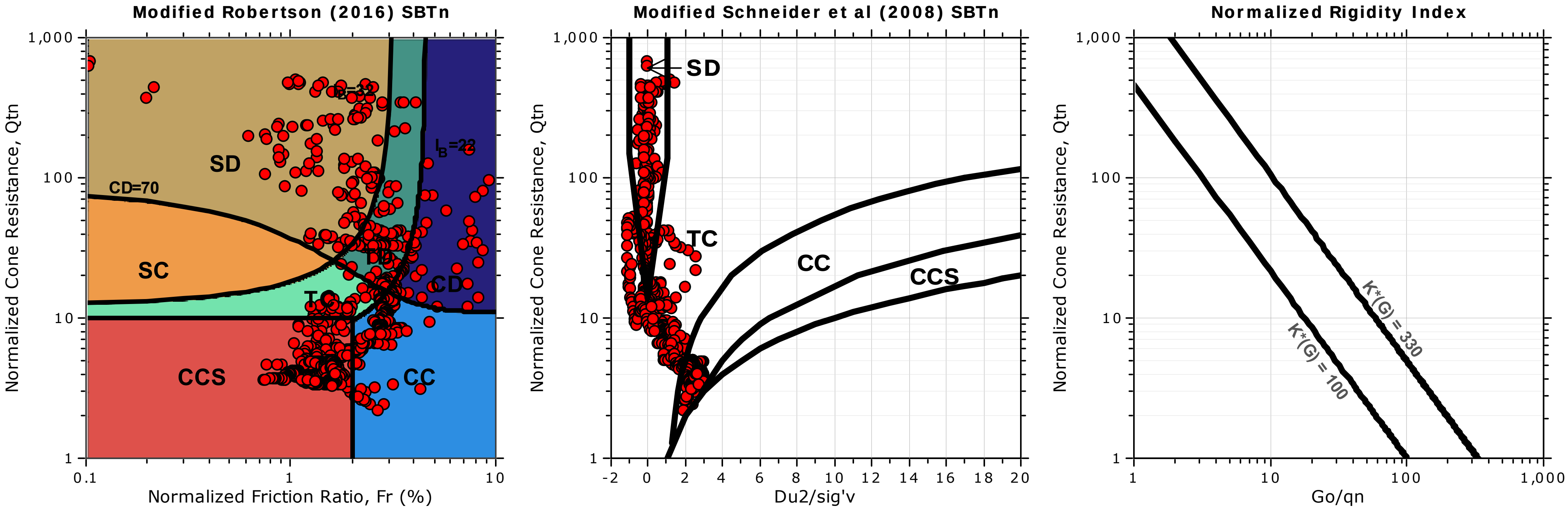
Cone Type:

Cone Operator:

Project:

Location:

Updated SBTn plots



CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
TD: Transitional - Dilative
SC: Sand-like - Contractive
SD: Sand-like - Dilative

K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

GZA GeoEnvironmental, Inc

CPT: CPT-WPC-201

Total depth: 92.00 ft, Date: 5/12/2021

Surface Elevation: 0.00 ft

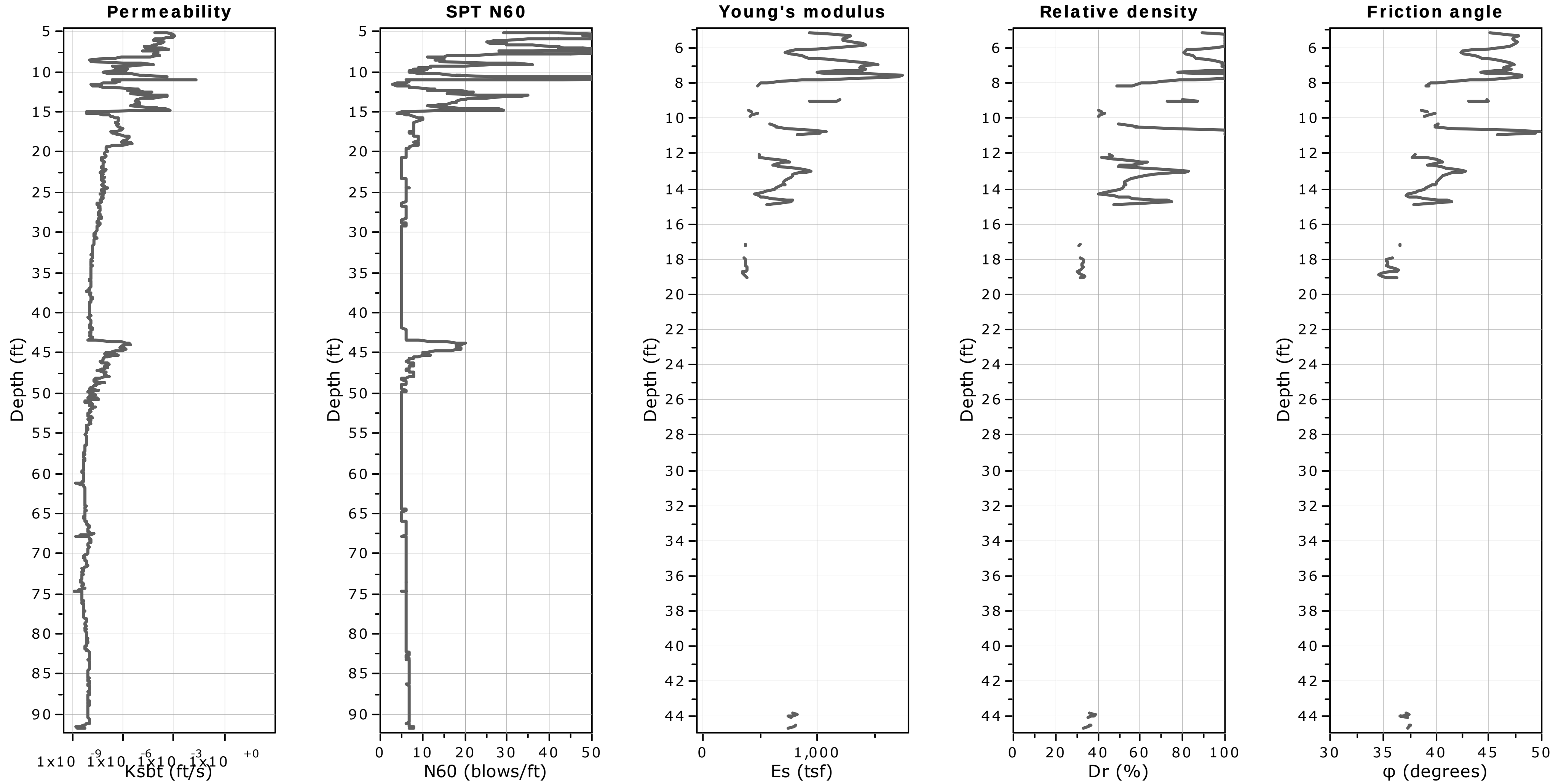
Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Project:

Location:



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60}: Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

Relative density constant, C_{Dr}: 350.0

Phi: Based on Kulhawy & Mayne (1990)

User defined estimation data

GZA GeoEnvironmental, Inc

CPT: CPT-WPC-201

Total depth: 92.00 ft, Date: 5/12/2021

Surface Elevation: 0.00 ft

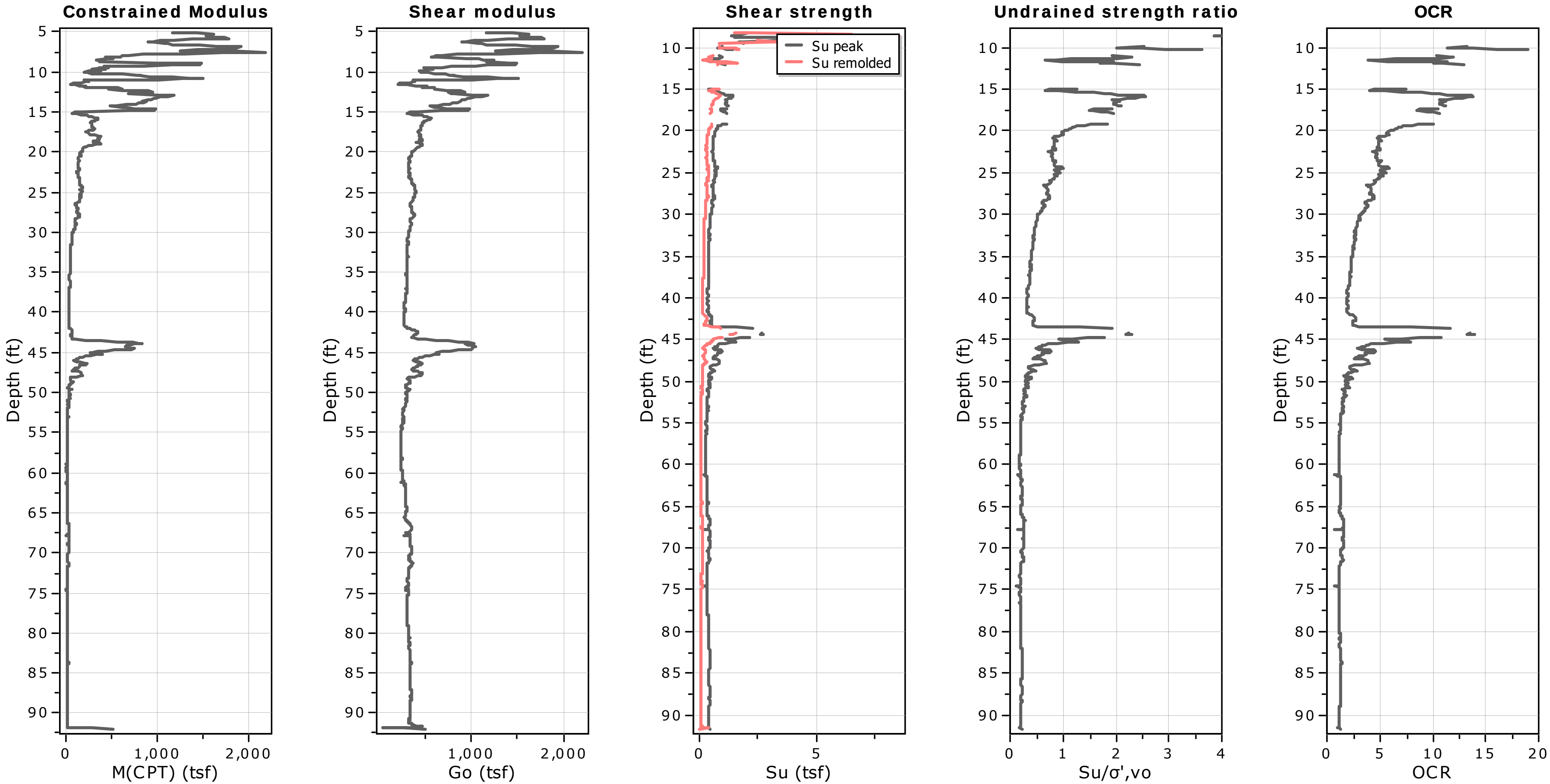
Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Project:

Location:



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt}: 18

OCR factor for clays, N_{kt}: 0.33

User defined estimation data

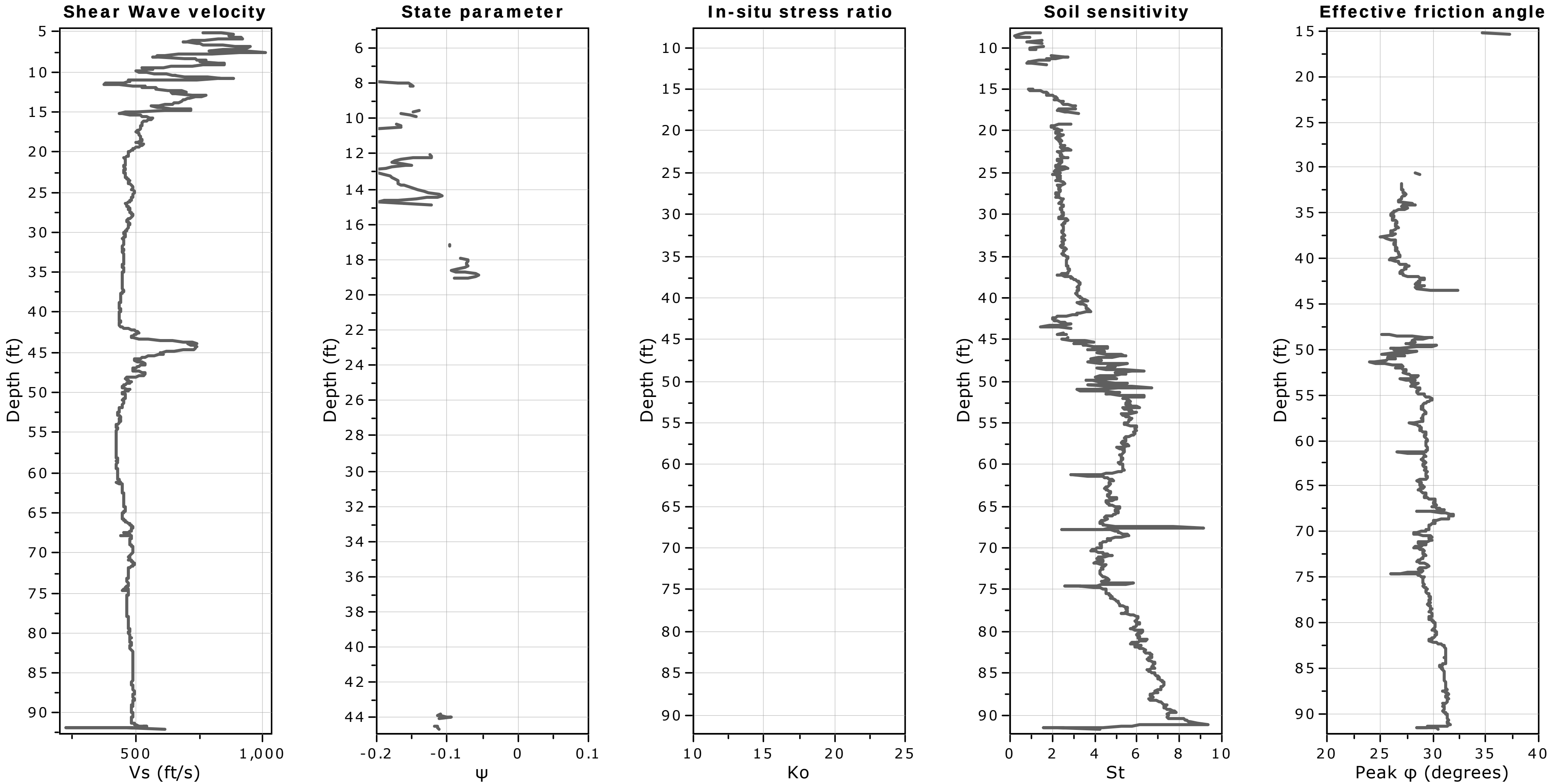
Flat Dilatometer Test data

GZA GeoEnvironmental, Inc

CPT: CPT-WPC-201

Total depth: 92.00 ft, Date: 5/12/2021
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



Calculation parameters

Soil Sensitivity factor, N_S: 7.00

User defined estimation data

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236\right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a}\right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$$

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

:: Drained Friction Angle, φ (°) ::

$$\varphi = \varphi'_{cv} + 15.94 \cdot \log(Q_{tn,cs}) - 26.88$$

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$
$\alpha = 14$ for $Q_{tn} > 14$
$\alpha = Q_{tn}$ for $Q_{tn} \leq 14$
$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \geq 2.20$

$$M_{CPT} = 0.03 \cdot (q_t - \sigma_v) \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Small strain shear Modulus, Go (MPa) ::

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho}\right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot + 7 \cdot \log(F_r))}\right]^{1.25}$$ or user defined

$$OCR = k_{OCR} \cdot Q_{tn}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Peak Friction Angle, φ' (°) ::

$$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for $0.10 < B_q < 1.00$)

References

• Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012

• Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

APPENDIX C.2 – CPT DATA REPORT BY SUMMIT GEOENGINGEERING SERVICES

November 17, 2019
Summit #19234.2

Blaine Cardale, PE
GZA GeoEnvironmntal, Inc.
477 Congress Street, Suite 700
Portland, Maine 04101

Reference: Geotechnical Exploration Services
Piezocone Penetration Testing – Estuary/Bridge 46 US Route 1 Woolwich, Maine

Dear Mr. Cardali;

We have completed exploration services for an estuary near bridge 46 on Route 1 in Woolwich, Maine. Summit Geoengineering Services (SGS) was asked to perform piezocone penetration testing (CPT) and prepare this data report summarizing the work performed.

Work Description

The project site is located on Route 1 at an estuary located near bridge 46 in Woolwich, Maine. Summit Geoengineering Services (SGS) performed 1 piezocone penetration test (CPT) on October 14, 2019. CPT was performed in accordance with ASTM D5778. CPT was advanced using a truck mounted PowerProbe 9630 Pro with a Vertek digital cone having a cross sectional area of 10 cm^2. CPT was performed to a depth of feet 79.7 feet below ground surface. Anchoring was conducting using a single point hollow anchor with start of test depth at 5 feet. Parameters obtained include cone resistance (q_c), sleeve friction (f_s), piezocone pore pressure (u_2), and shear wave velocity (V_s). An exploration log for CPT-KERP-101 is attached.

Closure

We appreciate the opportunity to serve you during this phase of your project. If there are any questions or additional information is required, please do not hesitate to call.

Sincerely yours,
Summit Geoengineering Services

Craig W. Coolidge, P.E.
Vice President, Principal Engineer

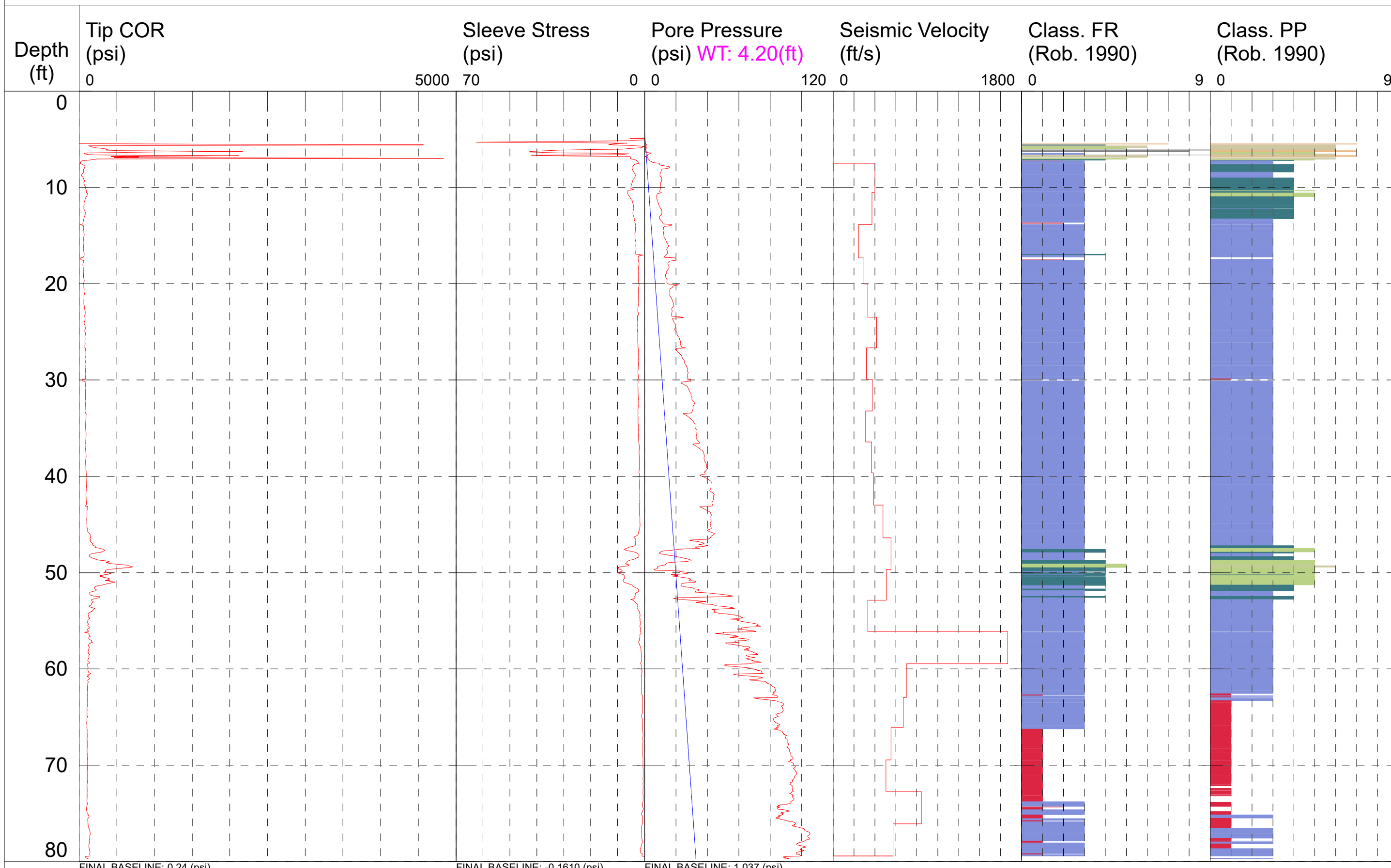
Attachments: EXPLORATION LOG (CPT-KERP-101)

145 Lisbon Street (PO Box 7216) Lewiston, Maine 04243 | (207) 576-3313
173 Pleasant Street Rockland, Maine 04841 | (207) 318-7761
www.summitgeoeng.com

CPT-KERP-101

COMPANY: Summit Geoengineering Services
OPERATOR: C.Coolidge, PE
CREW: K. Farrar
CLIENT: GZA GeoEnvironmental
CLIENT REP: Blaine Cardali, P.E.

TEST DATE: Fri 18/Oct/2019
TEST ID: CPT-KERP-101
PROJECT: 19234.2
SITE: Estuary Route 1
LOCATION: Woolwich, Maine



REMARKS

Set Anchor to 2 Ft
Start CPT at 5 Ft
Groundwater at 4.2 Ft
Anchor Failure at 79.7 Ft

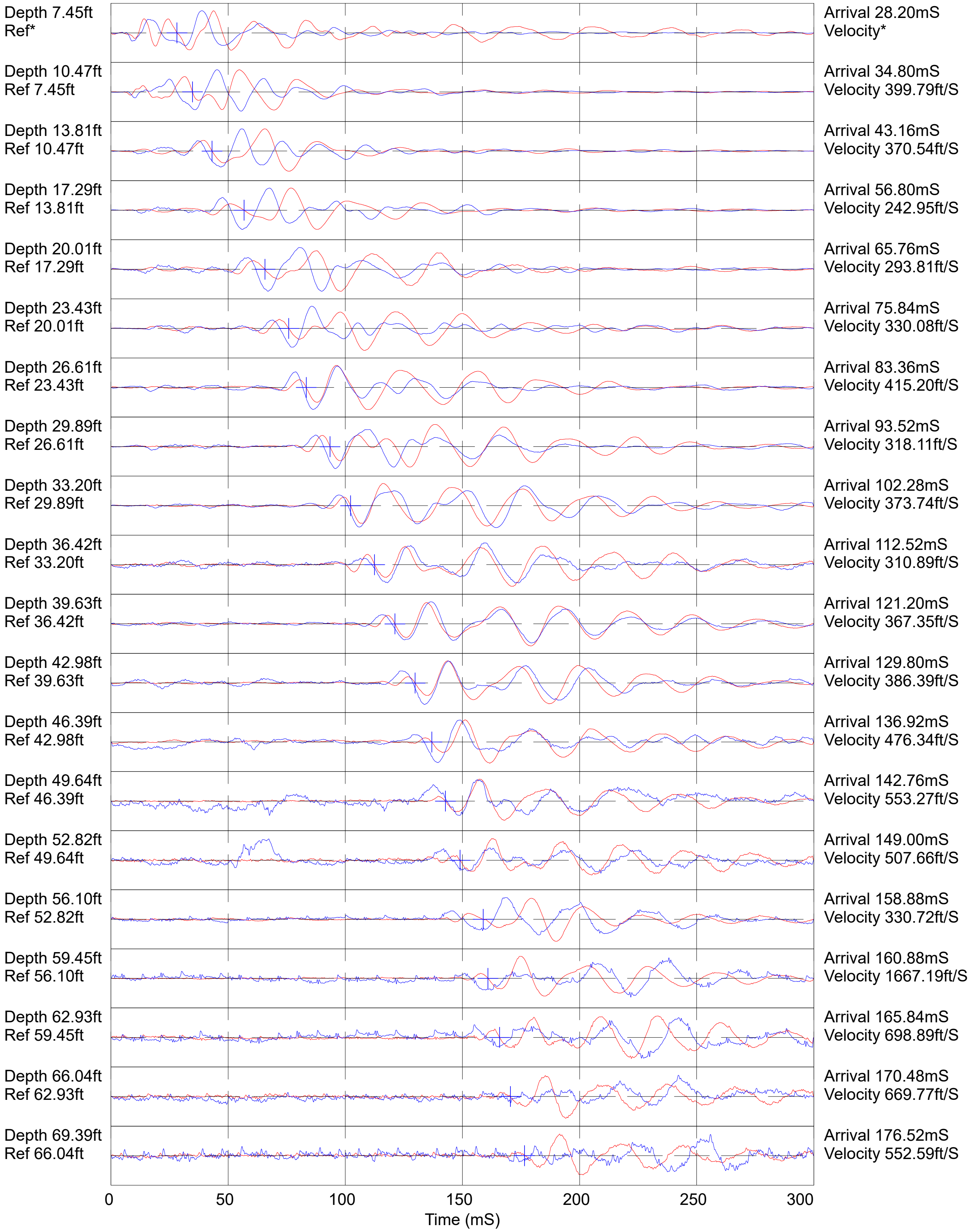
TOTAL DEPTH: 79.727 ft

PROBE ID: 4544.104.A

1 Sensitive, fine grained
2 Organic soils - peats
3 Clays - clay to silty clay
4 Silt mixtures - clayey silt to silty clay
5 Sand mixtures - silty sand to sandy silt
6 Sands - clean sand to silty sand
7 Gravelly sand to sand
8 Very stiff sand to clayey sand **
9 Very stiff, fine grained **

*SBT: Robertson 1990; **Overconsolidated or Cemented; *SBT/SPT CORRELATION: UBC-1983

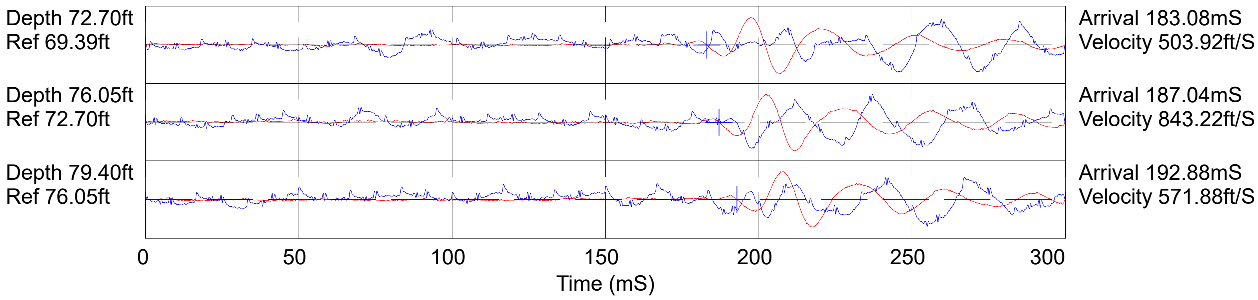
TEST ID: CPT-KERP-101



Hammer to Rod String Distance (ft): 4.92
* = Not Determined

PROBE ID: 4544.104.A

TEST ID: CPT-KERP-101



Hammer to Rod String Distance (ft): 4.92
* = Not Determined

PROBE ID: 4544.104.A

March 31, 2021
Summit #19234.22

Blaine M. Cardali, PE
GZA GeoEnvironmntal, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

Reference: Geotechnical Exploration Services
Piezocone Penetration Testing – Pleasant Cove Bridge US Route 1 Woolwich, ME

Dear Mr. Cardale;

We have completed exploration services for Pleasant Cove Bridge on Route 1 in Woolwich, Maine. Summit Geoengineering Services (SGS) was asked to perform seismic piezocone penetration testing ($SCPT_u$) and prepare this data report summarizing the work performed.

Work Description

The project site is located on Route 1 referred to as Pleasant Cove Bridge in Woolwich, Maine. SGS performed 1 seismic piezocone penetration tests on March 25, 2021. CPT-KERP-201 was advanced using a truck mounted Power Probe 9630 Pro with a Vertek digital cone having a cross sectional area of 10 cm^2. CPT-KERP-201 was performed to a depth of push refusal at 92 feet below ground surface. Anchoring was provided using a single point hollow anchor system. Parameters obtained include cone resistance (q_c), sleeve friction (f_s), and piezocone pore pressure (u_2). Shear wave velocity tests (v_s) were performed at rod break intervals for downhole seismic testing.

Closure

We appreciate the opportunity to serve you during this phase of your project. If there are any questions or additional information is required, please do not hesitate to call.

Sincerely yours,
Summit Geoengineering Services

Craig W. Coolidge

Craig W. Coolidge, P.E.
Vice President, Principal Engineer

Attachments: EXPLORATION PLAN, CPT LOG (CPT-KERP-201)

145 Lisbon Street (PO Box 7216) Lewiston, Maine 04243 | (207) 576-3313
173 Pleasant Street Rockland, Maine 04841 | (207) 318-7761
www.summitgeoeng.com

LEGEND

CPT-1 — SUMMIT CONE PENETRATION TEST (MARCH 24 & 25, 2021)

PLAN REFERENCE

AERIAL IMAGE (MAY 4, 2018) WAS OBTAINED FROM GOOGLE EARTH.

N
NORTH

EXPLORATION LOCATION PLAN
PLEASANT COVE BRIDGE

U.S. ROUTE 1 - WOOLWICH, MAINE
PREPARED FOR
GZA

DATE: 3-31-2021	DRAWN BY: KRF	CHECKED BY: CWC
JOB: 19234.22	SCALE: 1" = 100'	FILE: 19234 CPT

145 LISBON ST. - SUITE 701
LEWISTON, ME 04240
Tel.: (207) 576-3313

173 PLEASANT STREET
ROCKLAND, ME 04841
Tel.: (207) 318-7761

SUMMIT
GEOENGINEERING SERVICES
www.summitgeoeng.com

CPT EXPLORATION COVER SHEET

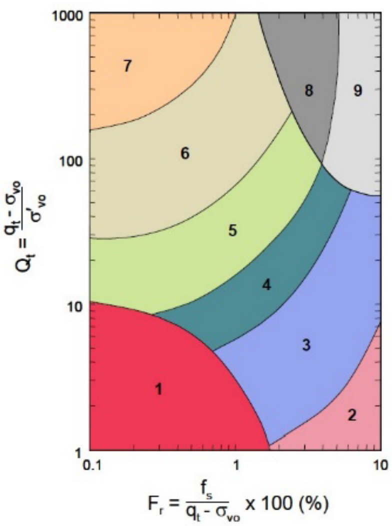
Piezocone penetration test (CPT) is performed by a cone on the end of a series of rods pushed into the ground at a constant rate (2 cm/s) to obtain near continuous measurements of soil parameters. Parameters obtained during the CPT test include cone tip resistance, sleeve friction, and piezocone pore pressure. These parameters are collected using real-time data logging and presented graphically on the CPT log.

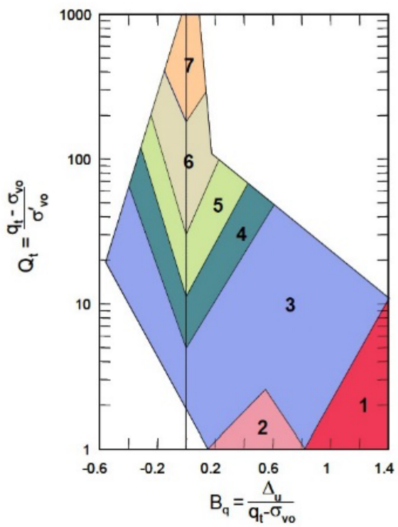
CPT Data Symbols:

q_c = Tip Resistance	u_2 = Pore Pressure	q_t = Total Resistance
f_s = Sleeve Friction	v_s = Shear Wave Velocity	c_h = Coefficient of Consolidation

Soil Behavior Type:

Soil behavior type is interpreted from CPT data as one of 9 soil behavior types published by Robertson et al. 1990, shown below. Each soil behavior type (SBT) is assigned a color which correlates to the SBT plot on the CPT log.





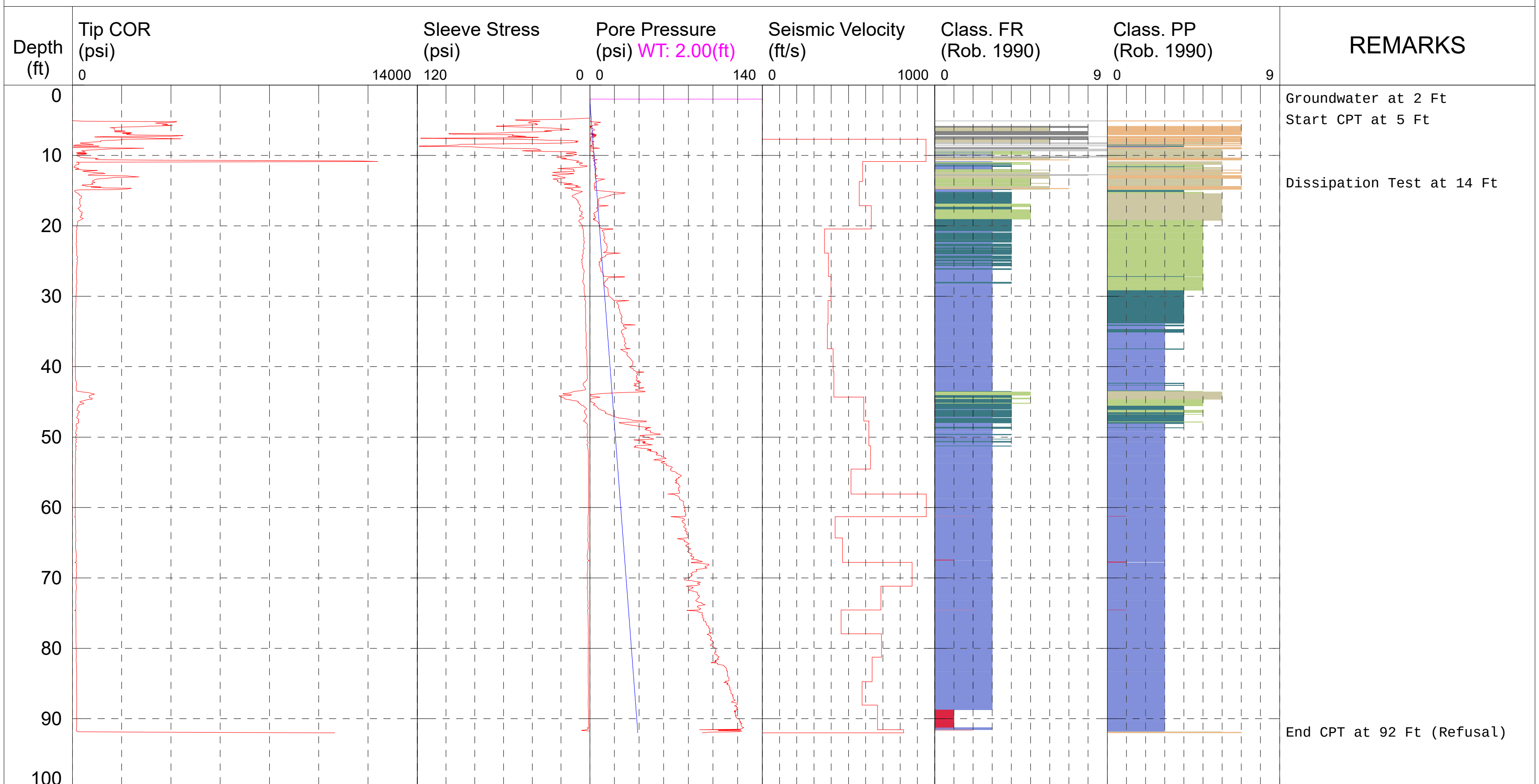
Zone	Soil Behavior Type
1	Sensitive, Fine Grained
2	Organic Soils-Peats
3	Clays; Clay to Silty Clay
4	Silt Mixtures; Clayey Silt to Silty Clay
5	Sand Mixtures; Silty Sand to Sandy Silt
6	Sands; Clean Sands to Silty Sands
7	Gravelly Sand to Sand
8	Very Stiff Sand to Clayey Sand*
9	Very Stiff Fine Grained*

*Overconsolidated or Cemented

CPT-KERP-201

COMPANY: Summit Geoengineering Services
OPERATOR: Craig Coolidge
CREW: Colleen Sullivan
CLIENT: GZA
CLIENT REP: Blaine Cardali

TEST DATE: Thu 25/Mar/2021
TEST ID: CPT-KERP-201
PROJECT: 19234.22
SITE: Bridge 46
LOCATION: Woolwich, ME



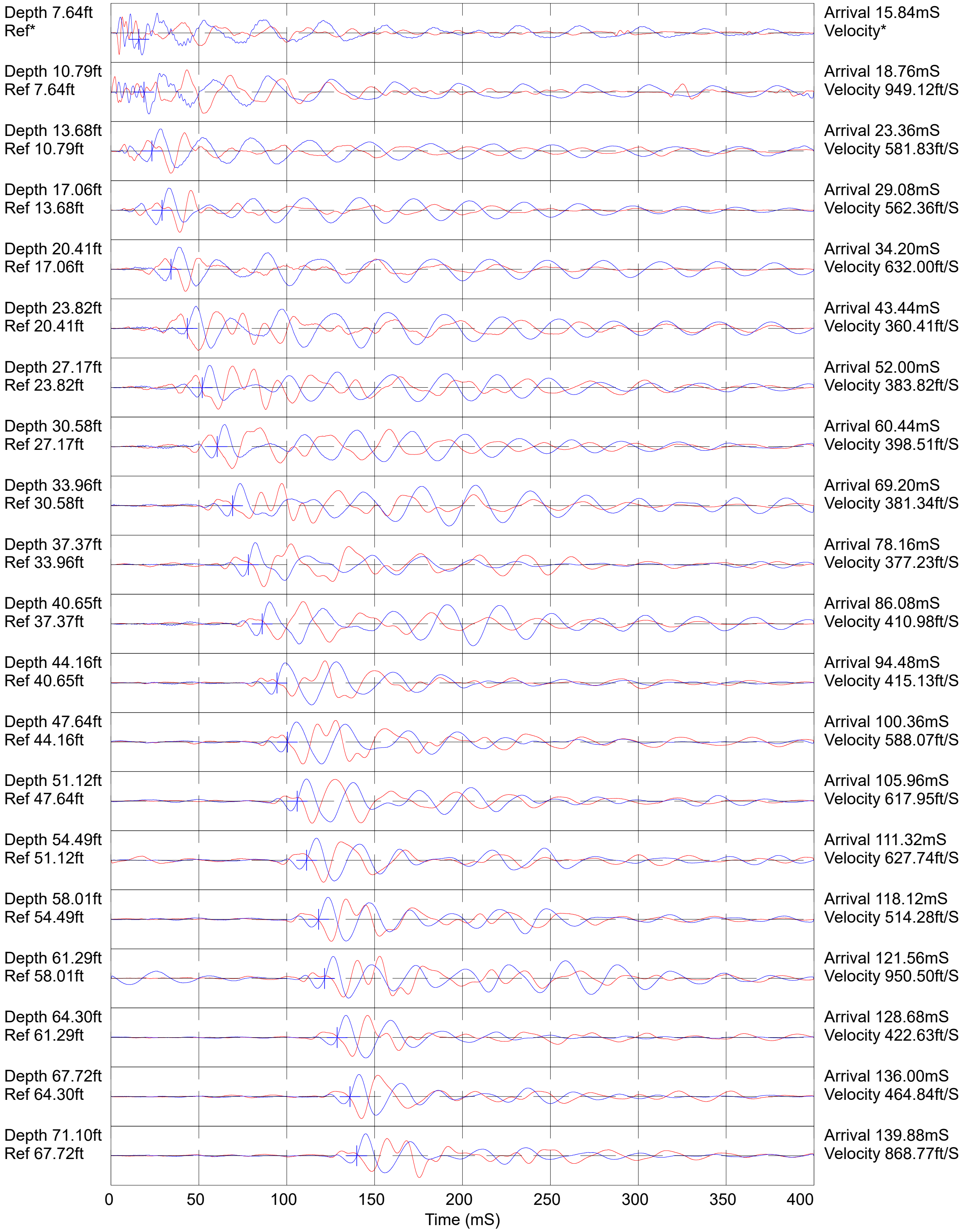
TOTAL DEPTH: 92.000 ft

PROBE ID: 4644.108XX

1	Sensitive, fine grained
2	Organic soils - peats
3	Clays - clay to silty clay
4	Silt mixtures - clayey silt to silty clay
5	Sand mixtures - silty sand to sandy silt
6	Sands - clean sand to silty sand
7	Gravelly sand to sand
8	Very stiff sand to clayey sand **
9	Very stiff, fine grained **

*SBT: Robertson 1990; **Overconsolidated or Cemented; *SBT/SPT CORRELATION: UBC-1983

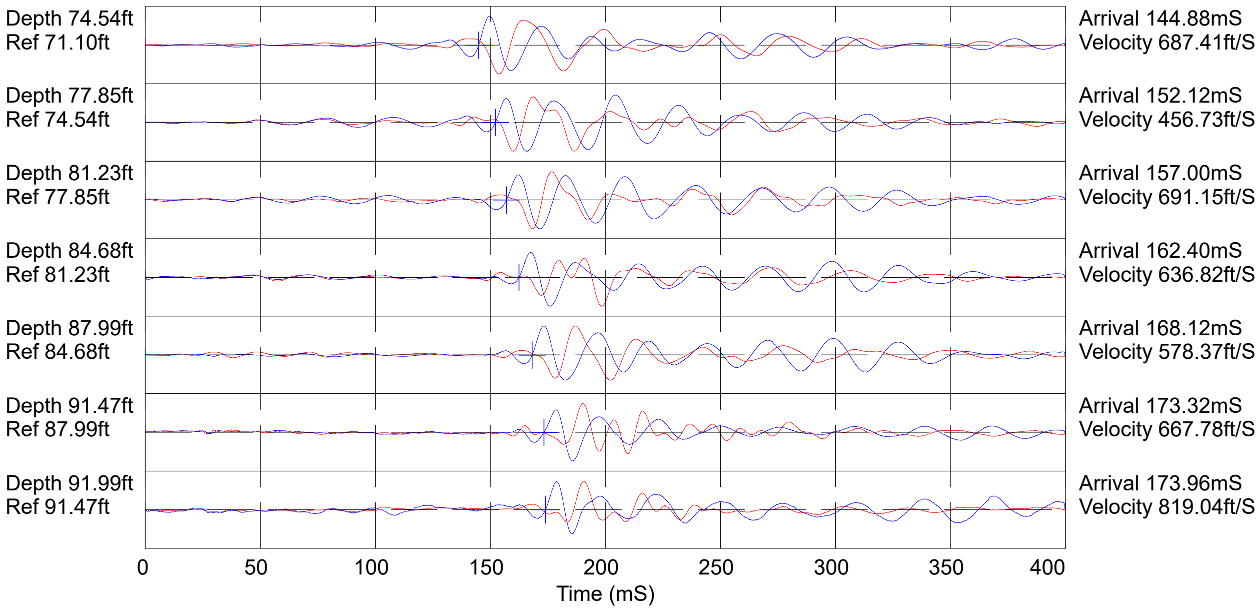
TEST ID: CPT-KERP-201



Hammer to Rod String Distance (ft): 4.92
* = Not Determined

PROBE ID: 4644.108XX

TEST ID: CPT-KERP-201



Hammer to Rod String Distance (ft): 4.92
* = Not Determined

PROBE ID: 4644.108XX

APPENDIX D – LABORATORY TEST RESULTS

THIELSCH ENGINEERING	195 Frances Avenue Cranston RI, 02910 Phone: (401)-467-6454 Fax: (401)-467-2398 thielsch.com *Let's Build a Solid Foundation*	Client Information: GZA GeoEnvironmental, Inc Portland, ME PM: B. Cardali Assigned By: M. Johnescu Collected By: L. Navarret	Project Information: **Kennebec River Esturary Tidal Restoration** **Woolwich, ME** GZA Project Number: 09.0026037.00 Summary Page: 1 of 2 Report Date: 12.13.19

LABORATORY TESTING DATA SHEET, Report No.: 7419-M-115

				Identification Tests								Proctor / CBR / Permeability Tests								
Boring ID: EB-KERP-XXX	Sample No.	Depth (Ft)	Laboratory No.	As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	Laboratory Log and Soil Description
				D2216	D4318		D6913			D2974	D854			D1557						
101	1D	0-2	19-S-2823	3.0			91.8	7.6	0.6											Brown f-c GRAVEL, f-c Sand, trace Silt
101	2D	4-6	19-S-2824	11.3			52.2	40.1	7.7											Brown f-c GRAVEL and f-c SAND, trace Silt
101	4D	14-16	19-S-2825	82.7																
101	7D	34-36	19-S-2826	64.8	82	52														Brown Silty CLAY
101	11D	54-56	19-S-2827	31.3	32	20														Brown CLAY & SILT
101	13D	64-66	19-S-2828	35.9																
101	15D	79-81	19-S-2829	32.1																
101	16D	84-86	19-S-2830	37.2	39	20														Brown CLAY & SILT
101	17D	89-91	19-S-2831	28.8																
101	19D	99-101	19-S-2832	30.5	38	22														Gray CLAY & SILT
101	21D	109-111	19-S-2833	48.6																
101	23D	119-121	19-S-2834	45.1	47	25														Gray Silty CLAY

Date Received: *12.06.19*   Reviewed By: Date Reviewed: *12.16.19*

THIELSCH ENGINEERING	195 Frances Avenue Cranston RI, 02910 Phone: (401)-467-6454 Fax: (401)-467-2398 thielsch.com *Let's Build a Solid Foundation*	Client Information: GZA GeoEnvironmental, Inc Portland, ME PM: B. Cardali Assigned By: M. Johnescu Collected By: L. Navarret	Project Information: **Kennebec River Esturary Tidal Restoration** **Woolwich, ME** GZA Project Number: 09.0026037.00 Summary Page: 2 of 2 Report Date: 12.13.19

LABORATORY TESTING DATA SHEET, Report No.: 7419-M-115

Boring ID: EB-KERP-XXX	Sample No.	Depth (Ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests							Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318			D6913		D2974	D854			D1557						
101	25D	134-136	19-S-2835	34.6																
102	1D	0.5-2.5	19-S-2836	2.4			47.8	44.7	7.5											Brown f-c GRAVEL and f-c SAND, trace Silt
102	3D	9-11	19-S-2837	17.2			13.1	64.0	22.9											Brown f-c SAND, some Silt, little fine Gravel
102	4D	14-16	19-S-2838	9.0			49.4	43.9	6.7											Brown f-c GRAVEL and f-c SAND, trace Silt
102	5D	19-21	19-S-2839	53.2																
102	6D	29-31	19-S-2840	62.9	93	56														Brown Organic Silty CLAY
102	8D	39-41	19-S-2841	24.8																
102	9D	44-46	19-S-2842	28.0	32	18														Brown CLAY & SILT

Date Received: 12.06.19   Reviewed By: Date Reviewed: 12.16.19

THIELSCH ENGINEERING

State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

Kennebec River Estuary Tidal Restoration

MDOT Project Number:

GZA Project Number: 09.0026037.00

Town(s): Woolwich, ME

Boring & Sample Identification Number	Station (Feet)	Sample No.	Depth (Feet)	Lab Number	Organic %	W.C.	L.L.	P.I.	Classification		
									Unified	AASHTO	Frost
EB-KERP-101		1D	0-2	19-S-2823		3.0			GP	A-1-a	0
EB-KERP-101		2D	4-6	19-S-2824		11.3			GW-GM	A-1-a	I
EB-KERP-101		4D	14-16	19-S-2825		82.7					
EB-KERP-101		7D	34-36	19-S-2826		64.8	82	30	OH	A-7	III
EB-KERP-101		11D	54-56	19-S-2827		31.3	32	12	CL	A-6	III
EB-KERP-101		13D	64-66	19-S-2828		35.9					
EB-KERP-101		15D	79-81	19-S-2829		32.1					
EB-KERP-101		16D	84-86	19-S-2830		37.2	39	19	CL	A-6	III
EB-KERP-101		17D	89-91	19-S-2831		28.8					
EB-KERP-101		19D	99-101	19-S-2832		30.5	38	16	CL	A-6	III
EB-KERP-101		21D	119-121	19-S-2833		48.6					
EB-KERP-101		23D	119-121	19-S-2834		45.1	47	22	CL	A-7	III
EB-KERP-101		25D	134-136	19-S-2835		34.6					
EB-KERP-102		1D	0.5-2.5	19-S-2836		2.4			GP-GM	A-1-a	I
EB-KERP-102		3D	9-11	19-S-2837		17.2			SM	A-2-4(0)	III
EB-KERP-102		4D	14-16	19-S-2838		9.0			GP-GM	A-1-a	I
EB-KERP-102		5D	19-21	19-S-2839		53.2					
EB-KERP-102		6D	29-31	19-S-2840		62.9	93	37	OH	A-7	III
EB-KERP-102		8D	39-41	19-S-2841		24.8					
EB-KERP-102		9D	44-46	19-S-2842		28.0	32	14	CL	A-6	III

Classification of these soil samples is in accordance with AASHTO Classification System M-145-40. This classification is followed by the "Frost Susceptibility Rating" from zero (non-frost susceptible) to Class IV (highly frost susceptible). The "Frost Susceptibility Rating" is based upon the MDOT and Corps of Engineers Classification Systems.

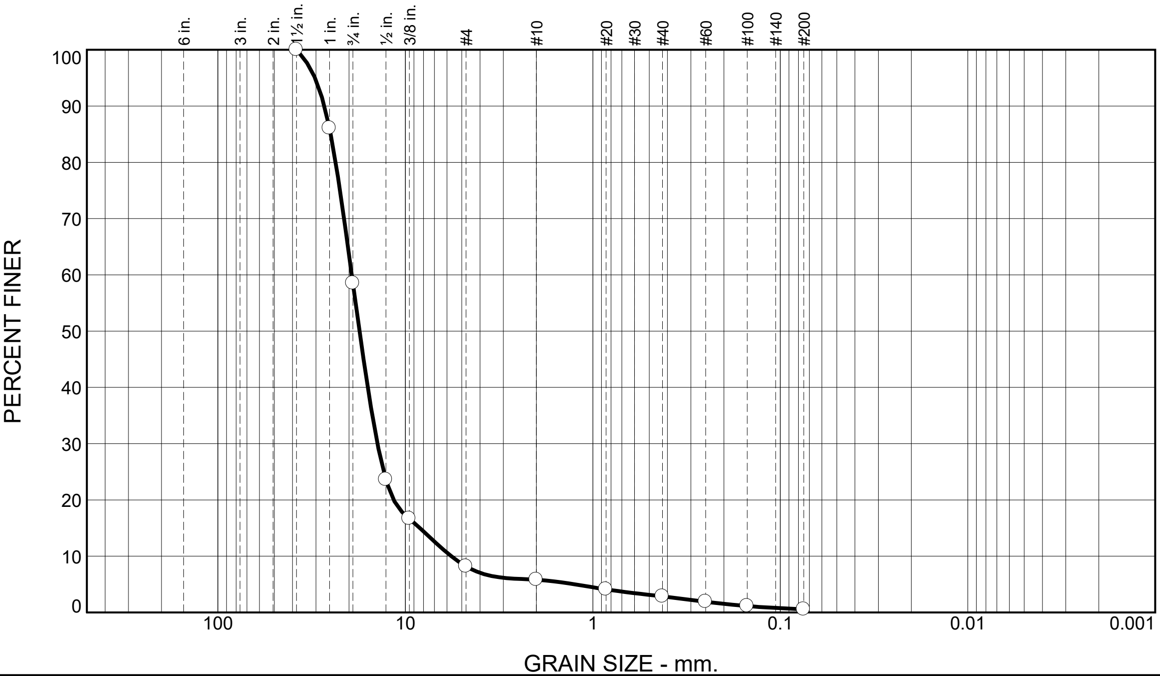
GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-93 (1996) and/or ASTM D 422-63 (Reapproved 1998)

WC = water content as determined by AASHTO T 265-93 and/or ASTM D 2216-98

LL = Liquid limit as determined by AASHTO T 89-96 and/or ASTM D 4318-98

PI = Plasticity Index as determined by AASHTO 90-96 and/or ASTM D4318-98

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	41.5	50.3	2.4	2.9	2.3	0.6	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	86.1		
3/4"	58.5		
1/2"	23.6		
3/8"	16.7		
#4	8.2		
#10	5.8		
#20	4.1		
#40	2.9		
#60	1.9		
#100	1.1		
#200	0.6		

* (no specification provided)

Material Description

Brown f-c GRAVEL, trace f-c Sand, trace Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= GP **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 27.0337 D_{85}= 25.0270 D_{60}= 19.3192
D_{50}= 17.5733 D_{30}= 14.0944 D_{15}= 8.3696
D_{10}= 5.6902 C_u= 3.40 C_c= 1.81

Remarks

Date Received: 12.06.19 **Date Tested:** 12.12.13

Tested By: MN / LR

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: EB-KERP-101 **Depth:** 0-2' **Date Sampled:**
Sample Number: 1D

Thielsch Engineering Inc.

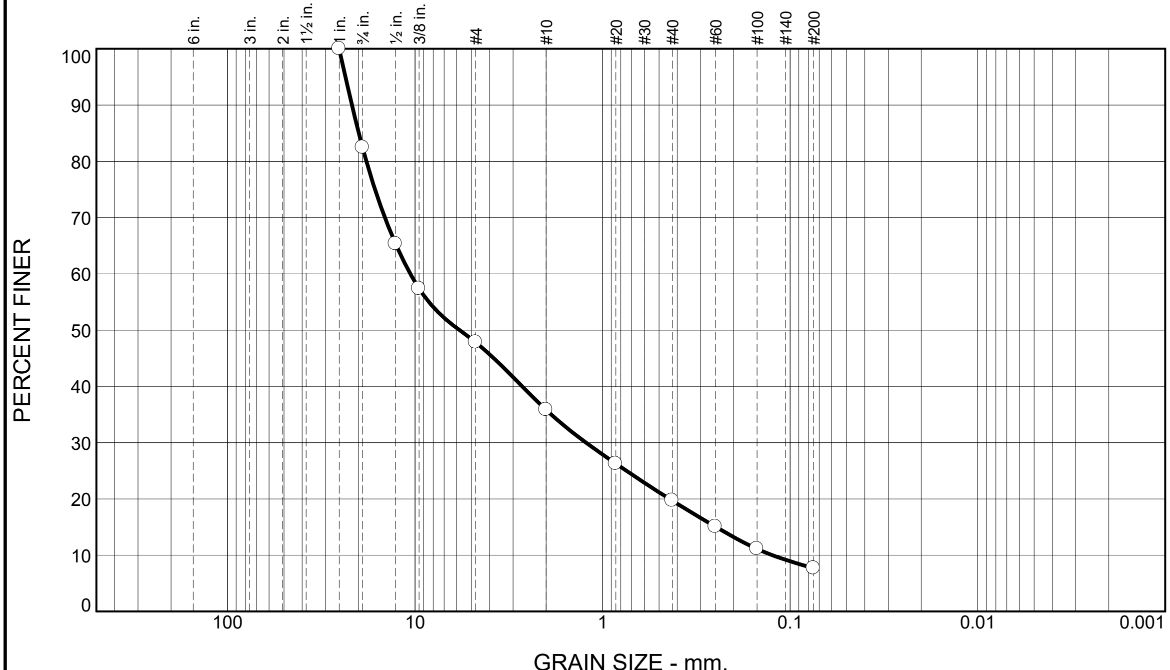
Cranston, RI

Client: GZA GeoEnvironmental

Project: Kennebec River Estuary Tidal Restoration
Woolwich, ME

Project No: 09.0026037.00 **Figure** 19-S-2823

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	17.6	34.6	12.0	16.1	12.0	7.7	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	82.4		
0.5"	65.4		
0.375"	57.4		
#4	47.8		
#10	35.8		
#20	26.3		
#40	19.7		
#60	15.1		
#100	11.1		
#200	7.7		

* (no specification provided)

Material Description

Brown f-c GRAVEL and f-c SAND, trace Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= GW-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 21.6951 D_{85}= 19.9436 D_{60}= 10.6062
D_{50}= 5.7888 D_{30}= 1.2255 D_{15}= 0.2479
D_{10}= 0.1245 C_u= 85.17 C_c= 1.14

Remarks

Date Received: 12.06.19 **Date Tested:** 12.13.19

Tested By: MN / LR

Checked By: Steven Accetta

Title: Laboratory Coordinator

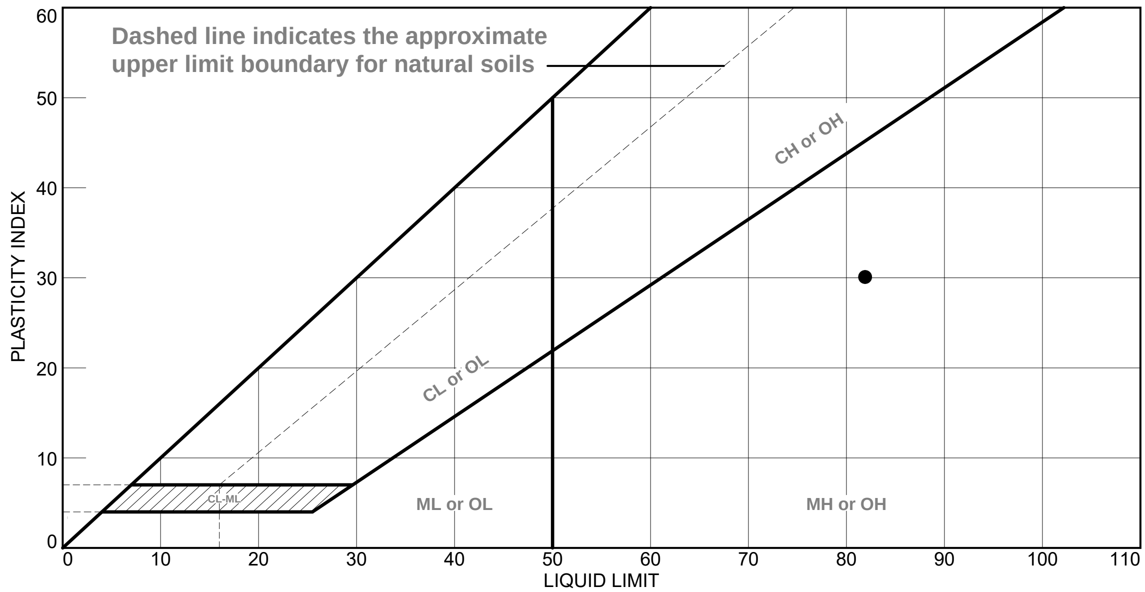
Source of Sample: EB-KERP-101 **Depth:** 4-6' **Date Sampled:**
Sample Number: 2D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Kennebec River Estuary Tidal Restoration
Woolwich, ME
Project No: 09.0026037.00 **Figure** 19-S-2824

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Silty CLAY	82	52	30			

Project No. 09.0026037.00 **Client:** GZA GeoEnvironmental

Project: Kennebec River Estuary Tidal Restoration

Woolwich, ME

Source of Sample: EB-KERP-101 **Depth:** 34-36'

Sample Number: 7D

Thielsch Engineering Inc.

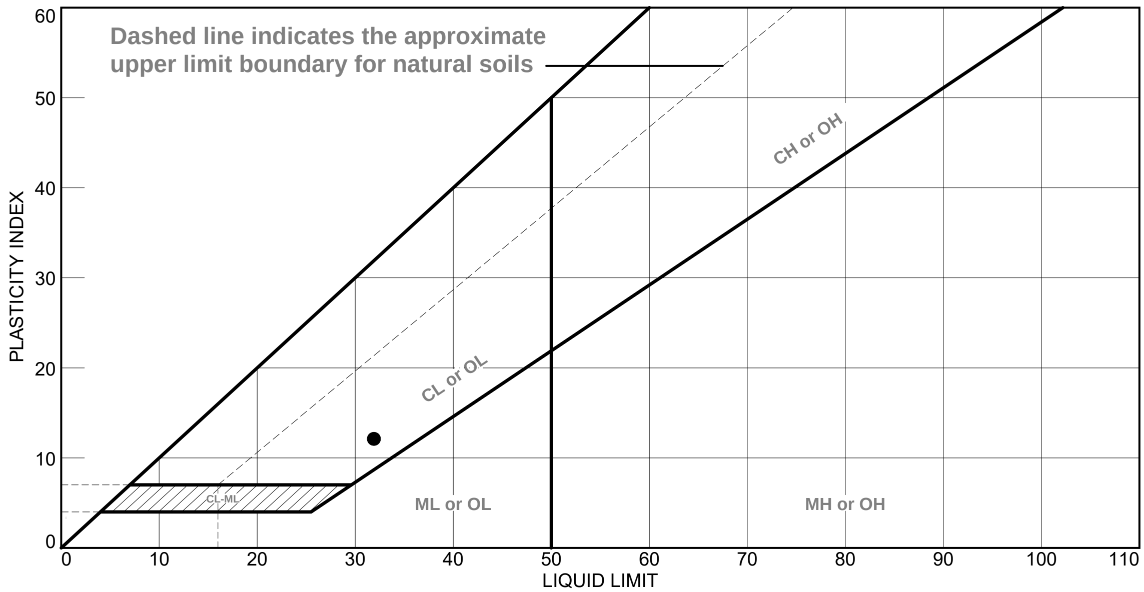
Cranston, RI

Remarks:

Figure 19-L-2826

Tested By: LR **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown CLAY & SILT	32	20	12			

Project No. 09.0026037.00 **Client:** GZA GeoEnvironmental

Project: Kennebec River Estuary Tidal Restoration

Woolwich, ME

Source of Sample: EB-KERP-101 **Depth:** 54-56'

Sample Number: 11D

Thielsch Engineering Inc.

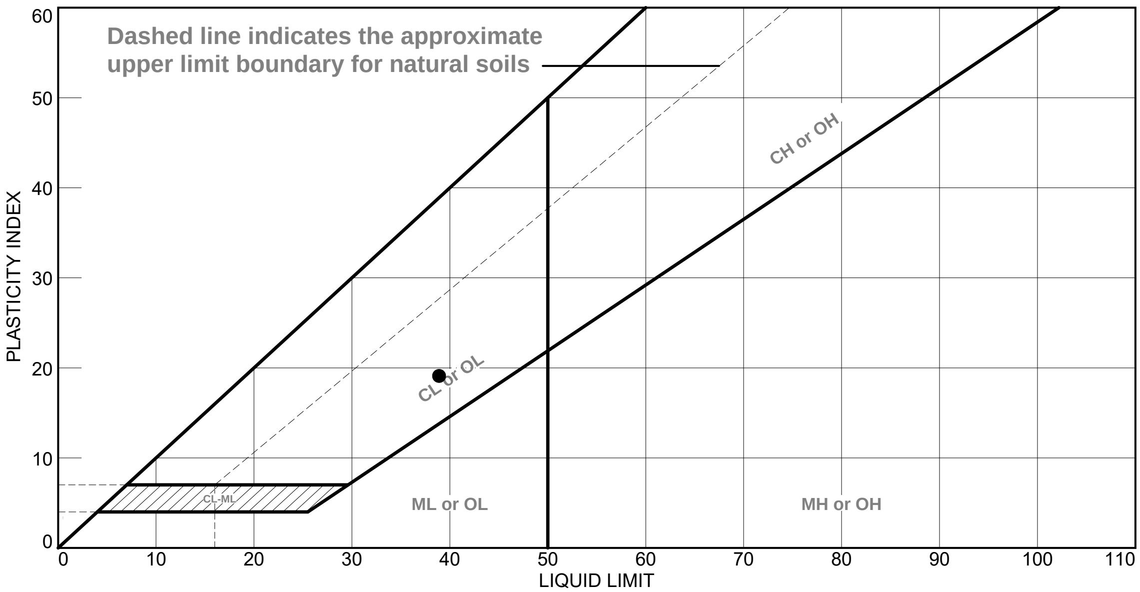
Cranston, RI

Remarks:

Figure 19-L-2827

Tested By: MN **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown CLAY & SILT	39	20	19			

Project No. 09.0026037.00 **Client:** GZA GeoEnvironmental

Project: Kennebec River Estuary Tidal Restoration

Woolwich, ME

Source of Sample: EB-KERP-101 **Depth:** 84-86'

Sample Number: 16D

Thielsch Engineering Inc.

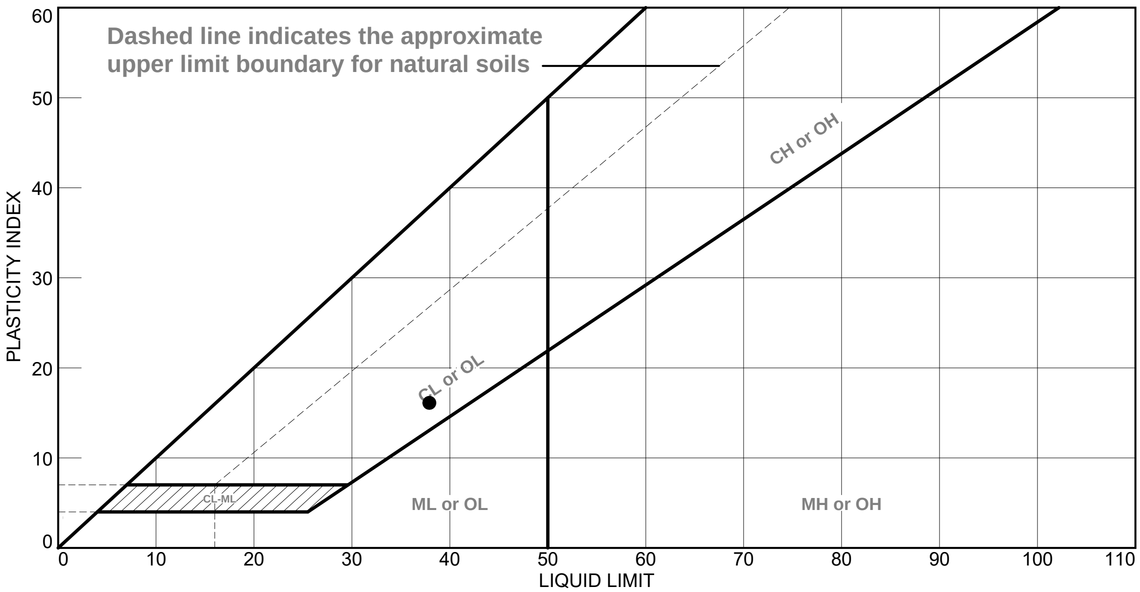
Cranston, RI

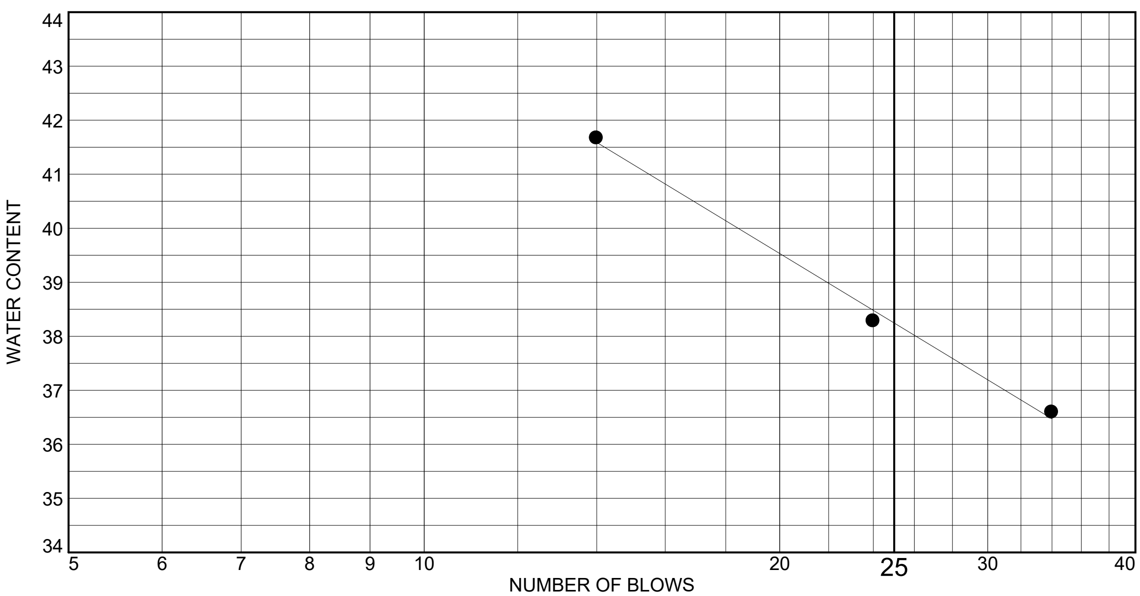
Remarks:

Figure 19-L-2830

Tested By: LR **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray CLAY & SILT	38	22	16			

Project No. 09.0026037.00 **Client:** GZA GeoEnvironmental

Project: Kennebec River Estuary Tidal Restoration

Woolwich, ME

Source of Sample: EB-KERP-101 **Depth:** 99-101'

Sample Number: 19D

Thielsch Engineering Inc.

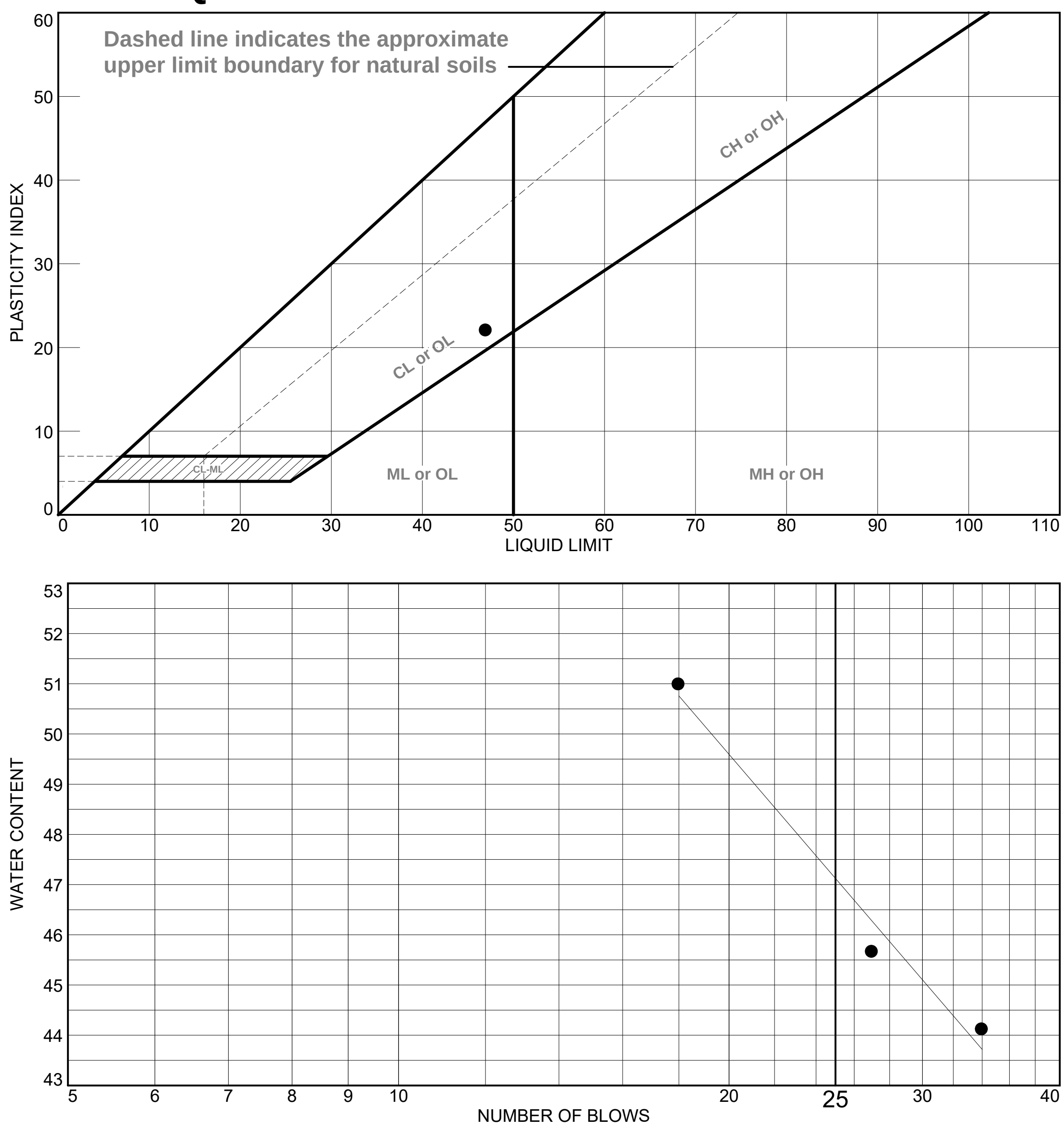
Cranston, RI

Remarks:

Figure 19-L-2832

Tested By: MN **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	47	25	22			

Project No. 09.0026037.00 **Client:** GZA GeoEnvironmental

Project: Kennebec River Estuary Tidal Restoration

Woolwich, ME

Source of Sample: EB-KERP-101 **Depth:** 119-121'

Sample Number: 23D

Thielsch Engineering Inc.

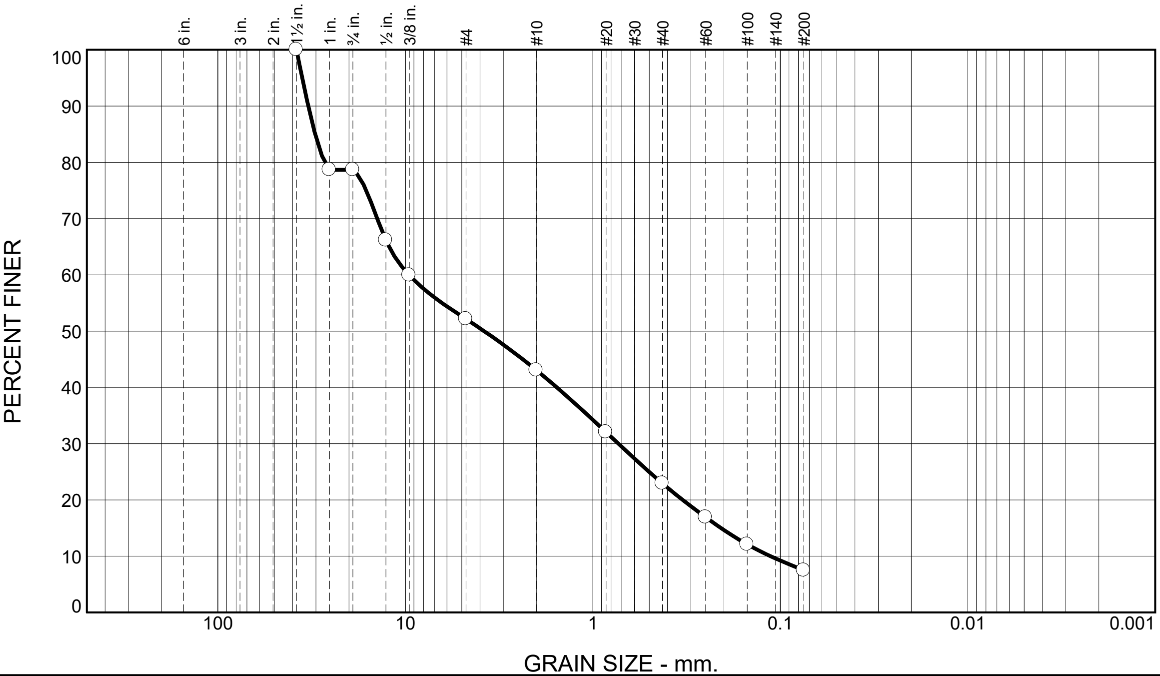
Cranston, RI

Remarks:

Figure 19-L-2834

Tested By: MN **Checked By:** SA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	21.3	26.5	9.1	20.2	15.4	7.5	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	78.7		
3/4"	78.7		
1/2"	66.2		
3/8"	59.9		
#4	52.2		
#10	43.1		
#20	32.0		
#40	22.9		
#60	16.9		
#100	12.1		
#200	7.5		

* (no specification provided)

Material Description

Brown f-c GRAVEL and f-c SAND, trace Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 32.9414 D_{85}= 30.2655 D_{60}= 9.5627
D_{50}= 3.8012 D_{30}= 0.7307 D_{15}= 0.2069
D_{10}= 0.1128 C_u= 84.79 C_c= 0.50

Remarks

Date Received: 12.06.19 **Date Tested:** 12.13.19

Tested By: MN / LR

Checked By: Steven Accetta

Title: Laboratory Coordinator

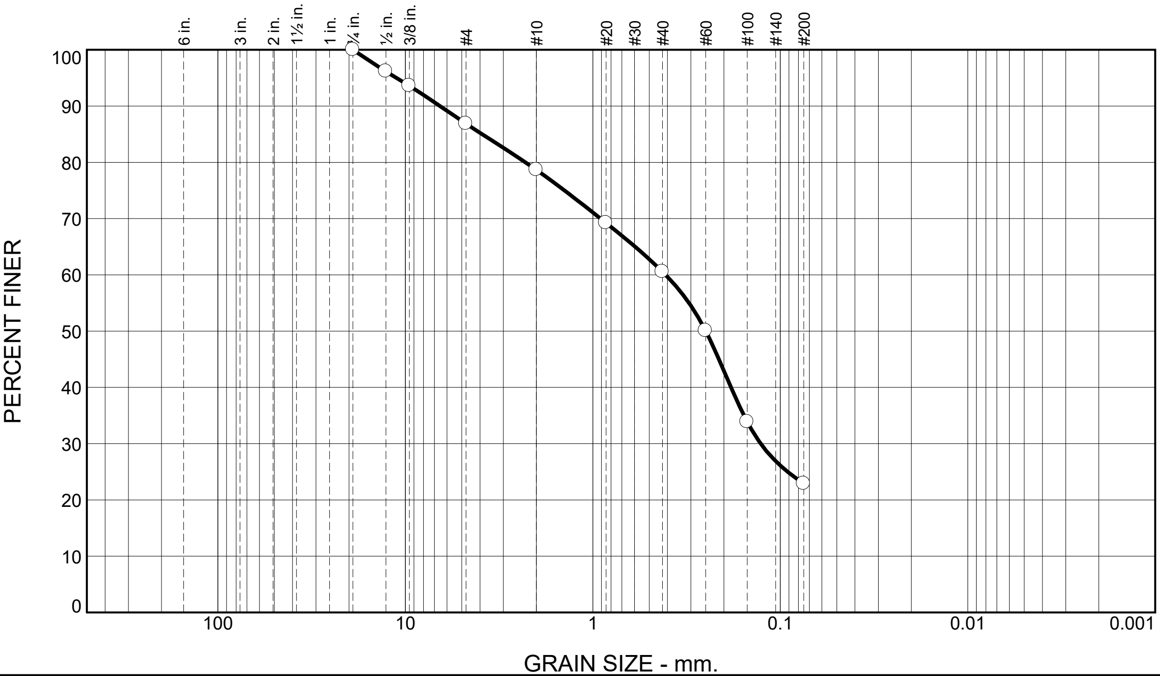
Source of Sample: EB-KERP-102 **Depth:** 0.5-2.5' **Date Sampled:**
Sample Number: 1D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Kennebec River Estuary Tidal Restoration
Woolwich, ME
Project No: 09.0026037.00 **Figure** 19-S-2836

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	13.1	8.2	18.2	37.6	22.9	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	96.2		
0.375"	93.6		
#4	86.9		
#10	78.7		
#20	69.2		
#40	60.5		
#60	50.0		
#100	33.9		
#200	22.9		

* (no specification provided)

Material Description

Brown f-c SAND, some Silt, little fine Gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 6.5355	D_{85}= 3.8939	D_{60}= 0.4096
D_{50}= 0.2496	D_{30}= 0.1271	D_{15}=
D_{10}=	C_u=	C_c=

Remarks

Date Received: 12.06.19 **Date Tested:** 12.13.19

Tested By: MN / LR

Checked By: Steven Accetta

Title: Laboratory Coordinator

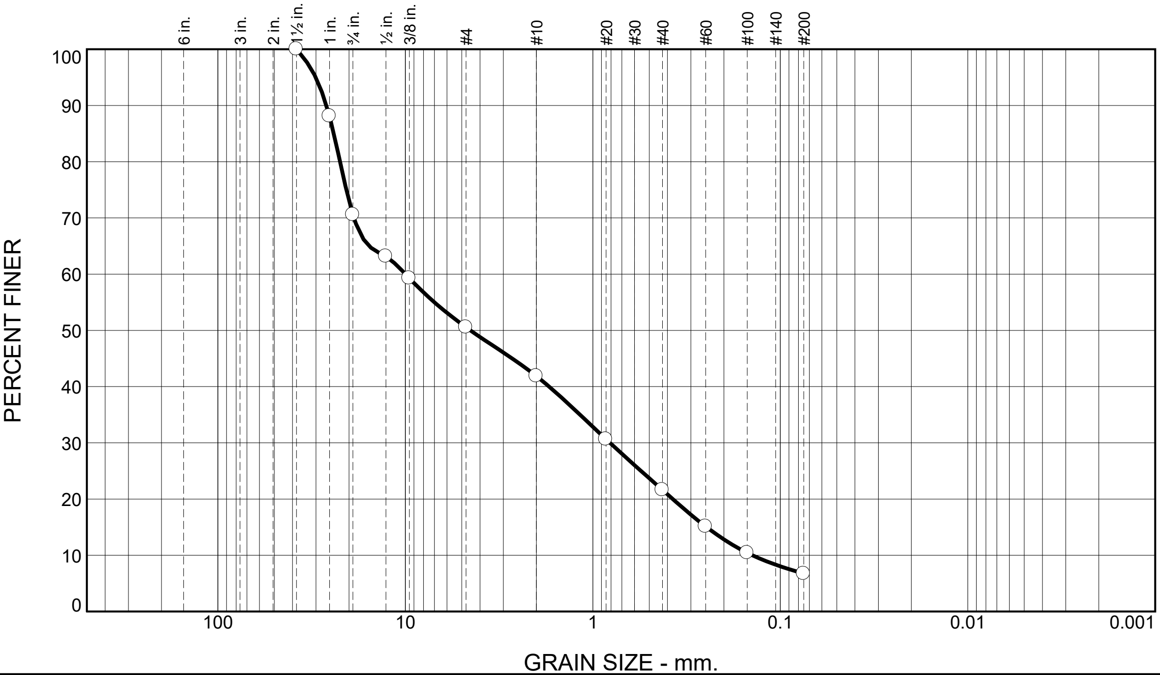
Source of Sample: EB-KERP-102 **Depth:** 9-11' **Date Sampled:**
Sample Number: 3D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Kennebec River Estuary Tidal Restoration
Woolwich, ME
Project No: 09.0026037.00 **Figure** 19-S-2837

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	29.4	20.0	8.7	20.3	14.9	6.7	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	88.1		
3/4"	70.6		
1/2"	63.2		
3/8"	59.3		
#4	50.6		
#10	41.9		
#20	30.6		
#40	21.6		
#60	15.1		
#100	10.4		
#200	6.7		

* (no specification provided)

Material Description

Brown f-c GRAVEL and f-c SAND, trace Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 26.3617 D_{85}= 24.0957 D_{60}= 9.9925
D_{50}= 4.4985 D_{30}= 0.8107 D_{15}= 0.2473
D_{10}= 0.1410 C_u= 70.85 C_c= 0.47

Remarks

Date Received: 12.06.19 **Date Tested:** 12.13.19

Tested By: MN / LR

Checked By: Steven Accetta

Title: Laboratory Coordinator

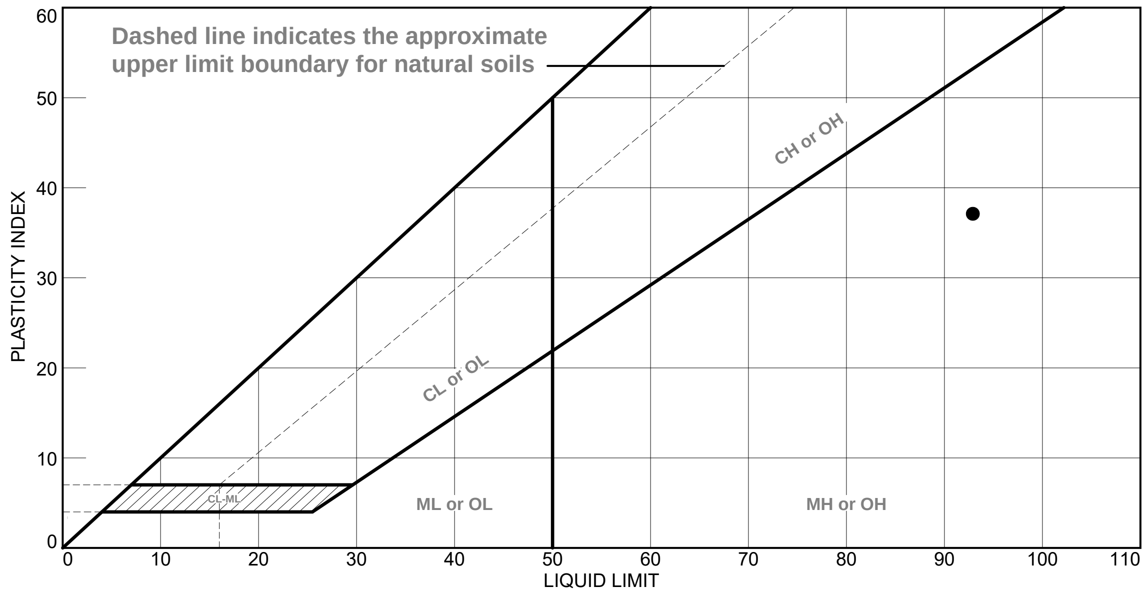
Source of Sample: EB-KERP-102 **Depth:** 14-16' **Date Sampled:**
Sample Number: 4D

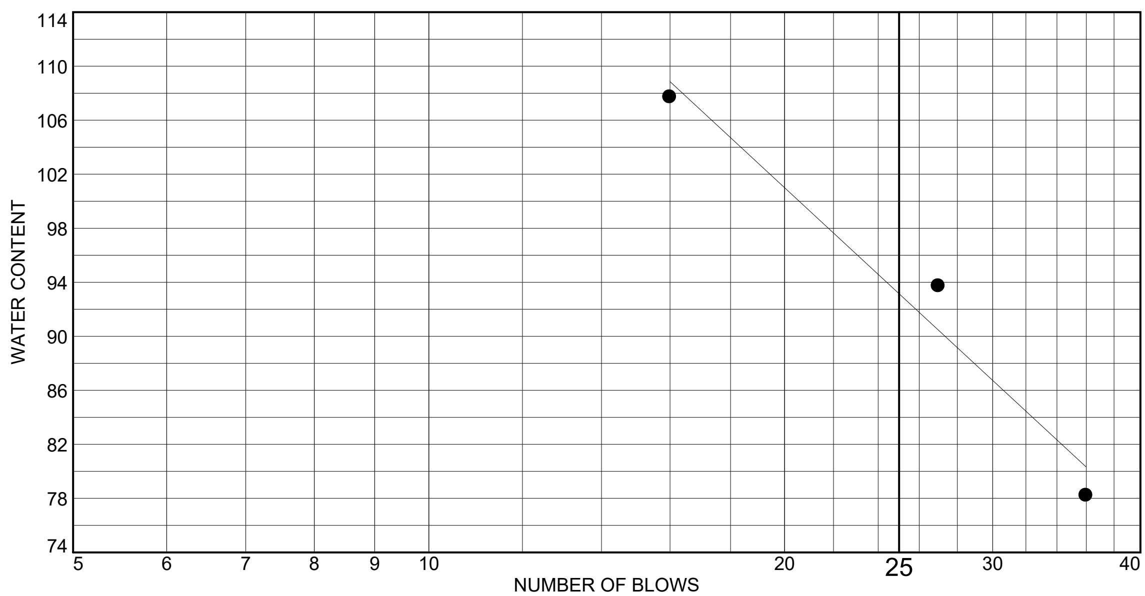
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Kennebec River Estuary Tidal Restoration
Woolwich, ME
Project No: 09.0026037.00 **Figure** 19-S-2838

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Organic Silty CLAY	93	56	37			

Project No. 09.0026037.00 **Client:** GZA GeoEnvironmental

Project: Kennebec River Estuary Tidal Restoration

Woolwich, ME

Source of Sample: EB-KERP-102 **Depth:** 29-31'

Sample Number: 6D

Thielsch Engineering Inc.

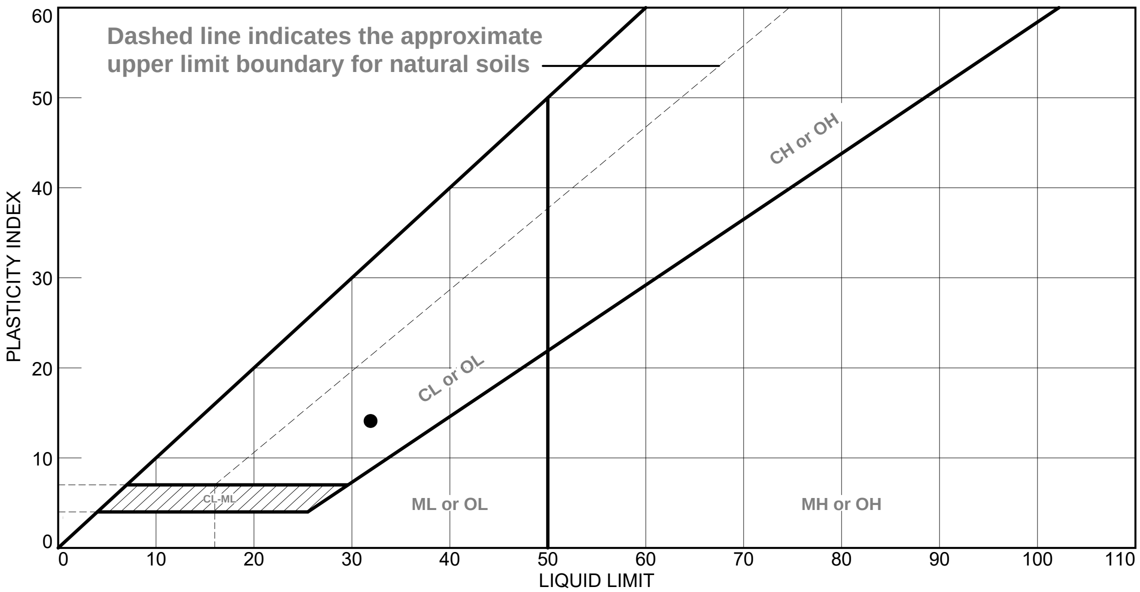
Cranston, RI

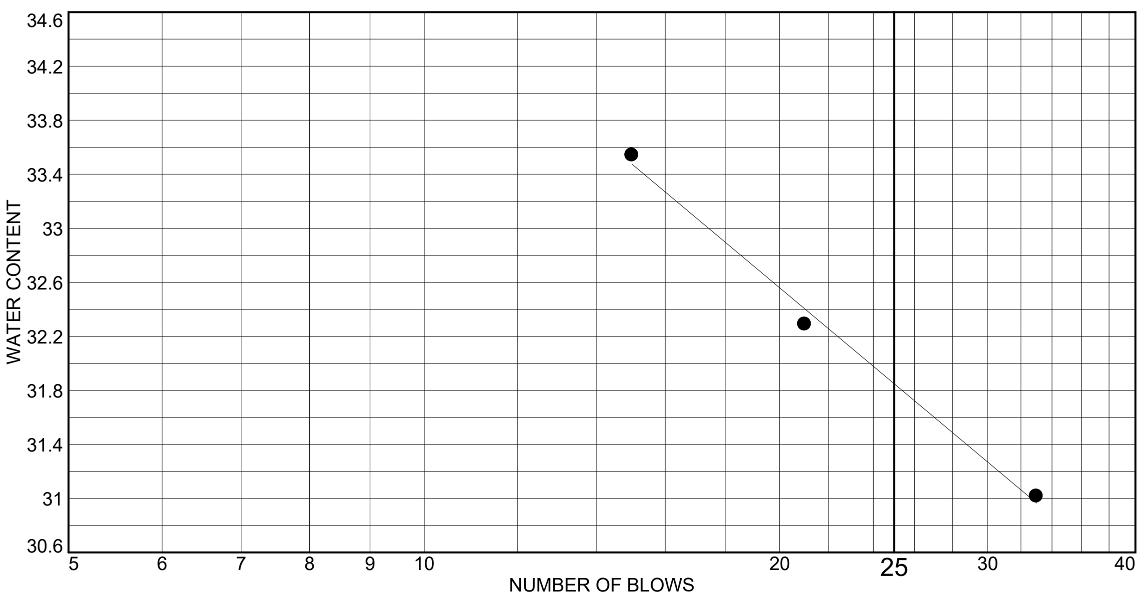
Remarks:

Figure 19-L-2840

Tested By: MN **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown CLAY & SILT	32	18	14			

Project No. 09.0026037.00 **Client:** GZA GeoEnvironmental

Project: Kennebec River Estuary Tidal Restoration

Woolwich, ME

Source of Sample: EB-KERP-102 **Depth:** 44-46'

Sample Number: 9D

Remarks:

Thielsch Engineering Inc.

Cranston, RI

Figure 19-L-2842

Tested By: LR **Checked By:** SA

Soil Metrics LLC Geotechnical Engineering

12 Farms Edge Road
Cape Elizabeth, Maine 04107
Ph. 207. 767.2192
Cell. 207.415.5835

MEMORANDUM

TO: **BLAINE CARDALI**

FROM: **STEVE RABASCA**

DATE: **JANUARY 8, 2020**

SUBJECT: **KERP LAB TEST RESULTS**

Attached please find the lab test results for the KERP Project. The following test results are included:

Incremental Consolidation Tests:

BB-KERP-101-1U (see time curve for load step 7 for c_{alpha}). I am going to re-run this test, because I think I may be able to do better, but wanted to send along these results.
BB- KERP-101-2U This sample is a clayey silt. The curve is not showing a pronounced break at the maximum previous stress, but this is likely due to the fact it is a silt. It is also not very compressible. I don't think re-running this sample will improve the results.
BB- KERP-101-3U: This sample was difficult to trim for the tests. I tried multiple times to trim in a 2.5 inch consolidometer, but the sample was fractured after I debonded it from the tube. I finaly tried a test using the 2.5 inch diameter ring, and the results were not very good (ICON 315). I then tried trimming to a 2.0 inch diameter, ¾ inch high ring, and had better results. The first test (ICON 316), had a small fracture, but I ran the test to see the results. There was a much better curve, but I ended up trimming another 2-inch diameter sample and running ICON 317. This test was better still, so I recommend using these results for enginerring properties. I plotted all three tests on the summary plot for reference, but only included ICON 317 data in the appendix.

Consolidated (K_o) Direct Simple Shear Tests:

BB-KERP-101-1U
BB- KERP-101-2U

Atterberg Limits: (Results included on Consolidation test or DSS Summary Sheets)

BB-KERP-101-1U
BB- KERP-101-2U
BB- KERP-101-3U

Moisture/Organic Content Determination:

BB-KERP-101-1U: MC = 58.2%, OC = 4.3% =

Please call me if you have any questions.
Regards - Steve

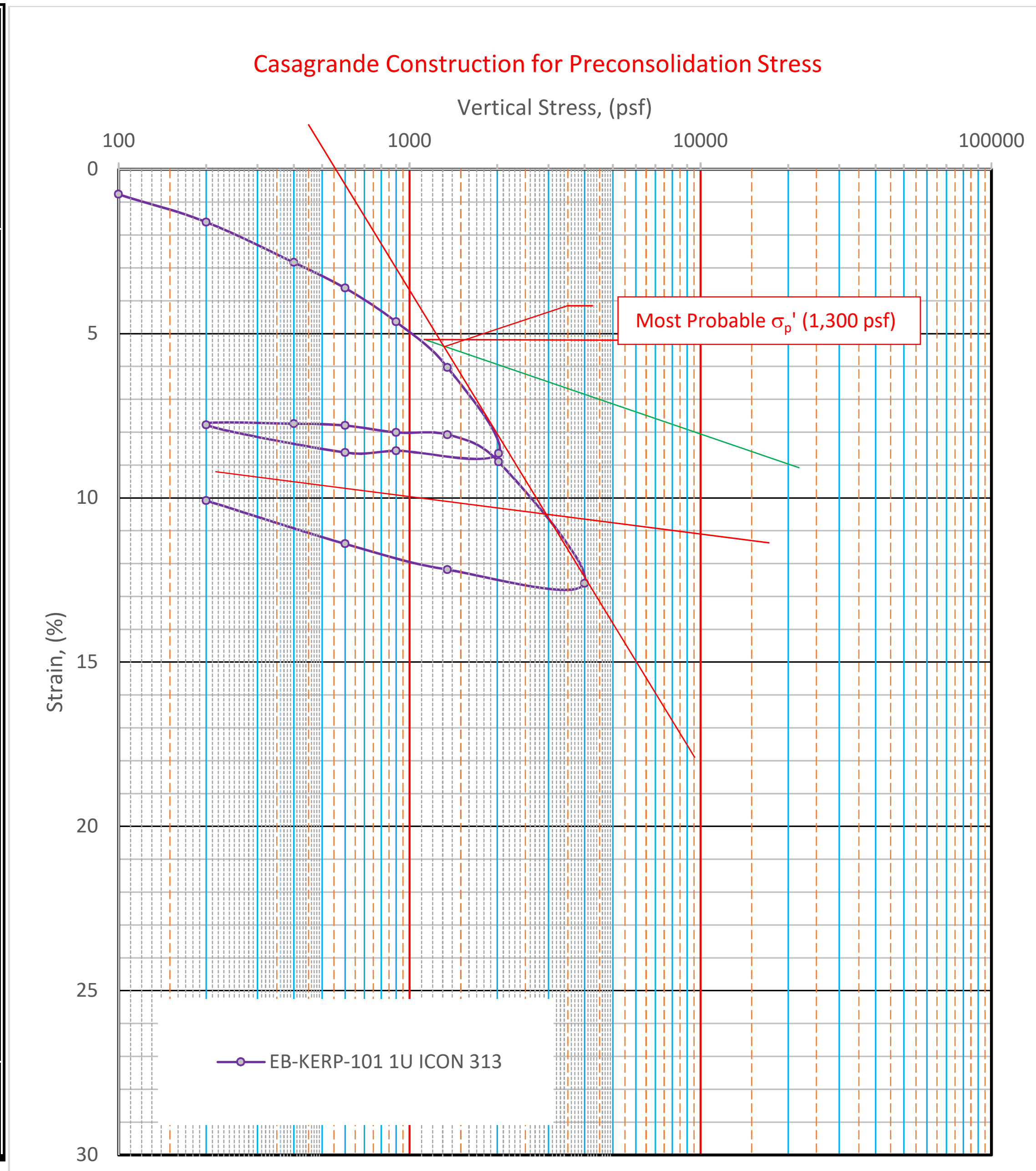
INCREMENTAL CONSOLIDATION

ICON 113:
BB KERP 1U

Consolidation Test Data
Summary Report

Project Name:	Kennebec River Estuary Restoration
Project Number:	166-13
Project Location:	Woolwich, Maine
Client:	GZA
Sample Description:	Gray Silty Clay
Preparation:	Trimmed Shelby Tube

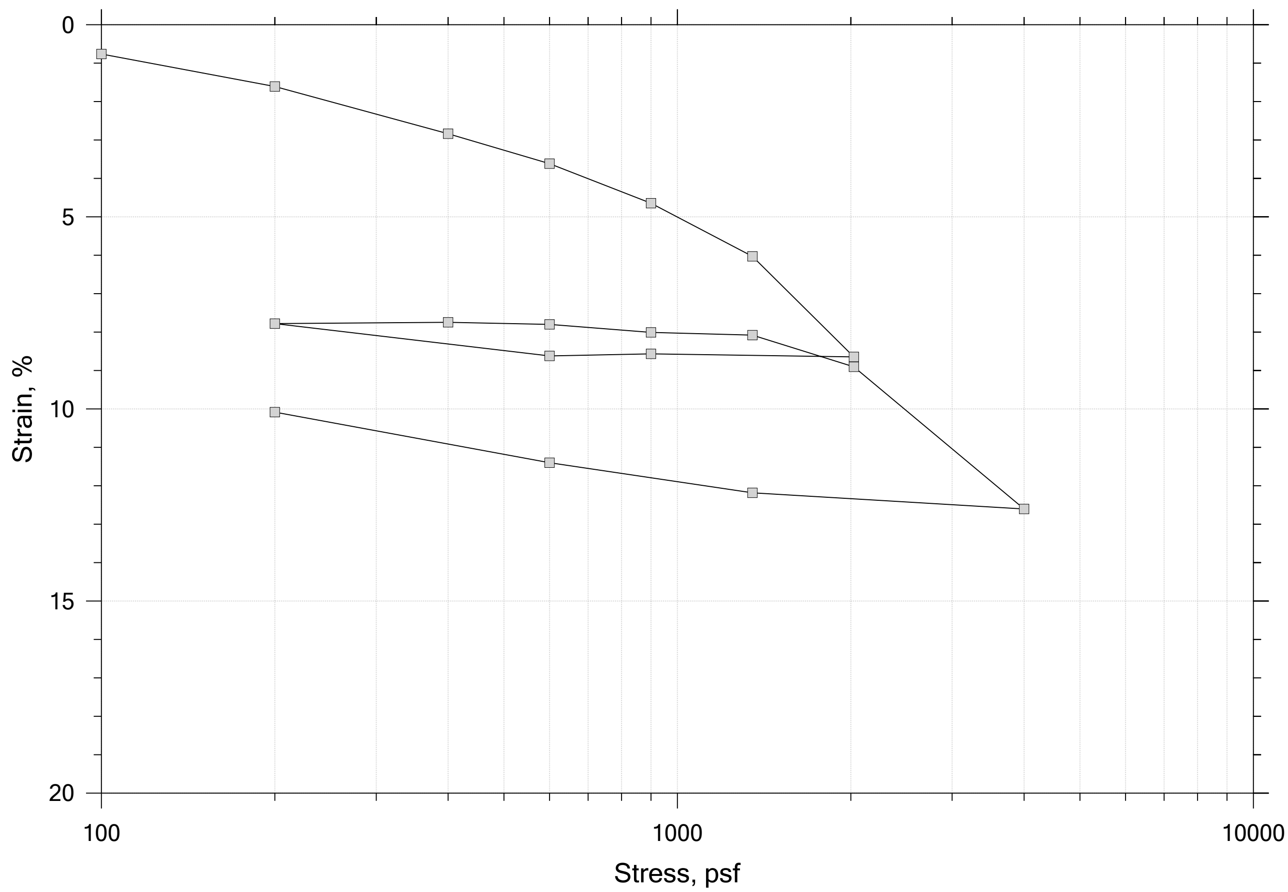
Lab Test No:	ICON 313			
Boring No.	KERP 101			
Sample No:	1U			
Boring Elevation (ft).	5.3			
Sample Depth (ft):	19-21			
Test Specimen Depth (Ft):	20.9			
Test Specimen Elevation:	-15.6			
Water Content (%):	62.5			
Dry Unit Weight (pcf):	60.7			
Wet Unit Weight (pcf):	98.6			
Saturation Before (%):	91.7			
Saturation After (%):	100			
Void Ratio Before:	1.97			
Void Ratio After:	1.67			
Overburden Pressure (psf):	--			
Max Previous stress (psf):	1,300			
Max Prev. stress (Work) (psf):	--			
OCR:	--			
Compression Index (C_{CE}):	0.15			
Recompression Index (C_{RE}):	0.013			
Liquid Limit:	66.1			
Plastic Limit:	45.4			
Plasticity Index:	20.7			
Liquidity Index:	0.83			
Specific Gravity (implied)	2.89			
Organic Content (%)	4.32			
Tested By:	sjr			
Date Tested:	12/26/2019			
Checked By:	sjr			

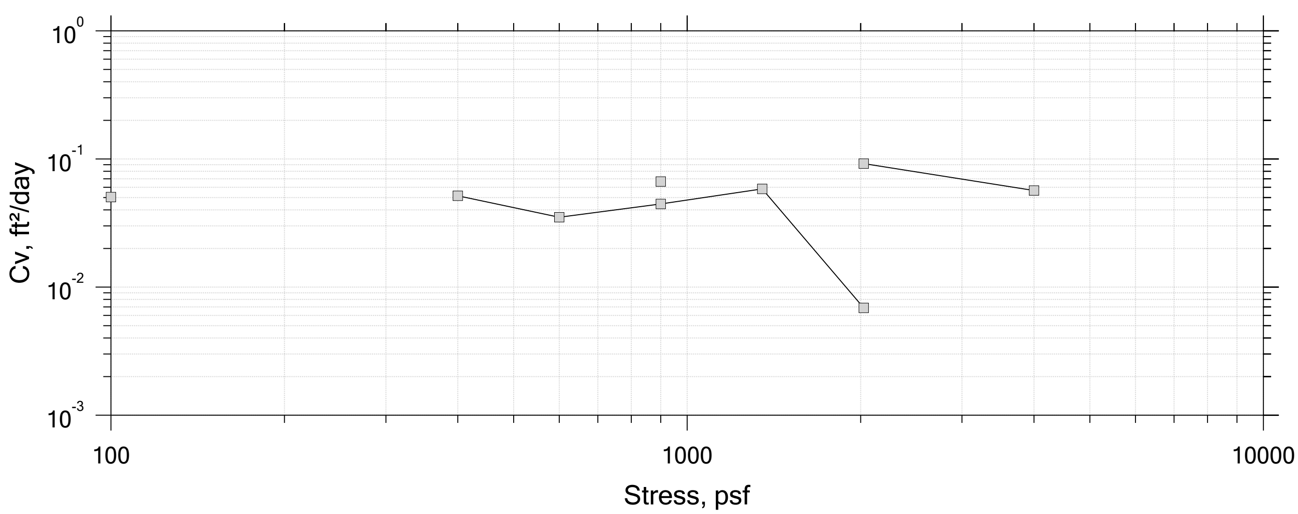


Soil Metrics LLC Geotechnical Engineering

One-Dimensional Consolidation by ASTM D2435 - Method B

Summary Report

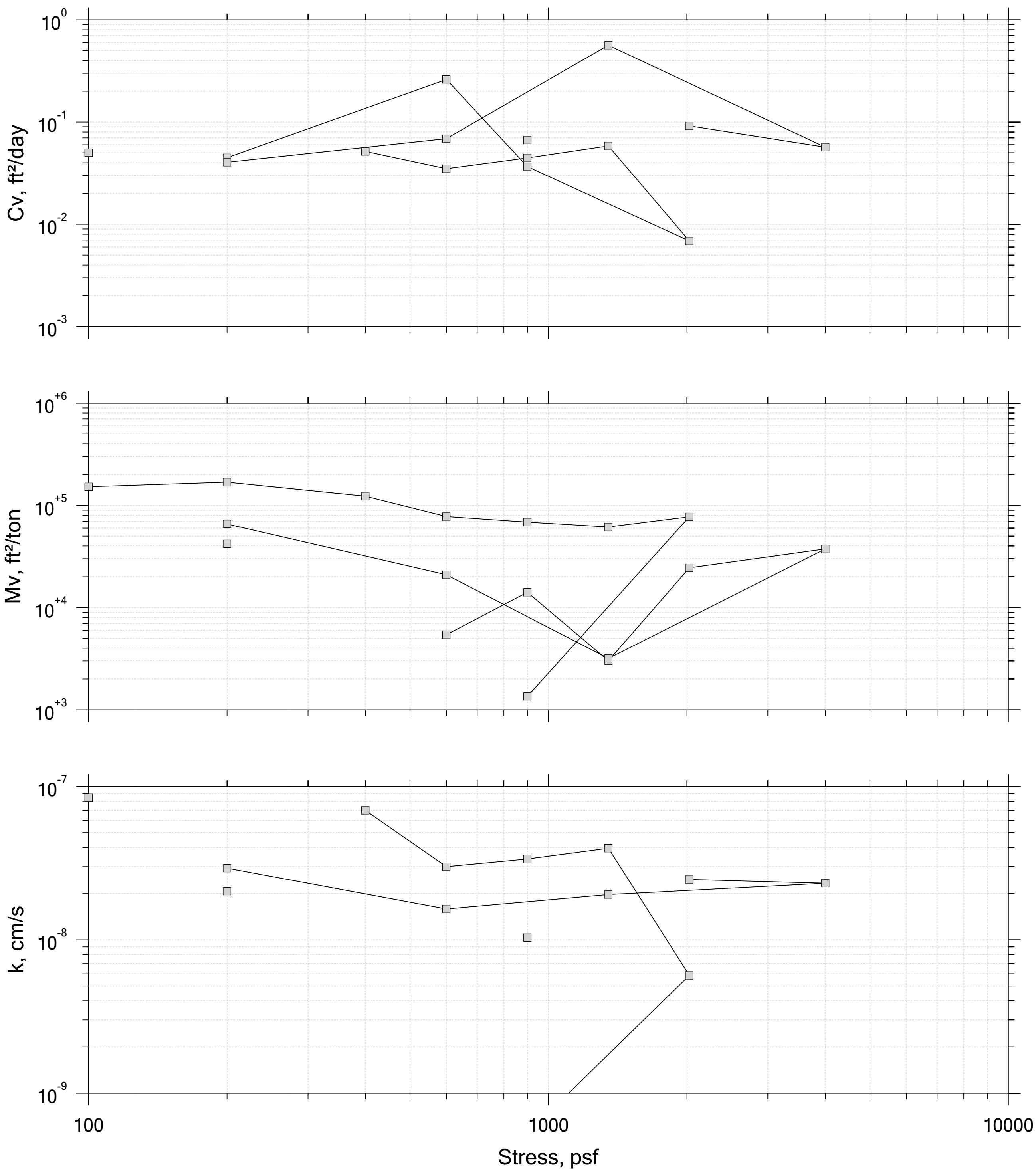




Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B

Sqrt of Time Coefficients



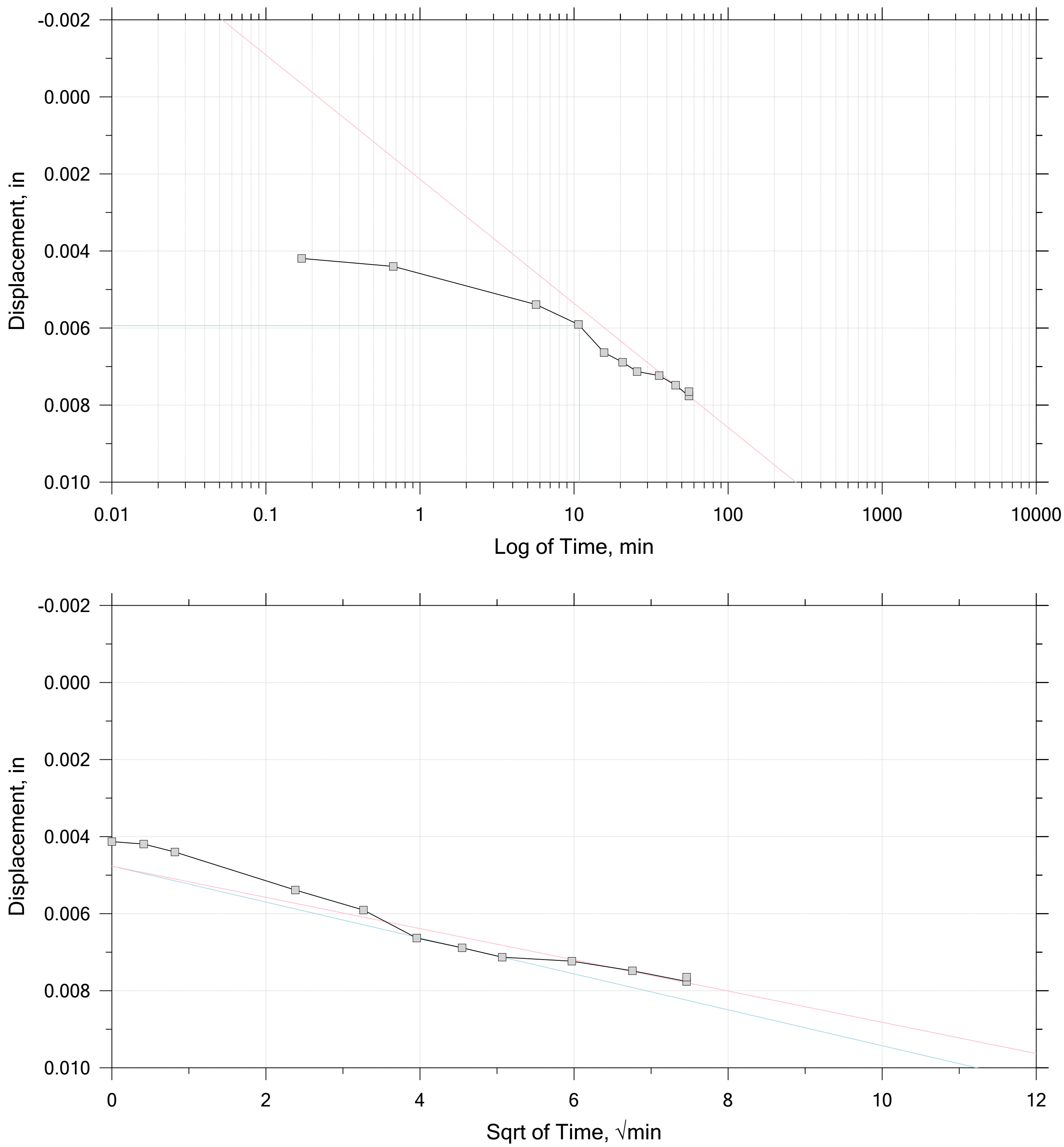
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 19

Constant Load Step

Stress: 100 psf



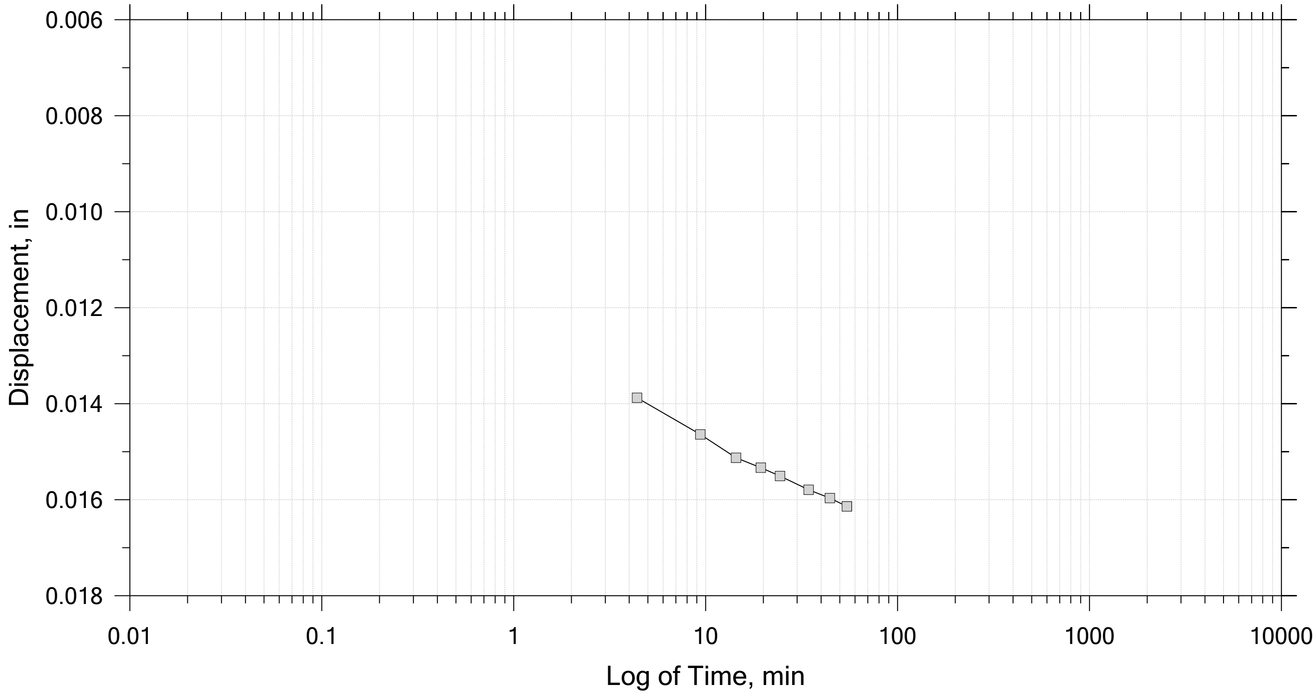
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

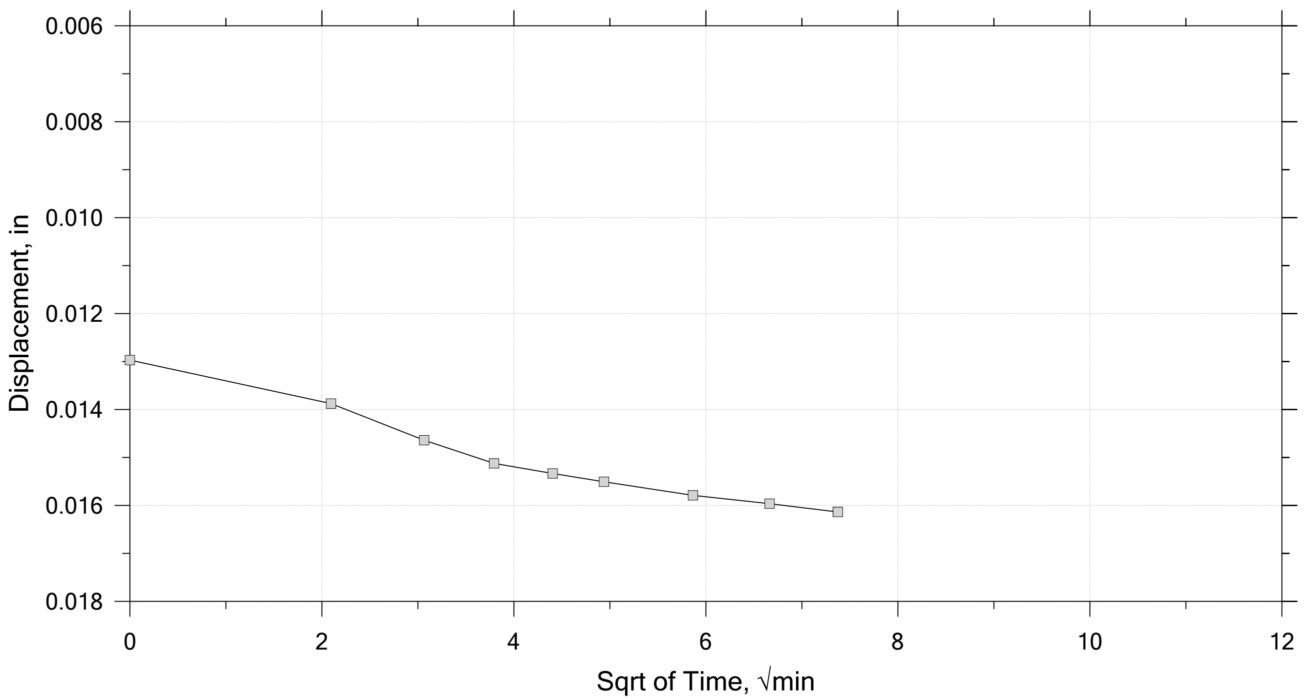
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 19

Constant Load Step

Stress: 200 psf





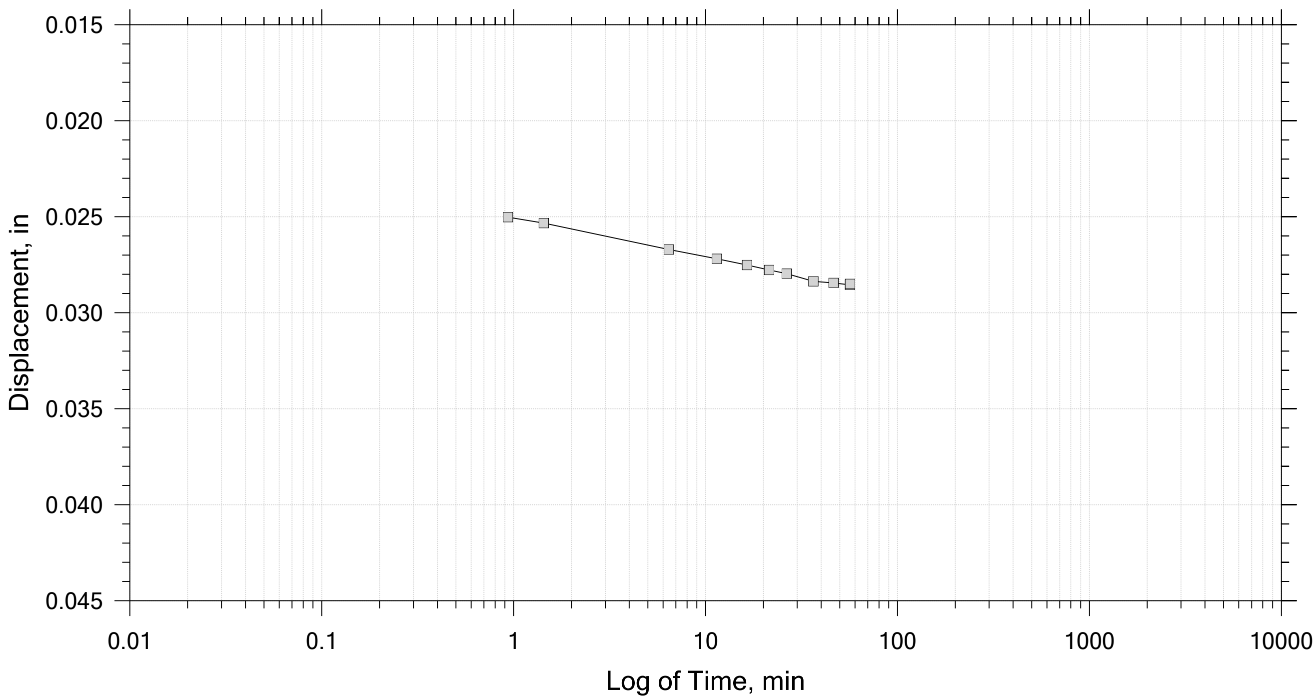
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

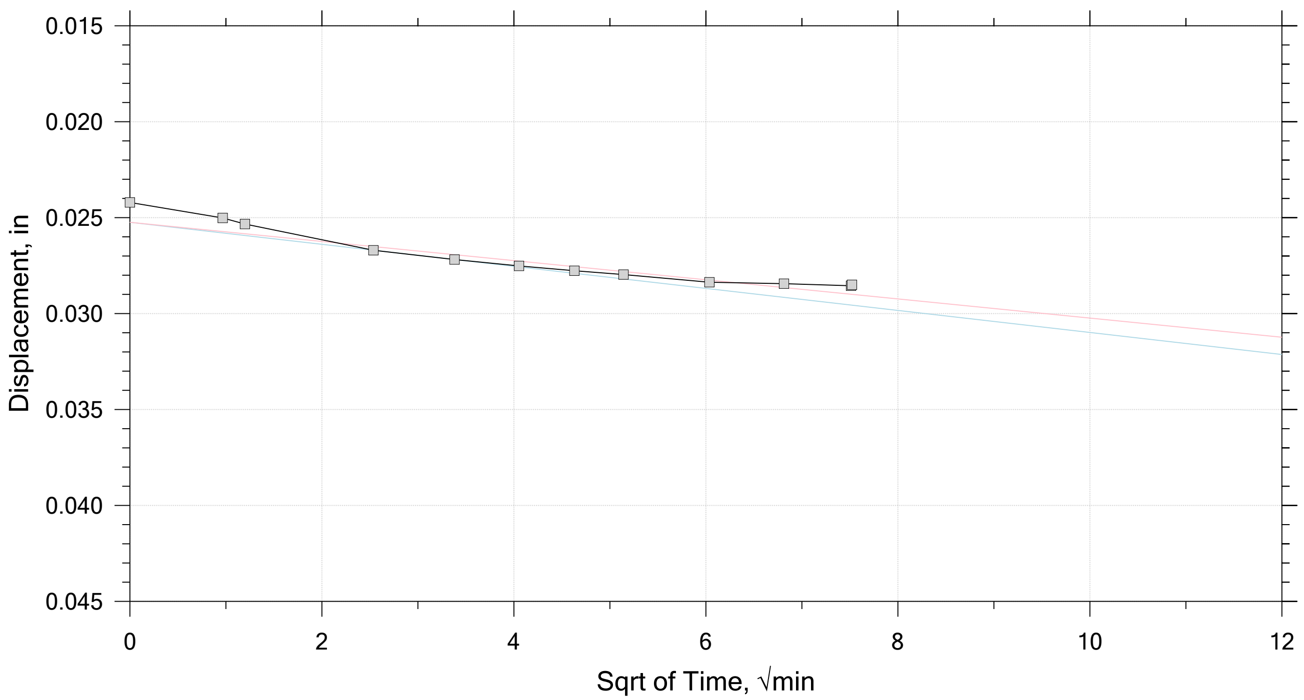
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 19

Constant Load Step

Stress: 400 psf





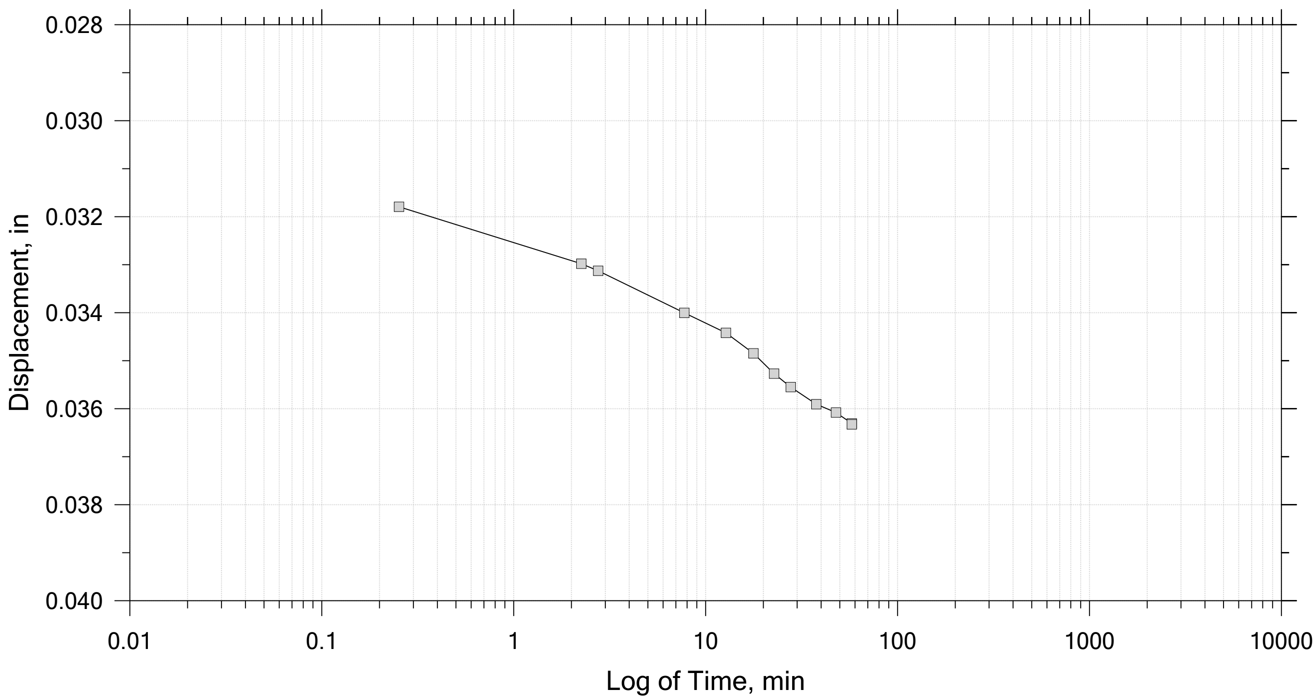
Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

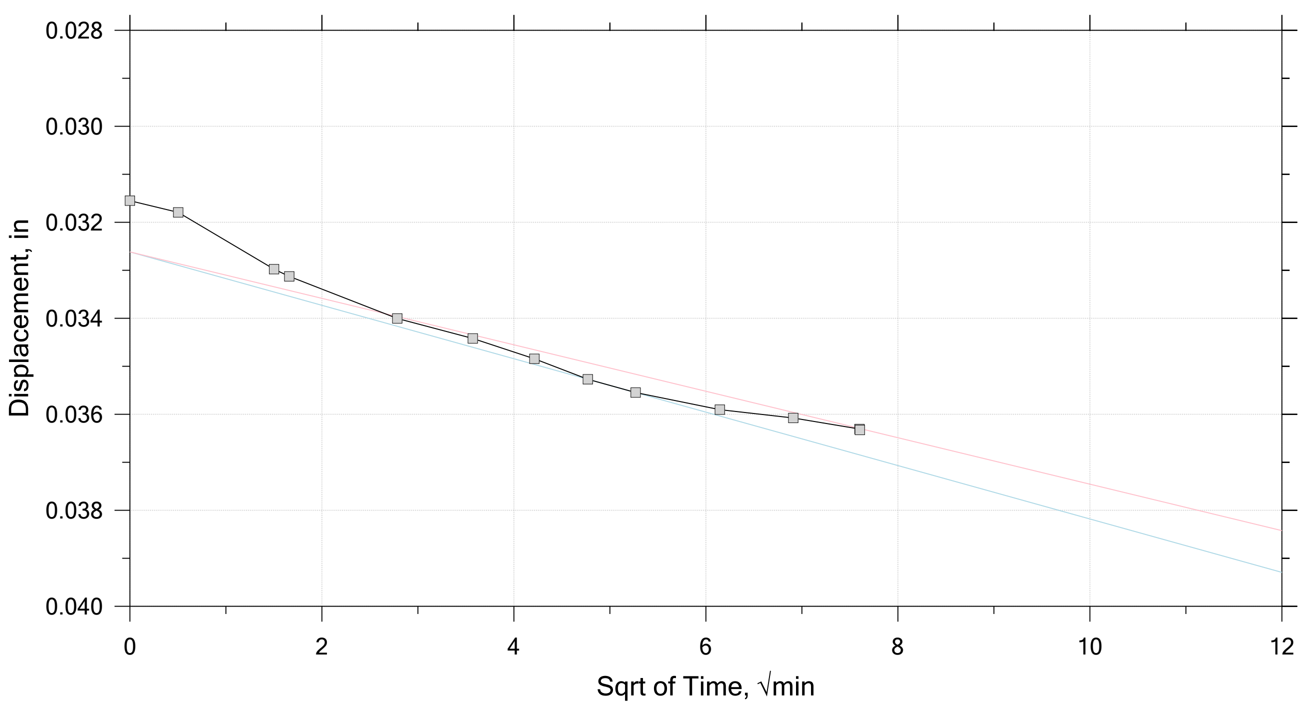
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 19

Constant Load Step

Stress: 600 psf

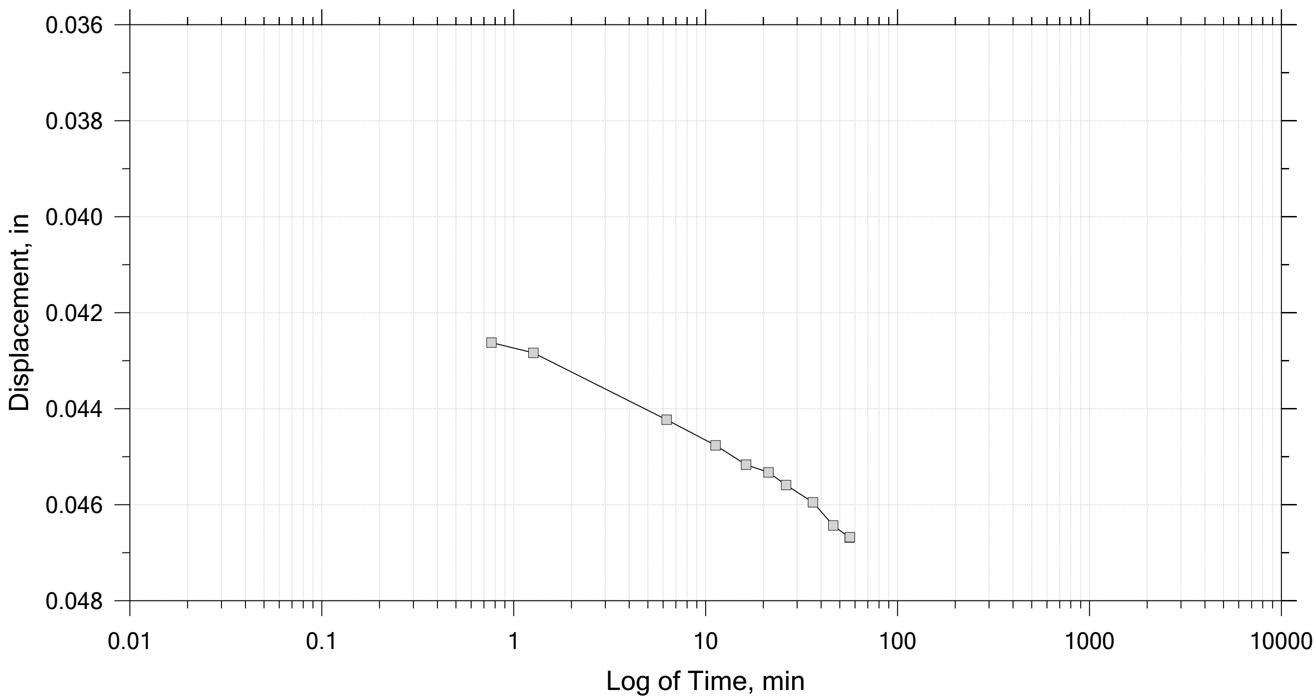


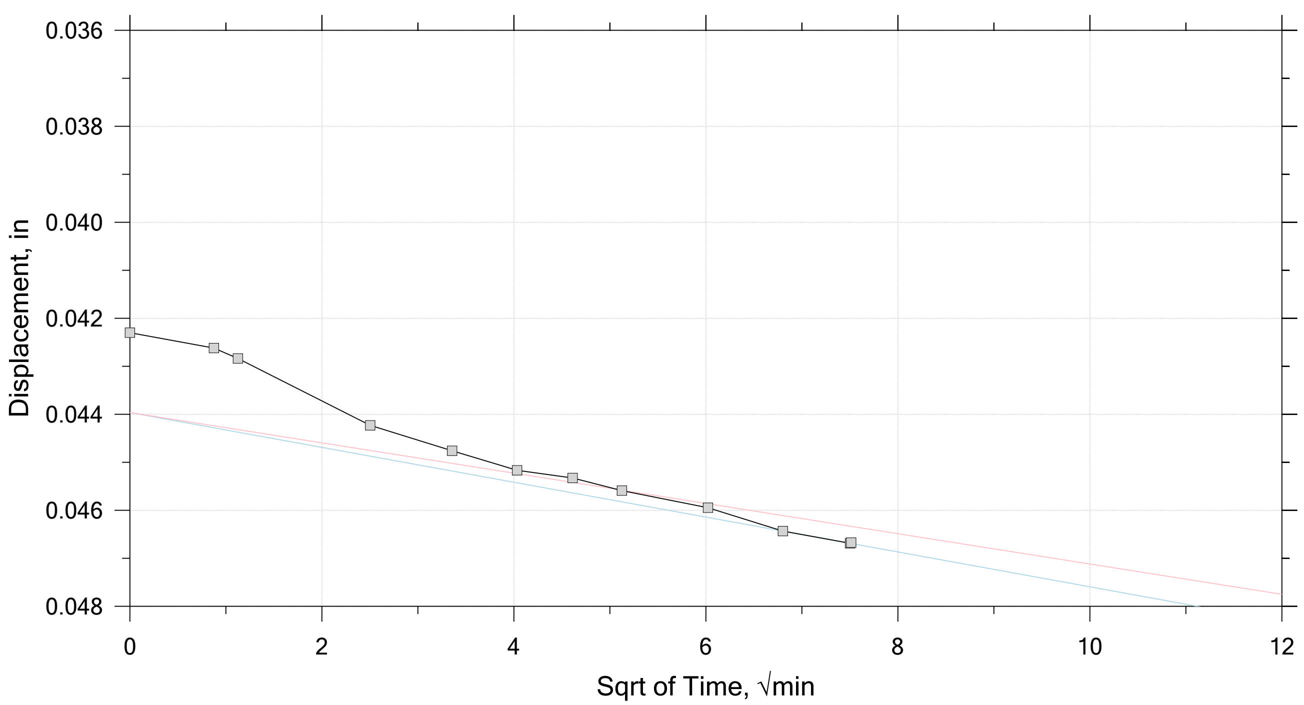


Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 19
Constant Load Step
Stress: 900 psf





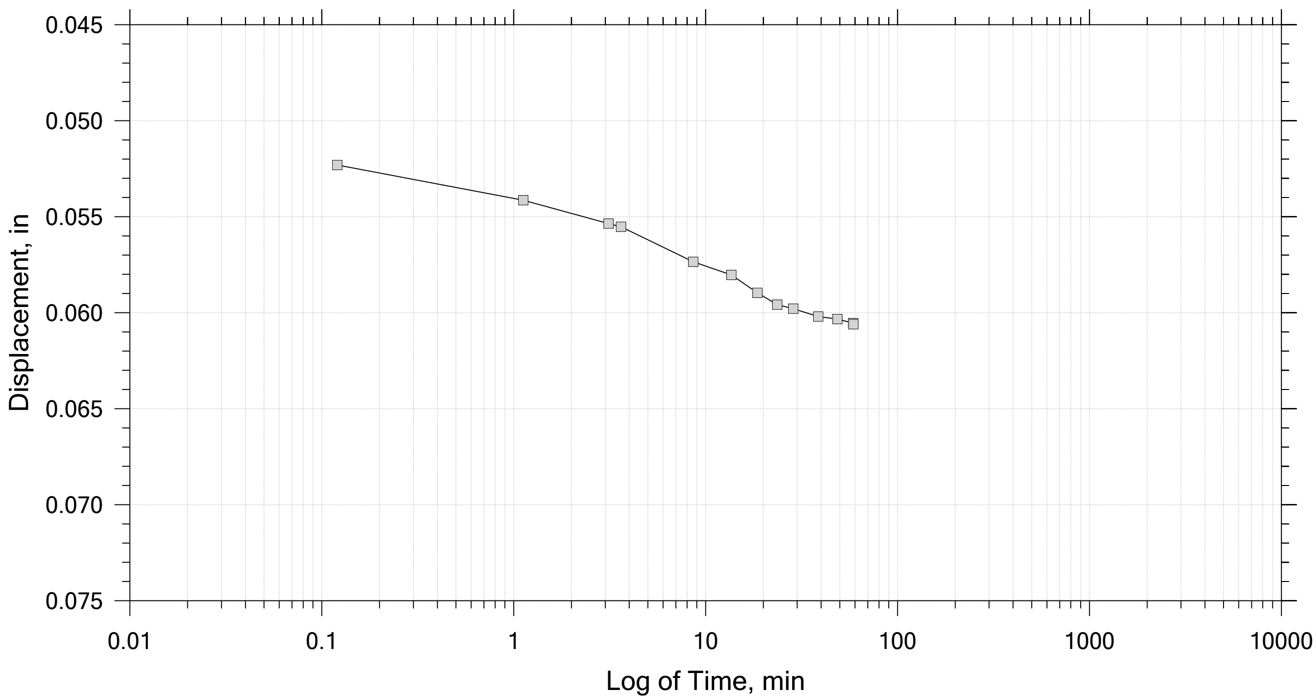
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

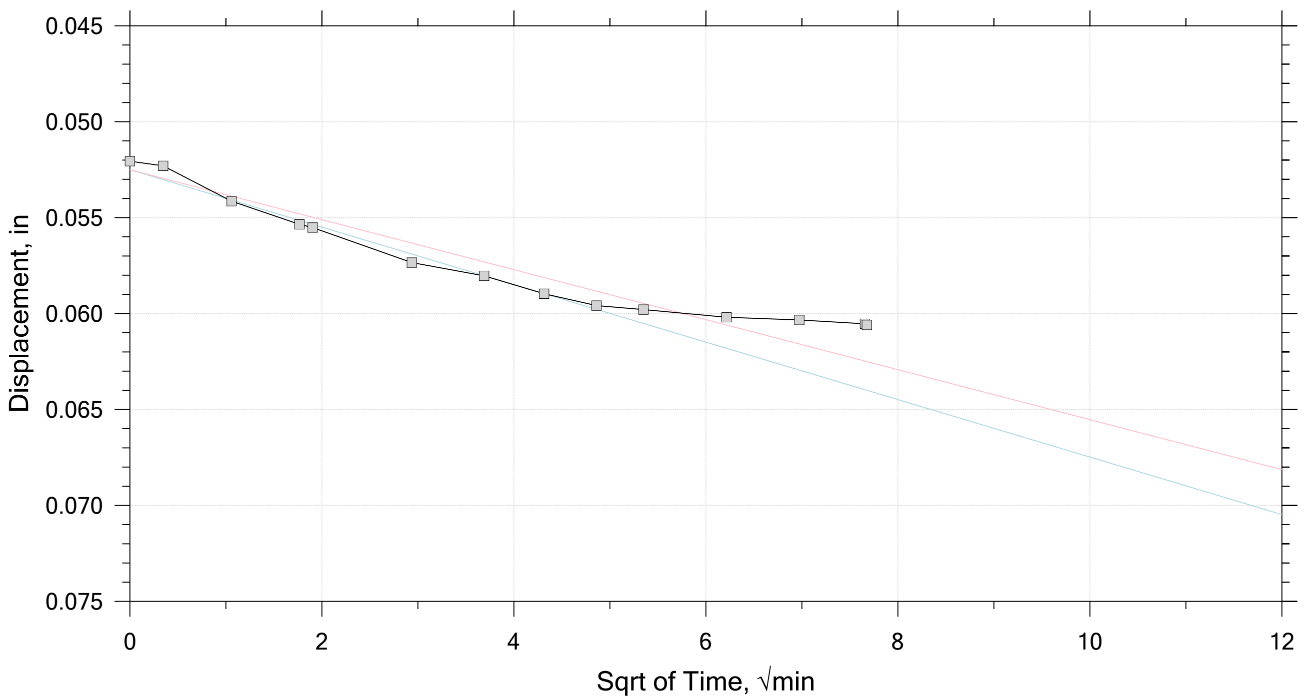
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 19

Constant Load Step

Stress: 1.35e+03 psf

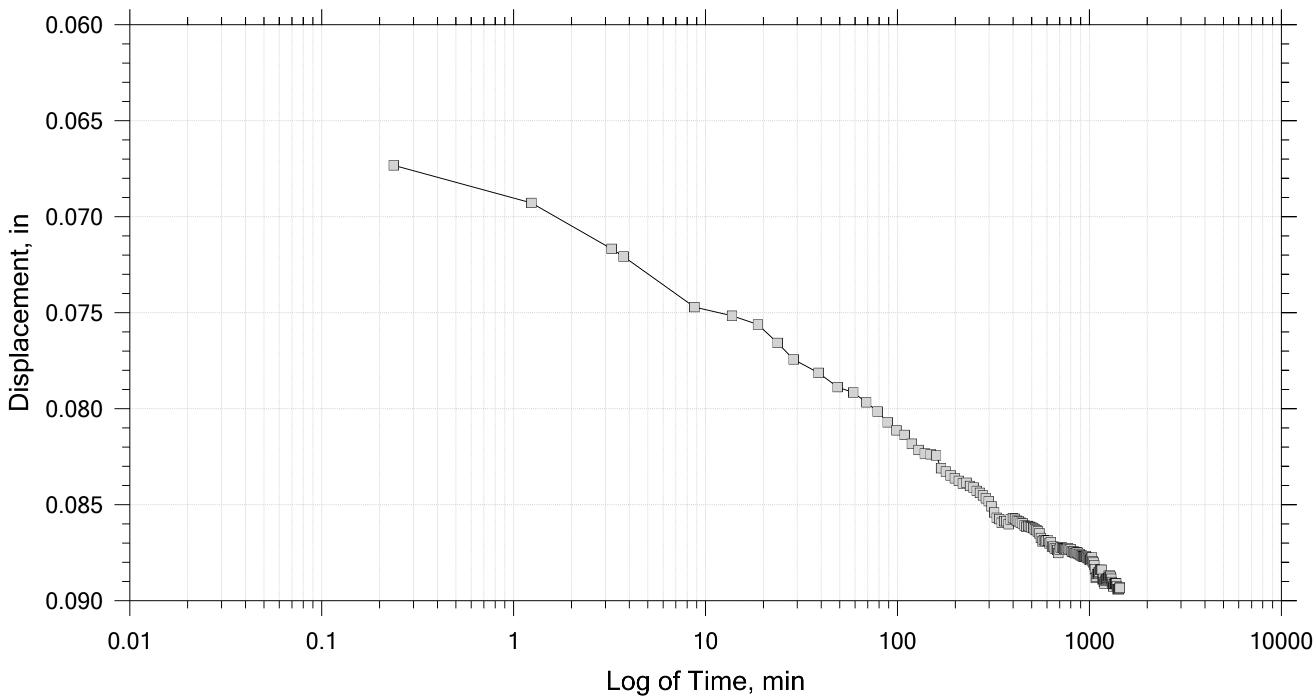


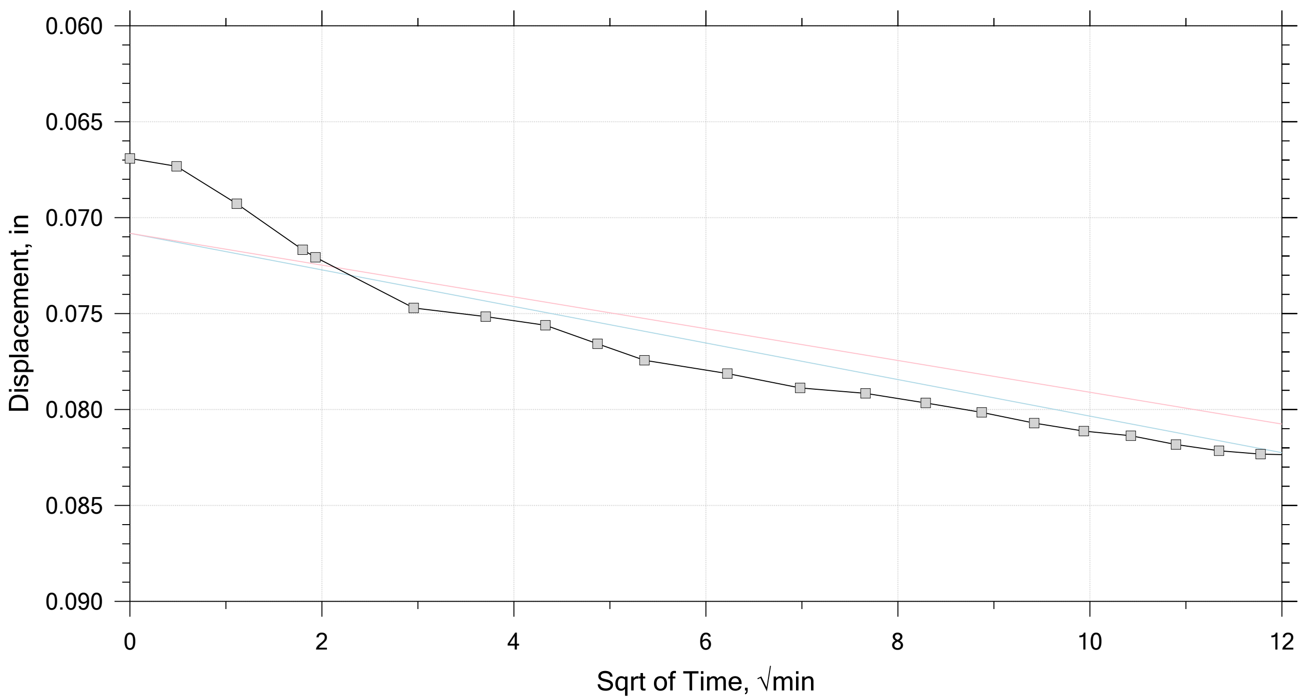


Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 19
Constant Load Step
Stress: 2.02e+03 psf





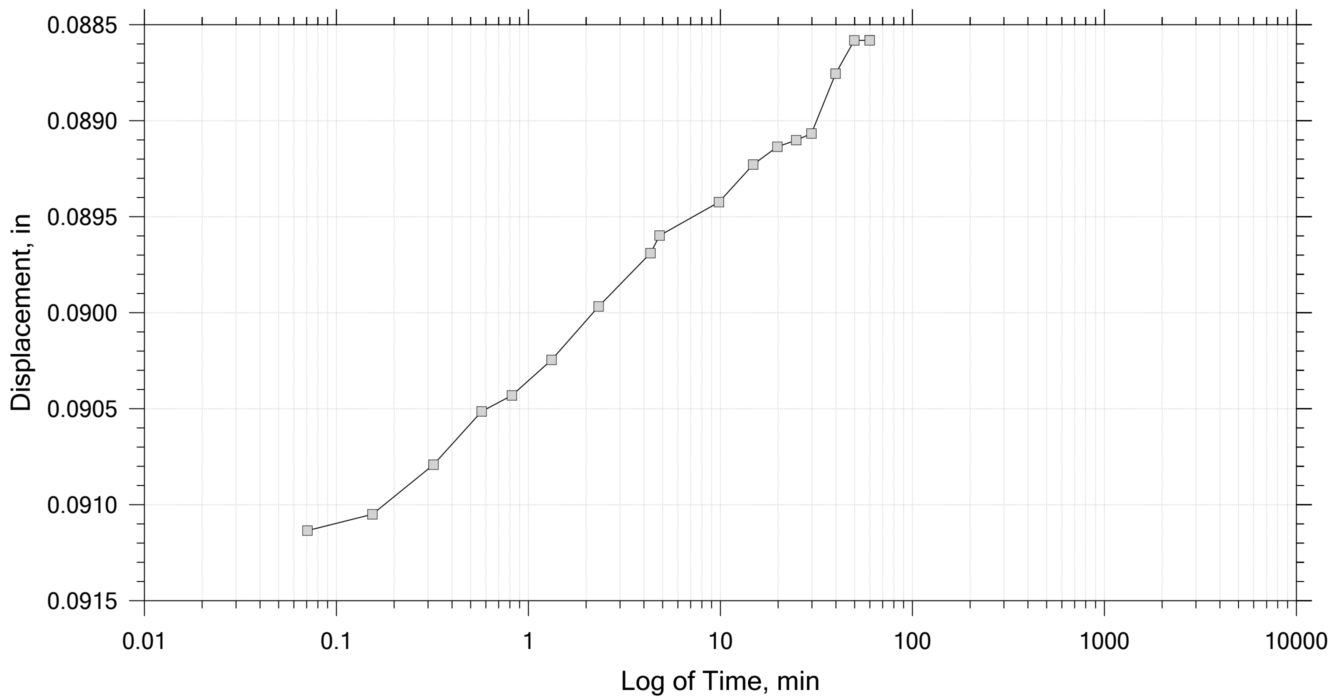
Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

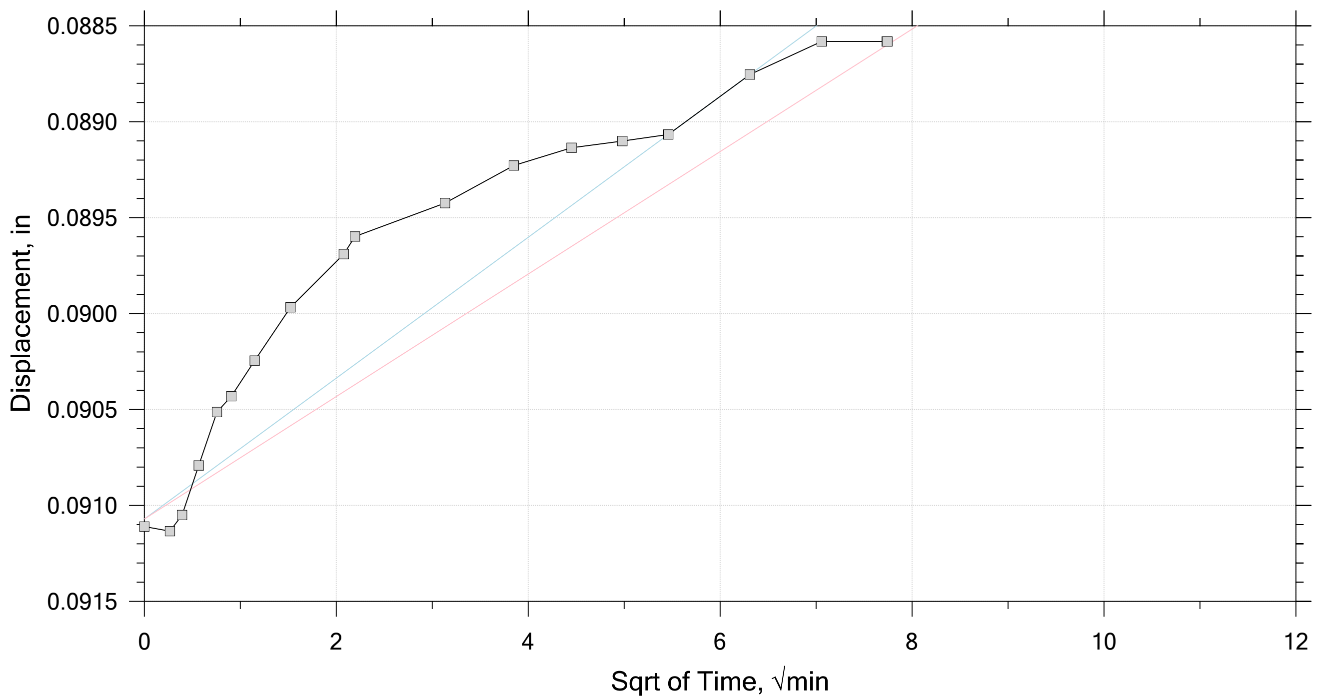
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 19

Constant Load Step

Stress: 900 psf





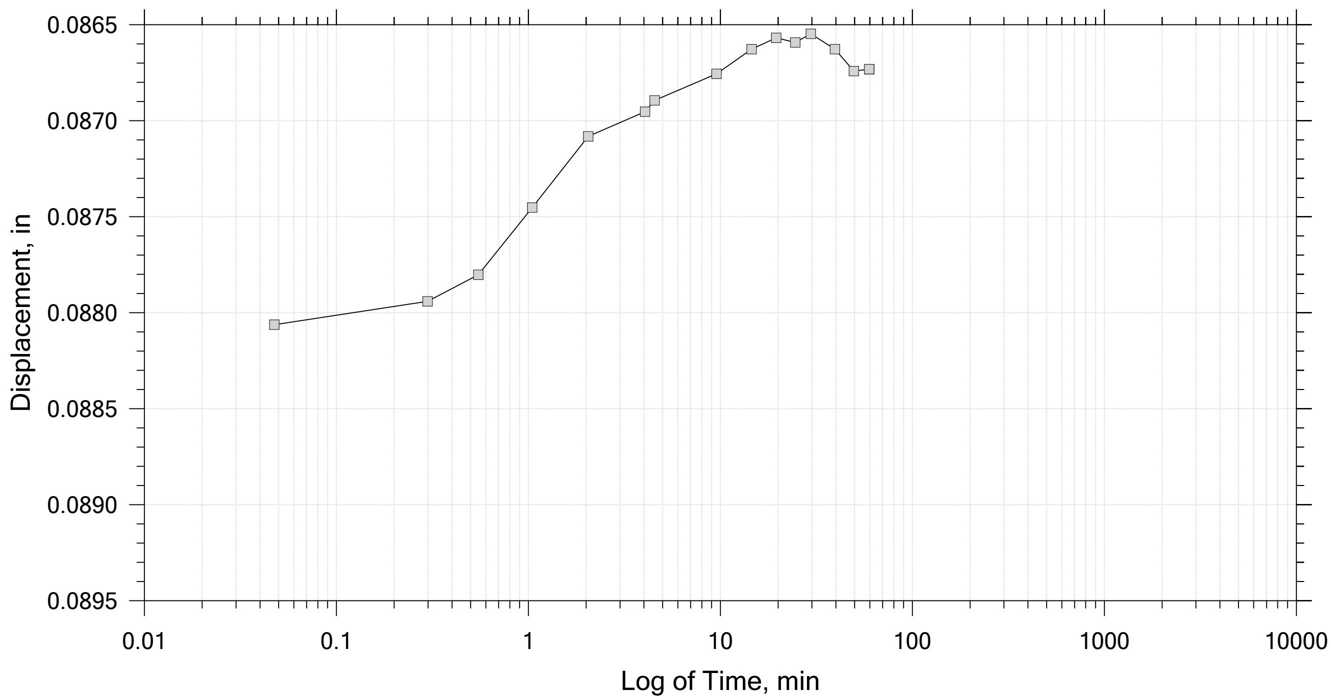
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

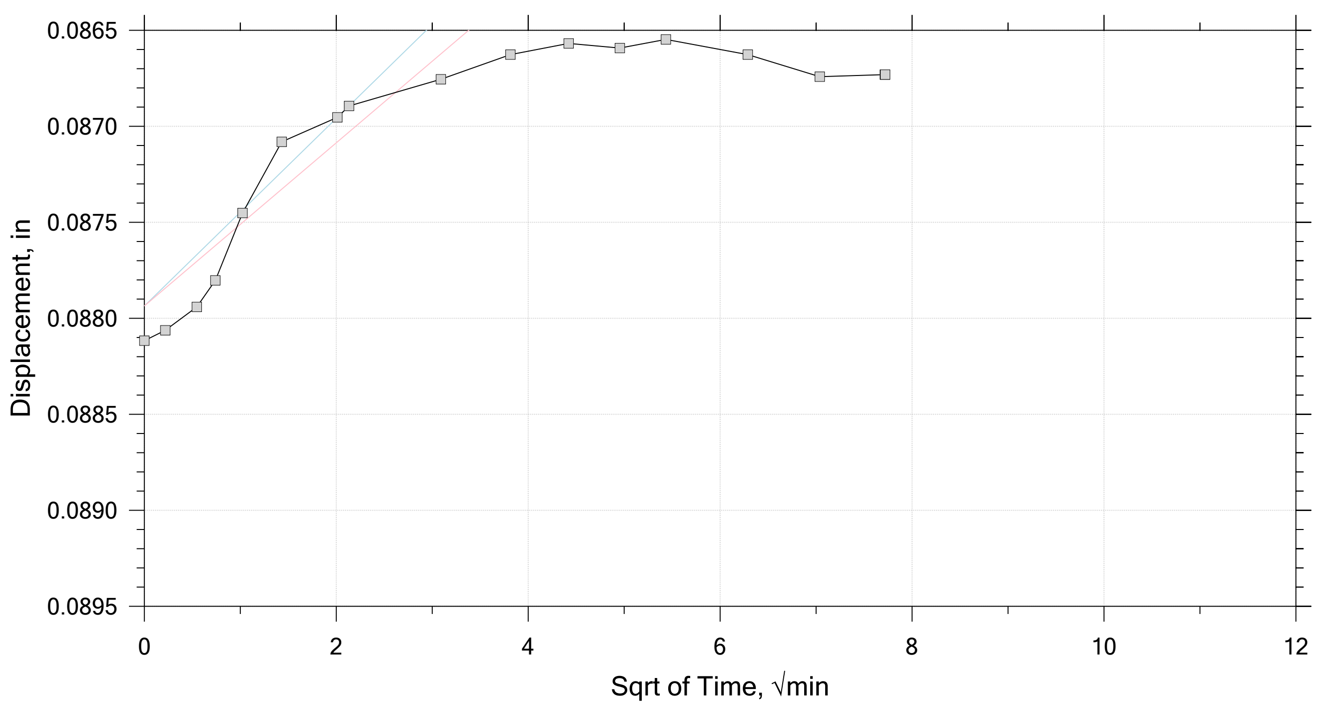
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 19

Constant Load Step

Stress: 600 psf





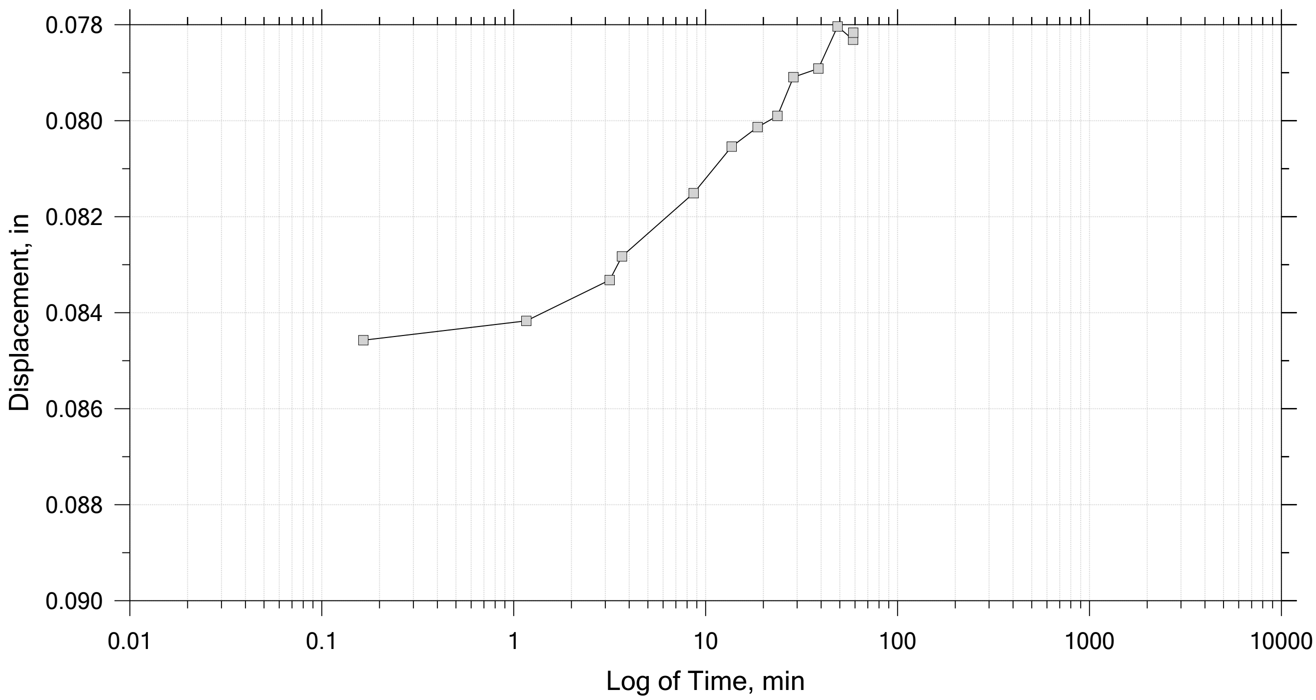
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

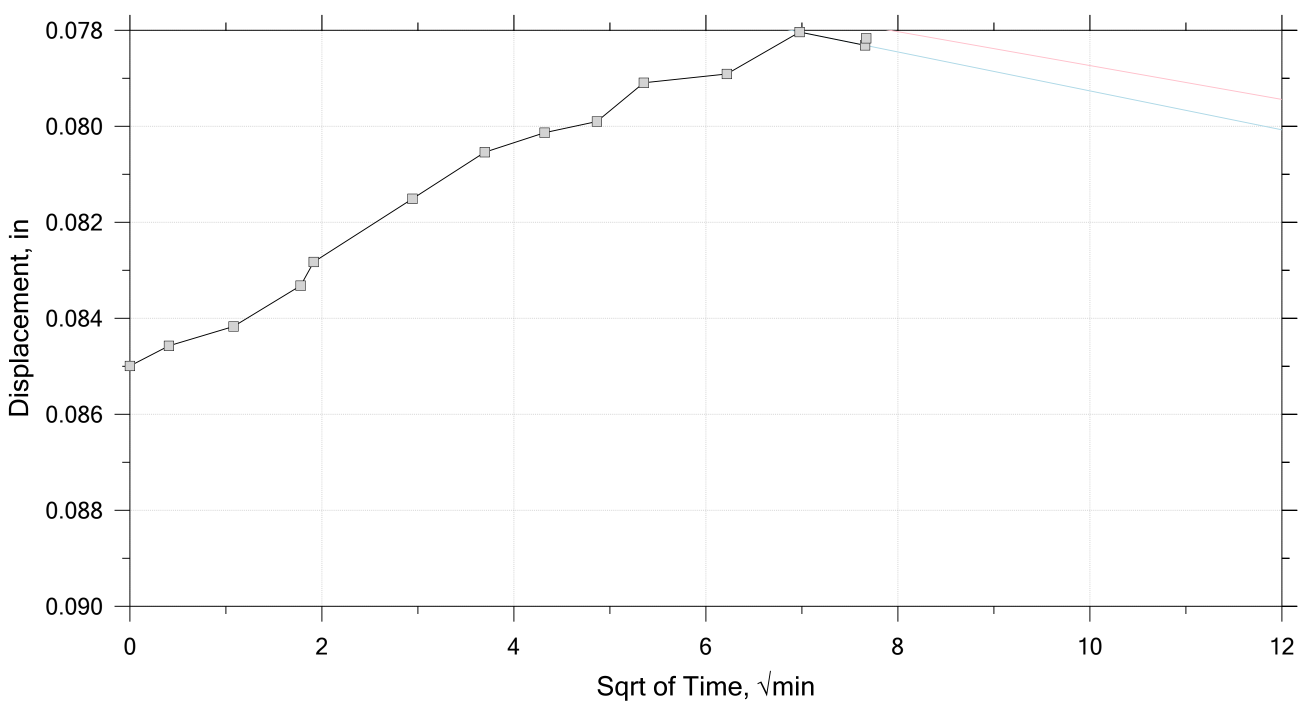
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 19

Constant Load Step

Stress: 200 psf





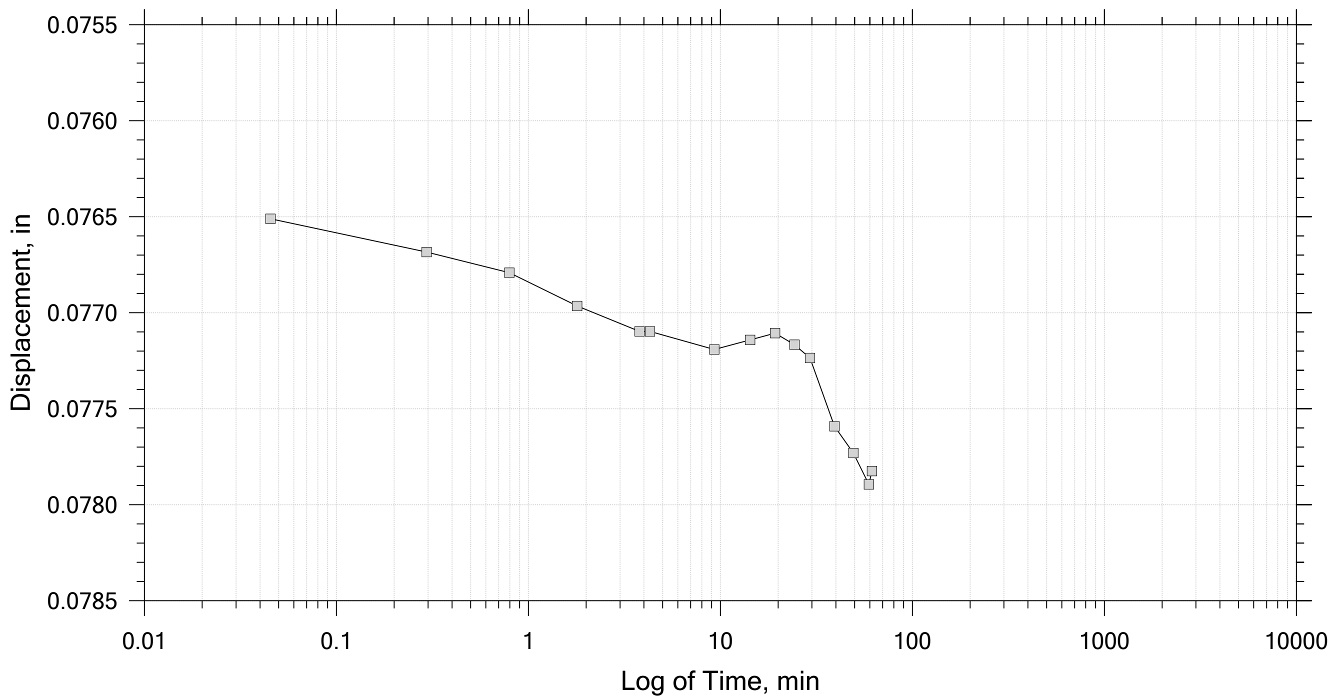
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

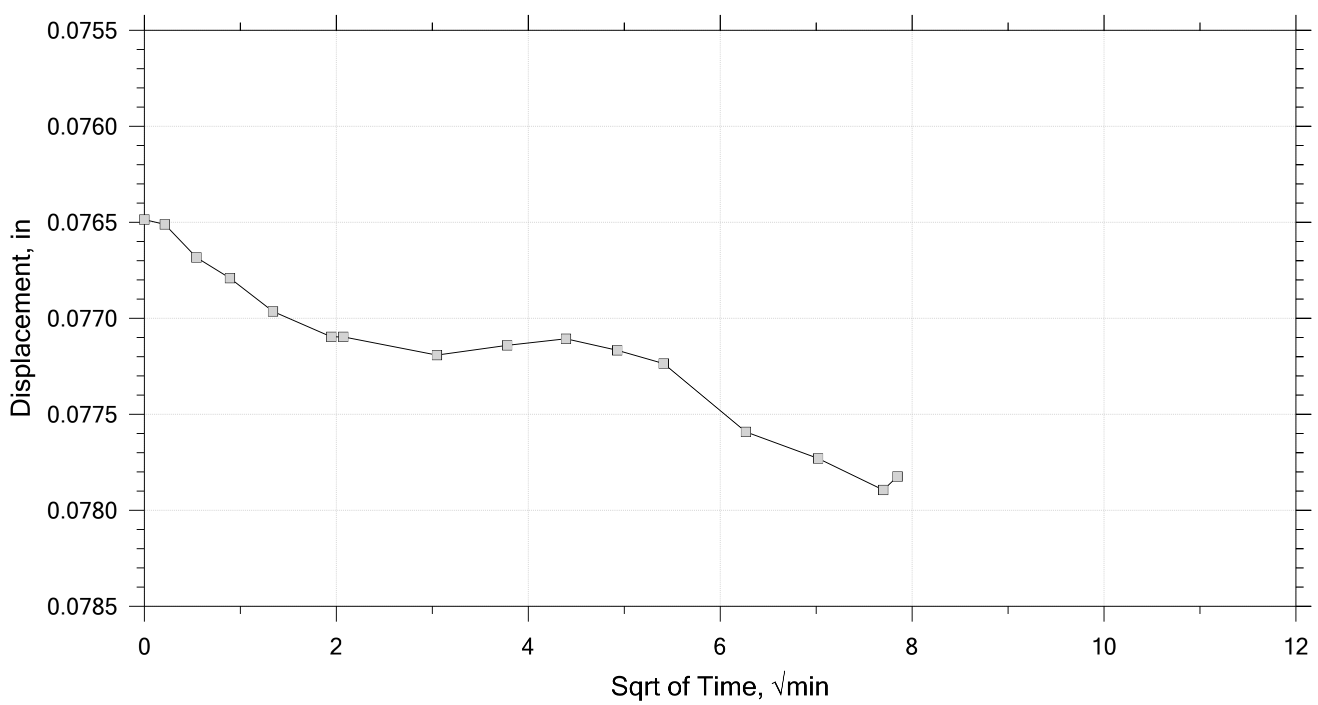
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 19

Constant Load Step

Stress: 400 psf





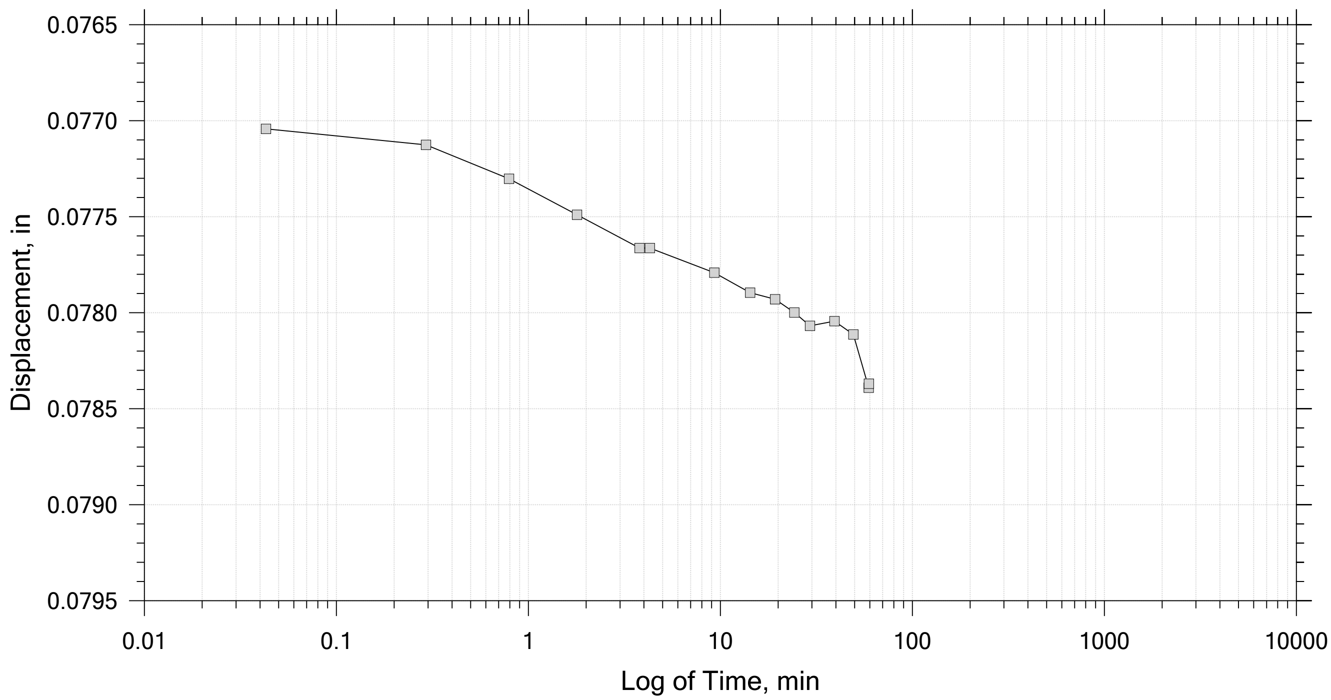
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

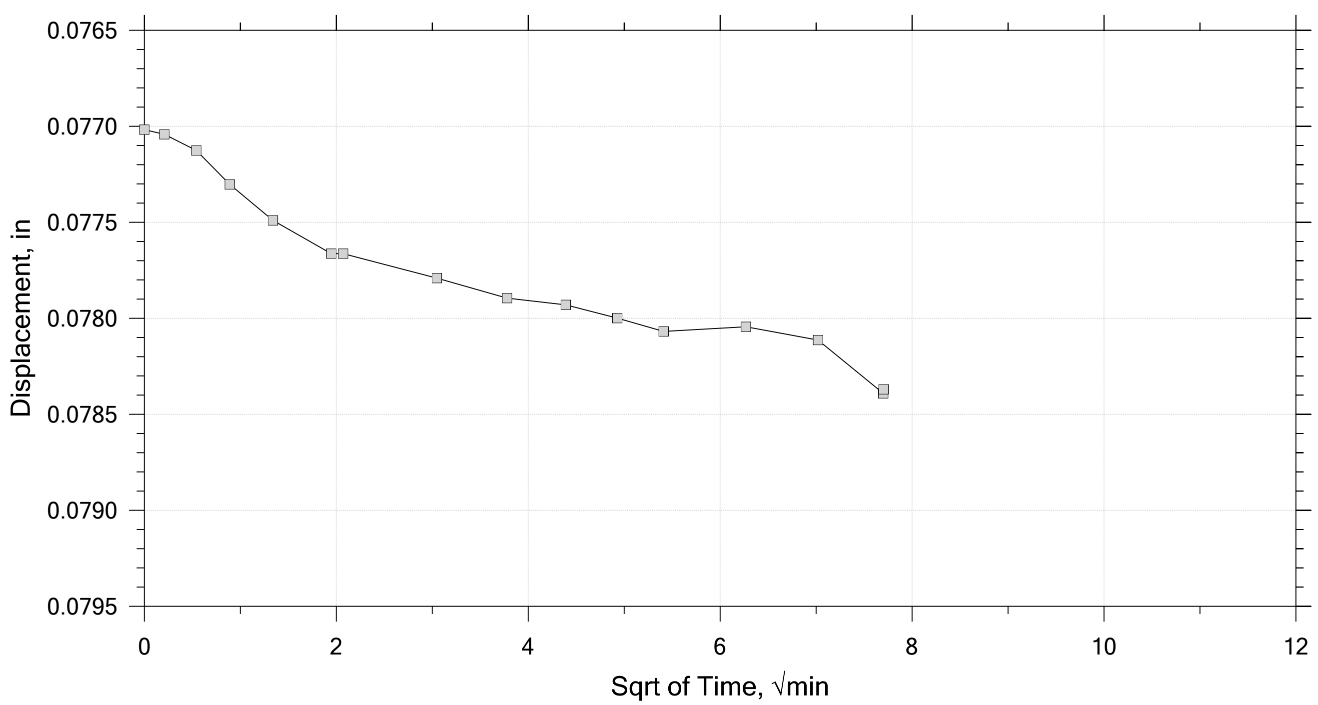
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 19

Constant Load Step

Stress: 600 psf





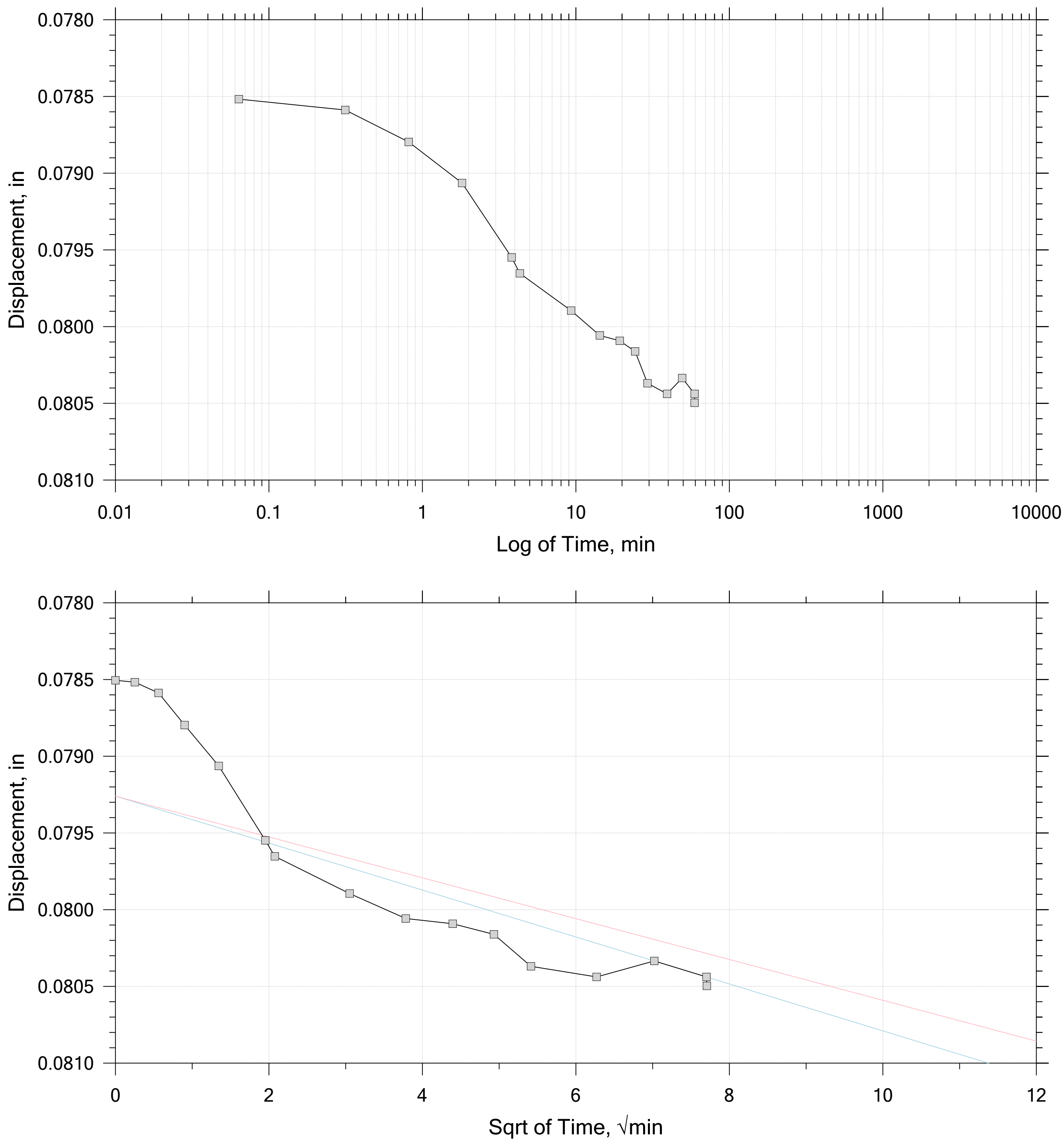
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 19

Constant Load Step

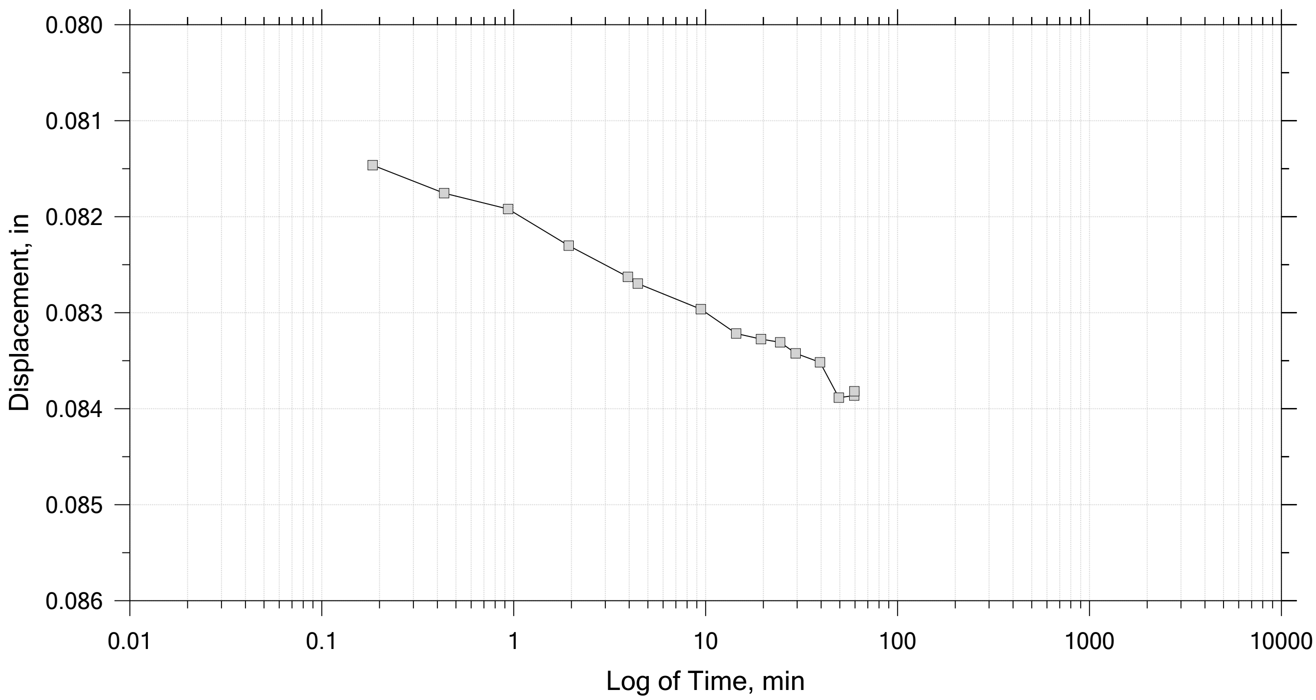
Stress: 900 psf

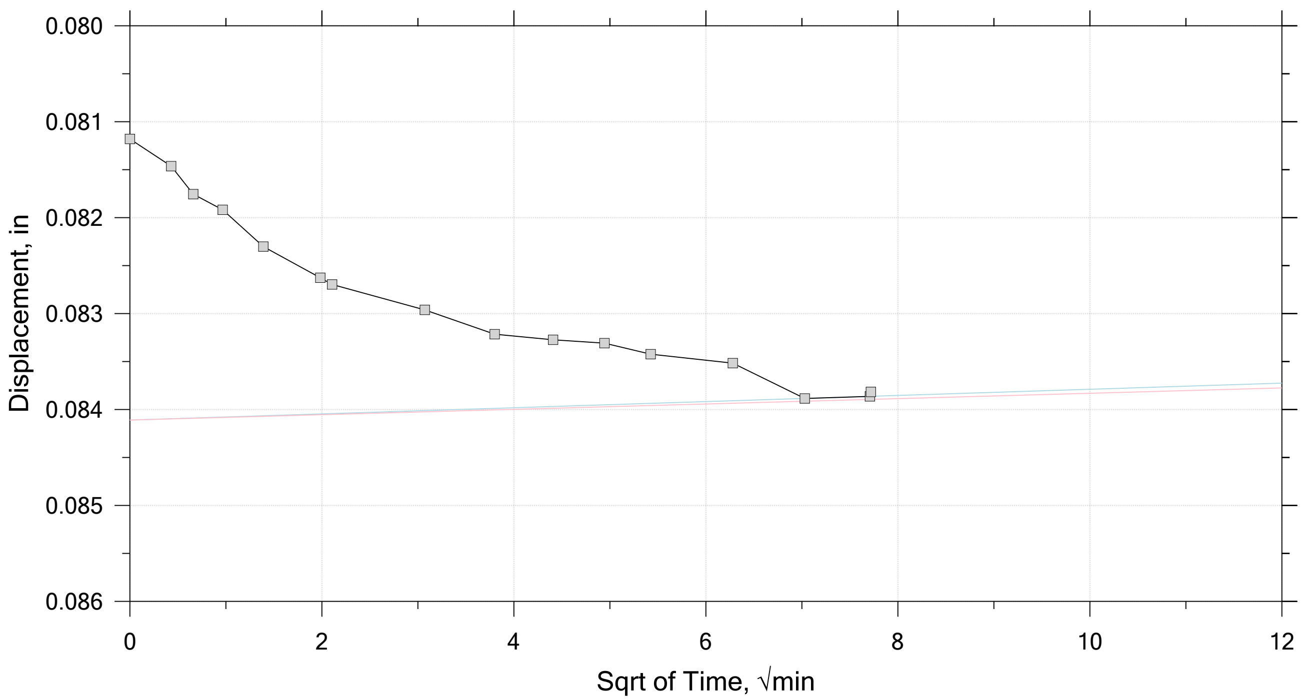


Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 19
Constant Load Step
Stress: 1.35e+03 psf

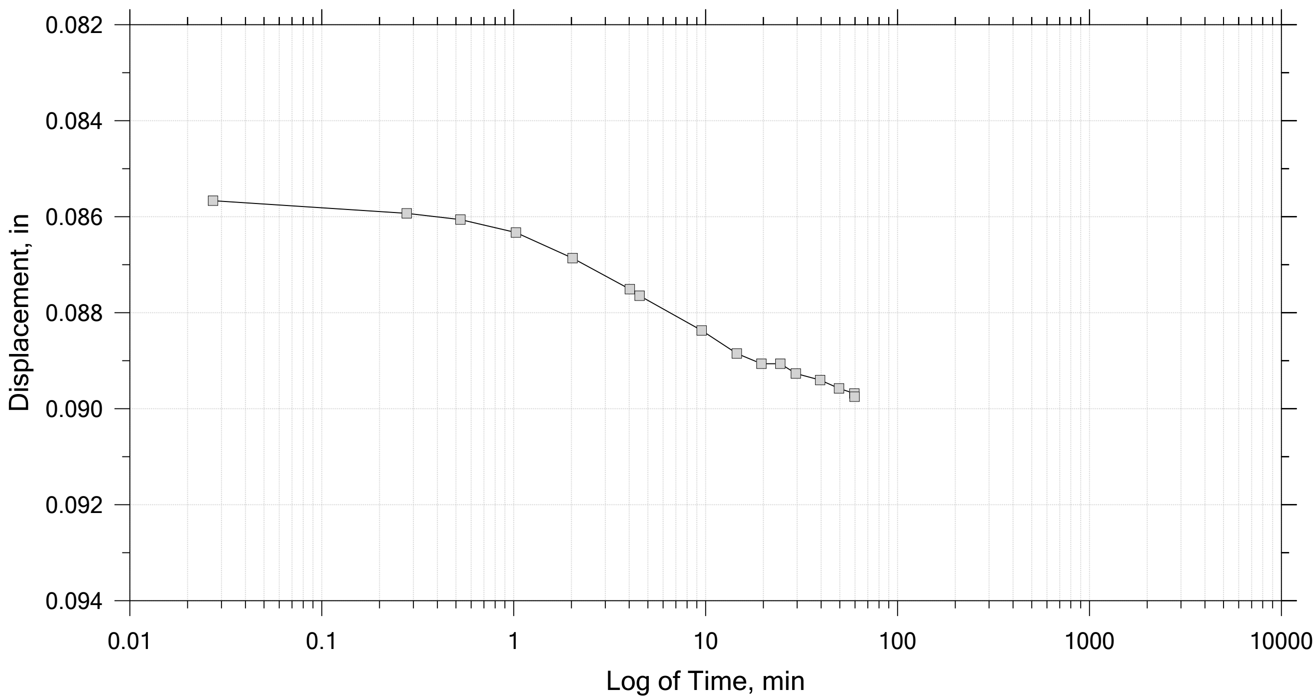


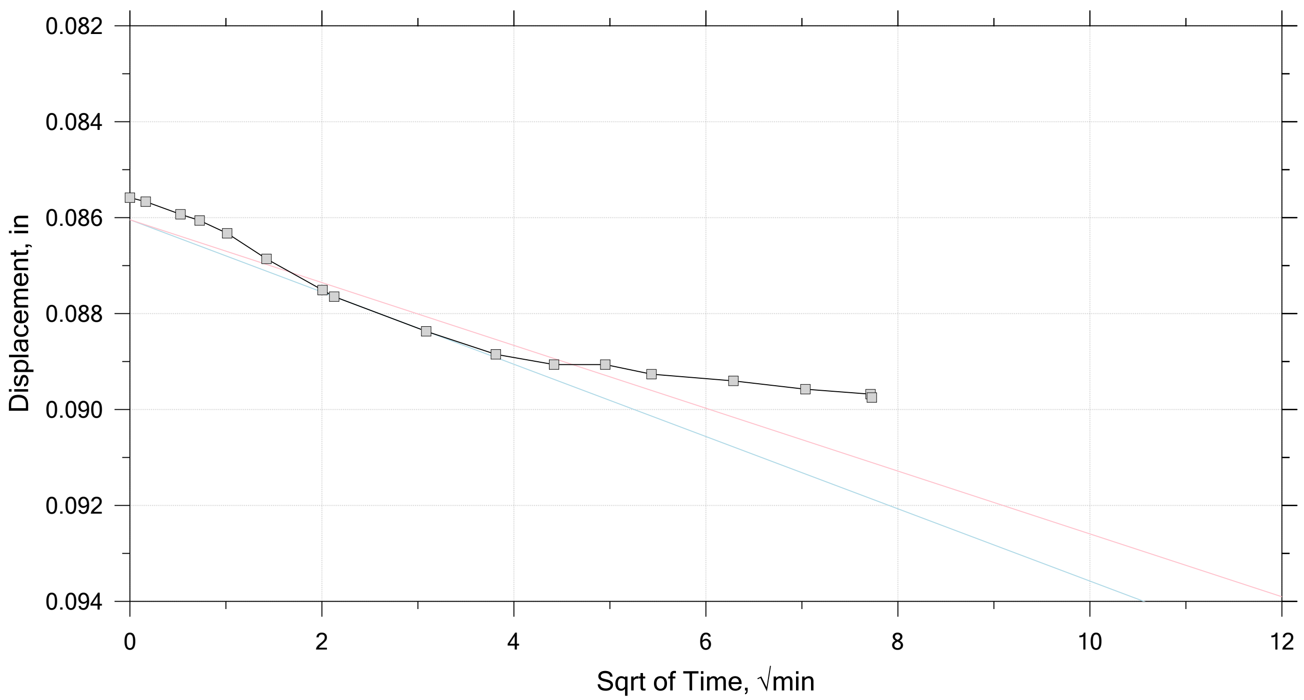


Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 19
Constant Load Step
Stress: 2.02e+03 psf





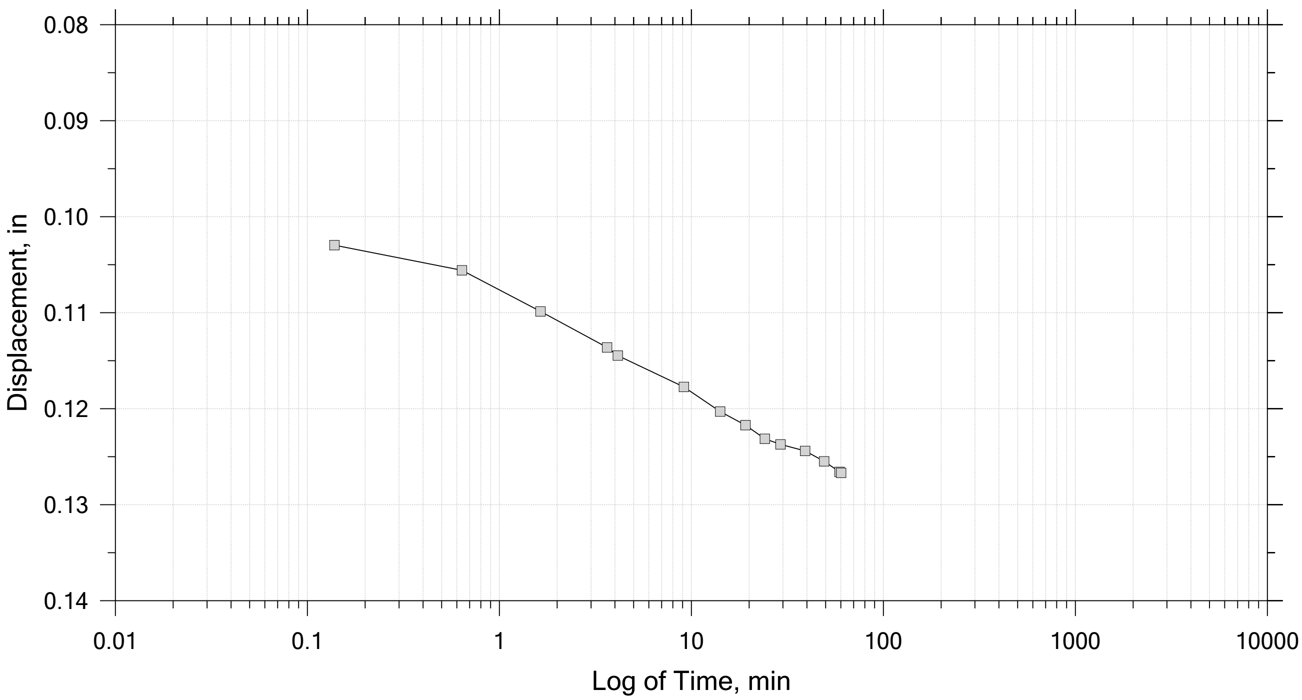
Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

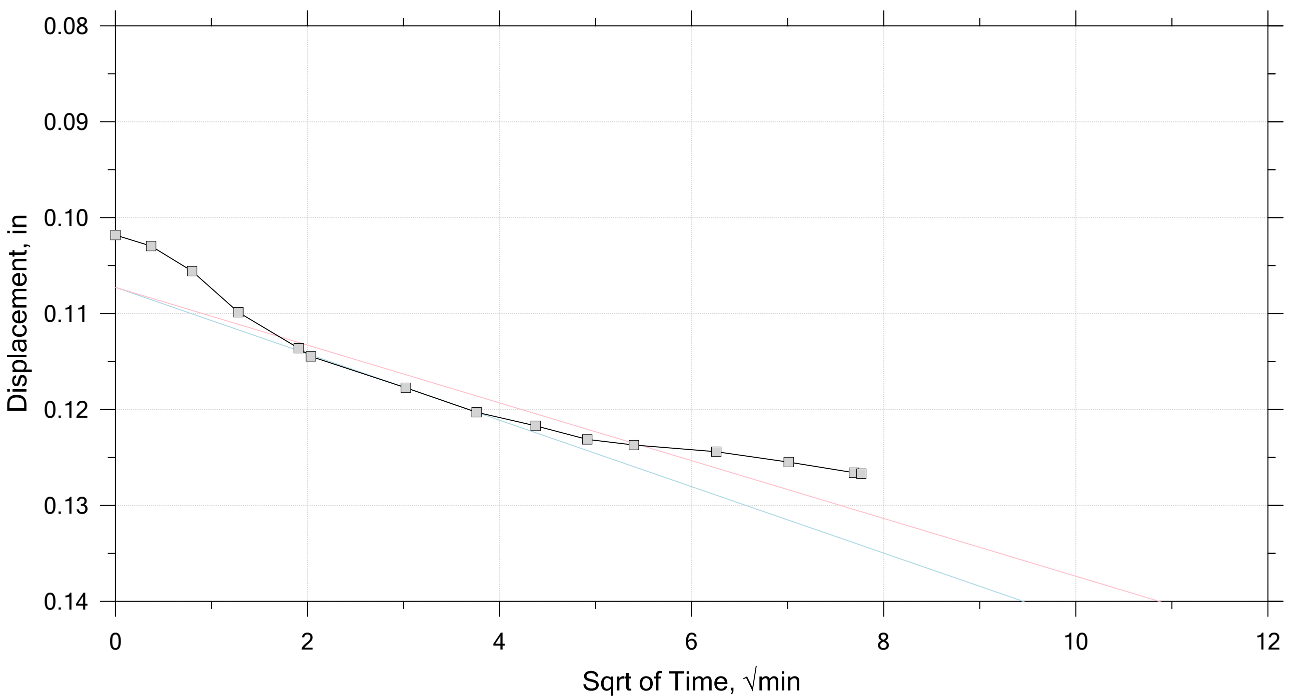
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 16 of 19

Constant Load Step

Stress: 4e+03 psf





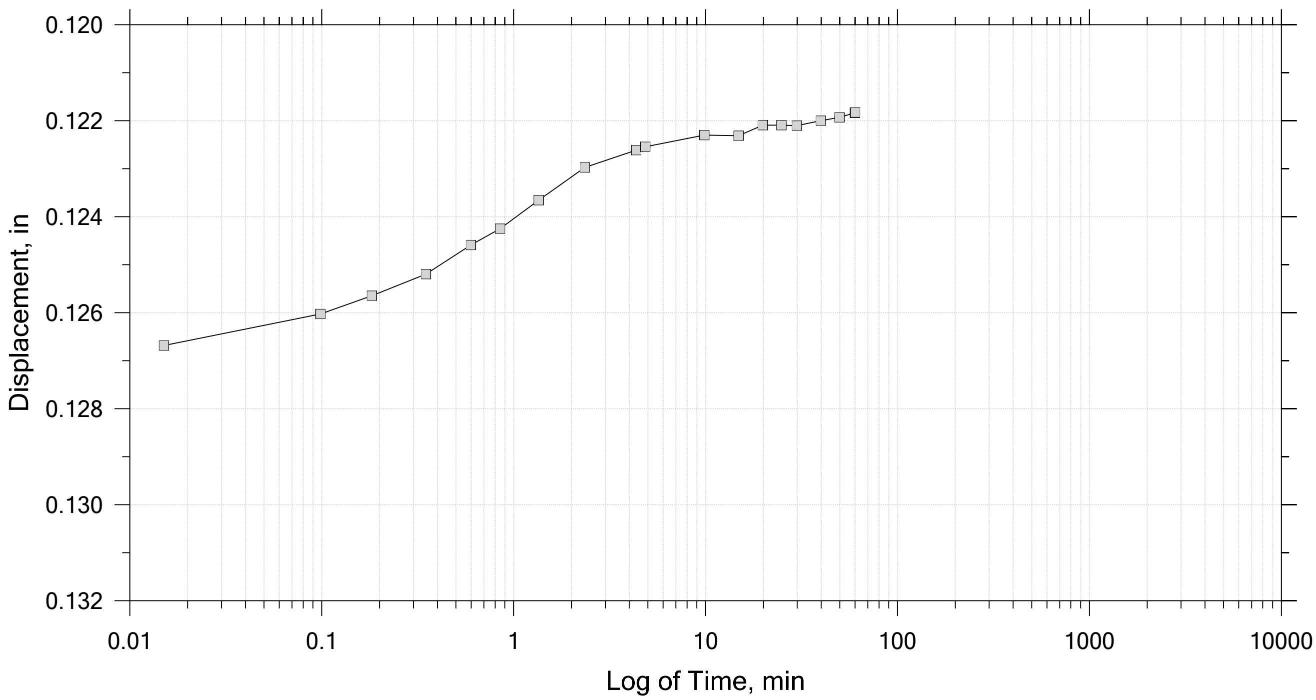
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

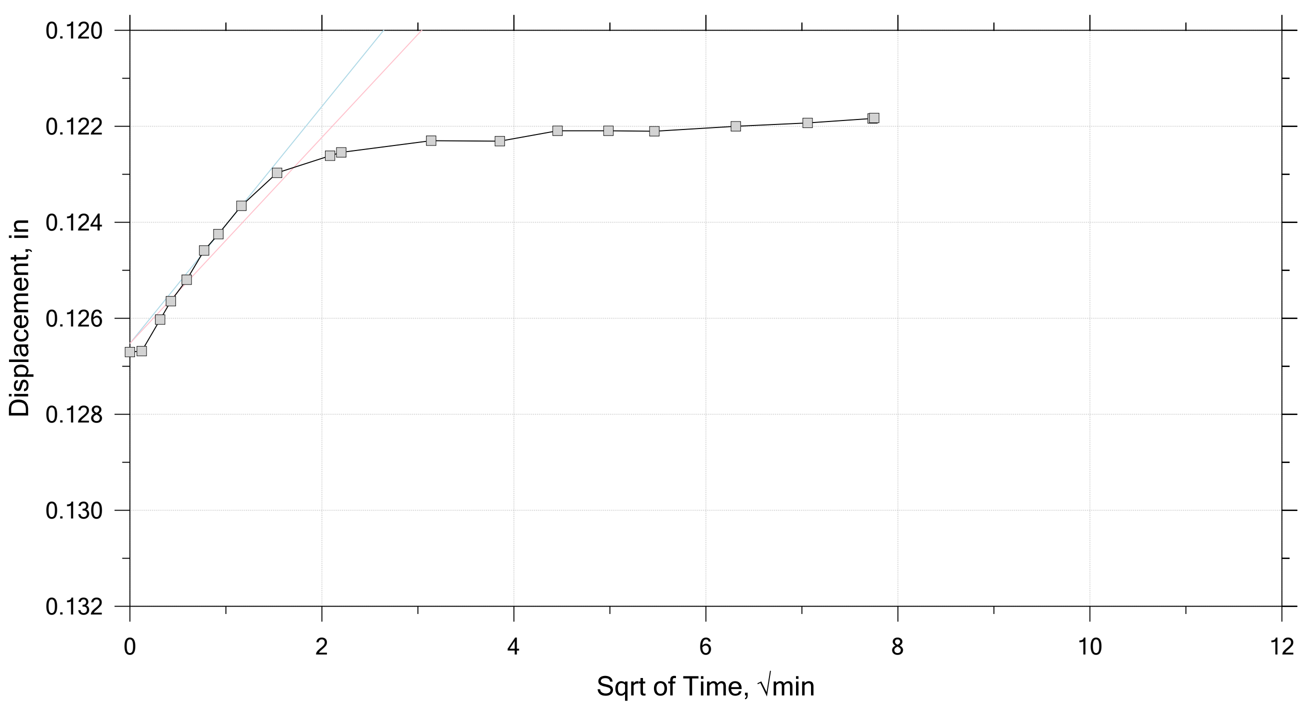
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 17 of 19

Constant Load Step

Stress: 1.35e+03 psf

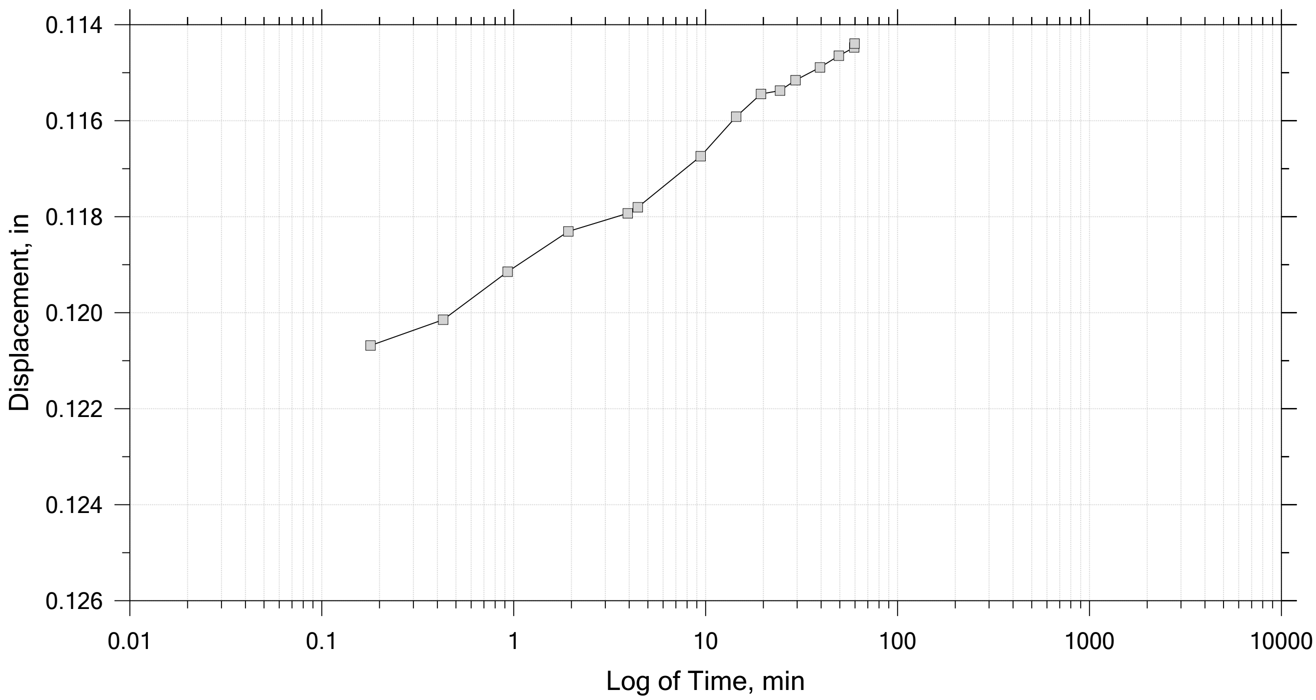


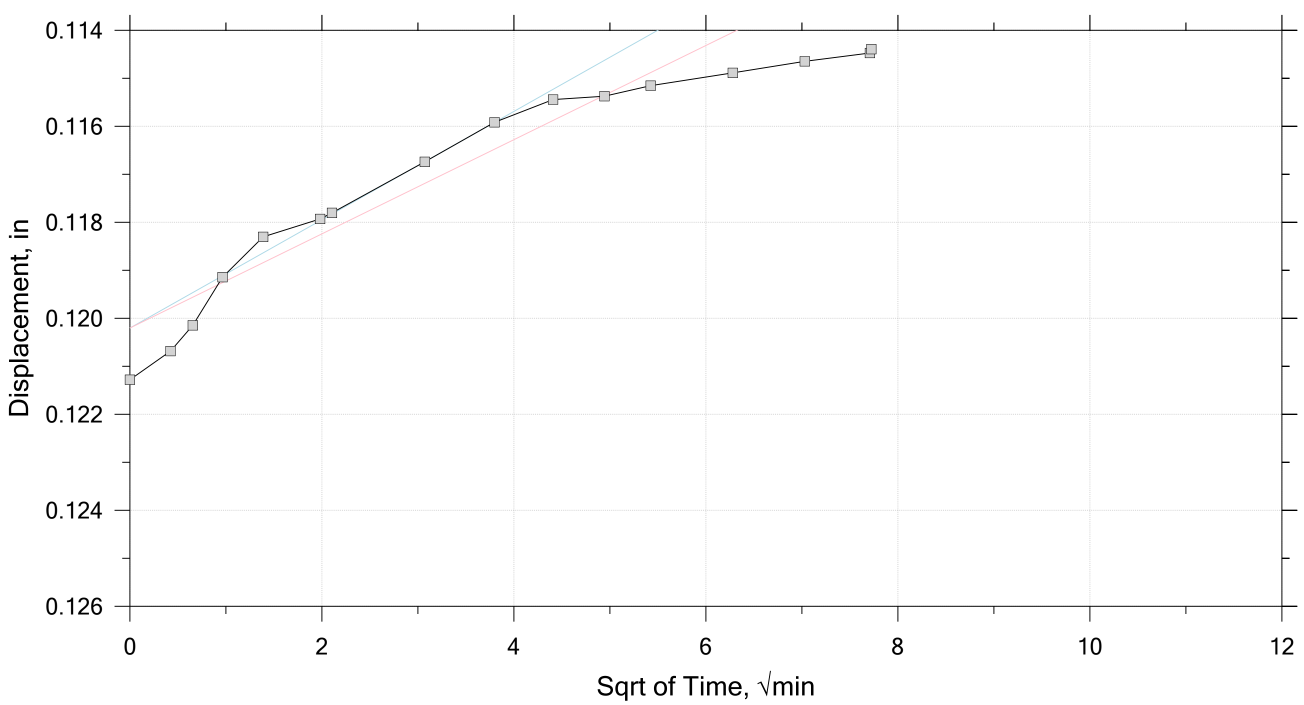


Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 18 of 19
Constant Load Step
Stress: 600 psf





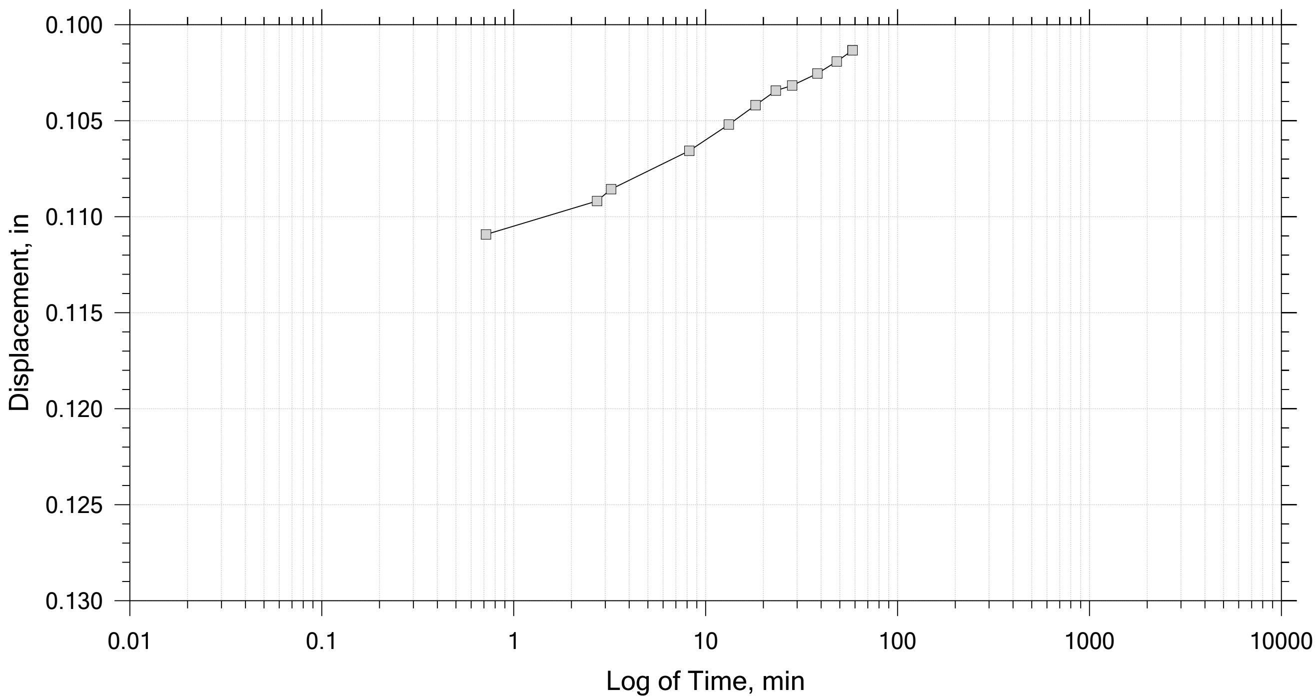
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

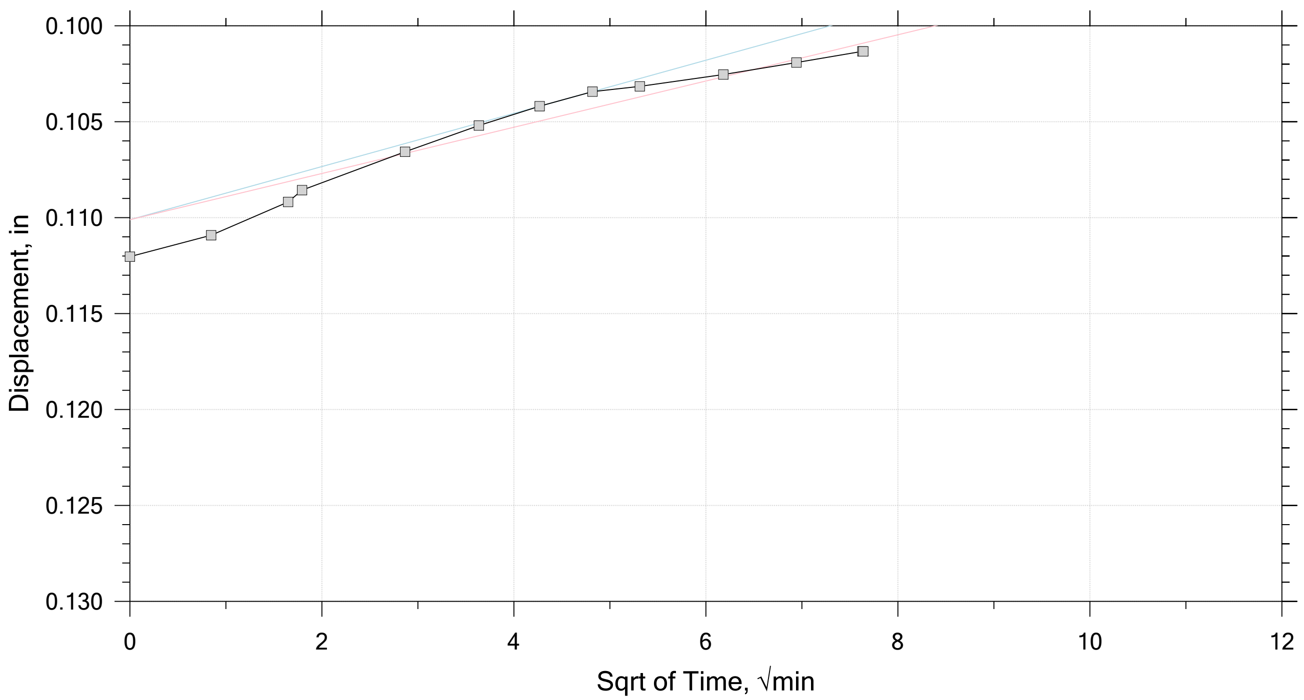
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 19 of 19

Constant Load Step

Stress: 200 psf





Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter, in: 2.50	Specific Gravity: 2.89 (Implied)	Liquid Limit: 66
Specimen Height, in: 1.00	Initial Void Ratio: 1.97	Plastic Limit: 45
Final Height, in: 0.90	Final Void Ratio: 1.67	Plasticity Index: 21

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	309	---	"ring"	311
Mass Container, gm	60.83	111.11	111.11	59.6
Mass Container + Wet Soil, gm	173.91	239.12	235.44	183.86
Mass Container + Dry Soil, gm	129.99	189.86	189.86	138.31
Mass Dry Soil, gm	69.16	78.754	78.754	78.71
Water Content, %	63.50	62.54	57.87	57.87
Void Ratio	---	1.97	1.67	---
Degree of Saturation, %	---	91.66	100.00	---
Dry Unit Weight, pcf	---	60.719	67.527	---

Preconsolidation Stress, psf	---
Compression Ratio	0
Rebound Ratio	0
Compression Index	0
Rebound Index	0

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Sqrt of Time Coefficients

Step	Applied Stress psf	EOP Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv ft²/day	Mv ft²/ton	k cm/s
1	100.	0.007649	1.95	0.761	42.193	5.04e-02	1.52e+05	8.44e-08
2	200.	0.01614	1.93	1.61	0.000	0.00e+00	1.69e+05	0.00e+00
3	400.	0.02850	1.89	2.84	39.694	5.16e-02	1.23e+05	6.98e-08
4	600.	0.03633	1.87	3.61	57.266	3.50e-02	7.79e+04	3.00e-08
5	900.	0.04668	1.84	4.64	44.157	4.46e-02	6.86e+04	3.37e-08
6	1.35e+03	0.06060	1.79	6.03	32.879	5.84e-02	6.16e+04	3.96e-08
7	2.02e+03	0.08687	1.72	8.64	267.687	6.87e-03	7.75e+04	5.86e-09
8	900.	0.08611	1.72	8.57	48.733	3.67e-02	1.35e+03	5.46e-10
9	600.	0.08662	1.72	8.62	6.854	2.61e-01	-3.37e+03	-9.69e-09
10	200.	0.07817	1.74	7.78	40.288	4.48e-02	4.20e+04	2.07e-08
11	400.	0.07782	1.74	7.74	0.000	0.00e+00	-3.40e+03	-0.00e+00
12	600.	0.07837	1.74	7.80	0.000	0.00e+00	5.43e+03	0.00e+00
13	900.	0.08050	1.74	8.01	27.244	6.67e-02	1.41e+04	1.04e-08
14	1.35e+03	0.08118	1.73	8.08	0.000	0.00e+00	3.02e+03	0.00e+00
15	2.02e+03	0.08948	1.71	8.90	19.527	9.18e-02	2.45e+04	2.47e-08
16	4.00e+03	0.1267	1.60	12.6	30.074	5.67e-02	3.75e+04	2.34e-08
17	1.35e+03	0.1225	1.61	12.2	2.915	5.64e-01	3.18e+03	1.97e-08
18	600.	0.1146	1.63	11.4	24.204	6.88e-02	2.10e+04	1.59e-08
19	200.	0.1013	1.67	10.1	42.166	4.05e-02	6.58e+04	2.93e-08

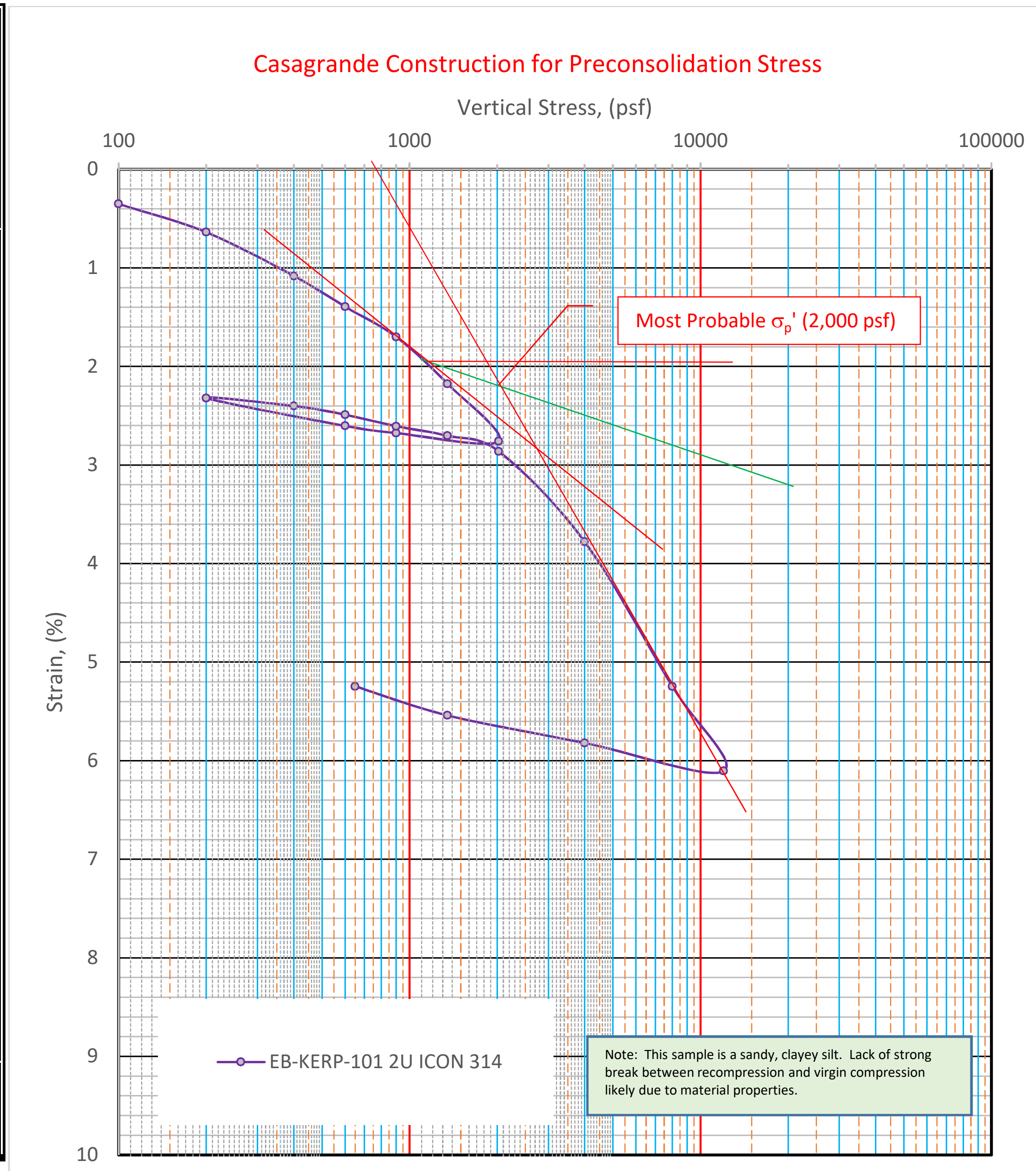
Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/20/19	Depth: 20.90
	Test Number: ICON 313	Preparation: Shelby Tube	Elevation: -15.6
	Description: Brown Organic Silt		
	Remarks:		
	Displacement at End of Primary		

ICON 114:
BB-KERP 101 2U

Consolidation Test Data
Summary Report

Project Name:	Kennebec River Estuary Restoration
Project Number:	166-13
Project Location:	Woolwich, Maine
Client:	GZA
Sample Description:	Gray Silty Clay
Preparation:	Trimmed Shelby Tube

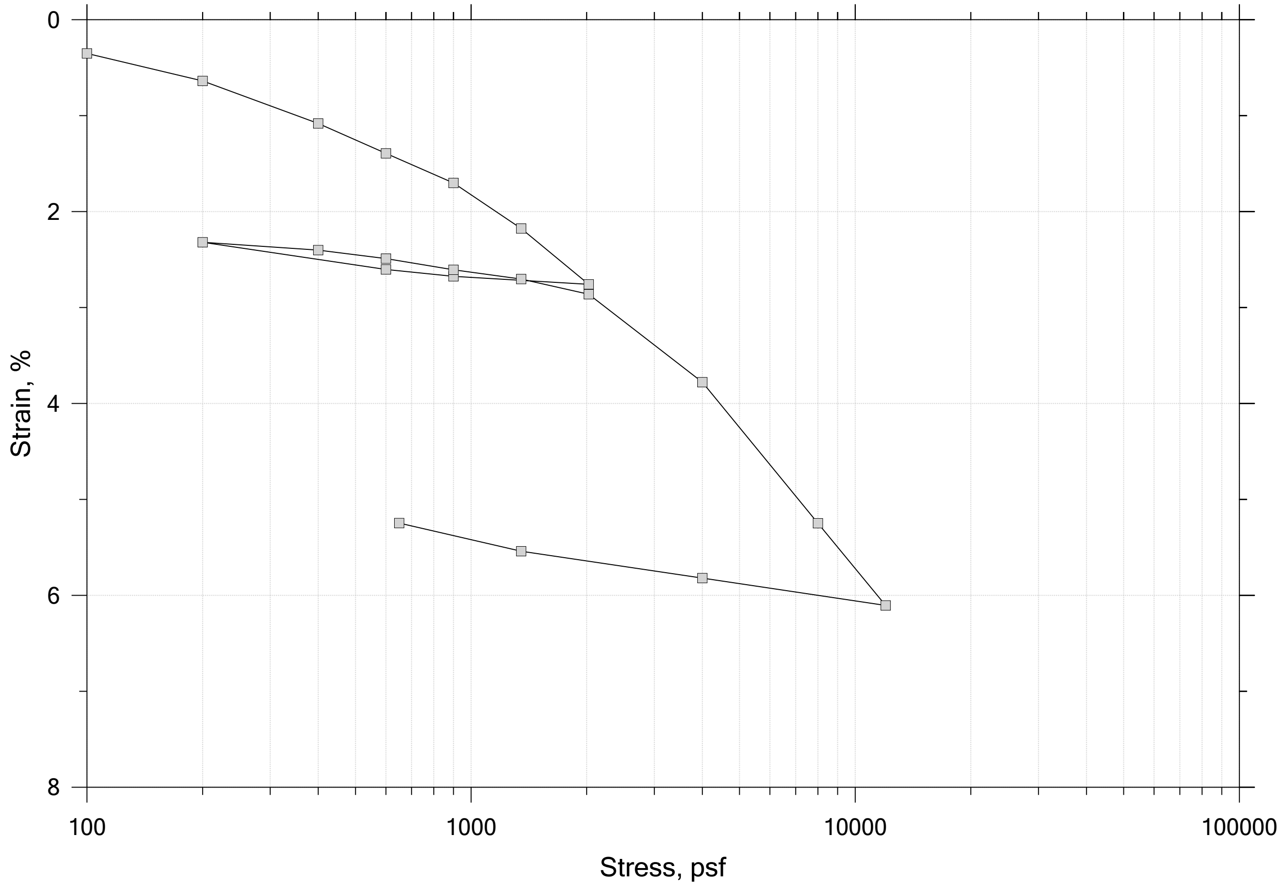
Lab Test No:	ICON 314			
Boring No.	KERP 101			
Sample No:	2U			
Boring Elevation (ft).	5.3			
Sample Depth (ft):	49-51			
Test Specimen Depth (Ft):	50.4			
Test Specimen Elevation:	-45.1			
Water Content (%):	22.1			
Dry Unit Weight (pcf):	104.7			
Wet Unit Weight (pcf):	127.8			
Saturation Before (%):	93.5			
Saturation After (%):	100			
Void Ratio Before:	0.65			
Void Ratio After:	0.57			
Overburden Pressure (psf):	--			
Max Previous stress (psf):	2,000			
Max Prev. stress (Work) (psf):	~1,000			
OCR:	--			
Compression Index (C_{CE}):	0.05			
Recompression Index (C_{RE}):	0.003			
Liquid Limit:	22.4			
Plastic Limit:	17.5			
Plasticity Index:	4.9			
Liquidity Index:	0.93			
Specific Gravity (implied)	2.77			
Tested By:	sjr			
Date Tested:	12/26/2019			
Checked By:	sjr			

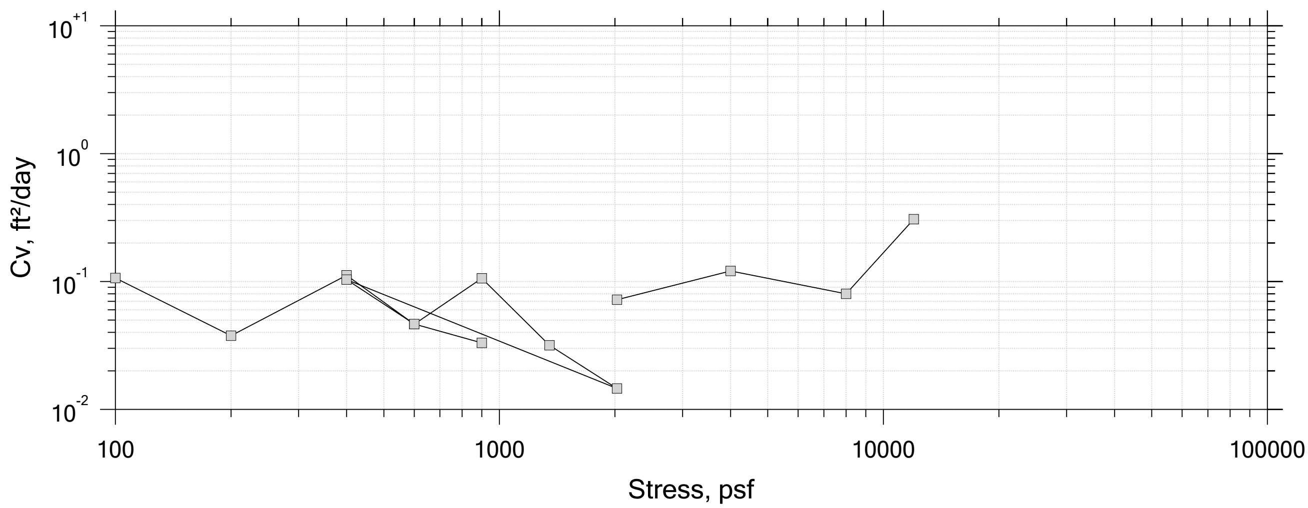


Soil Metrics LLC Geotechnical Engineering

One-Dimensional Consolidation by ASTM D2435 - Method B

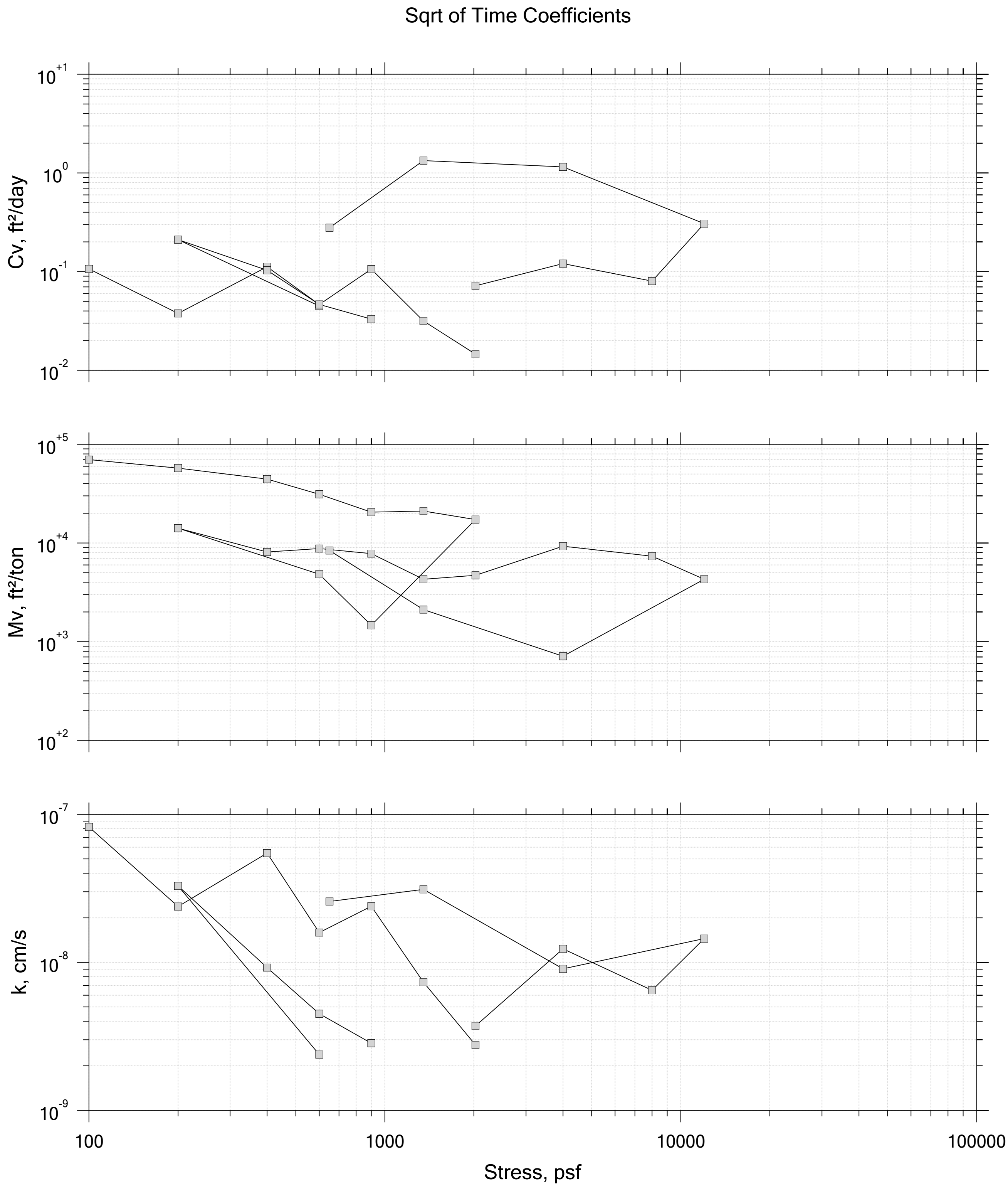
Summary Report





Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B



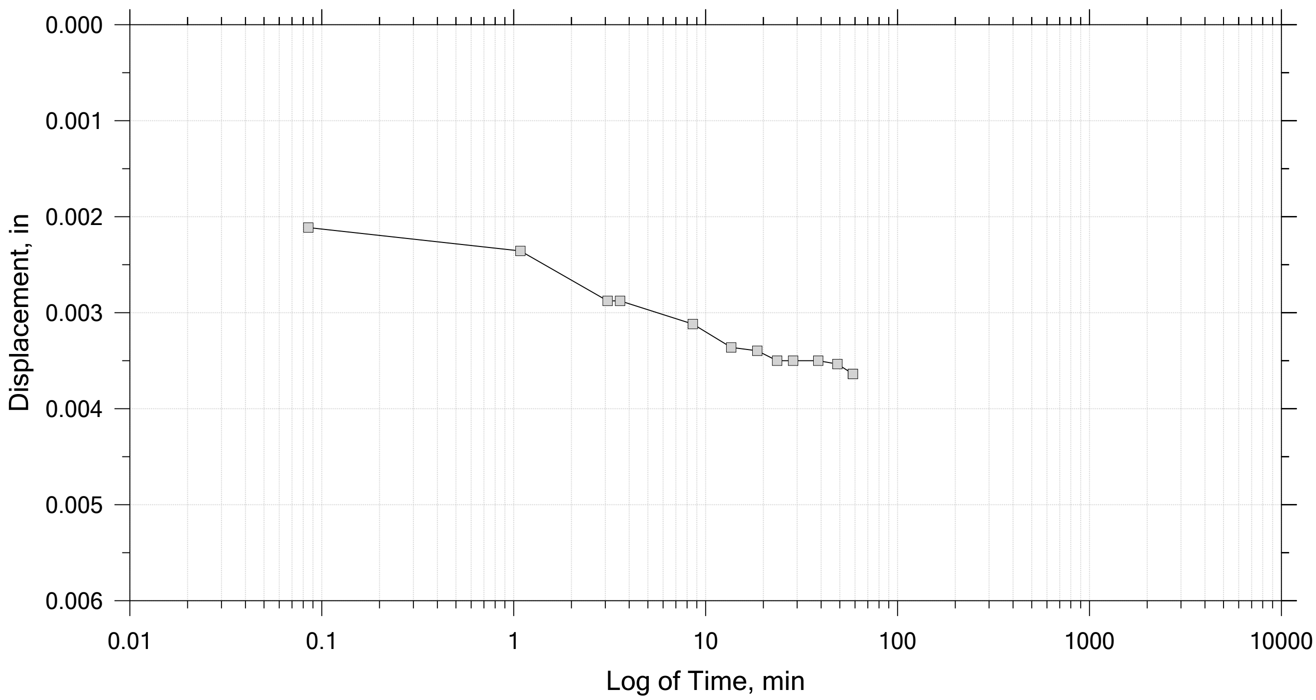
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

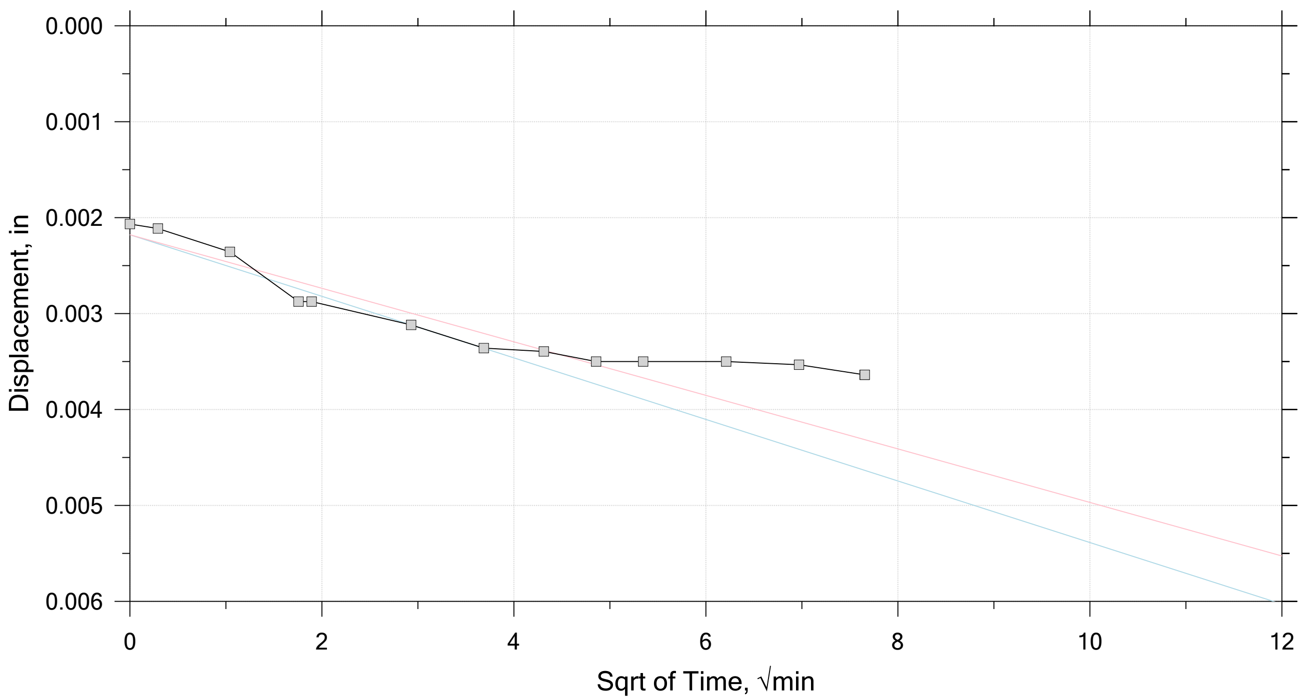
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 21

Constant Load Step

Stress: 100 psf





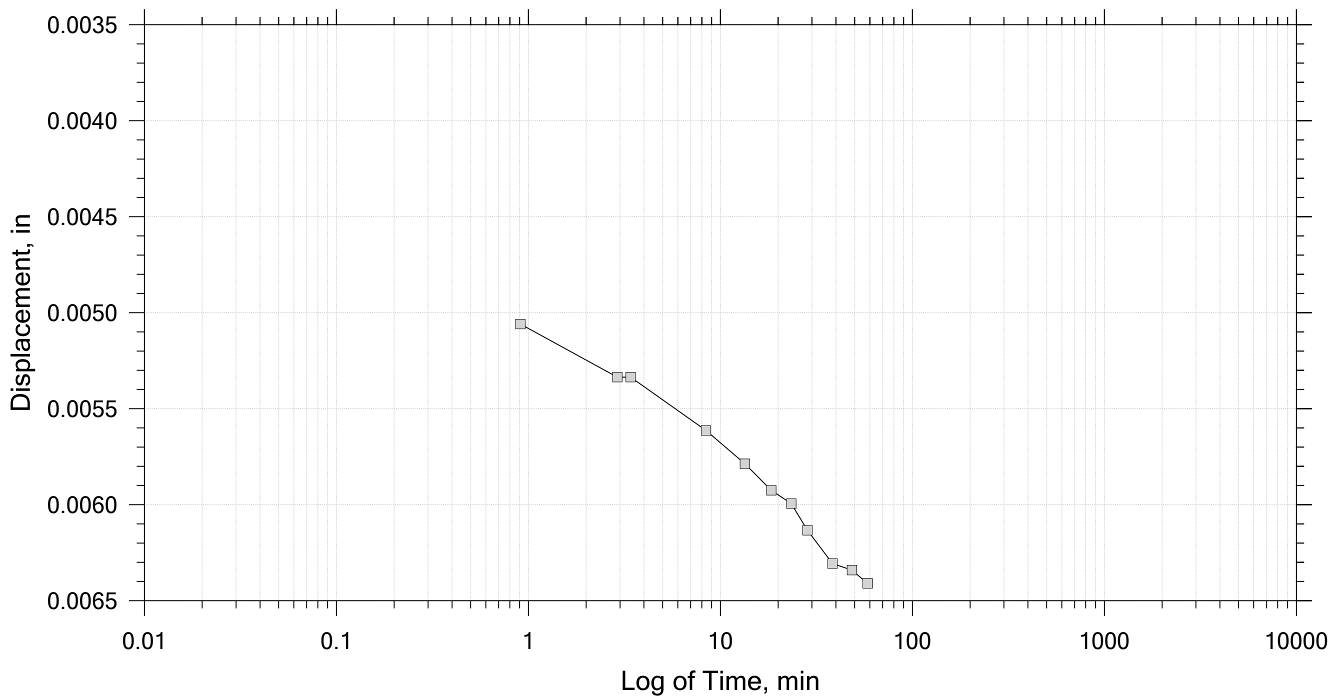
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

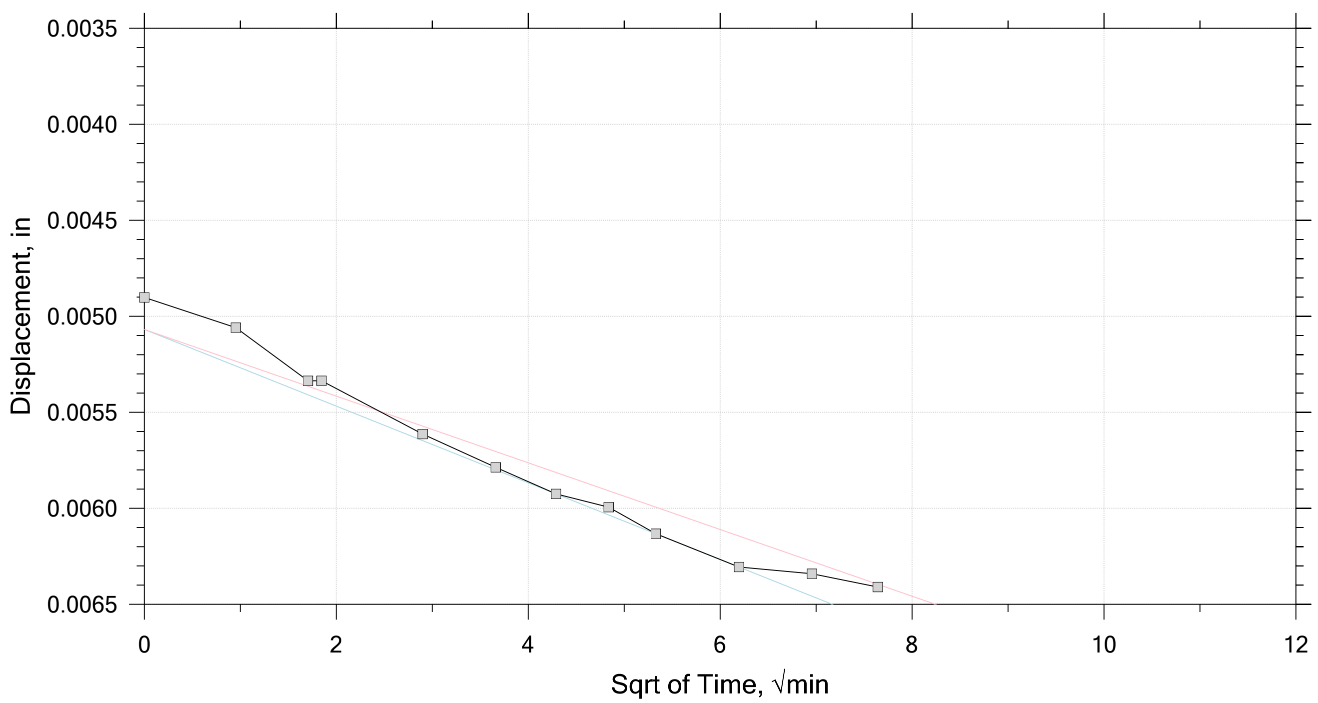
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 21

Constant Load Step

Stress: 200 psf





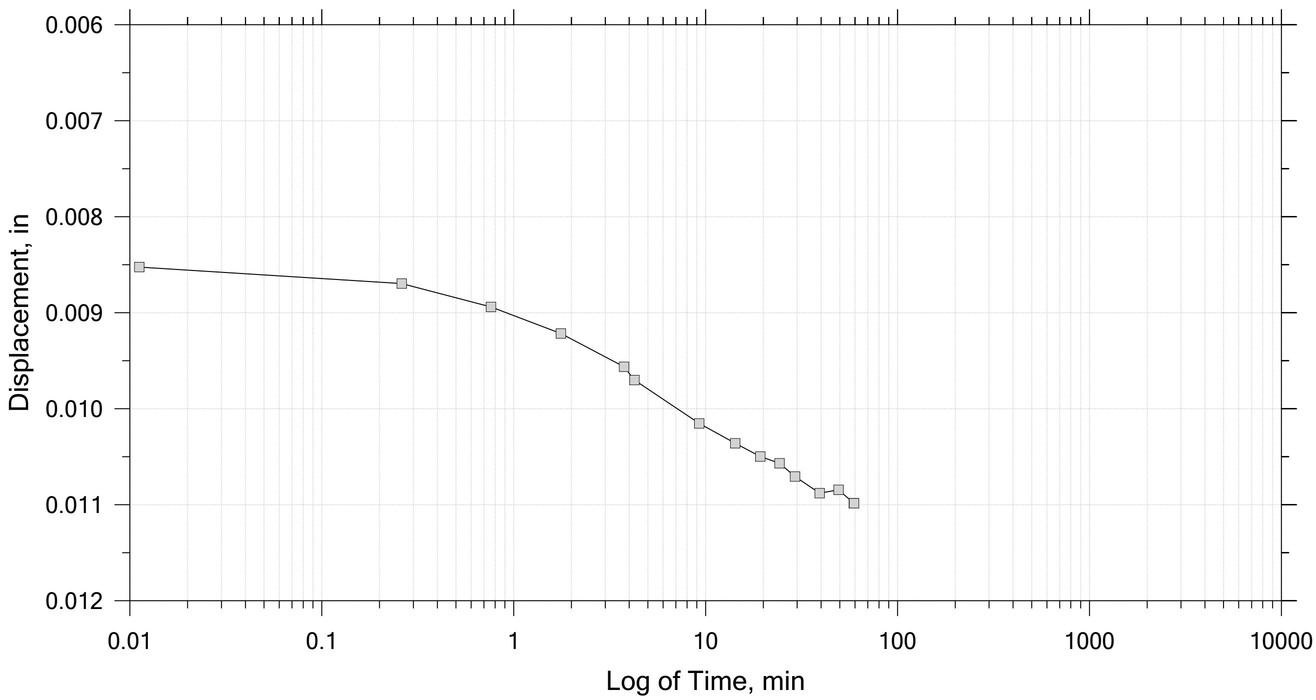
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

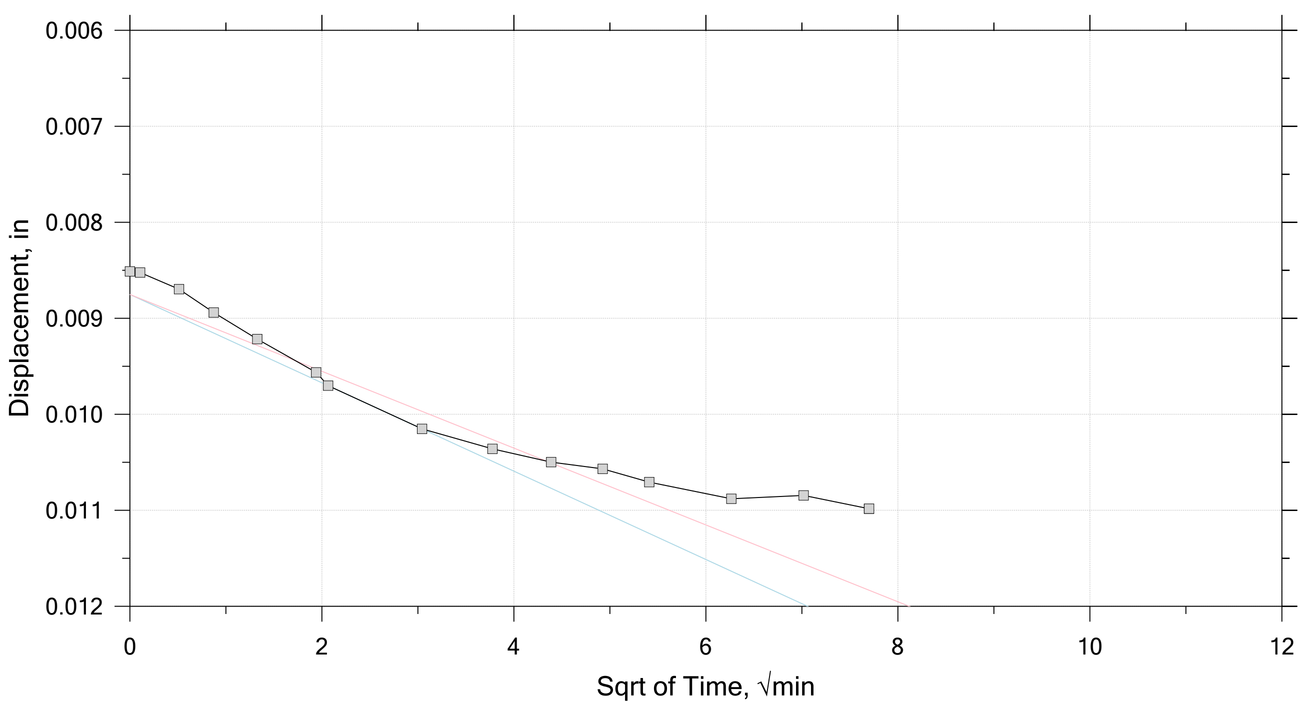
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 21

Constant Load Step

Stress: 400 psf





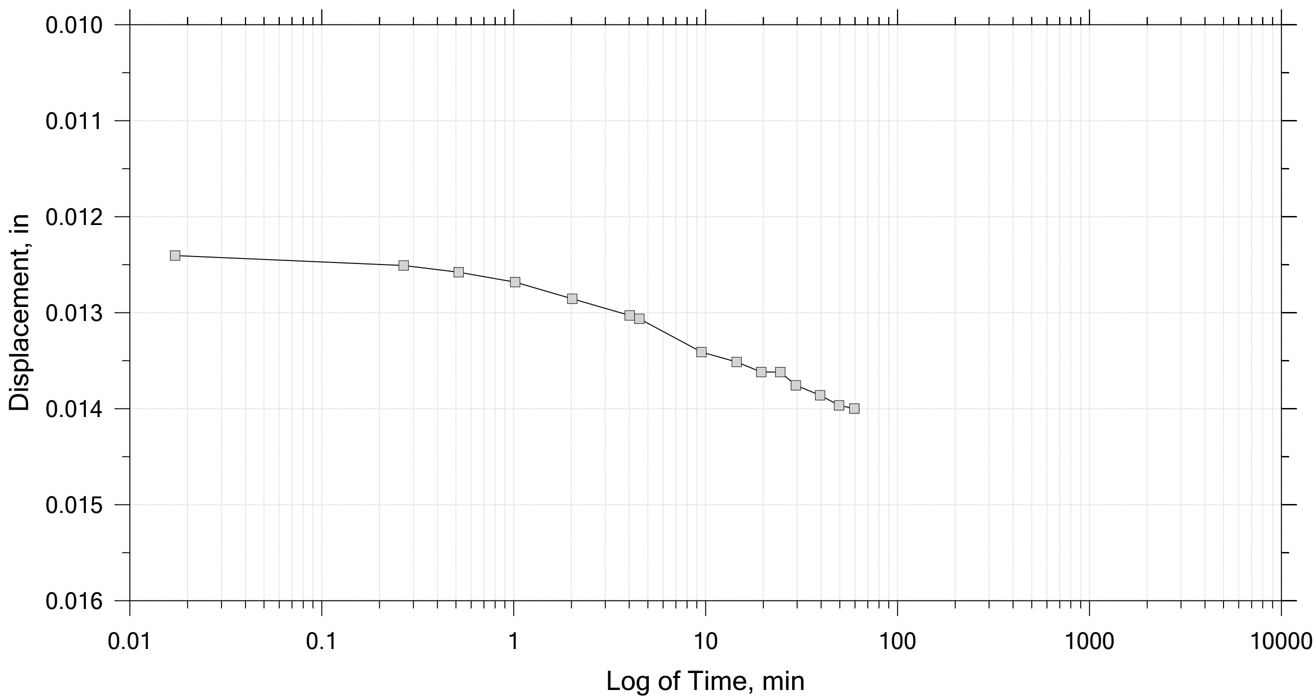
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

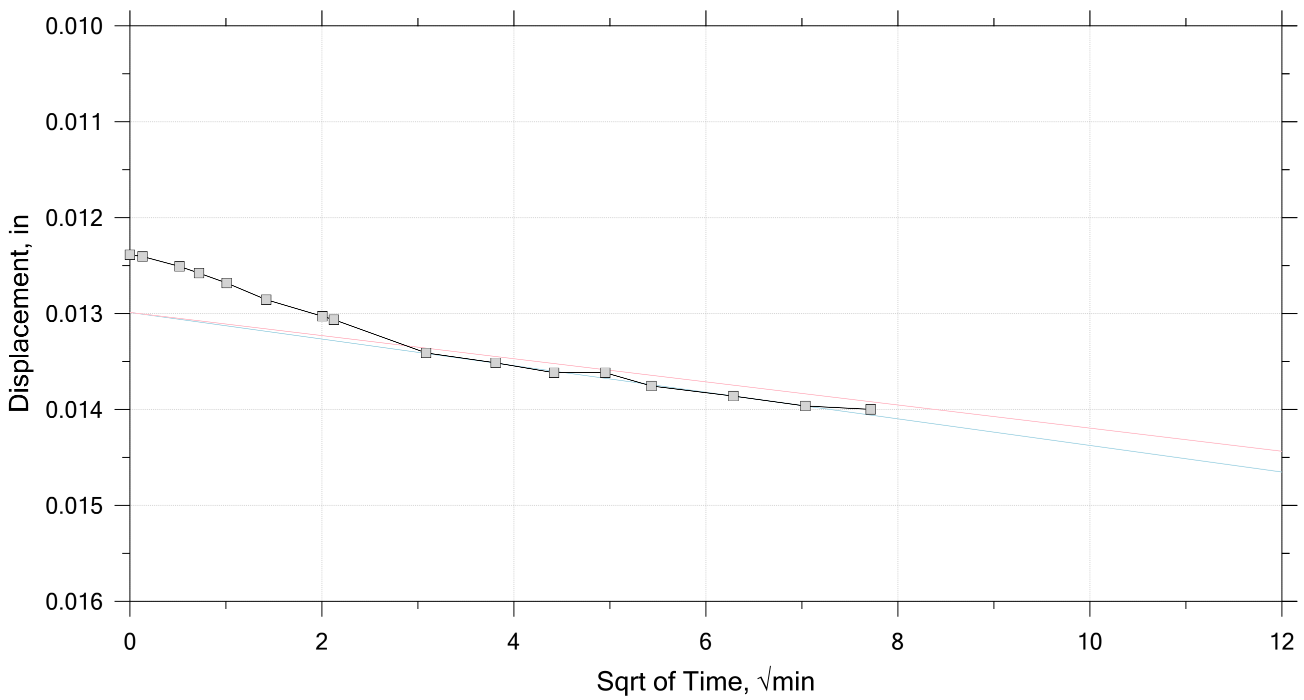
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 21

Constant Load Step

Stress: 600 psf





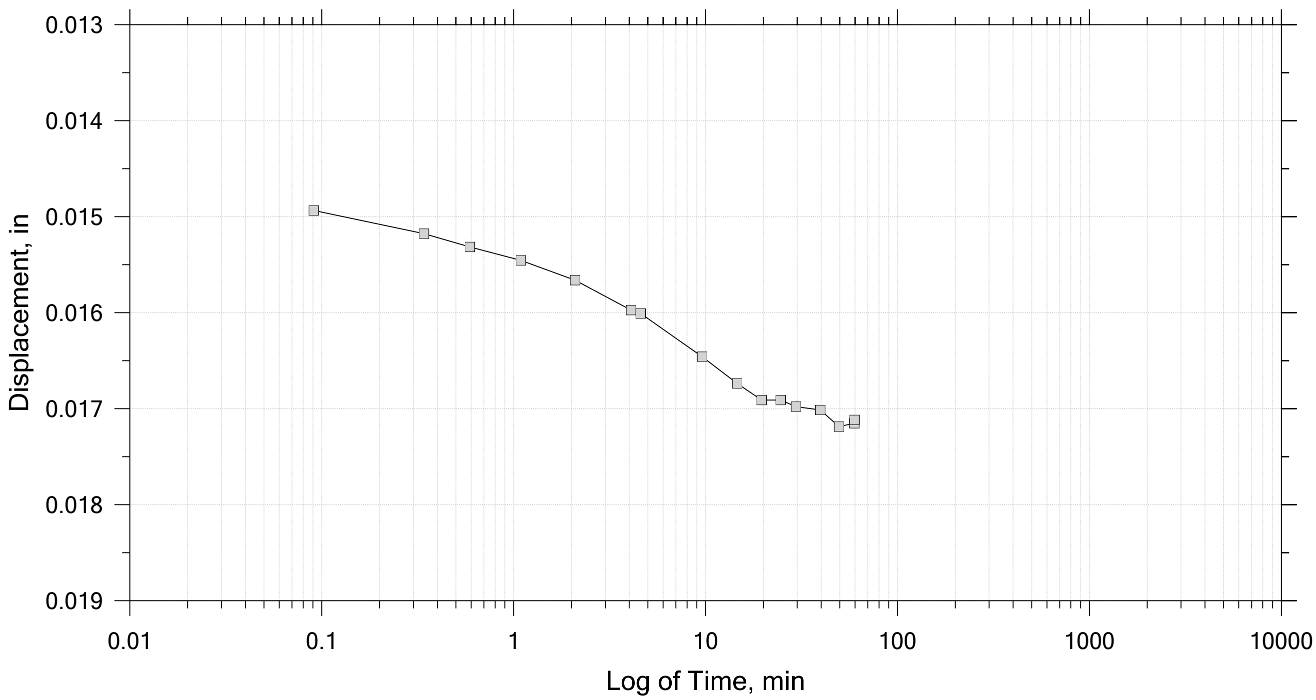
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

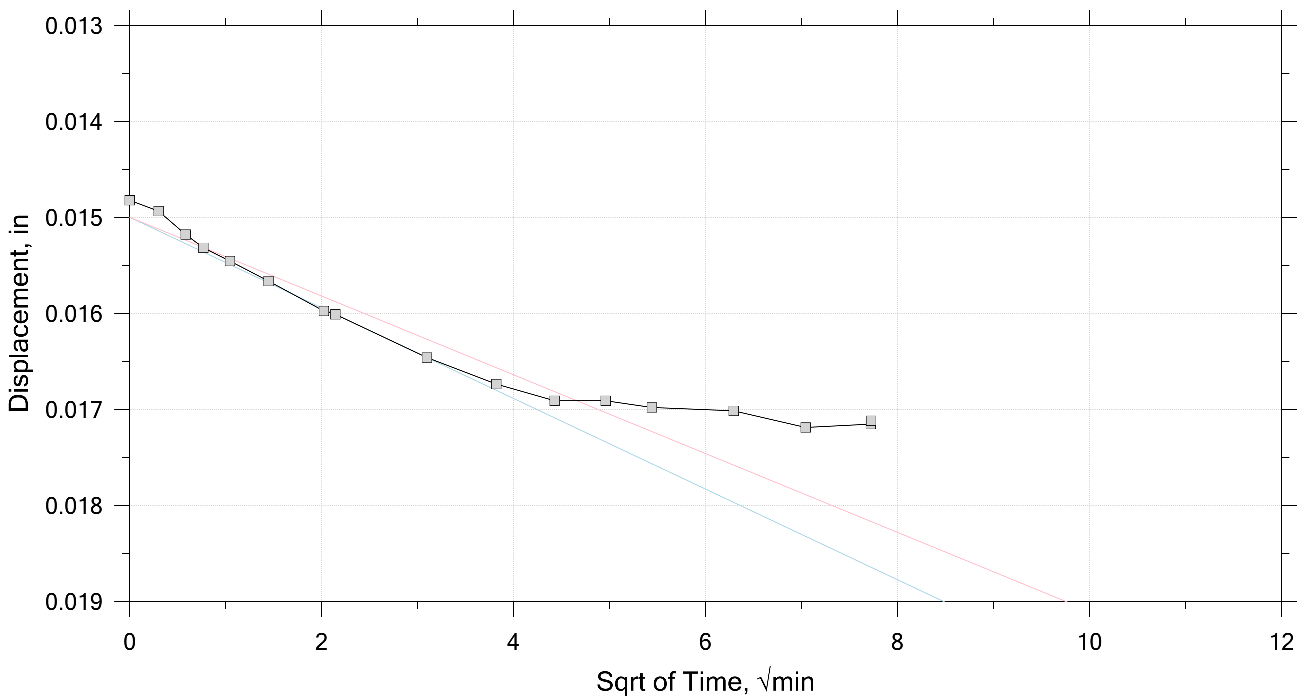
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 21

Constant Load Step

Stress: 900 psf

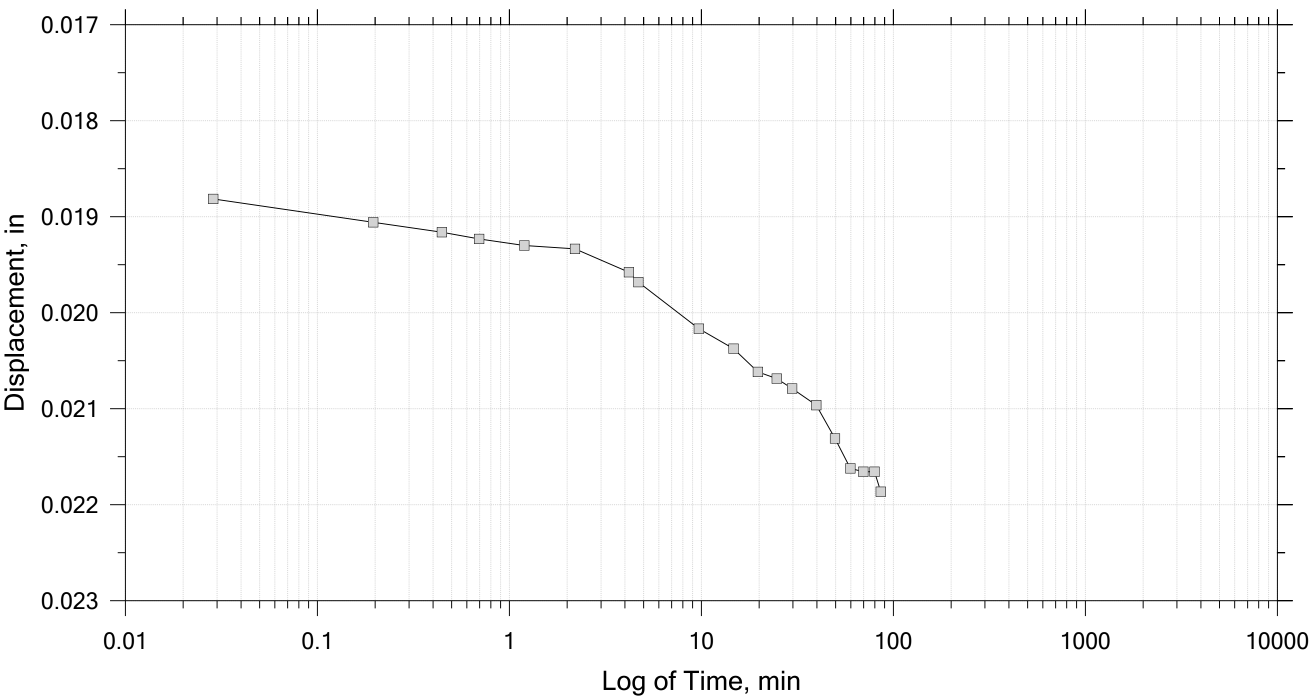


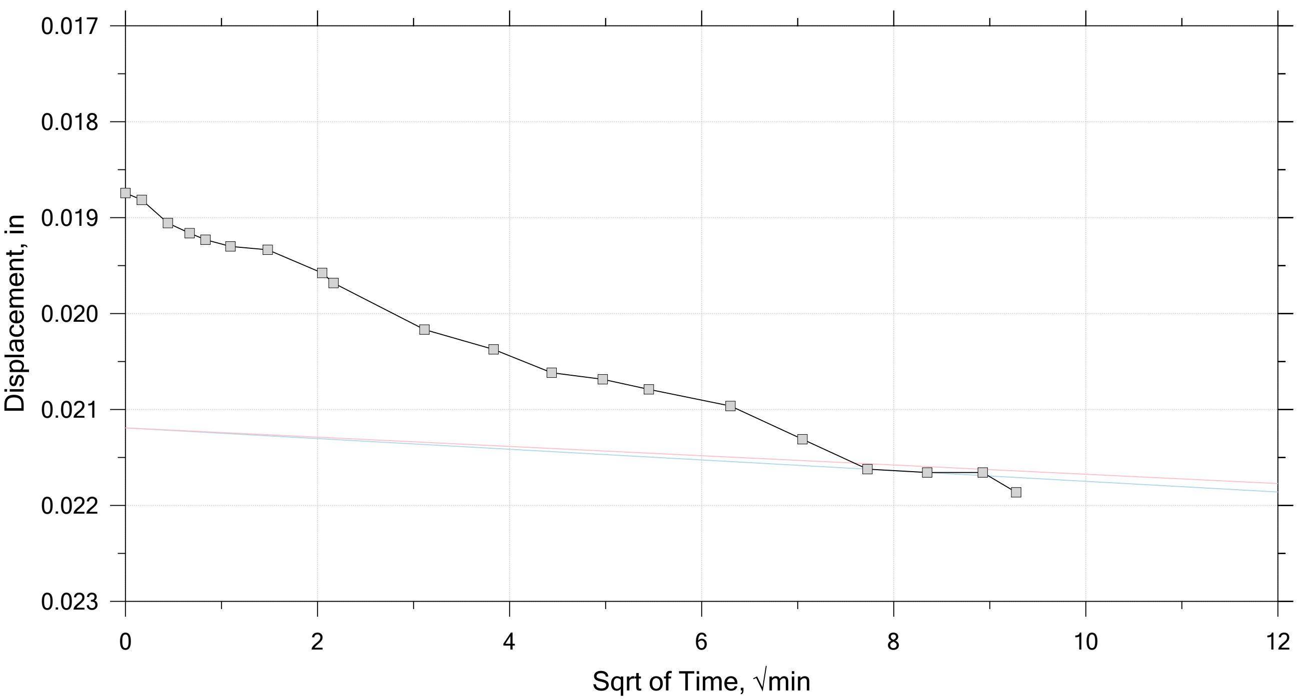


Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 21
Constant Load Step
Stress: 1.35e+03 psf





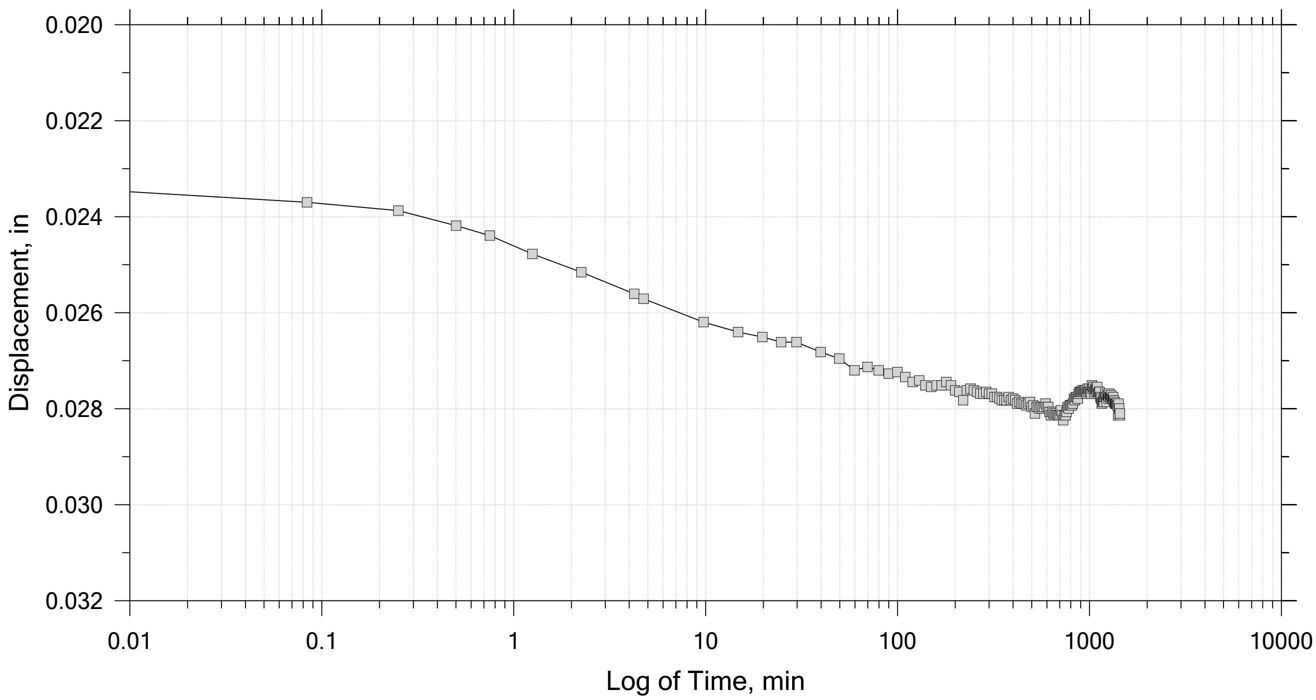
Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

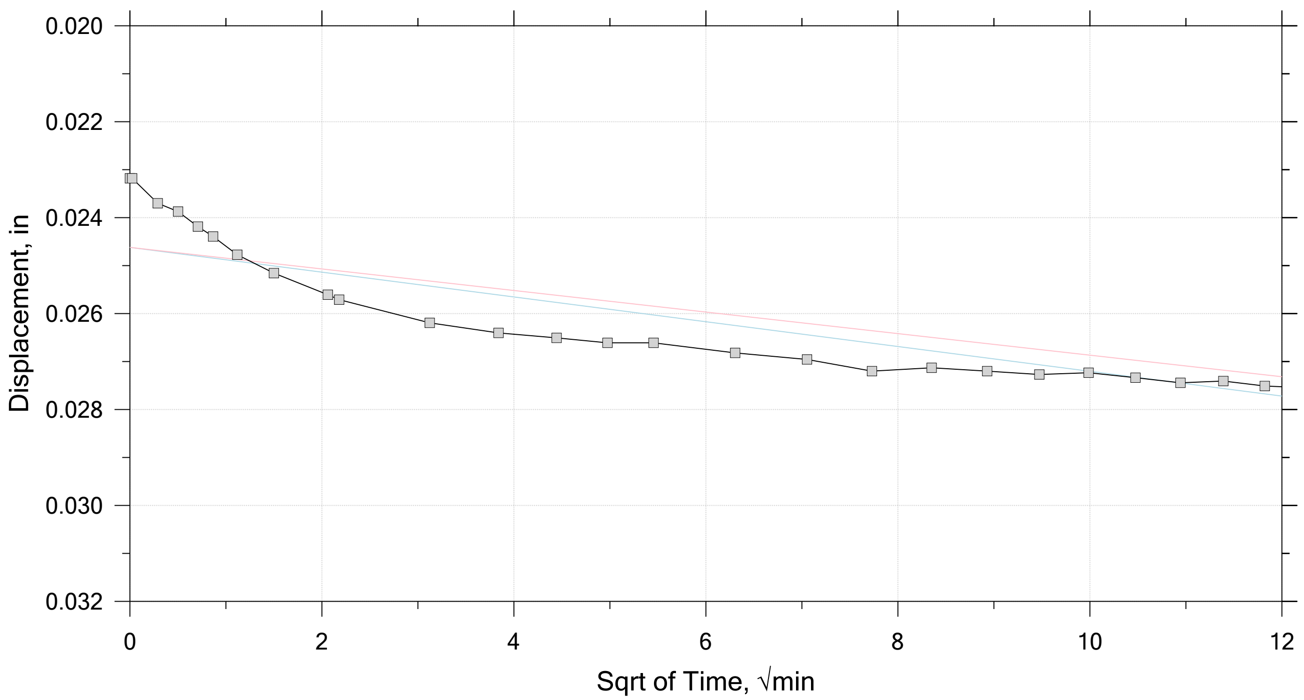
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 21

Constant Load Step

Stress: 2.02e+03 psf





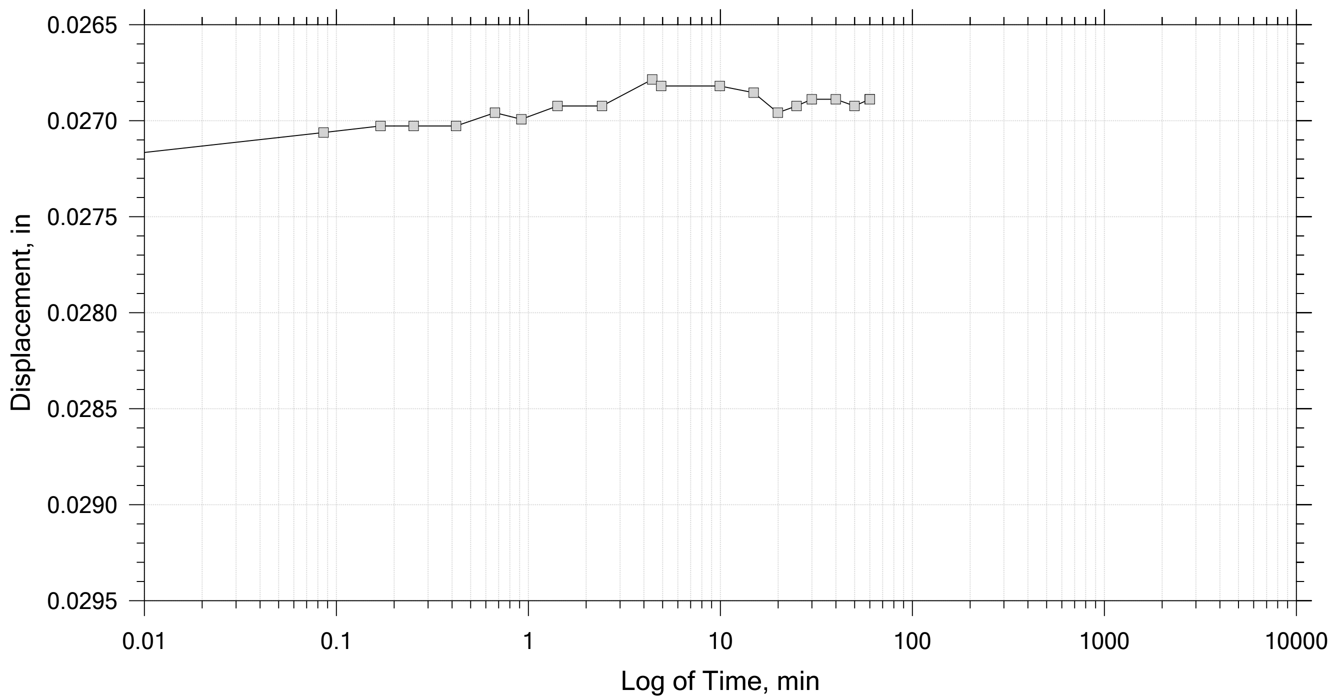
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

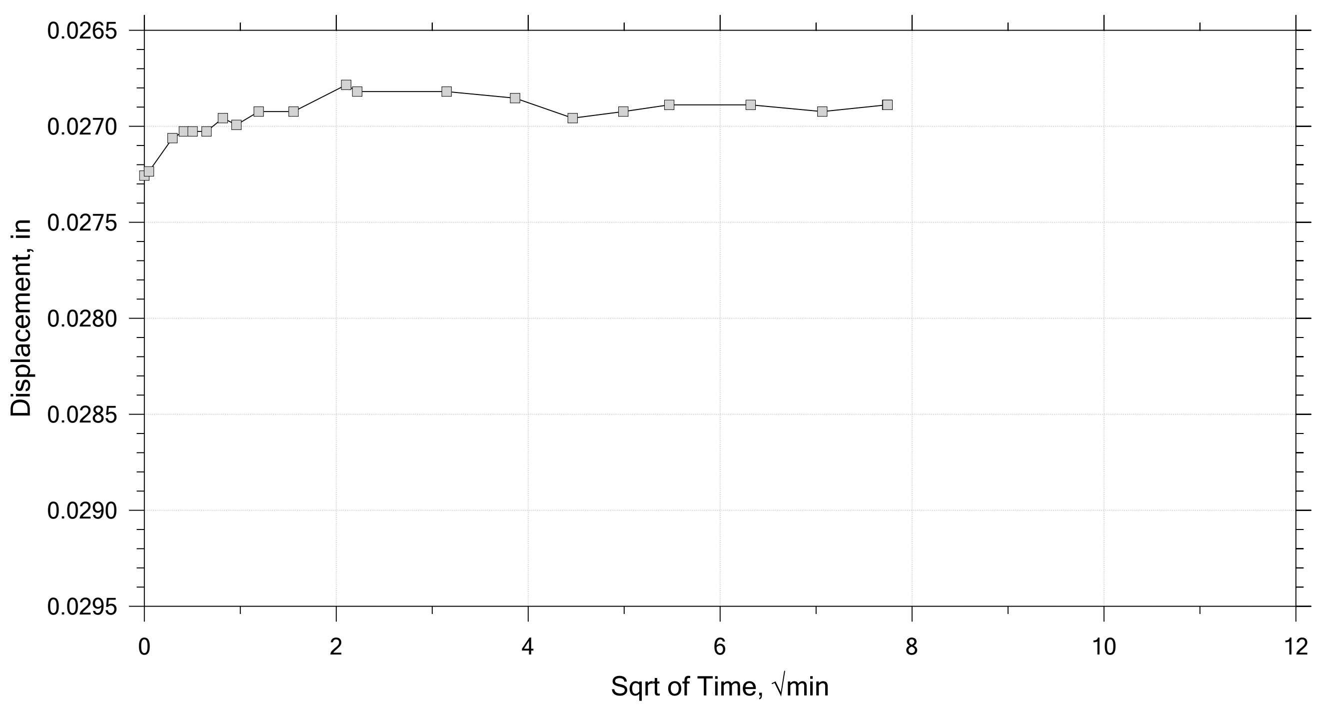
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 21

Constant Load Step

Stress: 900 psf





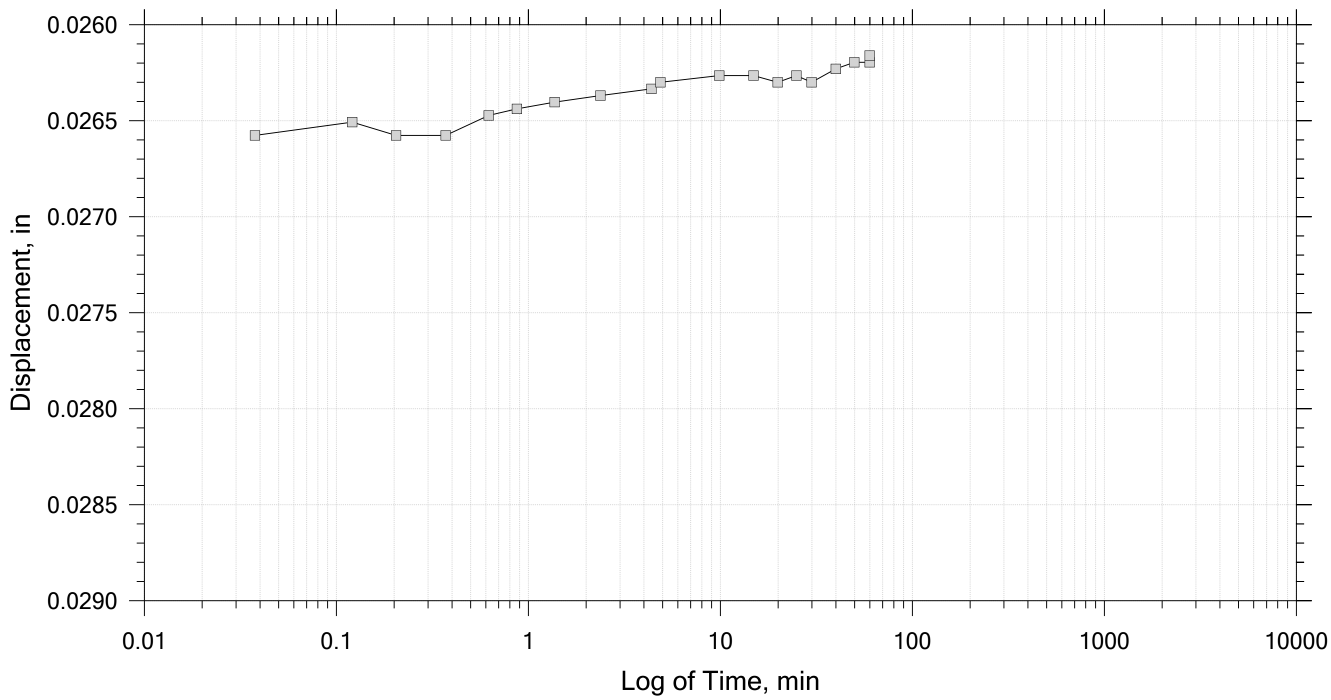
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

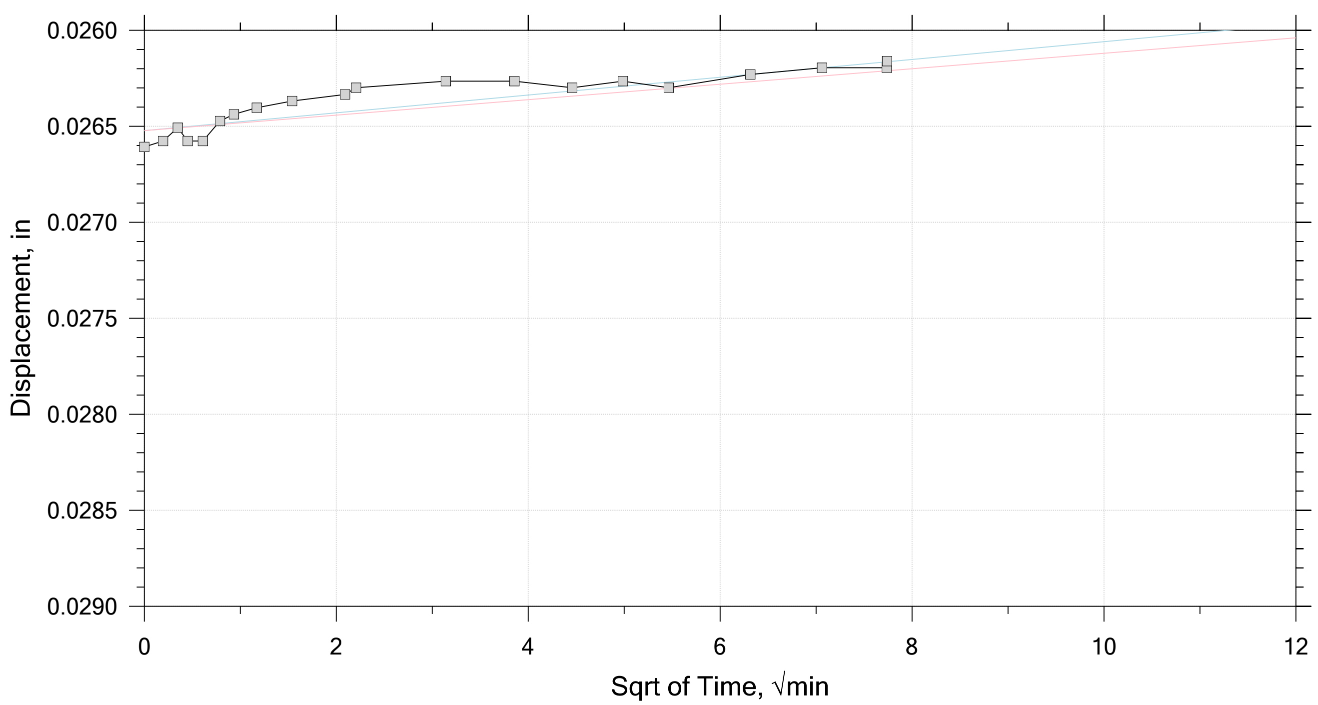
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 21

Constant Load Step

Stress: 600 psf





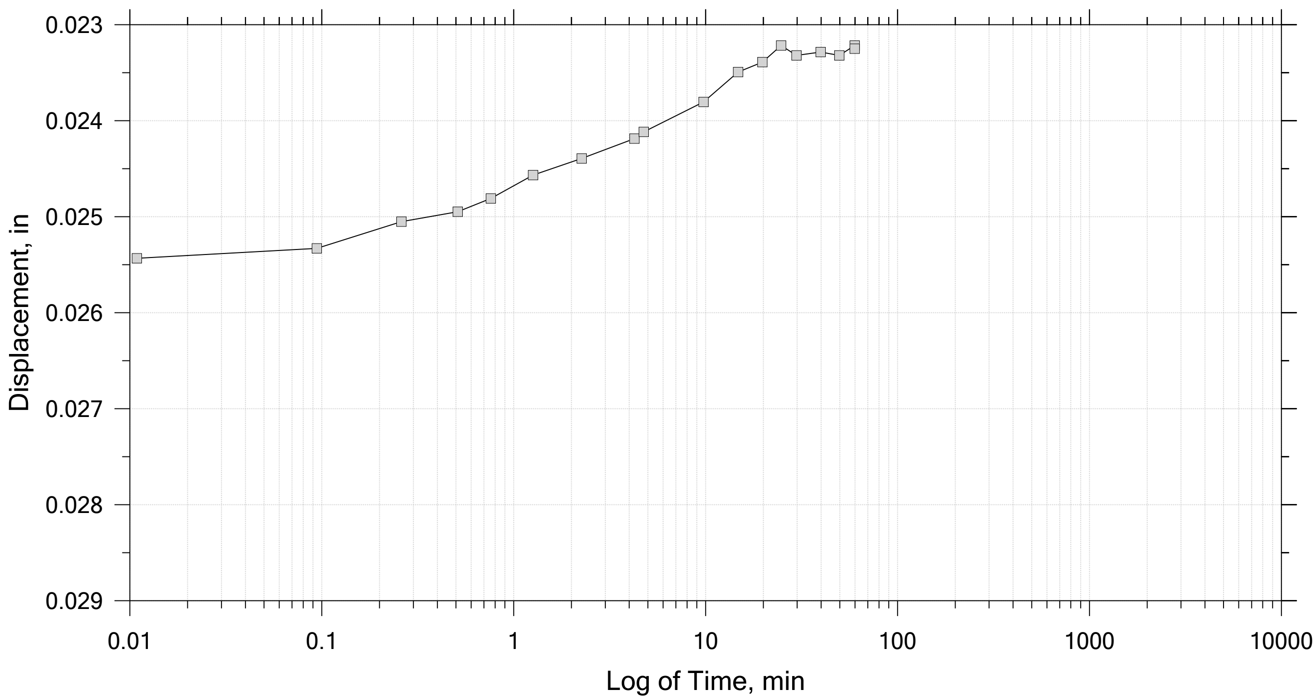
Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

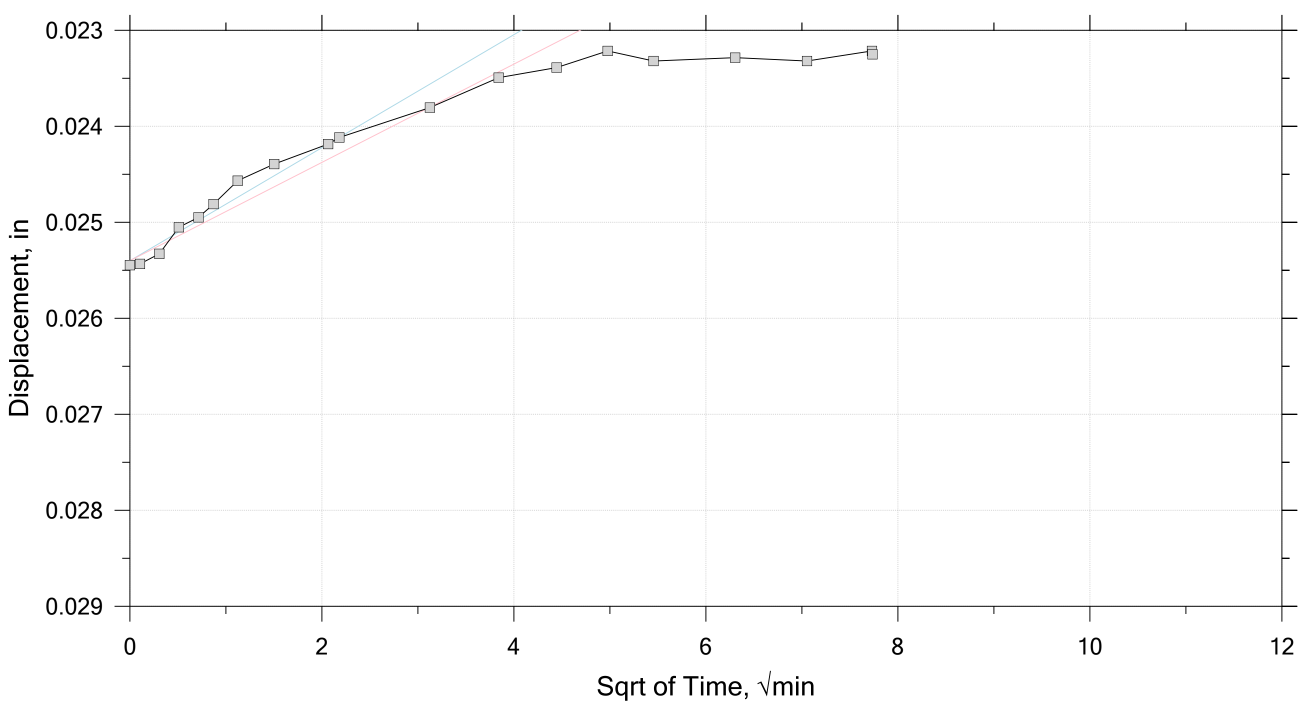
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 21

Constant Load Step

Stress: 200 psf





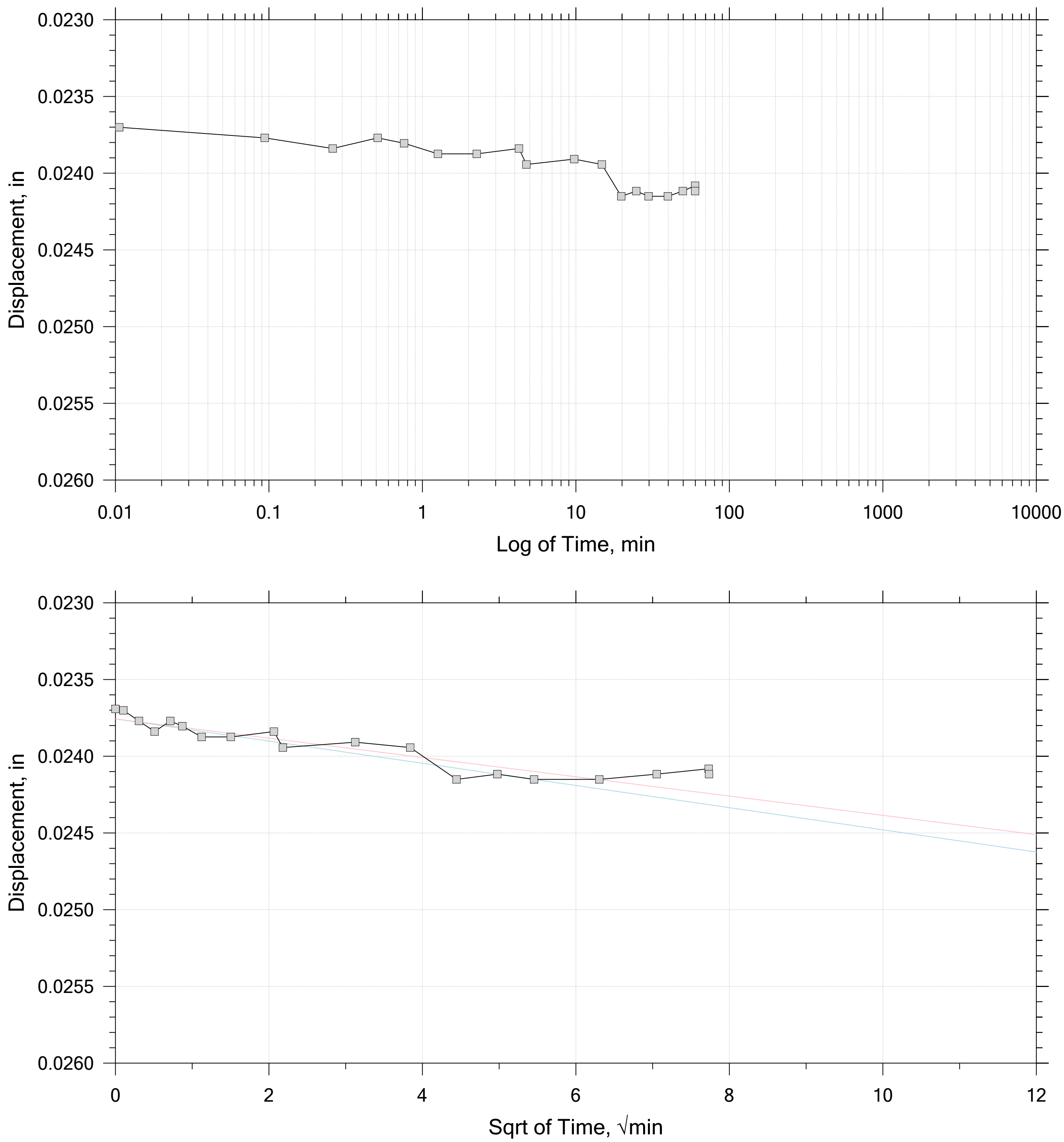
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 21

Constant Load Step

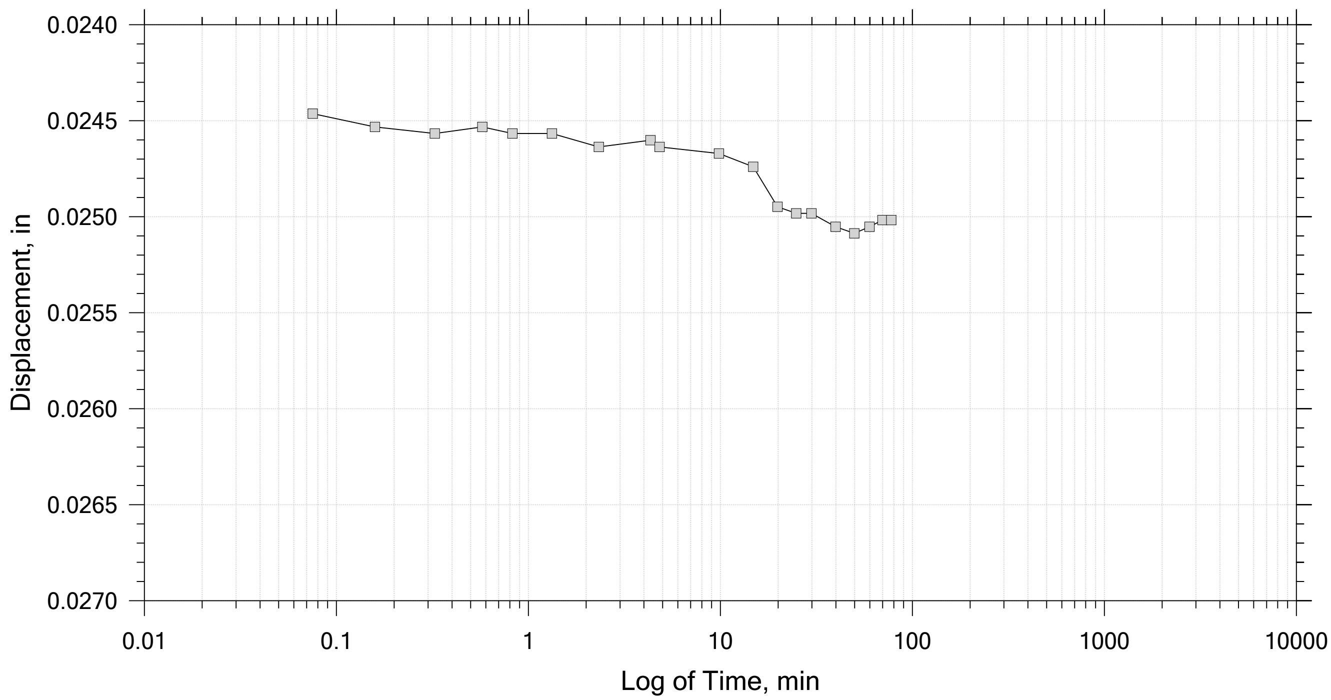
Stress: 400 psf

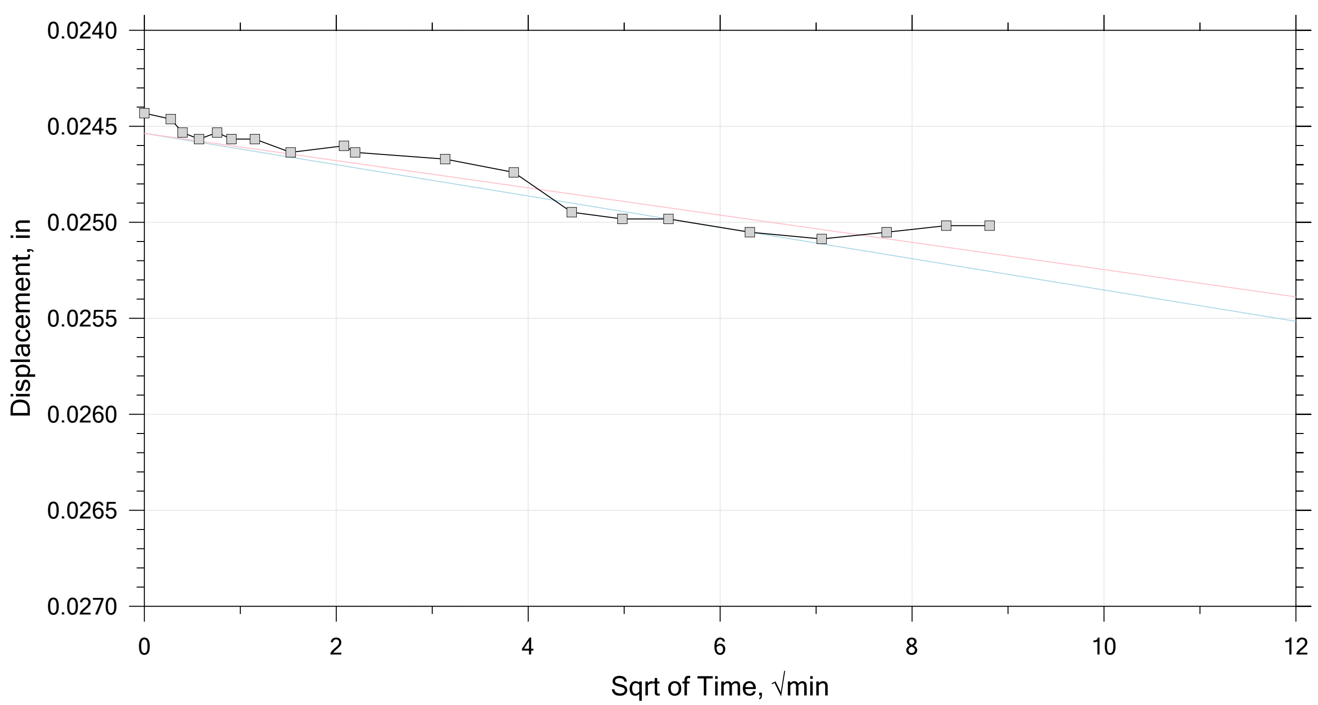


Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 21
Constant Load Step
Stress: 600 psf





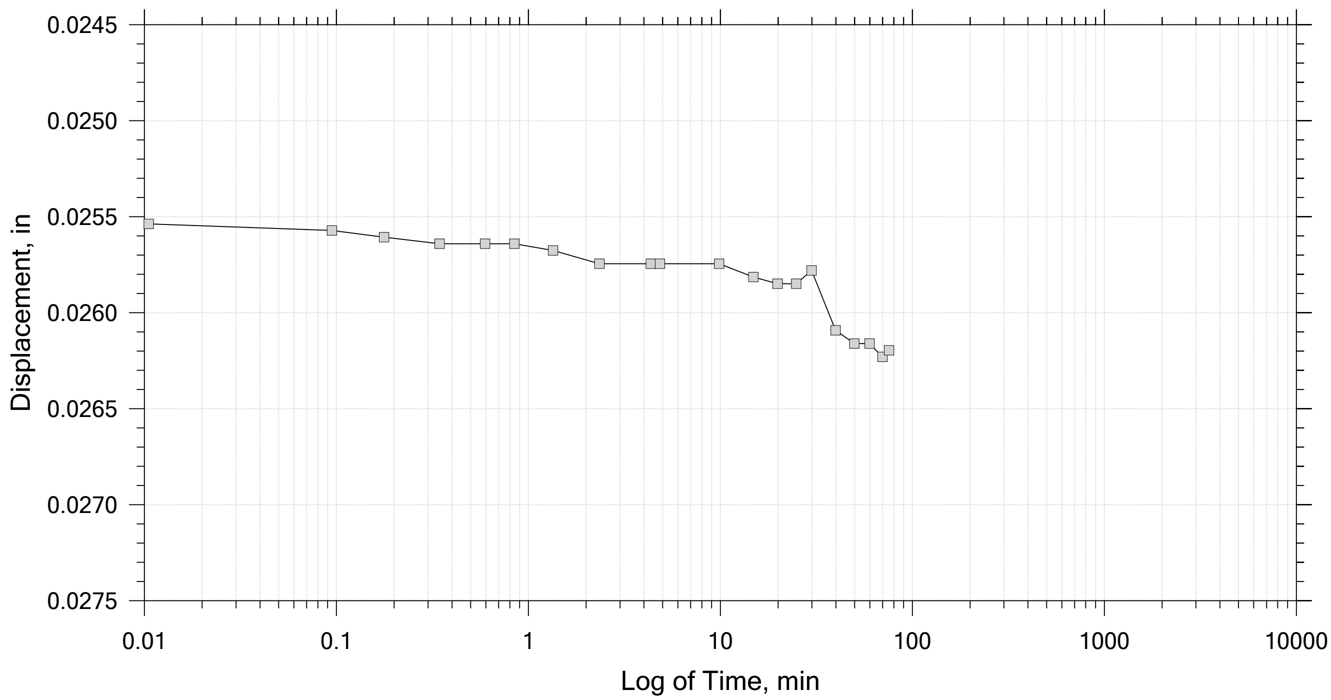
Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

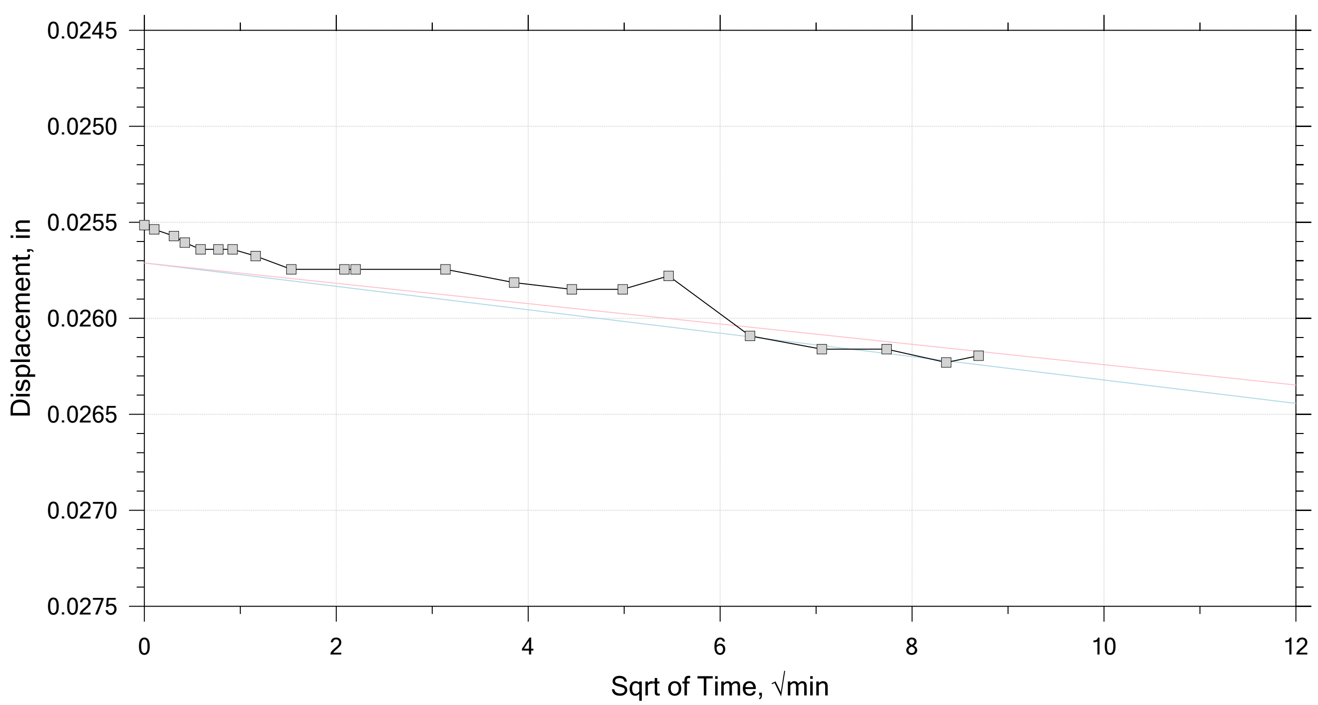
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 21

Constant Load Step

Stress: 900 psf

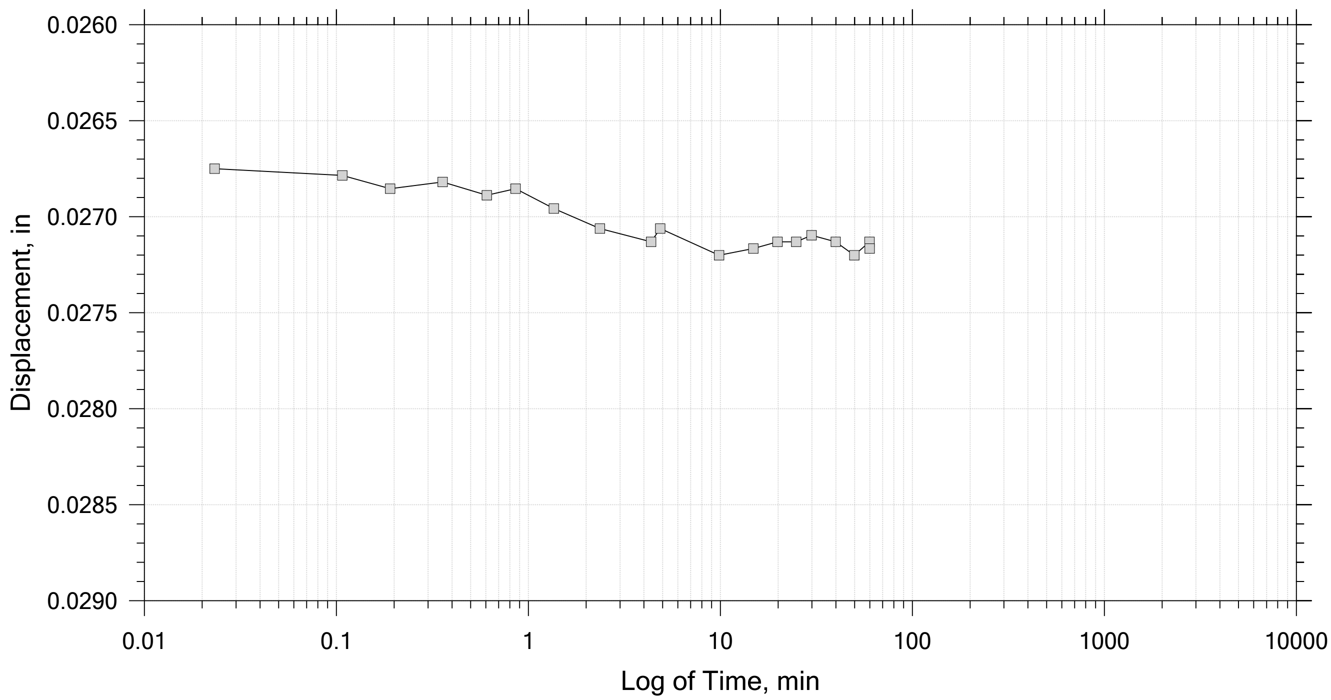


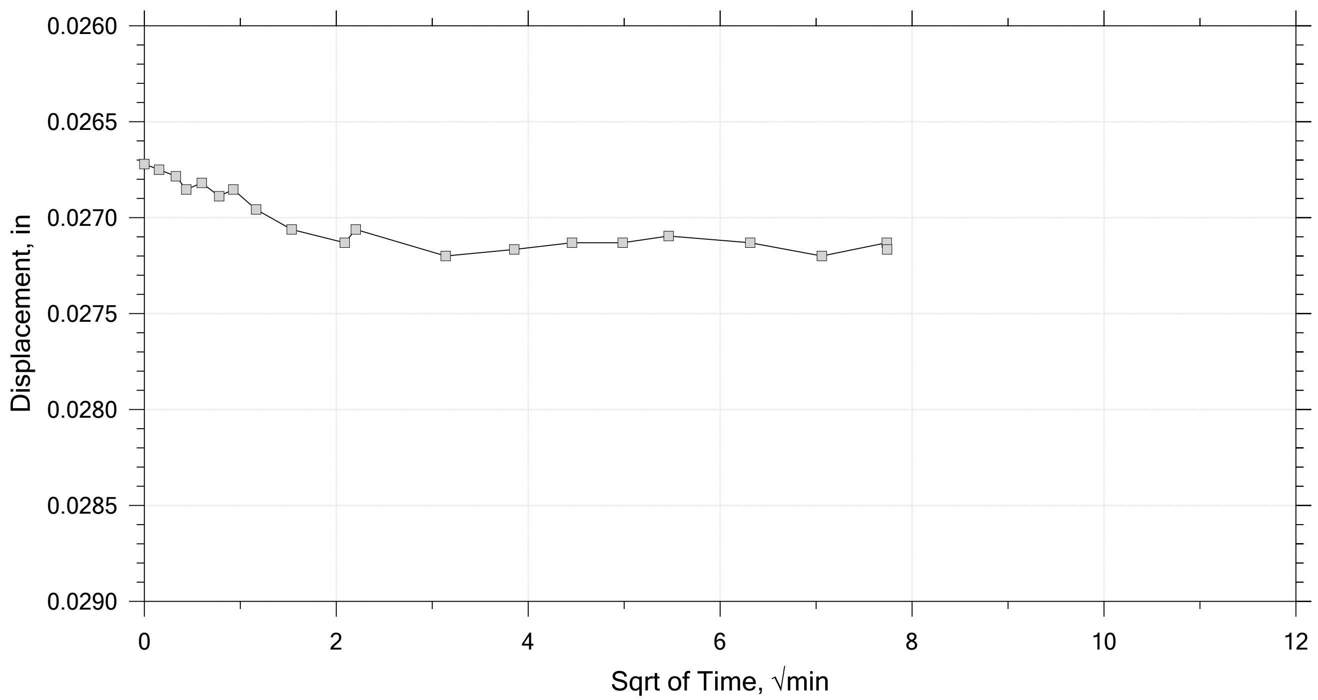


	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
Soil Metrics LLC	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 21
Constant Load Step
Stress: 1.35e+03 psf





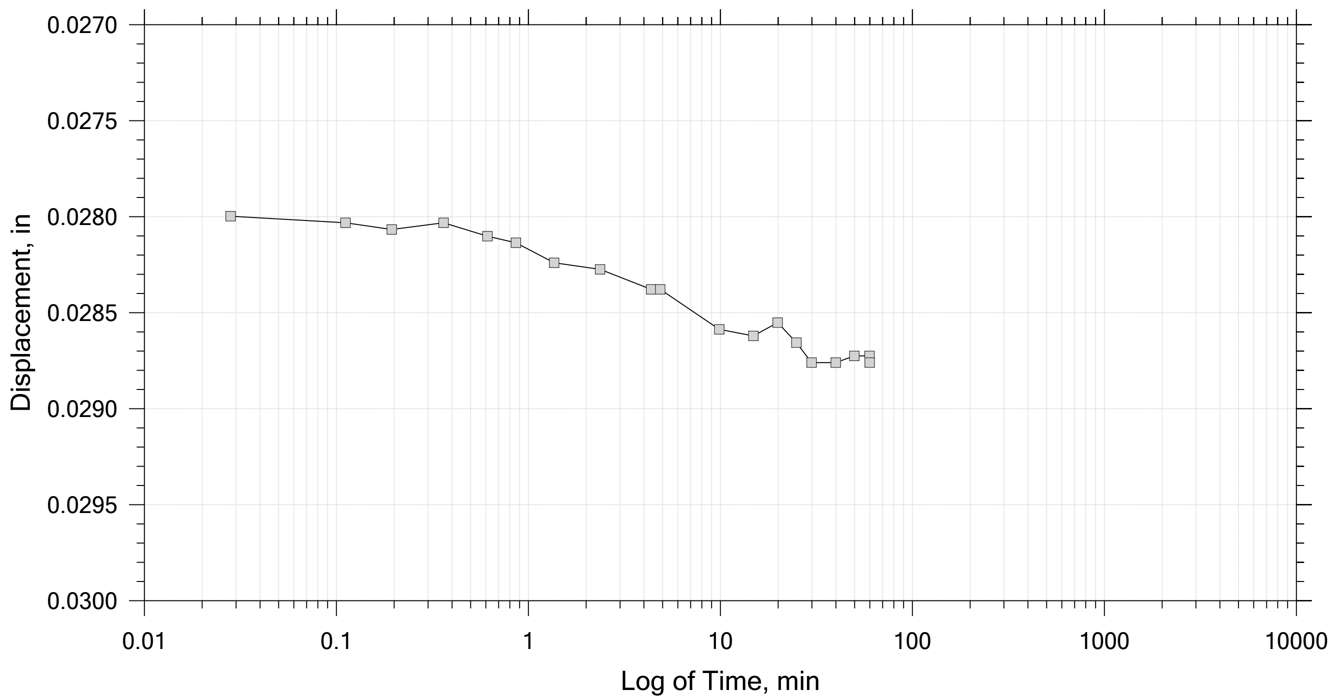
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

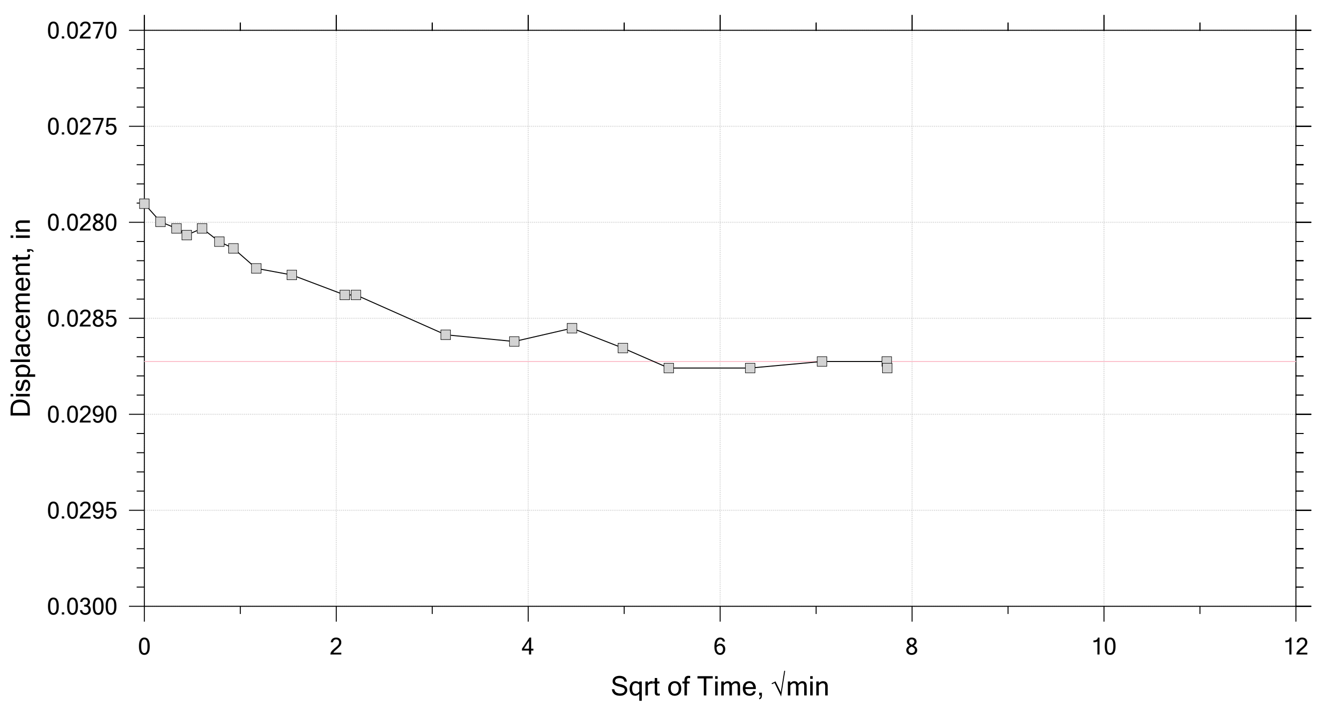
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 21

Constant Load Step

Stress: 2.02e+03 psf





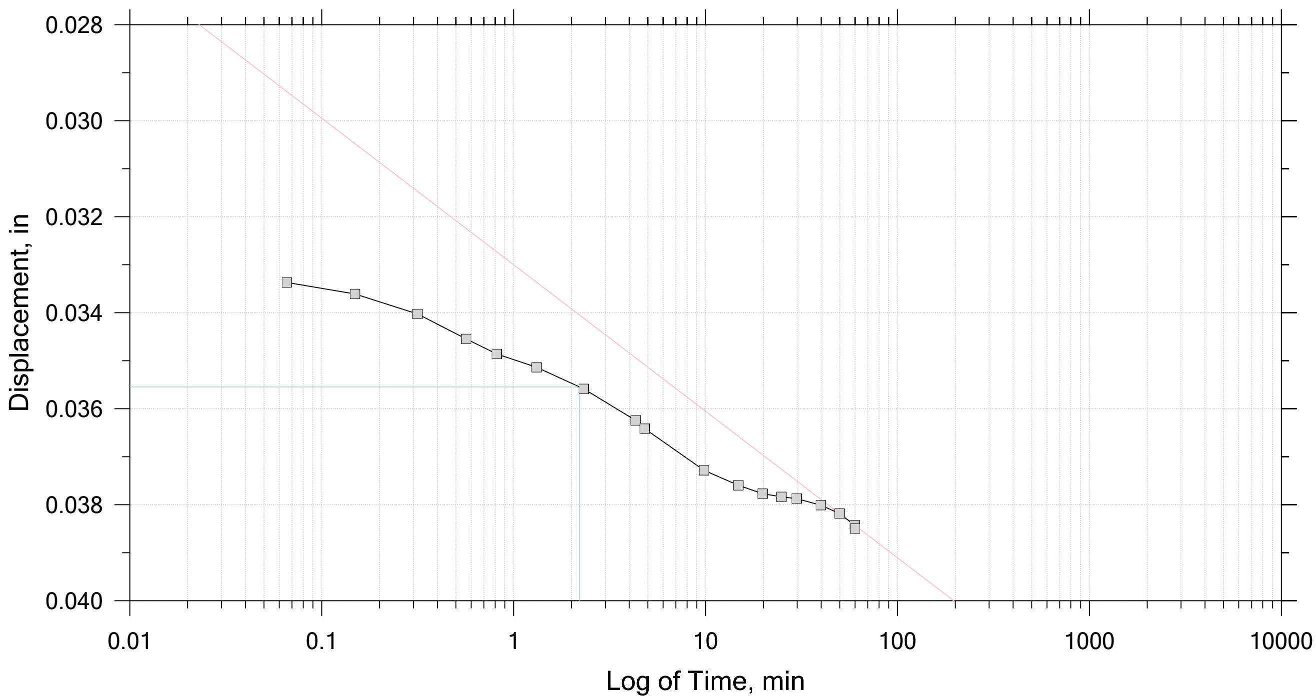
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

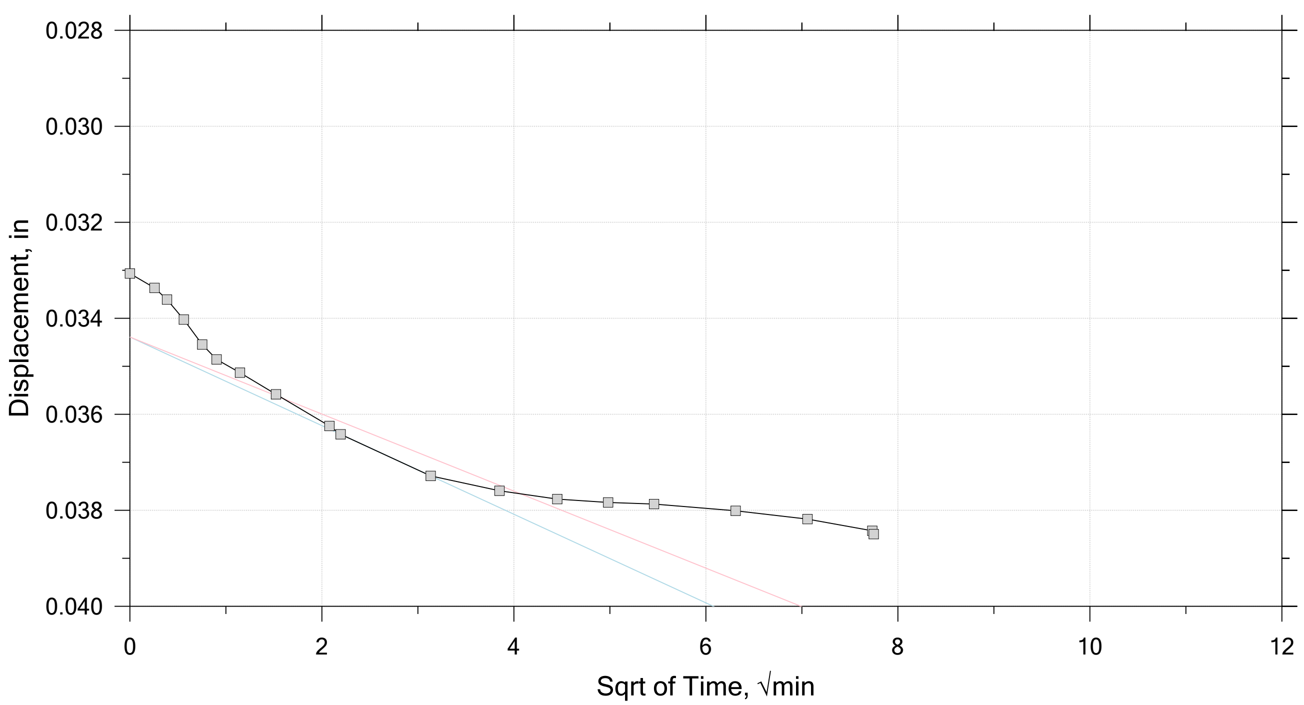
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 16 of 21

Constant Load Step

Stress: 4e+03 psf





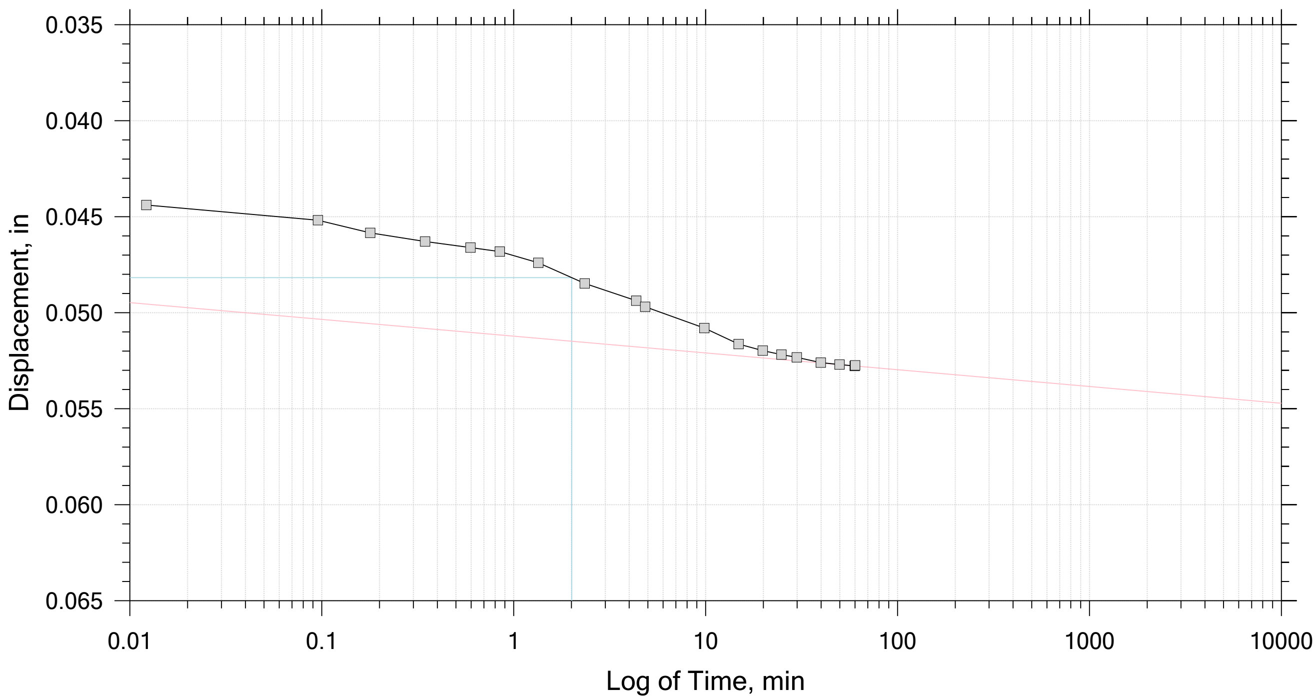
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

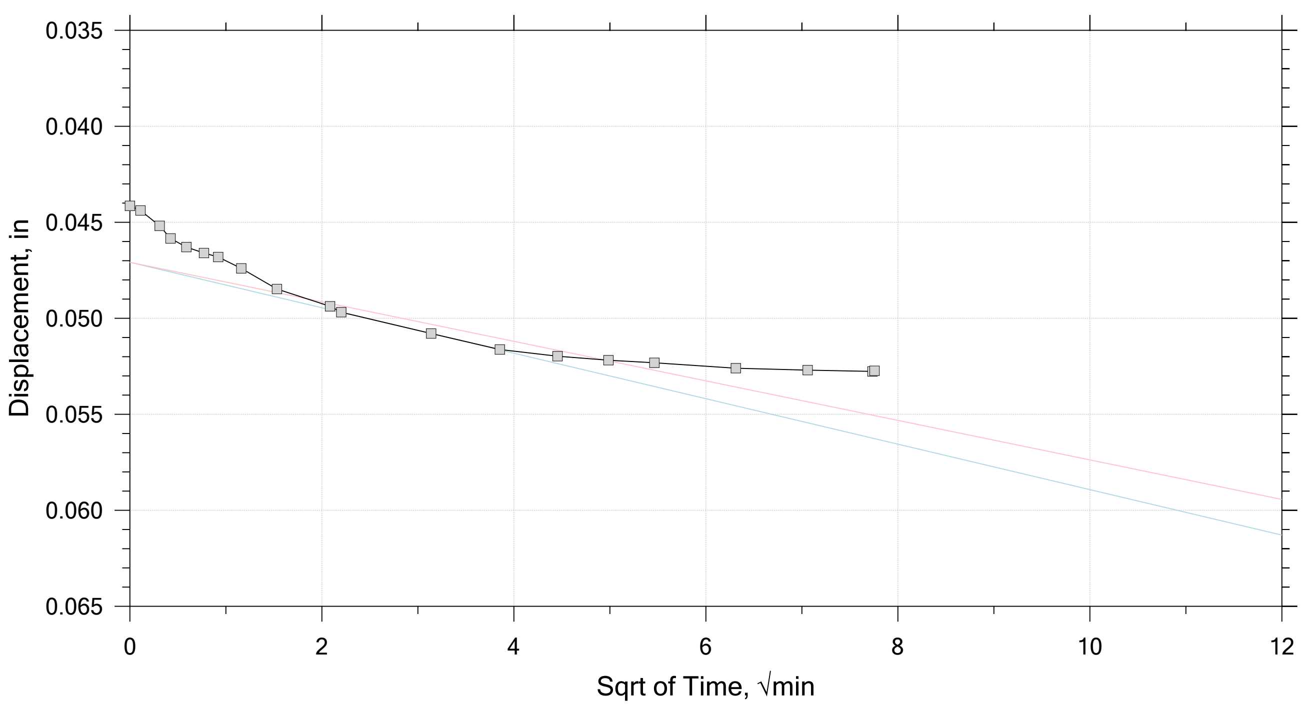
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 17 of 21

Constant Load Step

Stress: 8e+03 psf





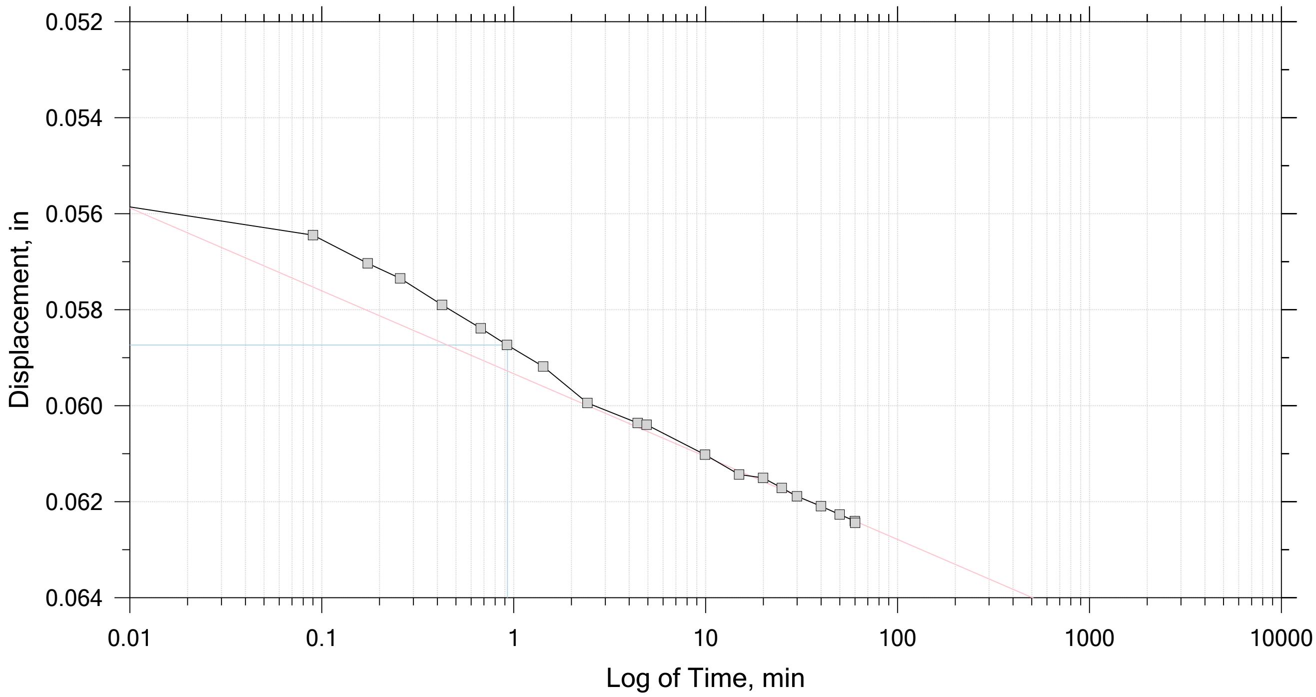
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

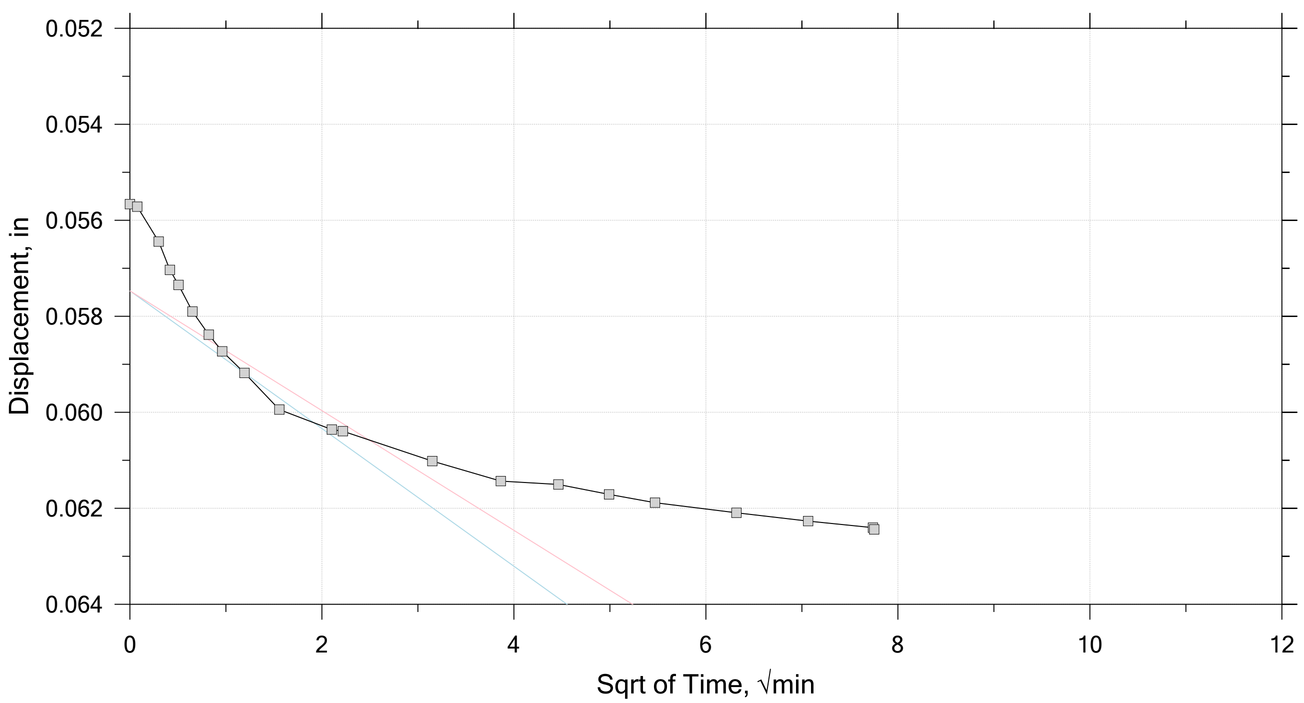
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 18 of 21

Constant Load Step

Stress: 1.2e+04 psf





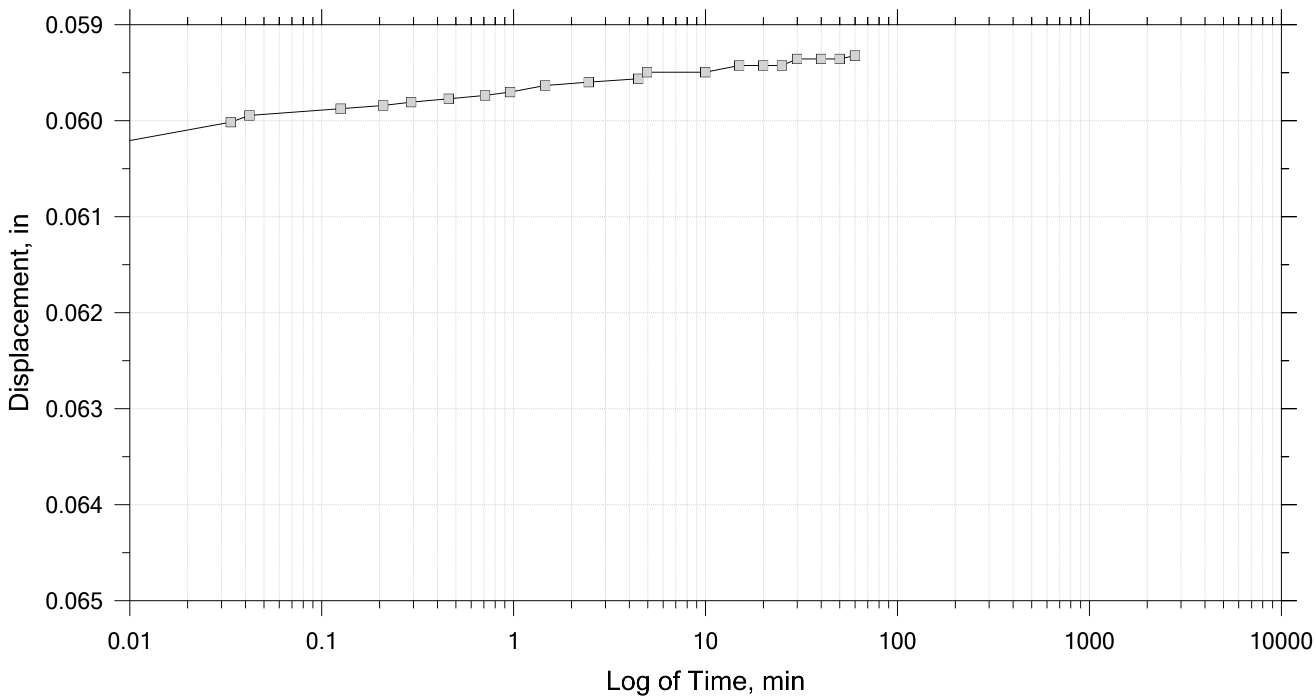
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

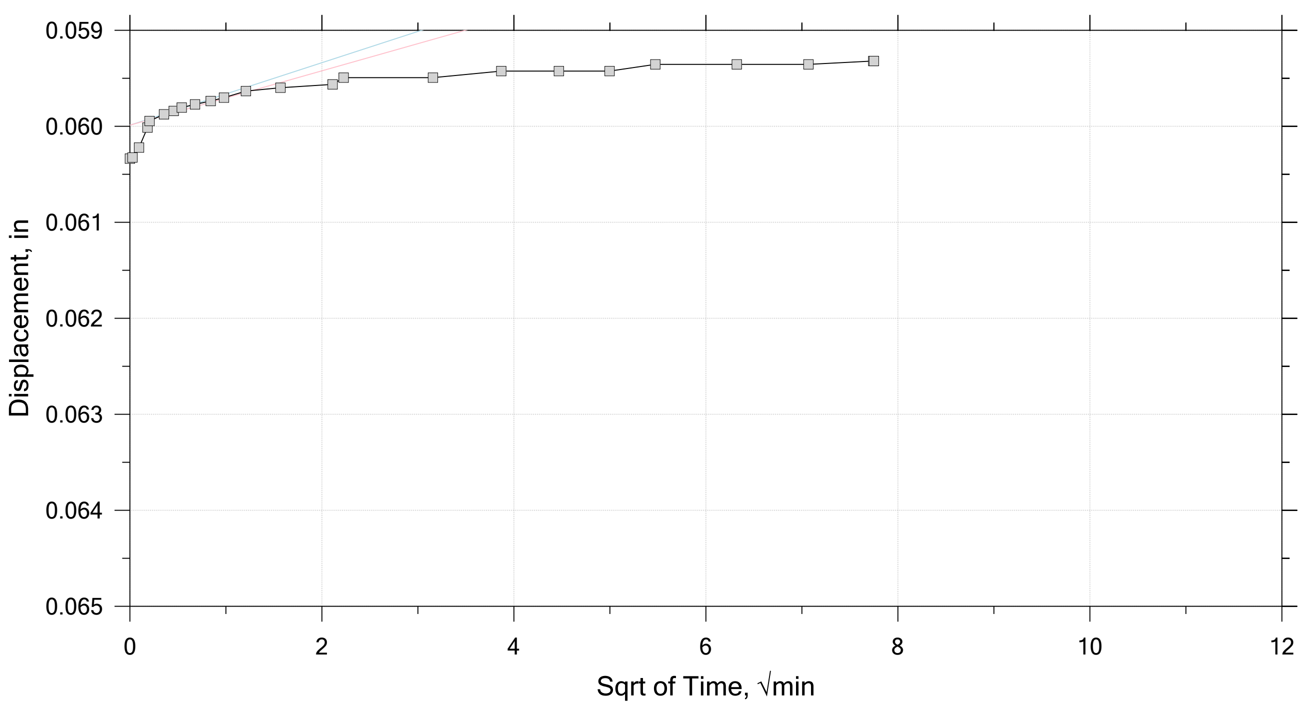
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 19 of 21

Constant Load Step

Stress: 4e+03 psf

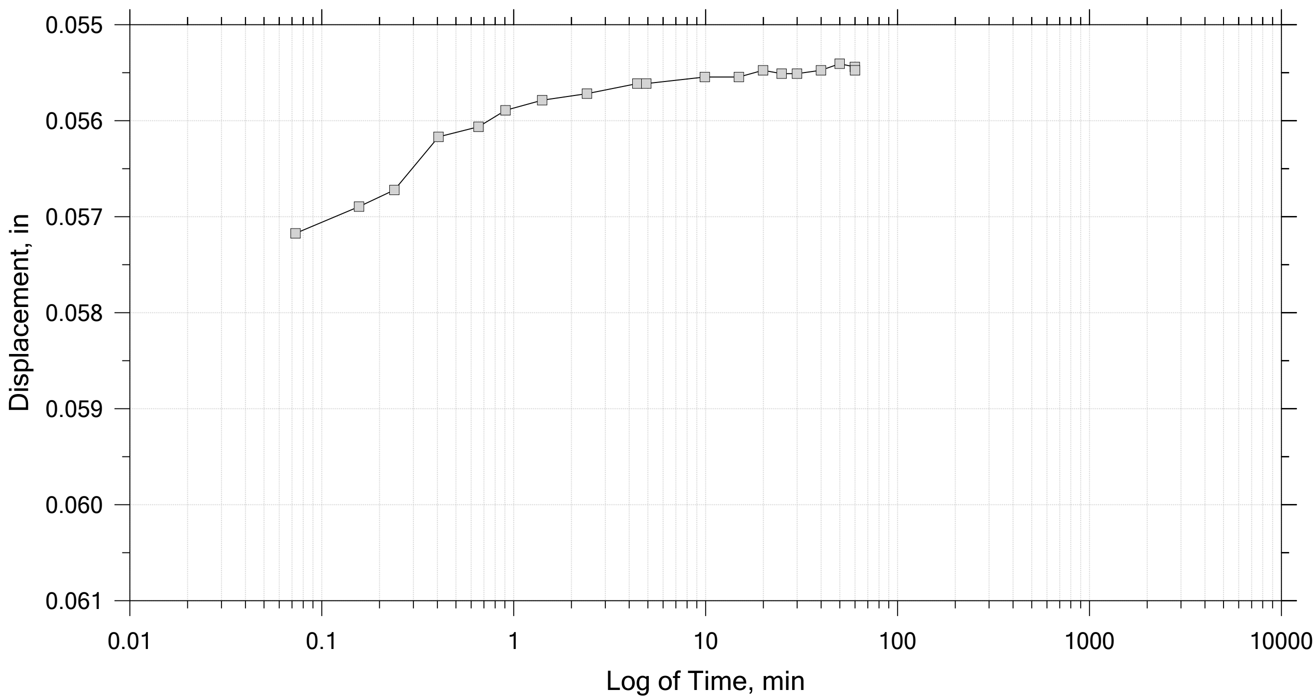


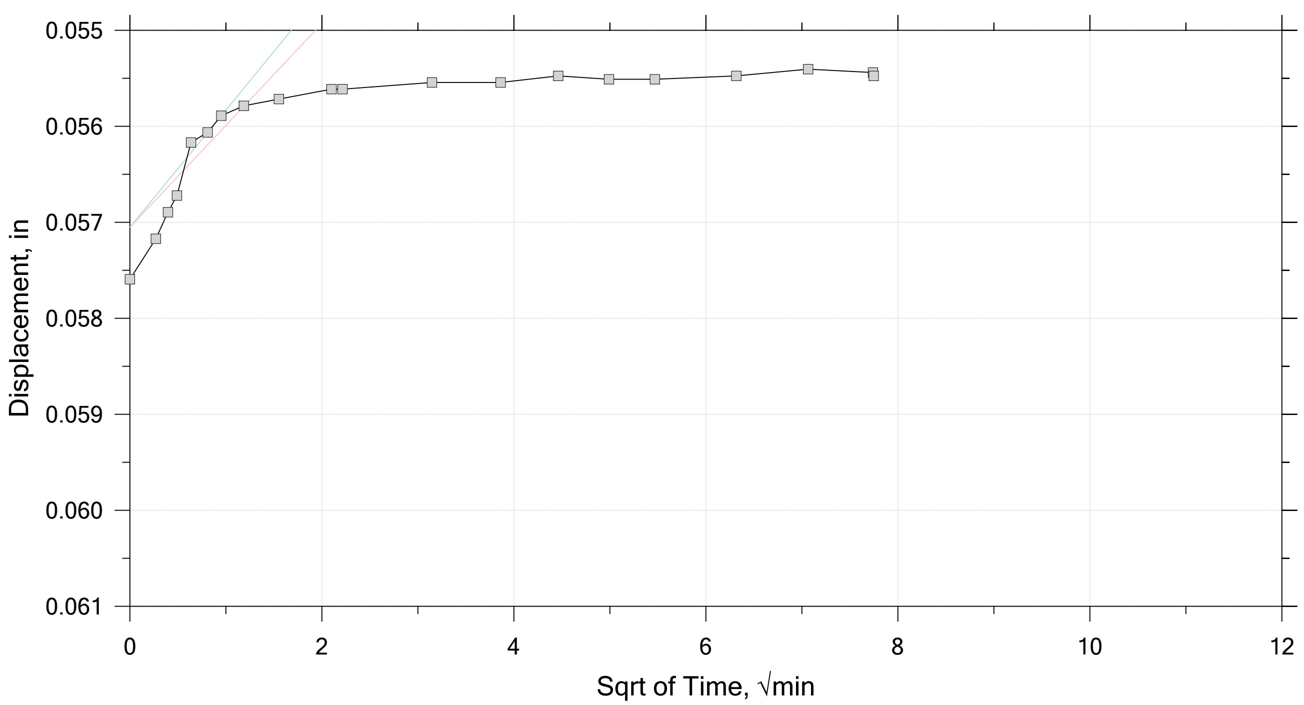


Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 20 of 21
Constant Load Step
Stress: 1.35e+03 psf





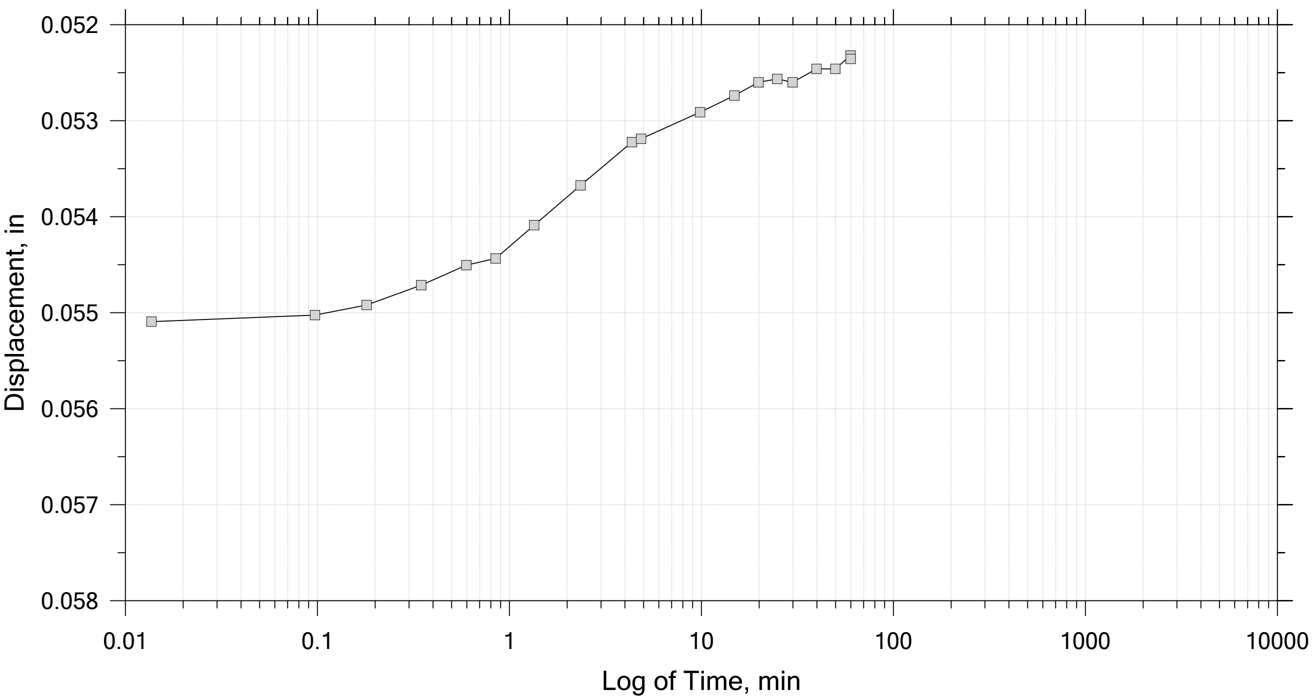
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

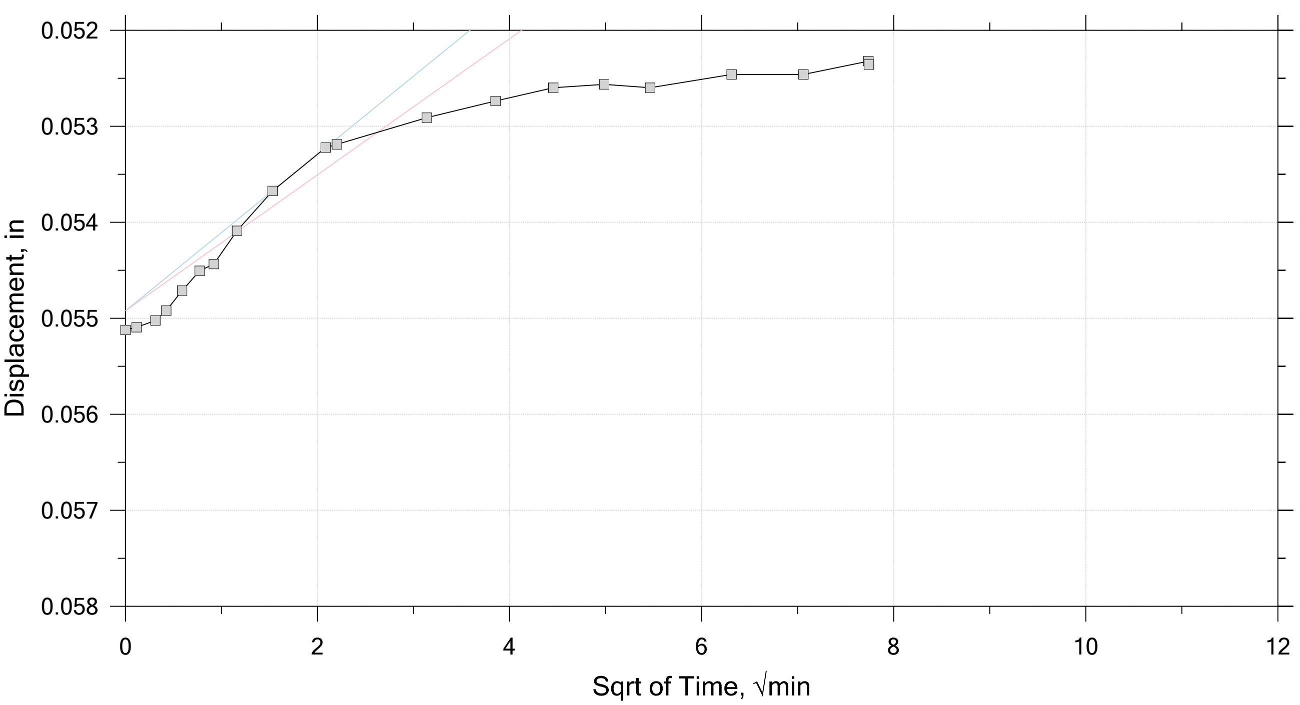
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 21 of 21

Constant Load Step

Stress: 650 psf





Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter, in: 2.50	Specific Gravity: 2.77 (Implied)	Liquid Limit: 22
Specimen Height, in: 1.00	Initial Void Ratio: 0.654	Plastic Limit: 18
Final Height, in: 0.95	Final Void Ratio: 0.568	Plasticity Index: 5

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	210	---	"ring"	321
Mass Container, gm	37.01	111.09	111.09	60.4
Mass Container + Wet Soil, gm	130.37	276.8	274.67	223.88
Mass Container + Dry Soil, gm	113.64	246.86	246.86	196.09
Mass Dry Soil, gm	76.63	135.77	135.77	135.69
Water Content, %	21.83	22.05	20.48	20.48
Void Ratio	---	0.65	0.57	---
Degree of Saturation, %	---	93.48	100.00	---
Dry Unit Weight, pcf	---	104.68	110.43	---

Preconsolidation Stress, psf	---
Compression Ratio	0
Rebound Ratio	0
Compression Index	0
Rebound Index	0

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Sqrt of Time Coefficients

Step	Applied Stress psf	EOP Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv ft²/day	Mv ft²/ton	k cm/s
1	100.	0.003522	0.648	0.350	20.021	1.07e-01	7.01e+04	8.23e-08
2	200.	0.006410	0.644	0.638	56.260	3.77e-02	5.75e+04	2.39e-08
3	400.	0.01087	0.636	1.08	18.800	1.12e-01	4.44e+04	5.47e-08
4	600.	0.01400	0.631	1.39	45.024	4.64e-02	3.11e+04	1.59e-08
5	900.	0.01709	0.626	1.70	19.590	1.06e-01	2.05e+04	2.39e-08
6	1.35e+03	0.02186	0.618	2.18	65.044	3.17e-02	2.11e+04	7.36e-09
7	2.02e+03	0.02772	0.609	2.76	139.750	1.46e-02	1.73e+04	2.77e-09
8	900.	0.02689	0.610	2.68	0.000	0.00e+00	1.47e+03	0.00e+00
9	600.	0.02616	0.611	2.60	45.291	4.48e-02	4.83e+03	2.38e-09
10	200.	0.02332	0.616	2.32	9.656	2.11e-01	1.41e+04	3.28e-08
11	400.	0.02413	0.615	2.40	19.760	1.03e-01	8.10e+03	9.21e-09
12	600.	0.02502	0.613	2.49	43.789	4.65e-02	8.78e+03	4.50e-09
13	900.	0.02620	0.611	2.61	61.487	3.31e-02	7.81e+03	2.85e-09
14	1.35e+03	0.02717	0.610	2.70	0.000	0.00e+00	4.29e+03	0.00e+00
15	2.02e+03	0.02876	0.607	2.86	28.143	7.19e-02	4.70e+03	3.72e-09
16	4.00e+03	0.03798	0.592	3.78	16.572	1.21e-01	9.29e+03	1.24e-08
17	8.00e+03	0.05274	0.567	5.25	24.365	8.01e-02	7.34e+03	6.48e-09
18	1.20e+04	0.06136	0.553	6.10	6.208	3.07e-01	4.29e+03	1.45e-08
19	4.00e+03	0.05849	0.558	5.82	1.643	1.15e+00	7.12e+02	9.04e-09
20	1.35e+03	0.05568	0.563	5.54	1.426	1.34e+00	2.12e+03	3.11e-08
21	650.	0.05272	0.568	5.25	6.876	2.79e-01	8.40e+03	2.58e-08

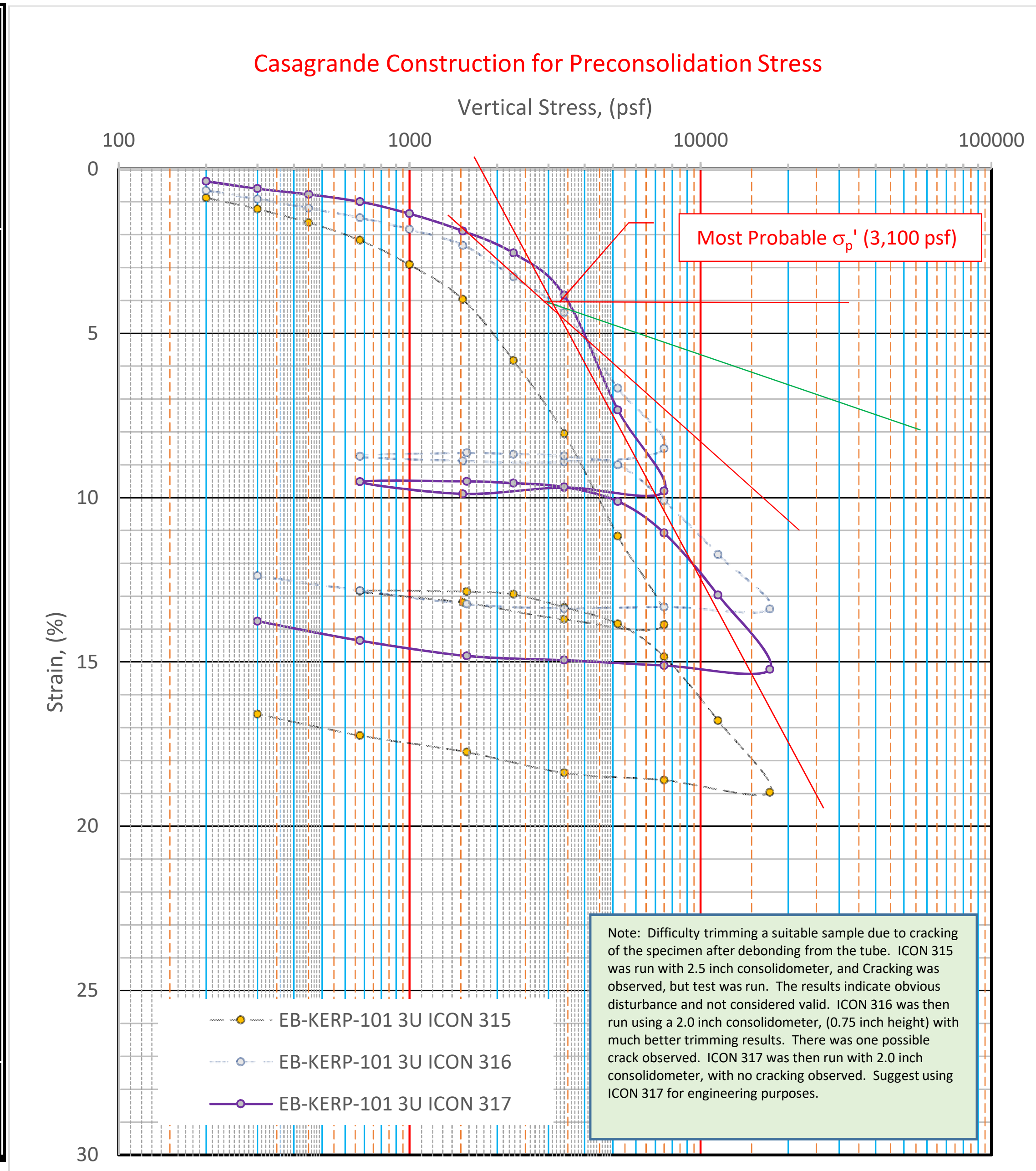
Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/24/19	Depth: 50.4
	Test Number: ICON 314	Preparation: Shelby Tube	Elevation: -45.1
	Description: Gray Clayey SILT		
	Remarks: This sample is likely a sandy clayey silt. The lack of a strong brealk is likely due to a silt-type behavior.		
	Displacement at End of Primary		

ICON 117:

BB-KERP 101 3U

Consolidation Test Data
Summary Report

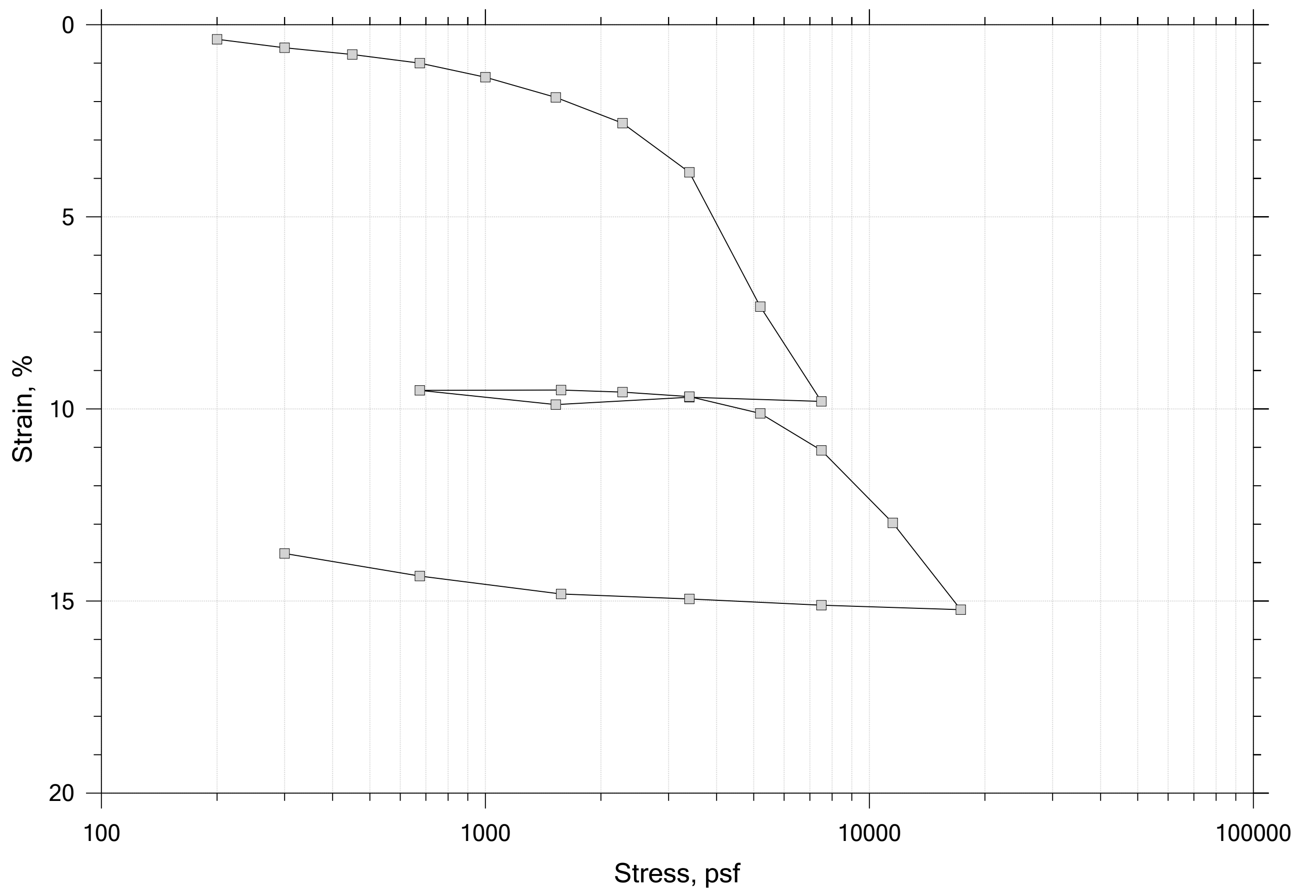
Project Name:	Kennebec River Estuary Restoration			
Project Number:	166-13			
Project Location:	Woolwich, Maine			
Client:	GZA			
Sample Description:	Gray Silty Clay			
Preparation:	Trimmed Shelby Tube			
Lab Test No:	ICON 315	ICON 316	ICON 317	
Boring No.	KERP 101	KERP 101	KERP 101	
Sample No:	3U	3U	3U	
Boring Elevation (ft).	5.3	5.3	5.3	
Sample Depth (ft):	69-71	69-71	69-71	
Test Specimen Depth (Ft):	70.1	69.95	69.8	
Test Specimen Elevation:	-64.8	-64.65	-64.5	
Water Content (%):	44.2	39.1	44.5	
Dry Unit Weight (pcf):	75.6	82.4	77.5	
Wet Unit Weight (pcf):	108.9	114.6	112.0	
Saturation Before (%):	92.9	96.7	98.0	
Saturation After (%):	100	100	100	
Void Ratio Before:	1.35	1.14	1.29	
Void Ratio After:	0.96	0.88	0.98	
Overburden Pressure (psf):	--	--	--	
Max Previous stress (psf):	1,900	3,000	3,100	
Max Prev. stress (Work) (psf):	2,000	2,900	3,000	
OCR:	--	--	--	
Compression Index (C_{CE}):	0.175	0.14	0.185	
Recompression Index (C_{RE}):	0.018	0.018	0.018	
Liquid Limit:	37.5	37.5	37.5	
Plastic Limit:	22.0	22.0	22.0	
Plasticity Index:	15.5	15.5	15.5	
Liquidity Index:	1.43	1.10	1.45	
Specific Gravity (implied)	2.83	2.83	2.85	
Tested By:	sjr	sjr	sjr	
Date Tested:	12/26/2019	12/28/2020	1/3/2020	
Checked By:	sjr	sjr	sjr	

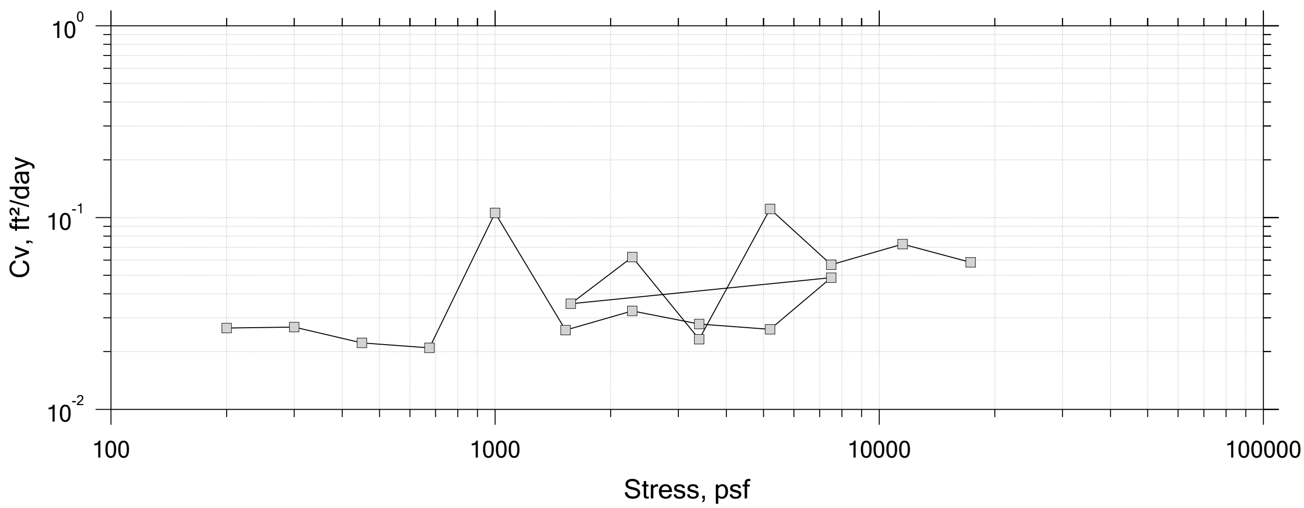


Soil Metrics LLC Geotechnical Engineering

One-Dimensional Consolidation by ASTM D2435 - Method B

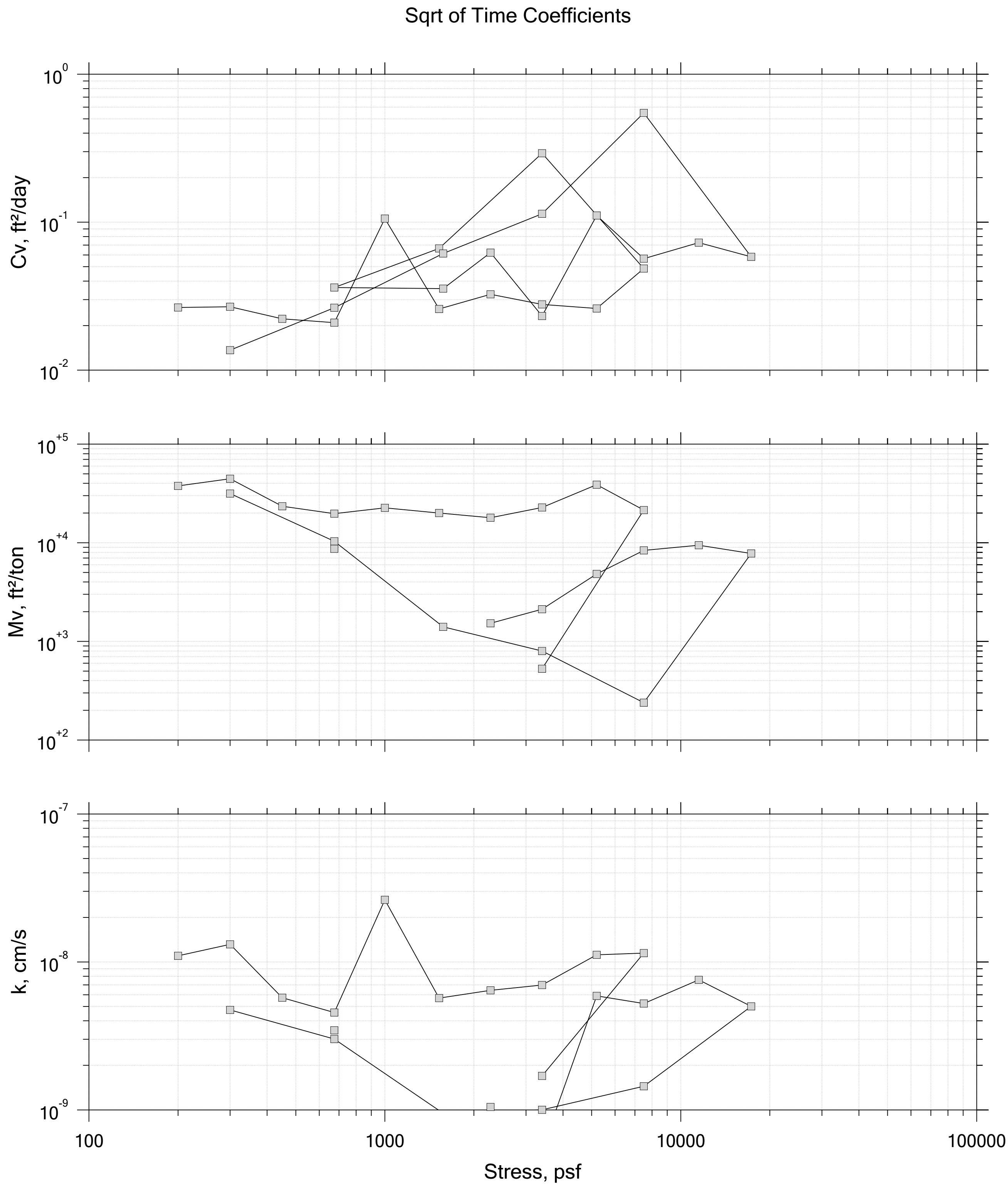
Summary Report





Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B



Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
Description: GraySsilty Clay		
Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

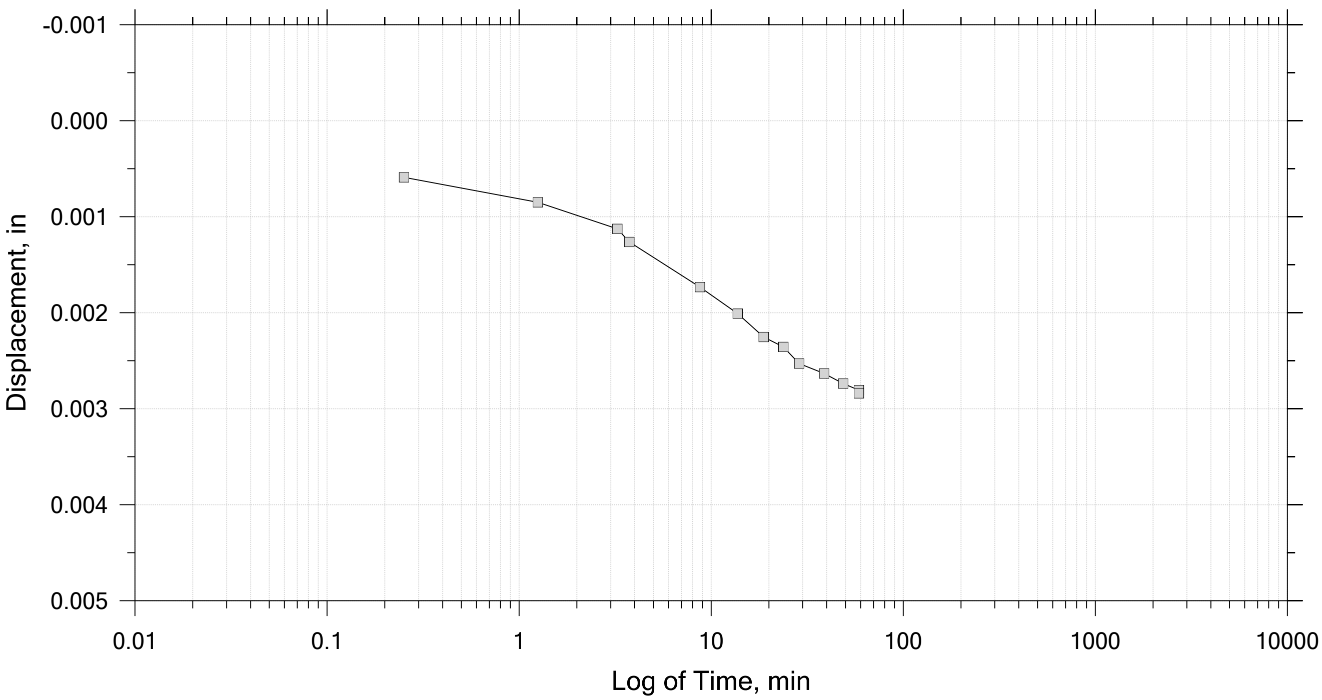
Soil Metrics LLC

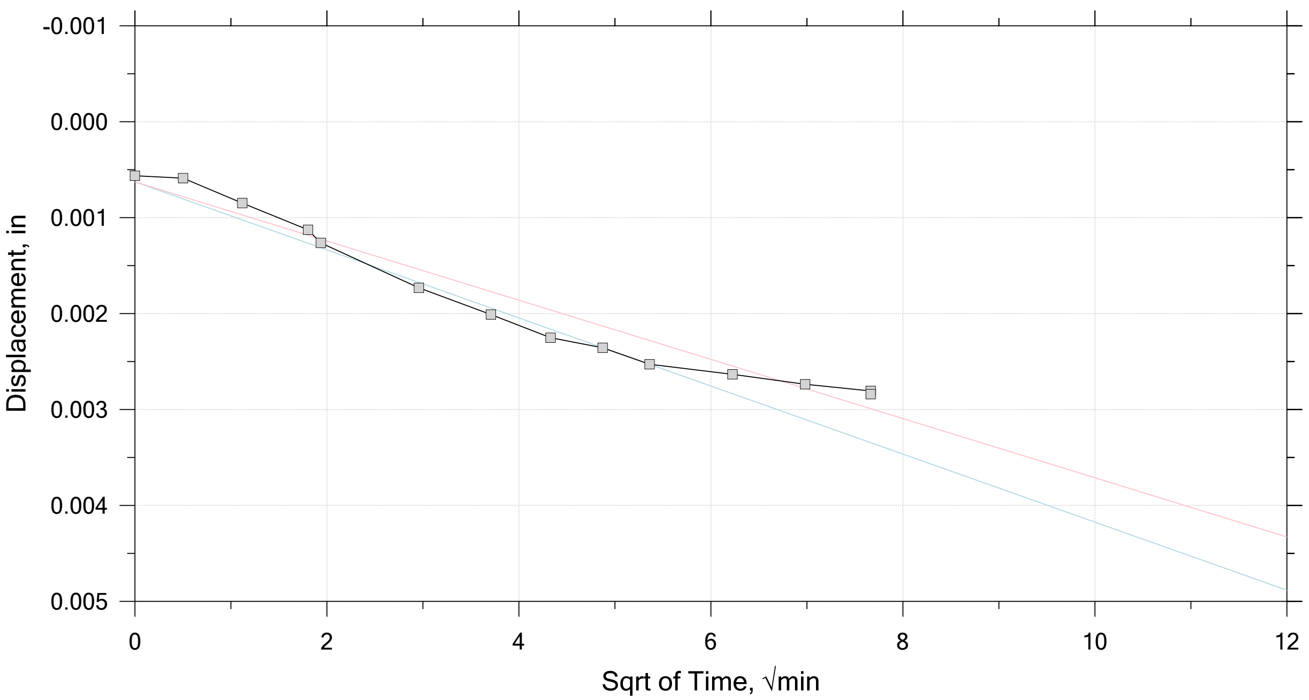
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 25

Constant Load Step

Stress: 200 psf





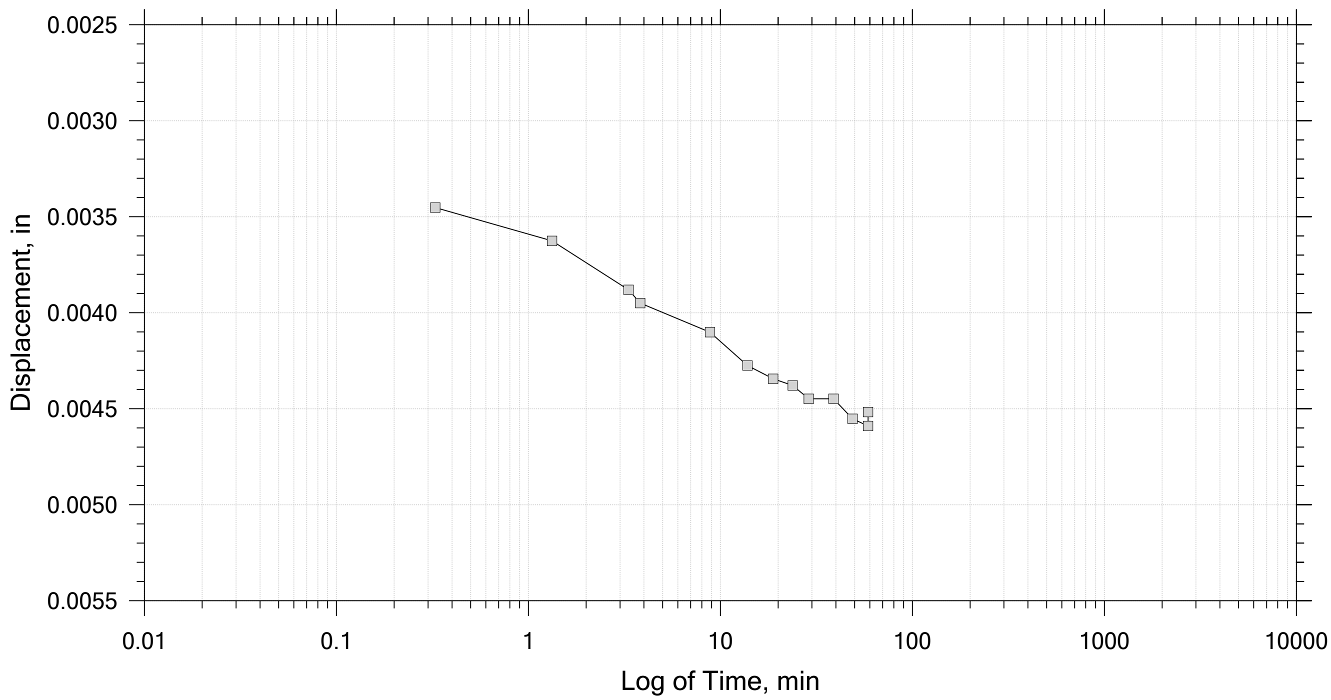
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

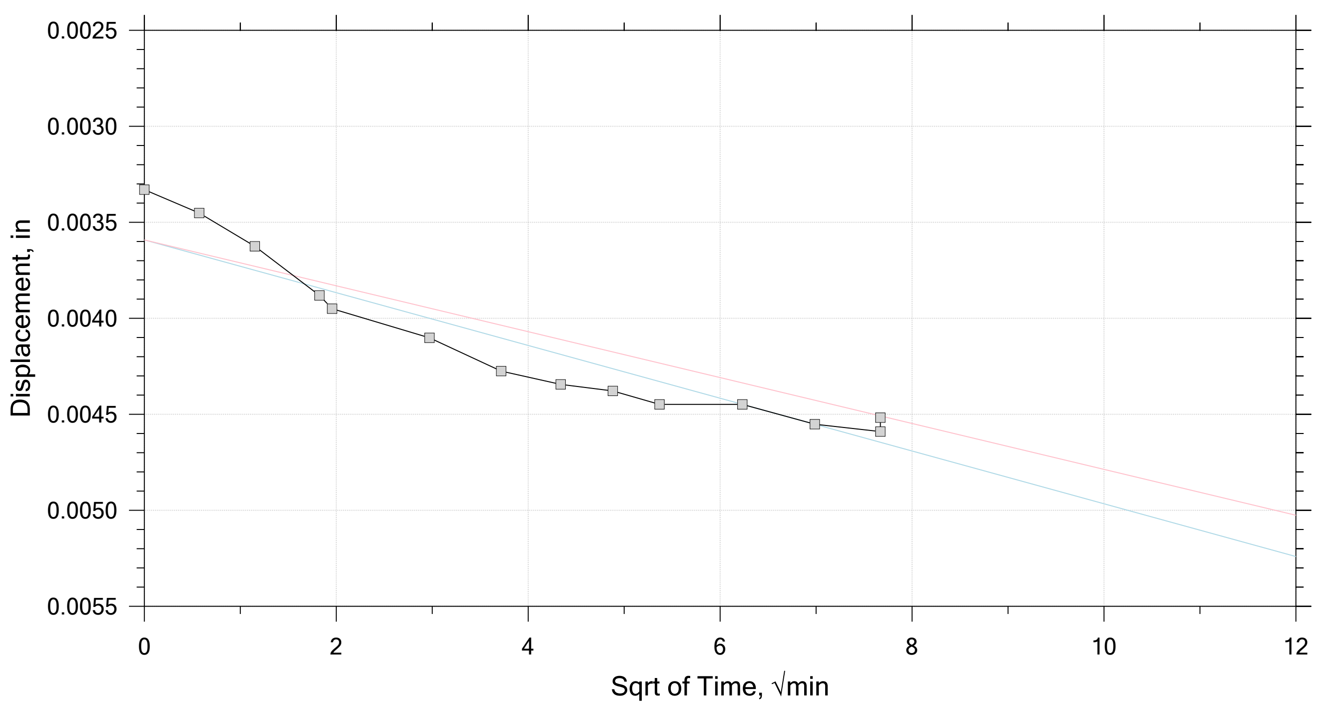
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 25

Constant Load Step

Stress: 300 psf





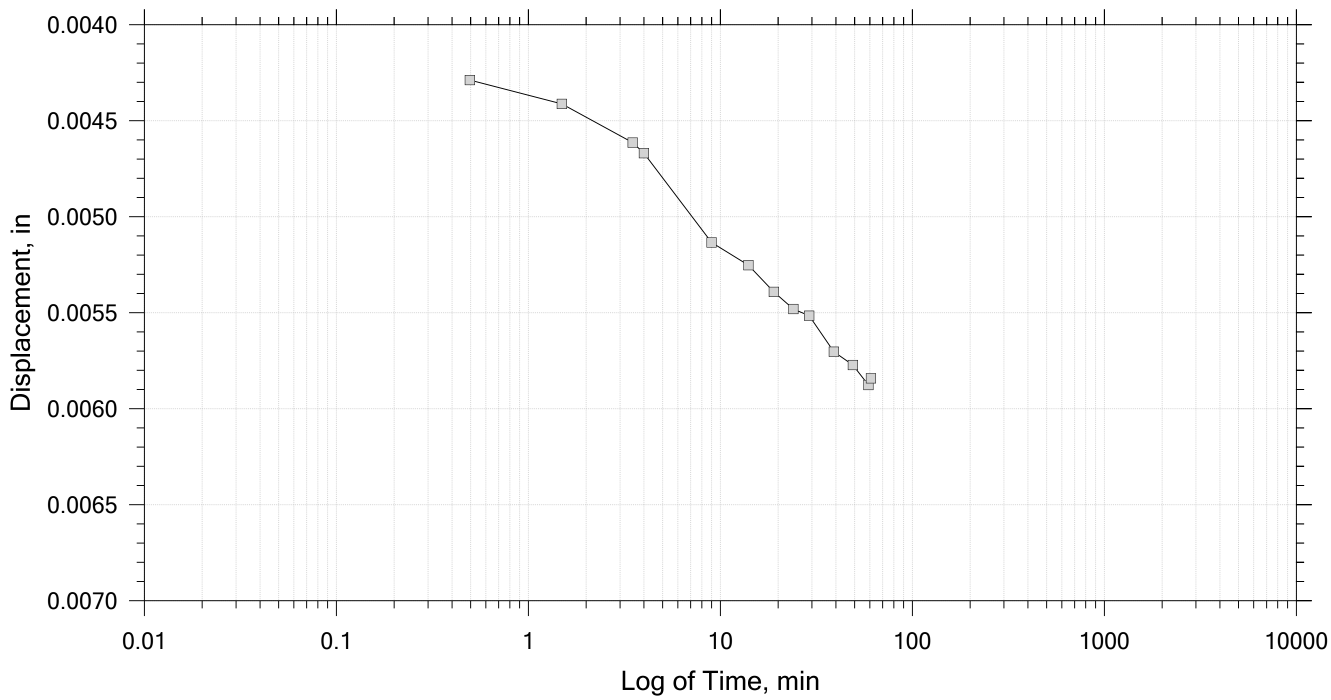
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

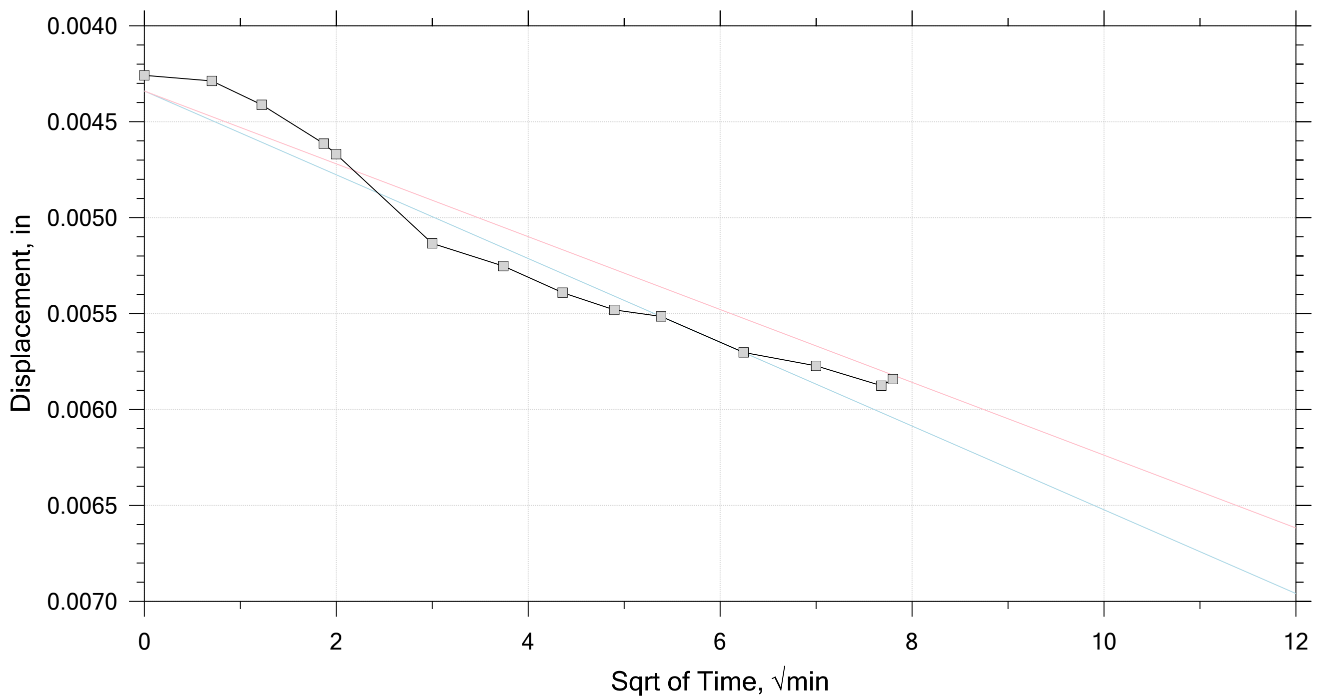
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 25

Constant Load Step

Stress: 450 psf





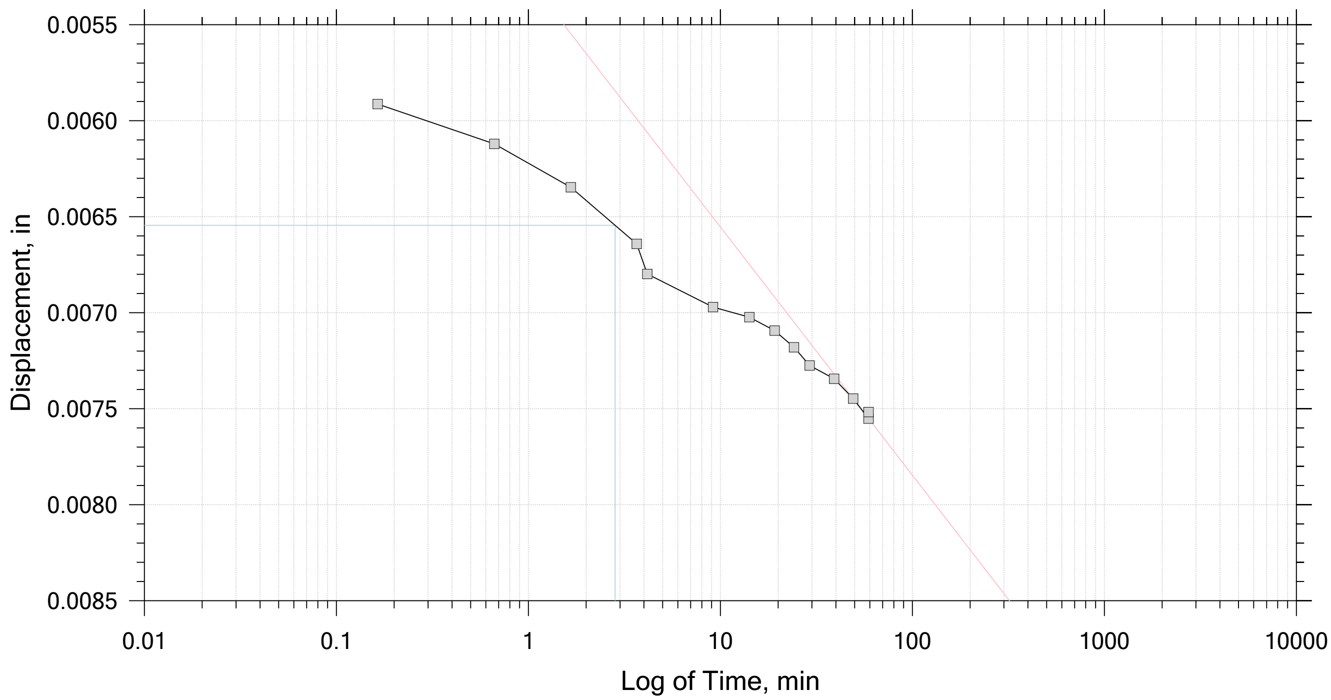
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

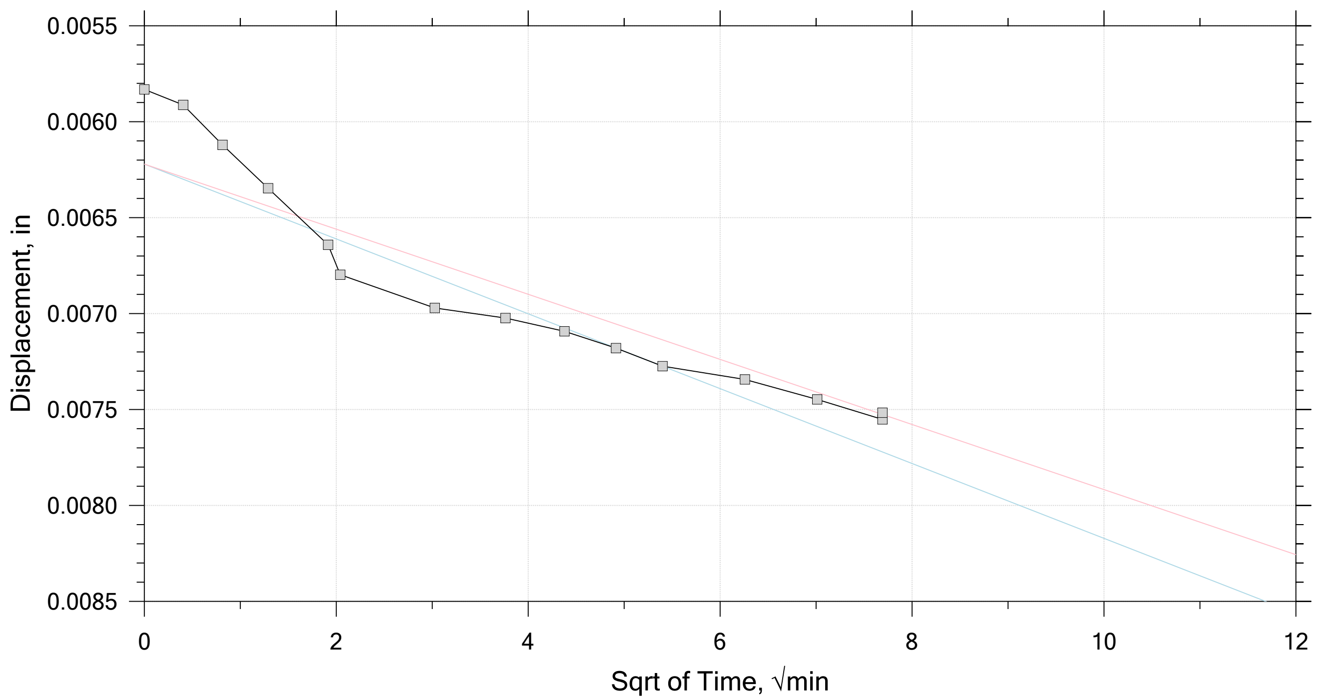
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 25

Constant Load Step

Stress: 675 psf

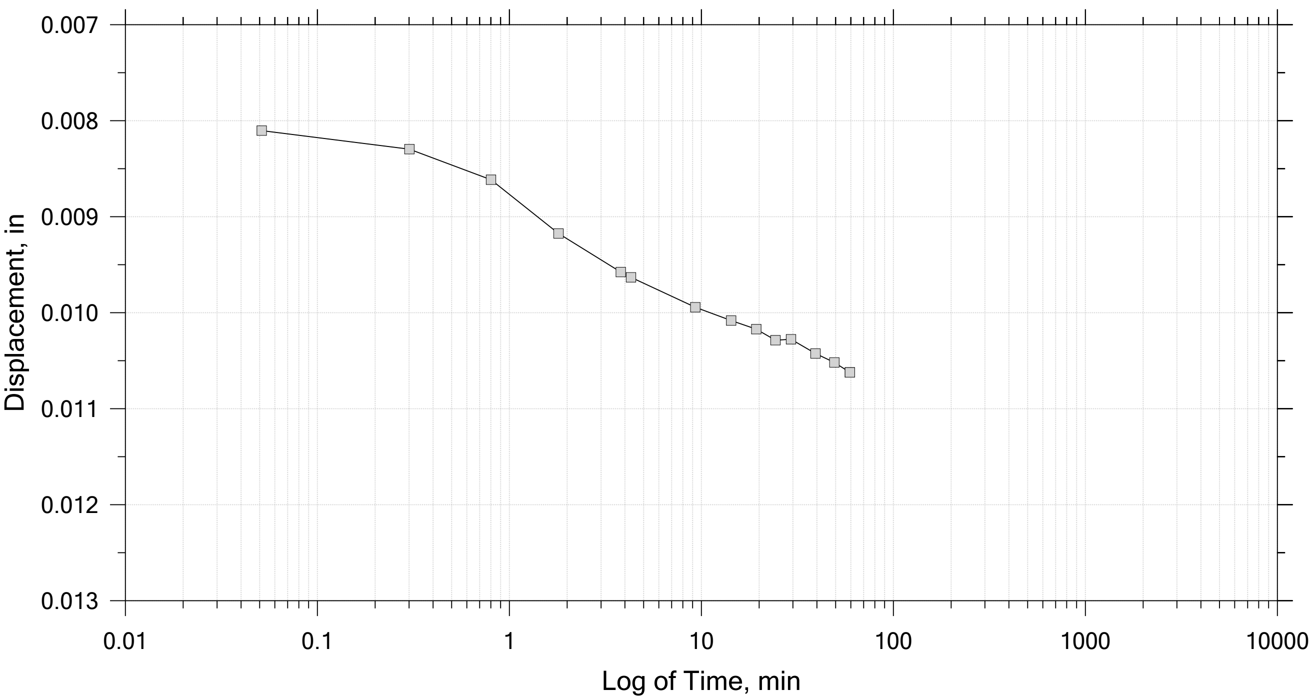


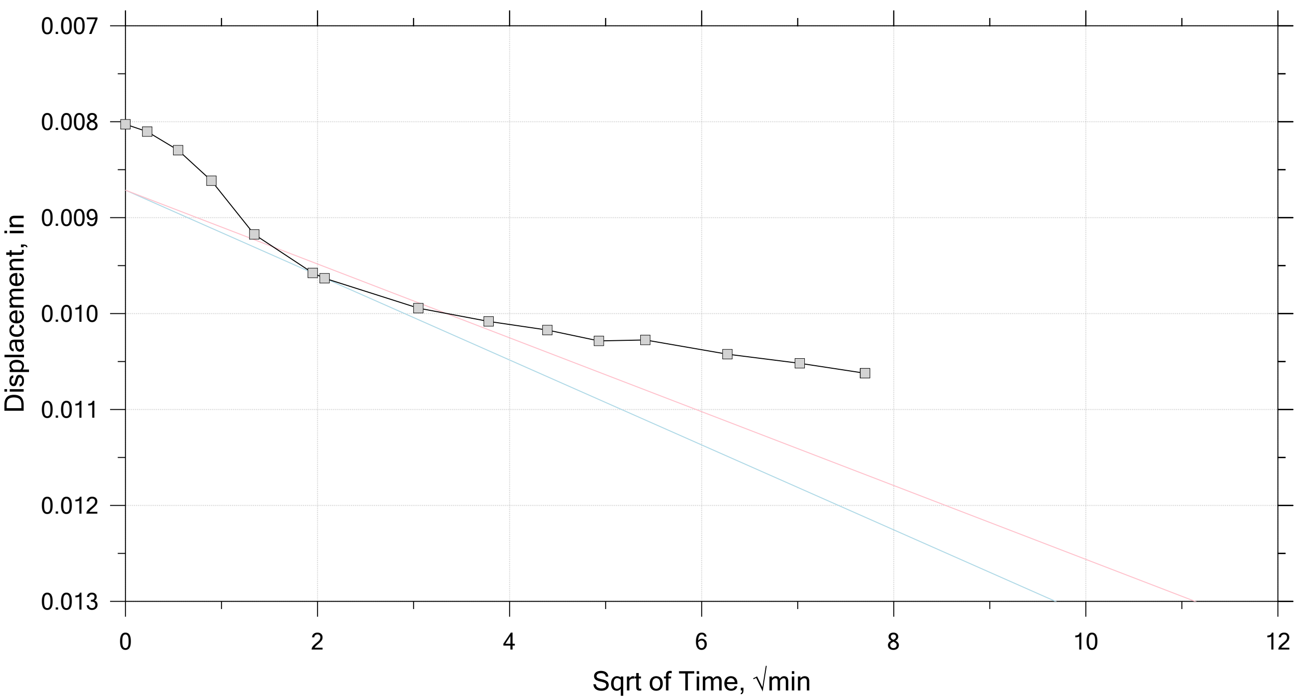


Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 25
Constant Load Step
Stress: 1e+03 psf





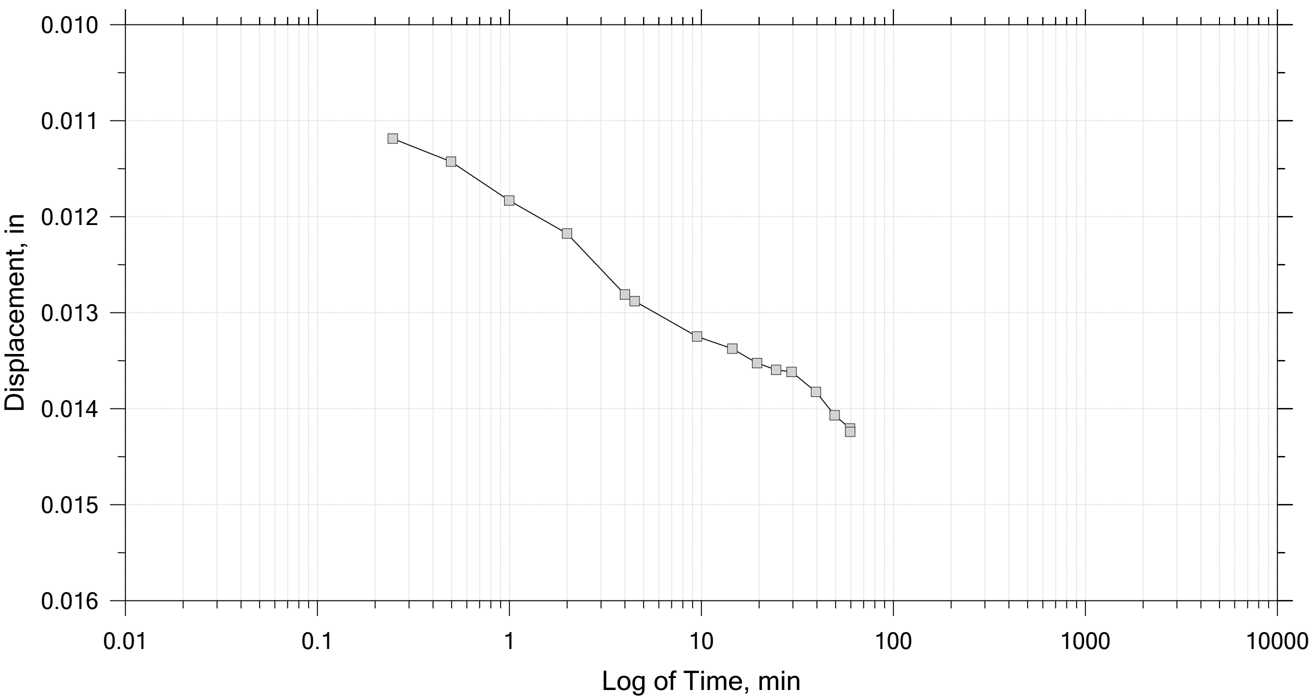
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

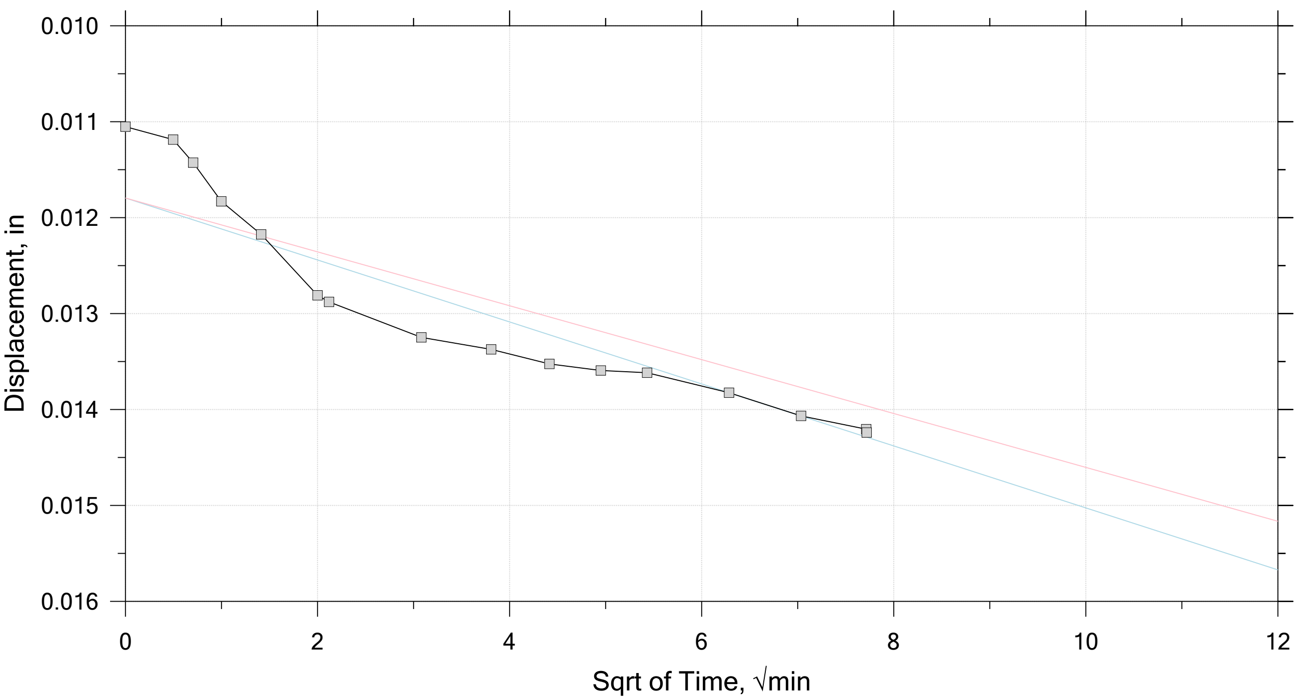
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 25

Constant Load Step

Stress: 1.53e+03 psf





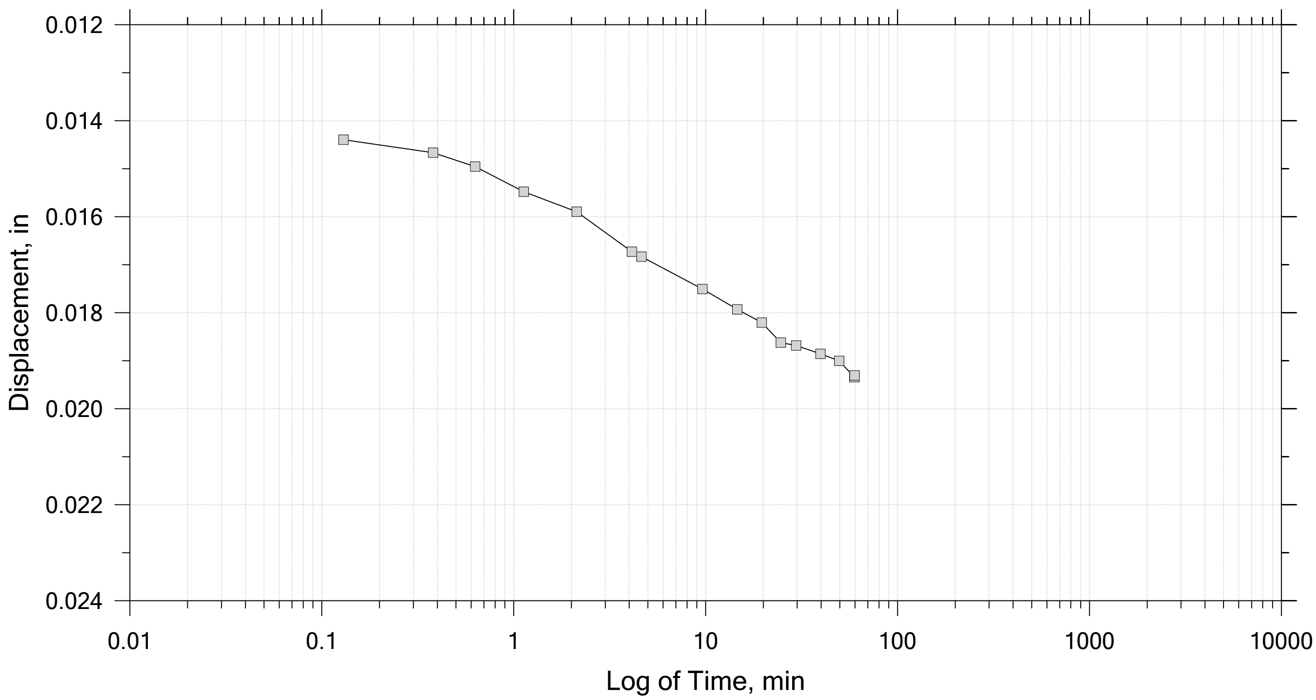
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

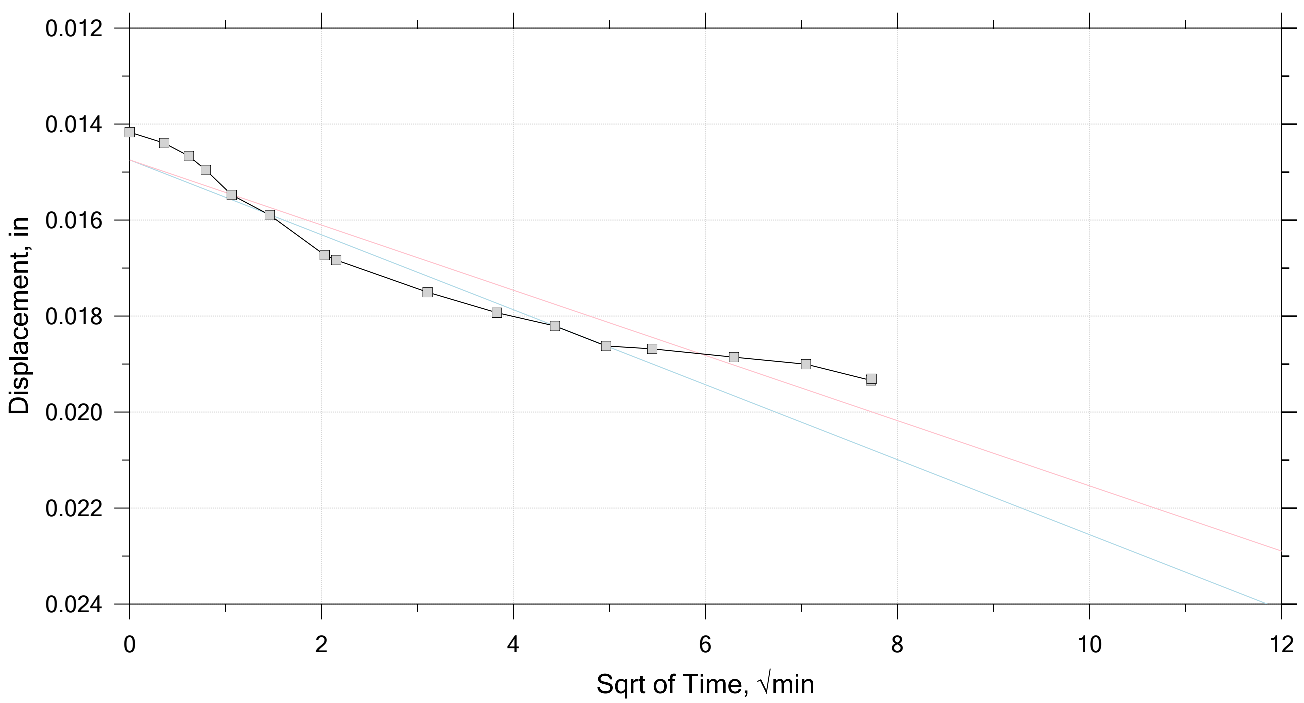
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 25

Constant Load Step

Stress: 2.28e+03 psf

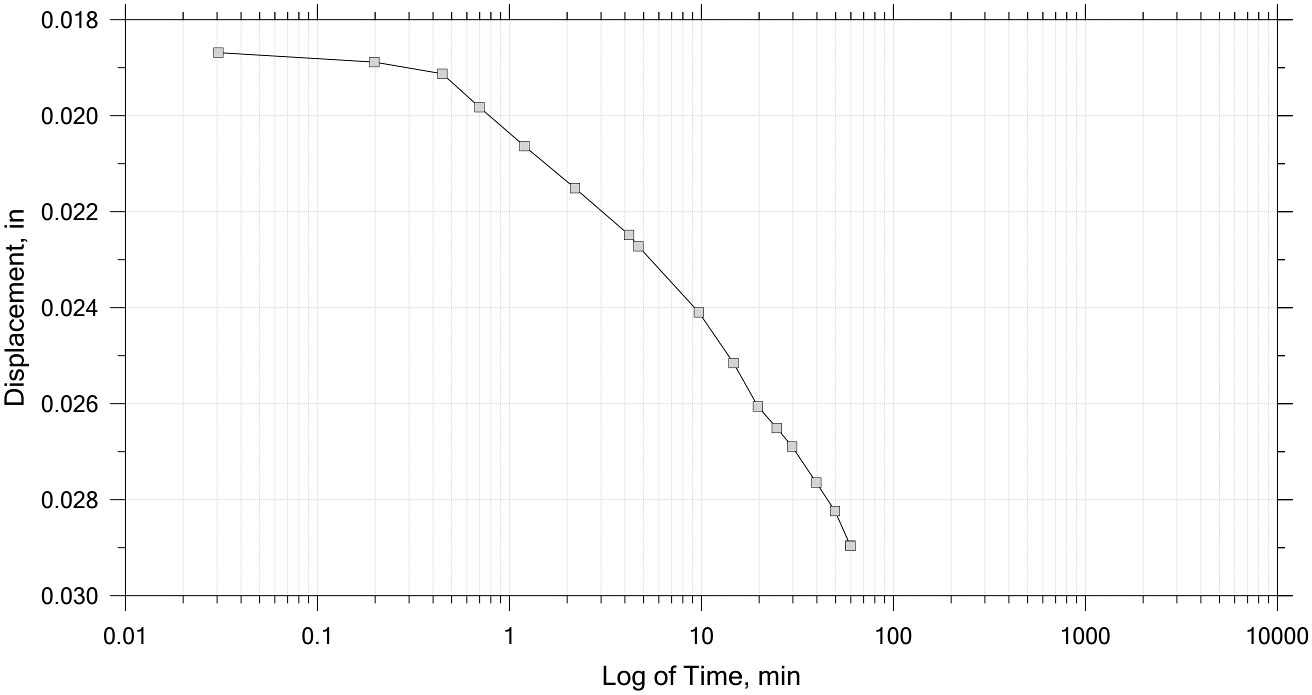


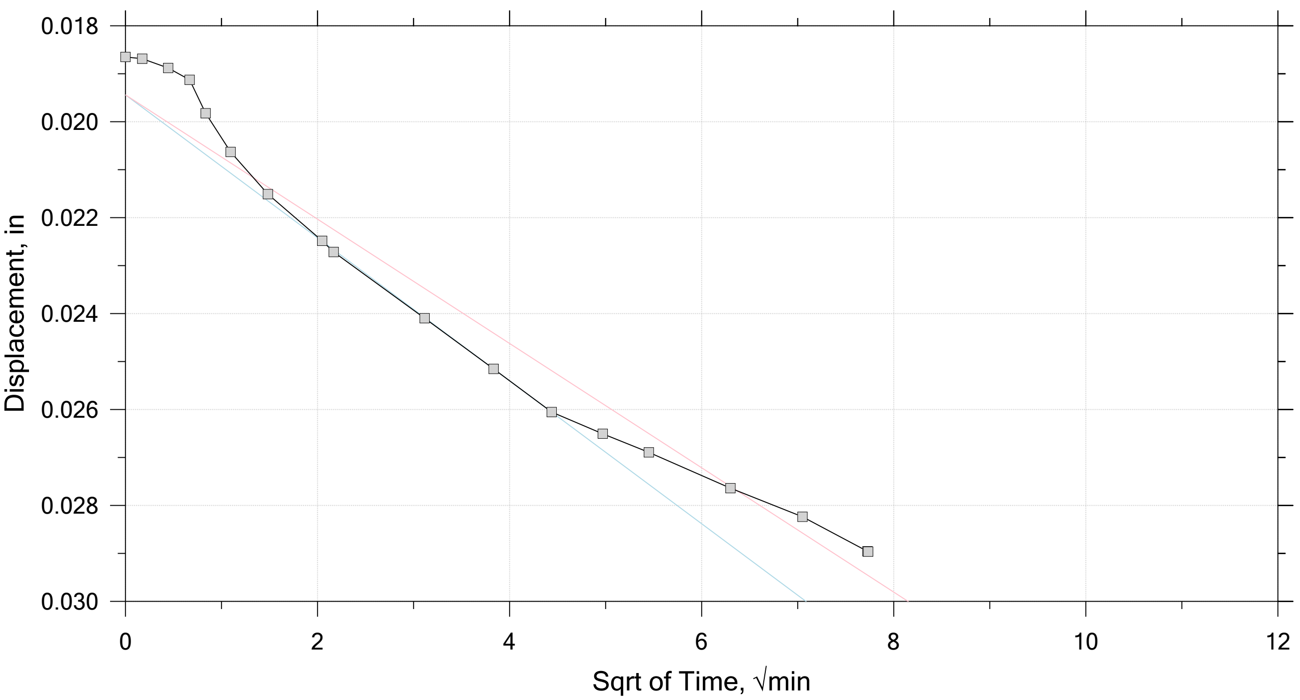


Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 25
Constant Load Step
Stress: 3.4e+03 psf

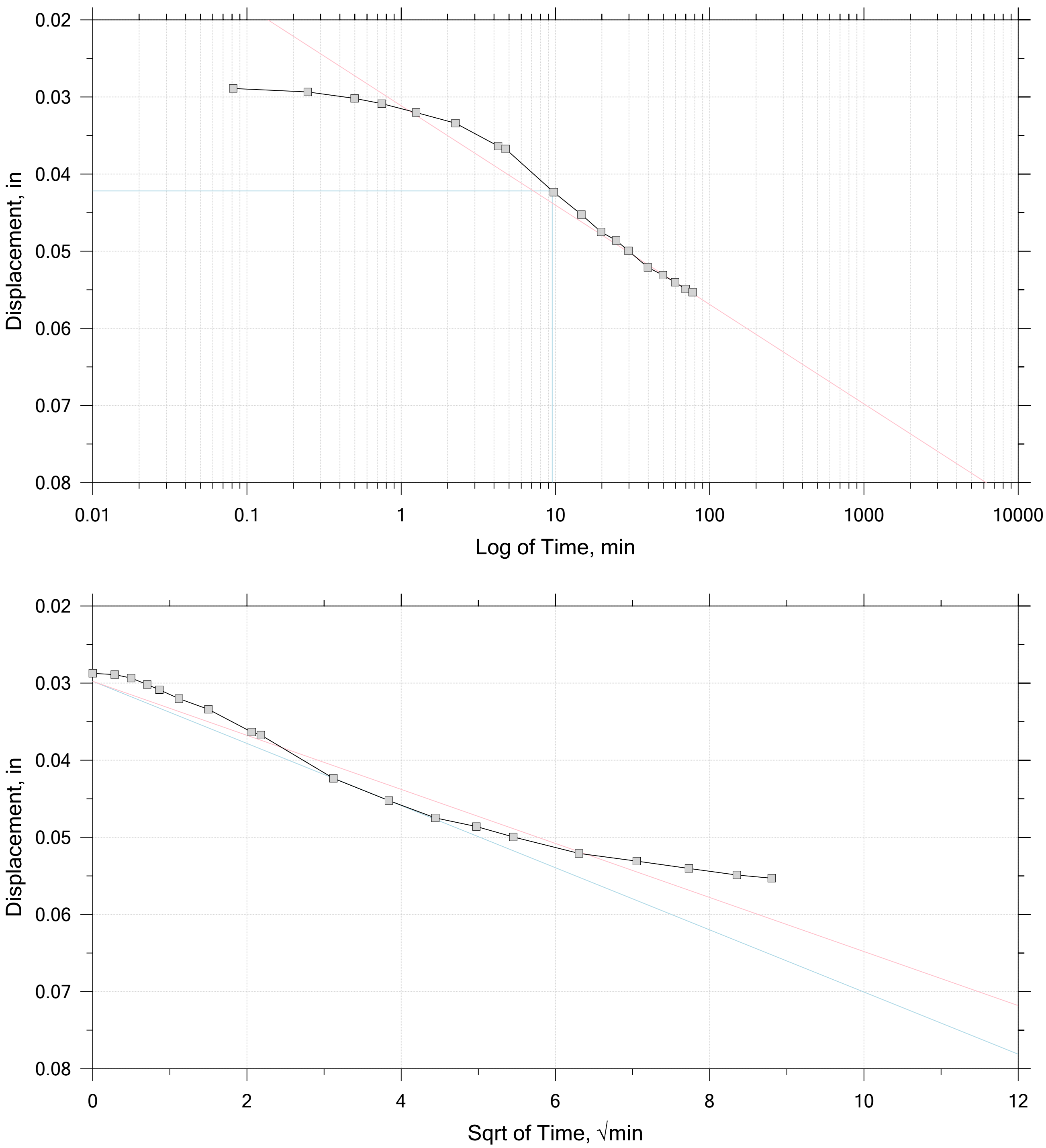




Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 25
Constant Load Step
Stress: 5.2e+03 psf



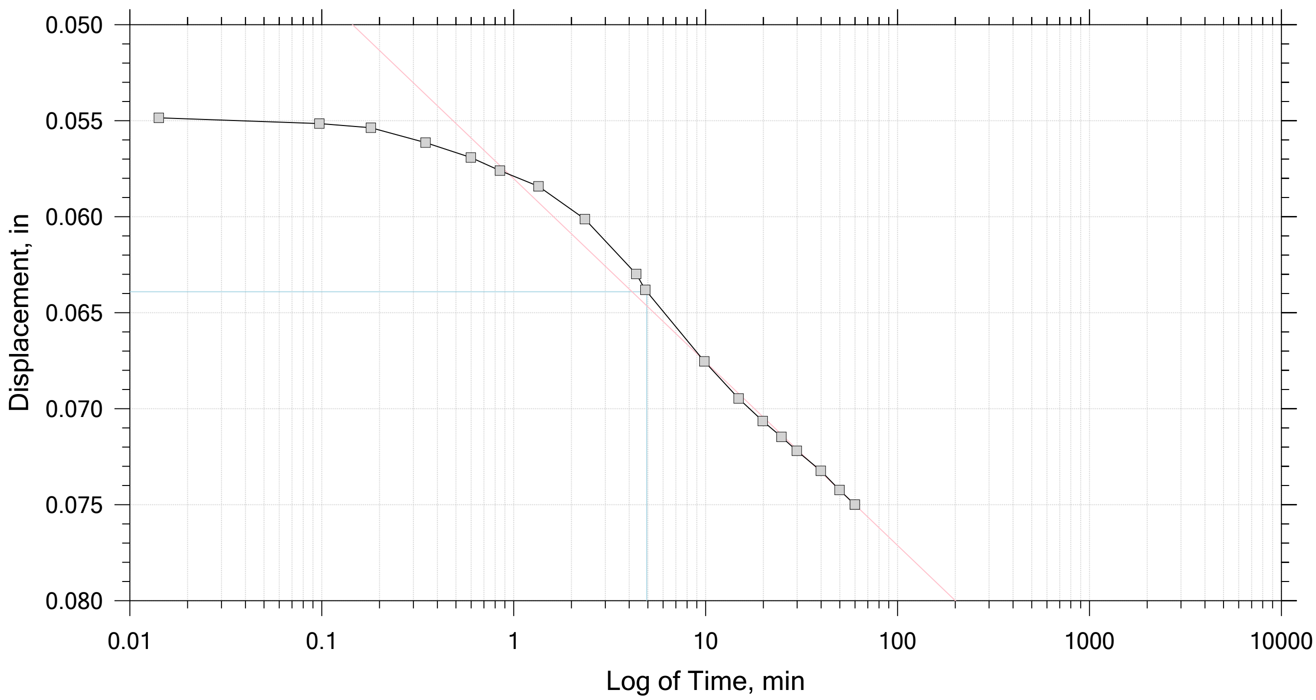
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

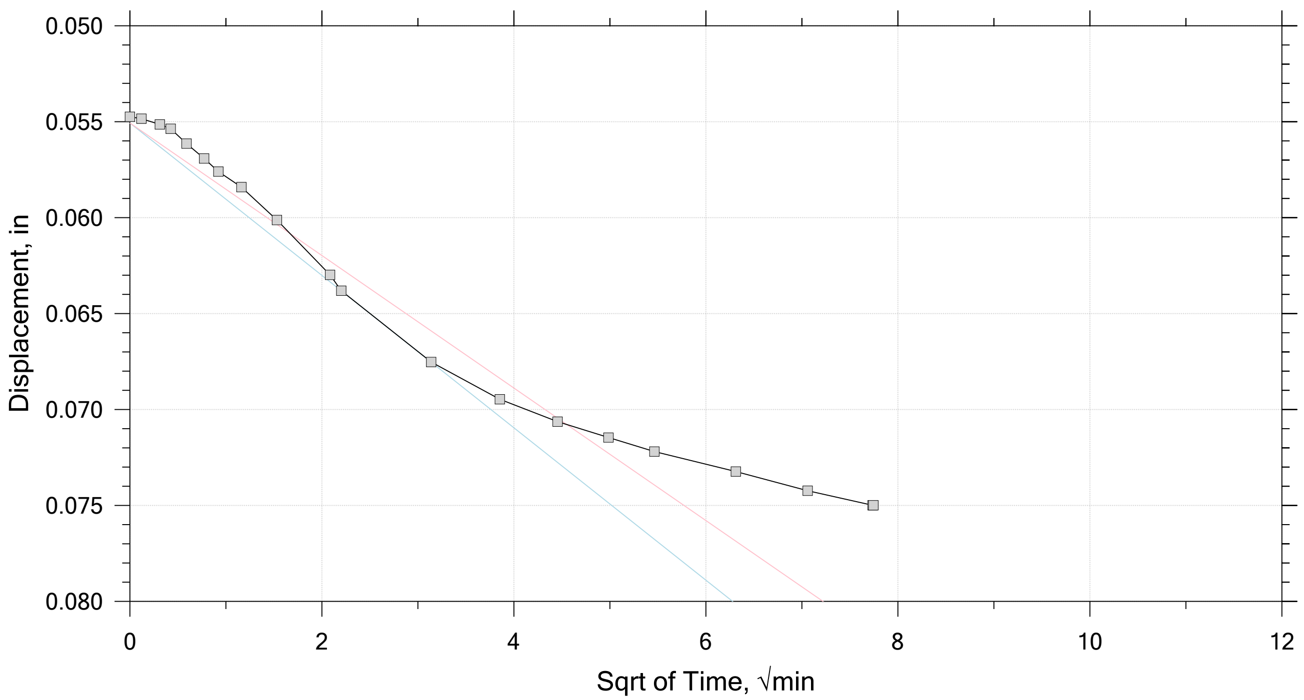
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 25

Constant Load Step

Stress: 7.5e+03 psf





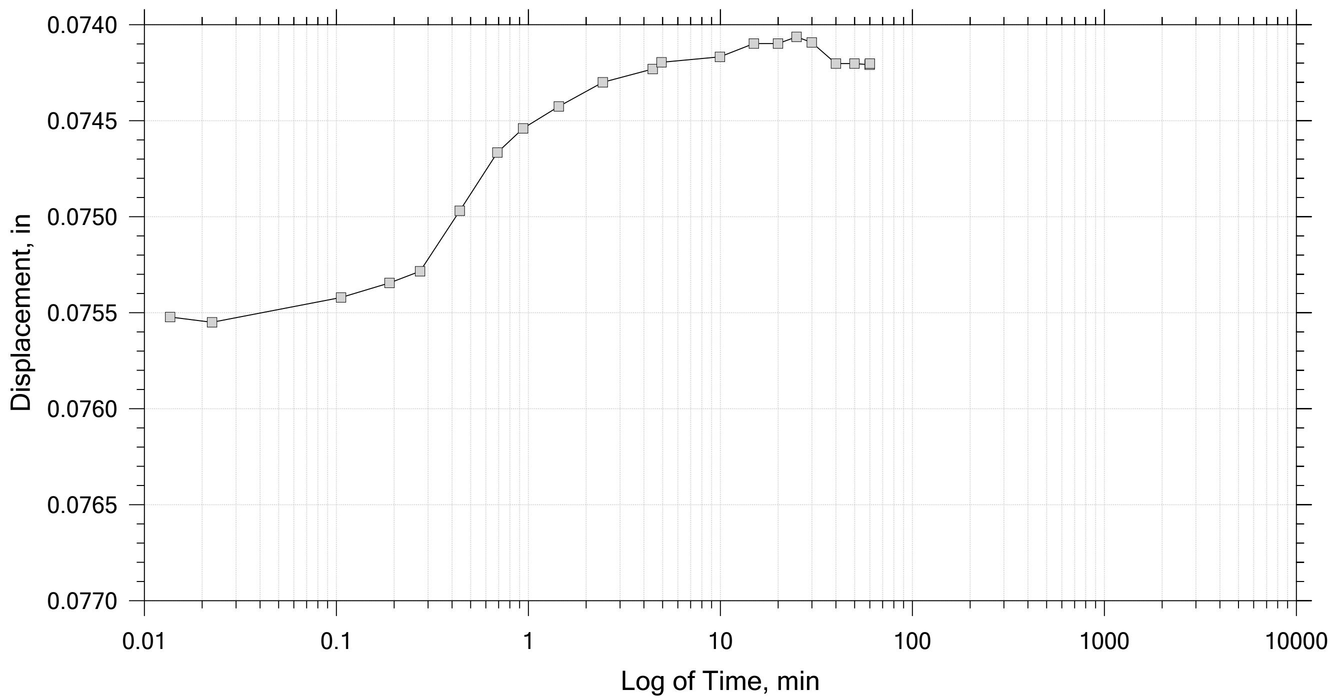
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

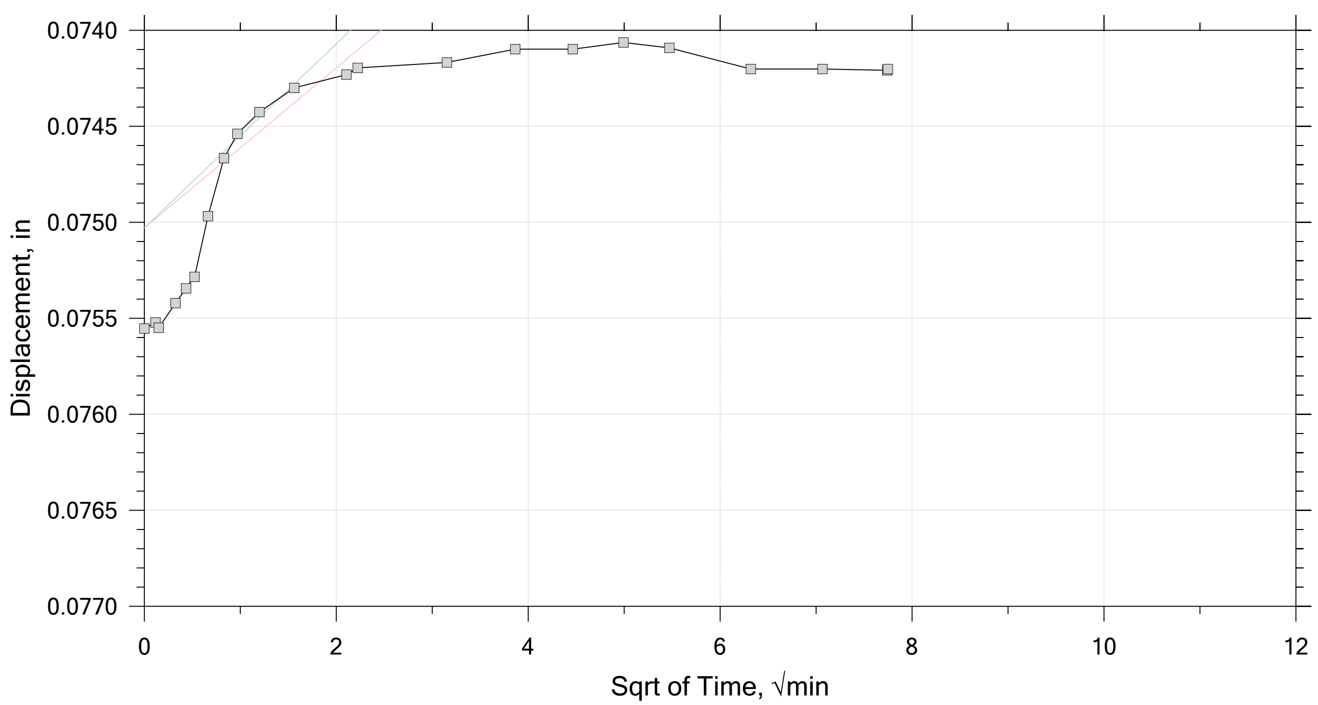
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 25

Constant Load Step

Stress: 3.4e+03 psf





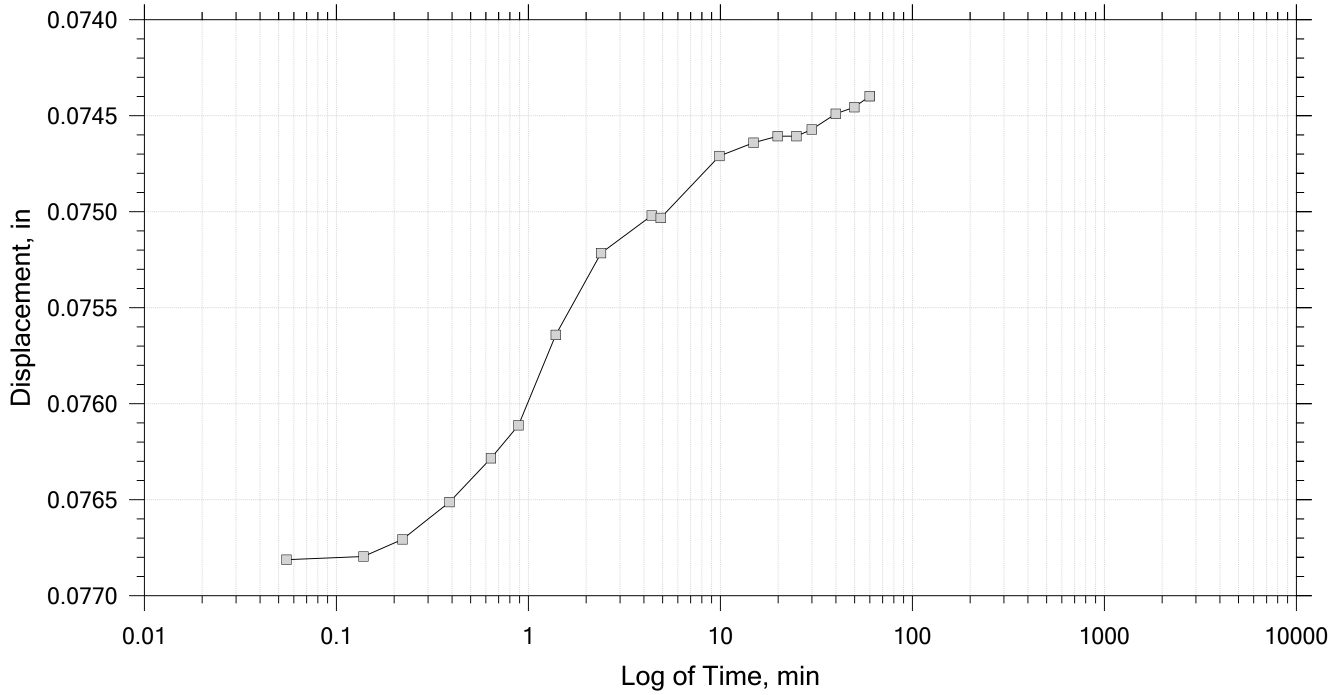
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

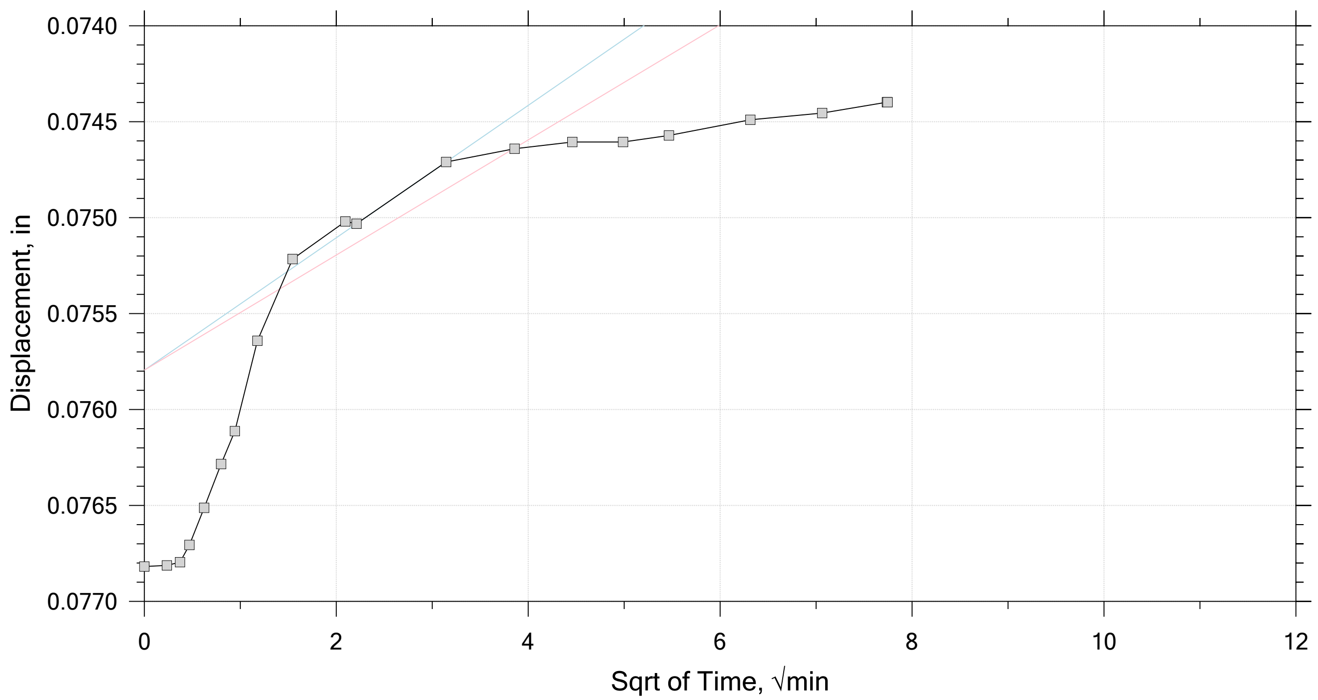
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 25

Constant Load Step

Stress: 1.53e+03 psf

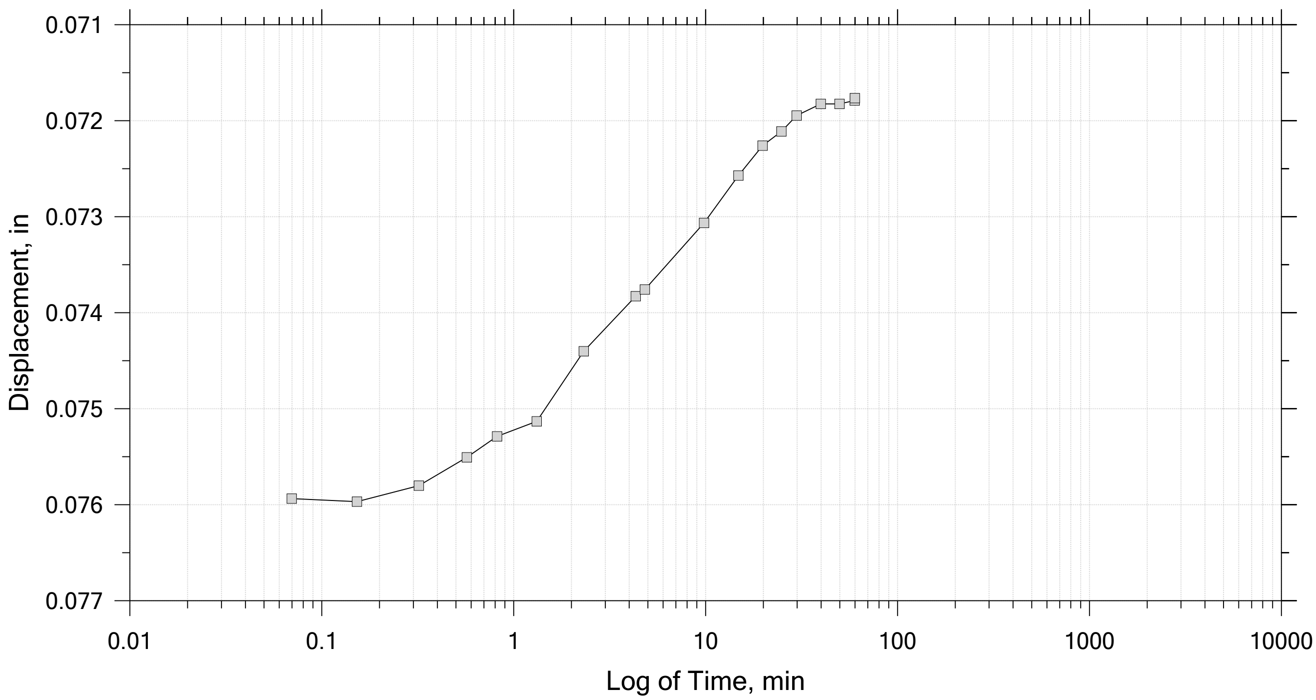


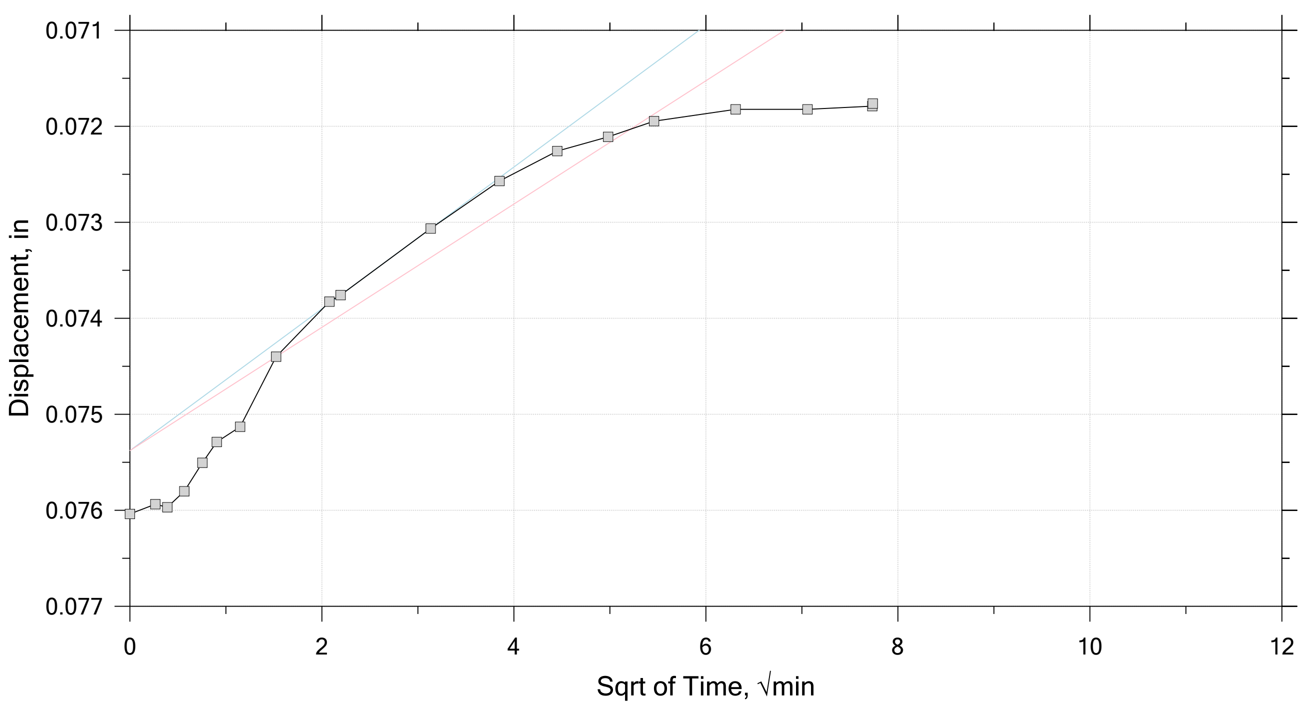


Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 25
Constant Load Step
Stress: 675 psf





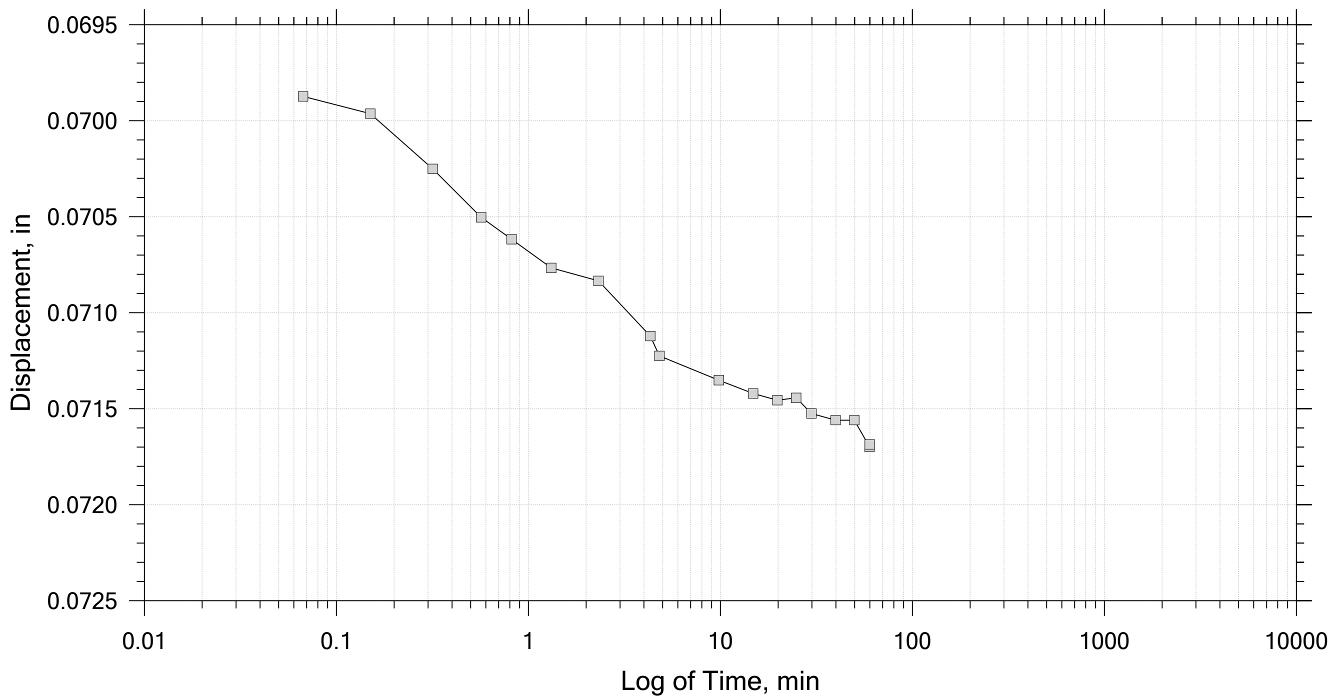
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

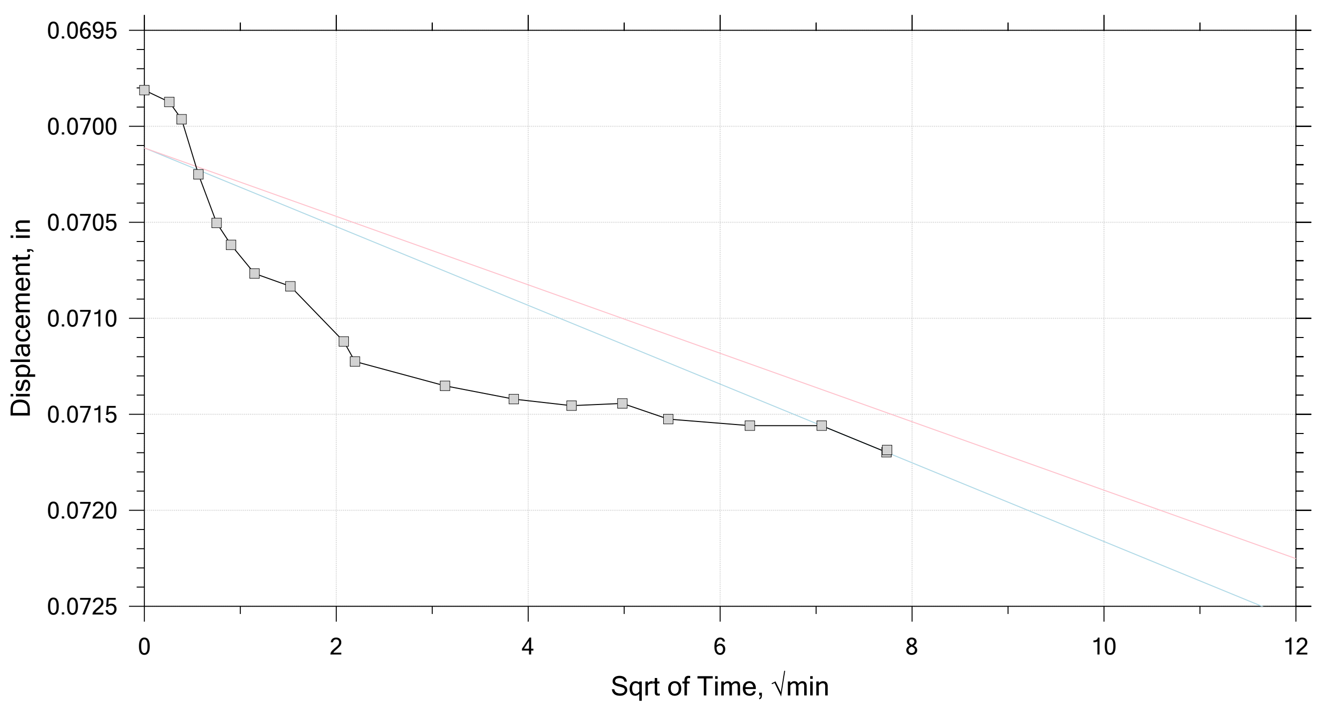
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 25

Constant Load Step

Stress: 1.58e+03 psf

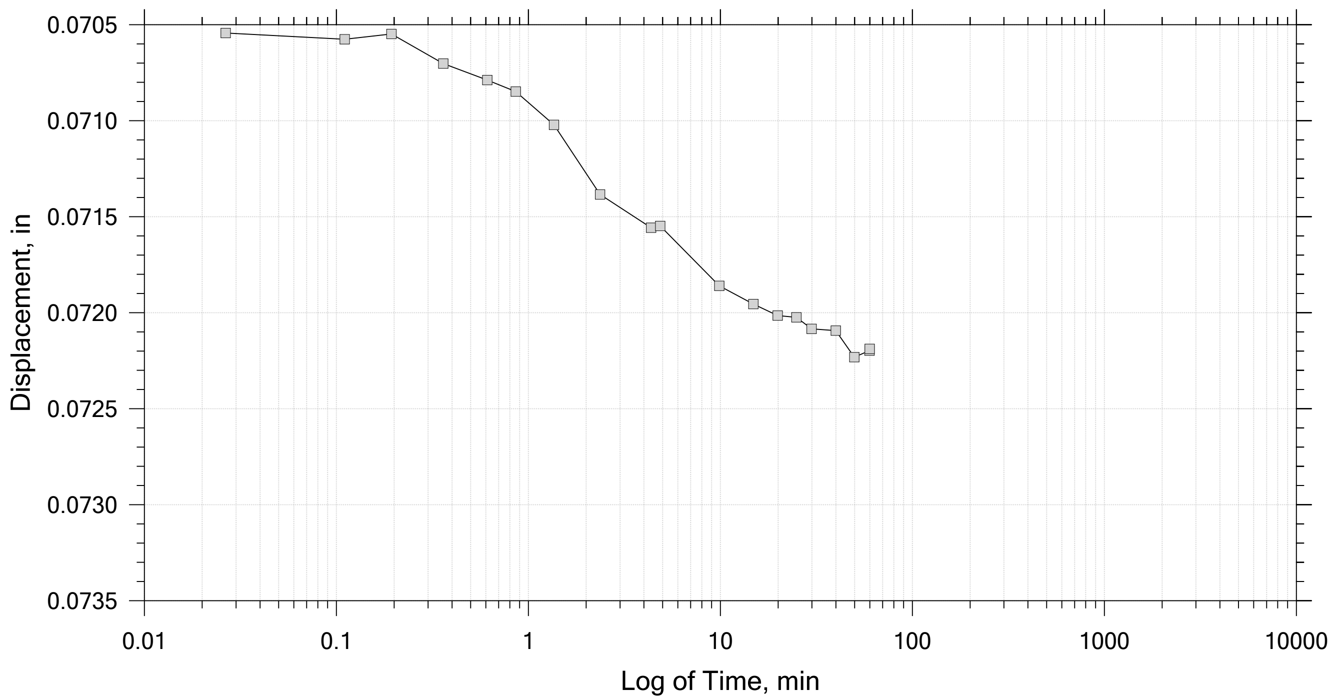


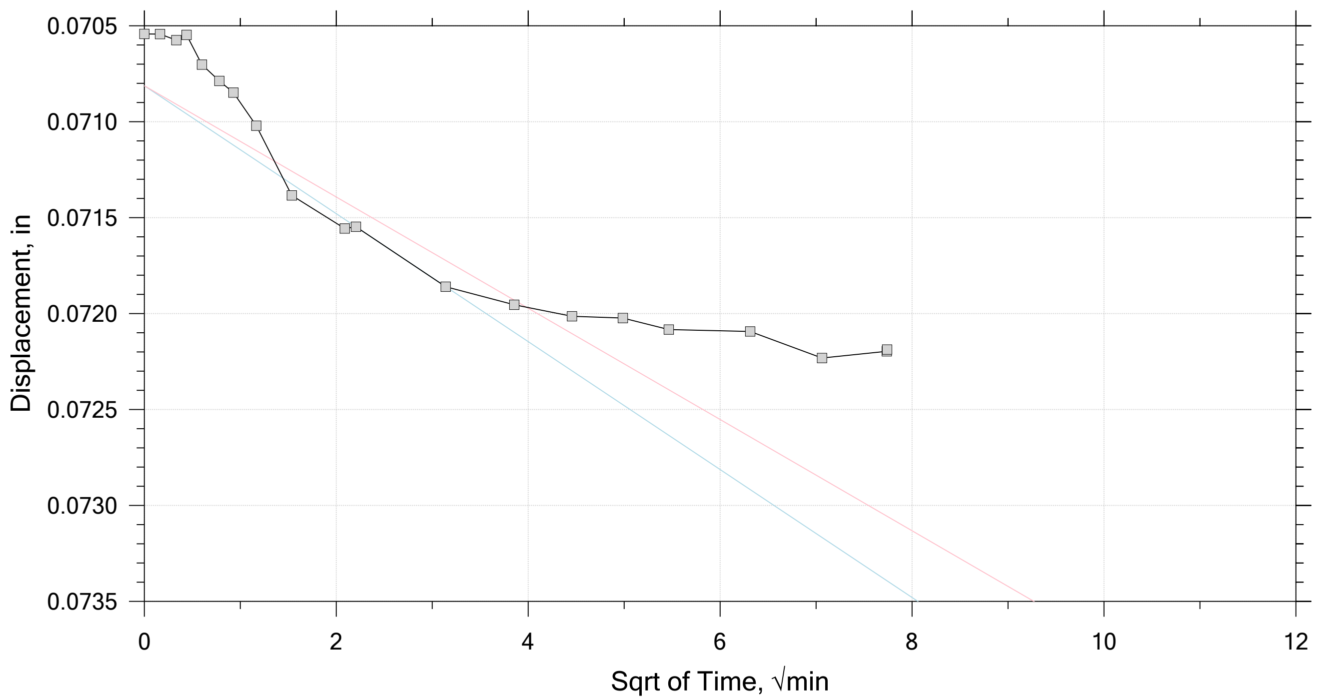


Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 25
Constant Load Step
Stress: 2.28e+03 psf

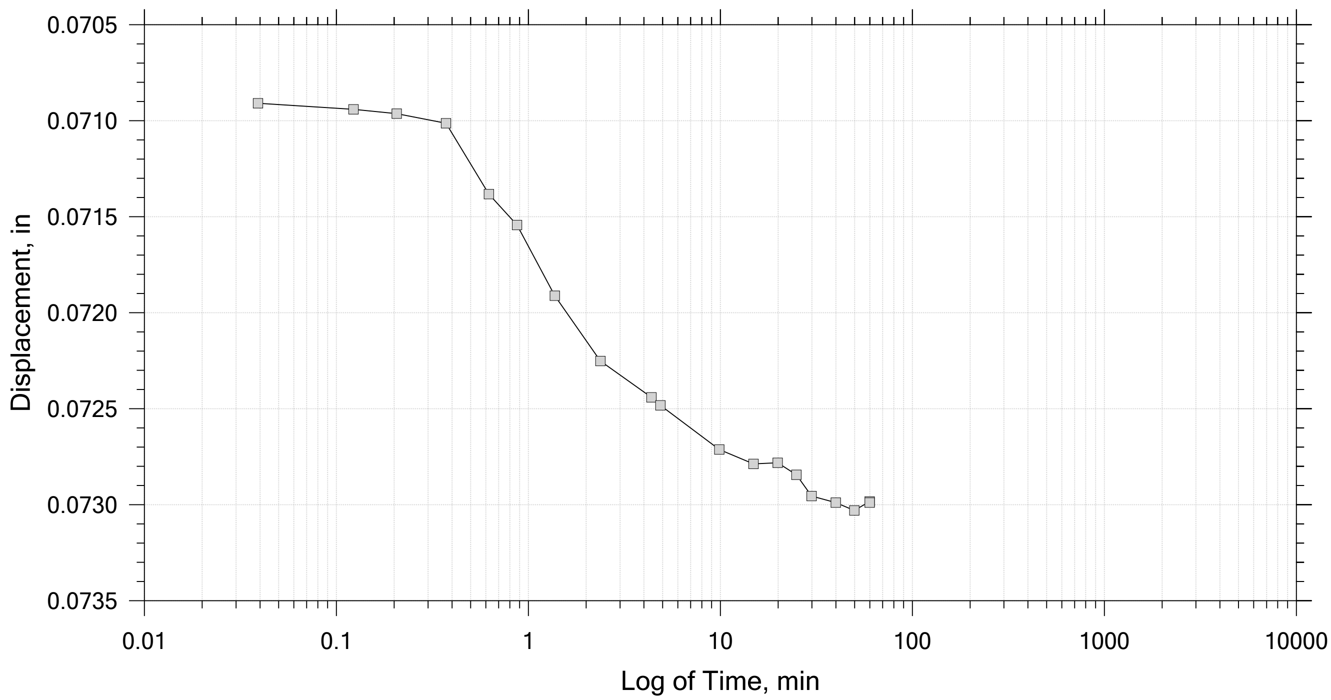


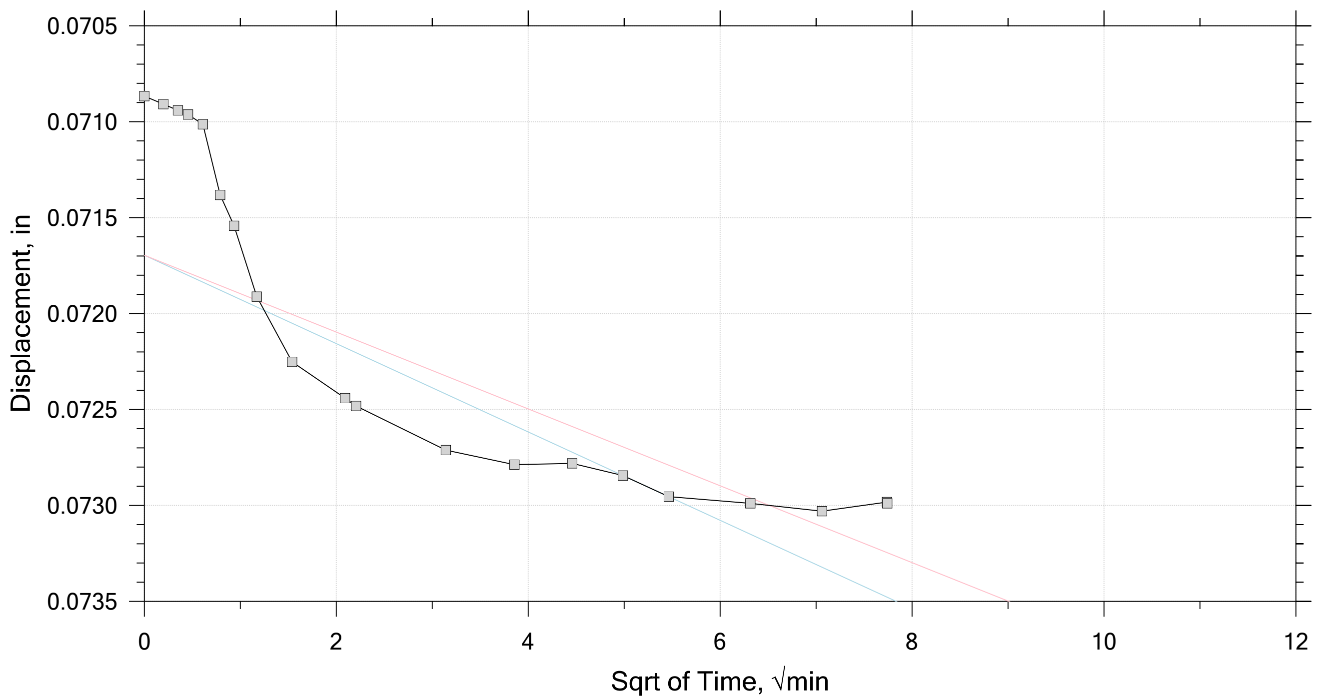


Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 16 of 25
Constant Load Step
Stress: 3.4e+03 psf

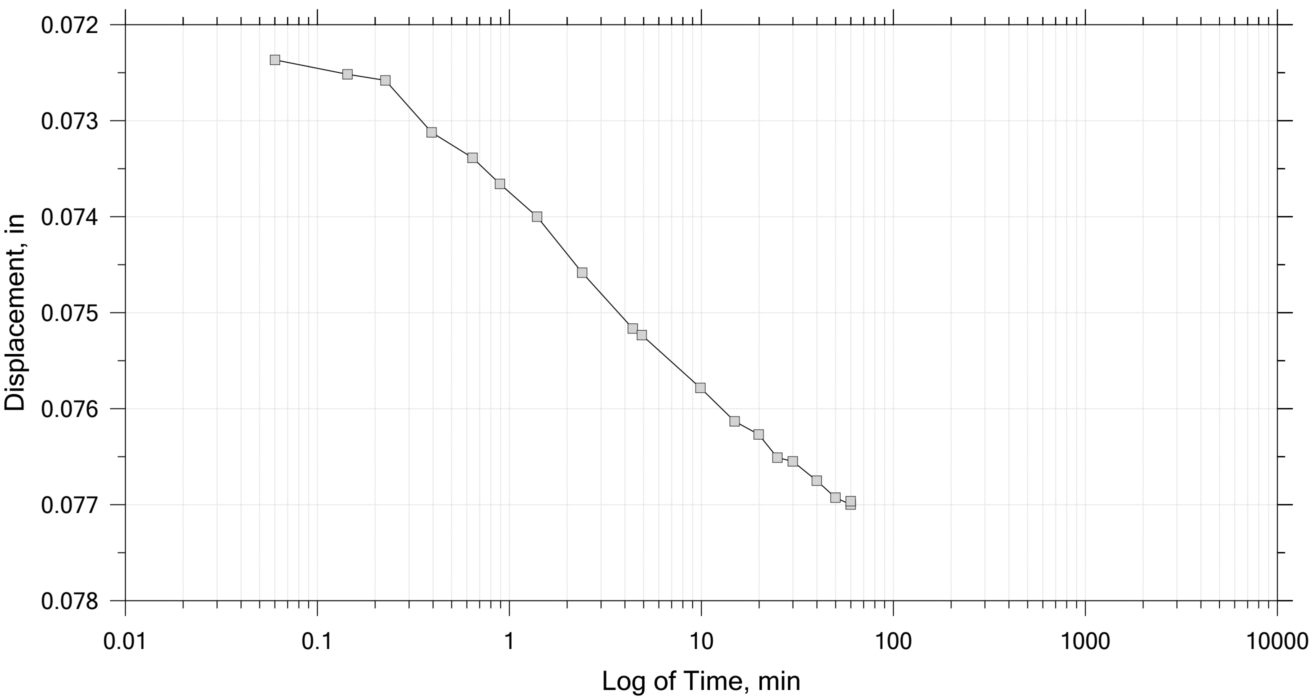


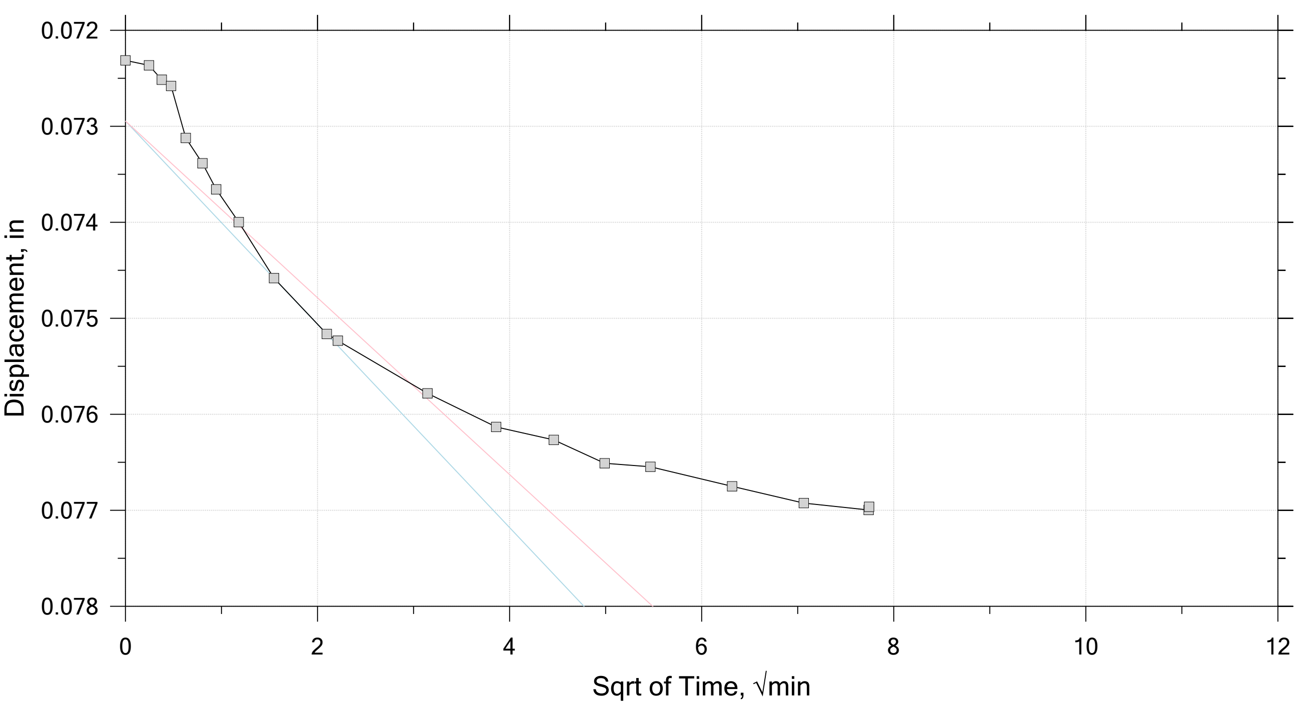


Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 17 of 25
Constant Load Step
Stress: 5.2e+03 psf





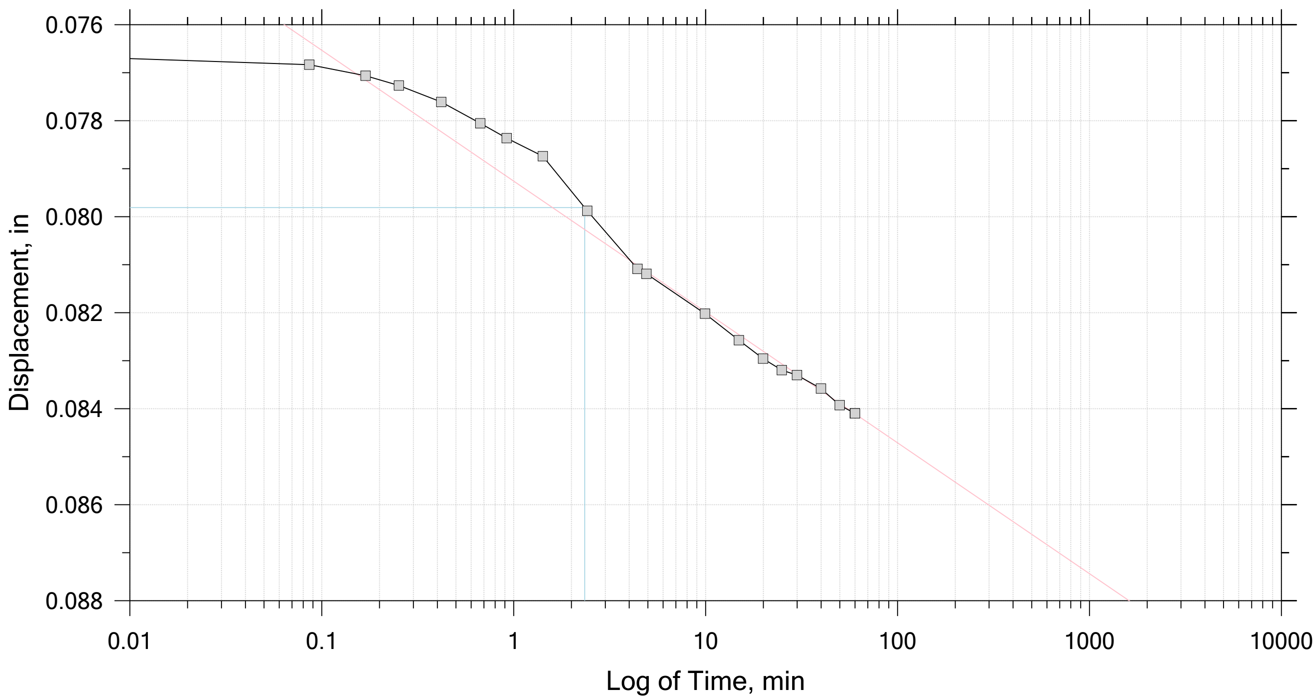
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

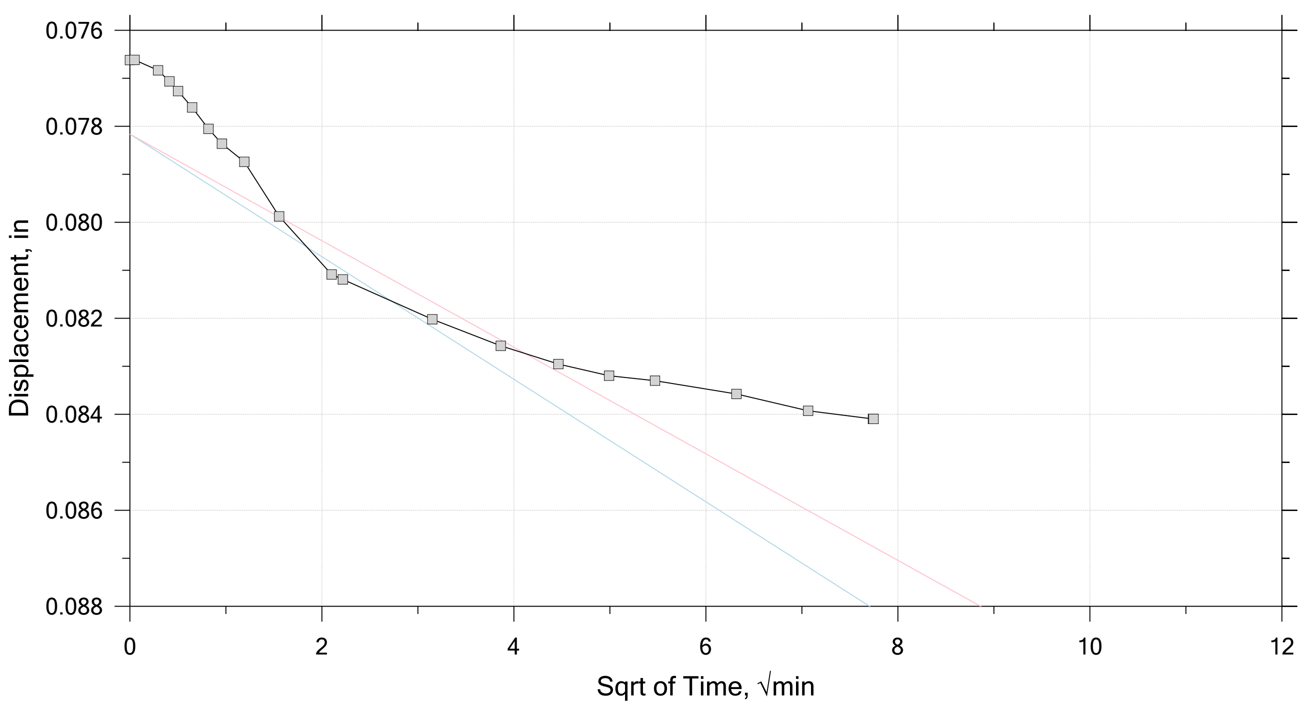
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 18 of 25

Constant Load Step

Stress: 7.5e+03 psf





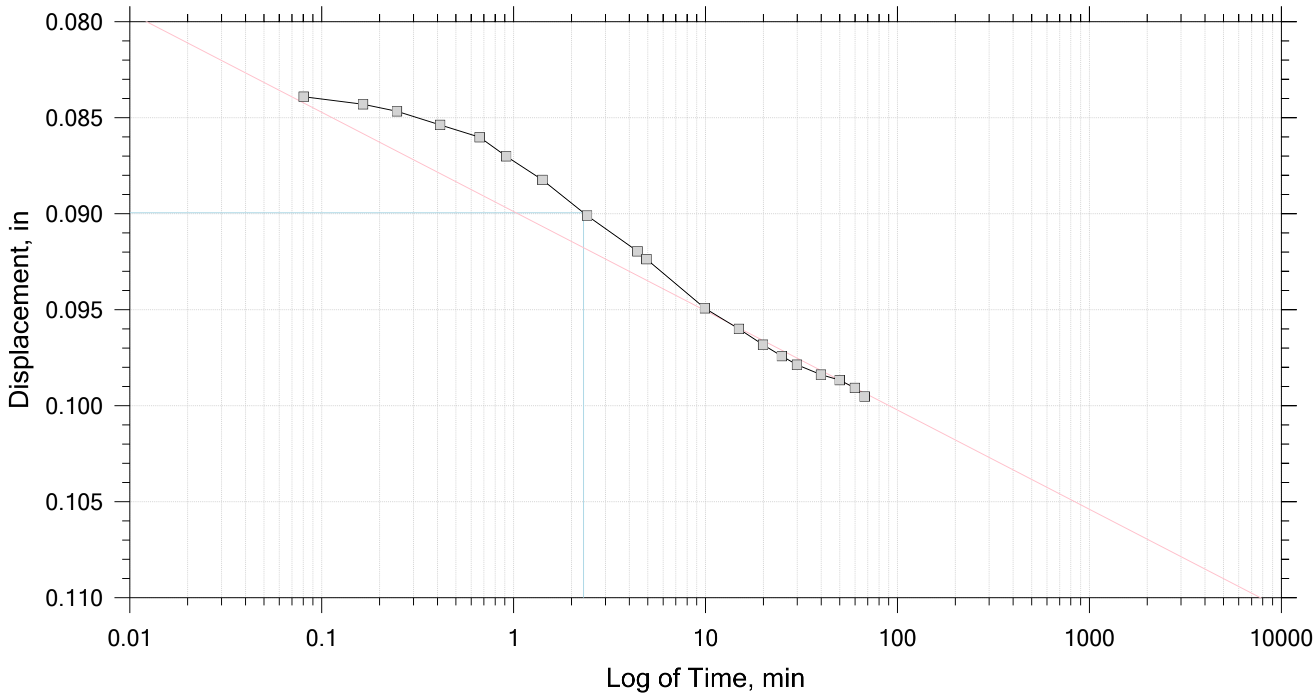
Project Name: Kennebec River Est. Restoratio	Location: Woolwich, ME	Project Number: 166-13
Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
Description: GraySsilty Clay		
Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

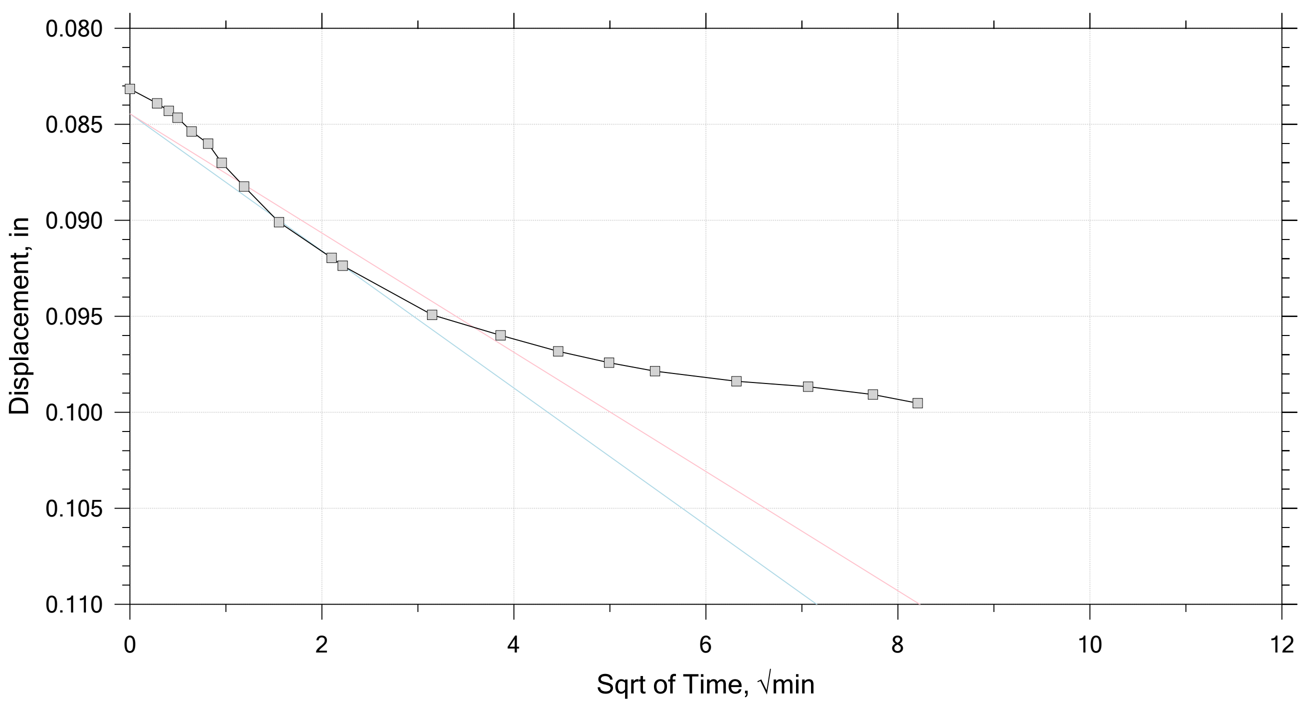
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 19 of 25

Constant Load Step

Stress: 1.15e+04 psf

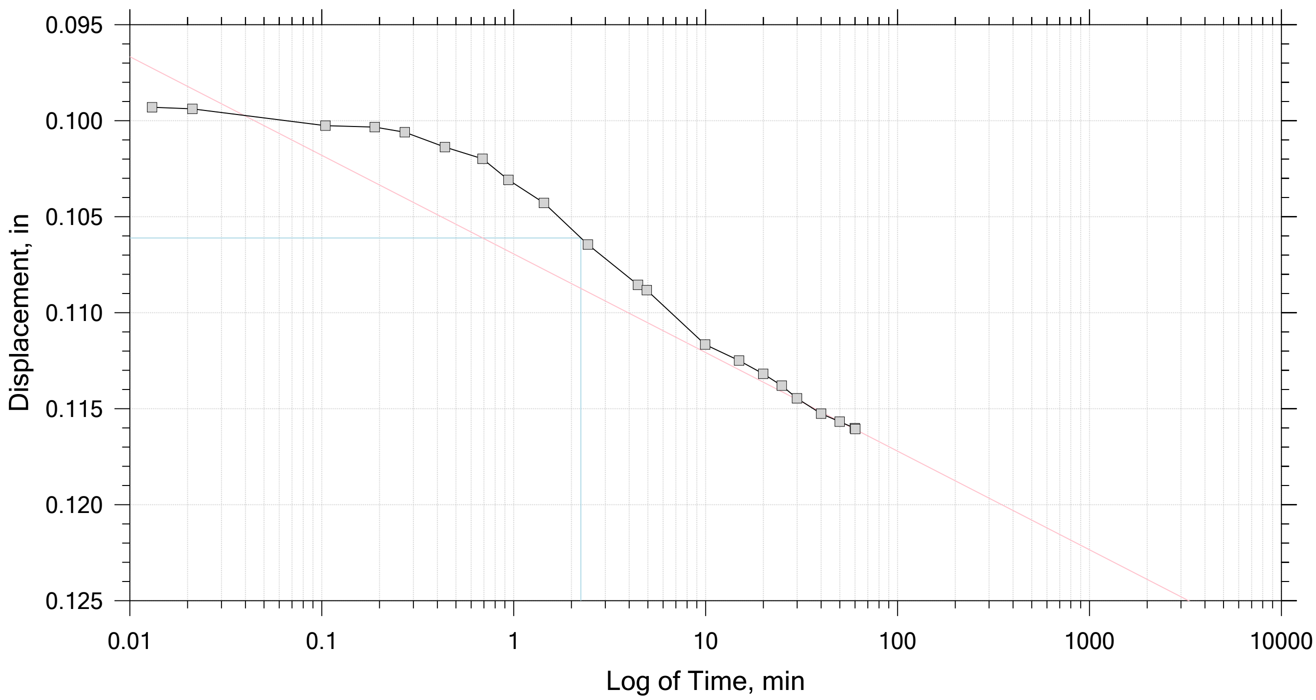


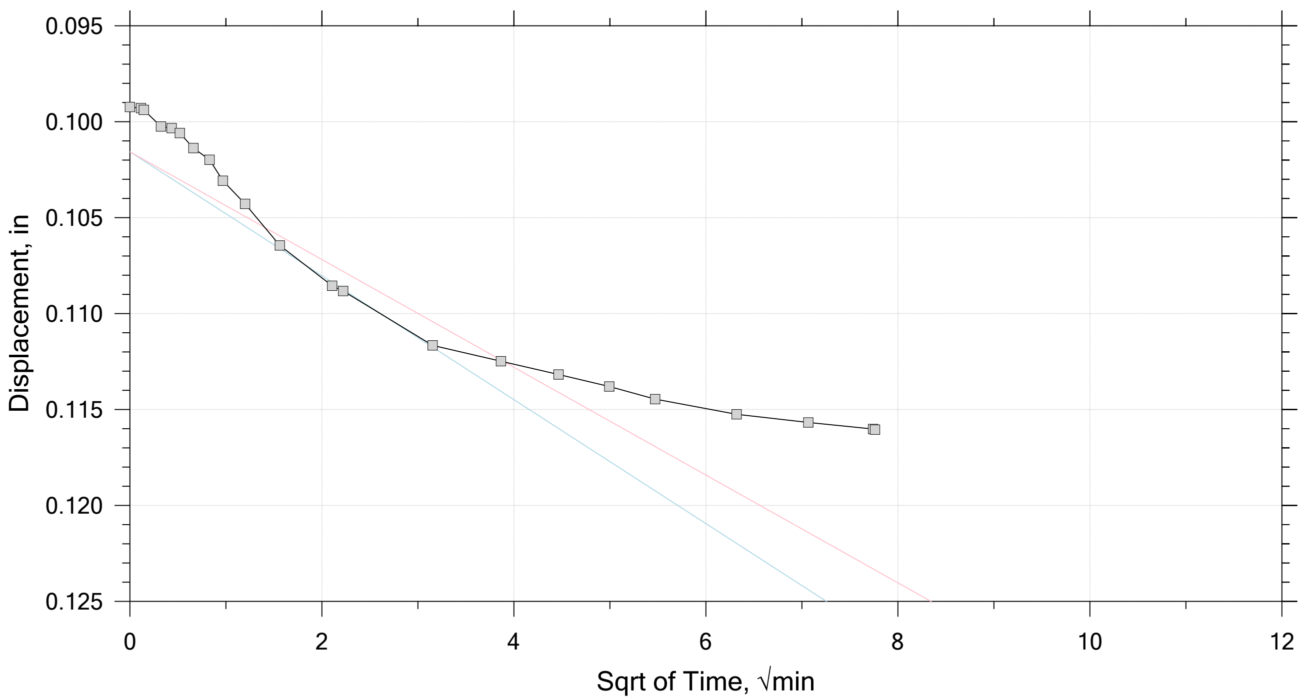


Project Name: Kennebec River Est. Restoratio	Location: Woolwich, ME	Project Number: 166-13
Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
Description: GraySsilty Clay		
Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 20 of 25
Constant Load Step
Stress: 1.73e+04 psf





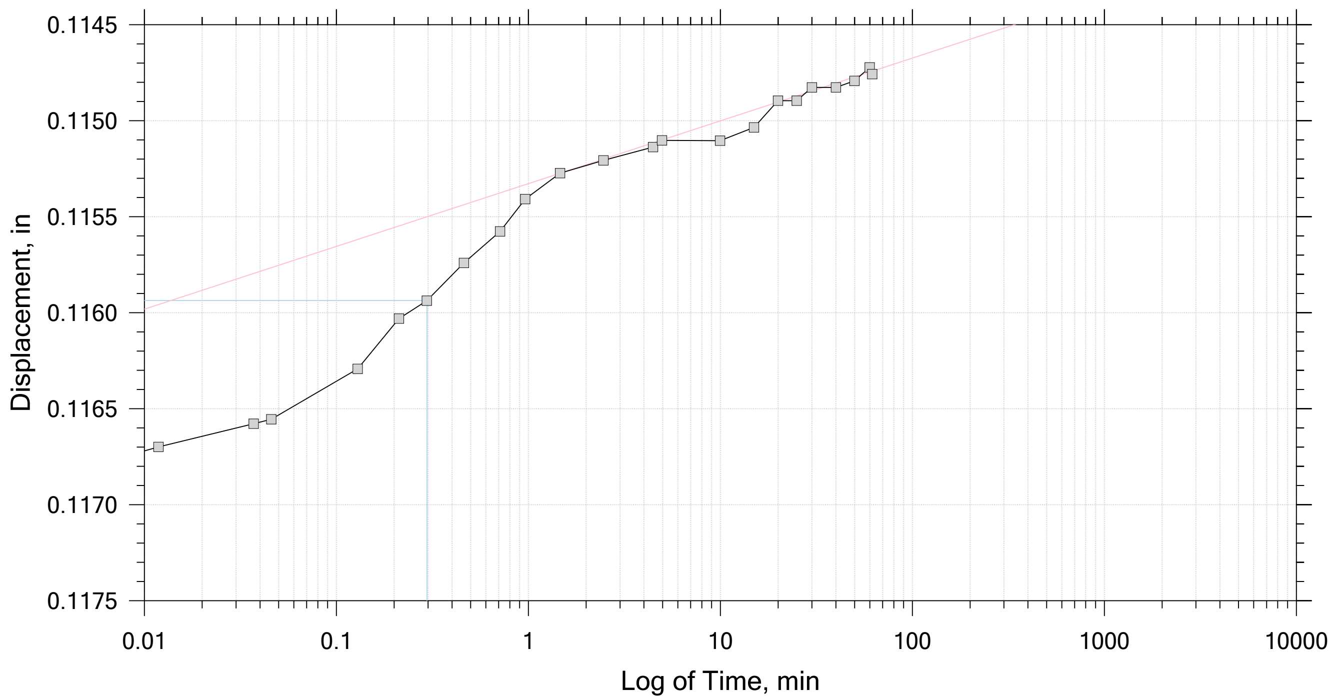
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

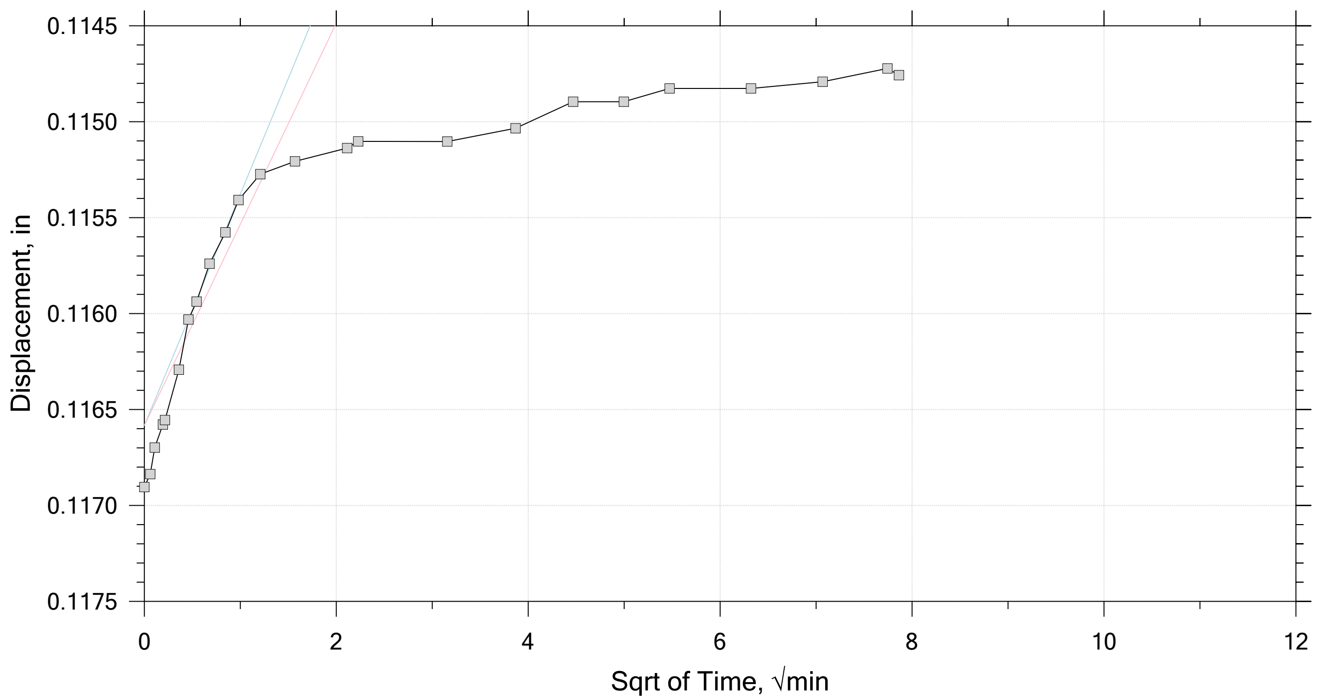
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 21 of 25

Constant Load Step

Stress: 7.5e+03 psf

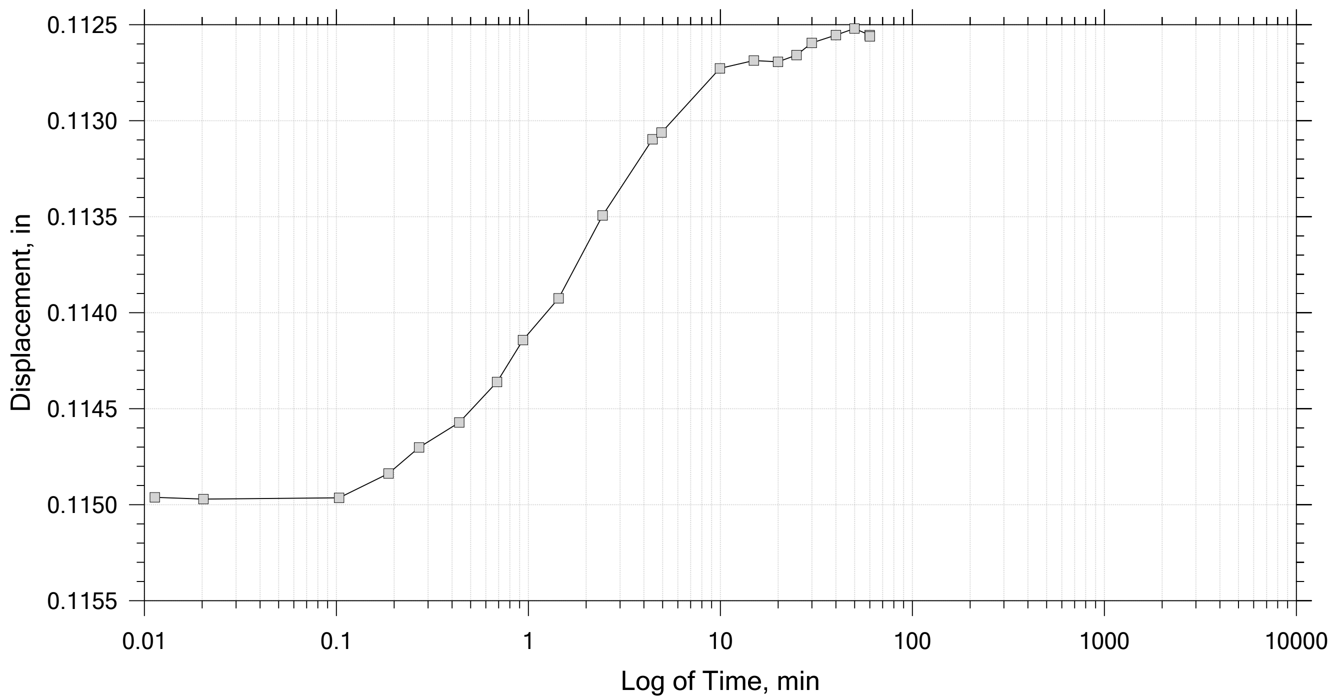


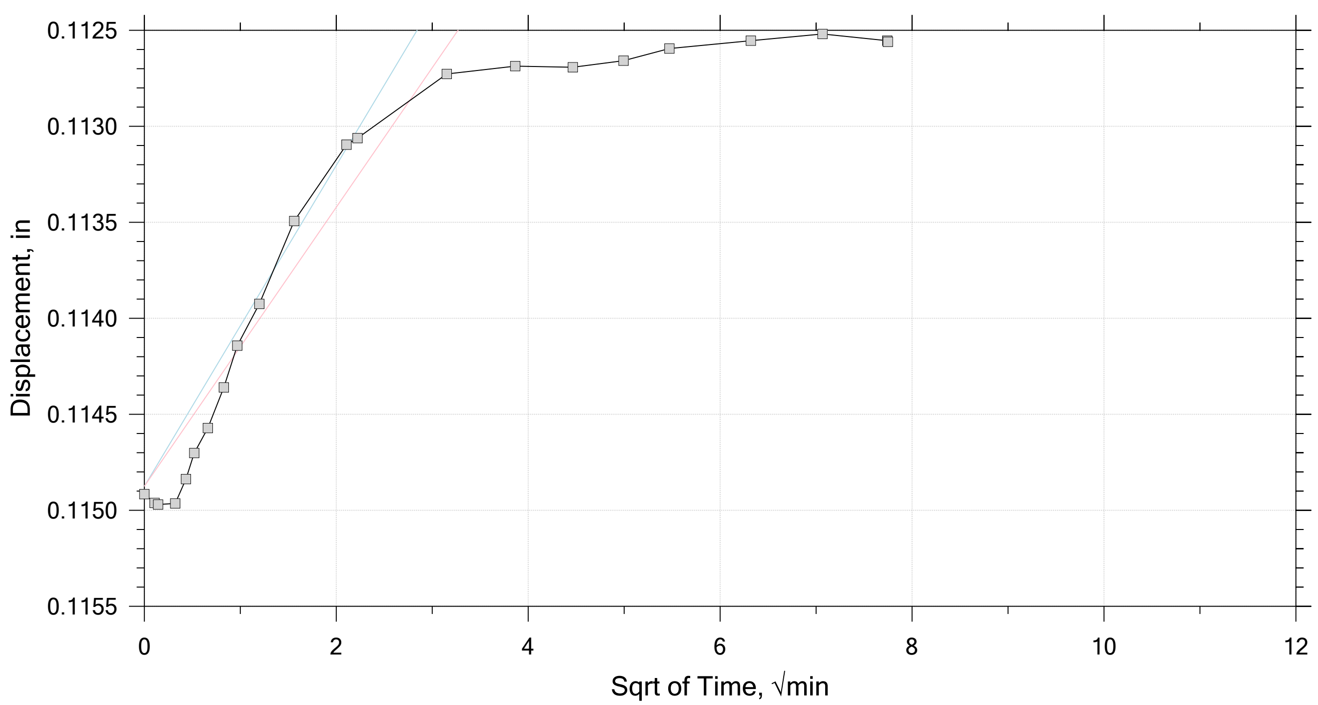


Soil Metrics LLC			
	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 22 of 25
Constant Load Step
Stress: 3.4e+03 psf

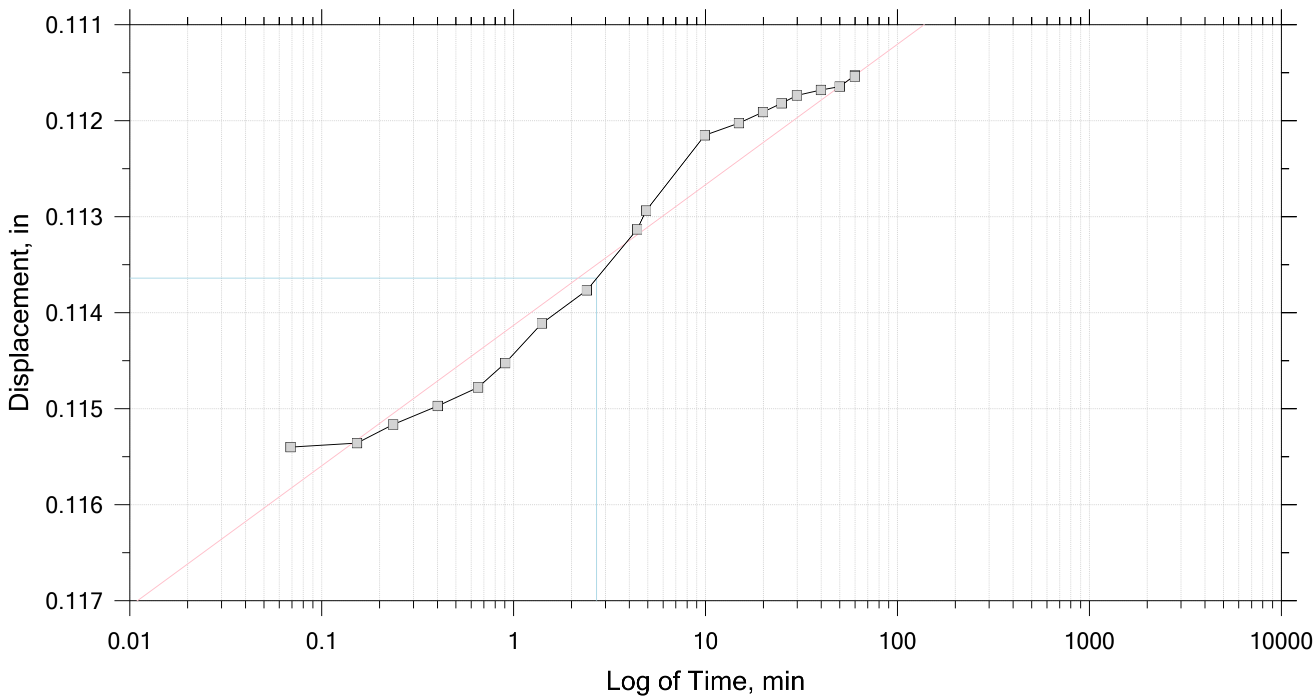


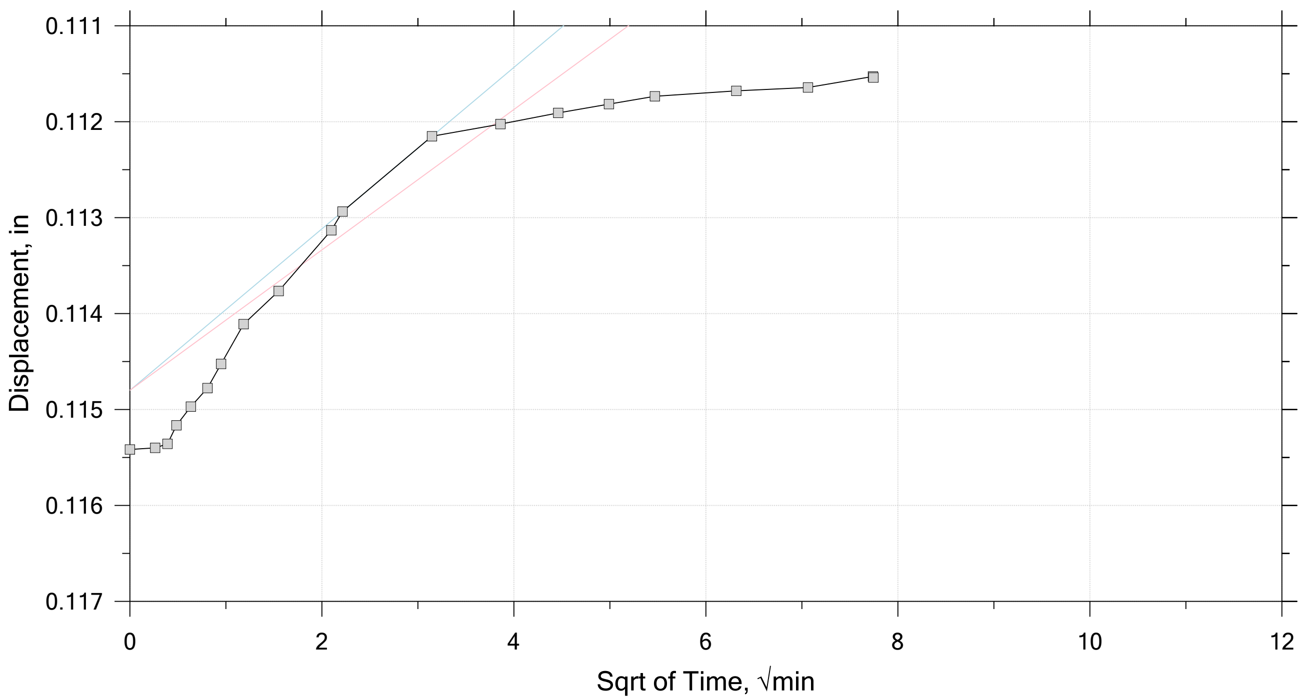


Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 23 of 25
Constant Load Step
Stress: 1.58e+03 psf





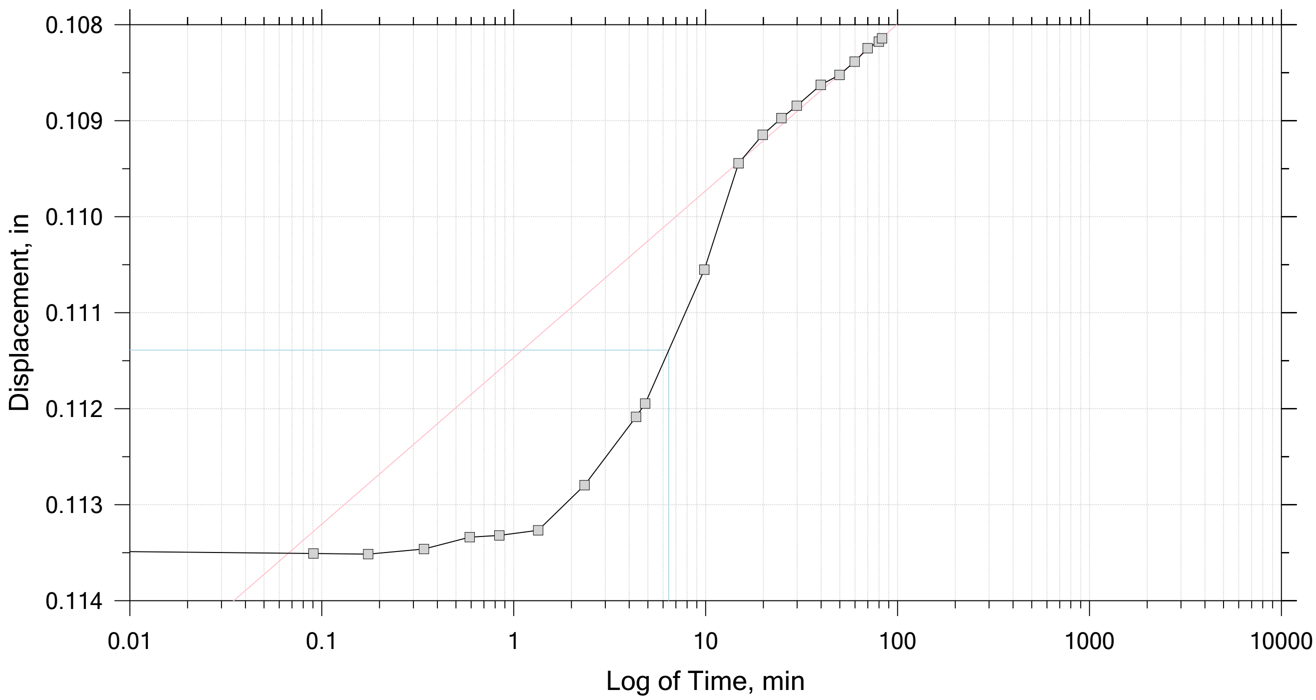
Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

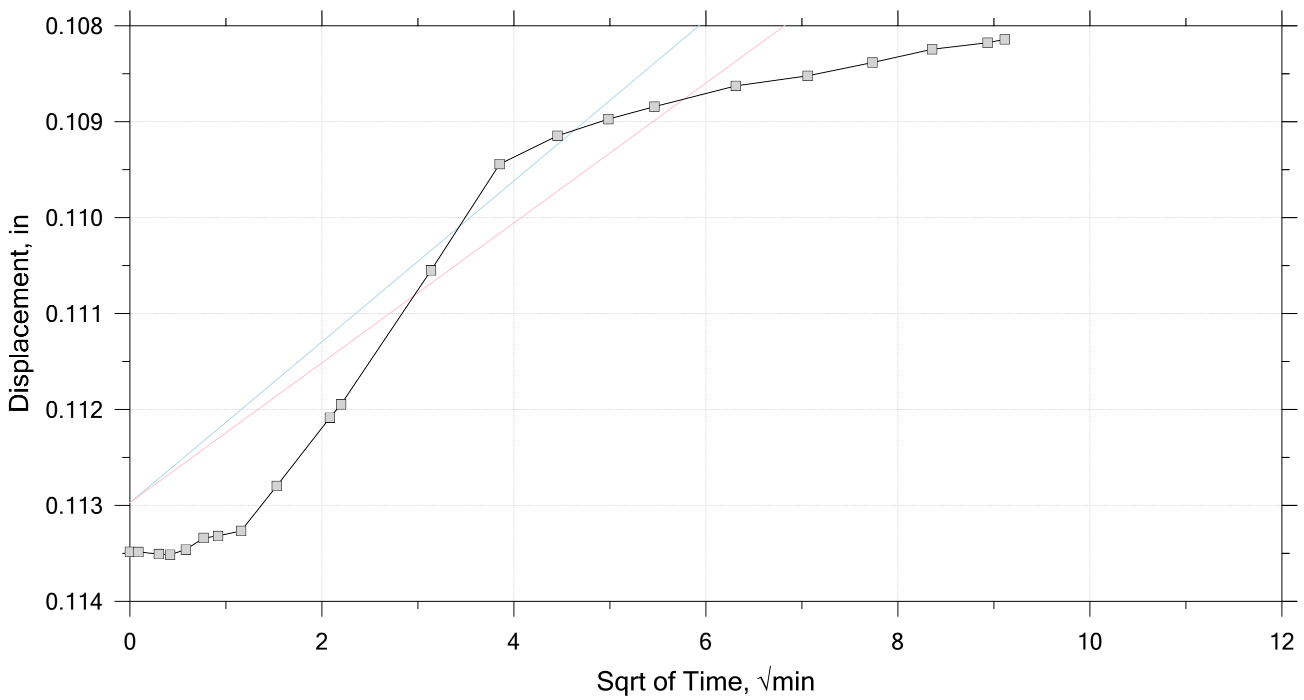
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 24 of 25

Constant Load Step

Stress: 675 psf

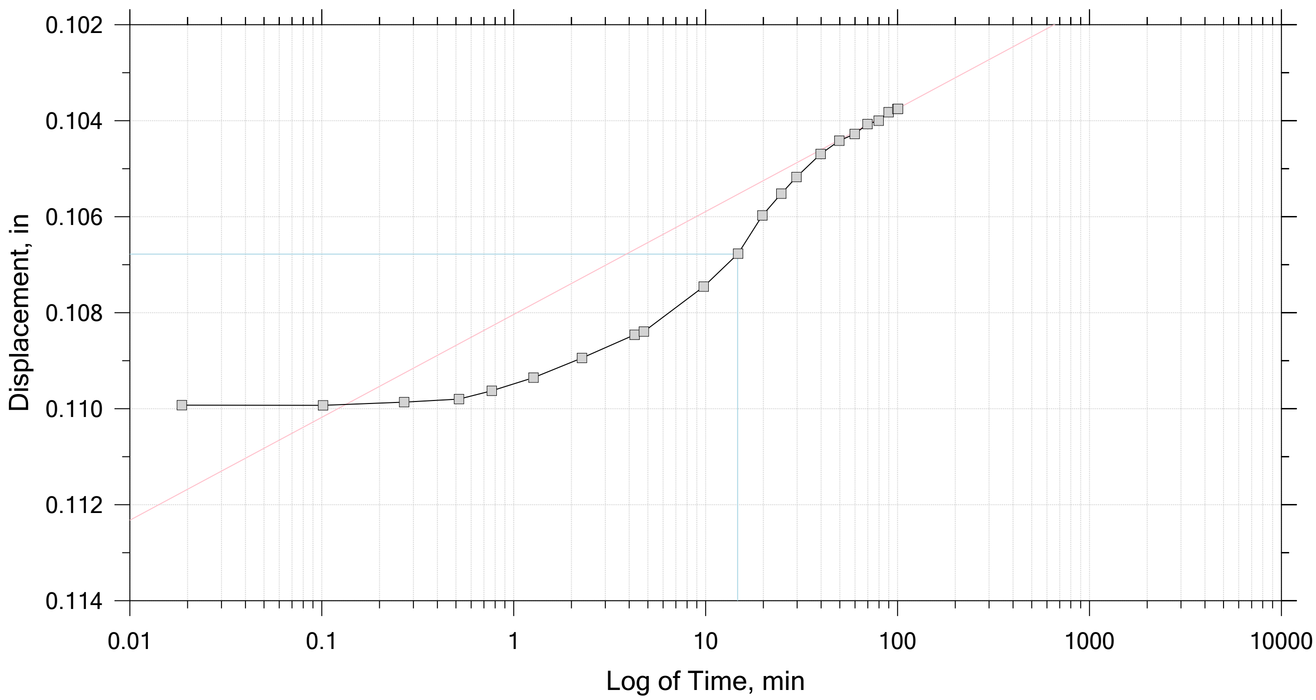


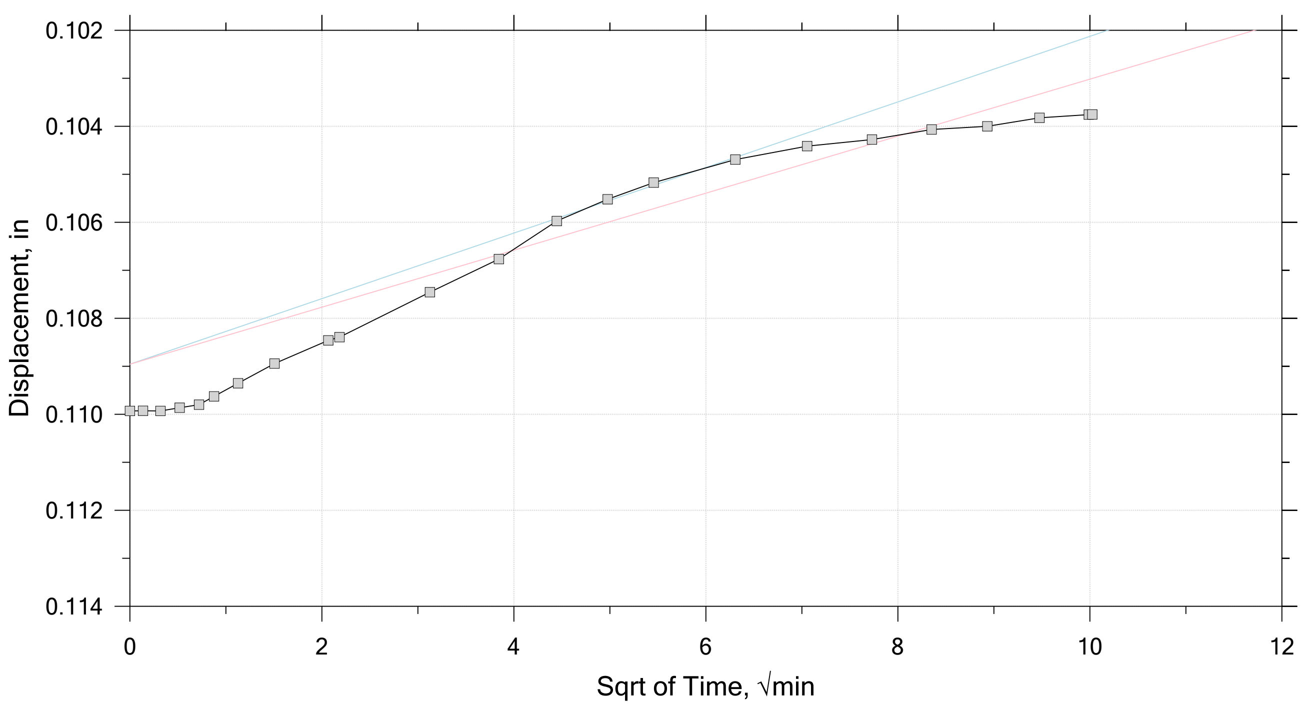


Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 25 of 25
Constant Load Step
Stress: 300 psf





Soil Metrics LLC	Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
	Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
	Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
	Description: GraySsilty Clay		
	Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter, in: 2.00	Specific Gravity: 2.85 (Implied)	Liquid Limit: 38
Specimen Height, in: 0.75	Initial Void Ratio: 1.29	Plastic Limit: 22
Final Height, in: 0.65	Final Void Ratio: 0.977	Plasticity Index: 16

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	216	---	"ring"	306
Mass Container, gm	36.78	62.31	62.31	60.86
Mass Container + Wet Soil, gm	98.06	131.99	127.08	125.5
Mass Container + Dry Soil, gm	80.615	110.53	110.53	108.98
Mass Dry Soil, gm	43.835	48.217	48.217	48.12
Water Content, %	39.80	44.51	34.33	34.33
Void Ratio	---	1.29	0.98	---
Degree of Saturation, %	---	98.02	100.00	---
Dry Unit Weight, pcf	---	77.506	89.873	---

Preconsolidation Stress, psf	---
Compression Ratio	0
Rebound Ratio	0
Compression Index	0
Rebound Index	0

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
Description: GraySsilty Clay		
Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		

Soil Metrics LLC

One-Dimensional Consolidation by ASTM D2435 - Method B

Sqrt of Time Coefficients

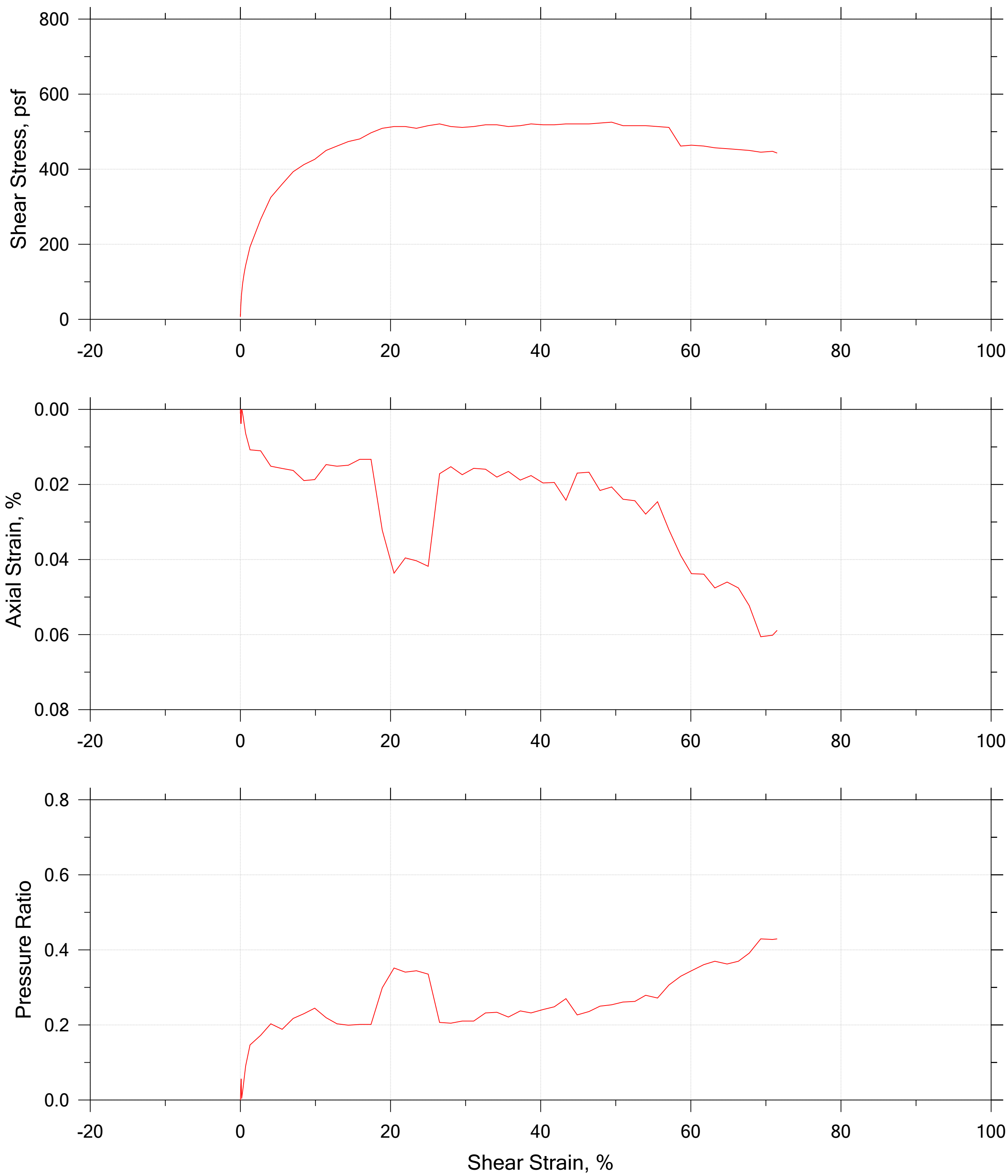
Step	Applied Stress psf	EOP Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv ft²/day	Mv ft²/ton	k cm/s
1	200.	0.002840	1.28	0.377	45.248	2.65e-02	3.77e+04	1.10e-08
2	300.	0.004517	1.28	0.599	44.488	2.68e-02	4.45e+04	1.31e-08
3	450.	0.005842	1.27	0.775	53.523	2.22e-02	2.34e+04	5.73e-09
4	675.	0.007517	1.27	0.997	56.592	2.09e-02	1.98e+04	4.55e-09
5	1.00e+03	0.01028	1.26	1.36	11.129	1.06e-01	2.26e+04	2.63e-08
6	1.53e+03	0.01424	1.25	1.89	45.041	2.59e-02	2.00e+04	5.70e-09
7	2.28e+03	0.01931	1.23	2.56	35.358	3.26e-02	1.79e+04	6.43e-09
8	3.40e+03	0.02896	1.20	3.84	40.588	2.78e-02	2.28e+04	6.98e-09
9	5.20e+03	0.05531	1.12	7.34	41.122	2.61e-02	3.88e+04	1.12e-08
10	7.50e+03	0.07391	1.07	9.80	20.725	4.86e-02	2.15e+04	1.15e-08
11	3.40e+03	0.07310	1.07	9.69	3.359	2.92e-01	5.27e+02	1.70e-09
12	1.53e+03	0.07454	1.07	9.89	14.760	6.65e-02	-2.05e+03	-1.50e-09
13	675.	0.07176	1.07	9.52	27.172	3.62e-02	8.68e+03	3.46e-09
14	1.58e+03	0.07169	1.07	9.51	27.760	3.55e-02	-2.31e+02	-9.04e-11
15	2.28e+03	0.07209	1.07	9.56	15.851	6.22e-02	1.53e+03	1.05e-09
16	3.40e+03	0.07299	1.07	9.68	42.413	2.32e-02	2.12e+03	5.42e-10
17	5.20e+03	0.07627	1.06	10.1	8.824	1.11e-01	4.83e+03	5.90e-09
18	7.50e+03	0.08353	1.04	11.1	16.977	5.67e-02	8.38e+03	5.24e-09
19	1.15e+04	0.09777	0.995	13.0	12.826	7.27e-02	9.44e+03	7.56e-09
20	1.73e+04	0.1148	0.944	15.2	15.241	5.84e-02	7.79e+03	5.01e-09
21	7.50e+03	0.1139	0.946	15.1	1.582	5.48e-01	2.39e+02	1.45e-09
22	3.40e+03	0.1127	0.950	14.9	7.631	1.14e-01	7.98e+02	1.00e-09
23	1.58e+03	0.1117	0.953	14.8	14.209	6.15e-02	1.40e+03	9.49e-10
24	675.	0.1082	0.964	14.4	33.277	2.64e-02	1.04e+04	3.01e-09
25	300.	0.1038	0.977	13.8	65.216	1.37e-02	3.15e+04	4.74e-09

Project Name: Kennebec River Est. Restoration	Location: Woolwich, ME	Project Number: 166-13
Boring Number: EB-KERP-101	Tester: SJR	Checker: SJR
Sample Number: 3U	Test Date: 1/3/2020	Depth: 69.8
Test Number: ICON 317	Preparation: Shelby Tube	Elevation: -64.5
Description: GraySsilty Clay		
Remarks: Sample tested using 2-inch diameter consolidometer, 0.75 inch thick. Limits reported from ICON 316.		
Displacement at End of Primary		

CK_O DIRECT SIMPLE SHEAR

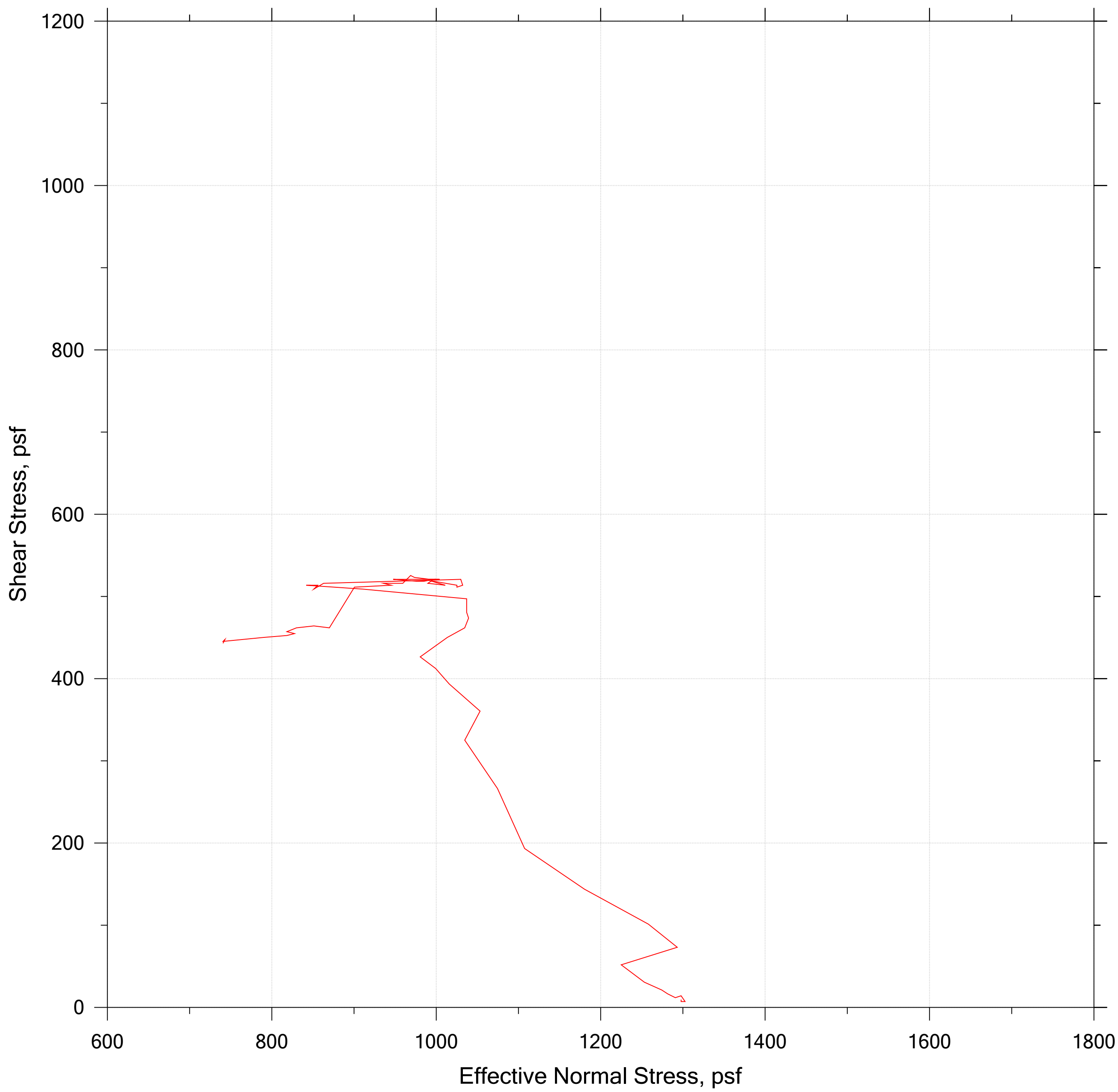
Ck_o DSS 112:
KERP 101 1U

Direct Simple Shear Test by ASTM D6528



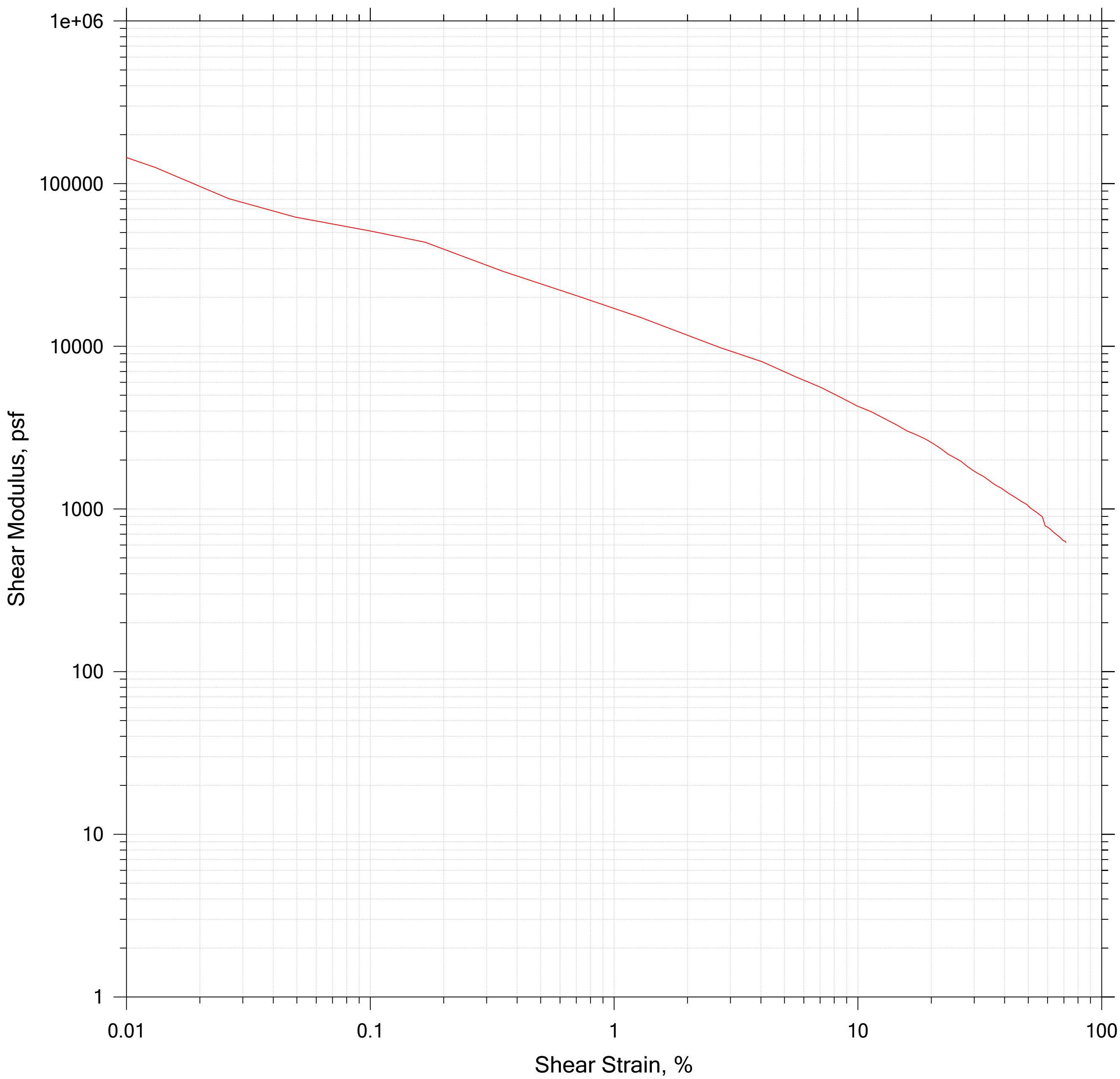
Soil Metrics LLC	Project Name: Kennebec River Estuary Rest.	Location: Woolwich,Maine	Project Number: 166-13
	Boring Number: KERP -101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/26/19	Depth: 20.6
	Test Number: DSS 112	Preparation: wet	Elevation: -15.3
	Description:		
	Remarks: Sample consolidated to 1300 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



Soil Metrics LLC	Project Name: Kennebec River Estuary Rest.	Location: Woolwich,Maine	Project Number: 166-13
	Boring Number: KERP -101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/26/19	Depth: 20.6
	Test Number: DSS 112	Preparation: wet	Elevation: -15.3
	Description:		
	Remarks: Sample consolidated to 1300 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



Soil Metrics LLC	Project Name: Kennebec River Estuary Rest.	Location: Woolwich,Maine	Project Number: 166-13
	Boring Number: KERP -101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/26/19	Depth: 20.6
	Test Number: DSS 112	Preparation: wet	Elevation: -15.3
	Description:		
	Remarks: Sample consolidated to 1300 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Specimen Dimension, in: 2.50	Specific Gravity: 2.30 (Estimated)	Liquid Limit: 66
Specimen Height, in: 1.00	Initial Void Ratio: 1.35	Plastic Limit: 45
Final Height, in: 0.98	Final Void Ratio: 1.29	Plasticity Index: 21

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	211	---		302
Mass Container, gm	37	0	0	60.04
Mass Container + Wet Soil, gm	142.1	127.4	128.08	188.12
Mass Container + Dry Soil, gm	102.03	78.92	78.92	138.96
Mass Dry Soil, gm	65.03	78.92	78.92	78.92
Water Content, %	61.62	61.43	62.29	62.29
Void Ratio	---	1.35	1.29	---
Degree of Saturation, %	---	104.81	110.97	---
Dry Unit Weight, pcf	---	61.151	62.671	---

Soil Metrics LLC			
	Project Name: Kennebec River Estuary Rest.	Location: Woolwich,Maine	Project Number: 166-13
	Boring Number: KERP -101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/26/19	Depth: 20.6
	Test Number: DSS 112	Preparation: wet	Elevation: -15.3
	Description:		
	Remarks: Sample consolidated to 1300 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Shear Phase

Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
0.00000	0.00000	9.4262	0.00000	0.00000	1297.9	0.00000
0.00013333	0.00000	9.4262	0.00000	0.00000	1297.9	0.00000
0.016883	-0.0032816	7.0696	0.00000	-0.0017117	1297.9	0.00000
0.033750	0.0032816	7.0696	2.1543e+05	-0.0026461	1302.6	-0.0036232
0.083433	0.00000	14.139	0.00000	0.0010592	1297.9	0.00000
0.10025	0.0065632	11.783	1.7953e+05	-0.00022957	1290.9	0.0054348
0.16678	0.013126	16.496	1.2567e+05	0.00033428	1281.5	0.012681
0.25017	0.026253	21.209	80787.	0.0024689	1274.4	0.018116
0.50007	0.049224	30.635	62236.	0.0037375	1253.3	0.034420
1.0003	0.10173	51.844	50963.	0.0037174	1225.0	0.056159
2.0003	0.16736	73.053	43650.	-0.00037053	1293.2	0.0036232
4.0003	0.35113	101.33	28859.	0.0017439	1258.0	0.030797
8.0007	0.70226	143.75	20469.	0.0063957	1180.4	0.090580
15.000	1.2831	193.24	15060.	0.010766	1107.5	0.14674
30.000	2.7040	266.29	9847.8	0.011027	1074.6	0.17210
45.000	4.0462	325.20	8037.2	0.015135	1034.6	0.20290
60.000	5.5656	360.55	6478.2	0.015719	1053.4	0.18841
75.000	7.0259	393.54	5601.3	0.016263	1015.8	0.21739
90.000	8.4633	412.40	4872.8	0.018962	999.31	0.23007
105.00	9.8973	426.54	4309.6	0.018688	980.50	0.24457
120.00	11.413	450.10	3943.6	0.014692	1013.4	0.21920
135.00	12.874	461.88	3587.8	0.015135	1034.6	0.20290
150.00	14.377	473.67	3294.7	0.014853	1039.3	0.19928
165.00	15.903	480.74	3023.0	0.013283	1036.9	0.20109
180.00	17.393	497.23	2858.9	0.013283	1036.9	0.20109
195.00	18.905	509.01	2692.4	0.032213	909.96	0.29891
210.00	20.461	513.73	2510.8	0.043632	841.77	0.35145
225.00	21.970	513.73	2338.3	0.039558	855.88	0.34058
240.00	23.450	509.01	2170.6	0.040346	851.18	0.34420
255.00	25.012	516.08	2063.3	0.041800	862.94	0.33514
270.00	26.529	520.80	1963.2	0.017129	1029.9	0.20652
285.00	28.041	513.73	1832.0	0.015276	1032.2	0.20471
300.00	29.557	511.37	1730.1	0.017411	1025.2	0.21014
315.00	31.090	513.73	1652.4	0.015699	1025.2	0.21014
330.00	32.655	518.44	1587.6	0.015932	996.96	0.23188
345.00	34.175	518.44	1517.0	0.018037	994.61	0.23370
360.00	35.701	513.73	1439.0	0.016545	1011.1	0.22101
375.00	37.279	516.08	1384.4	0.018825	989.91	0.23732
390.00	38.720	520.80	1345.0	0.017644	996.96	0.23188
405.00	40.318	518.44	1285.9	0.019612	985.21	0.24094
420.00	41.818	518.44	1239.8	0.019476	975.80	0.24819
435.00	43.360	520.80	1201.1	0.024201	947.58	0.26993
450.00	44.869	520.80	1160.7	0.016968	1004.0	0.22645
465.00	46.431	520.80	1121.6	0.016719	992.26	0.23551
480.00	47.905	523.15	1092.1	0.021581	973.45	0.25000
495.00	49.454	525.51	1062.6	0.020657	968.75	0.25362
510.00	50.960	516.08	1012.7	0.023944	959.34	0.26087
525.00	52.558	516.08	981.93	0.024338	956.99	0.26268
540.00	53.992	516.08	955.85	0.027882	935.83	0.27899
555.00	55.571	513.73	924.46	0.024595	945.23	0.27174

Project Name: Kennebec River Estuary Rest.	Location: Woolwich,Maine	Project Number: 166-13
Boring Number: KERP -101	Tester: SJR	Checker: SJR
Sample Number: 1U	Test Date: 12/26/19	Depth: 20.6
Test Number: DSS 112	Preparation: wet	Elevation: -15.3
Description:		
Remarks: Sample consolidated to 1300 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

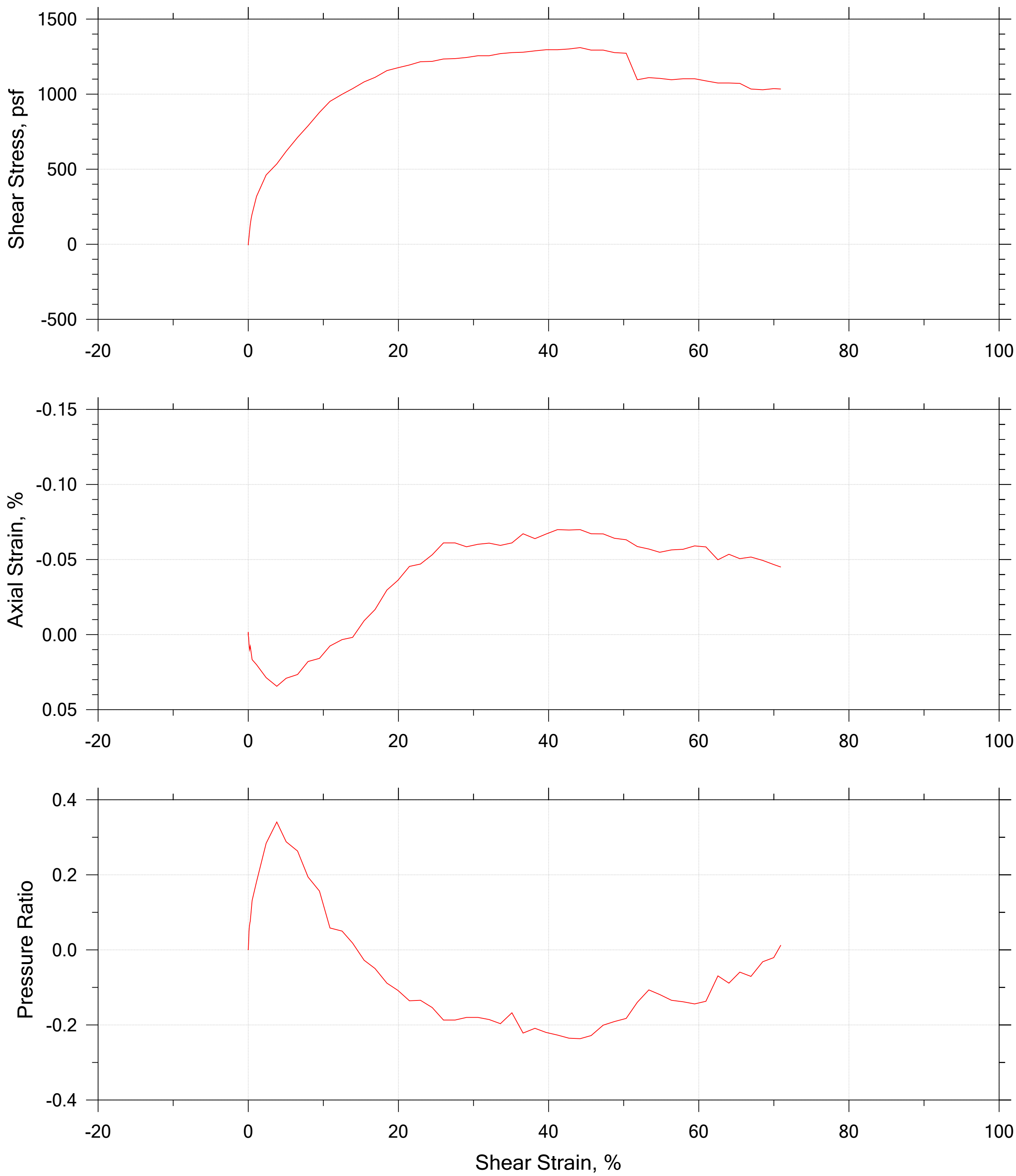
Shear Phase

Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
570.00	57.084	511.37	895.83	0.032076	900.56	0.30616
585.00	58.649	461.88	787.54	0.038907	869.99	0.32971
600.00	60.090	464.24	772.58	0.043769	851.18	0.34420
615.00	61.734	461.88	748.19	0.043890	830.02	0.36051
630.00	63.200	457.17	723.37	0.047570	818.26	0.36957
645.00	64.835	454.81	701.50	0.045995	827.67	0.36232
660.00	66.328	452.46	682.15	0.047570	818.26	0.36957
675.00	67.778	450.10	664.08	0.052295	790.05	0.39130
690.00	69.321	445.39	642.50	0.060565	740.67	0.42935
705.00	70.879	447.74	631.70	0.060171	743.02	0.42754
710.64	71.496	443.03	619.66	0.058853	740.67	0.42935

Soil Metrics LLC			
	Project Name: Kennebec River Estuary Rest.	Location: Woolwich,Maine	Project Number: 166-13
	Boring Number: KERP -101	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/26/19	Depth: 20.6
	Test Number: DSS 112	Preparation: wet	Elevation: -15.3
	Description:		
	Remarks: Sample consolidated to 1300 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

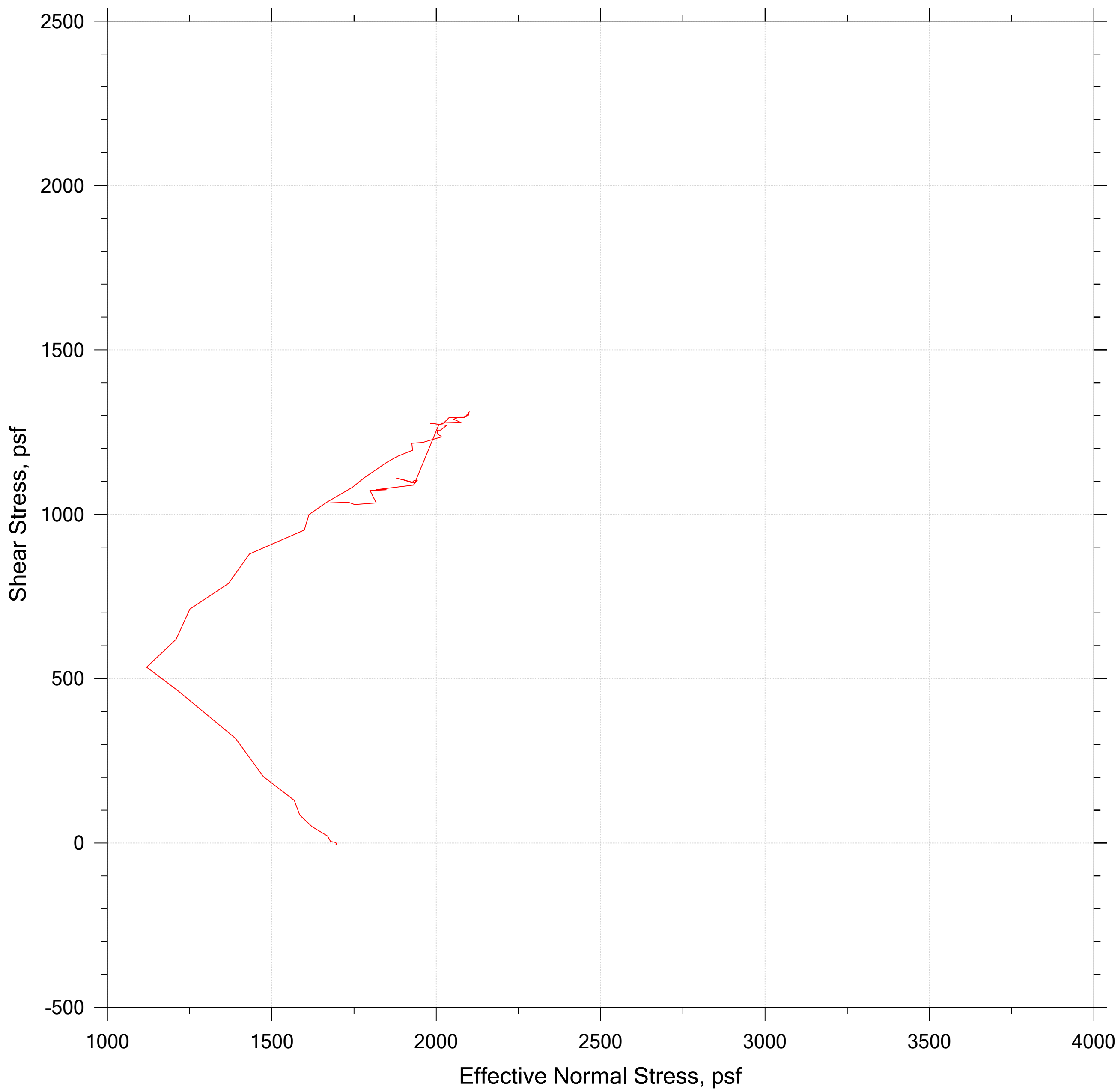
Ck_o DSS 113:
BB-KERP -101 2U

Direct Simple Shear Test by ASTM D6528



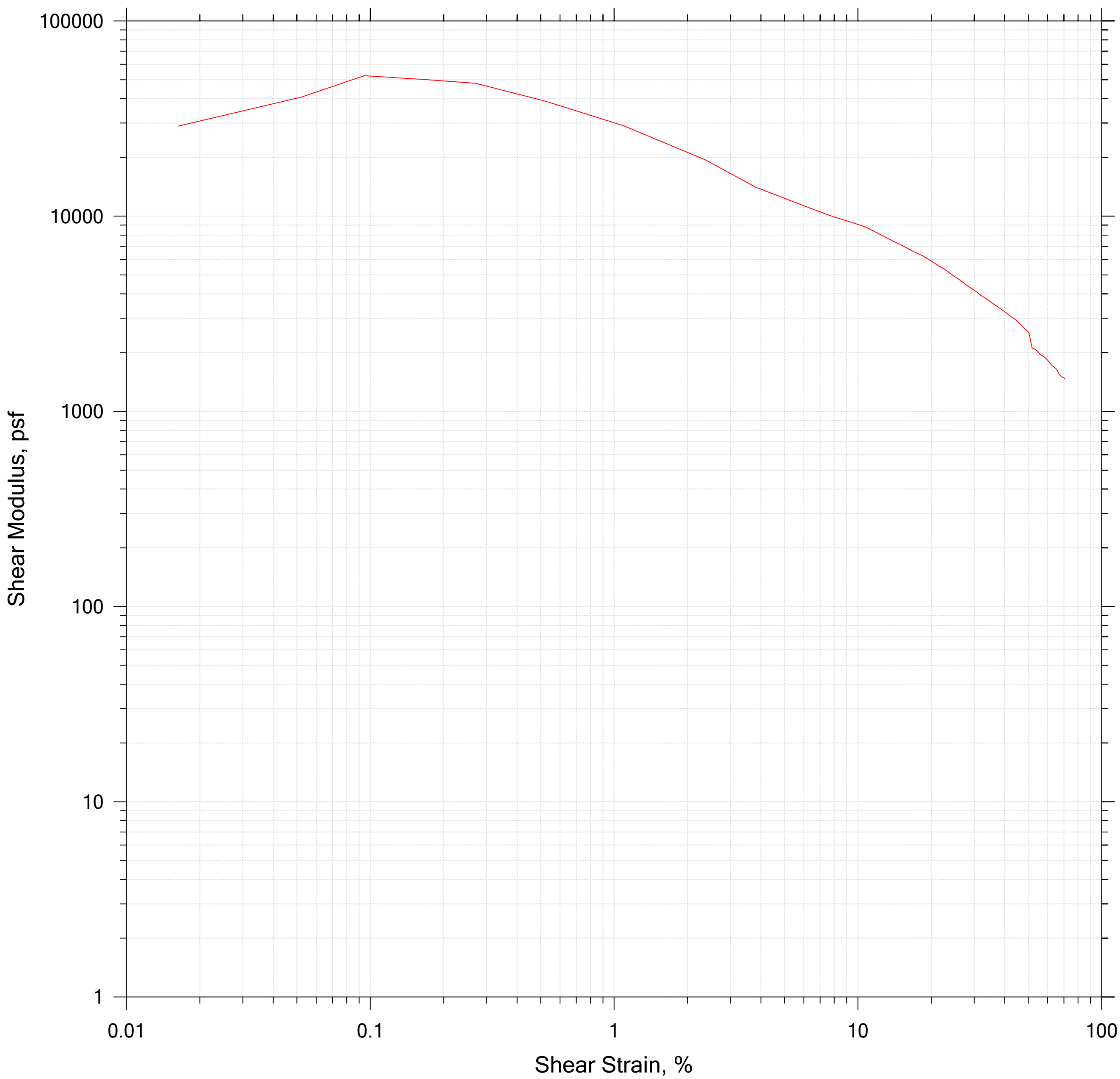
Soil Metrics LLC	Project Name: Kennebec River Estuary Rest.	Location: Woolwich,Maine	Project Number: 166-13
	Boring Number: KERP -101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/28/19	Depth: 50.5
	Test Number: DSS 113	Preparation: wet	Elevation: -45.2
	Description: Gray Clayey Sandy Silt		
	Remarks: Sample consolidated to 1700 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



Soil Metrics LLC	Project Name: Kennebec River Estuary Rest.	Location: Woolwich,Maine	Project Number: 166-13
	Boring Number: KERP -101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/28/19	Depth: 50.5
	Test Number: DSS 113	Preparation: wet	Elevation: -45.2
	Description: Gray Clayey Sandy Silt		
	Remarks: Sample consolidated to 1700 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



Project Name: Kennebec River Estuary Rest.	Location: Woolwich,Maine	Project Number: 166-13
Boring Number: KERP -101	Tester: SJR	Checker: SJR
Sample Number: 2U	Test Date: 12/28/19	Depth: 50.5
Test Number: DSS 113	Preparation: wet	Elevation: -45.2
Description: Gray Clayey Sandy Silt		
Remarks: Sample consolidated to 1700 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Specimen Dimension, in: 2.50	Specific Gravity: 2.72 (Implied)	Liquid Limit: 22
Specimen Height, in: 1.00	Initial Void Ratio: 0.594	Plastic Limit: 18
Final Height, in: 0.99	Final Void Ratio: 0.569	Plasticity Index: 5

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	220	---		323
Mass Container, gm	36.7	0	0	60.69
Mass Container + Wet Soil, gm	127.66	166.81	166.41	227.1
Mass Container + Dry Soil, gm	111.7	137.65	137.65	198.34
Mass Dry Soil, gm	75	137.65	137.65	137.65
Water Content, %	21.28	21.18	20.89	20.89
Void Ratio	---	0.59	0.57	---
Degree of Saturation, %	---	97.10	100.00	---
Dry Unit Weight, pcf	---	106.66	108.37	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Project Name: Kennebec River Estuary Rest.	Location: Woolwich,Maine	Project Number: 166-13
Boring Number: KERP -101	Tester: SJR	Checker: SJR
Sample Number: 2U	Test Date: 12/28/19	Depth: 50.5
Test Number: DSS 113	Preparation: wet	Elevation: -45.2
Description: Gray Clayey Sandy Silt		
Remarks: Sample consolidated to 1700 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Shear Phase

Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
0.00000	0.00000	-2.3565	0.00000	0.00000	1697.7	0.00000
0.00026667	0.00000	-2.3565	0.00000	0.00000	1697.7	0.00000
0.017667	-0.0032567	-4.7131	0.00000	0.00013989	1695.3	0.0013850
0.033967	-0.0032567	-4.7131	0.00000	-0.0016987	1697.7	0.00000
0.083450	0.00000	0.00000	0.00000	0.00013989	1695.3	0.0013850
0.10102	0.0032567	0.00000	0.00000	0.00013989	1695.3	0.0013850
0.16742	0.00000	2.3565	0.00000	0.00041968	1690.6	0.0041551
0.25108	0.016284	4.7131	28944.	0.0011192	1678.8	0.011080
0.50060	0.052108	21.209	40702.	0.0016787	1669.4	0.016620
1.0005	0.094446	49.488	52398.	0.0061754	1622.4	0.044321
2.0005	0.16935	84.836	50095.	0.010112	1584.8	0.066482
4.0005	0.27031	129.61	47949.	0.0076942	1568.3	0.076177
8.0010	0.52108	202.66	38893.	0.016687	1474.3	0.13158
15.000	1.0943	318.13	29073.	0.020025	1389.6	0.18144
30.001	2.3839	461.88	19375.	0.028678	1215.6	0.28393
45.001	3.7908	534.94	14111.	0.034414	1119.2	0.34072
60.001	5.0447	619.77	12286.	0.029098	1208.6	0.28809
75.000	6.5656	711.68	10840.	0.026580	1250.9	0.26316
90.001	7.9725	789.44	9902.1	0.017887	1368.5	0.19391
105.00	9.4771	878.99	9274.9	0.015808	1432.0	0.15651
120.00	10.878	952.05	8752.4	0.0075743	1598.9	0.058172
135.00	12.503	999.18	7991.7	0.0033375	1613.0	0.049861
150.00	13.897	1036.9	7461.4	0.0018186	1667.1	0.018006
165.00	15.434	1081.7	7008.4	-0.0092730	1744.7	-0.027701
180.00	16.883	1112.3	6588.2	-0.016691	1782.3	-0.049861
195.00	18.469	1157.1	6264.9	-0.029674	1848.1	-0.088643
210.00	19.938	1175.9	5897.9	-0.036165	1881.1	-0.10803
225.00	21.472	1194.8	5564.4	-0.045438	1928.1	-0.13573
240.00	22.927	1216.0	5303.6	-0.046997	1925.7	-0.13435
255.00	24.504	1218.3	4972.0	-0.053164	1958.7	-0.15374
270.00	25.992	1234.8	4750.8	-0.061066	2015.1	-0.18698
285.00	27.536	1237.2	4493.0	-0.061066	2015.1	-0.18698
300.00	29.060	1244.3	4281.7	-0.058499	2003.3	-0.18006
315.00	30.600	1256.0	4104.7	-0.060198	2003.3	-0.18006
330.00	32.079	1256.0	3915.5	-0.060892	2012.7	-0.18560
345.00	33.577	1270.2	3782.9	-0.059387	2031.5	-0.19668
360.00	35.117	1277.2	3637.1	-0.061073	1982.2	-0.16759
375.00	36.599	1279.6	3496.3	-0.067204	2073.9	-0.22161
390.00	38.179	1289.0	3376.3	-0.063943	2052.7	-0.20914
405.00	39.661	1296.1	3268.0	-0.067031	2071.5	-0.22022
420.00	41.185	1296.1	3147.0	-0.069885	2083.3	-0.22715
435.00	42.719	1300.8	3045.1	-0.069660	2097.4	-0.23546
450.00	44.204	1310.2	2964.1	-0.069905	2099.7	-0.23684
465.00	45.669	1293.7	2832.9	-0.067164	2085.6	-0.22853
480.00	47.275	1293.7	2736.6	-0.067089	2038.6	-0.20083
495.00	48.763	1277.2	2619.3	-0.064174	2022.1	-0.19114
510.00	50.336	1272.5	2528.1	-0.063132	2008.0	-0.18283
525.00	51.812	1095.8	2115.0	-0.058660	1935.1	-0.13989
540.00	53.352	1109.9	2080.4	-0.057002	1878.7	-0.10665
555.00	54.798	1105.2	2016.9	-0.054863	1899.9	-0.11911

Project Name: Kennebec River Estuary Rest.	Location: Woolwich,Maine	Project Number: 166-13
Boring Number: KERP -101	Tester: SJR	Checker: SJR
Sample Number: 2U	Test Date: 12/28/19	Depth: 50.5
Test Number: DSS 113	Preparation: wet	Elevation: -45.2
Description: Gray Clayey Sandy Silt		
Remarks: Sample consolidated to 1700 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Shear Phase

Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
570.00	56.361	1095.8	1944.2	-0.056402	1925.7	-0.13435
585.00	57.924	1102.9	1904.0	-0.056822	1932.8	-0.13850
600.00	59.445	1102.9	1855.3	-0.059080	1942.2	-0.14404
615.00	60.947	1088.7	1786.4	-0.058381	1930.4	-0.13712
630.00	62.552	1074.6	1717.9	-0.049827	1815.2	-0.069252
645.00	64.018	1074.6	1678.6	-0.053484	1848.1	-0.088643
660.00	65.474	1072.2	1637.7	-0.050546	1798.8	-0.059557
675.00	66.959	1034.5	1545.0	-0.051666	1817.6	-0.070637
690.00	68.512	1029.8	1503.1	-0.049447	1751.7	-0.031856
705.00	69.987	1036.9	1481.5	-0.046629	1732.9	-0.020776
713.87	70.942	1034.5	1458.3	-0.044971	1676.5	0.012465

Soil Metrics LLC			
	Project Name: Kennebec River Estuary Rest.	Location: Woolwich,Maine	Project Number: 166-13
	Boring Number: KERP -101	Tester: SJR	Checker: SJR
	Sample Number: 2U	Test Date: 12/28/19	Depth: 50.5
	Test Number: DSS 113	Preparation: wet	Elevation: -45.2
	Description: Gray Clayey Sandy Silt		
	Remarks: Sample consolidated to 1700 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

THIELSCH ENGINEERING	195 Frances Avenue Cranston RI, 02910 Phone: (401)-467-6454 Fax: (401)-467-2398 thielsch.com *Let's Build a Solid Foundation*	Client Information: GZA GeoEnvironmental South Portland, ME PM: Blaine Cardali Assigned By: Blaine Cardali Collected By: L. Navarrete	Project Information: **Pleasant Cove Bridge** **Woolwich, ME** GZA Project Number: 09.0026037.01 Summary Page: 1 of 4 Report Date: 05.05.21

LABORATORY TESTING DATA SHEET, Report No.: 7421-D-198

Boring No.	Sample No.	Depth (Ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318		D6913			D2974	D854			D1557						
HB-WPC-201	2D	2-4	21-S-1511	6.0			30.2	61.7	8.1											Brown f-c SAND, some f-c Gravel, trace Silt
HB-WPC-201	4D	9-11	21-S-1512				54.2	39.0	6.8											Light Brown sandy fine to coarse GRAVEL, trace Silt
HB-WPC-201	6D	19-21	21-S-1513	70.6	94	59														Brown fine-grained peat
HB-WPC-201	8D	29-30.4	21-S-1514	22.5	27	16														Gray CLAY & SILT
HB-WPC-202	1D (Bot. 7")	0-2	21-S-1515	3.4			40.3	51.3	8.4											Brown gravelly fine to coarse SAND, trace Silt
HB-WPC-202	4D	14-16	21-S-1516	70.5																Water Content Only
HB-WPC-202	5D	24-26	21-S-1517	64.5	80	49														Brown fine-grained peat
HB-WPC-202	7D	34-36	21-S-1518	23.9	33	18														Gray CLAY & SILT
HB-WPC-202	9D	49-51	21-S-1519	42.4	49	23														Gray Silty CLAY
HB-WPC-202	11D	69-71	21-S-1520	38.7																Water Content Only
HB-WPC-202	12D	79-81	21-S-1521				30.3	41.5	28.2											Gray f-c SAND, some fine Gravel, some Silt
HB-WPC-203	1D	0-2	21-S-1522	2.3			50.2	44.3	5.5											Brown sandy fine to coarse GRAVEL, trace Silt

Date Received: *04.27.21* Reviewed By: [illegible] Date Reviewed: *05.06.21*

THIELSCH ENGINEERING	195 Frances Avenue Cranston RI, 02910 Phone: (401)-467-6454 Fax: (401)-467-2398 thielsch.com *Let's Build a Solid Foundation*	Client Information: GZA GeoEnvironmental South Portland, ME PM: Blaine Cardali Assigned By: Blaine Cardali Collected By: L. Navarrete	Project Information: **Pleasant Cove Bridge** **Woolwich, ME** GZA Project Number: 09.0026037.01 Summary Page: 2 of 4 Report Date: 05.05.21

LABORATORY TESTING DATA SHEET, Report No.: 7421-D-198

Boring No.	Sample No.	Depth (Ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318		D6913			D2974	D854			D1557						
HB-WPC-203	5D	19-21	21-S-1523	65.1	81	49														Brown Silty CLAY
HB-WPC-203	9D	35-37	21-S-1524	65.7	76	40														Brown Silty CLAY
HB-WPC-203	12D	44-46	21-S-1525	33.0																Water Content Only
HB-WPC-203	15D	59-61	21-S-1526	41.0	47	20														Gray Silty CLAY
HB-WPC-203	16D	64-66	21-S-1527	42.8																Water Content Only
HB-WPC-203	19D	88.7-90.7	21-S-1528	30.4																Water Content Only
HB-WPC-204	1D	0.5-2.5	21-S-1529	4.0			22.9	60.9	16.2											Brown f-c SAND, some fine Gravel, little Silt
HB-WPC-205	2D	5-7	21-S-1530	6.6			36.8	44.1	19.1											Brown gravelly fine to coarse SAND, little Silt
B-WPC-201/201	2D	3-5	21-S-1531	9.2			43.1	44.1	12.8											Light Brown gravelly fine to coarse SAND, little Silt
B-WPC-201/201	6D	11-13	21-S-1532	10.1			53.8	40.6	5.6											Light Brown sandy fine to coarse GRAVEL, trace Silt
B-WPC-201/201	8D	19-21	21-S-1533	52.7			0.0	14.4	85.6											Dark Gray CLAYEY SILT, little f-m Sand
B-WPC-201/201	9D	29-31	21-S-1534	58.8	78	49														Brown Silty CLAY

Date Received: *04.27.21*   Reviewed By: ____________   Date Reviewed: *05.06.21*

THIELSCH ENGINEERING	195 Frances Avenue Cranston RI, 02910 Phone: (401)-467-6454 Fax: (401)-467-2398 thielsch.com *Let's Build a Solid Foundation*	Client Information: GZA GeoEnvironmental South Portland, ME PM: Blaine Cardali Assigned By: Blaine Cardali Collected By: L. Navarrete	Project Information: **Pleasant Cove Bridge** **Woolwich, ME** GZA Project Number: 09.0026037.01 Summary Page: 3 of 4 Report Date: 05.05.21

LABORATORY TESTING DATA SHEET, Report No.: 7421-D-198

Boring No.	Sample No.	Depth (Ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318		D6913			D2974	D854			D1557						
B-WPC-201/201	13D	40-42	21-S-1535	49.6																Water Content Only
B-WPC-201/201	15D	44-46	21-S-1536				0.0	2.1	97.9											Dark Gray SILT & CLAY, trace f-m Sand
B-WPC-201/201	16D	49-51	21-S-1537	30.2																Water Content Only
B-WPC-201/201	17D	59-61	21-S-1538	34.4	41	20														Gray Silty CLAY
B-WPC-201/201	19D	69-71	21-S-1539	35.8																Water Content Only
BB-WPC-202	2D	5-7	21-S-1540	6.4			45.4	47.1	7.5											Brown gravelly fine to coarse SAND, trace Silt
BB-WPC-202	5D	25-27	21-S-1541				0.0	38.8	61.2											Dark Gray Organic sandy SILT
BB-WPC-202	9D	45-47	21-S-1542	33.5	42	24														Olive CLAY & SILT
BB-WPC-202	11D	55-57	21-S-1543	41.3	48	21														Gray Silty CLAY
BB-WPC-202	13D	70-72	21-S-1544	35.3																Water Content Only
BB-WPC-202	14D (Bot. 18")	80-82	21-S-1545				0.0	21.2	78.8											Gray SILT & CLAY, some fine Sand
BB-WPC-203	1D	1-3	21-S-1546	3.2			22.8	62.8	14.4											Brown f-c SAND, some fine Gravel, little Silt

Date Received: *04.27.21* Reviewed By: Date Reviewed: *05.06.21*

THIELSCH ENGINEERING

195 Frances Avenue
Cranston RI, 02910
Phone: (401)-467-6454
Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
GZA GeoEnvironmental
South Portland, ME
PM: Blaine Cardali
Assigned By: Blaine Cardali
Collected By: L. Navarrete

Project Information:
Pleasant Cove Bridge
Woolwich, ME
GZA Project Number: 09.0026037.01
Summary Page: 4 of 4
Report Date: 05.05.21

LABORATORY TESTING DATA SHEET, Report No.: 7421-D-198

Boring No.	Sample No.	Depth (Ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318		D6913			D2974	D854			D1557						
BB-WPC-203	8D	20-22	21-S-1547				0.0	24.2	75.8											Dark Gray Organic SILT, some f-m Sand
BB-WPC-203	10D	30-32	21-S-1548	44.8	NV	NP														Brown SILT
BB-WPC-203	13D	45-47	21-S-1549	26.5																Water Content Only
BB-WPC-203	15D	55-57	21-S-1550	35.3																Water Content Only
BB-WPC-203	16D	60-62	21-S-1551	38.1	44	19														Gray Silty CLAY
BB-WPC-203	18D	70-72	21-S-1552	91.8																Water Content Only

Date Received: *04.27.21*

Reviewed By: [illegible]

Date Reviewed: *05.06.21*

THIELSCH ENGINEERING

State of Maine - Department of Transportation
Laboratory Testing Summary Sheet

Pleasant Cove Bridge
Town(s): Woolwich, ME

MDOT Project Number:
GZA Project Number: 09.0026037.01

Boring & Sample Identification Number	Station (Feet)	Sample No.	Depth (Feet)	Lab Number	Organic %	W.C.	L.L.	P.I.	Classification		
									Unified	AASHTO	Frost
HB-WPC-201		2D	2-4	21-S-1511		6.0			SP-SM	A-1-b	II
HB-WPC-201		4D	9-11	21-S-1512					GP-GM	A-1-a	I
HB-WPC-201		6D	19-21	21-S-1513		70.6	94	59			
HB-WPC-201		8D	29-30.4	21-S-1514		22.5	27	16			
HB-WPC-202		1D (Bot. 7")	0-2	21-S-1515		3.4			SP-SM	A-1-a	II
HB-WPC-202		4D	14-16	21-S-1516		70.5					
HB-WPC-202		5D	24-26	21-S-1517		64.5	80	49			
HB-WPC-202		7D	34-36	21-S-1518		23.9	33	18			
HB-WPC-202		9D	49-51	21-S-1519		42.4	49	23			
HB-WPC-202		11D	69-71	21-S-1520		38.7					
HB-WPC-202		12D	79-81	21-S-1521					SM	A-2-4(0)	III
HB-WPC-203		1D	0-2	21-S-1522		2.3			GP-GM	A-1-a	I
HB-WPC-203		5D	19-21	21-S-1523		65.1	81	49			
HB-WPC-203		9D	35-37	21-S-1524		65.7	76	40			
HB-WPC-203		12D	44-46	21-S-1525		33.0					
HB-WPC-203		15D	59-61	21-S-1526		41.0	47	20			
HB-WPC-203		16D	64-66	21-S-1527		42.8					
HB-WPC-203		19D	88.7-90.7	21-S-1528		30.4					
HB-WPC-204		1D	0.5-2.5	21-S-1529		4.0			SM	A-1-b	II
HB-WPC-205		2D	5-7	21-S-1530		6.6			SM	A-1-b	II
BB-WPC-201/201A		2D	3-5	21-S-1531		9.2			SM	A-1-b	II
BB-WPC-201/201A		6D	11-13	21-S-1532		10.1			GP-GM	A-1-a	I
BB-WPC-201/201A		8D	19-21	21-S-1533		52.7			ML	A-4(0)	IV
BB-WPC-201/201A		9D	29-31	21-S-1534		58.8	78	49			
BB-WPC-201/201A		13D	40-42	21-S-1535		49.6					
BB-WPC-201/201A		15D	44-46	21-S-1536					CL	A-4-(0)	IV
BB-WPC-201/201A		16D	49-51	21-S-1537		30.2					
BB-WPC-201/201A		17D	59-61	21-S-1538		34.4	41	20			
BB-WPC-201/201A		19D	69-71	21-S-1539		35.8					
BB-WPC-202		2D	5-7	21-S-1540		6.4			SP-SM	A-1-a	II
BB-WPC-202		5D	25-27	21-S-1541					OL	A-5	IV
BB-WPC-202		9D	45-47	21-S-1542		33.5	42	24			
BB-WPC-202		11D	55-57	21-S-1543		41.3	48	21			
BB-WPC-202		13D	70-72	21-S-1544		35.3					
BB-WPC-202		14D (Bot. 18"	80-82	21-S-1545					CL	A-4(0)	IV
BB-WPC-203		1D	1-3	21-S-1546		3.2			SM	A-1-b	II
BB-WPC-203		8D	20-22	21-S-1547					OL	A-5	IV
BB-WPC-203		10D	30-32	21-S-1548		44.8	NV	NP			
BB-WPC-203		13D	45-47	21-S-1549		26.5					
BB-WPC-203		15D	55-57	21-S-1550		35.3					
BB-WPC-203		16D	60-62	21-S-1551		38.1	44	19			
BB-WPC-203		18D	70-72	21-S-1552		91.8					

Classification of these soil samples is in accordance with AASHTO Classification System M-145-40. This classification is followed by the "Frost Susceptibility Rating" from zero (non-frost susceptible) to Class IV (highly frost susceptible). The "Frost Susceptibility Rating" is based upon the MDOT and Corps of Engineers Classification Systems.

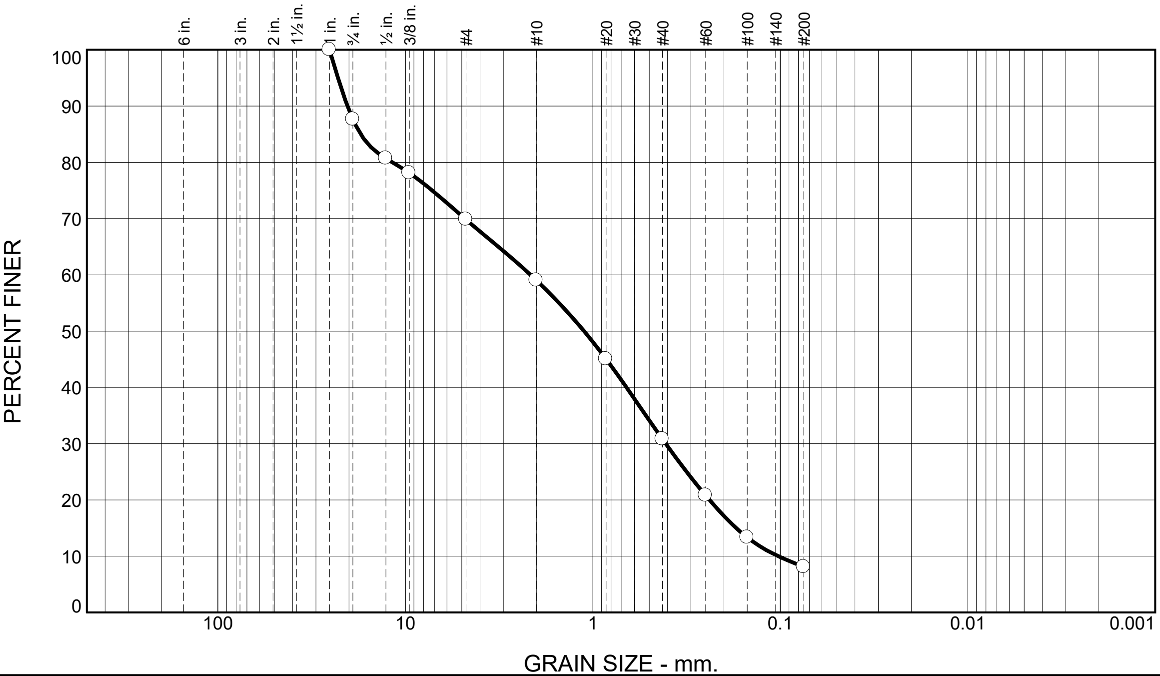
GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-93 (1996) and/or ASTM D 422-63 (Reapproved 1998)

WC = water content as determined by AASHTO T 265-93 and/or ASTM D 2216-98

LL = Liquid limit as determined by AASHTO T 89-96 and/or ASTM D 4318-98

PI = Plasticity Index as determined by AASHTO 90-96 and/or ASTM D4318-98

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.4	17.8	10.8	28.2	22.7	8.1	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	87.6		
0.5"	80.7		
0.375"	78.1		
#4	69.8		
#10	59.0		
#20	45.0		
#40	30.8		
#60	20.8		
#100	13.3		
#200	8.1		

* (no specification provided)

Material Description

Brown f-c SAND, some f-c Gravel, trace Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 20.3628 D_{85}= 17.3218 D_{60}= 2.1473
D_{50}= 1.1143 D_{30}= 0.4087 D_{15}= 0.1718
D_{10}= 0.1025 C_u= 20.95 C_c= 0.76

Remarks

Date Received: 04.27.21 **Date Tested:** 05.05.21

Tested By: RR / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

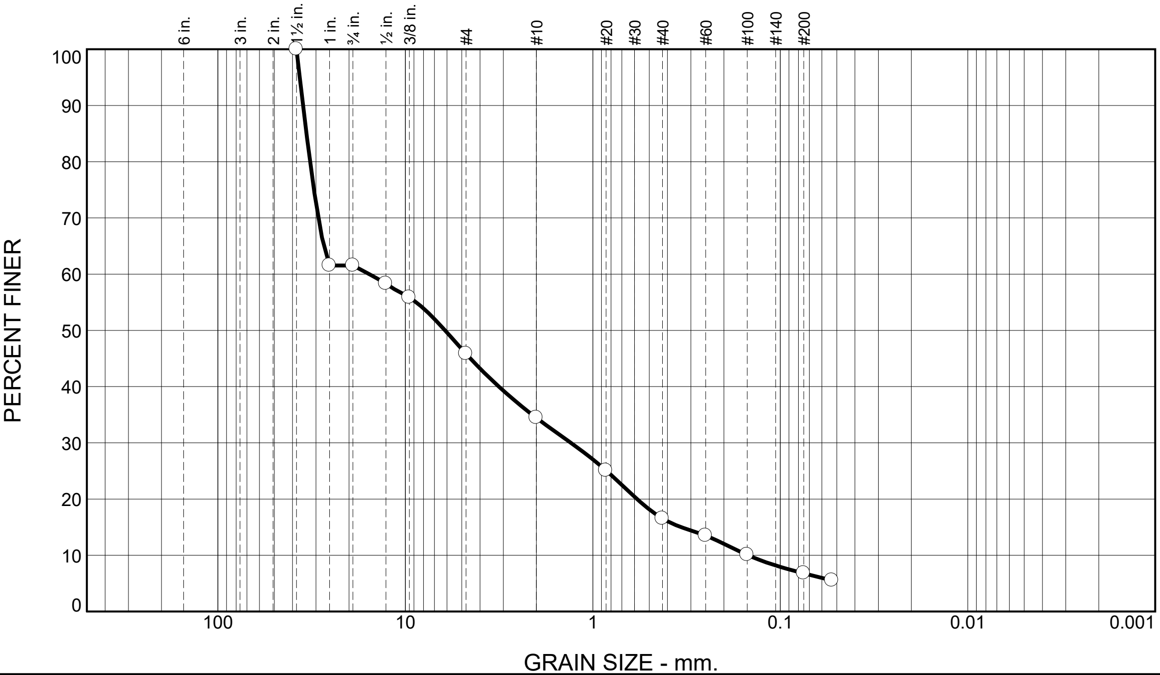
Source of Sample: HB-WPC-201 **Depth:** 2-4' **Date Sampled:**
Sample Number: 2D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1511

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	38.5	15.7	11.4	17.9	9.7	6.8	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5"	100.0		
1"	61.5		
0.75"	61.5		
0.5"	58.3		
0.375"	55.9		
#4	45.8		
#10	34.4		
#20	25.1		
#40	16.5		
#60	13.5		
#100	10.1		
#200	6.8		
#270	5.5		

* (no specification provided)

Material Description

Light Brown sandy fine to coarse GRAVEL, trace Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 35.1325 D_{85}= 33.6844 D_{60}= 15.5825
D_{50}= 6.1397 D_{30}= 1.3097 D_{15}= 0.3374
D_{10}= 0.1484 C_u= 104.98 C_c= 0.74

Remarks

Date Received: 04.27.21 **Date Tested:** 05.03.21

Tested By: RR / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

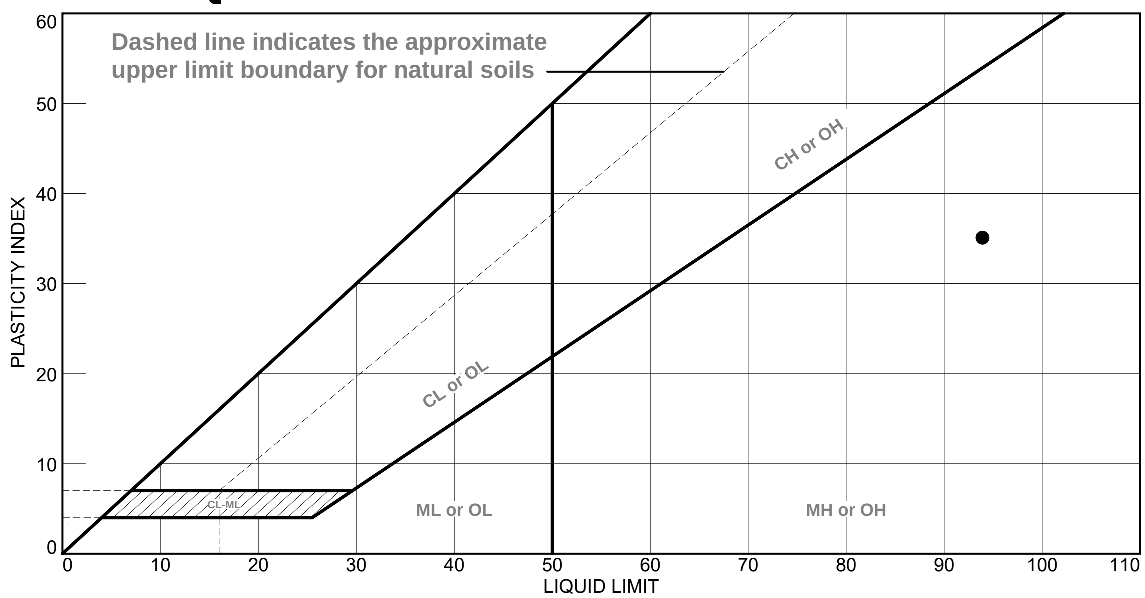
Source of Sample: HB-WPC-201 **Depth:** 9-11' **Date Sampled:**
Sample Number: 4D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1512

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown fine-grained peat	94	59	35			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: HB-WPC-201 **Depth:** 19-21'

Sample Number: 6D

Thielsch Engineering Inc.

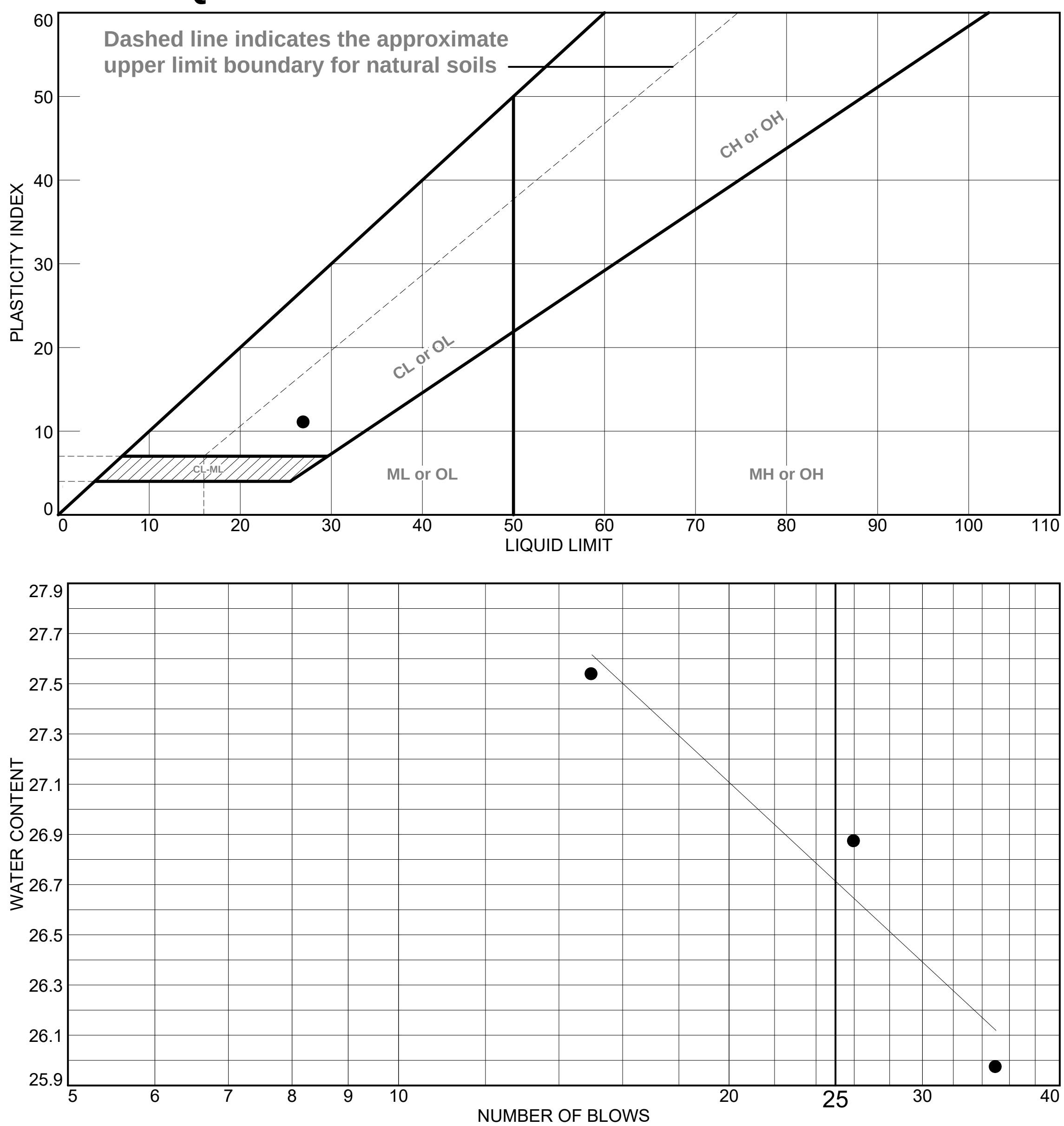
Cranston, RI

Remarks:

Figure 21-L-1513

Tested By: JM **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray CLAY & SILT	27	16	11			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: HB-WPC-201 **Depth:** 29-30.5'

Sample Number: 8D

Remarks:

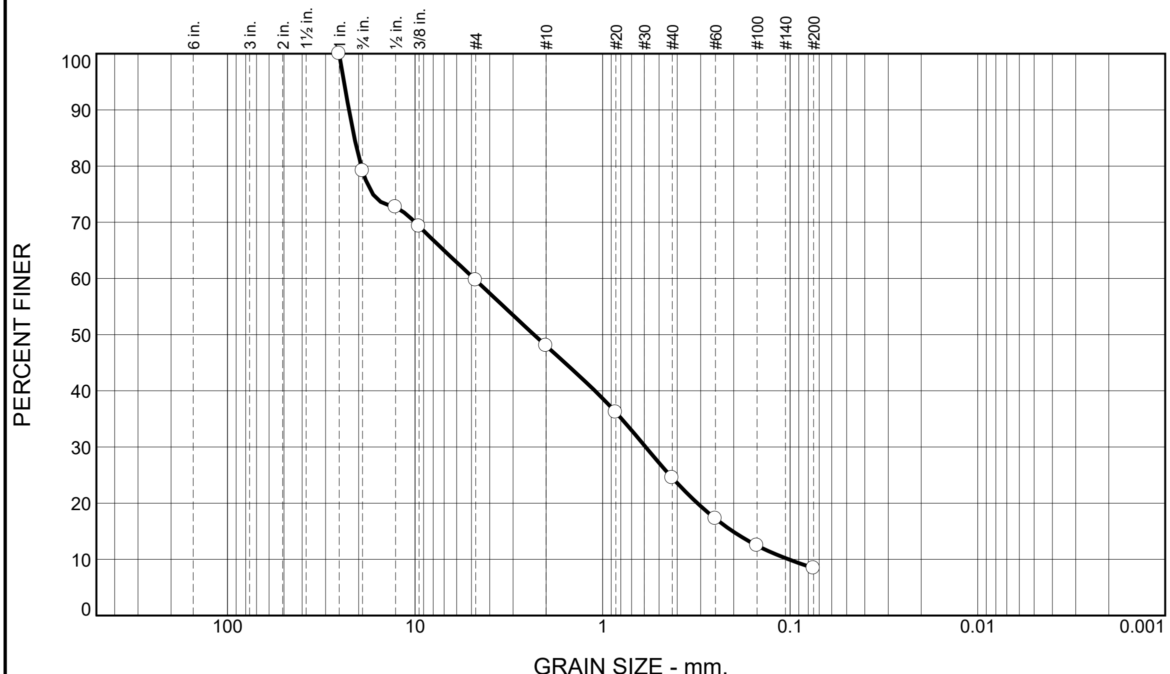
Thielsch Engineering Inc.

Cranston, RI

Figure 21-L-1514

Tested By: JM **Checked By:** SA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.8	19.5	11.7	23.5	16.1	8.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	79.2		
0.5"	72.7		
0.375"	69.3		
#4	59.7		
#10	48.0		
#20	36.2		
#40	24.5		
#60	17.2		
#100	12.4		
#200	8.4		

* (no specification provided)

Material Description

Brown gravelly fine to coarse SAND, trace Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 22.5107 D_{85}= 21.0395 D_{60}= 4.8533
D_{50}= 2.3231 D_{30}= 0.5895 D_{15}= 0.2022
D_{10}= 0.1018 C_u= 47.68 C_c= 0.70

Remarks

Date Received: 04.27.21 **Date Tested:** 05.05.21

Tested By: JM / RR / SF

Checked By: Steven Accetta

Title: Laboratory Coordinator

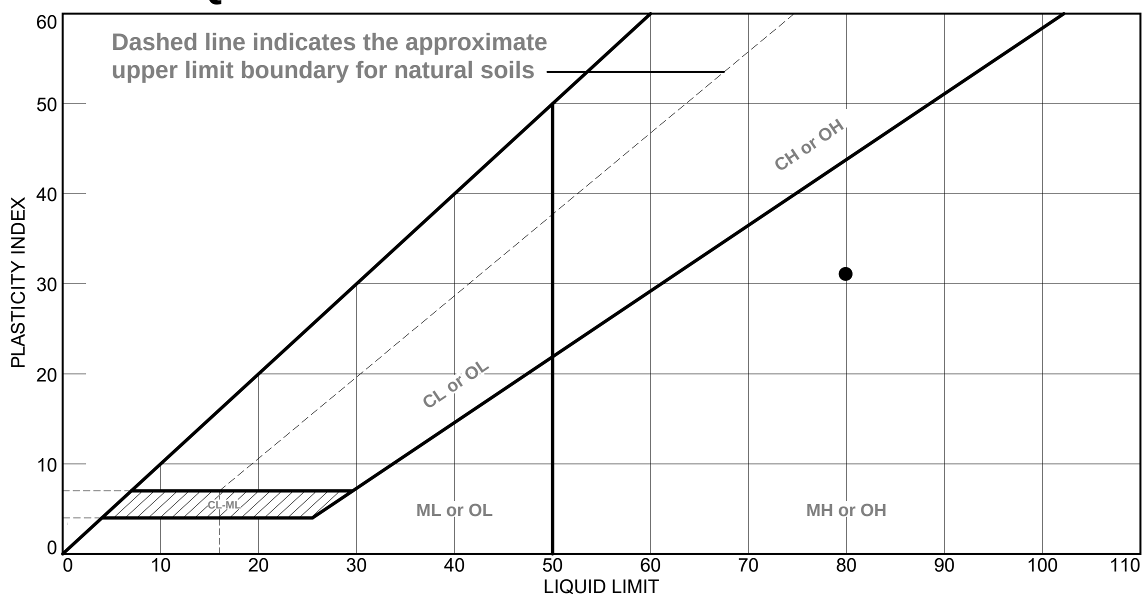
Source of Sample: HB-WPC-202 **Depth:** 0-2' **Date Sampled:**
Sample Number: 1D (Bot 7")

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1515

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown fine-grained peat	80	49	31			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: HB-WPC-202 **Depth:** 24-26'

Sample Number: 5D

Thielsch Engineering Inc.

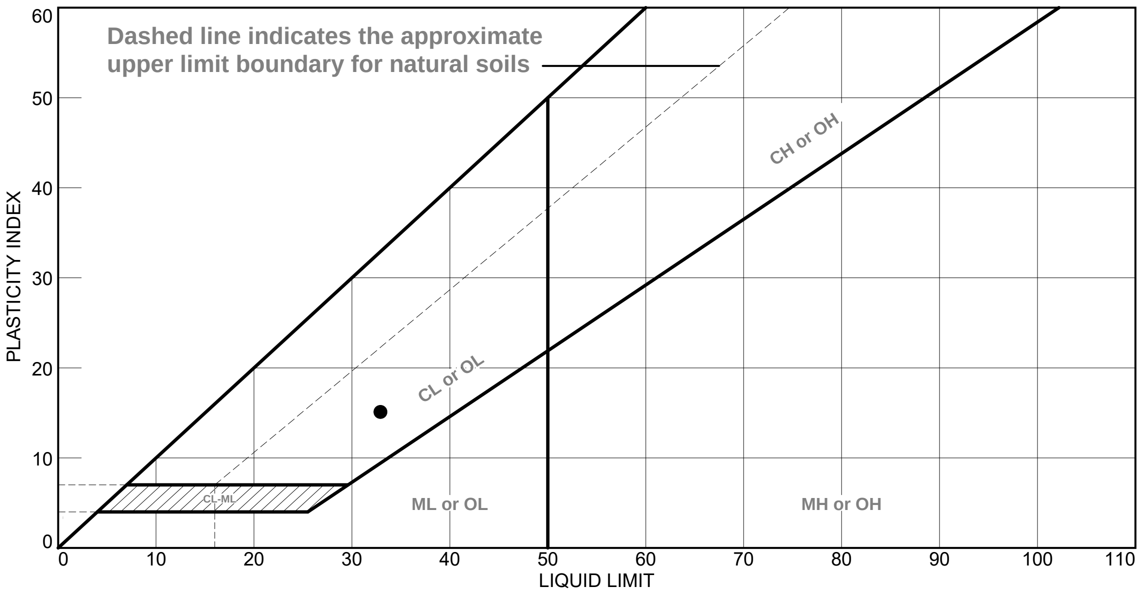
Cranston, RI

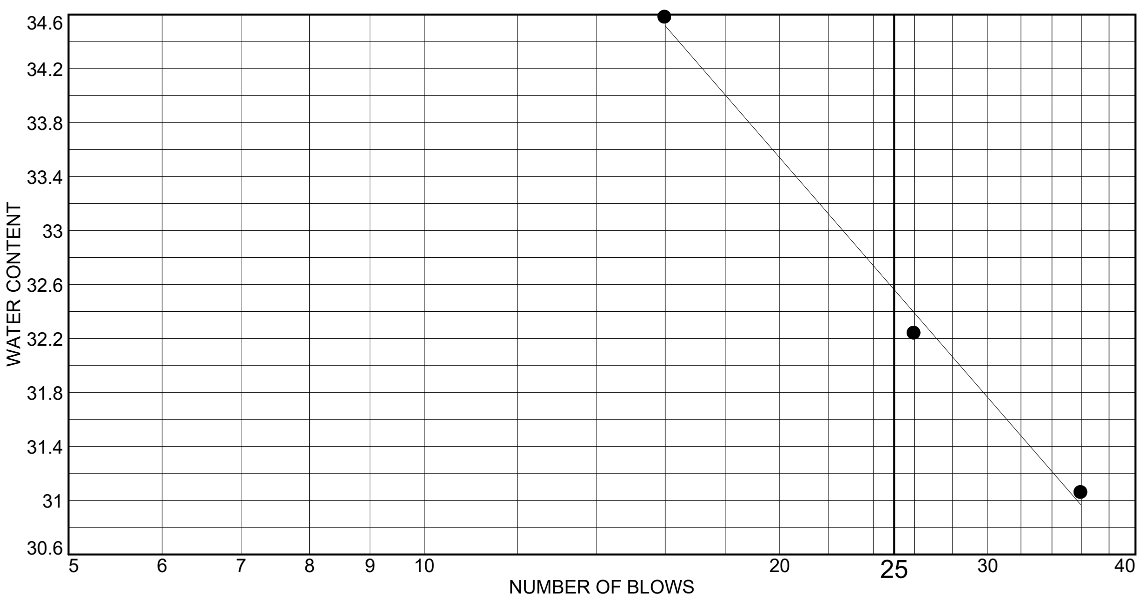
Remarks:

Figure 21-L-1517

Tested By: JM **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray CLAY & SILT	33	18	15			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: HB-WPC-202 **Depth:** 34-36'

Sample Number: 7D

Thielsch Engineering Inc.

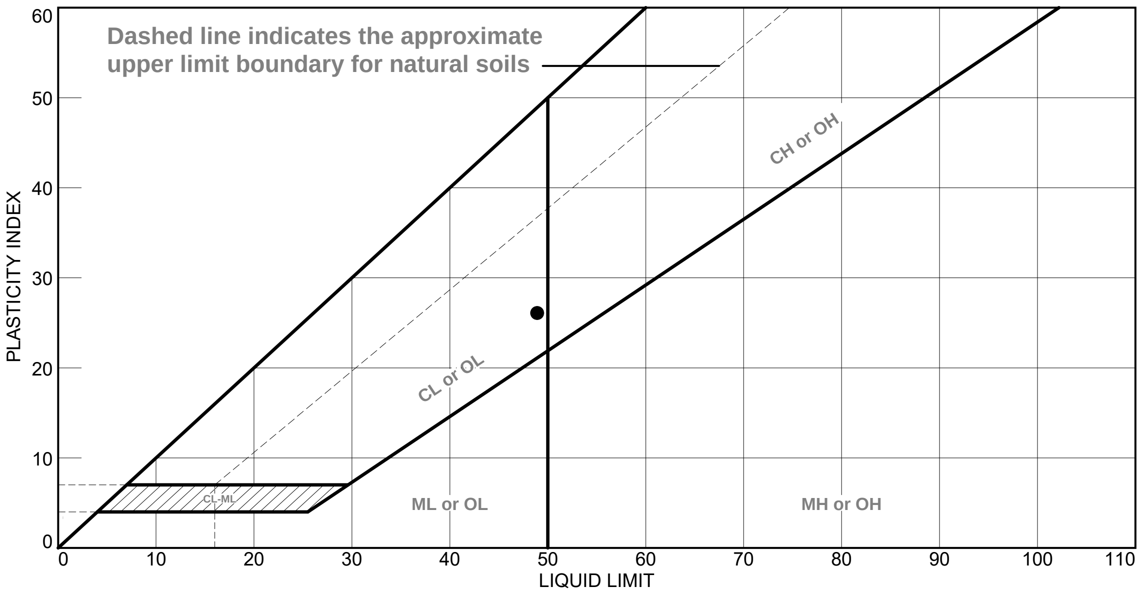
Cranston, RI

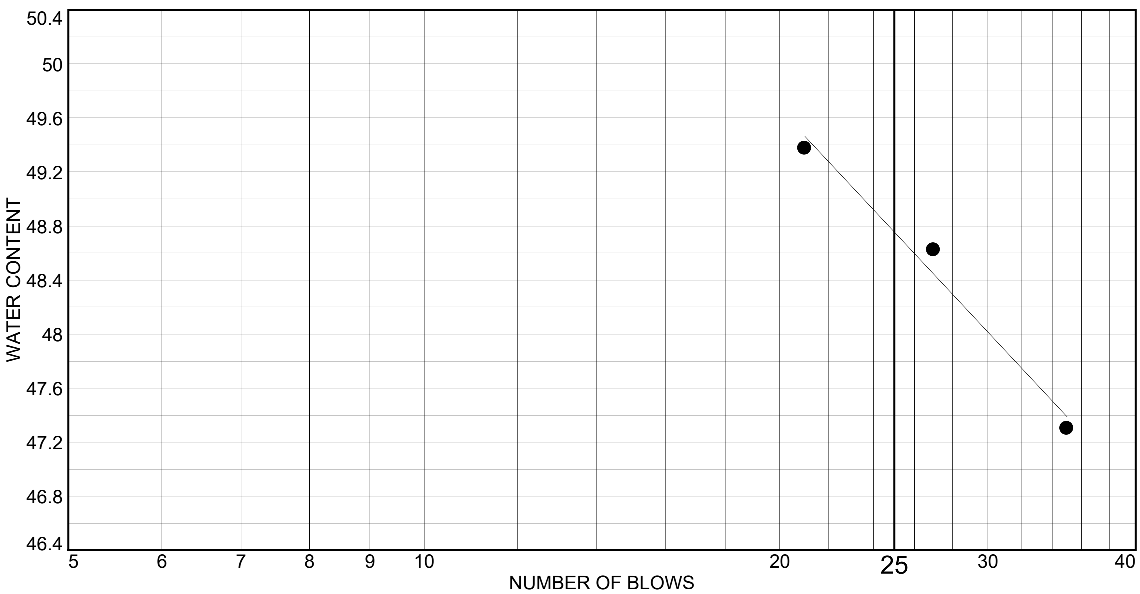
Remarks:

Figure 21-L-1518

Tested By: JM **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	49	23	26			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: HB-WPC-202 **Depth:** 49-51'

Sample Number: 9D

Thielsch Engineering Inc.

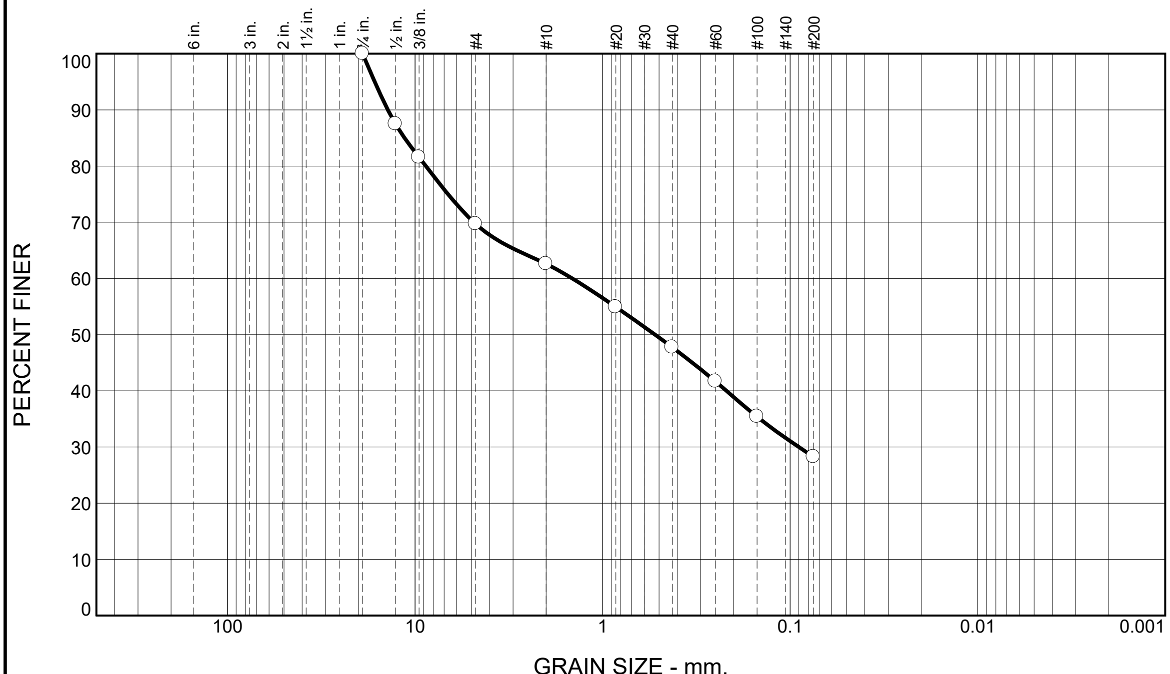
Cranston, RI

Remarks:

Figure 21-L-1519

Tested By: RR **Checked By:** SA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	30.3	7.1	14.9	19.5	28.2	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	87.5		
0.375"	81.6		
#4	69.7		
#10	62.6		
#20	54.9		
#40	47.7		
#60	41.7		
#100	35.4		
#200	28.2		

* (no specification provided)

Material Description

Gray f-c SAND, some fine Gravel, some Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 13.9616 D_{85}= 11.3824 D_{60}= 1.4493
D_{50}= 0.5254 D_{30}= 0.0899 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 04.27.21 **Date Tested:** 05.05.21

Tested By: JM / RR / SF

Checked By: Steven Accetta

Title: Laboratory Coordinator

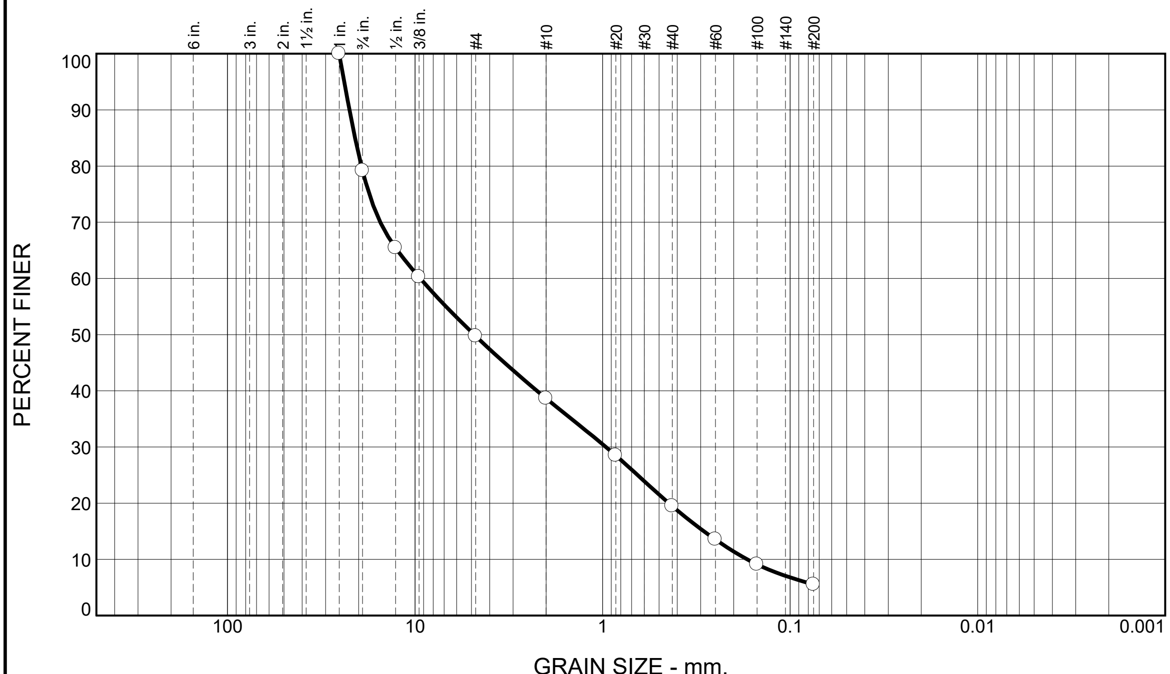
Source of Sample: HB-WPC-202 **Depth:** 79-81' **Date Sampled:**
Sample Number: 12D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1521

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.8	29.4	11.2	19.1	14.0	5.5	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	79.2		
0.5"	65.5		
0.375"	60.3		
#4	49.8		
#10	38.6		
#20	28.5		
#40	19.5		
#60	13.5		
#100	9.1		
#200	5.5		

* (no specification provided)

Material Description

Brown sandy fine to coarse GRAVEL, trace Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 22.3670 D_{85}= 20.8810 D_{60}= 9.3825
D_{50}= 4.8359 D_{30}= 0.9608 D_{15}= 0.2882
D_{10}= 0.1693 C_u= 55.43 C_c= 0.58

Remarks

Date Received: 04.27.21 **Date Tested:** 05.05.21

Tested By: JM / RR / SF

Checked By: Steven Accetta

Title: Laboratory Coordinator

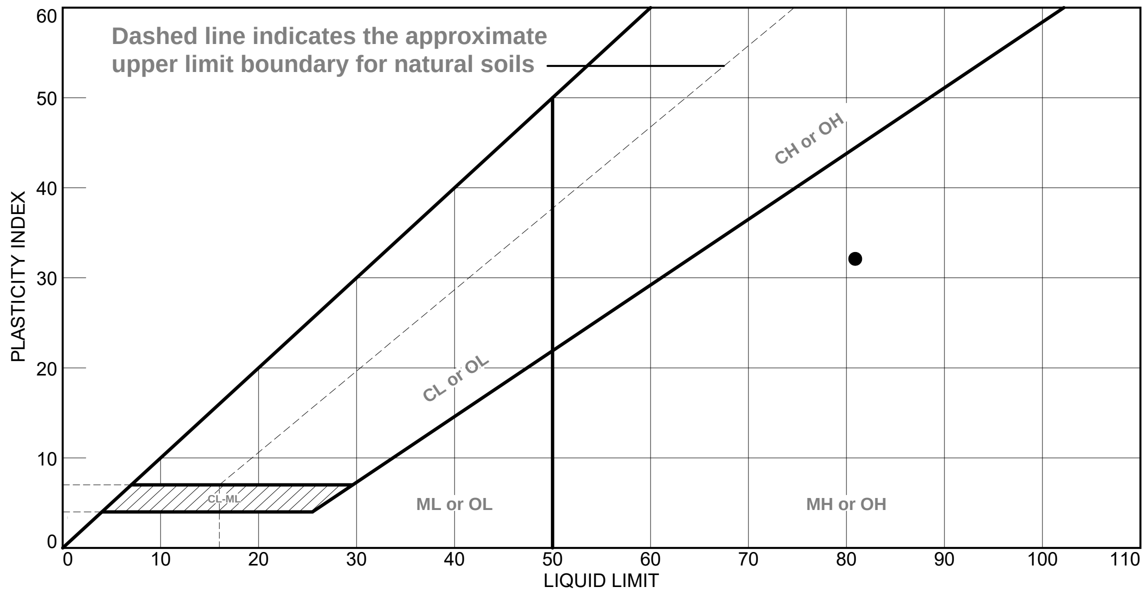
Source of Sample: HB-WPC-203 **Depth:** 0-2' **Date Sampled:**
Sample Number: 1D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1522

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Silty CLAY	81	49	32			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: HB-WPC-203 **Depth:** 19-21'

Sample Number: 5D

Remarks:

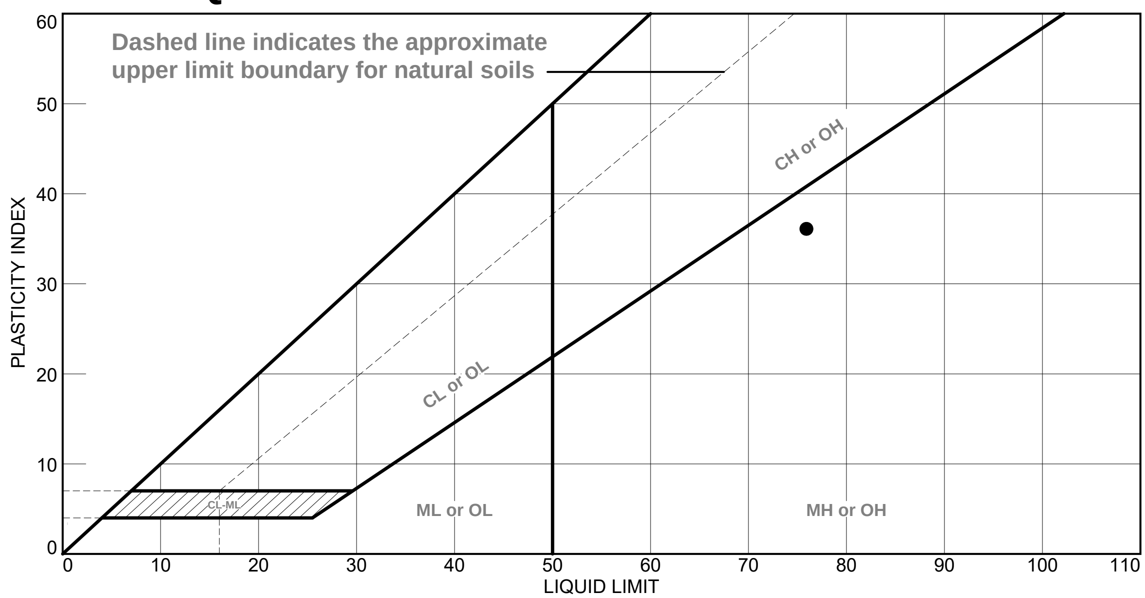
Thielsch Engineering Inc.

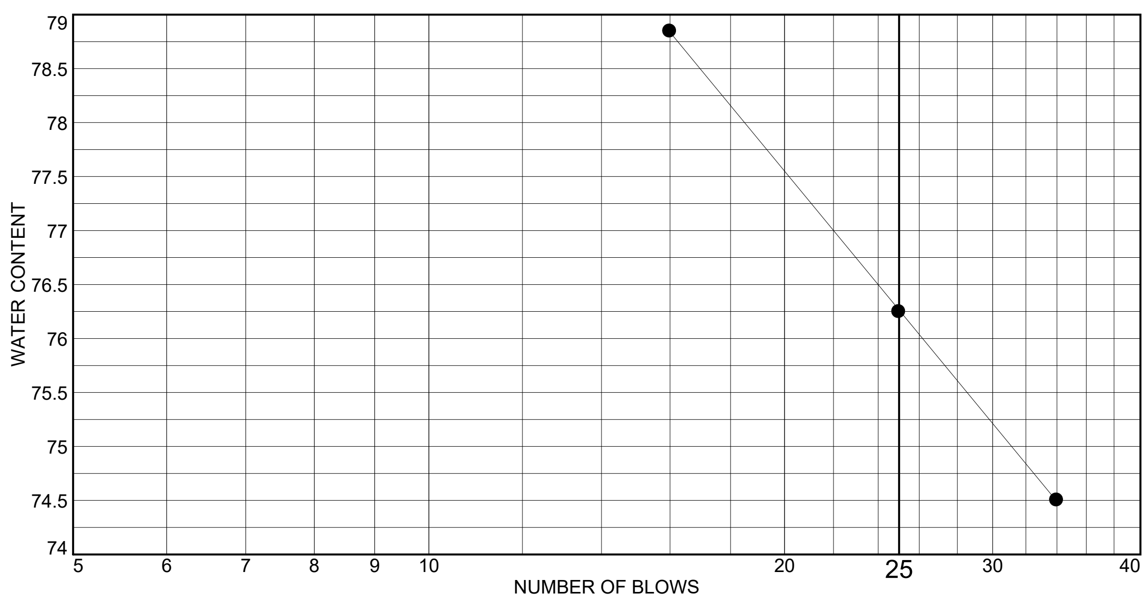
Cranston, RI

Figure 21-L-1523

Tested By: RR **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Silty CLAY	76	40	36			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: HB-WPC-203 **Depth:** 35-37'

Sample Number: 9D

Remarks:

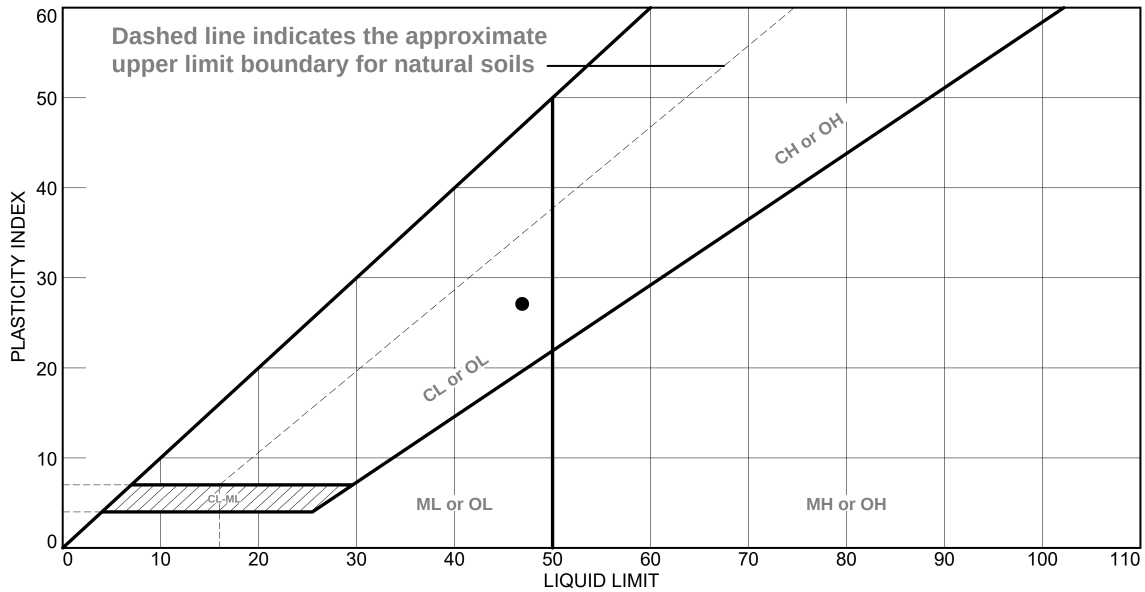
Thielsch Engineering Inc.

Cranston, RI

Figure 21-L-1524

Tested By: JM **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	47	20	27			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: HB-WPC-203 **Depth:** 59-61'

Sample Number: 15D

Remarks:

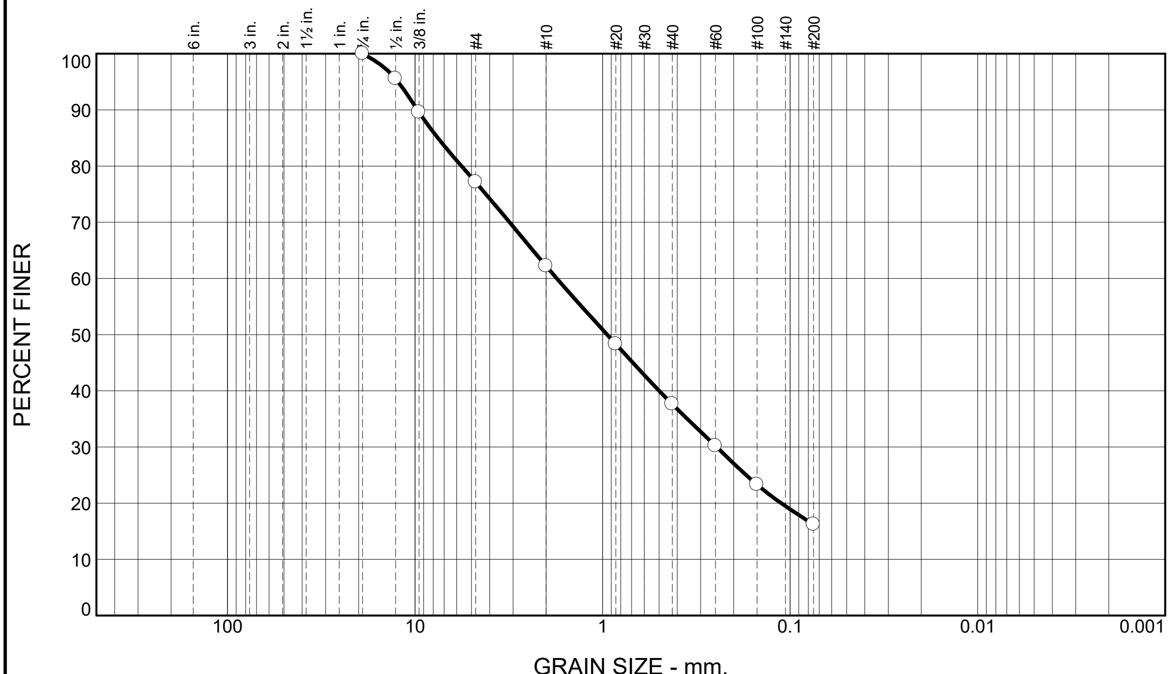
Thielsch Engineering Inc.

Cranston, RI

Figure 21-L-1526

Tested By: JM **Checked By:** SA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	22.9	14.9	24.6	21.4	16.2	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	95.6		
0.375"	89.6		
#4	77.1		
#10	62.2		
#20	48.3		
#40	37.6		
#60	30.2		
#100	23.3		
#200	16.2		

* (no specification provided)

Material Description

Brown f-c SAND, some fine Gravel, little Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 9.7123 D_{85}= 7.5490 D_{60}= 1.7532
D_{50}= 0.9460 D_{30}= 0.2465 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 04.27.21 **Date Tested:** 05.05.21

Tested By: JM / RR / SF

Checked By: Steven Accetta

Title: Laboratory Coordinator

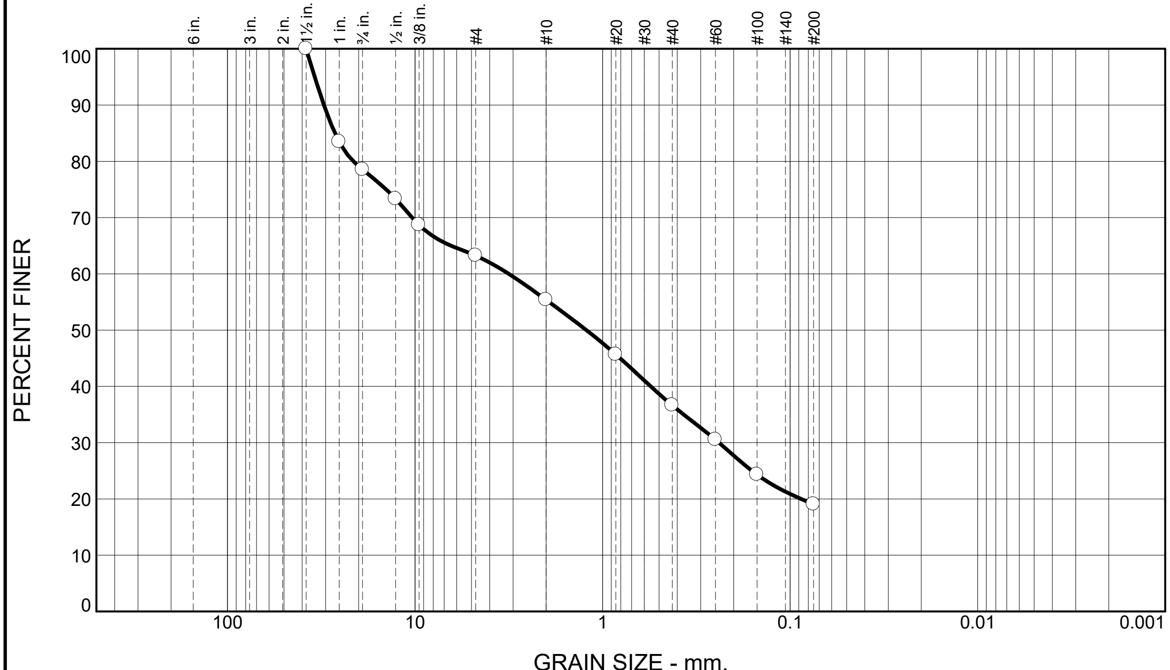
Source of Sample: HB-WPC-204 **Depth:** 0.5-2.5' **Date Sampled:**
Sample Number: 1D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1529

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	21.5	15.3	7.8	18.8	17.5	19.1	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	83.5		
3/4"	78.5		
1/2"	73.3		
3/8"	68.7		
#4	63.2		
#10	55.4		
#20	45.7		
#40	36.6		
#60	30.5		
#100	24.3		
#200	19.1		

* (no specification provided)

Material Description

Brown gravelly fine to coarse SAND, little Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 30.5929 D_{85}= 26.7380 D_{60}= 3.1626
D_{50}= 1.2199 D_{30}= 0.2396 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 04.27.21 **Date Tested:** 05.05.21

Tested By: JM / RR / SF

Checked By: Steven Accetta

Title: Laboratory Coordinator

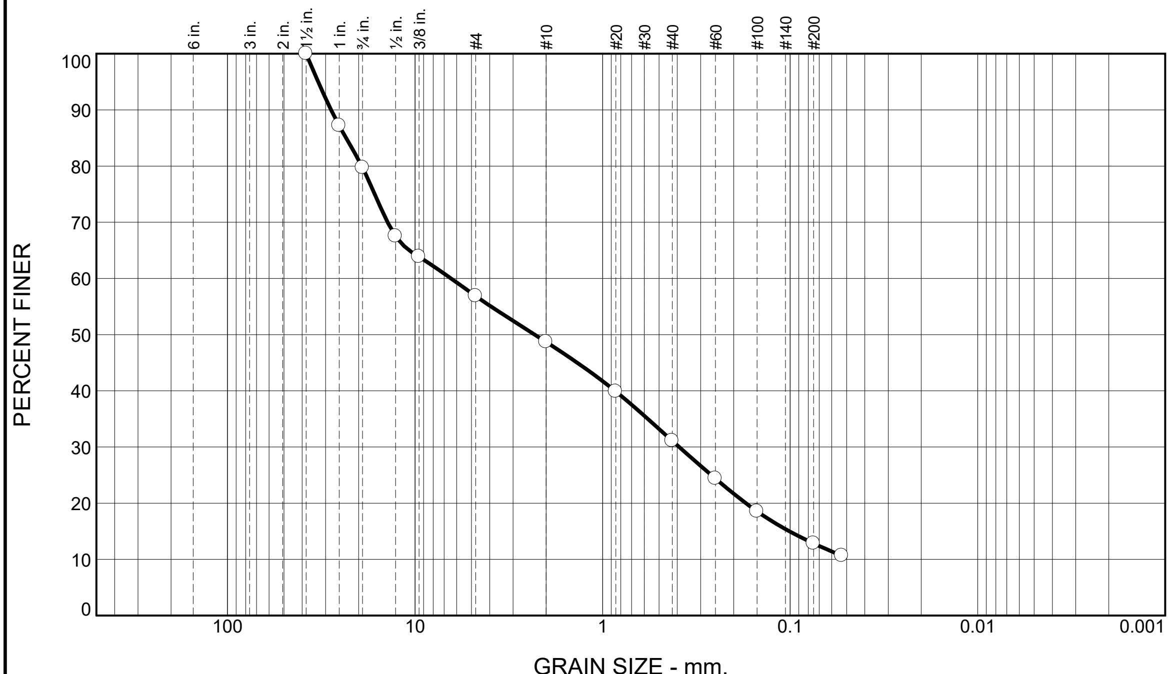
Source of Sample: HB-WPC-205 **Depth:** 5-7' **Date Sampled:**
Sample Number: 2D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1530

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.3	22.8	8.2	17.6	18.3	12.8	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	87.2		
3/4"	79.7		
1/2"	67.5		
3/8"	63.9		
#4	56.9		
#10	48.7		
#20	39.9		
#40	31.1		
#60	24.4		
#100	18.5		
#200	12.8		
#270	10.6		

* (no specification provided)

Material Description

Light Brown gravelly fine to coarse SAND, little Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 28.0228 D_{85}= 23.3142 D_{60}= 6.4316
D_{50}= 2.3012 D_{30}= 0.3904 D_{15}= 0.1010
D_{10}= C_u= C_c=

Remarks

Date Received: 04.27.21 **Date Tested:** 05.03.21

Tested By: RR / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

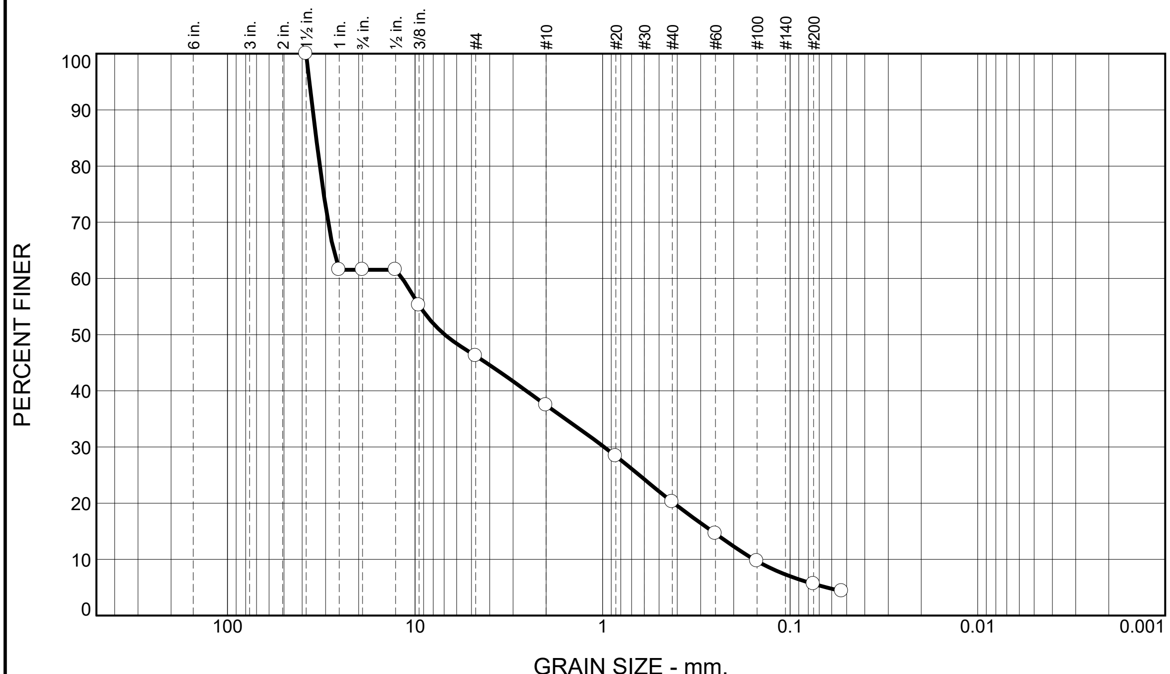
Source of Sample: BB-WPC-201/201A **Depth:** 3-5' **Date Sampled:**
Sample Number: 2D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1531

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	38.5	15.3	8.8	17.2	14.6	5.6	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	61.5		
3/4"	61.5		
1/2"	61.5		
3/8"	55.3		
#4	46.2		
#10	37.4		
#20	28.4		
#40	20.2		
#60	14.6		
#100	9.7		
#200	5.6		
#270	4.3		

* (no specification provided)

Material Description

Light Brown sandy fine to coarse GRAVEL, trace Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 35.1097 D_{85}= 33.6518 D_{60}= 11.6980
D_{50}= 6.9378 D_{30}= 0.9822 D_{15}= 0.2604
D_{10}= 0.1558 C_u= 75.09 C_c= 0.53

Remarks

Date Received: 04.27.21 **Date Tested:** 05.03.21

Tested By: RR / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

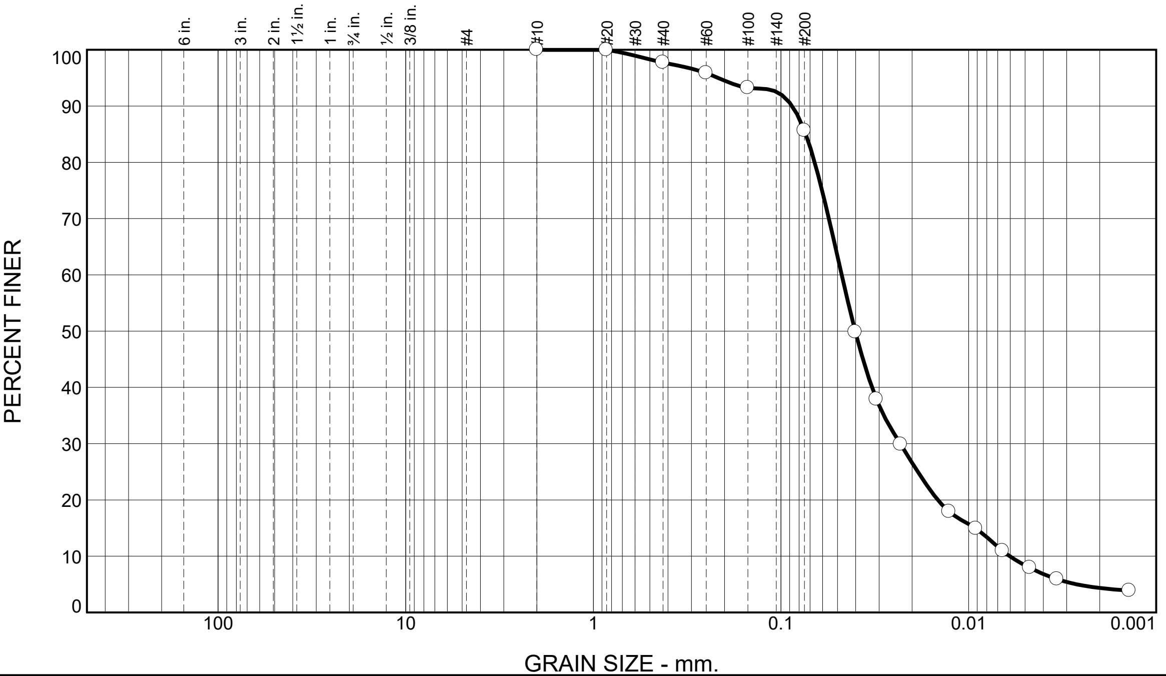
Source of Sample: BB-WPC-201/201A **Depth:** 11-13' **Date Sampled:**
Sample Number: 6D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1532

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	2.3	12.1	81.3	4.3

Test Results (D7928 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#10	100.0		
#20	100.0		
#40	97.7		
#60	95.9		
#100	93.2		
#200	85.6		
0.0401 mm.	49.8		
0.0309 mm.	37.9		
0.0230 mm.	29.9		
0.0127 mm.	17.9		
0.0091 mm.	14.9		
0.0066 mm.	10.9		
0.0047 mm.	7.9		
0.0034 mm.	5.9		
0.0014 mm.	3.9		

* (no specification provided)

Material Description

Dark Gray CLAYEY SILT, little f-m Sand

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.0872 D_{85}= 0.0738 D_{60}= 0.0475

D_{50}= 0.0402 D_{30}= 0.0231 D_{15}= 0.0092

D_{10}= 0.0060 C_u= 7.87 C_c= 1.87

Remarks

Sample visually classified as plastic. Sample rolled to 1/4".

Date Received: 04.27.21 **Date Tested:** 05.03.21

Tested By: RR / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: BB-WPC-201/201A **Depth:** 19-21' **Date Sampled:**

Sample Number: 8D

Thielsch Engineering Inc.

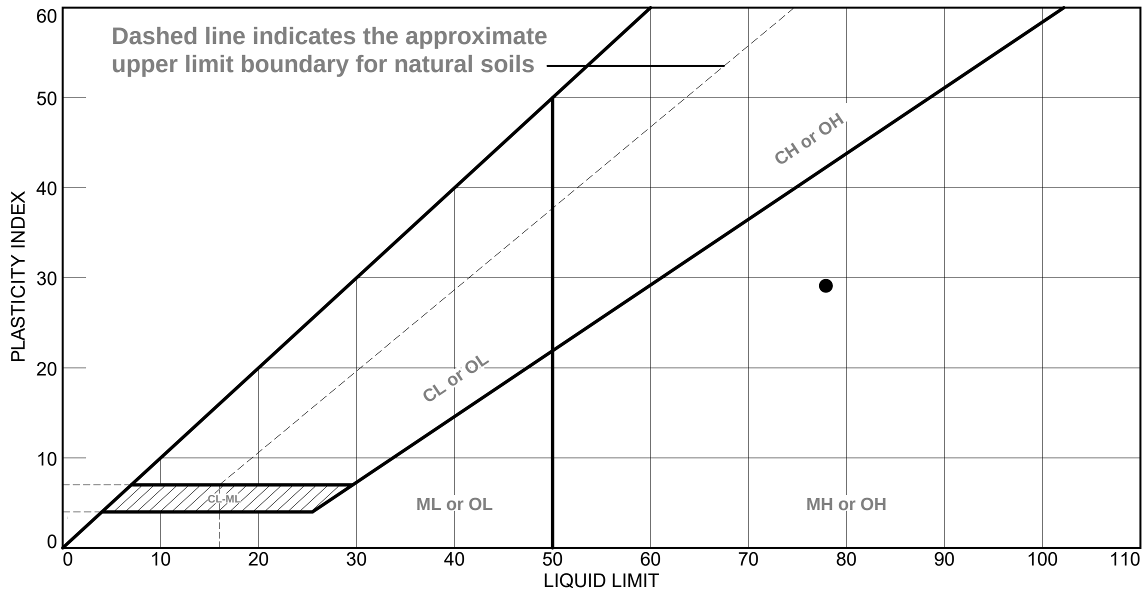
Cranston, RI

Client: GZA GeoEnvironmental

Project: Pleasant Cove Bridge
Woolwich, ME

Project No: 09.0026037.01 **Figure** 21-S-1533

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Silty CLAY	78	49	29			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: BB-WPC-201/201A **Depth:** 29-31'

Sample Number: 9D

Thielsch Engineering Inc.

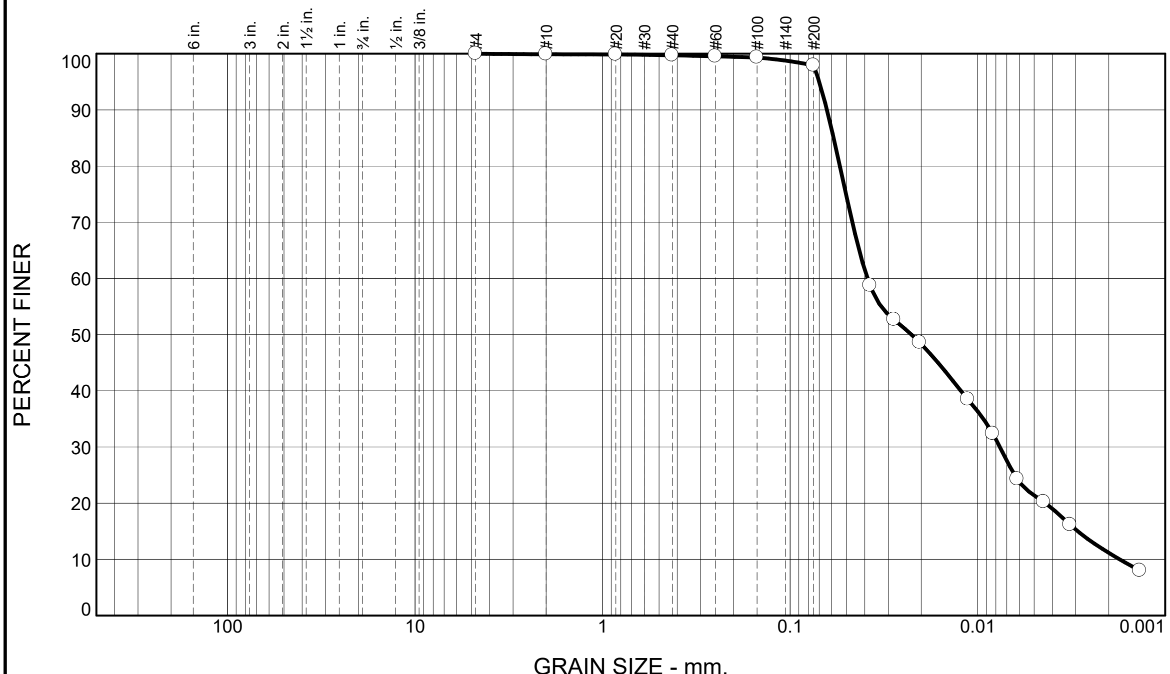
Cranston, RI

Remarks:

Figure 21-L-1534

Tested By: RR **Checked By:** SA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.2	1.8	86.8	11.1

Test Results (D7928 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.9		
#20	99.9		
#40	99.7		
#60	99.5		
#100	99.3		
#200	97.9		
0.0375 mm.	58.7		
0.0279 mm.	52.7		
0.0204 mm.	48.6		
0.0113 mm.	38.5		
0.0083 mm.	32.4		
0.0061 mm.	24.3		
0.0044 mm.	20.2		
0.0032 mm.	16.1		
0.0014 mm.	8.0		

* (no specification provided)

Material Description

Dark Gray SILT & CLAY, trace f-m Sand

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= CL AASHTO (M 145)= A-4(0)

Coefficients

D_{90}= 0.0636 D_{85}= 0.0586 D_{60}= 0.0387
D_{50}= 0.0225 D_{30}= 0.0076 D_{15}= 0.0029
D_{10}= 0.0017 C_u= 22.11 C_c= 0.86

Remarks

Sample visually classified as plastic. Sample rolled to 1/8".

Date Received: 04.27.21 **Date Tested:** 05.03.21

Tested By: RR / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

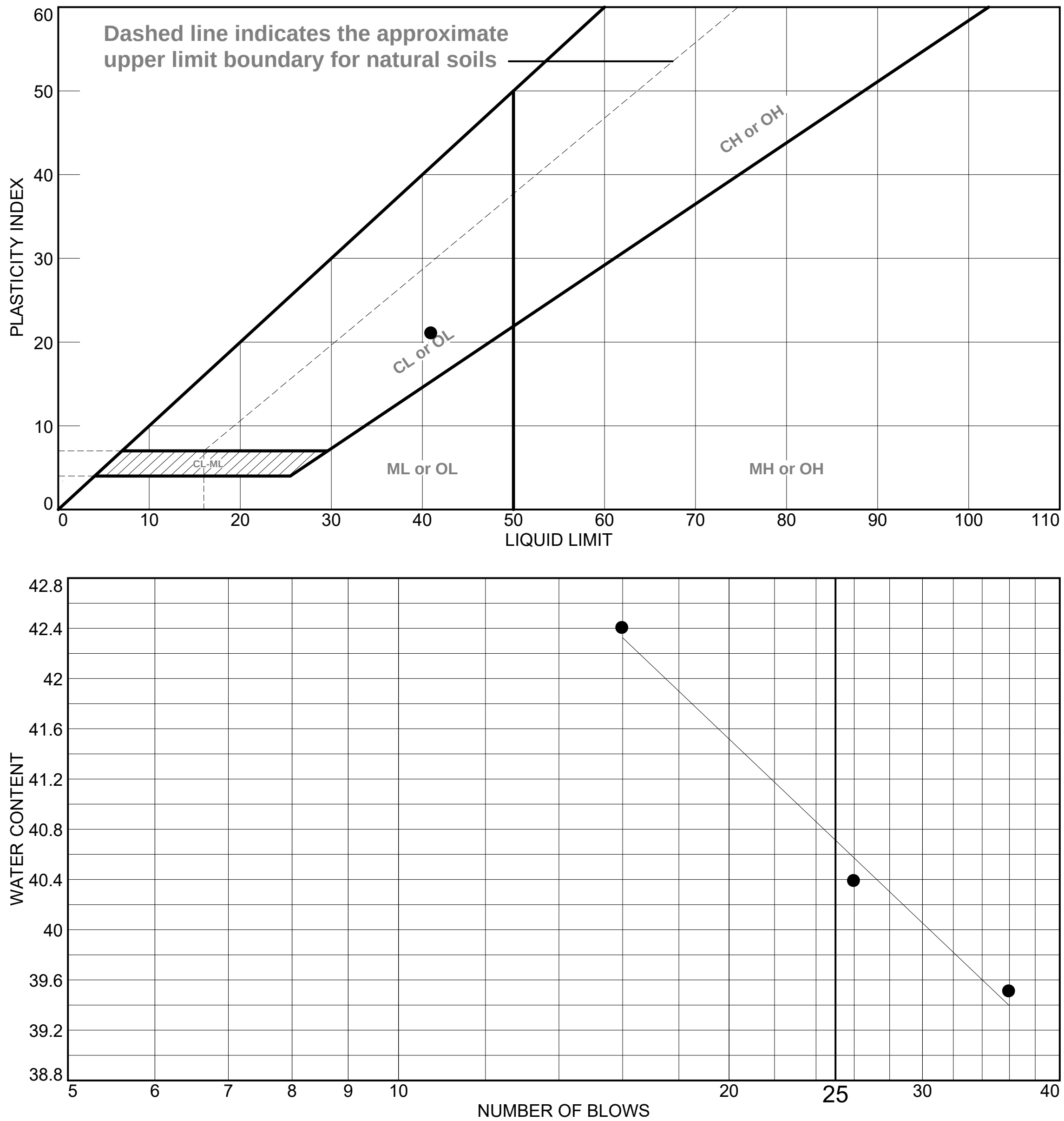
Source of Sample: BB-WPC-201/201A **Depth:** 44-46' **Date Sampled:**
Sample Number: 15D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1536

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	41	20	21			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: BB-WPC-201/201A **Depth:** 59-61'

Sample Number: 17D

Thielsch Engineering Inc.

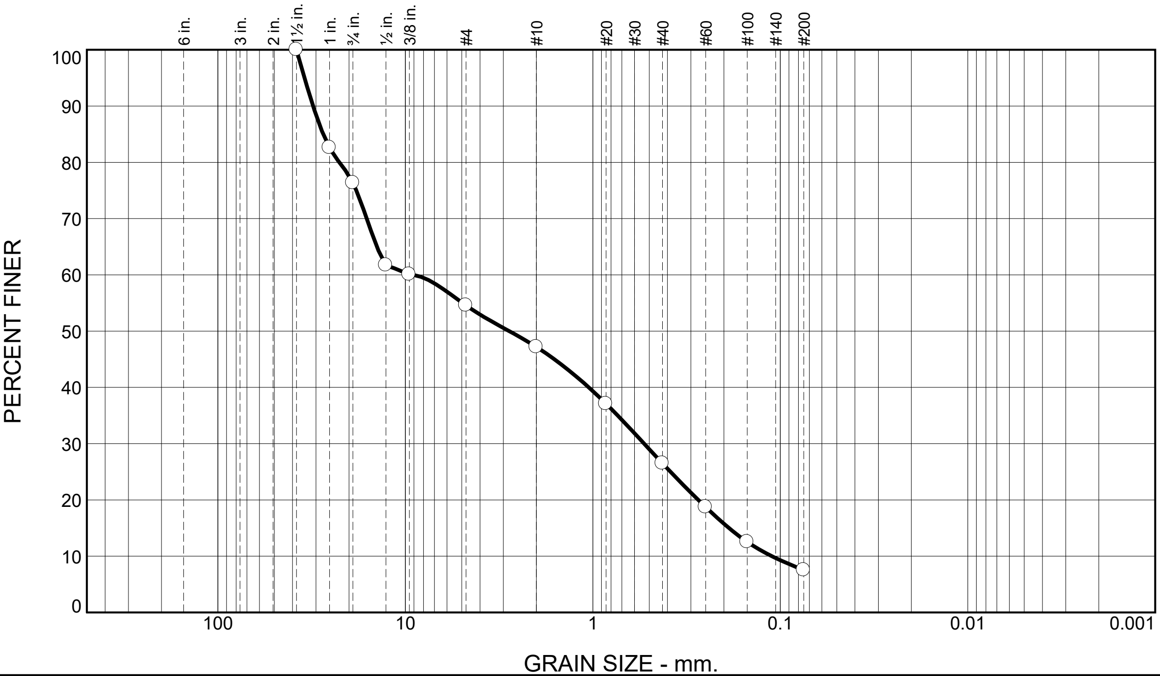
Cranston, RI

Remarks:

Figure 21-L-1538

Tested By: JM **Checked By:** SA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	23.7	21.7	7.4	20.7	19.0	7.5	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	82.6		
3/4"	76.3		
1/2"	61.7		
3/8"	60.1		
#4	54.6		
#10	47.2		
#20	37.1		
#40	26.5		
#60	18.7		
#100	12.5		
#200	7.5		

* (no specification provided)

Material Description

Brown gravelly fine to coarse SAND, trace Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 31.0530 D_{85}= 27.4274 D_{60}= 9.0919
D_{50}= 2.7923 D_{30}= 0.5324 D_{15}= 0.1877
D_{10}= 0.1109 C_u= 81.95 C_c= 0.28

Remarks

Date Received: 04.27.21 **Date Tested:** 05.05.21

Tested By: JM / RR / SF

Checked By: Steven Accetta

Title: Laboratory Coordinator

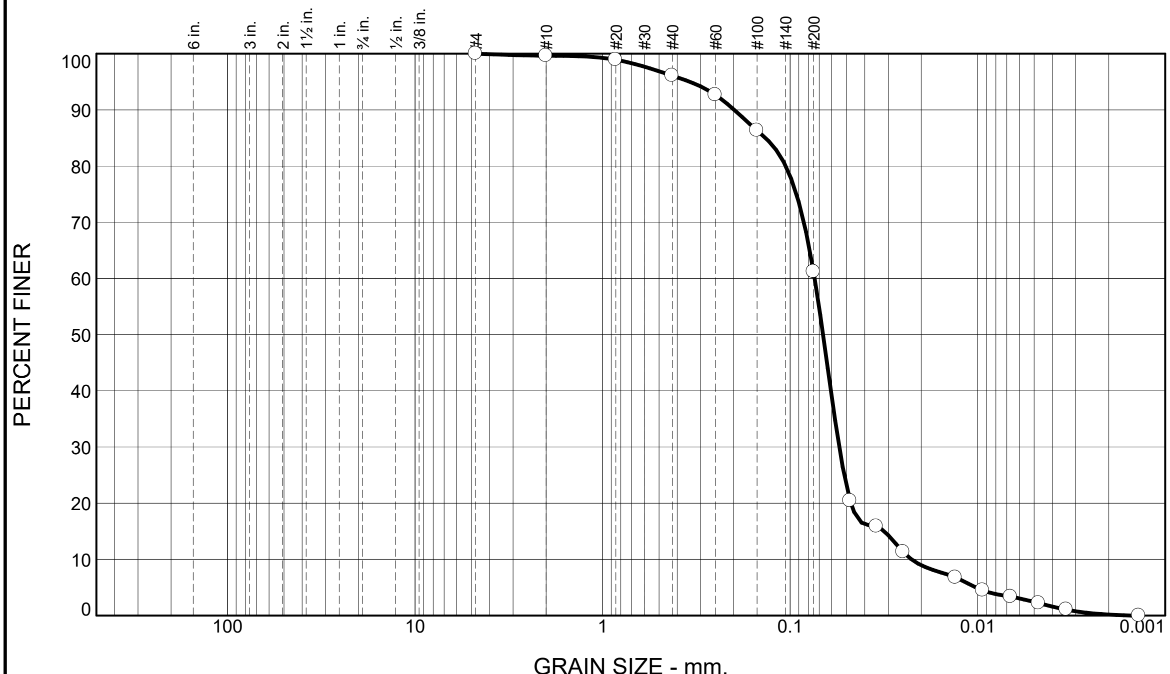
Source of Sample: BB-WPC-202 **Depth:** 5-7' **Date Sampled:**
Sample Number: 2D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1540

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.4	3.5	34.9	61.0	0.2

Test Results (D7928 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.6		
#20	98.9		
#40	96.1		
#60	92.7		
#100	86.3		
#200	61.2		
0.0479 mm.	20.4		
0.0346 mm.	15.9		
0.0250 mm.	11.3		
0.0131 mm.	6.8		
0.0094 mm.	4.5		
0.0067 mm.	3.4		
0.0047 mm.	2.2		
0.0034 mm.	1.1		
0.0014 mm.	0.0		

* (no specification provided)

Material Description

Dark Gray Organic sandy SILT

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= OL AASHTO (M 145)= A-5

Coefficients

D_{90}= 0.1985 D_{85}= 0.1352 D_{60}= 0.0740
D_{50}= 0.0668 D_{30}= 0.0547 D_{15}= 0.0315
D_{10}= 0.0225 C_u= 3.29 C_c= 1.80

Remarks

Sample visually classified as plastic. Sample rolled to 1/8".

Date Received: 04.27.21 **Date Tested:** 05.03.21

Tested By: RR / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

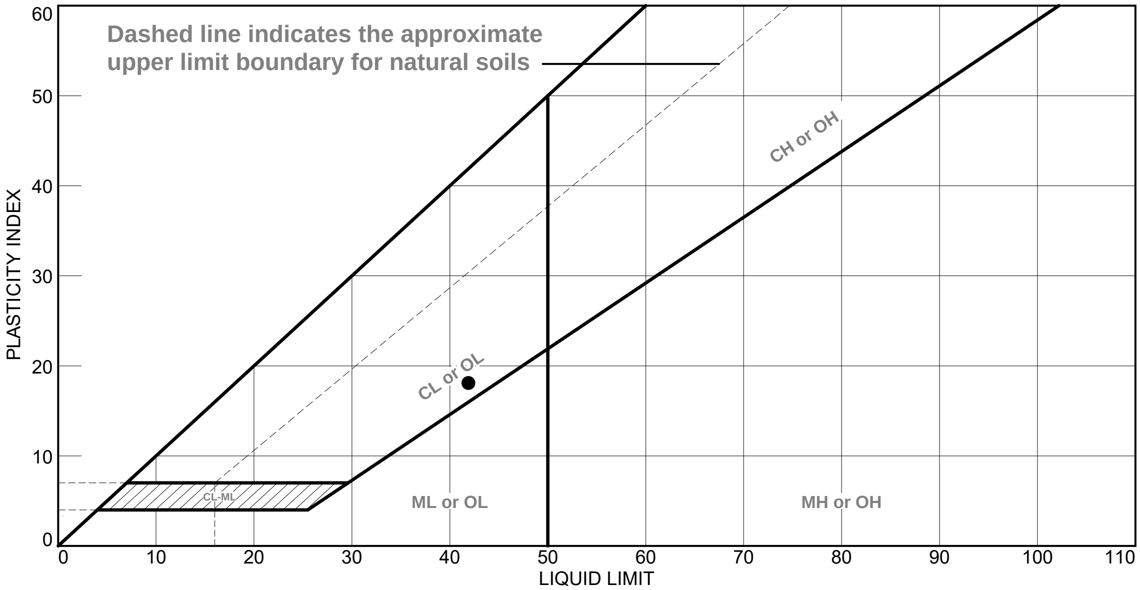
Source of Sample: BB-WPC-202 **Depth:** 25-27' **Date Sampled:**
Sample Number: 5D

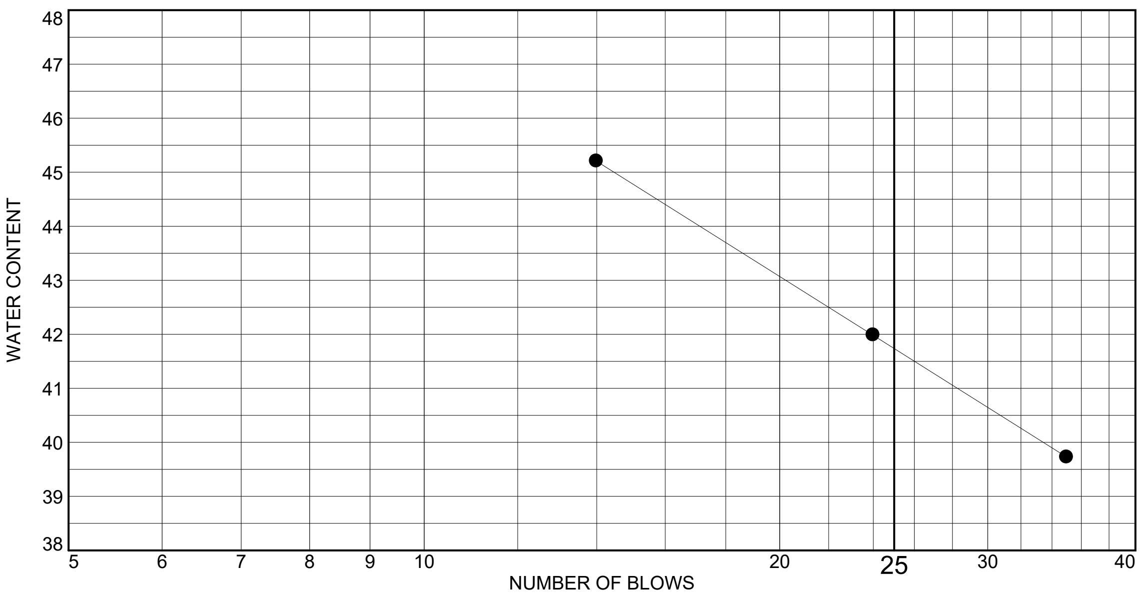
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1541

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Olive CLAY & SILT	42	24	18			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: BB-WPC-202 **Depth:** 45-47'

Sample Number: 9D

Thielsch Engineering Inc.

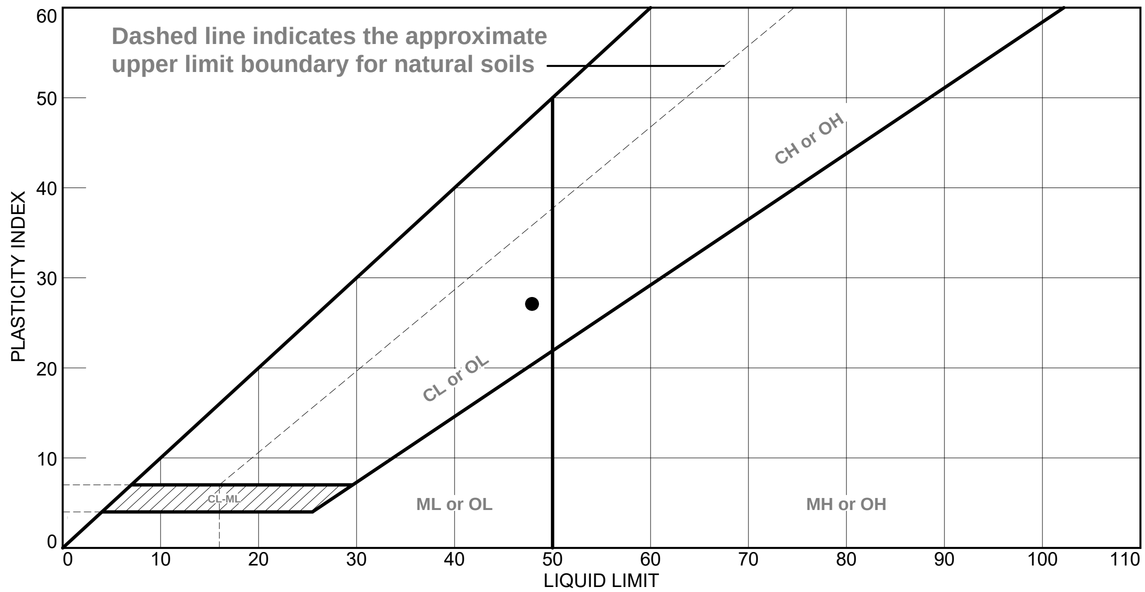
Cranston, RI

Remarks:

Figure 21-L-1542

Tested By: RR **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	48	21	27			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: BB-WPC-202 **Depth:** 55-57'

Sample Number: 11D

Thielsch Engineering Inc.

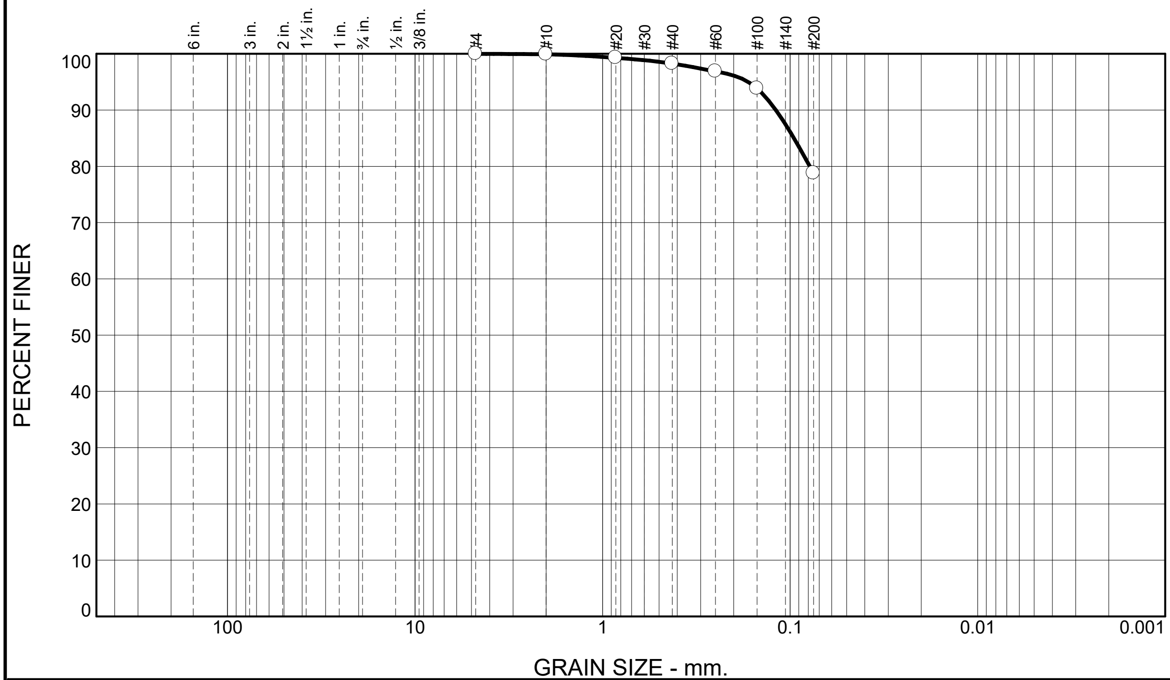
Cranston, RI

Remarks:

Figure 21-L-1543

Tested By: JM **Checked By:** SA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.6	19.5	78.8	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.9		
#20	99.3		
#40	98.3		
#60	96.9		
#100	93.8		
#200	78.8		

* (no specification provided)

Material Description

Gray SILT & CLAY, some fine Sand

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= CL AASHTO (M 145)= A-4(0)

Coefficients

D_{90}= 0.1191 D_{85}= 0.0955 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as plastic. Sample rolled to 1/8".

Date Received: 04.27.21 **Date Tested:** 05.05.21

Tested By: JM / RR / SF

Checked By: Steven Accetta

Title: Laboratory Coordinator

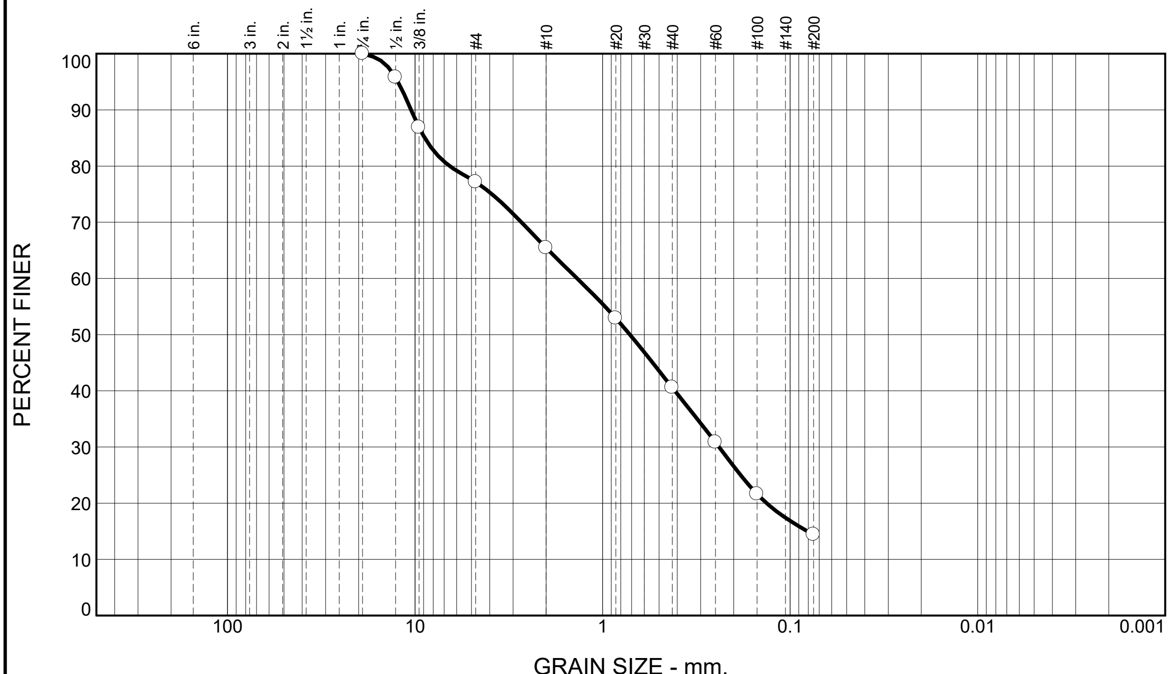
Source of Sample: BB-WPC-202 **Depth:** 80-82' **Date Sampled:**
Sample Number: 14D (Bot 18")

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1545

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	22.8	11.7	24.9	26.2	14.4	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	95.8		
0.375"	86.9		
#4	77.2		
#10	65.5		
#20	52.9		
#40	40.6		
#60	30.8		
#100	21.6		
#200	14.4		

* (no specification provided)

Material Description

Brown f-c SAND, some fine Gravel, little Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 10.5113 D_{85}= 8.8677 D_{60}= 1.3660
D_{50}= 0.7153 D_{30}= 0.2393 D_{15}= 0.0808
D_{10}= C_u= C_c=

Remarks

Date Received: 04.27.21 **Date Tested:** 05.05.21

Tested By: JM / RR / SF

Checked By: Steven Accetta

Title: Laboratory Coordinator

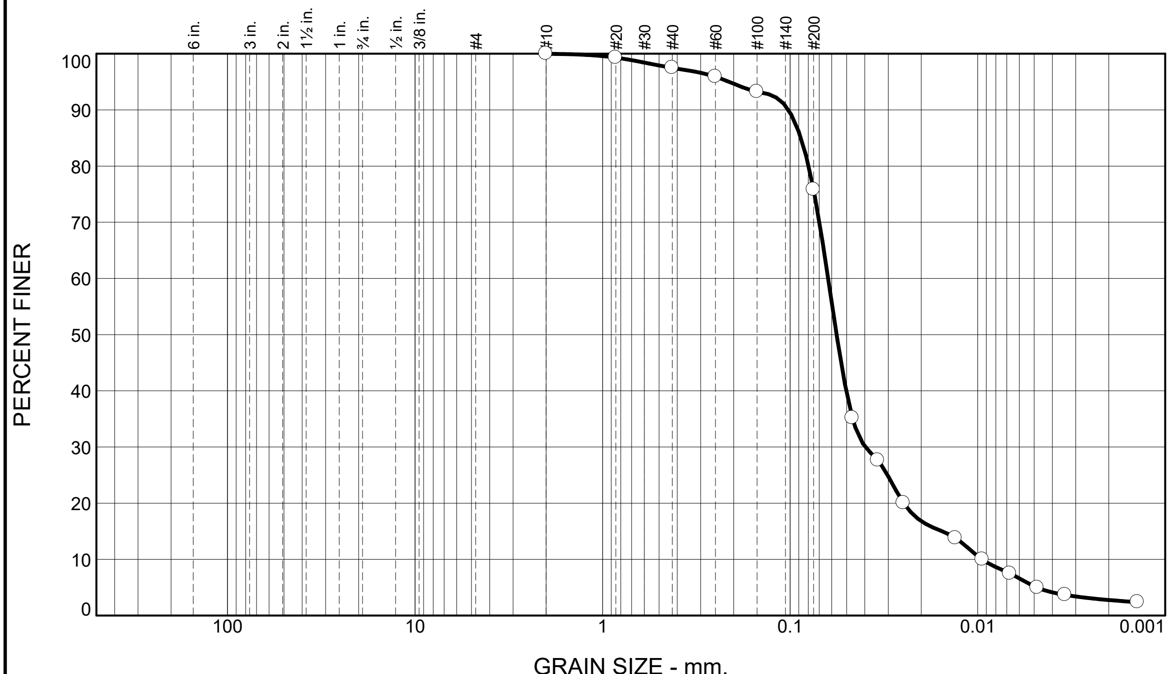
Source of Sample: BB-WPC-203 **Depth:** 1-3' **Date Sampled:**
Sample Number: 1D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1546

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	2.5	21.7	73.0	2.8

Test Results (D7928 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#10	100.0		
#20	99.3		
#40	97.5		
#60	95.9		
#100	93.2		
#200	75.8		
0.0466 mm.	35.2		
0.0341 mm.	27.6		
0.0249 mm.	20.1		
0.0132 mm.	13.8		
0.0094 mm.	10.0		
0.0067 mm.	7.5		
0.0048 mm.	5.0		
0.0034 mm.	3.7		
0.0014 mm.	2.4		

* (no specification provided)

Material Description

Dark Gray Organic SILT, some f-m Sand

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= OL AASHTO (M 145)= A-5

Coefficients

D_{90}= 0.1022 D_{85}= 0.0876 D_{60}= 0.0628
D_{50}= 0.0566 D_{30}= 0.0397 D_{15}= 0.0155
D_{10}= 0.0095 C_u= 6.63 C_c= 2.66

Remarks

Sample visually classified as plastic. Sample rolled to 1/8".

Date Received: 04.27.21 **Date Tested:** 05.03.21

Tested By: RR / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

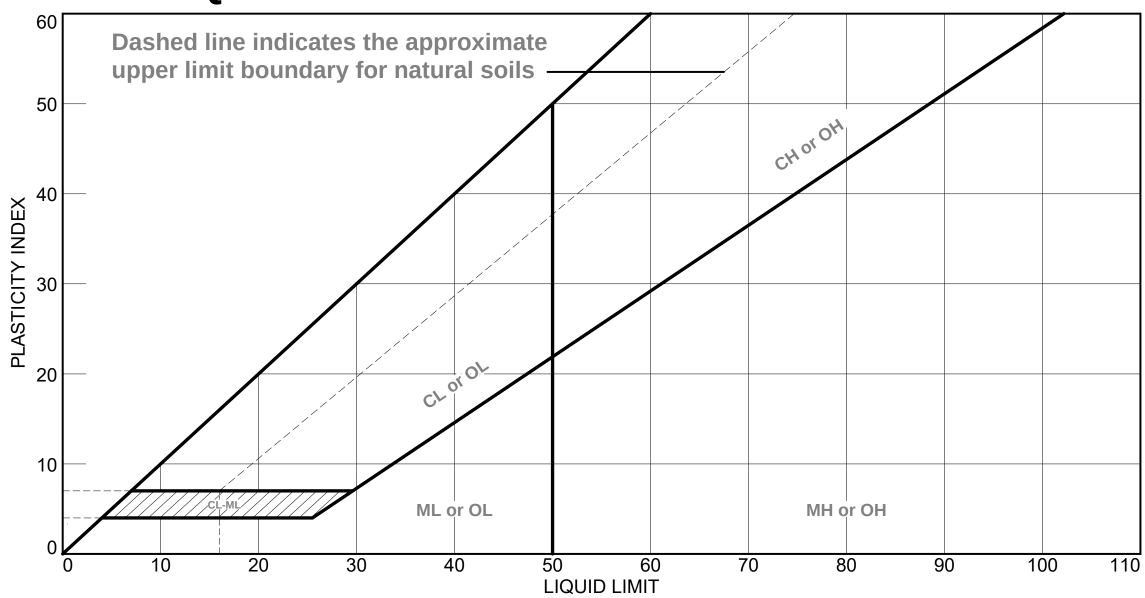
Source of Sample: BB-WPC-203 **Depth:** 20-22' **Date Sampled:**
Sample Number: 8D

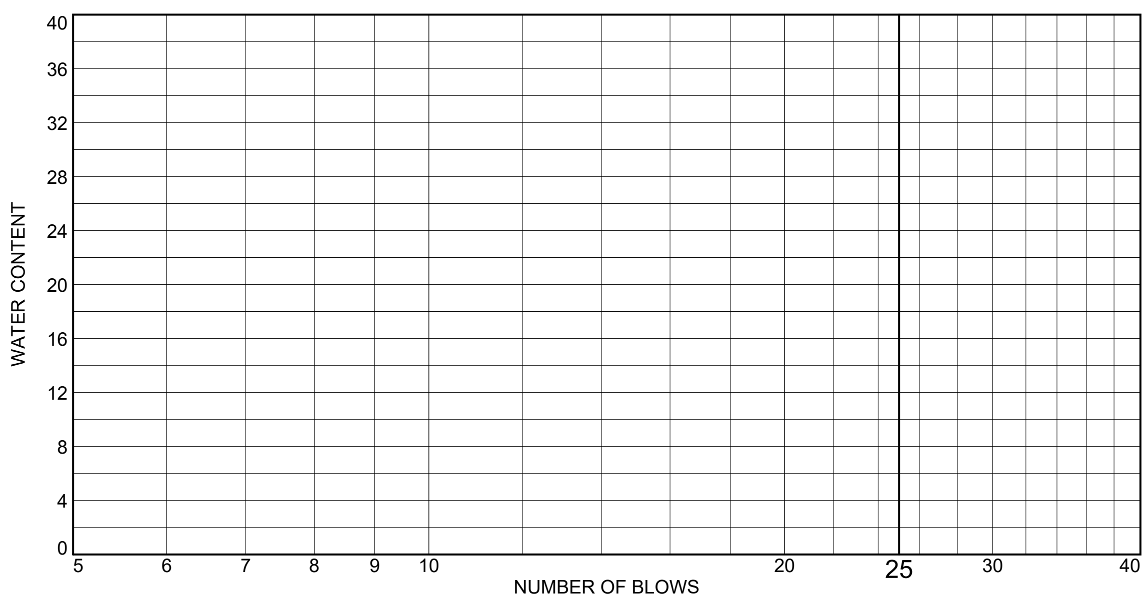
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Pleasant Cove Bridge
Woolwich, ME
Project No: 09.0026037.01 **Figure** 21-S-1547

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown SILT	NV	NP	NP			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: BB-WPC-203 **Depth:** 30-32'

Sample Number: 10D

Thielsch Engineering Inc.

Cranston, RI

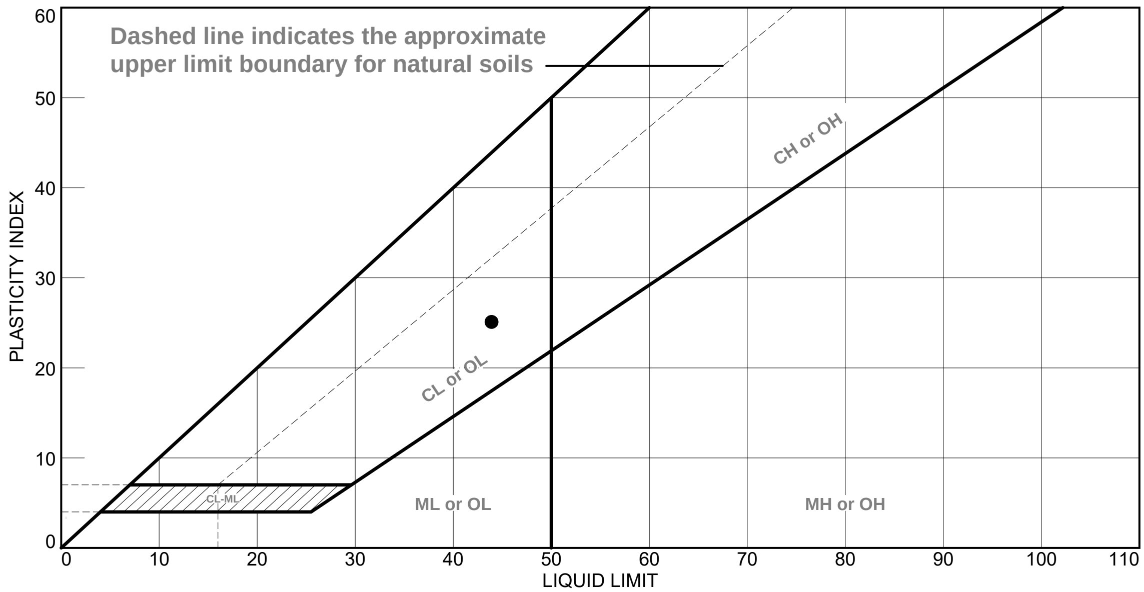
Remarks:

●Sample classified as non-plastic and non-viscous. Sample could not roll past 1/4" and could not achieve more than 25 blows.

Figure 21-L-1546

Tested By: RR **Checked By:** RR

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	44	19	25			

Project No. 09.0026037.01 **Client:** GZA GeoEnvironmental

Project: Pleasant Cove Bridge

Woolwich, ME

Source of Sample: BB-WPC-203 **Depth:** 60-62'

Sample Number: 16D

Thielsch Engineering Inc.

Cranston, RI

Remarks:

Figure 21-L-1551

Tested By: JM **Checked By:** SA

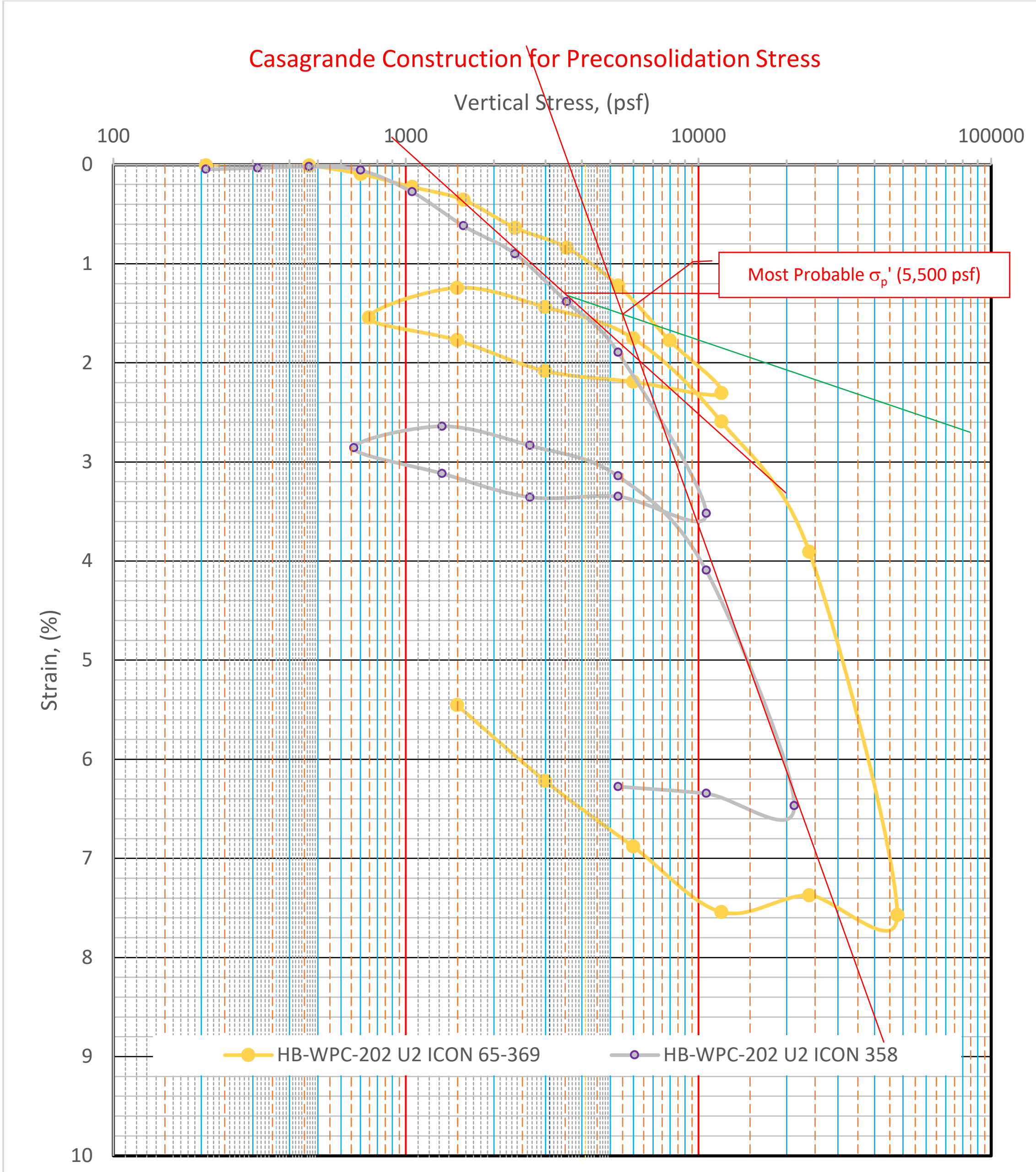
Summary Table
Atterberg Limits, Moisture Contents and Organic Contents
GZA -- Pleasant Cove

Boring No	Sample No	Sample depth	Specimin Depth	Plastic Limit	Liquid Limit	Plasticity Index	Natural MC	Liquidity Index	Classification	Organic Content
WPC-202	U2	39 - 41	40.9	24.0	45.5	21.5	35.0	0.51	CL	
WPC-203	U1	13-15	14.85	61.4	71.0	9.6	69.3	0.82	OH	6.02
WPC-203	U2	29-31	30.8	57.4	75.0	17.6	66.5	0.52	OH	6.03
WPC-203	U3	49-51	50.9	25.1	47.4	22.3	41.9	0.75	CL	
WPC-203	U4	79-81	80.9	22.8	42.9	20.1	39.4	0.83	CL	
BB WS46-305	U1	8-10	9.35	50.7	85.2	34.5	84.1	0.97	OH	5.32

Consolidation Test Data
Summary Report

Project Name:	Pleasant Cove
Project Number:	166-21
Project Location:	Woolwich, ME
Client:	GZA
Sample Description:	Gray Silty Clay
Preparation:	Trimmed Shelby Tube

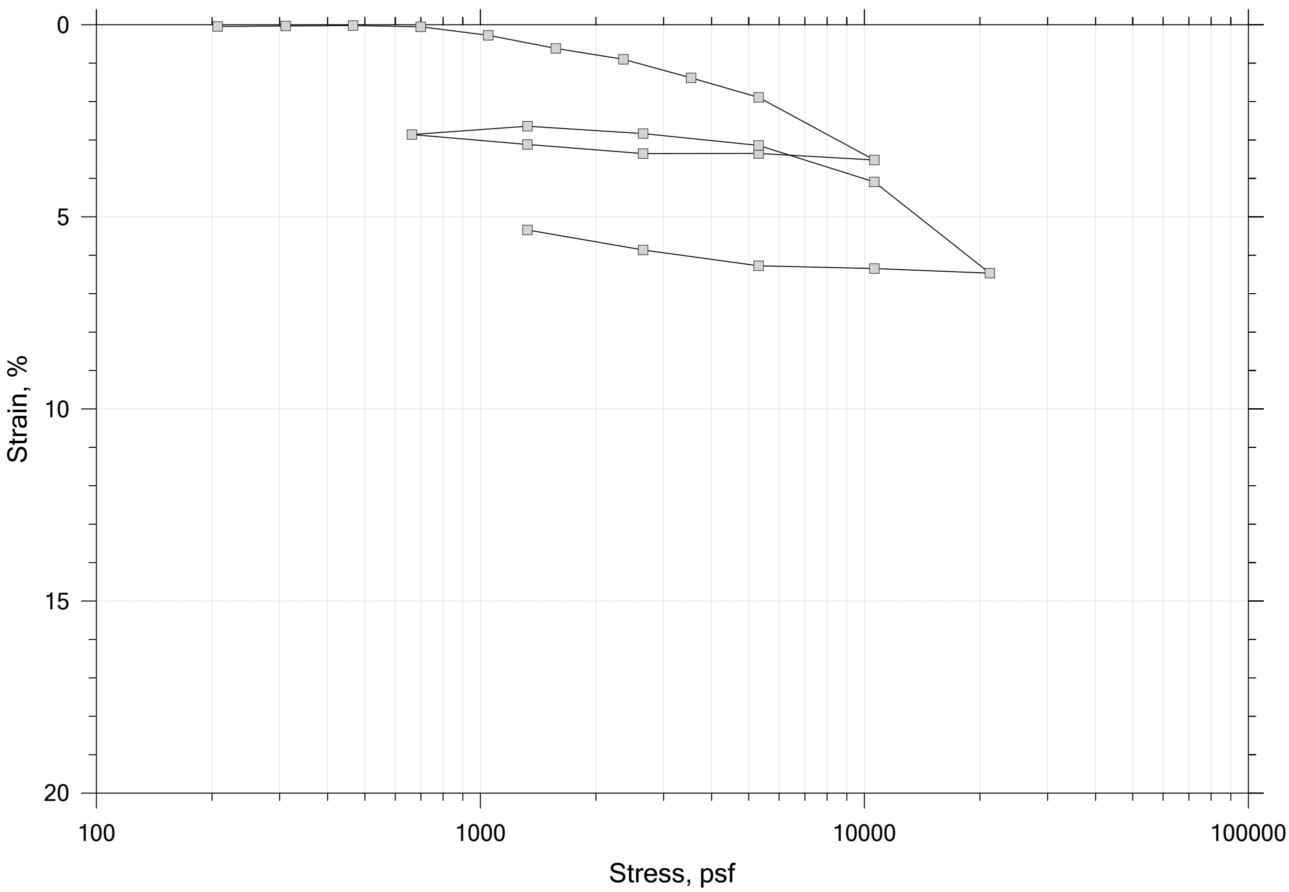
Lab Test No:	ICON 358PCOVE	ICON 65-369		
Boring No.	HB-WPC-202	HB-WPC-202		
Sample No:	U2	U2		
Boring Elevation (ft).				
Sample Depth (ft):	39-41	39-41		
Test Specimen Depth (Ft):	40.8	40.65		
Test Specimen Elevation:				
Water Content (%):	35.0	33.7		
Dry Unit Weight (pcf):	85.9	88.3		
Wet Unit Weight (pcf):	115.9	118.1		
Saturation Before (%):	93.7	99.2		
Saturation After (%):	100	100.0		
Void Ratio Before:	1.12	0.99		
Void Ratio After:	1.01	0.88		
Overburden Pressure (psf):	--			
Max Previous stress (psf):	5,500	--		
Max Prev. stress (Work) (psf):	5,400	--		
OCR:	--			
Compression Index (C_{CE}):	0.081	--		
Recompression Index (C_{RE}):	0.03	--		
Liquid Limit:	45.5	45.5		
Plastic Limit:	24.0	24.0		
Plasticity Index:	21.5	21.5		
Liquidity Index:	0.51	0.45		
Specific Gravity (implied)	2.91	2.82		
Organic Content (%)	--	--		
Tested By:	sjr	sjr		
Date Tested:	5/3/2021	6/2/2021		
Checked By:	sjr	sjr		

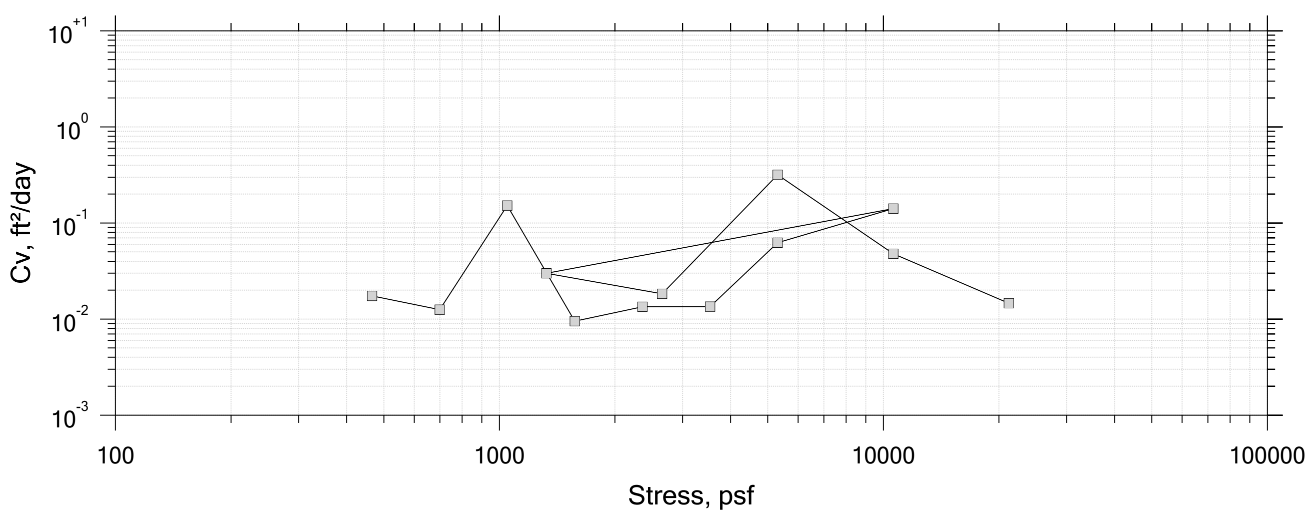


Soil Metrics LLC
Geotechnical Engineering

One-Dimensional Consolidation by ASTM D2435 - Method B

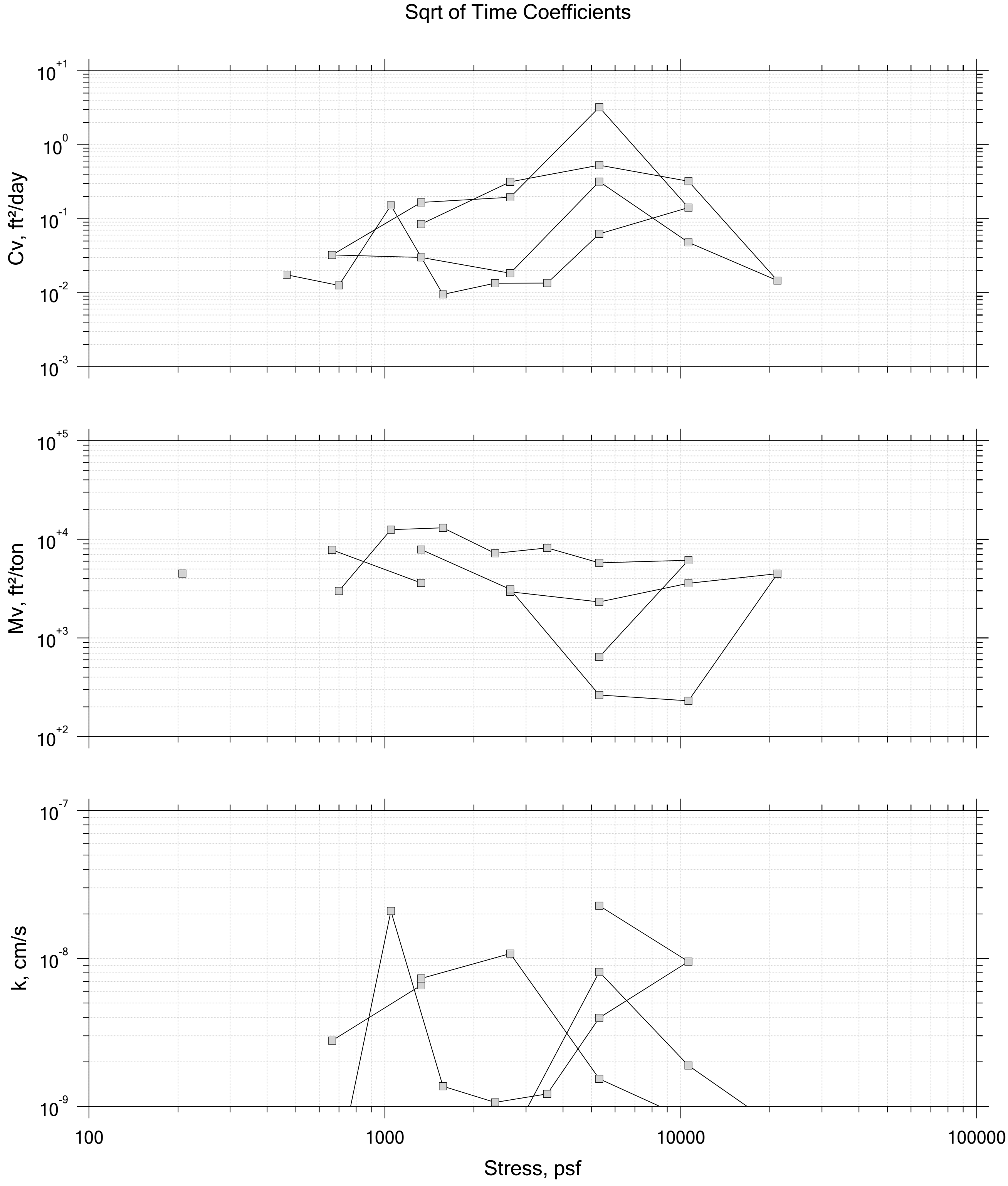
Summary Report





Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B



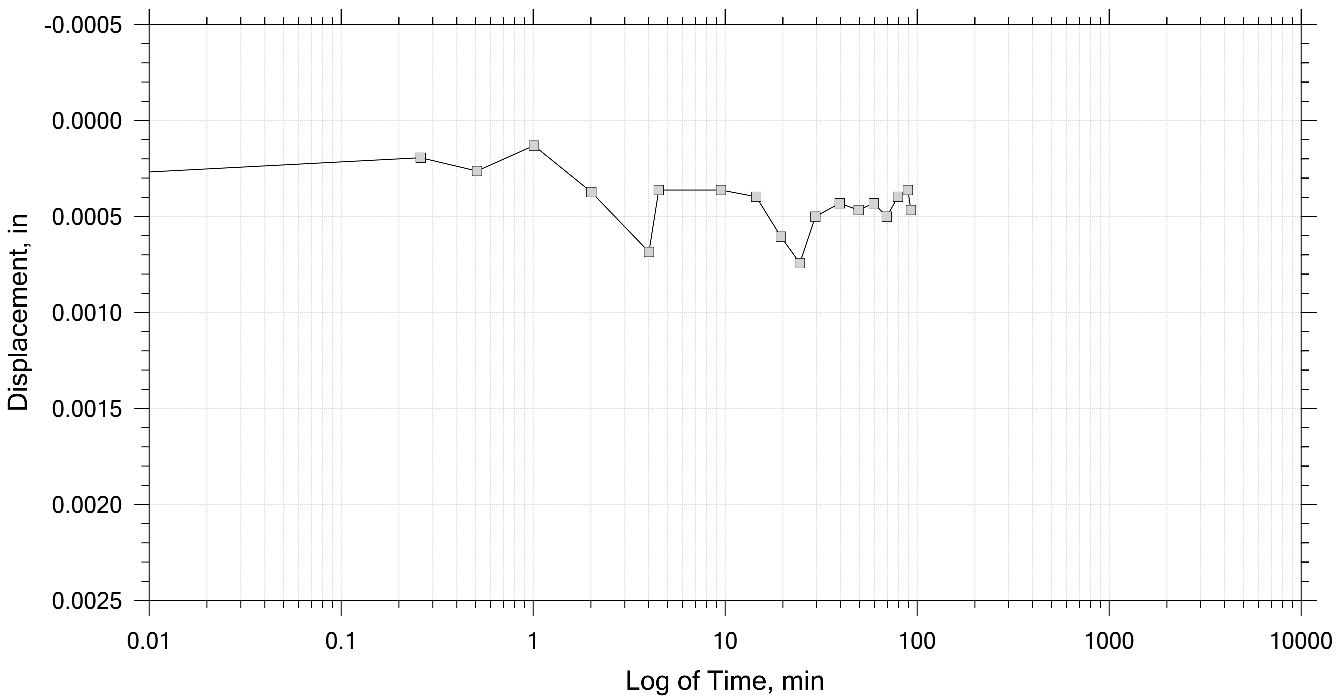
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

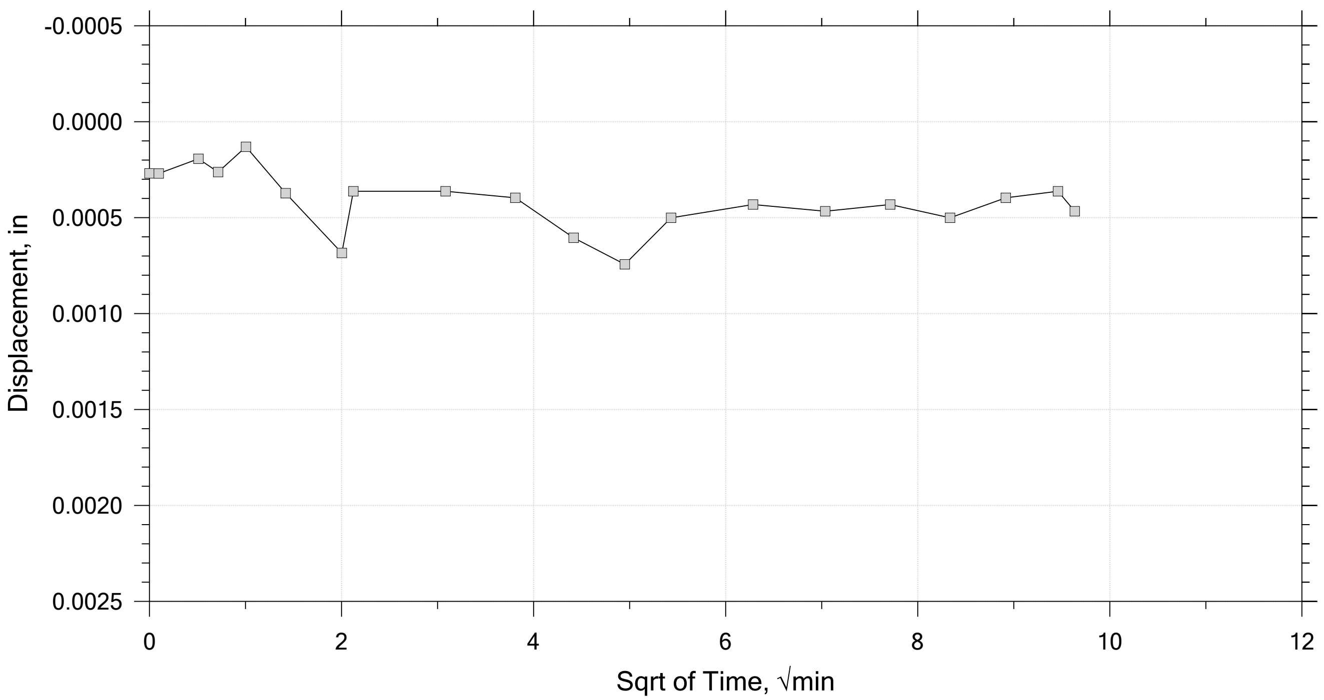
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 23

Constant Load Step

Stress: 207 psf





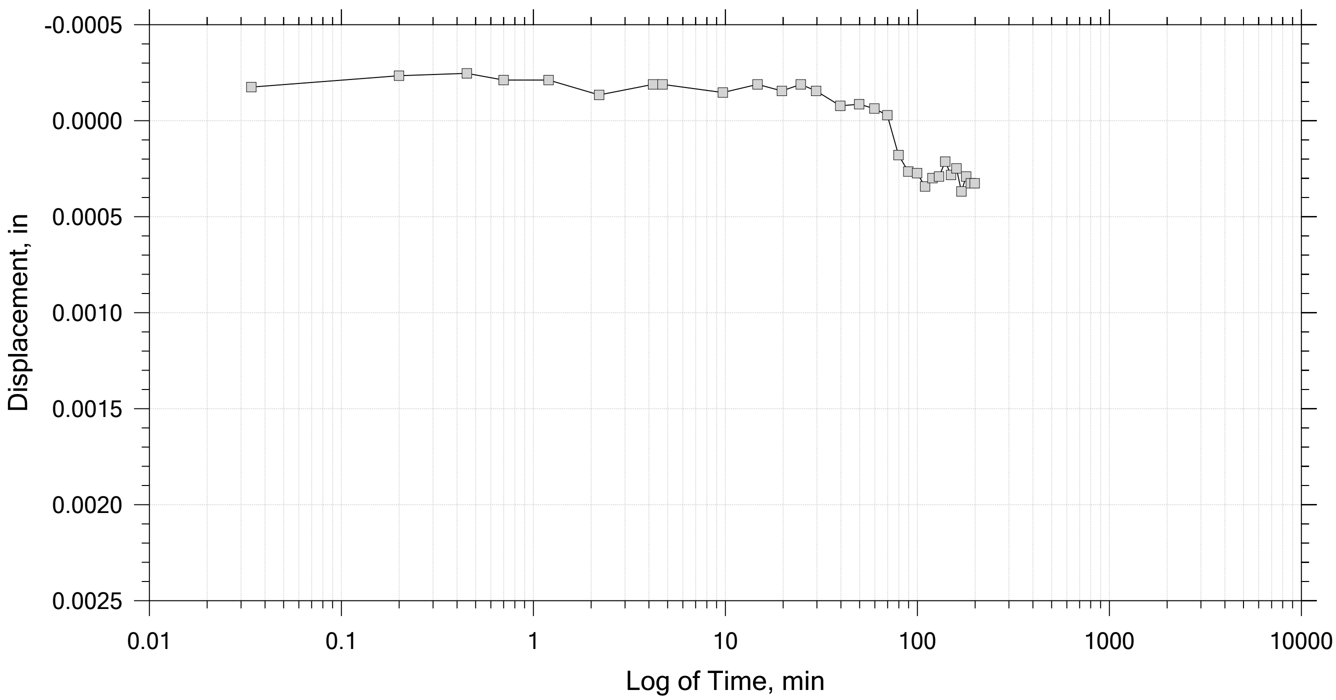
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

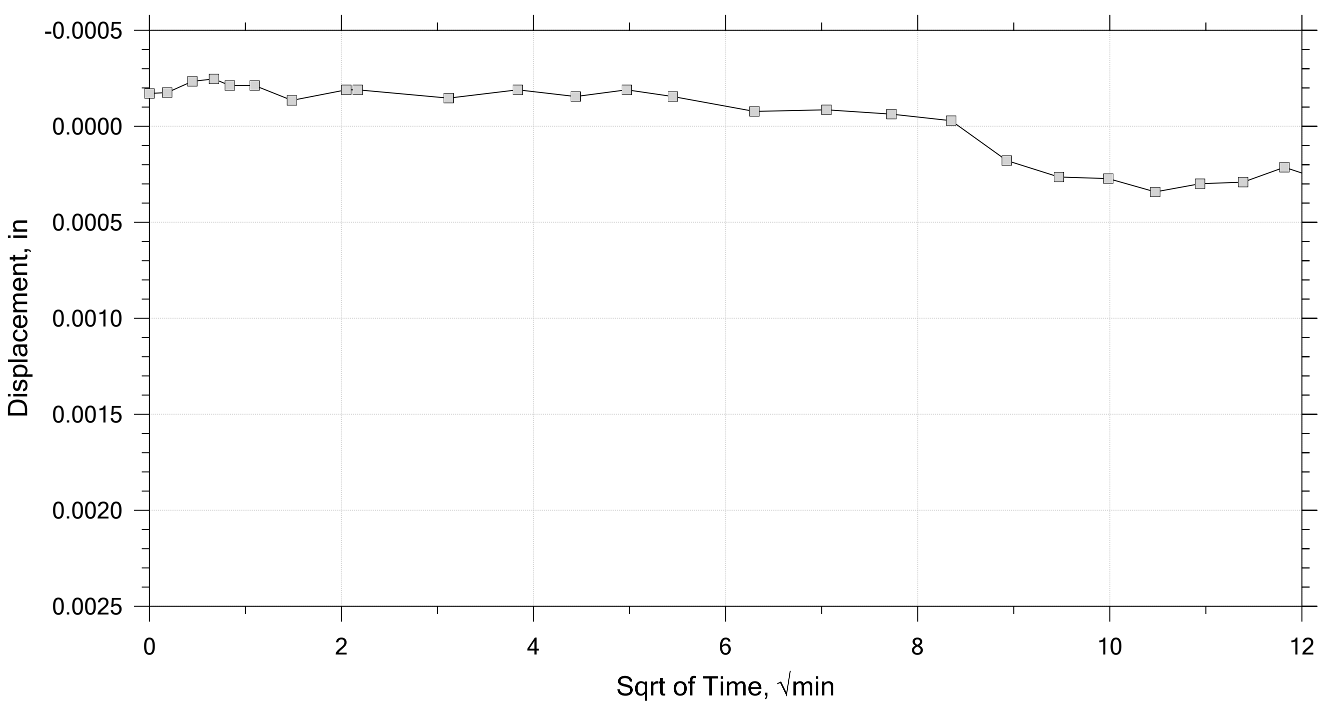
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 23

Constant Load Step

Stress: 311 psf





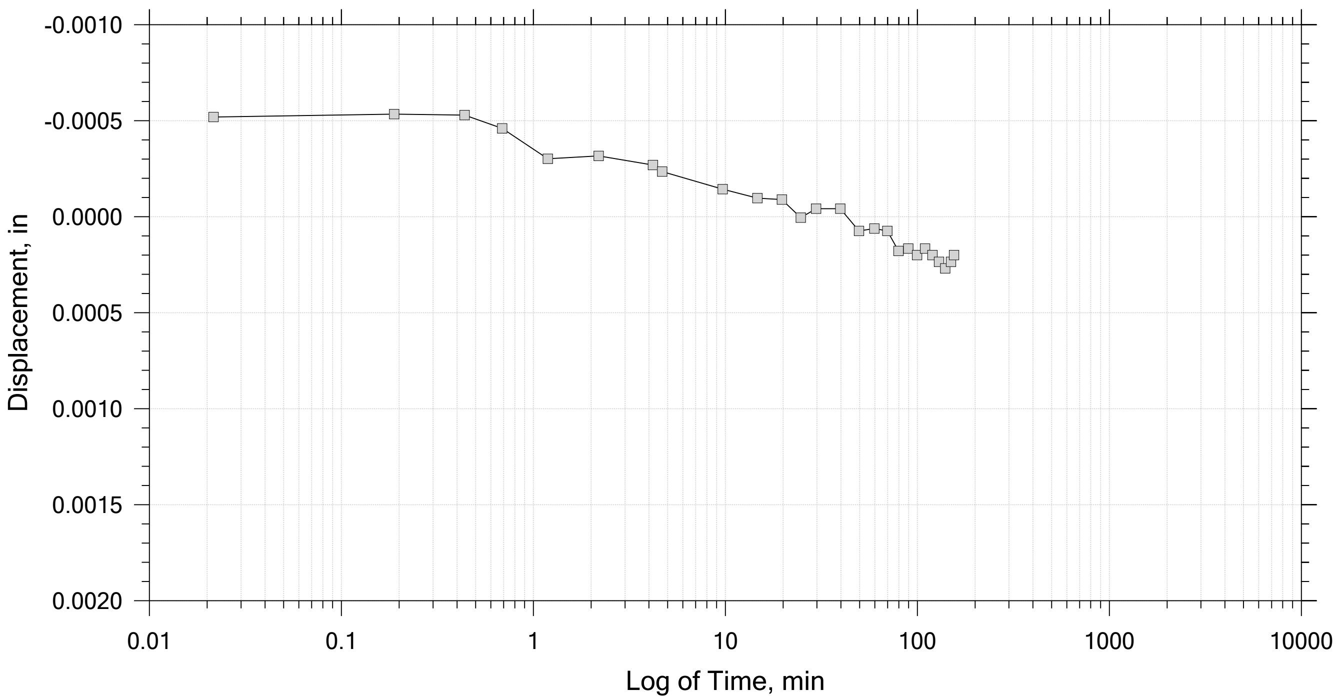
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

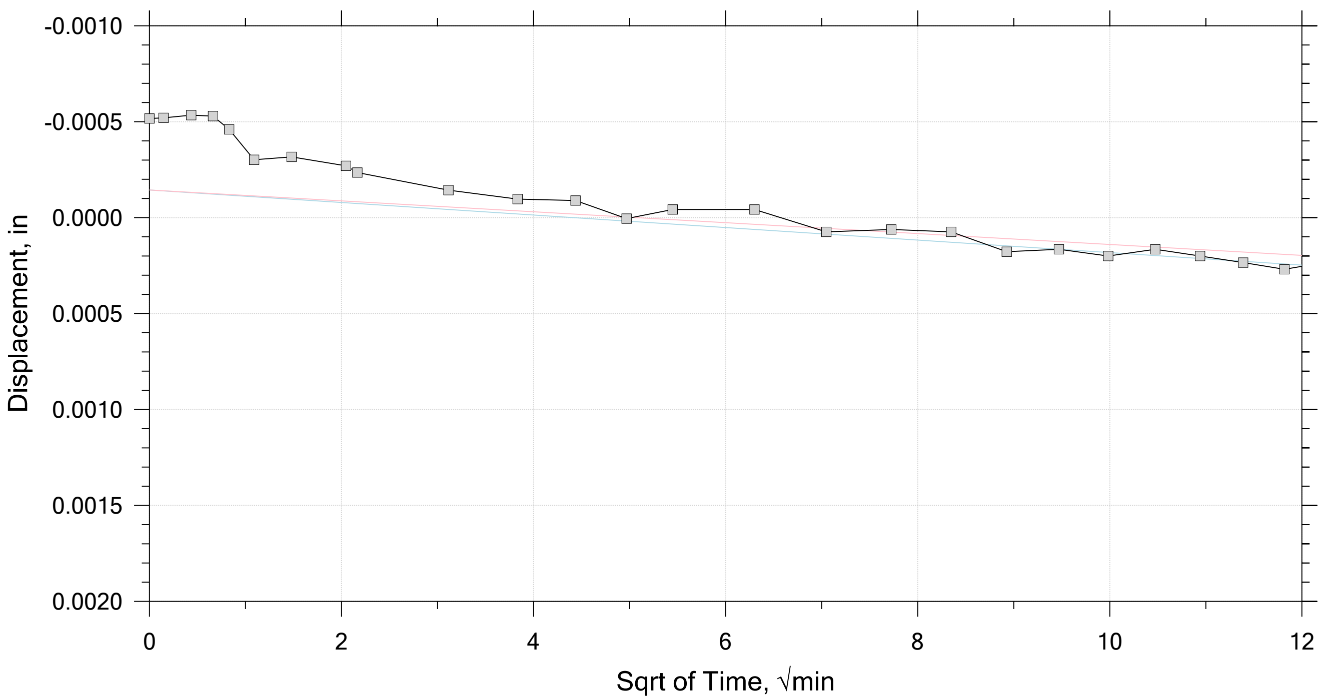
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 23

Constant Load Step

Stress: 466 psf





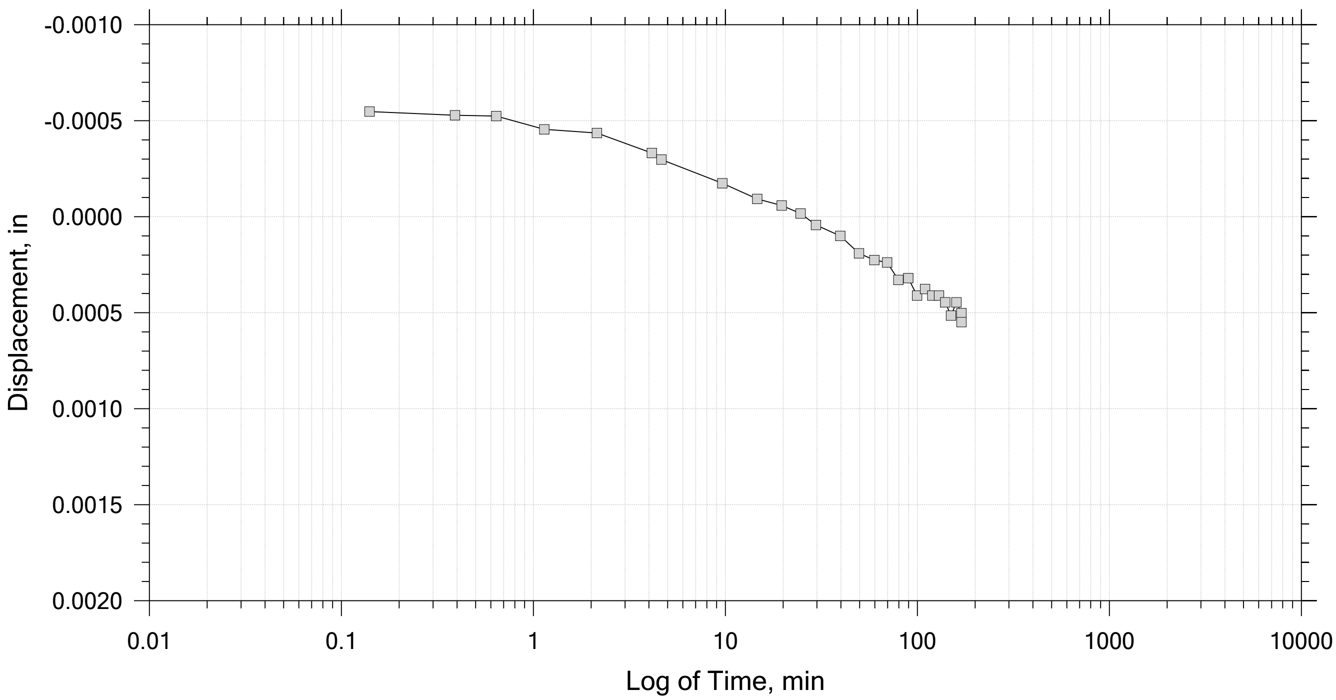
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

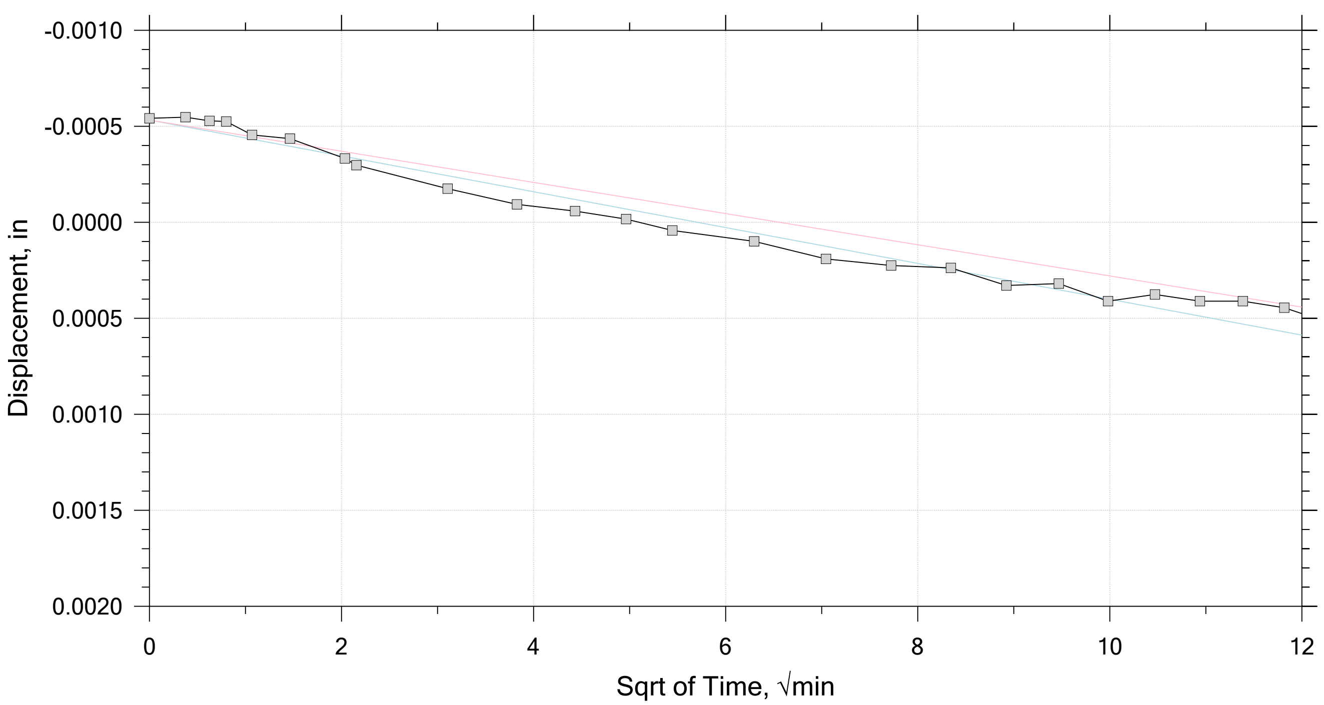
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 23

Constant Load Step

Stress: 699 psf





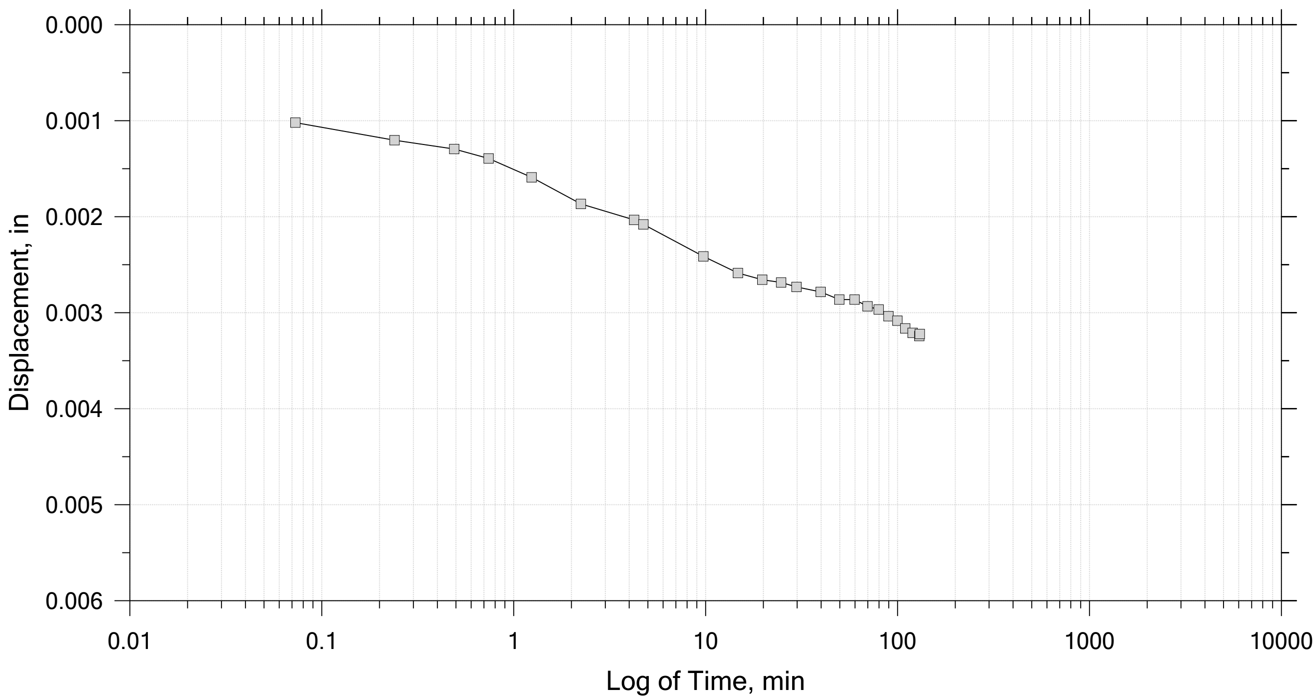
Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

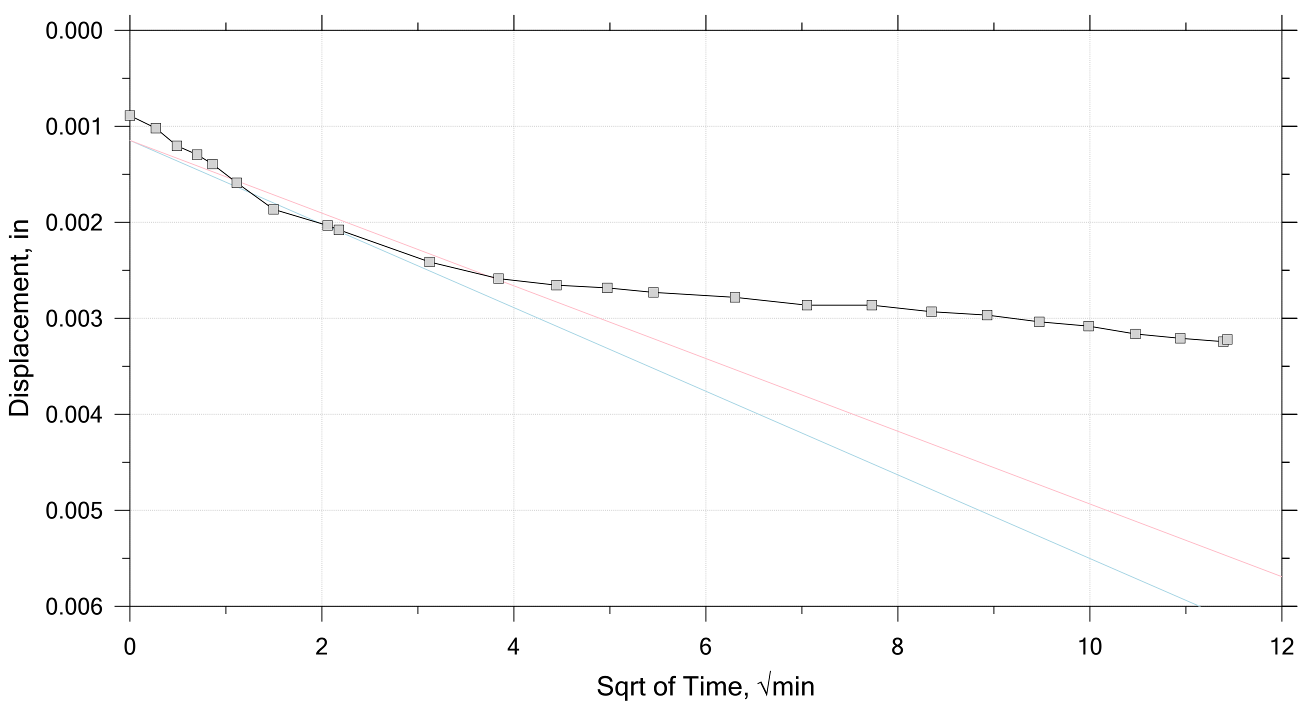
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 23

Constant Load Step

Stress: 1.05e+03 psf

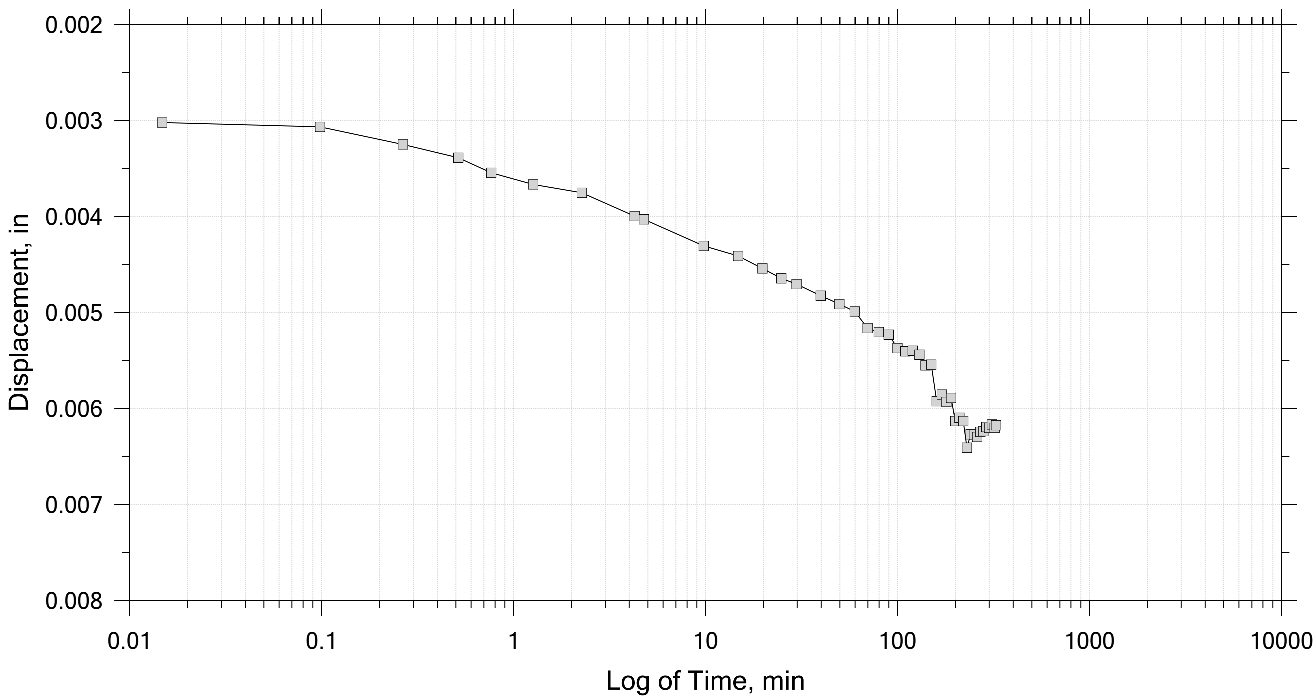


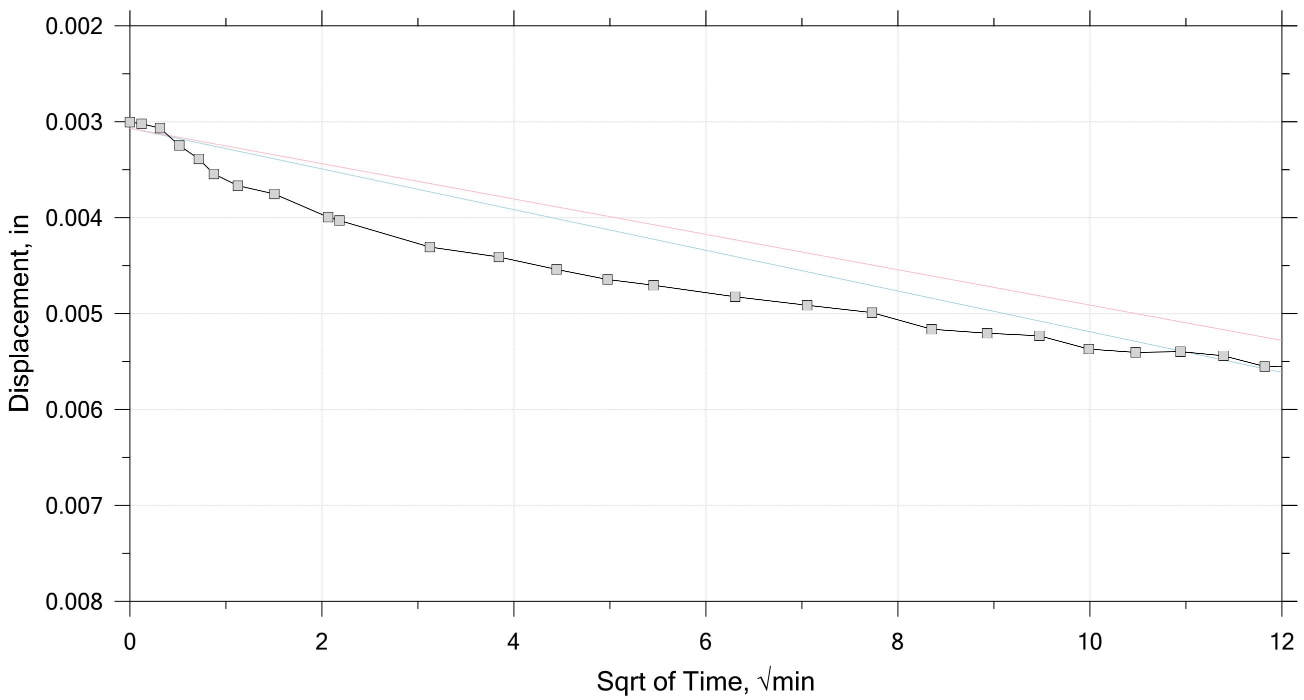


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 23
Constant Load Step
Stress: 1.57e+03 psf





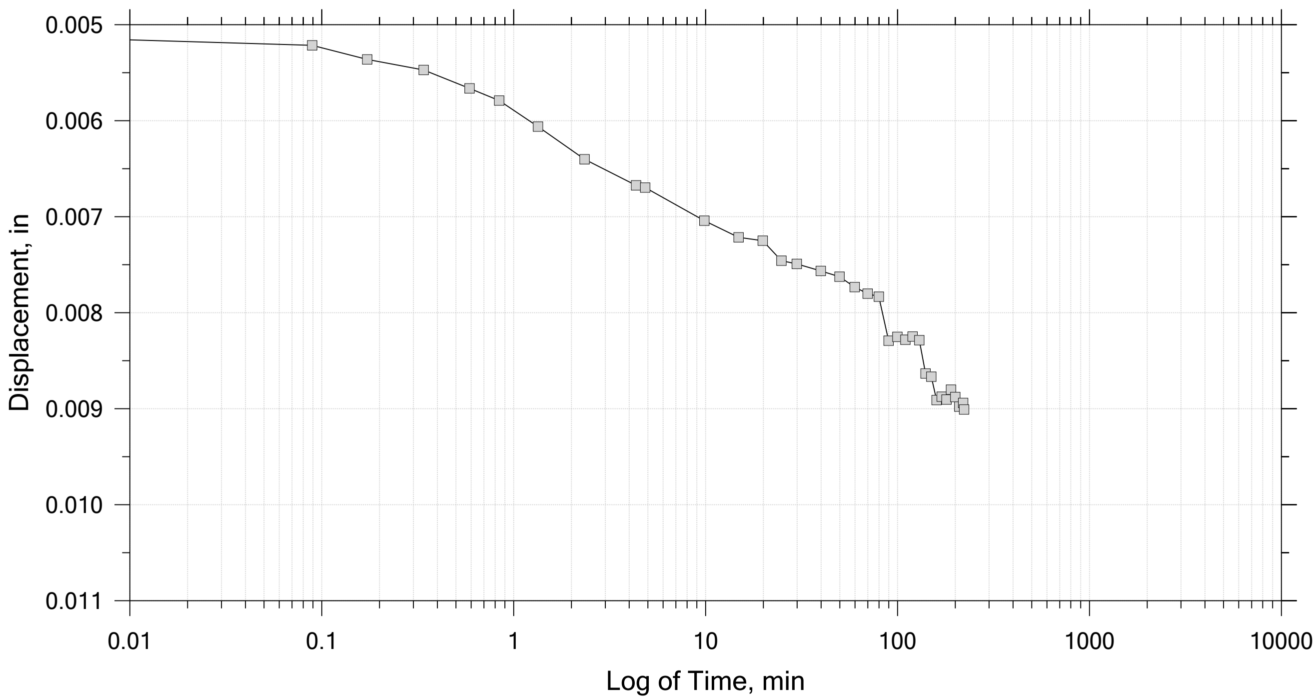
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

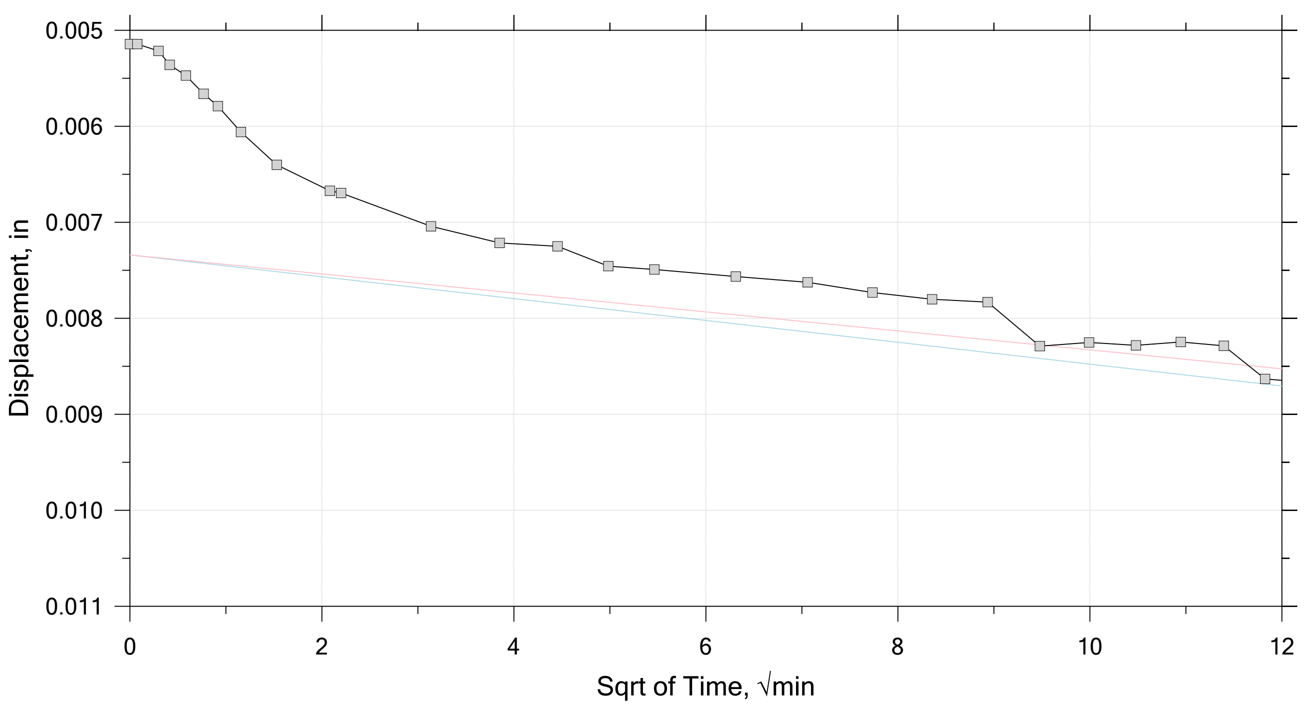
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 23

Constant Load Step

Stress: 2.36e+03 psf

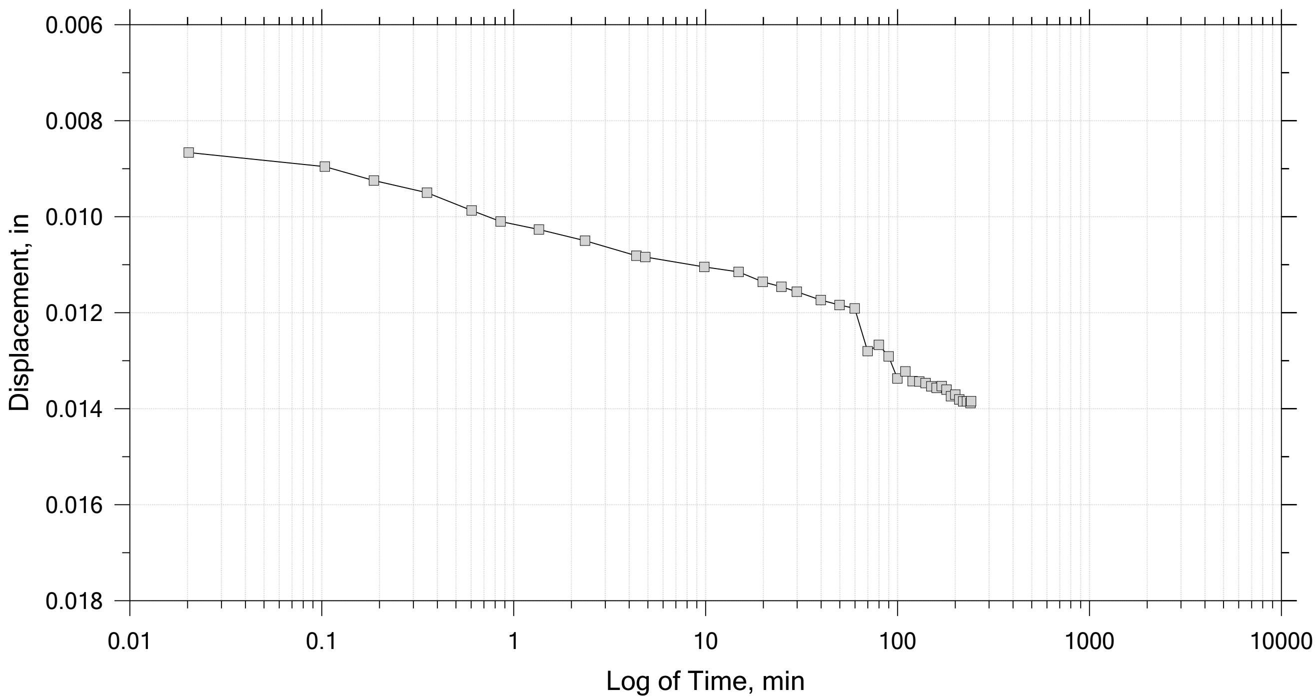


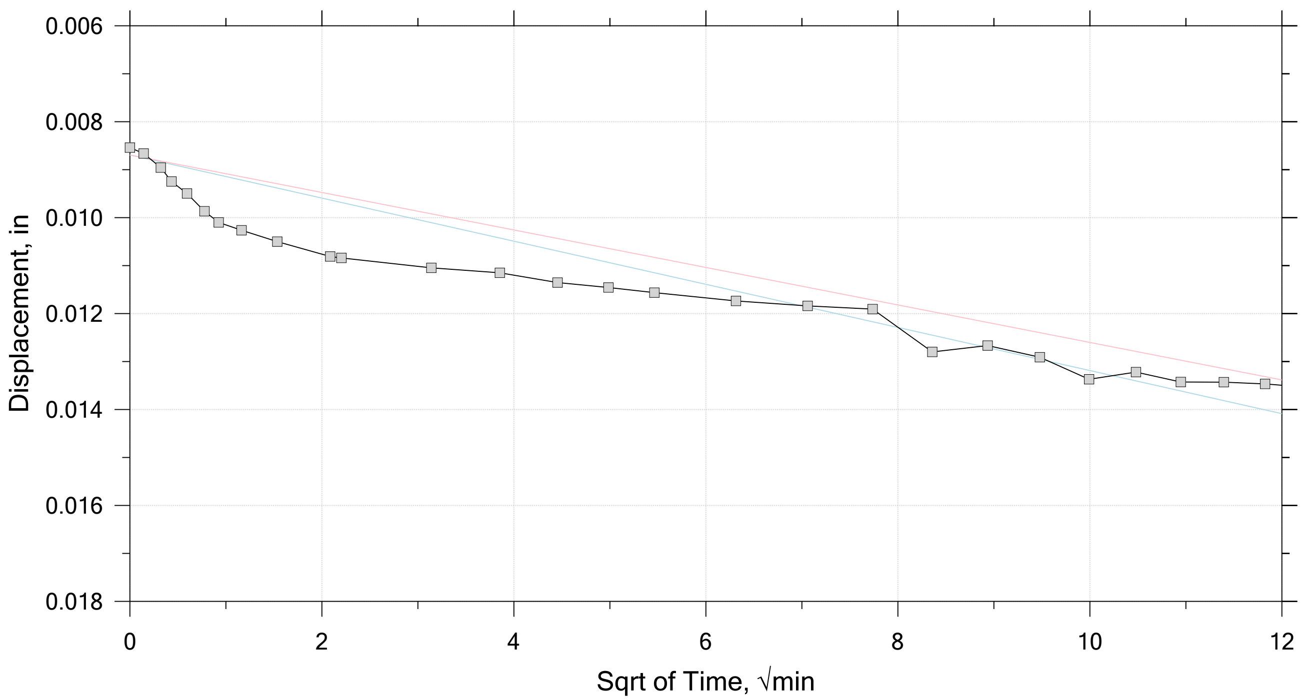


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 23
Constant Load Step
Stress: 3.54e+03 psf

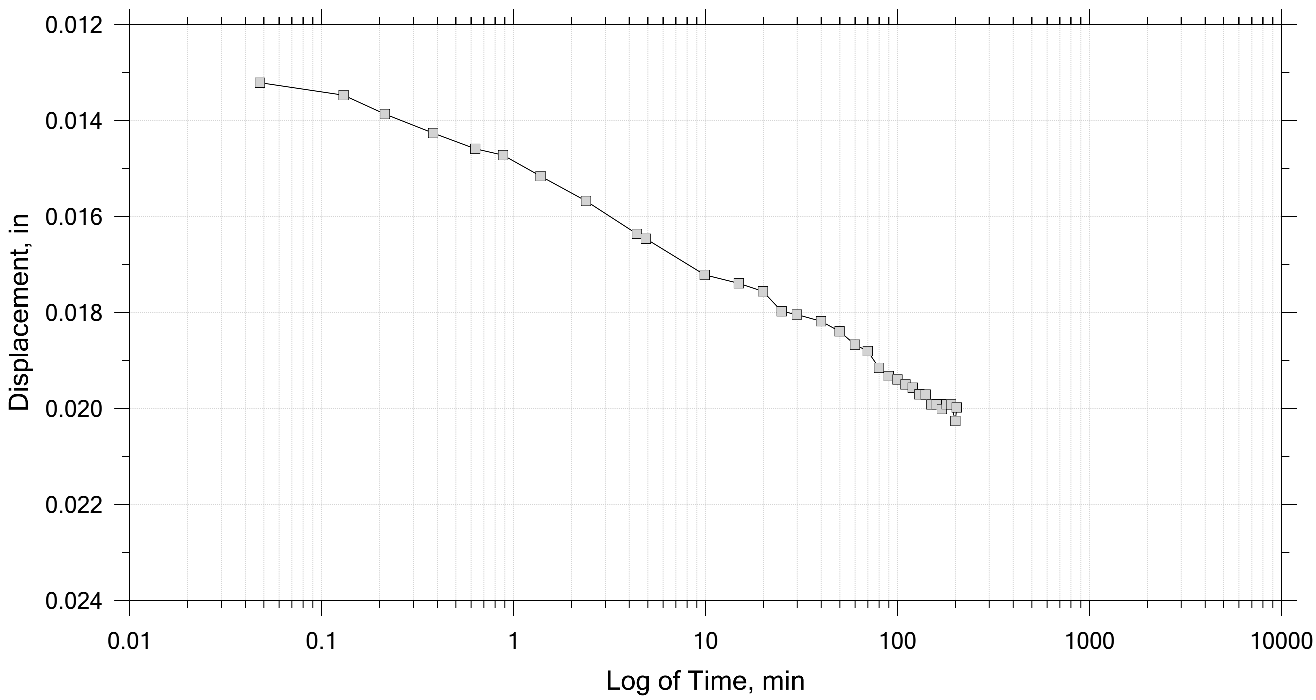


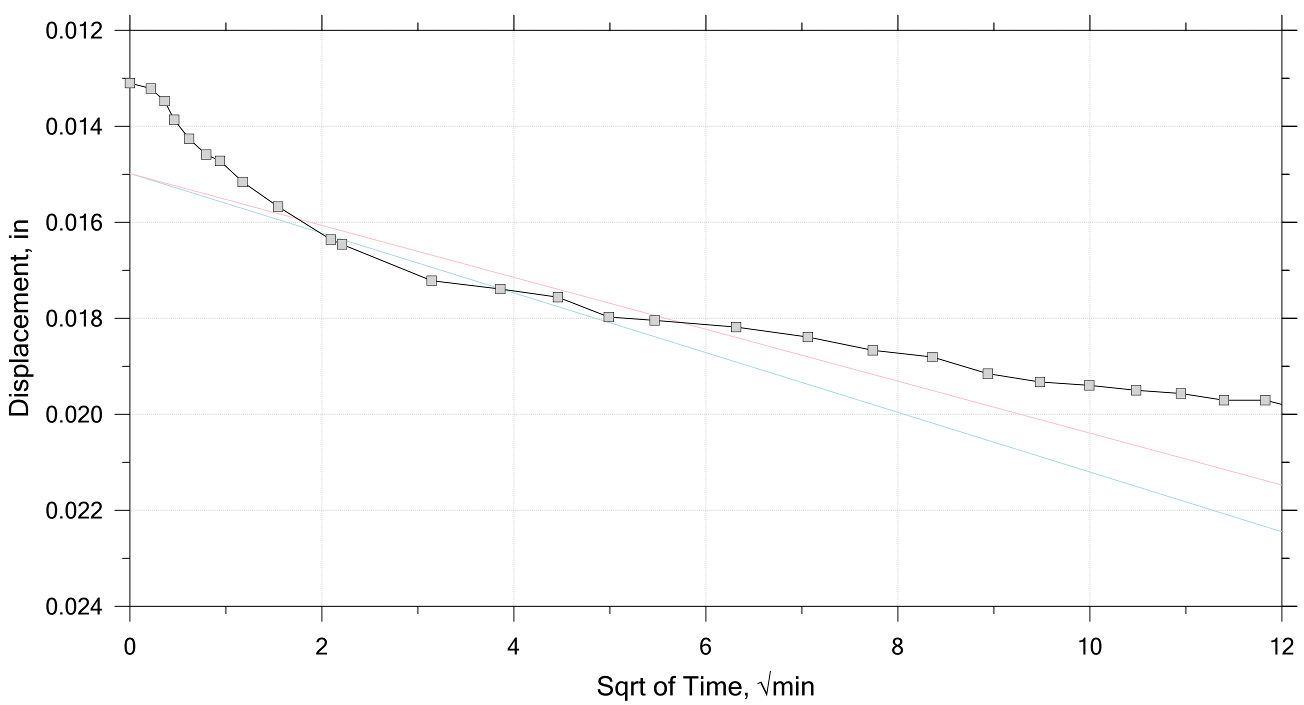


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 23
Constant Load Step
Stress: 5.3e+03 psf

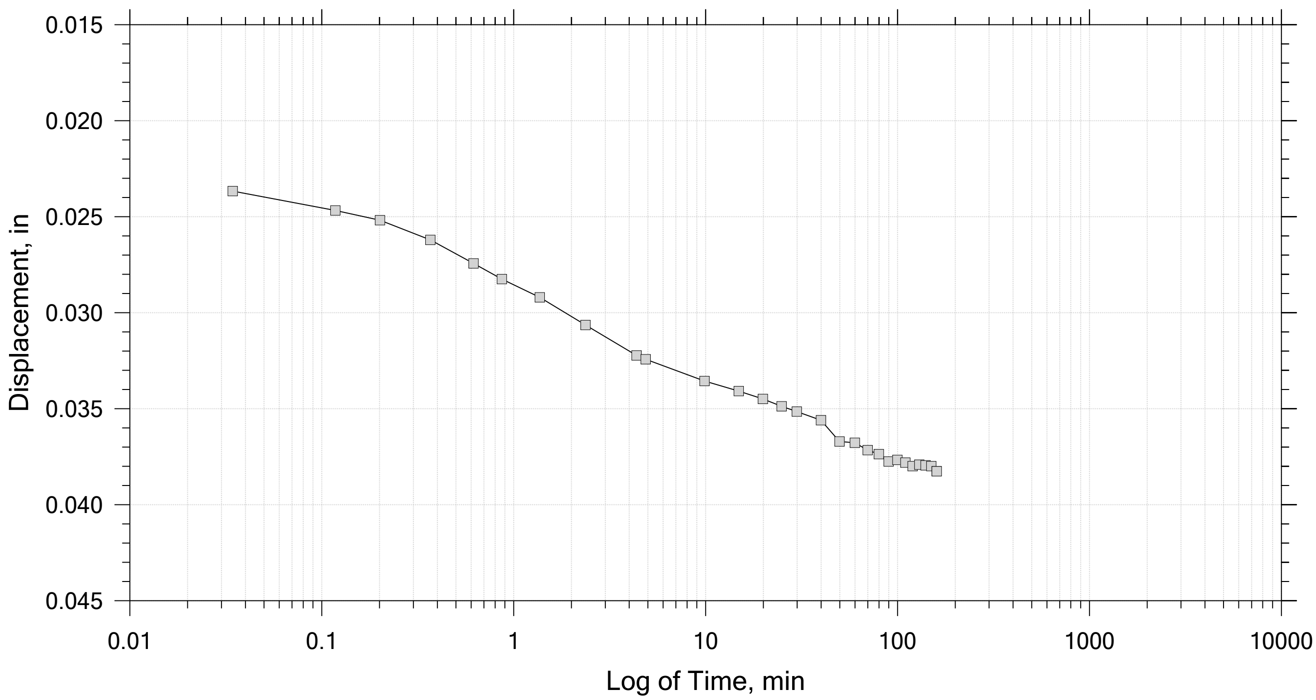


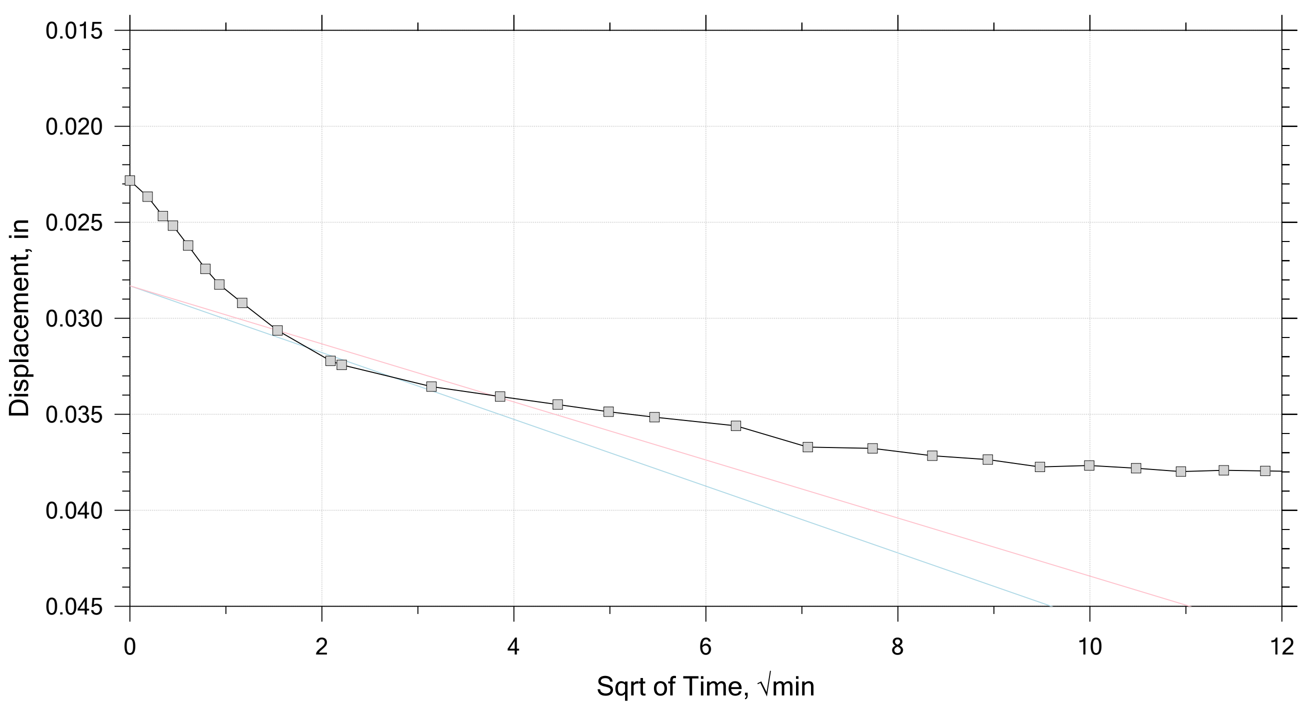


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 23
Constant Load Step
Stress: 1.06e+04 psf

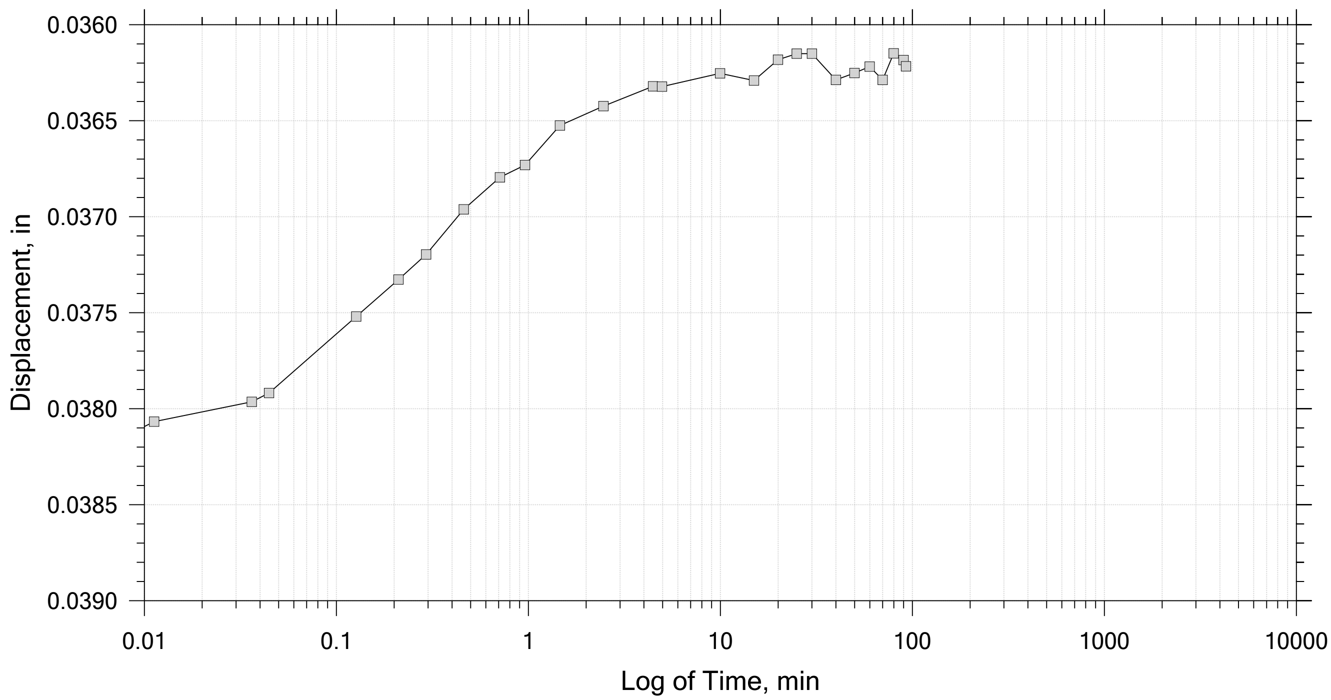


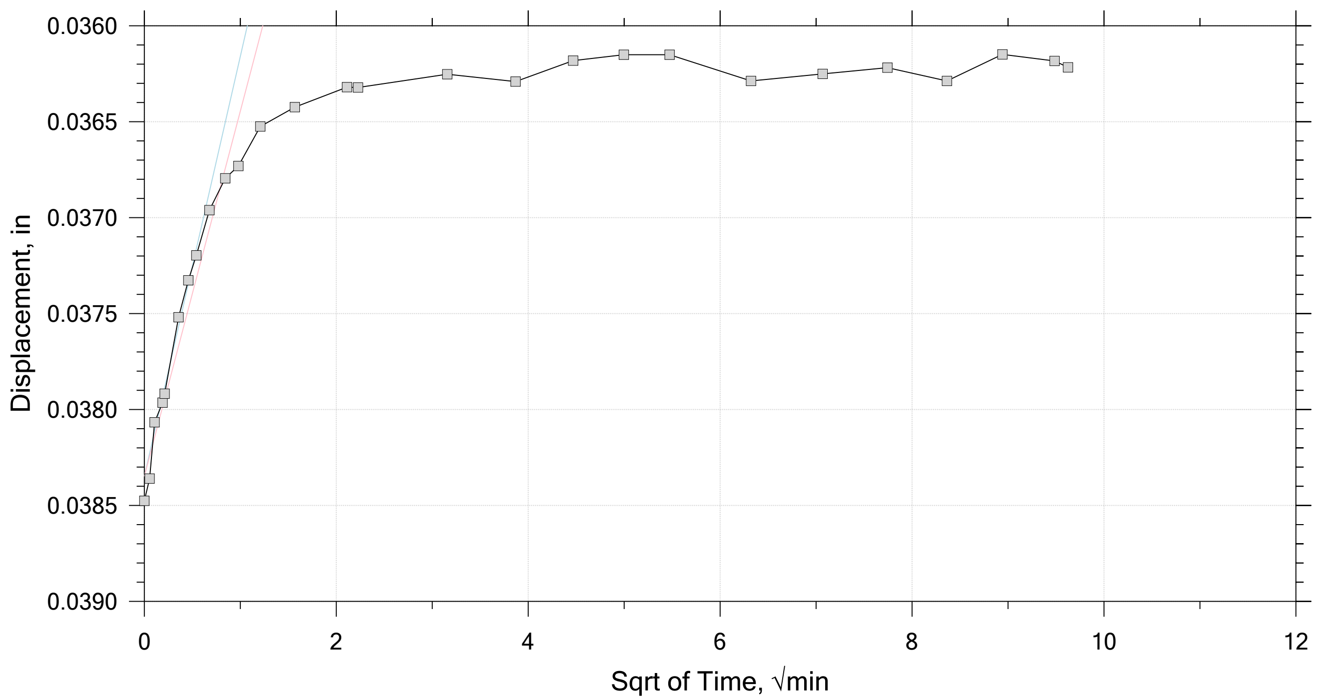


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 23
Constant Load Step
Stress: 5.3e+03 psf





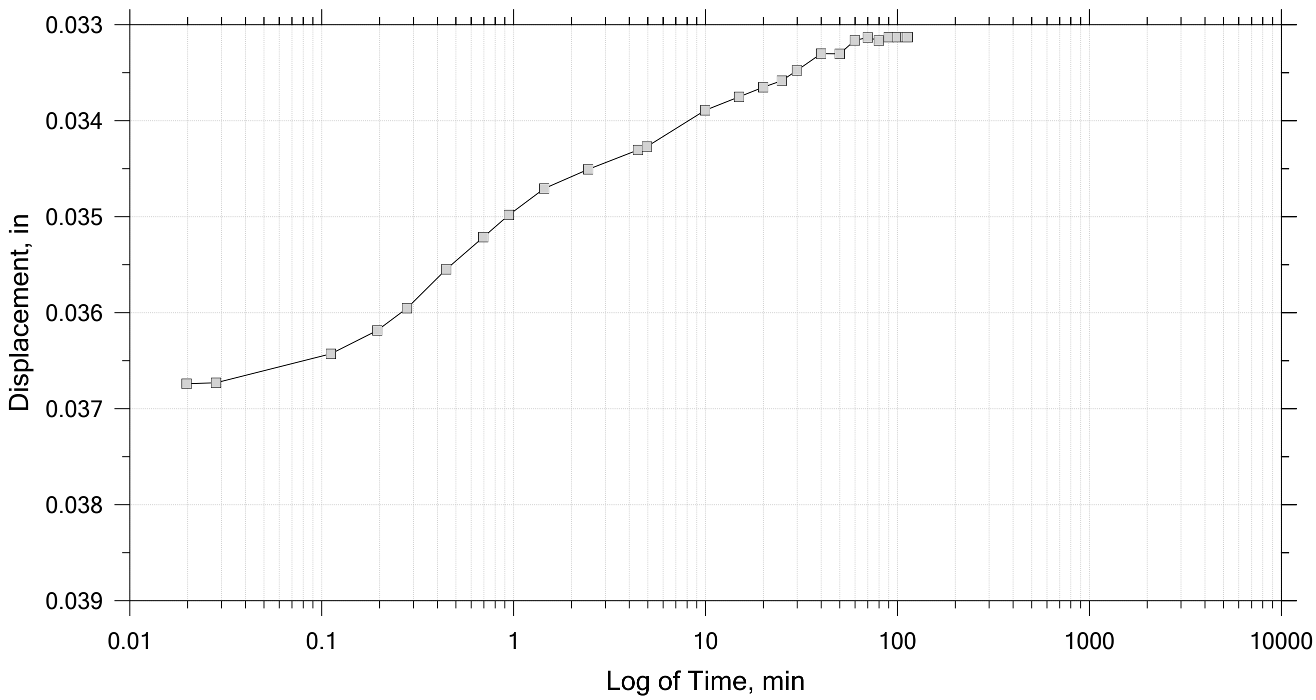
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

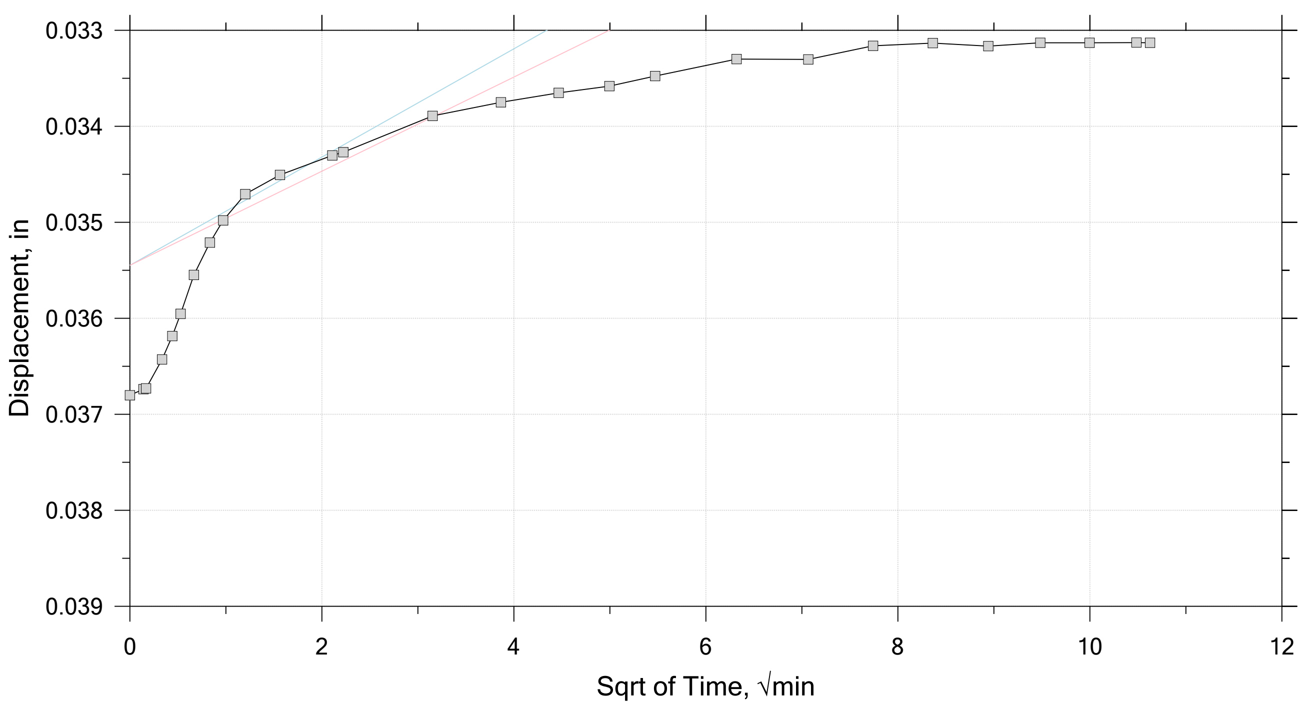
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 23

Constant Load Step

Stress: 2.65e+03 psf





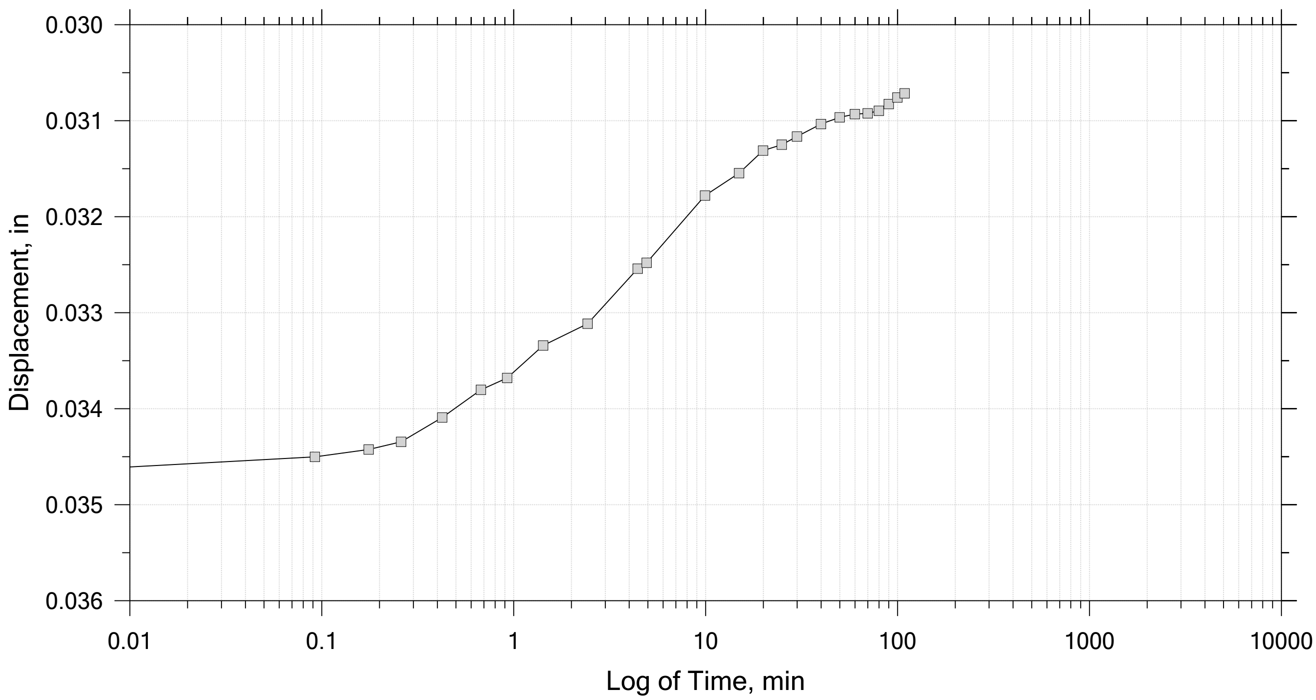
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

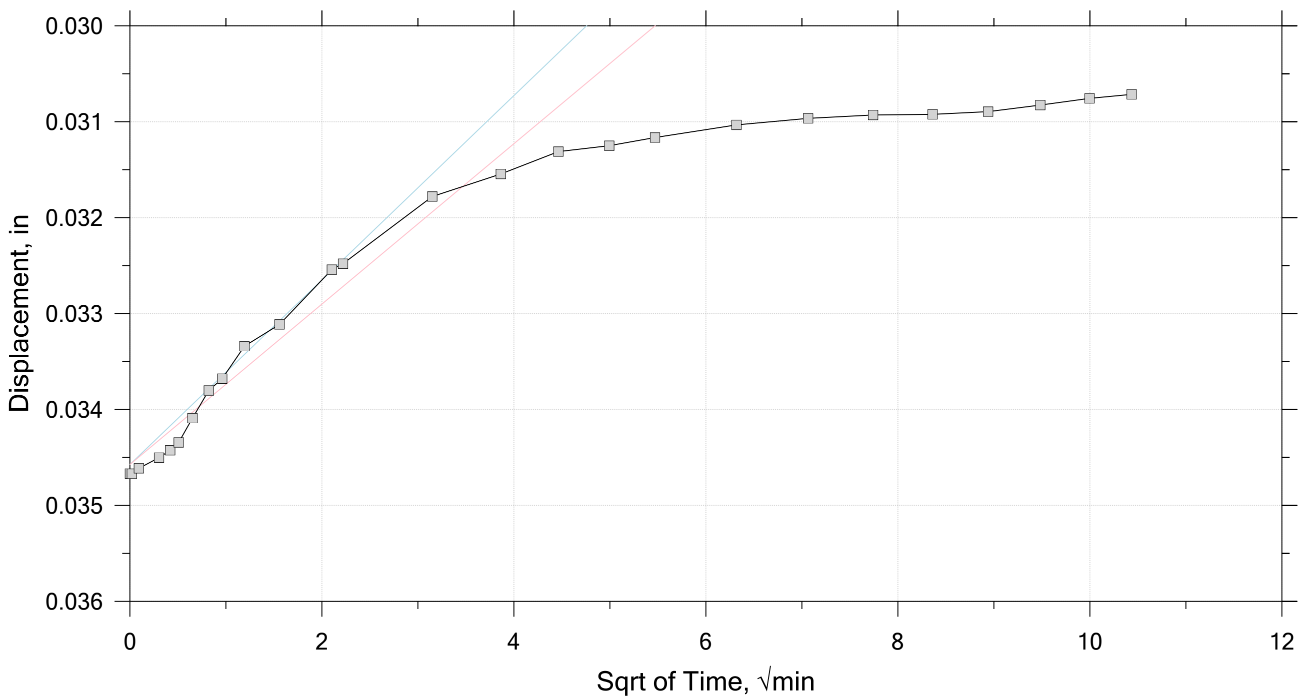
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 23

Constant Load Step

Stress: 1.33e+03 psf

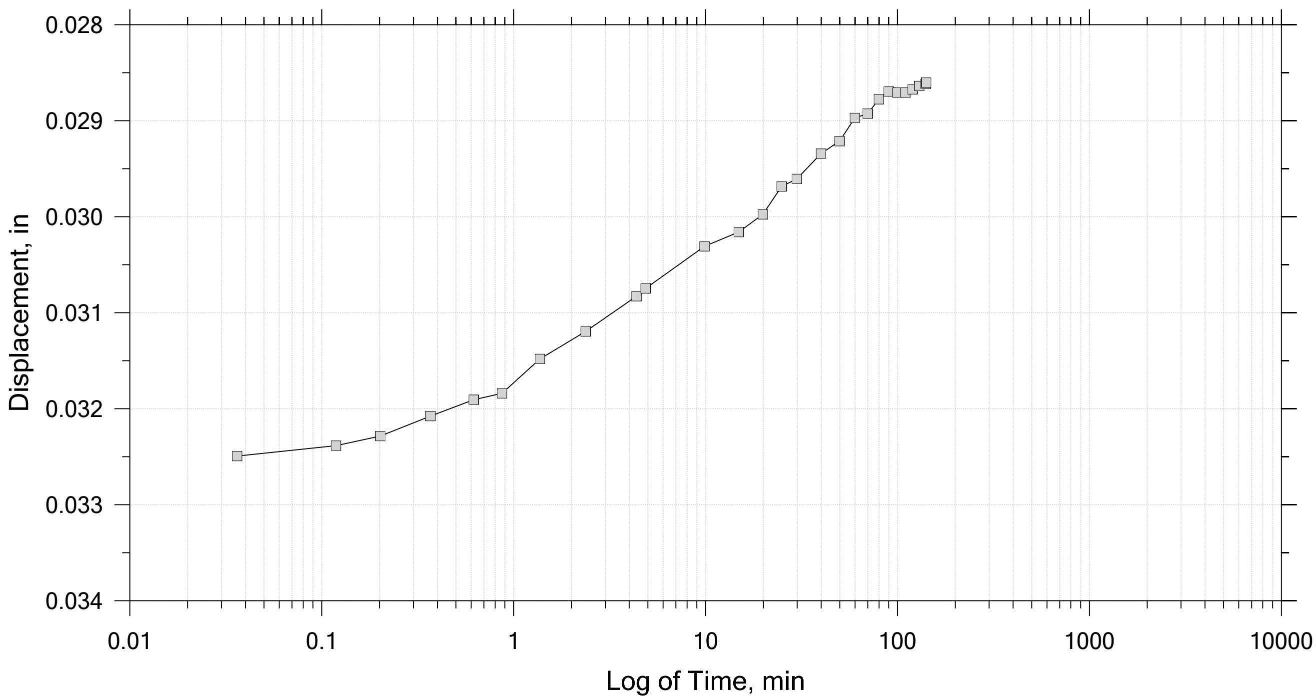


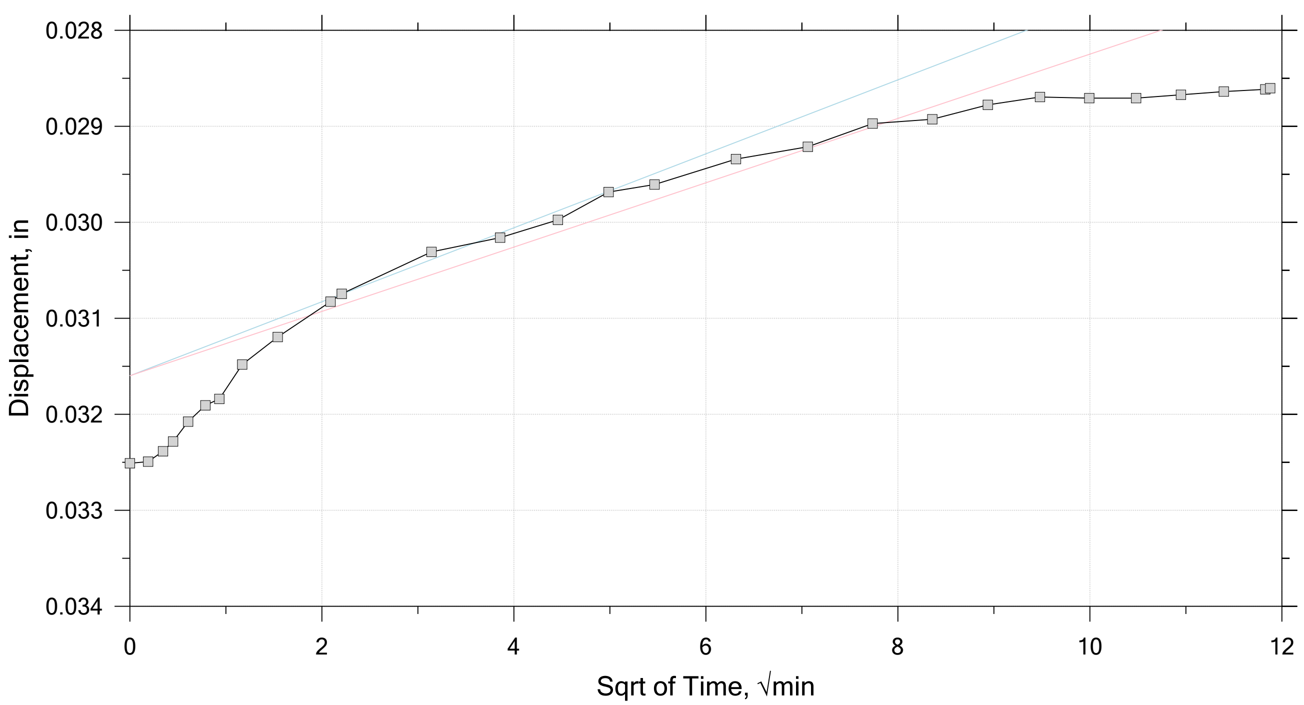


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 23
Constant Load Step
Stress: 663 psf





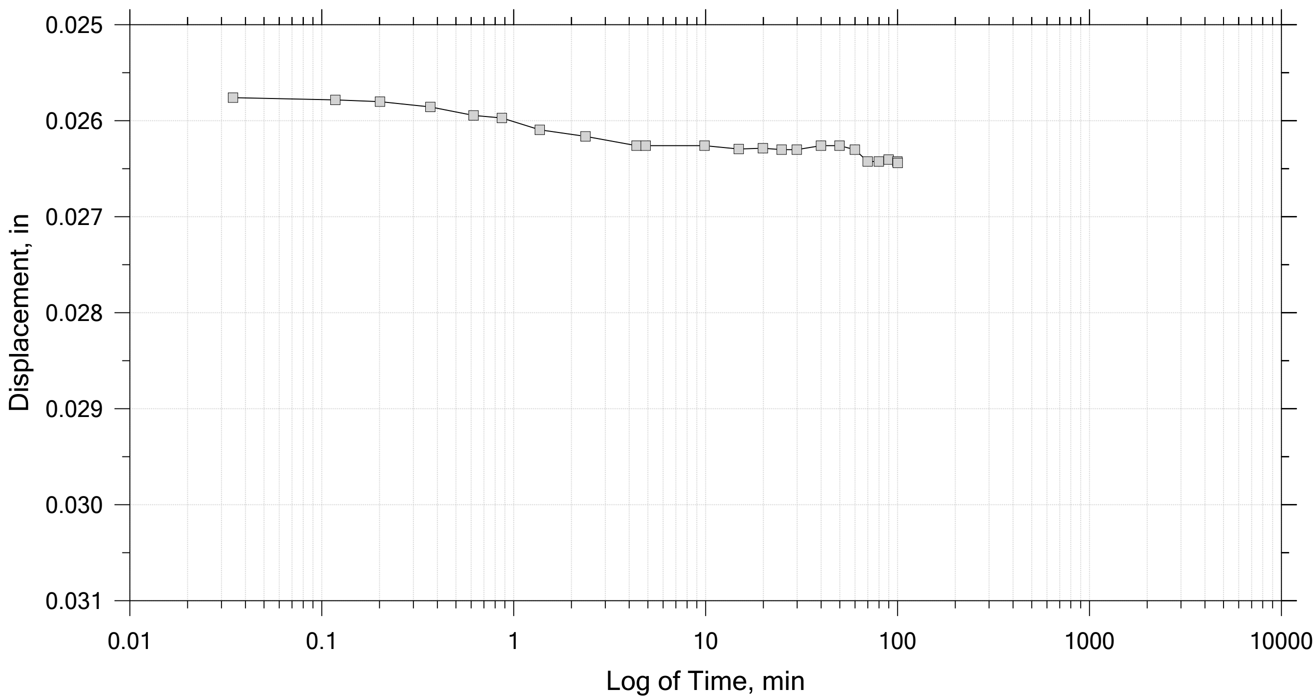
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

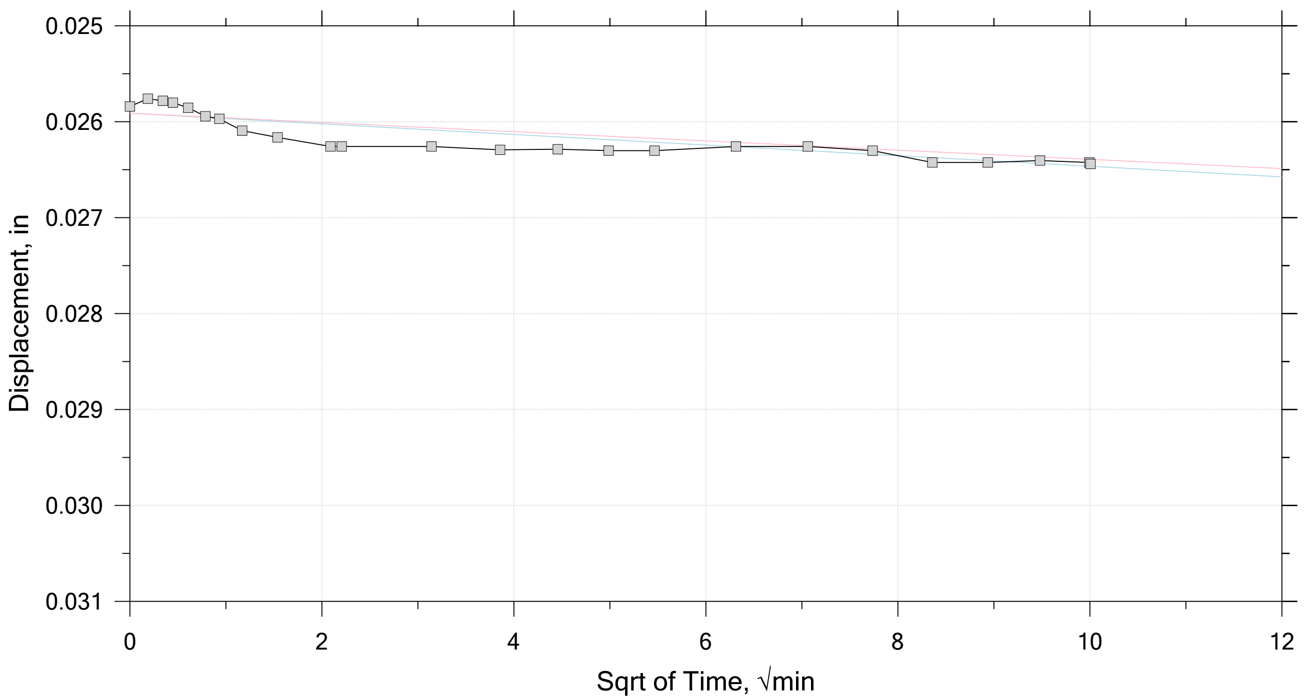
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 23

Constant Load Step

Stress: 1.33e+03 psf





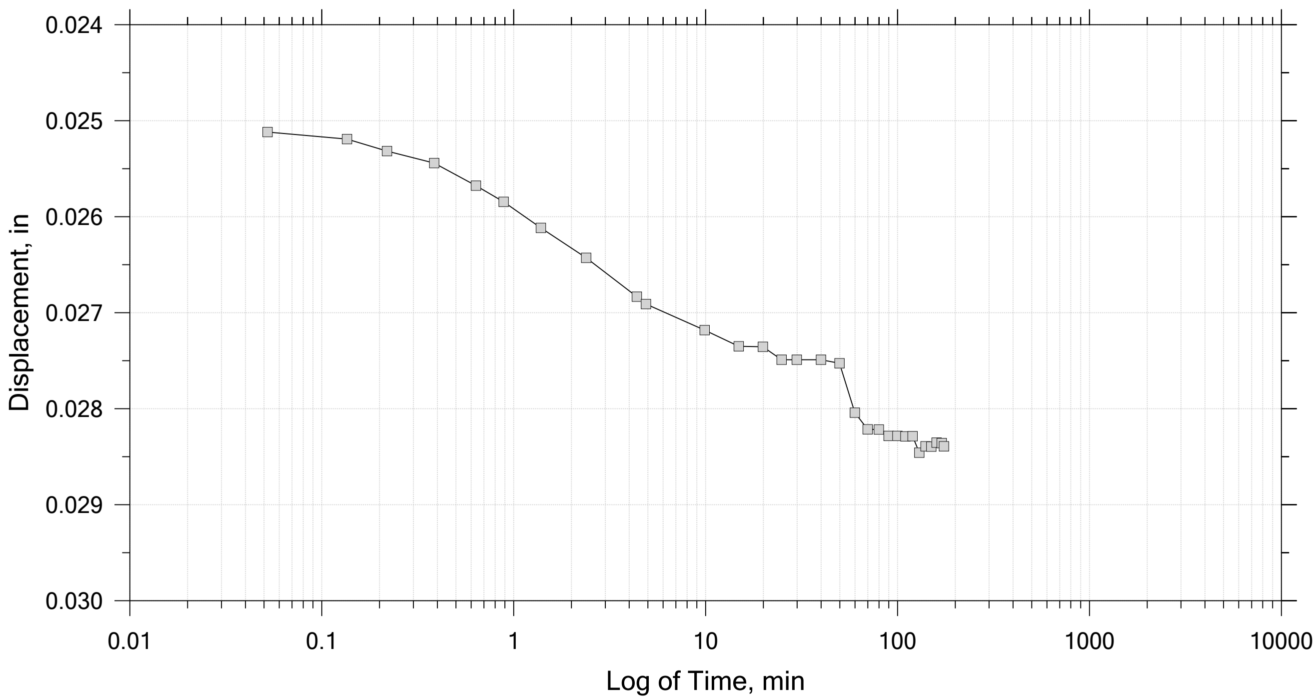
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

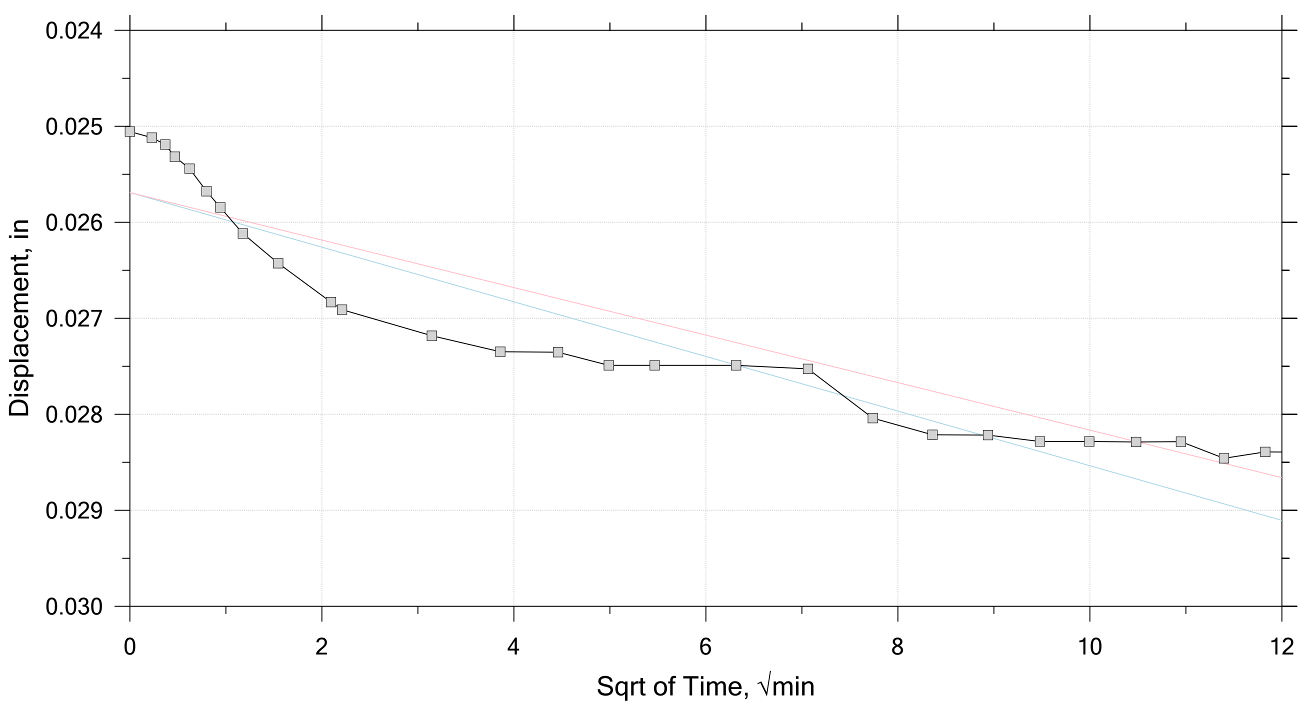
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 16 of 23

Constant Load Step

Stress: 2.65e+03 psf





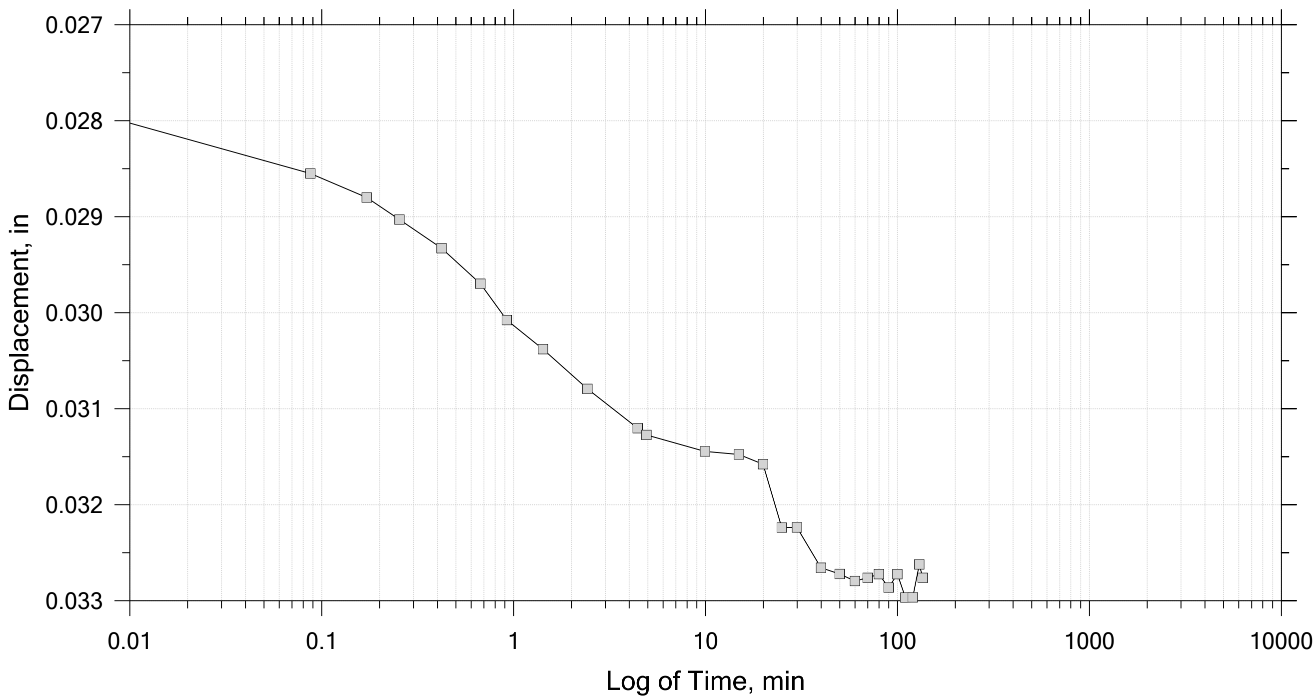
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

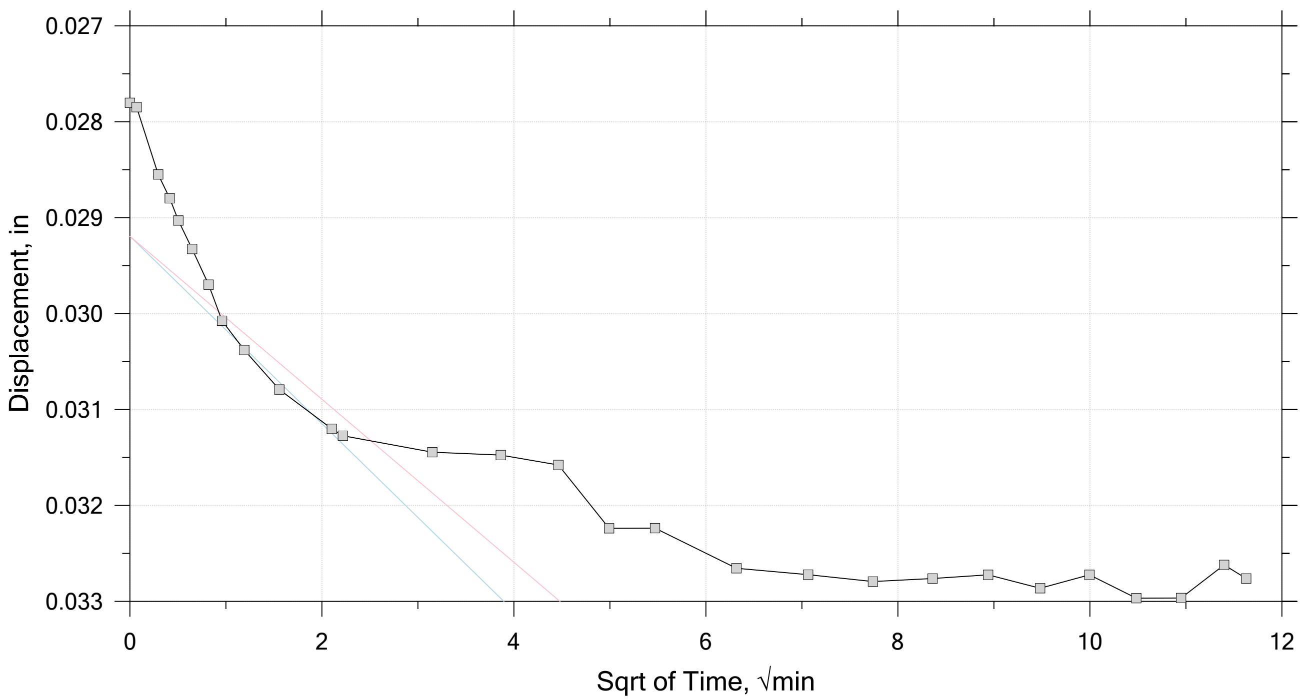
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 17 of 23

Constant Load Step

Stress: 5.3e+03 psf

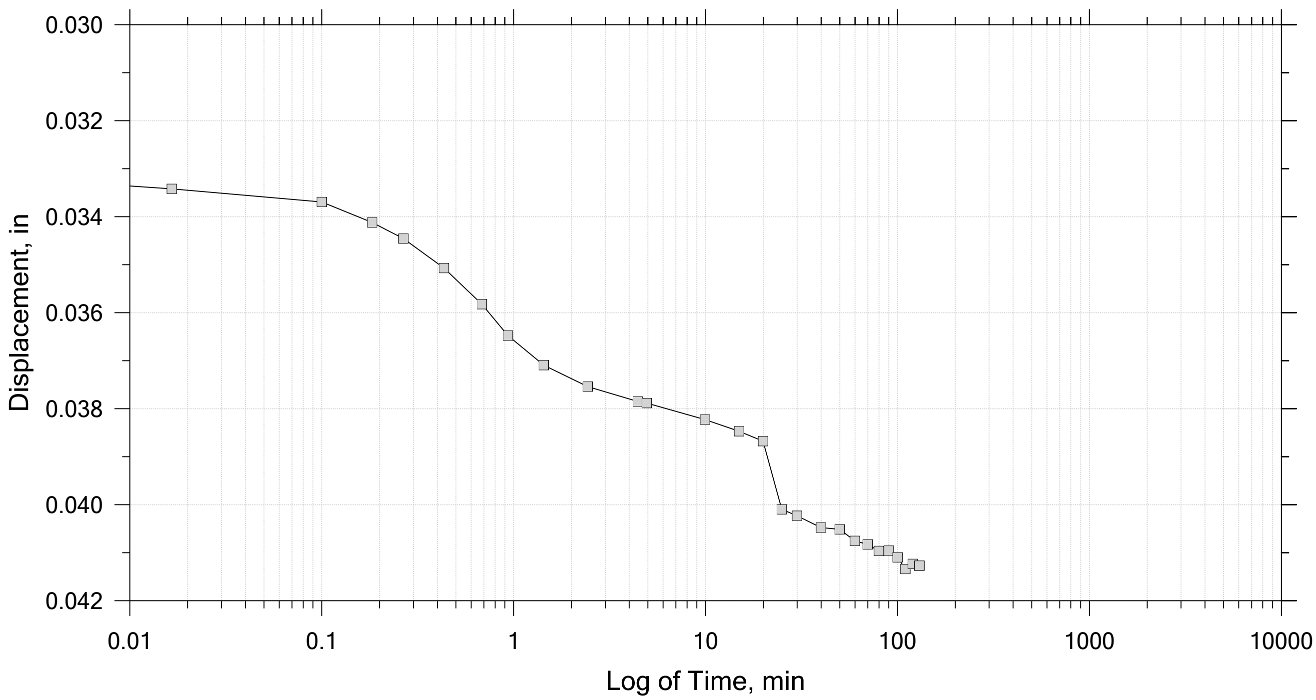


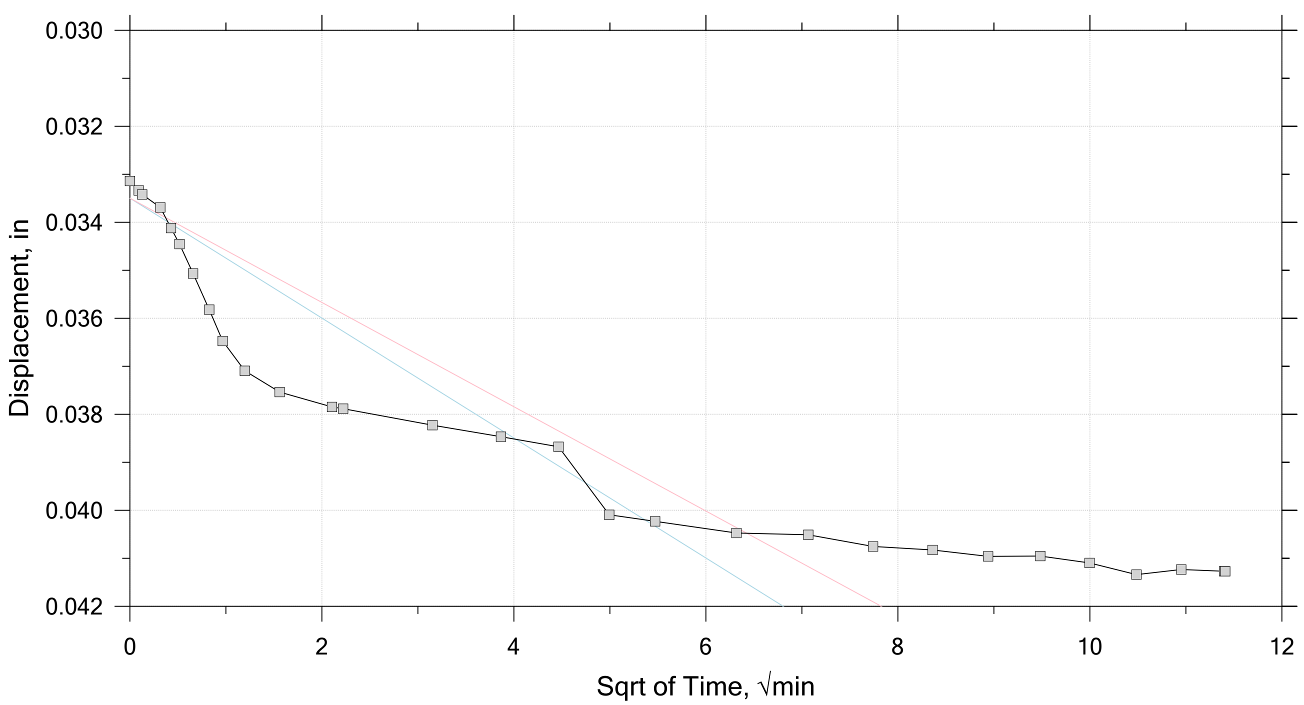


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 18 of 23
Constant Load Step
Stress: 1.06e+04 psf

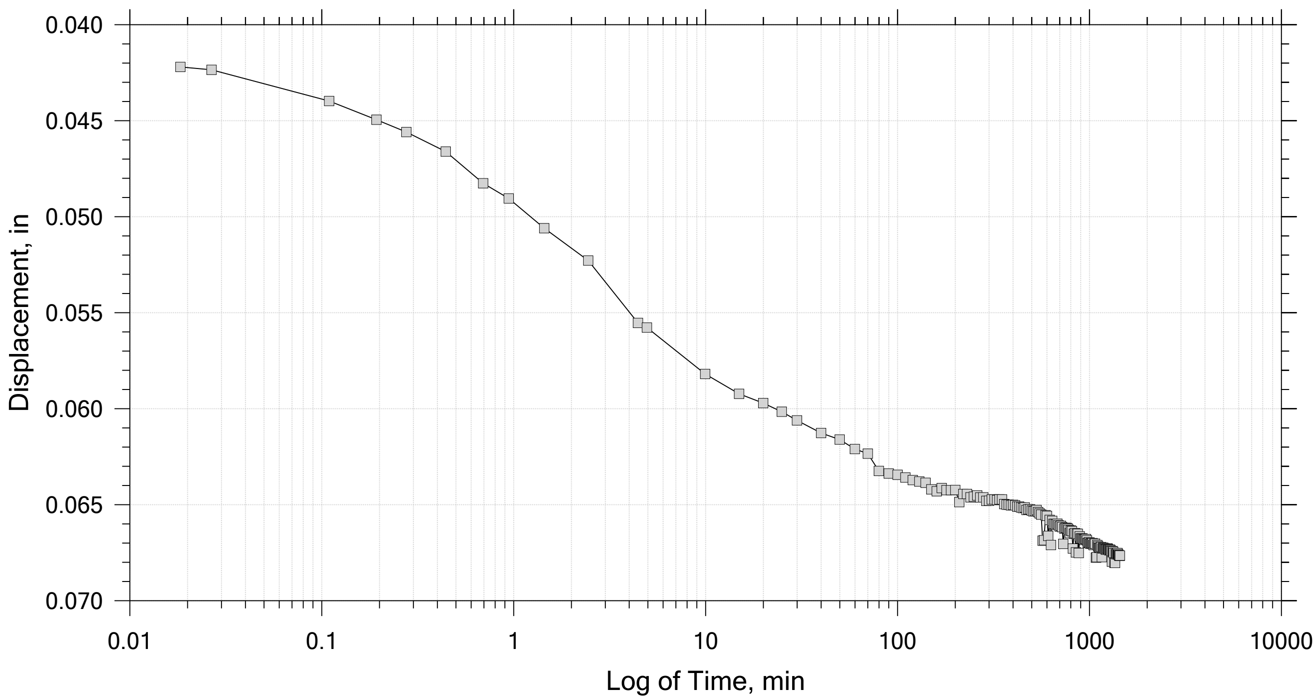


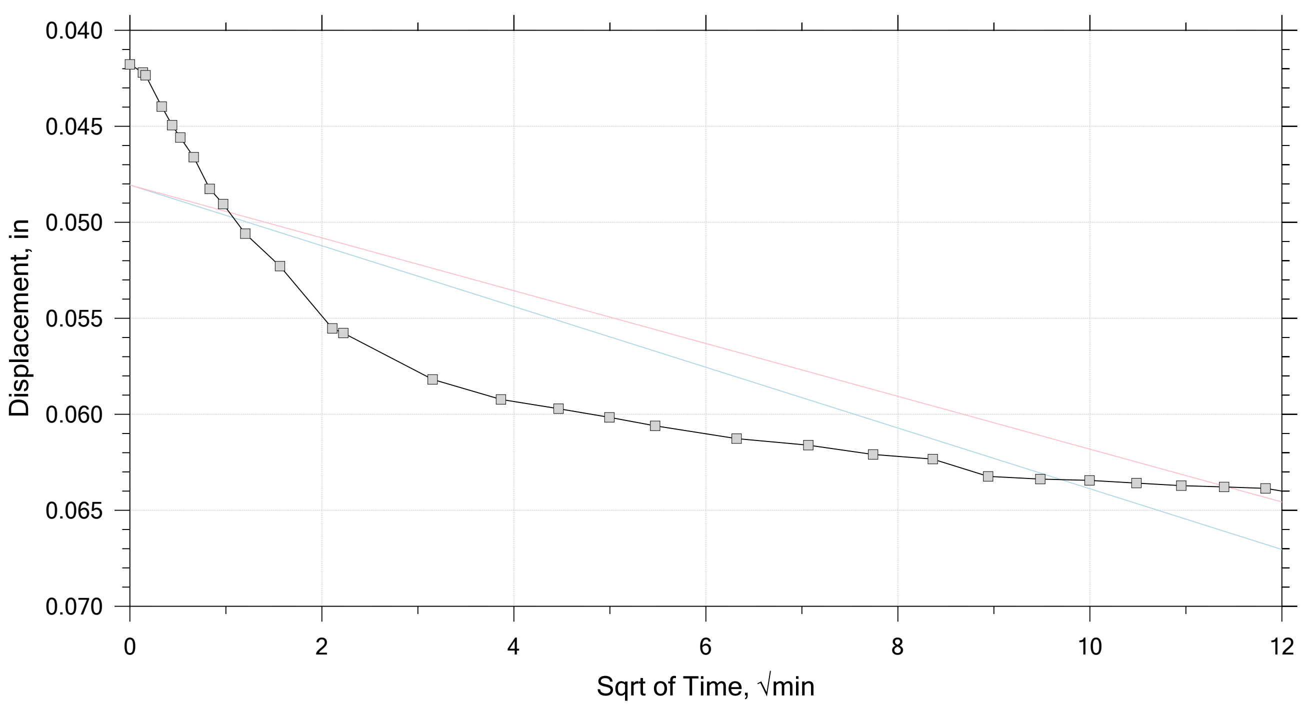


Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 19 of 23
Constant Load Step
Stress: 2.12e+04 psf

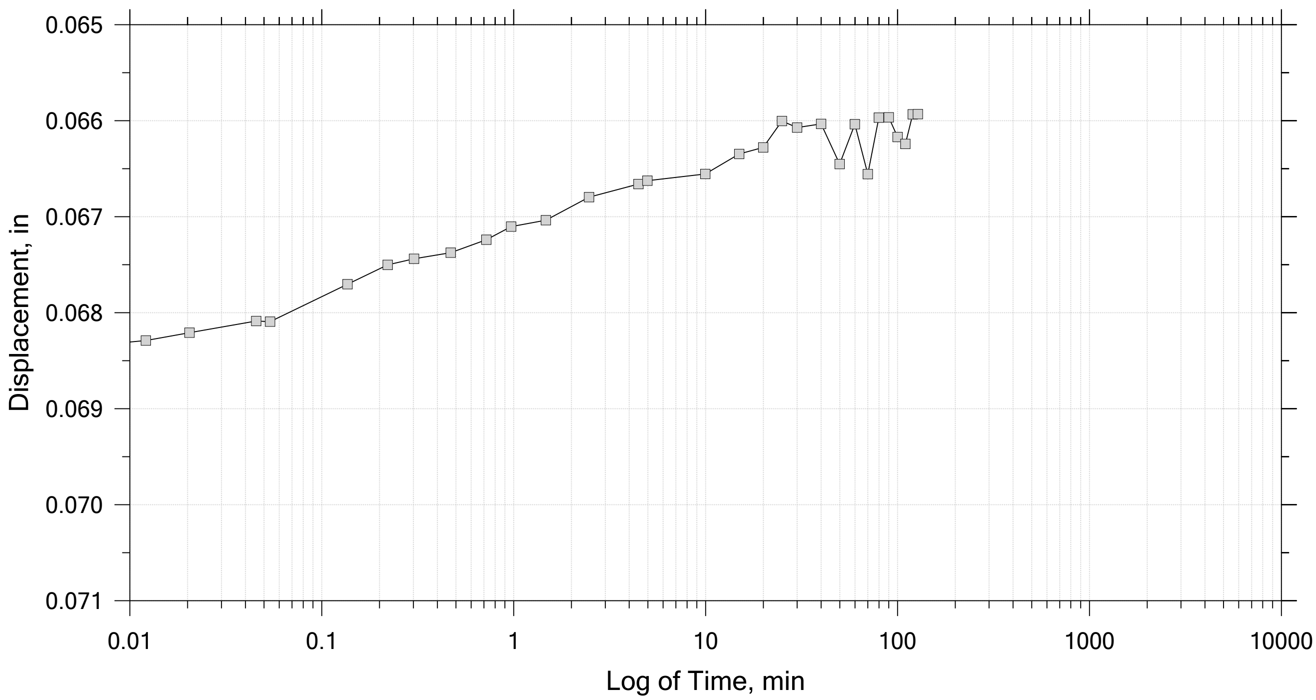


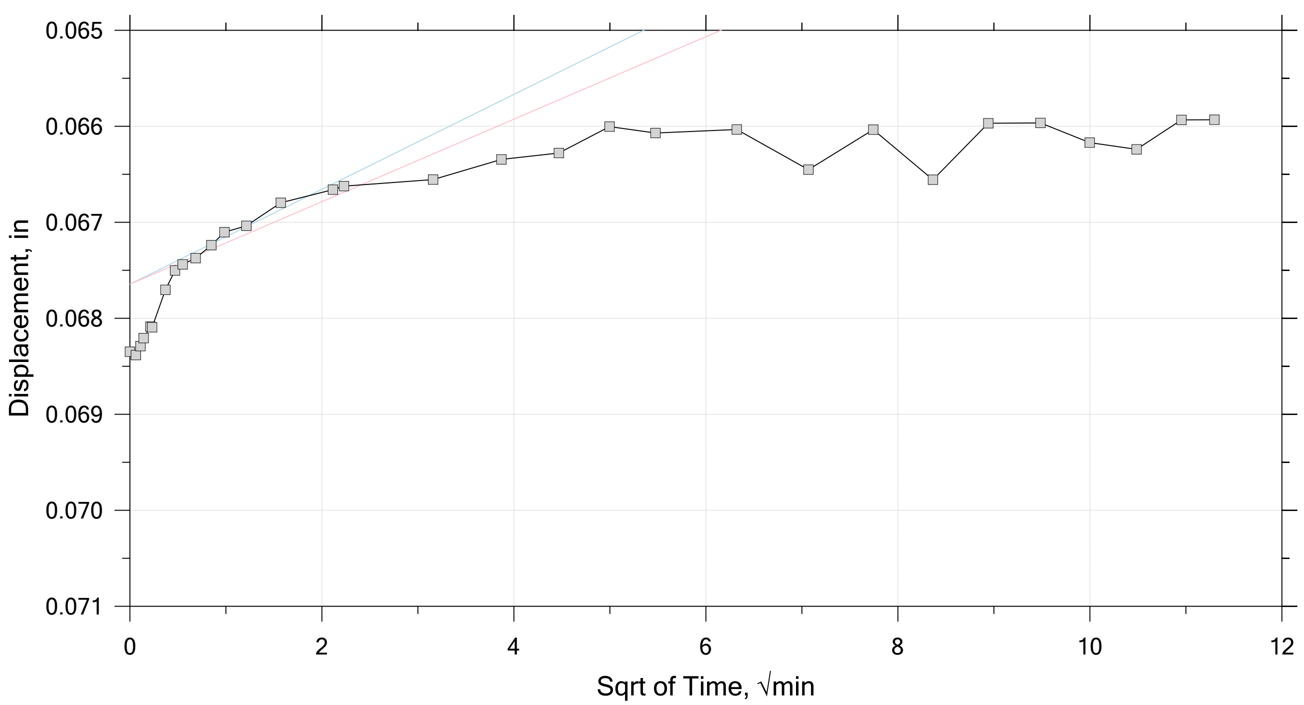


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 20 of 23
Constant Load Step
Stress: 1.06e+04 psf

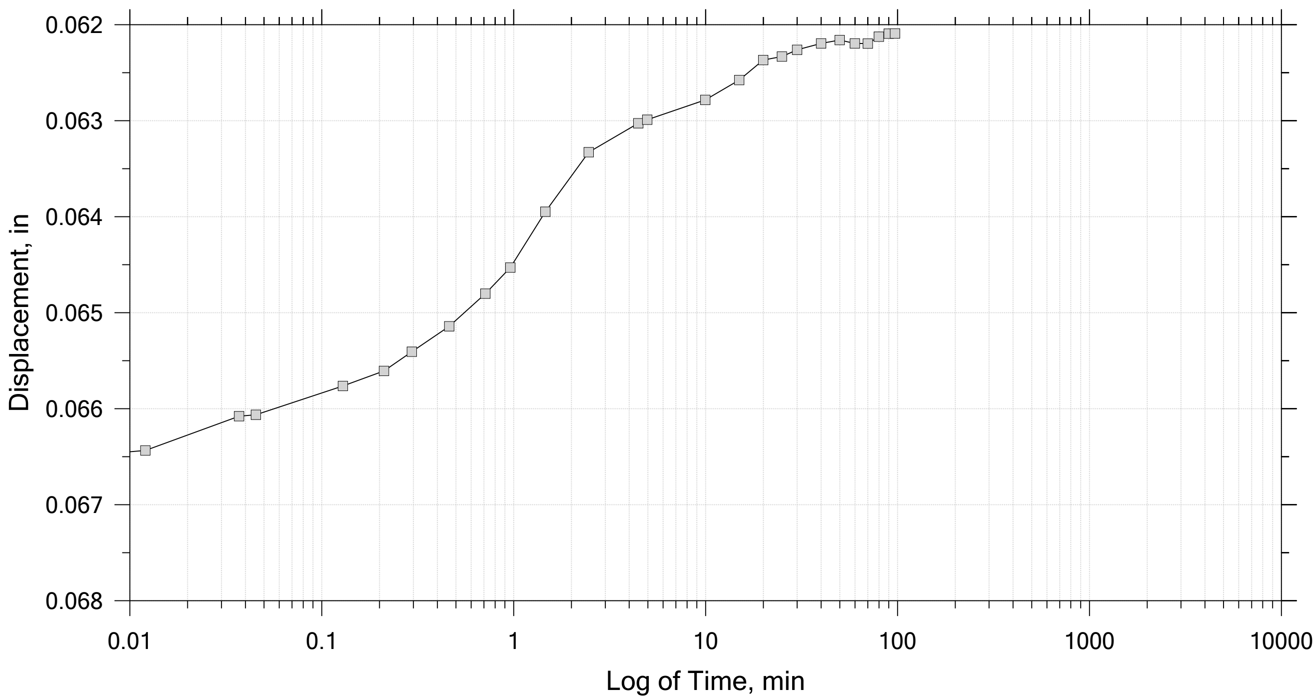


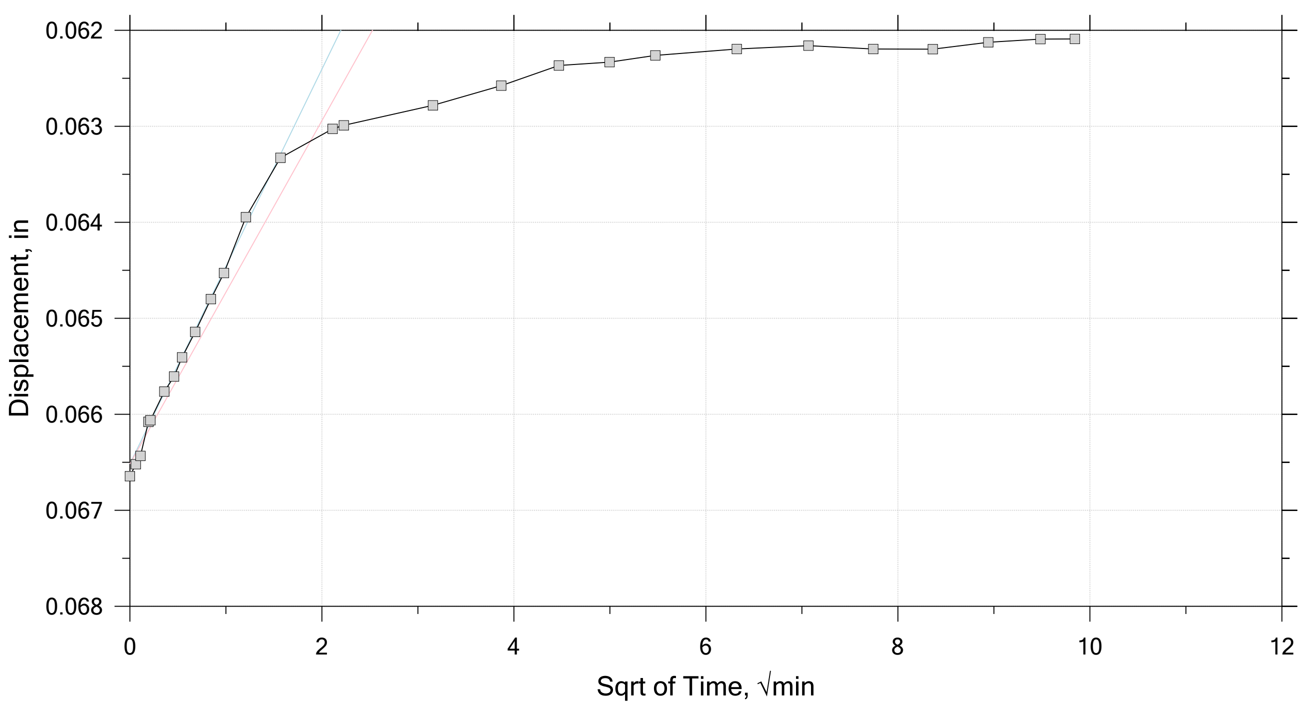


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 21 of 23
Constant Load Step
Stress: 5.3e+03 psf

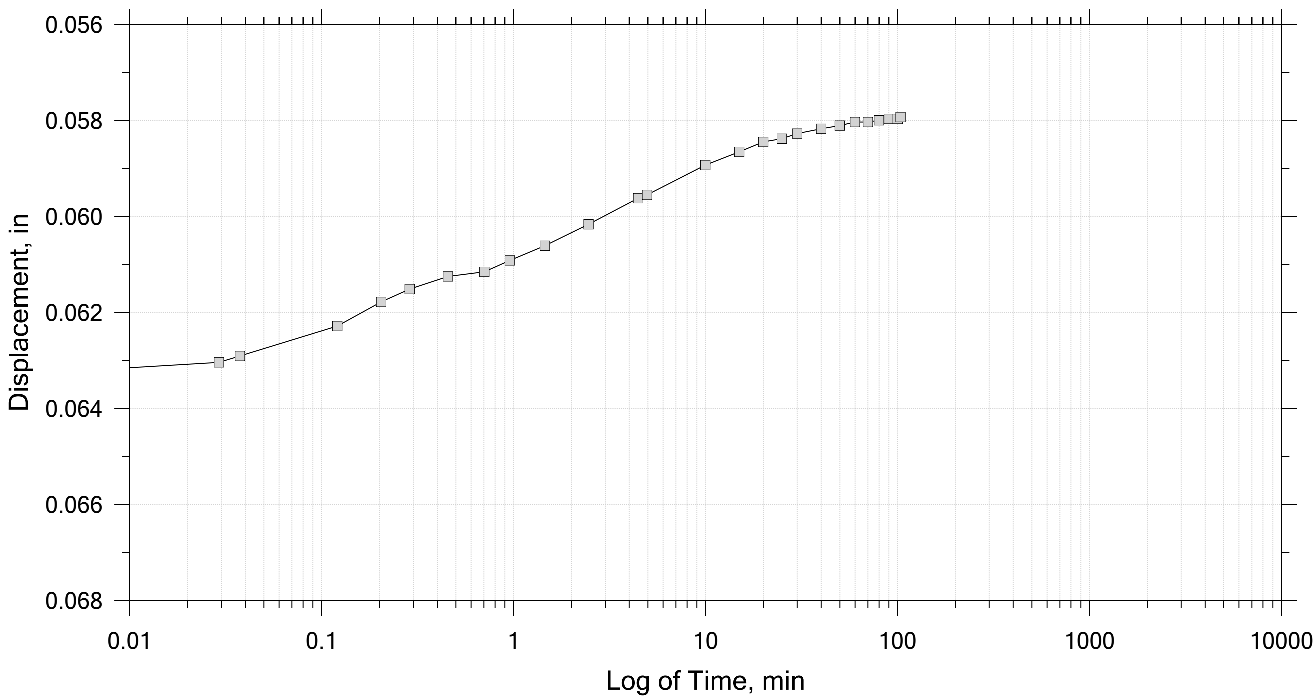


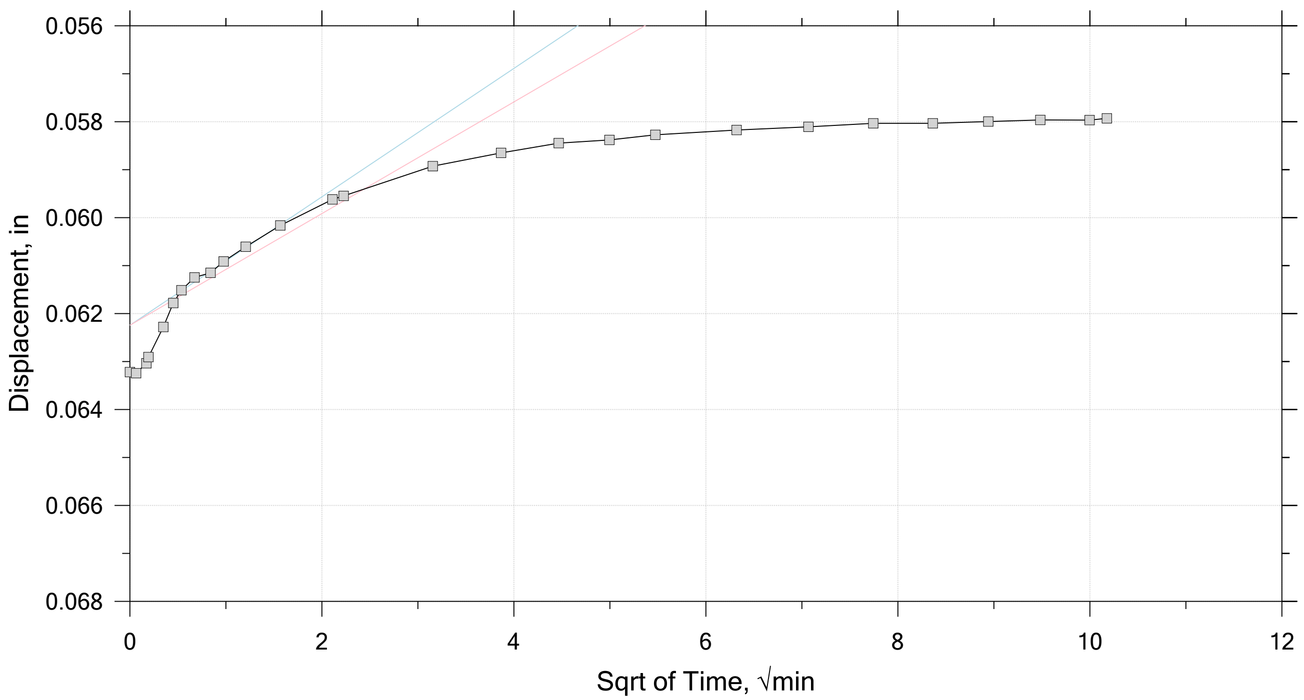


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 22 of 23
Constant Load Step
Stress: 2.65e+03 psf

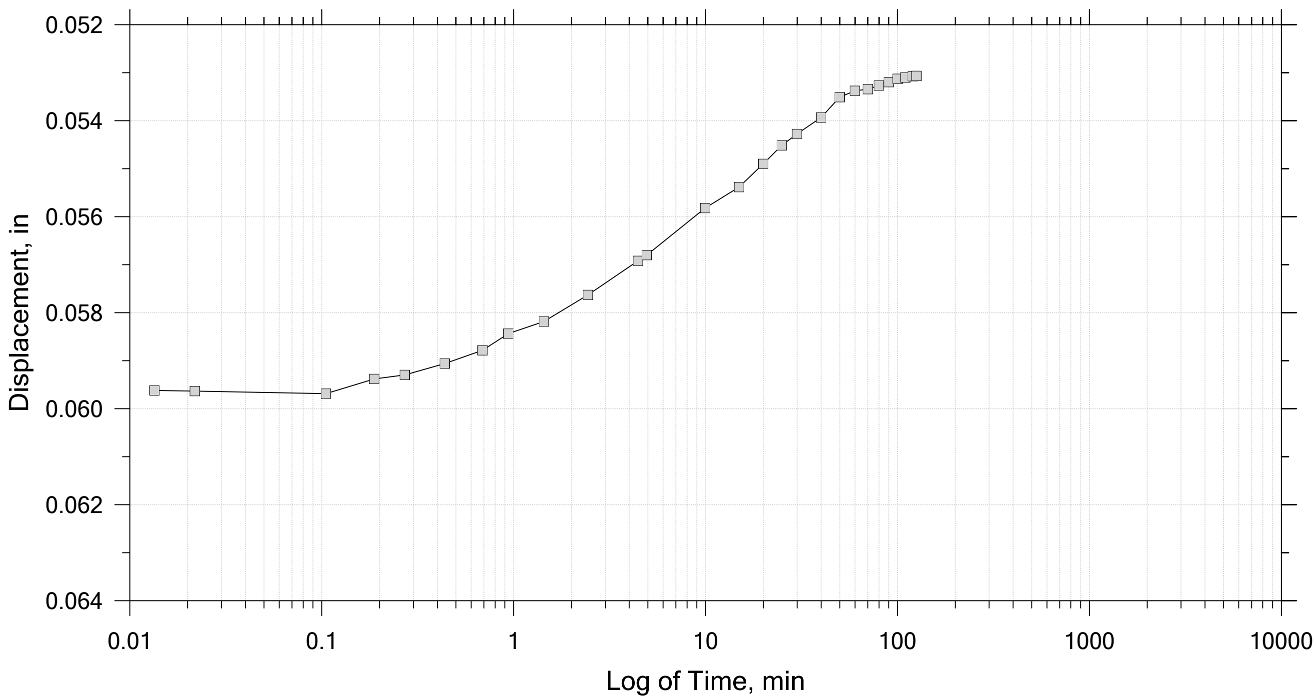


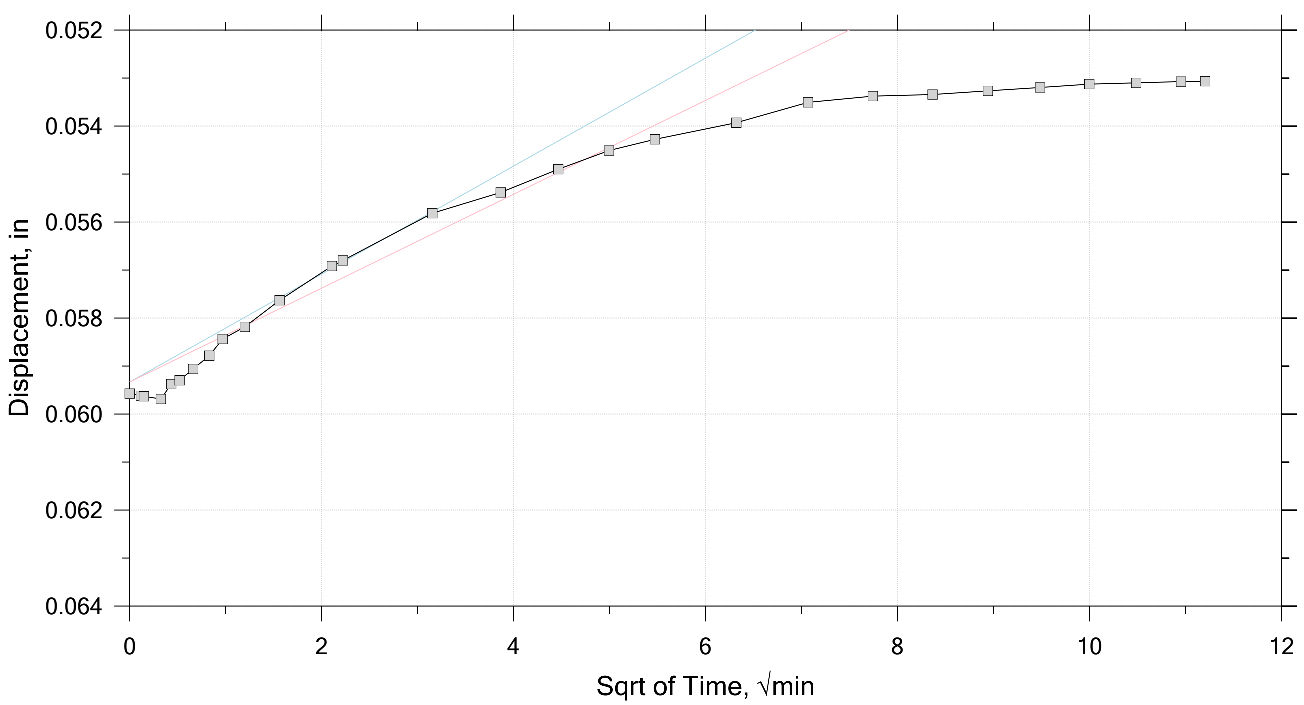


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 23 of 23
Constant Load Step
Stress: 1.33e+03 psf





Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter, in: 2.50	Specific Gravity: 2.91 (Implied)	Liquid Limit: 46
Specimen Height, in: 1.00	Initial Void Ratio: 1.12	Plastic Limit: 24
Final Height, in: 0.95	Final Void Ratio: 1.01	Plasticity Index: 22

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	224	---	"ring"	307
Mass Container, gm	36.63	109.53	109.53	60.45
Mass Container + Wet Soil, gm	144.27	260.28	258.68	208.69
Mass Container + Dry Soil, gm	116.37	220.41	220.41	170.65
Mass Dry Soil, gm	79.74	110.88	110.88	110.2
Water Content, %	34.99	35.96	34.52	34.52
Void Ratio	---	1.12	1.01	---
Degree of Saturation, %	---	93.73	100.00	---
Dry Unit Weight, pcf	---	85.878	90.68	---

Preconsolidation Stress, psf	---
Compression Ratio	0
Rebound Ratio	0
Compression Index	0
Rebound Index	0

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Log of Time Coefficients

Step	Applied Stress psf	EOP Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/day	Mv ft²/ton	k cm/s	Ca %
1	207.	0.0004664	1.12	0.0465	1.942	2.54e-01	4.50e+03	1.26e-08	0.00e+00
2	311.	0.0003254	1.12	0.0325	0.000	0.00e+00	-2.71e+03	-0.00e+00	0.00e+00
3	466.	0.0002000	1.12	0.0200	0.000	0.00e+00	-1.62e+03	-0.00e+00	0.00e+00
4	699.	0.0005493	1.12	0.0548	0.000	0.00e+00	2.99e+03	0.00e+00	0.00e+00
5	1.05e+03	0.002739	1.11	0.273	0.000	0.00e+00	1.25e+04	0.00e+00	0.00e+00
6	1.57e+03	0.006174	1.10	0.616	0.000	0.00e+00	1.31e+04	0.00e+00	0.00e+00
7	2.36e+03	0.009009	1.10	0.899	0.000	0.00e+00	7.20e+03	0.00e+00	0.00e+00
8	3.54e+03	0.01384	1.09	1.38	0.000	0.00e+00	8.19e+03	0.00e+00	0.00e+00
9	5.30e+03	0.01896	1.08	1.89	0.000	0.00e+00	5.77e+03	0.00e+00	0.00e+00
10	1.06e+04	0.03525	1.04	3.52	0.000	0.00e+00	6.13e+03	0.00e+00	0.00e+00
11	5.30e+03	0.03354	1.05	3.35	0.000	0.00e+00	6.42e+02	0.00e+00	0.00e+00
12	2.65e+03	0.03361	1.05	3.35	0.629	7.34e-01	-4.98e+01	-4.02e-10	0.00e+00
13	1.33e+03	0.03121	1.05	3.12	2.447	1.89e-01	3.61e+03	7.51e-09	0.00e+00
14	663.	0.02862	1.06	2.86	0.000	0.00e+00	7.82e+03	0.00e+00	0.00e+00
15	1.33e+03	0.02644	1.06	2.64	0.000	0.00e+00	-6.55e+03	-0.00e+00	0.00e+00
16	2.65e+03	0.02839	1.06	2.83	0.000	0.00e+00	2.94e+03	0.00e+00	0.00e+00
17	5.30e+03	0.03147	1.05	3.14	0.000	0.00e+00	2.32e+03	0.00e+00	0.00e+00
18	1.06e+04	0.04100	1.03	4.09	0.000	0.00e+00	3.58e+03	0.00e+00	0.00e+00
19	2.12e+04	0.06479	0.981	6.47	0.000	0.00e+00	4.48e+03	0.00e+00	0.00e+00
20	1.06e+04	0.06357	0.983	6.34	0.000	0.00e+00	2.31e+02	0.00e+00	0.00e+00
21	5.30e+03	0.06287	0.985	6.27	0.000	0.00e+00	2.64e+02	0.00e+00	0.00e+00
22	2.65e+03	0.05874	0.994	5.86	1.461	2.99e-01	3.11e+03	1.02e-08	0.00e+00
23	1.33e+03	0.05350	1.00	5.34	0.000	0.00e+00	7.88e+03	0.00e+00	0.00e+00

Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B

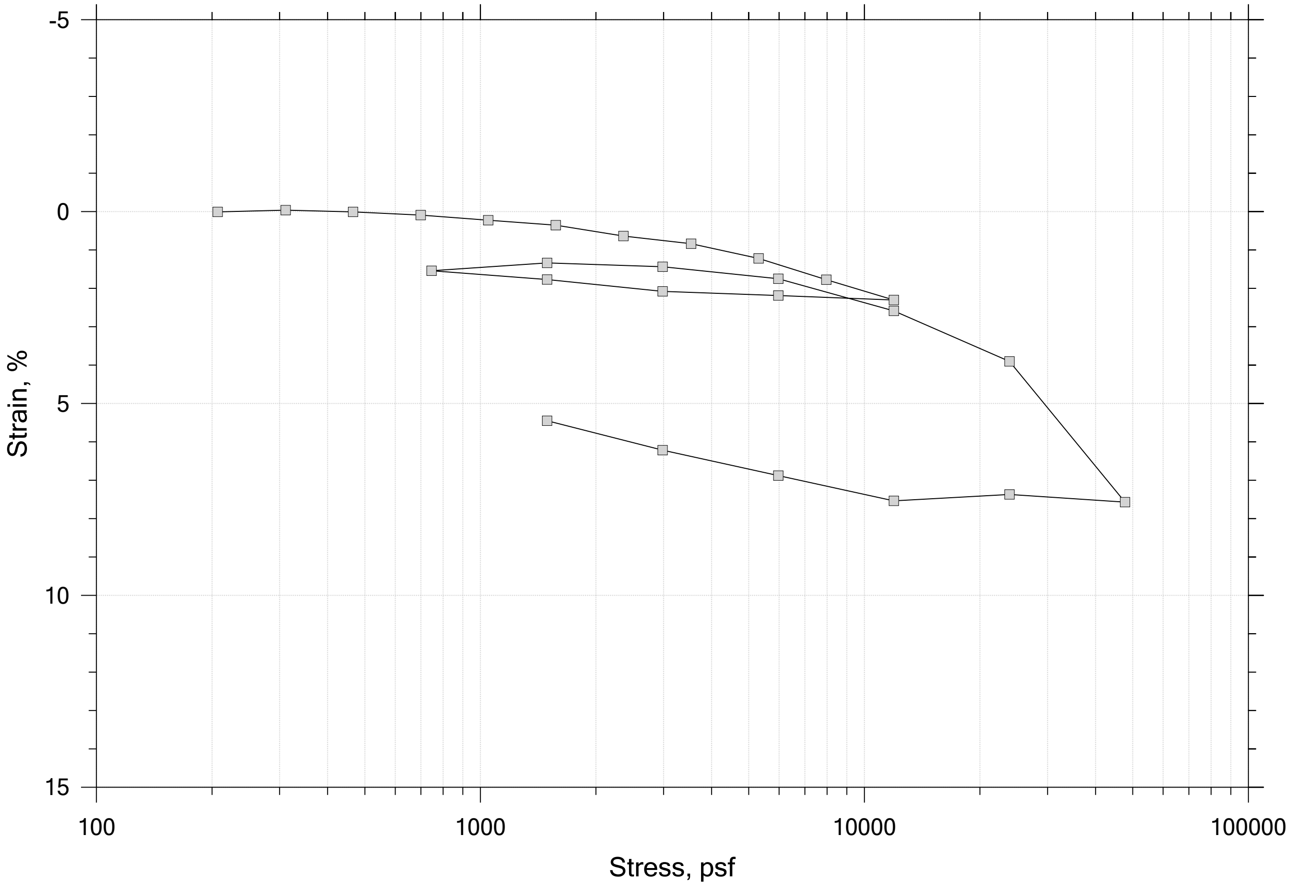
Sqrt of Time Coefficients

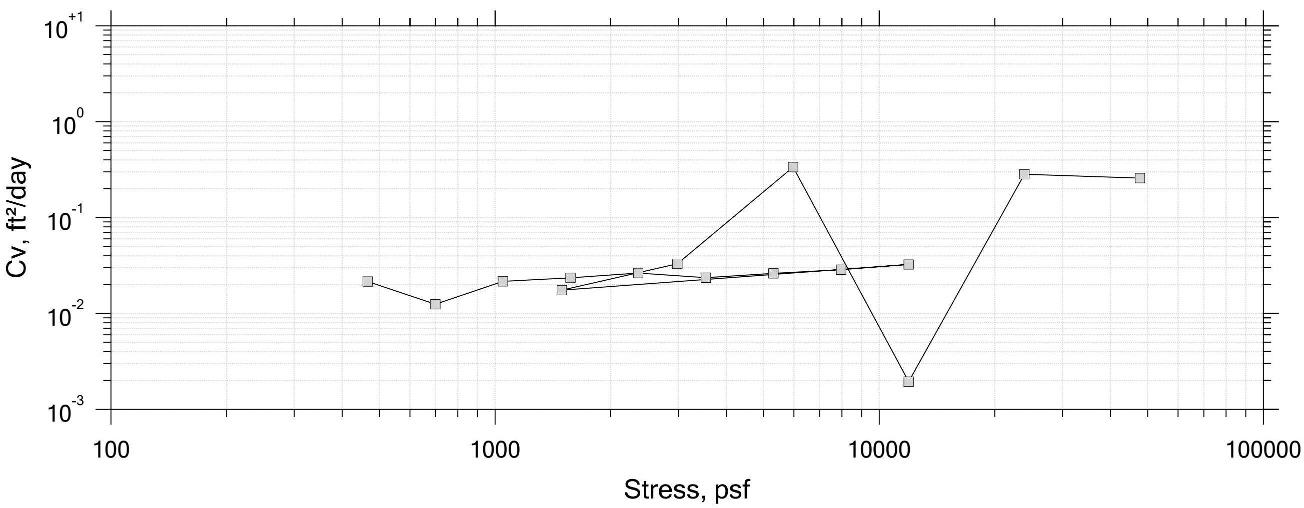
Step	Applied Stress psf	EOP Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv ft²/day	Mv ft²/ton	k cm/s
1	207.	0.0004664	1.12	0.0465	0.000	0.00e+00	4.50e+03	0.00e+00
2	311.	0.0003254	1.12	0.0325	0.000	0.00e+00	-2.71e+03	-0.00e+00
3	466.	0.0002000	1.12	0.0200	122.016	1.74e-02	-1.62e+03	-3.10e-10
4	699.	0.0005493	1.12	0.0548	169.677	1.25e-02	2.99e+03	4.13e-10
5	1.05e+03	0.002739	1.11	0.273	13.976	1.52e-01	1.25e+04	2.09e-08
6	1.57e+03	0.006174	1.10	0.616	222.186	9.49e-03	1.31e+04	1.37e-09
7	2.36e+03	0.009009	1.10	0.899	155.909	1.34e-02	7.20e+03	1.07e-09
8	3.54e+03	0.01384	1.09	1.38	154.148	1.35e-02	8.19e+03	1.22e-09
9	5.30e+03	0.01896	1.08	1.89	32.982	6.24e-02	5.77e+03	3.97e-09
10	1.06e+04	0.03525	1.04	3.52	14.272	1.41e-01	6.13e+03	9.53e-09
11	5.30e+03	0.03354	1.05	3.35	0.618	3.21e+00	6.42e+02	2.27e-08
12	2.65e+03	0.03361	1.05	3.35	10.177	1.95e-01	-4.98e+01	-1.07e-10
13	1.33e+03	0.03121	1.05	3.12	12.013	1.66e-01	3.61e+03	6.59e-09
14	663.	0.02862	1.06	2.86	61.942	3.23e-02	7.82e+03	2.78e-09
15	1.33e+03	0.02644	1.06	2.64	67.238	2.99e-02	-6.55e+03	-2.16e-09
16	2.65e+03	0.02839	1.06	2.83	109.710	1.84e-02	2.94e+03	5.93e-10
17	5.30e+03	0.03147	1.05	3.14	6.306	3.18e-01	2.32e+03	8.11e-09
18	1.06e+04	0.04100	1.03	4.09	41.307	4.79e-02	3.58e+03	1.89e-09
19	2.12e+04	0.06479	0.981	6.47	130.780	1.46e-02	4.48e+03	7.20e-10
20	1.06e+04	0.06357	0.983	6.34	5.797	3.22e-01	2.31e+02	8.17e-10
21	5.30e+03	0.06287	0.985	6.27	3.535	5.29e-01	2.64e+02	1.54e-09
22	2.65e+03	0.05874	0.994	5.86	5.947	3.16e-01	3.11e+03	1.08e-08
23	1.33e+03	0.05350	1.00	5.34	22.449	8.45e-02	7.88e+03	7.33e-09

Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 4/23/2021	Depth: 40.9
	Test Number: ICON 358	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B

Summary Report

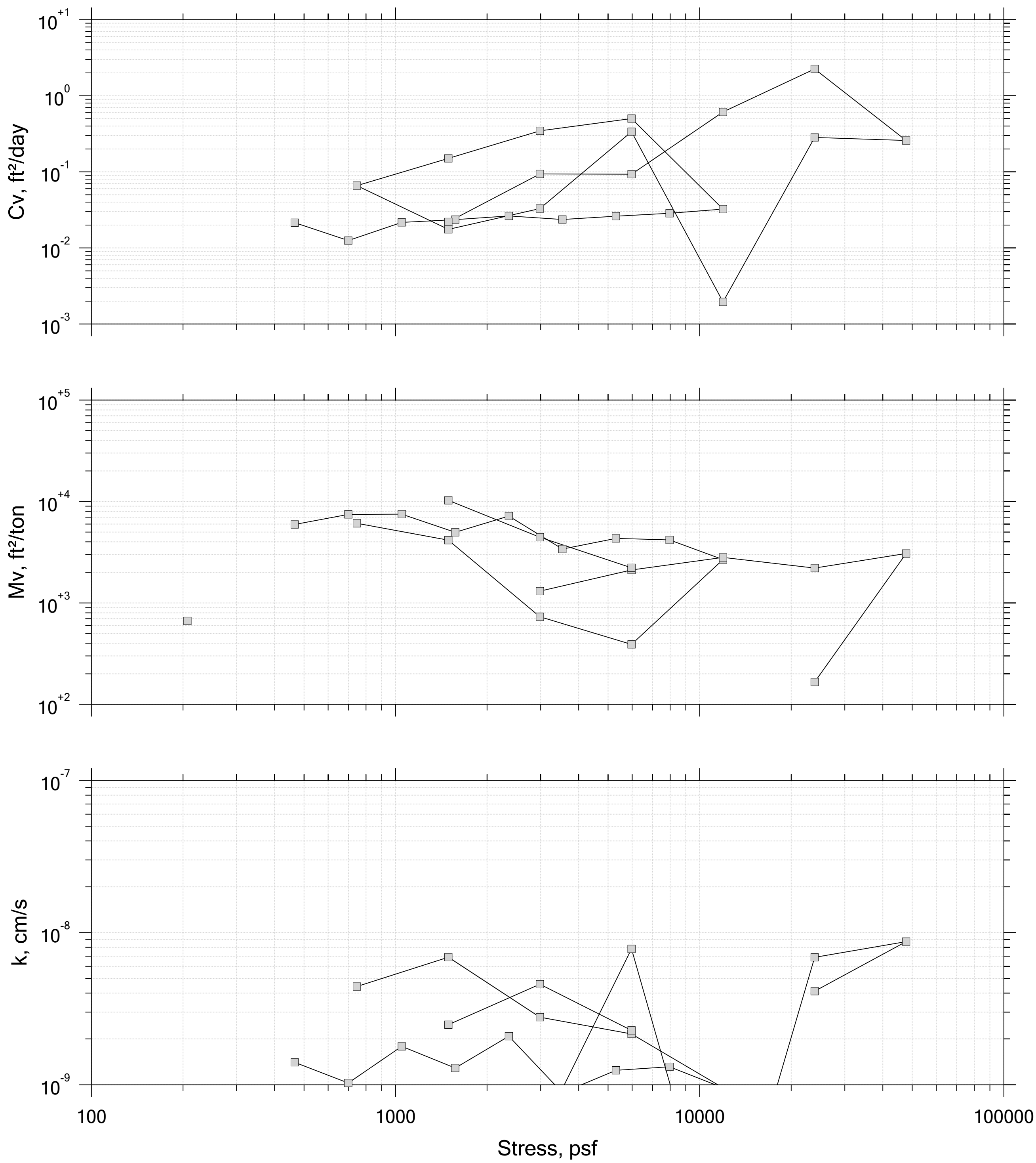




Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B

Sqrt of Time Coefficients



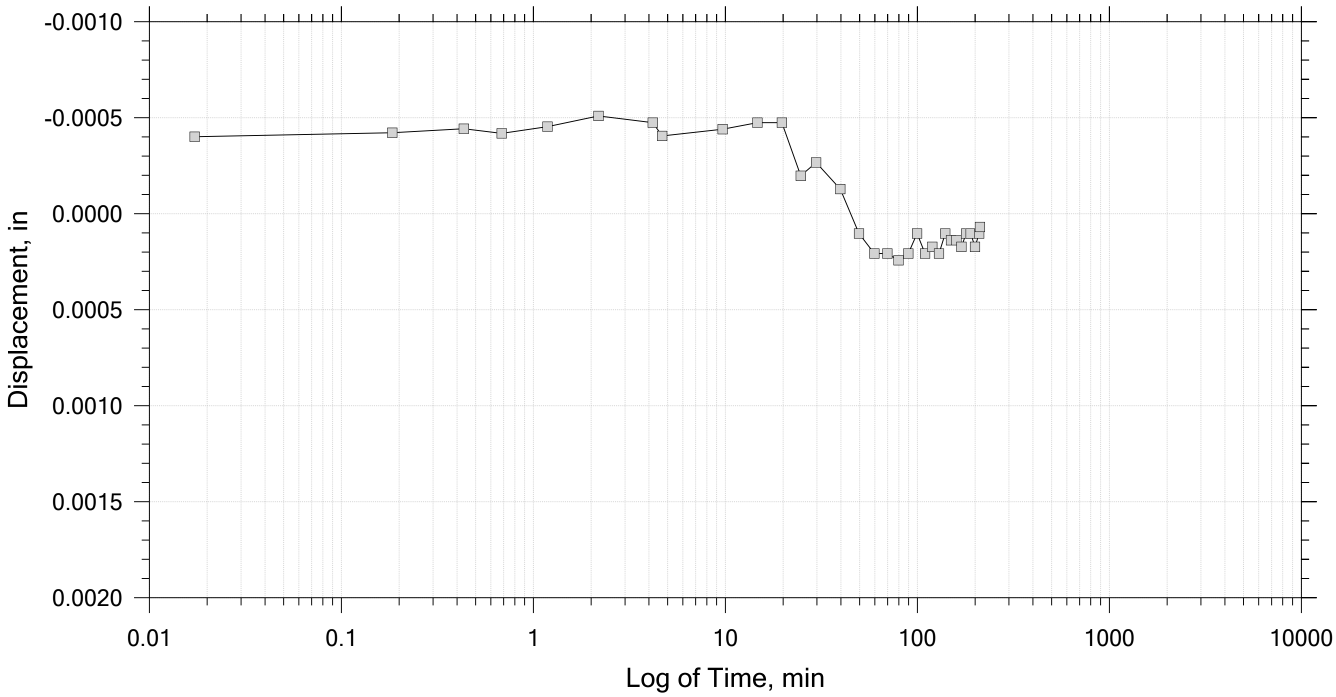
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

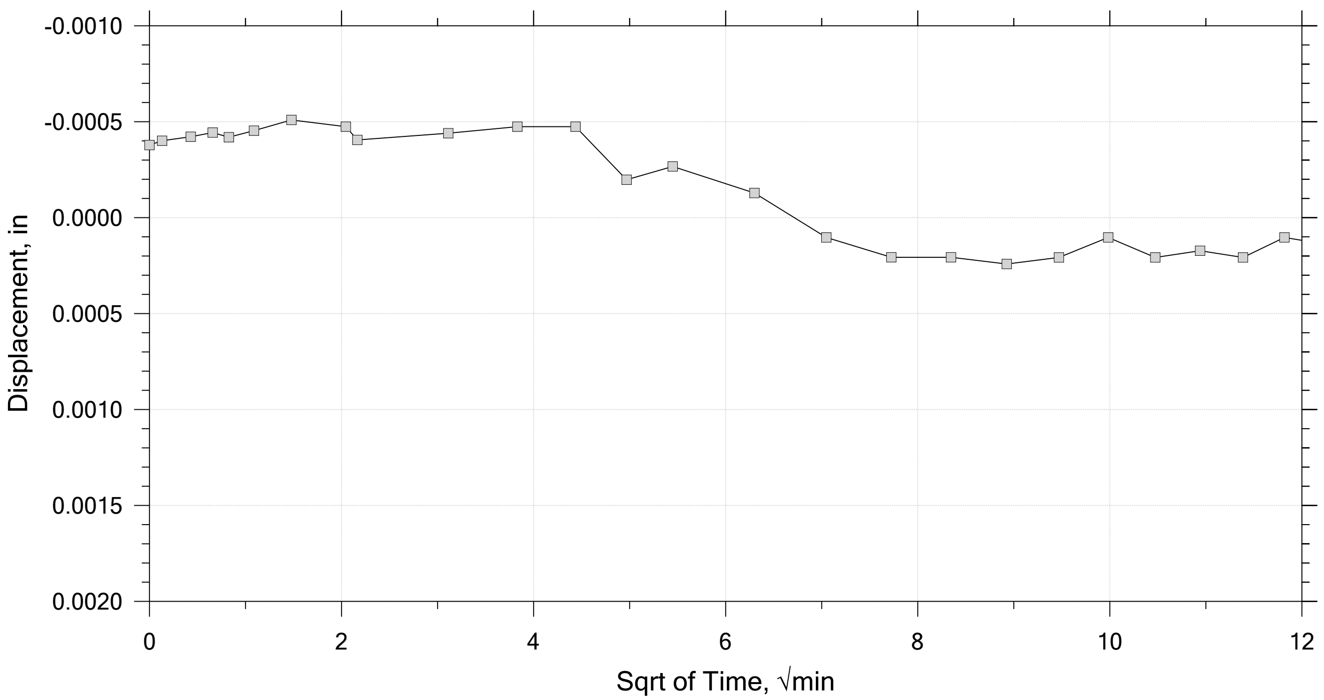
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 26

Constant Load Step

Stress: 207 psf





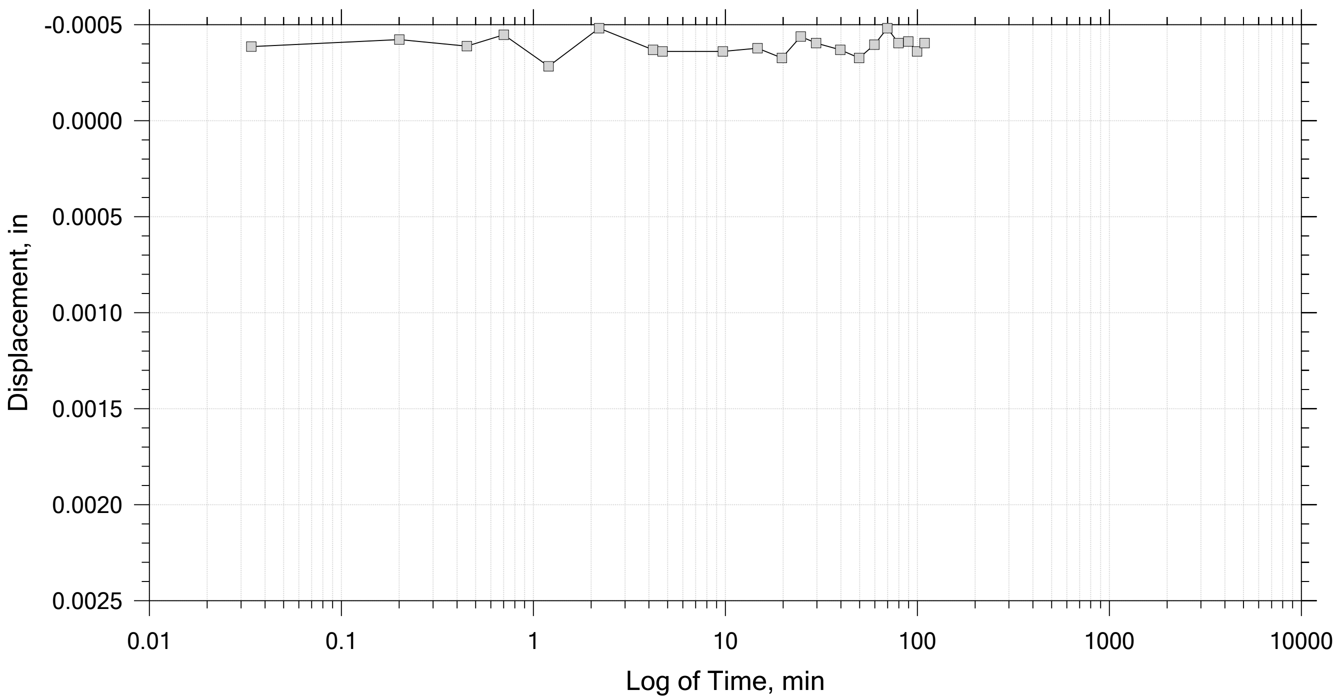
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

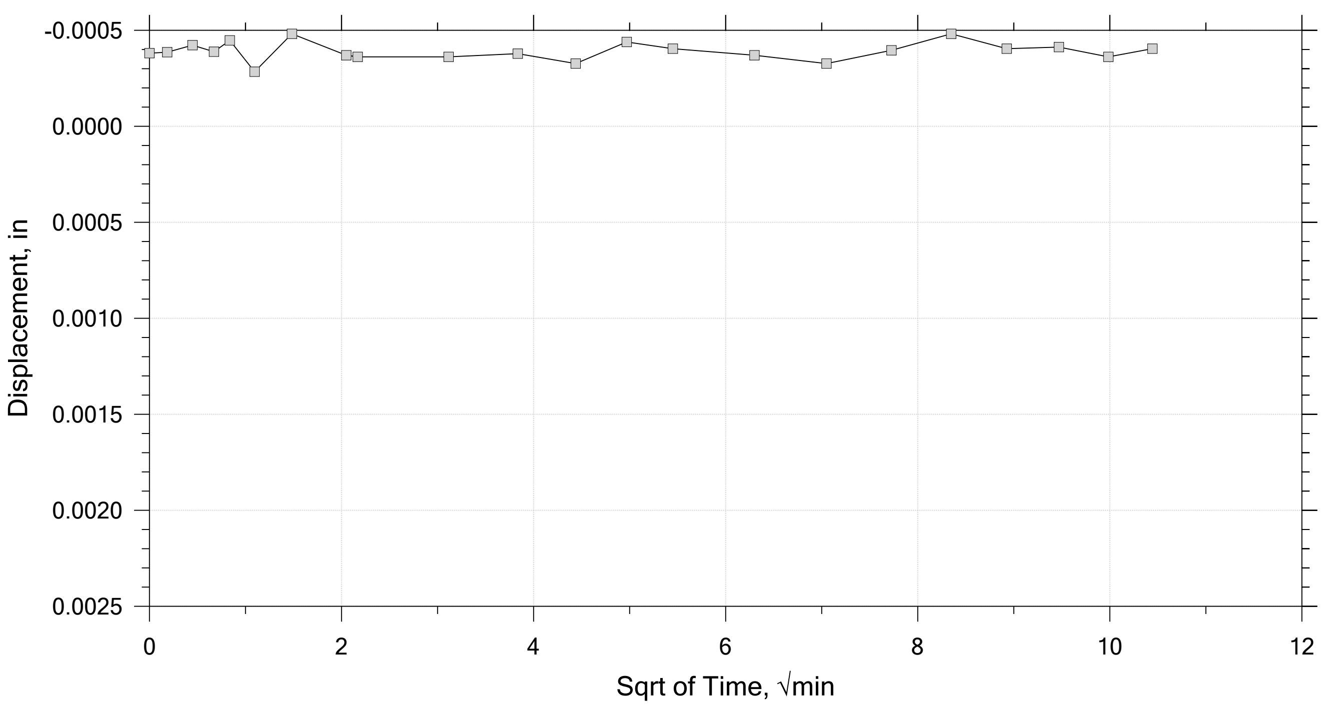
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 26

Constant Load Step

Stress: 311 psf

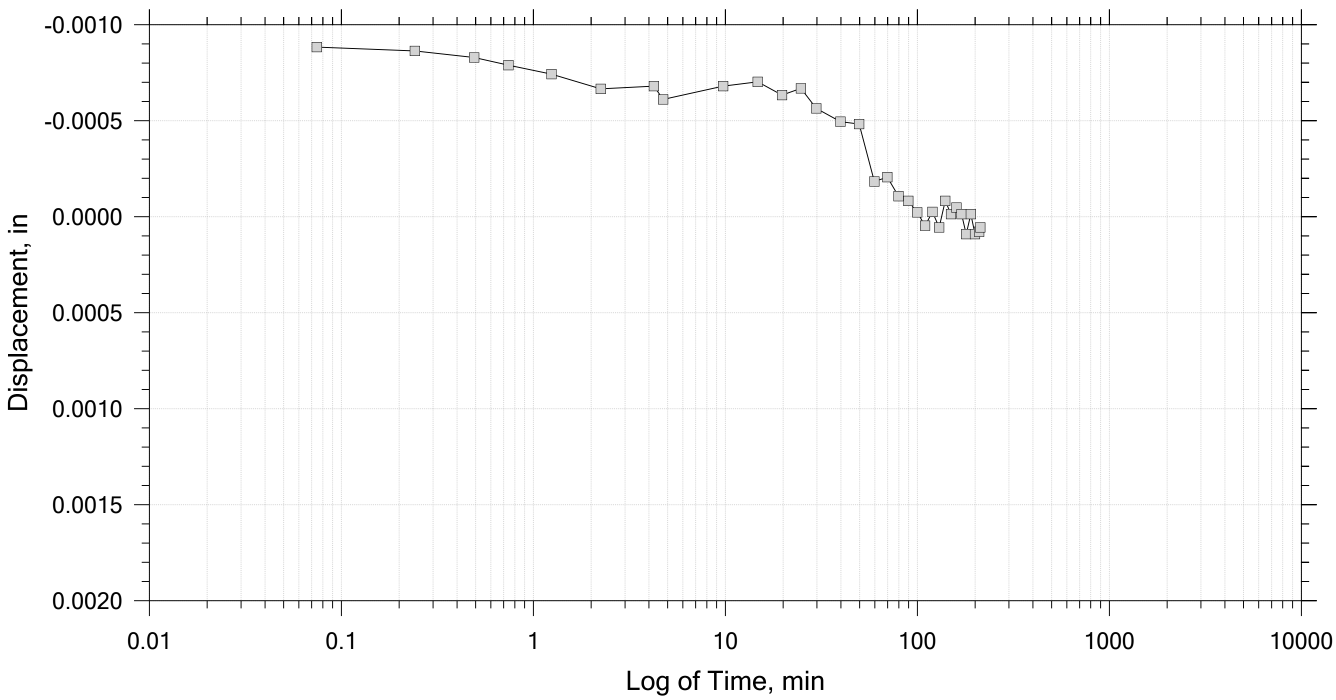


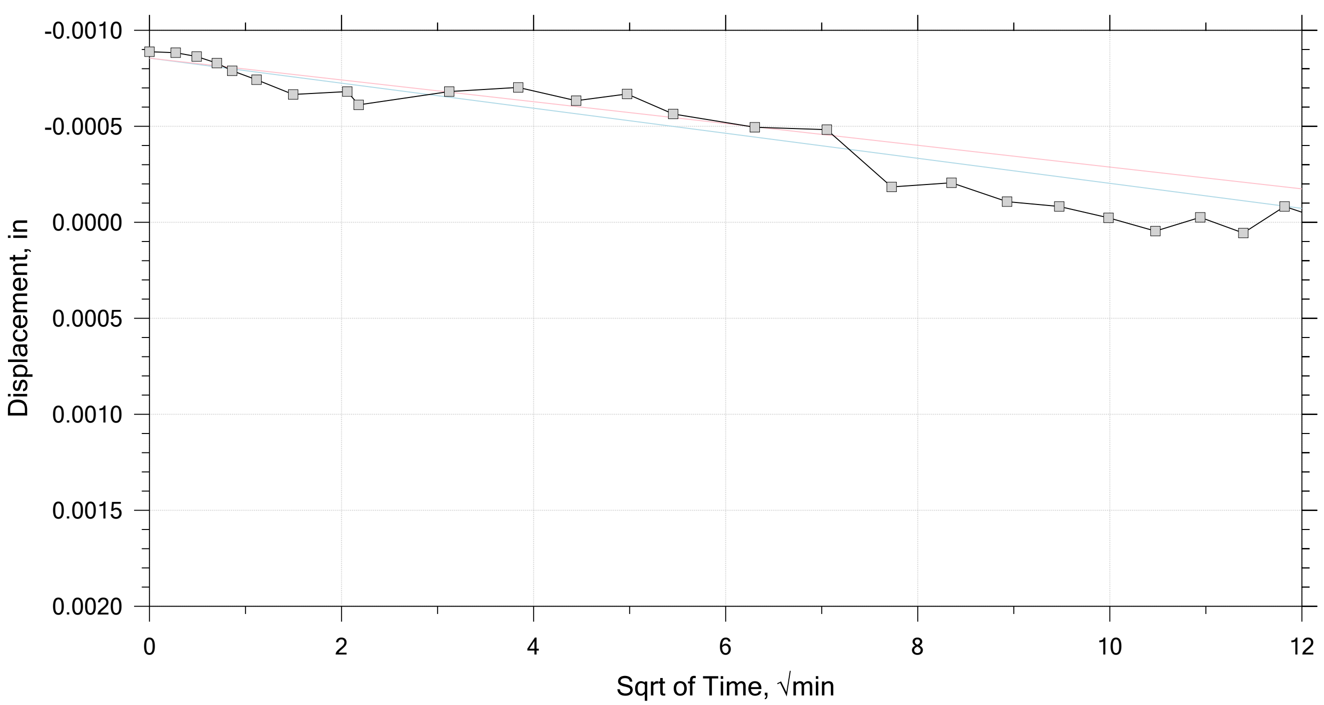


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 26
Constant Load Step
Stress: 466 psf





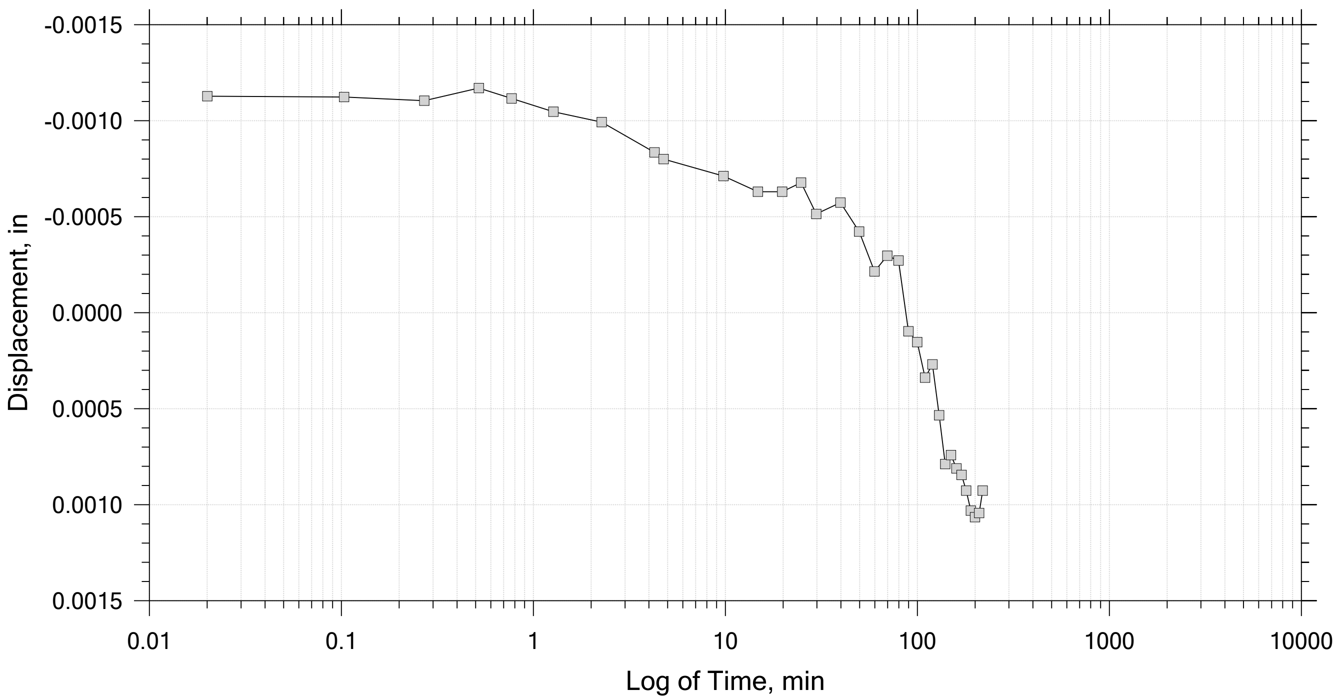
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

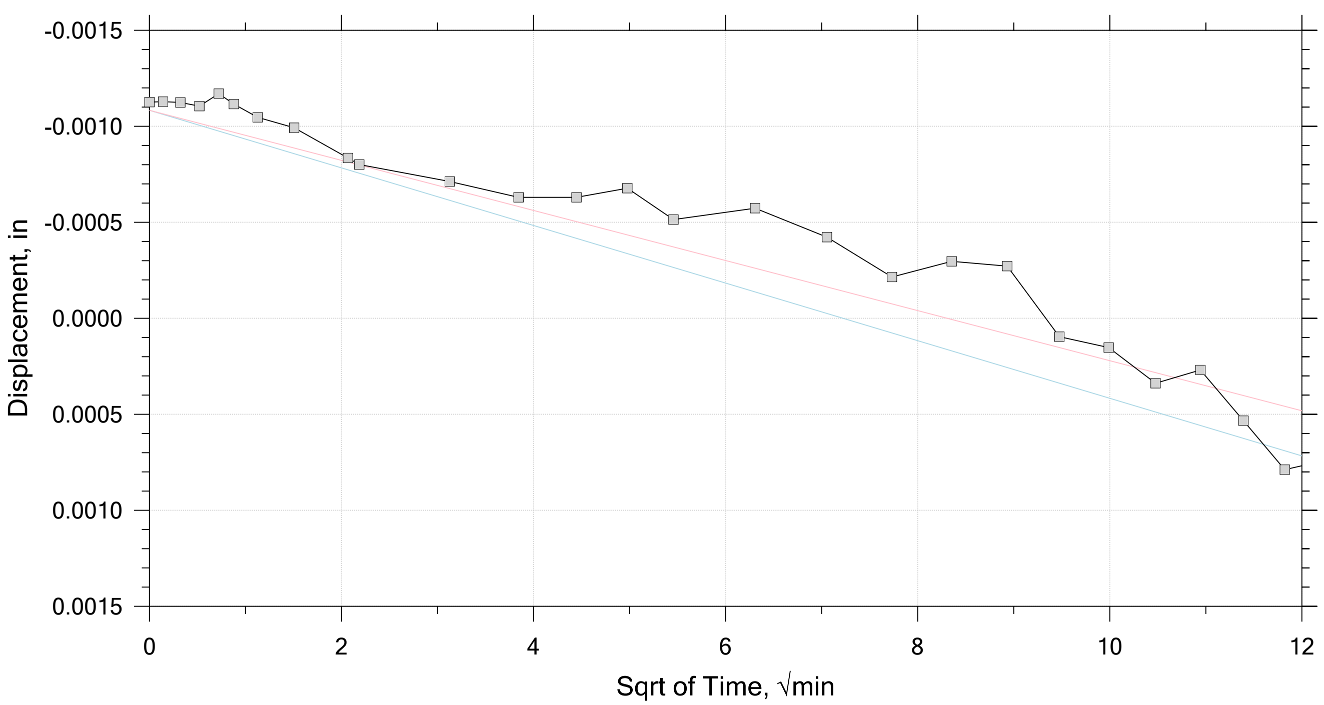
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 26

Constant Load Step

Stress: 699 psf





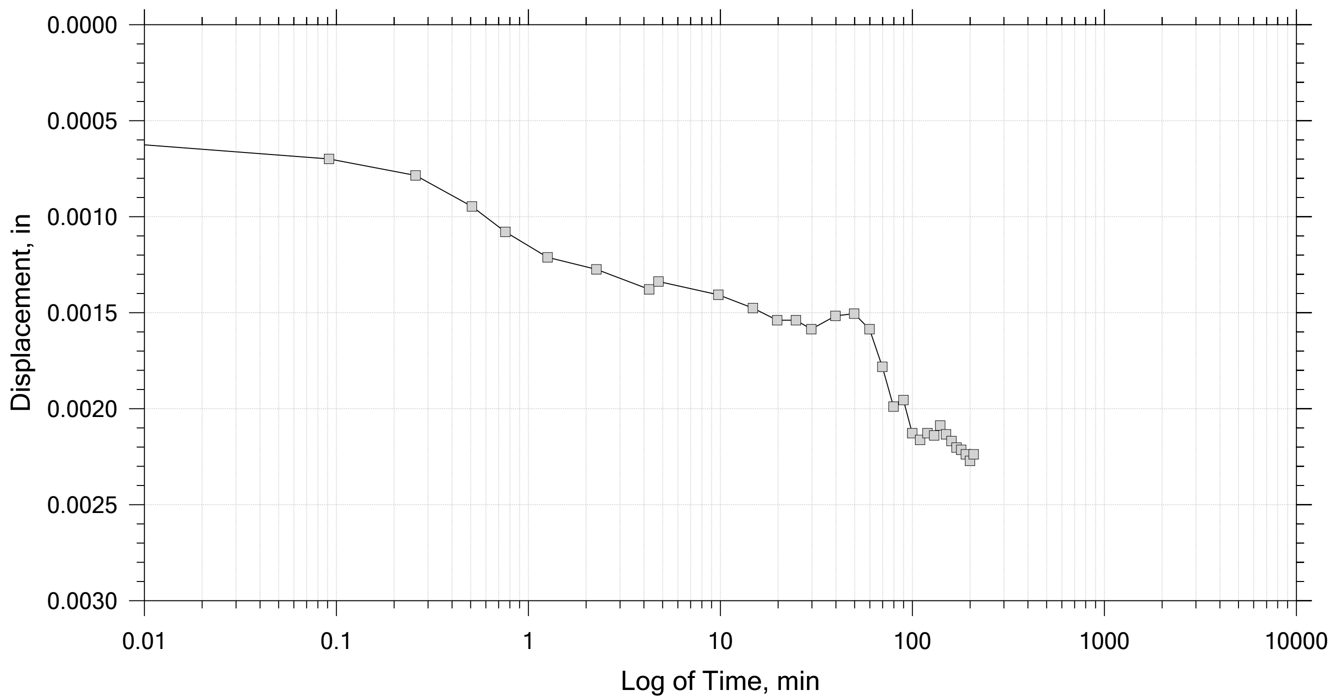
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

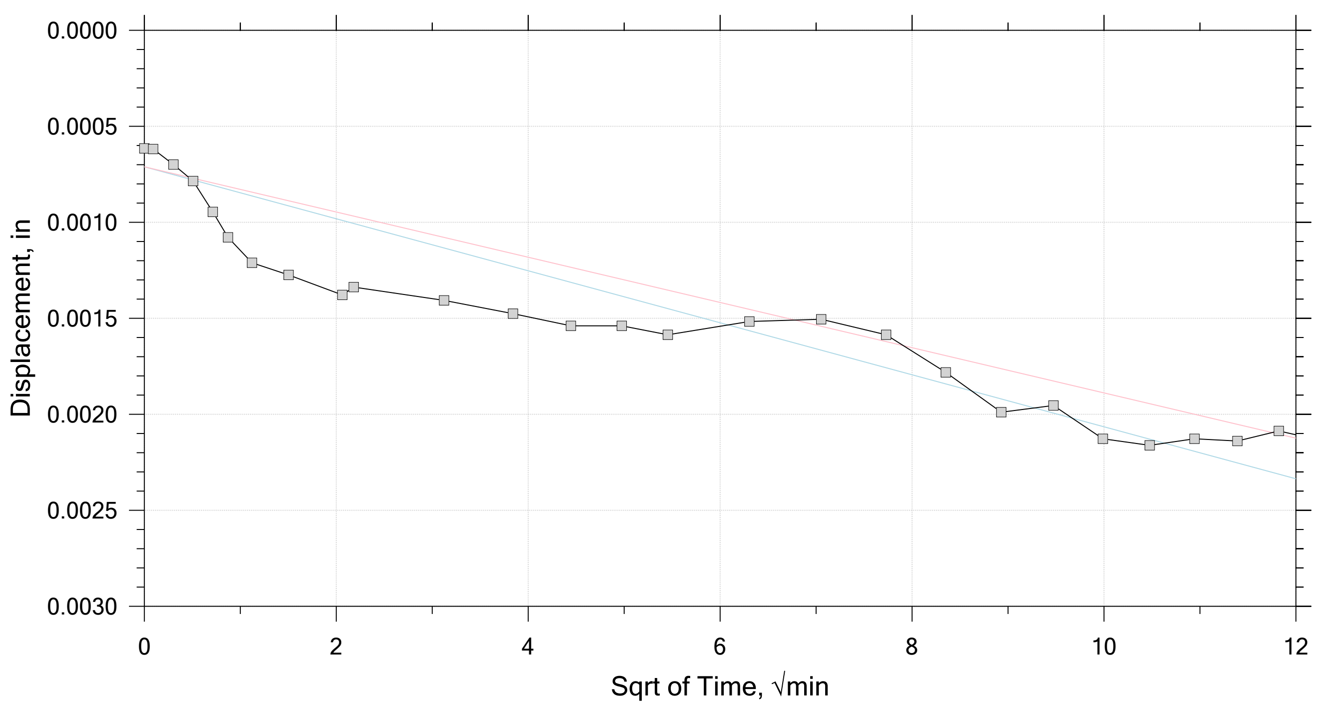
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 26

Constant Load Step

Stress: 1.05e+03 psf

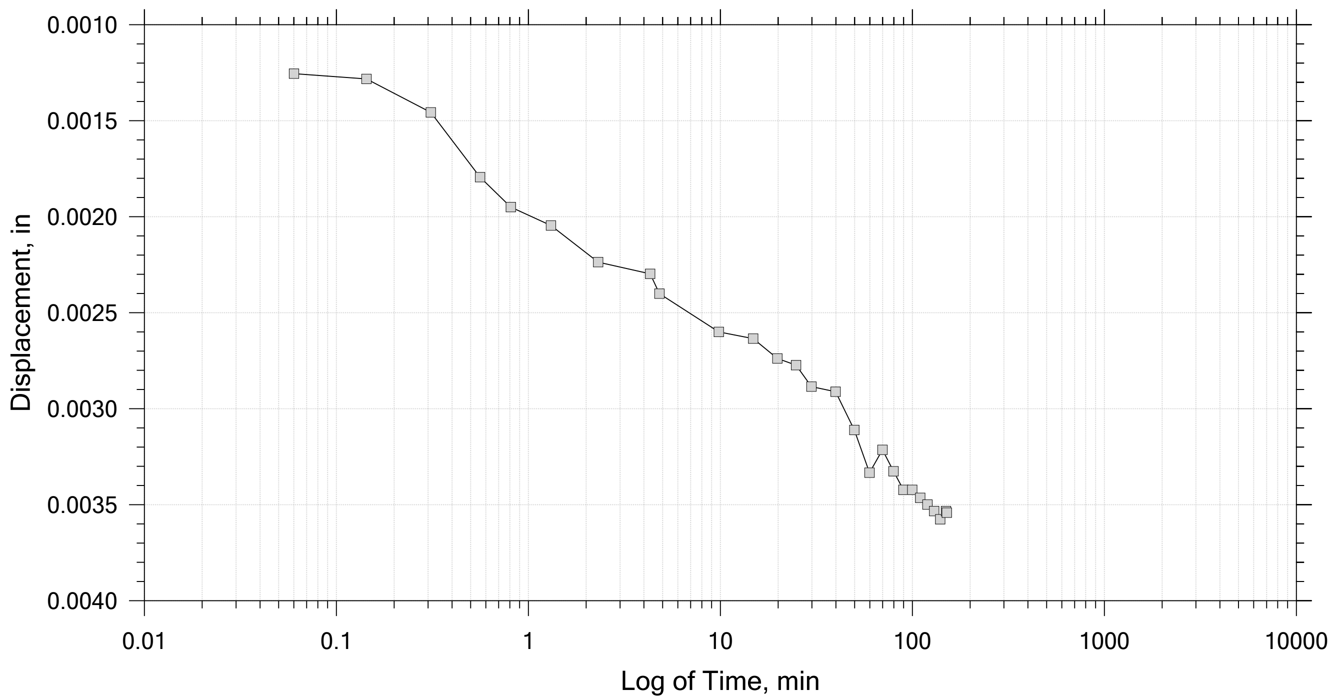


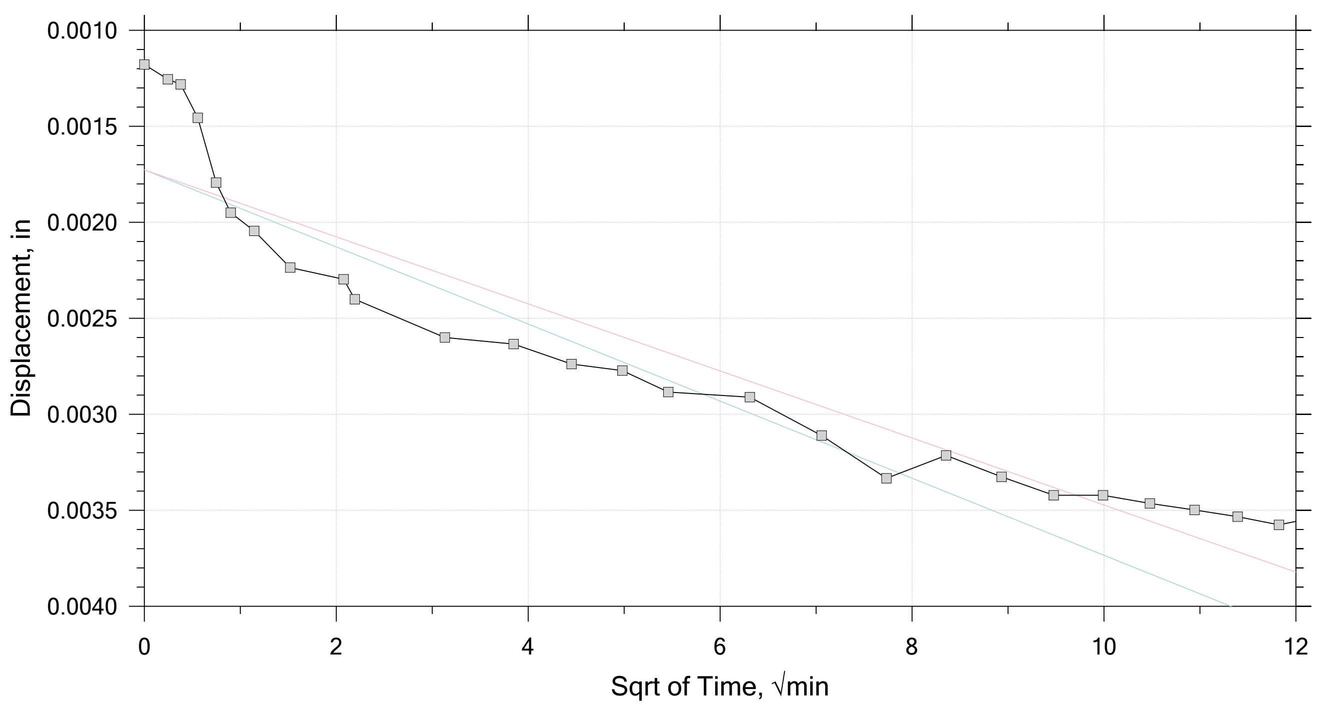


Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 26
Constant Load Step
Stress: 1.57e+03 psf





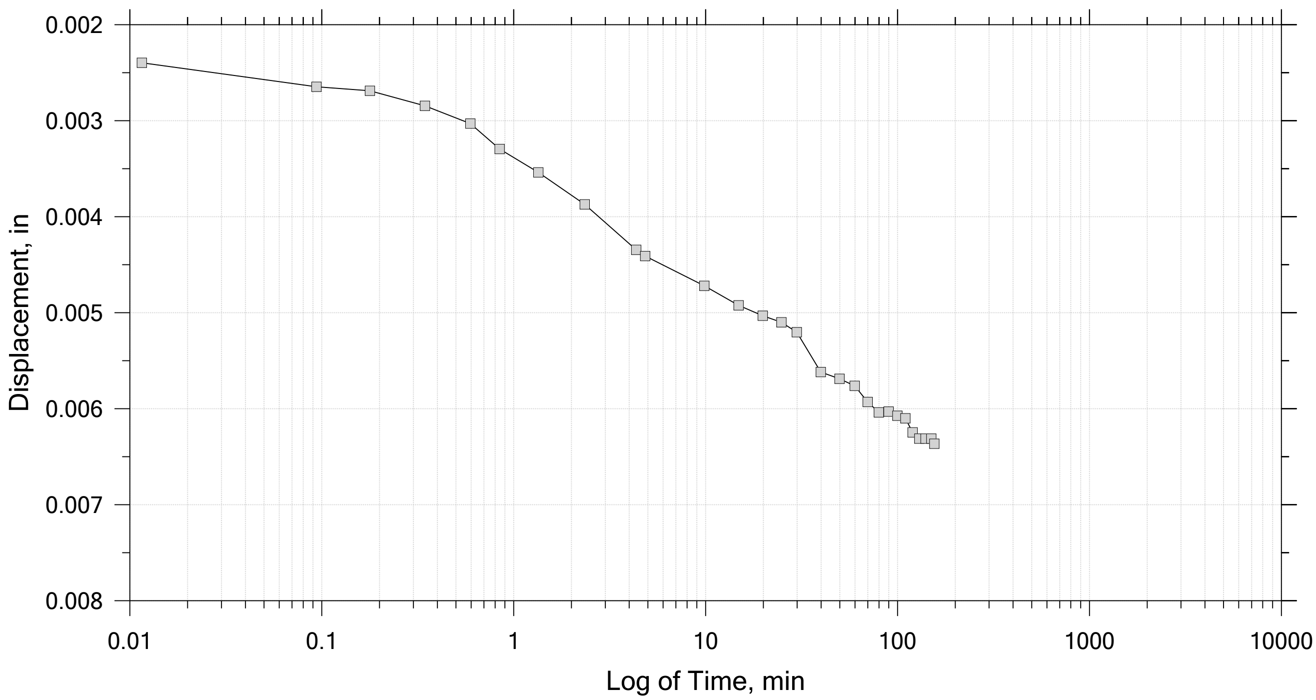
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

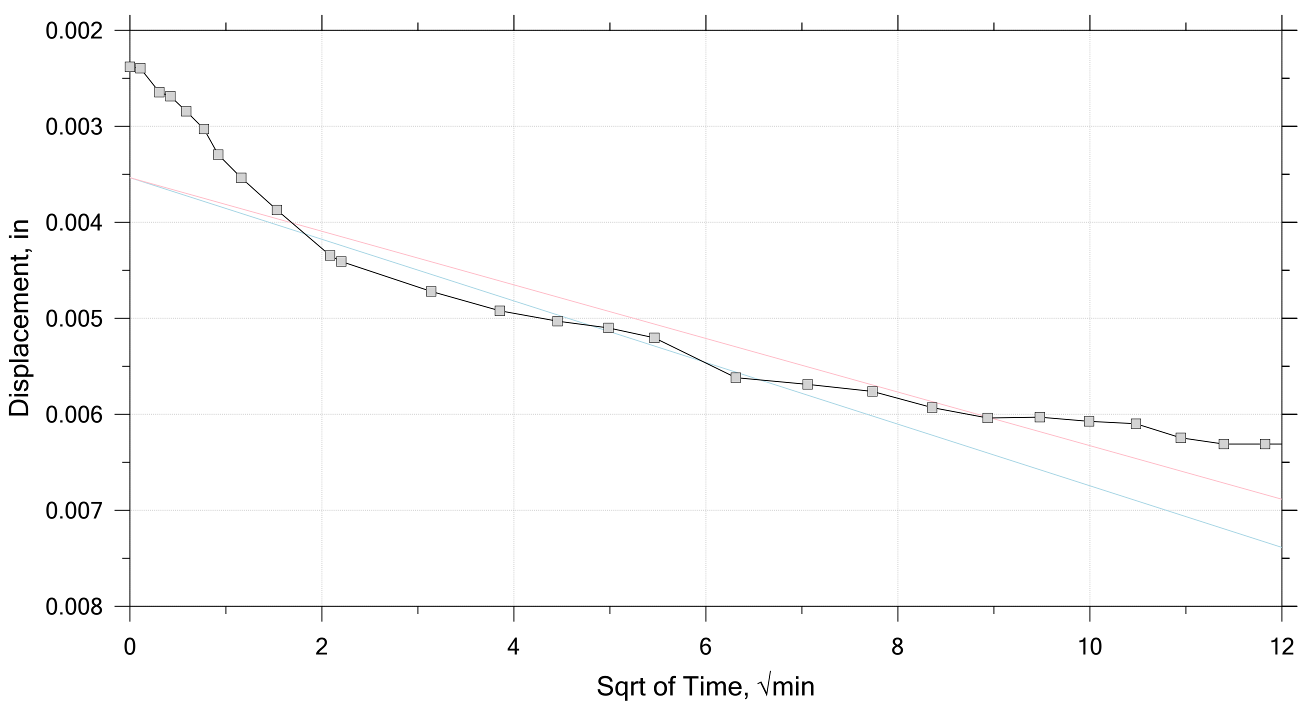
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 26

Constant Load Step

Stress: 2.36e+03 psf

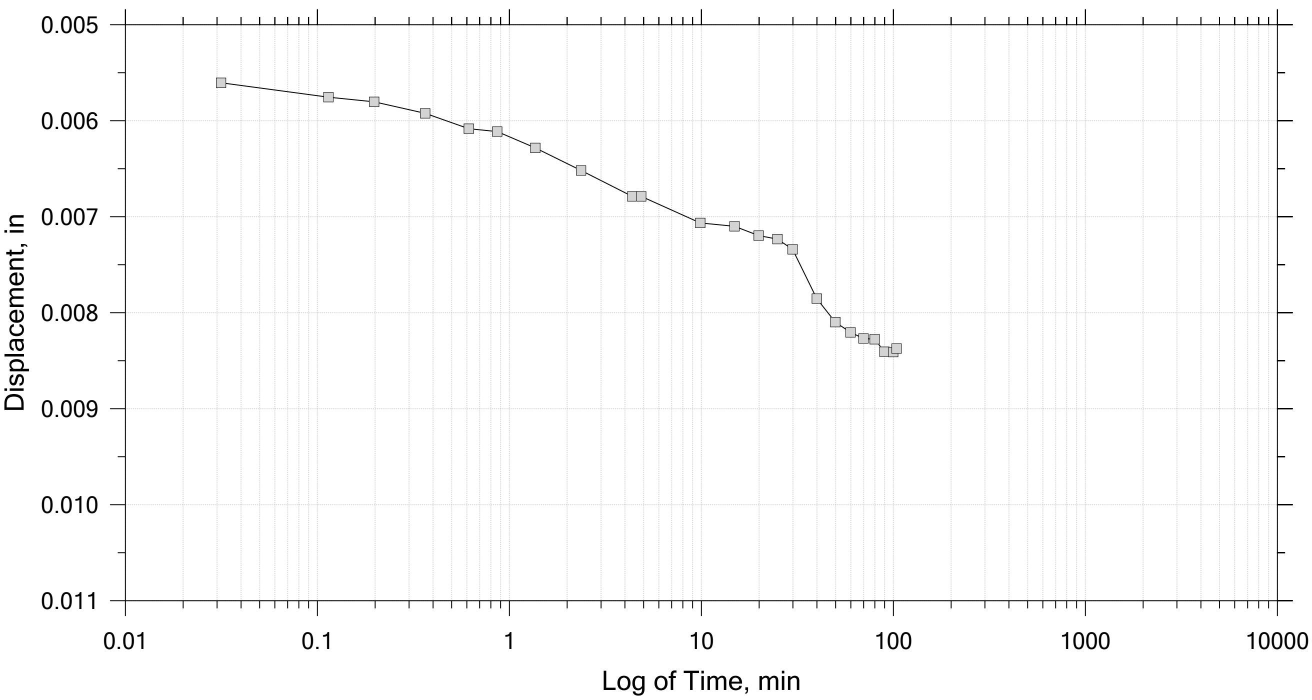


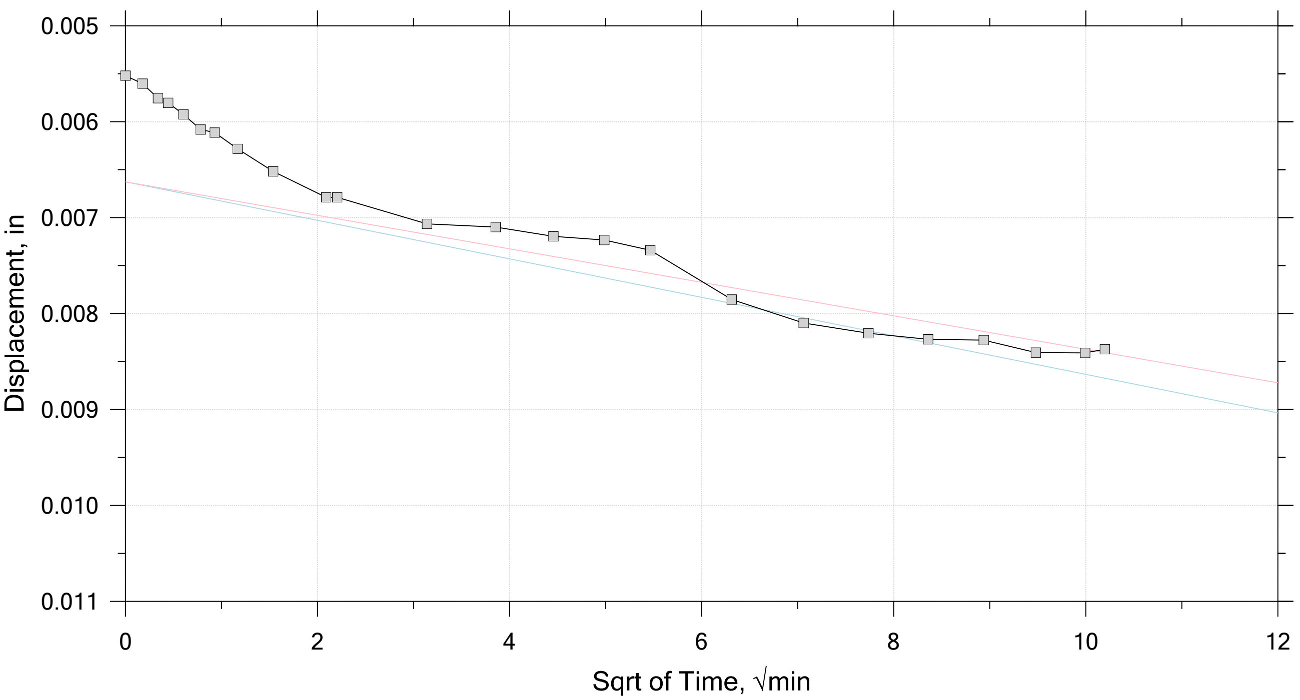


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 26
Constant Load Step
Stress: 3.54e+03 psf

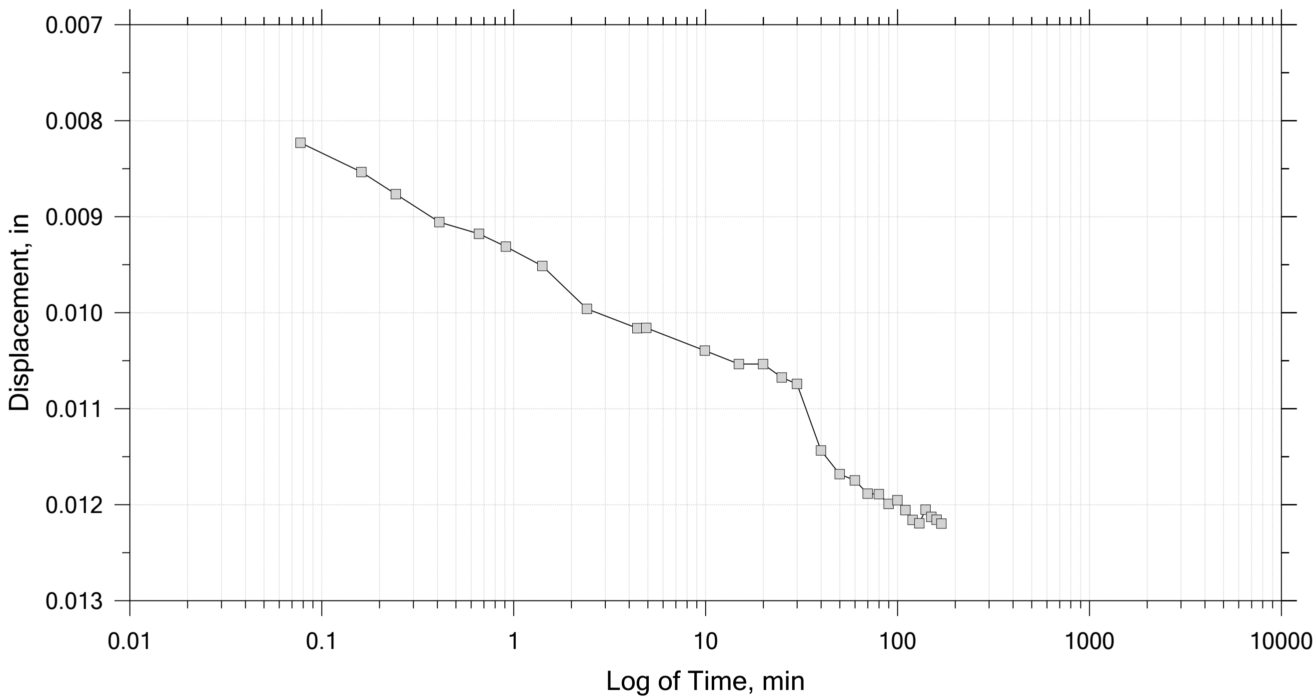


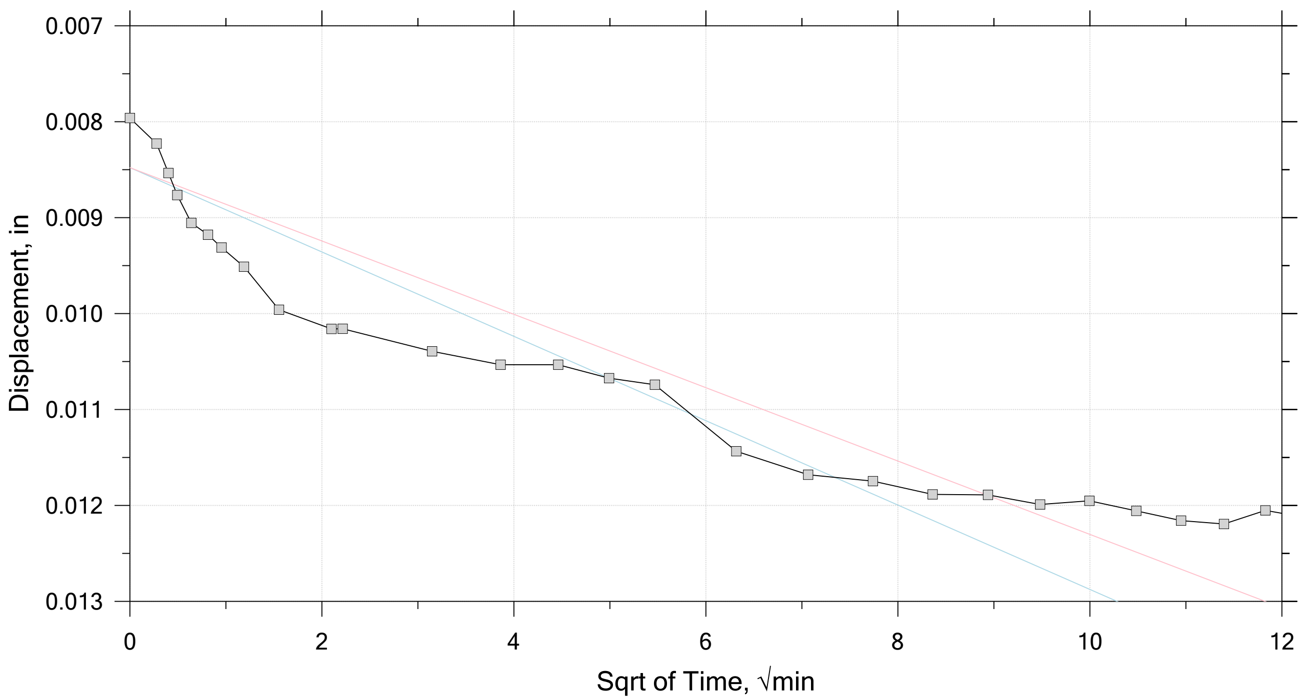


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 26
Constant Load Step
Stress: 5.3e+03 psf

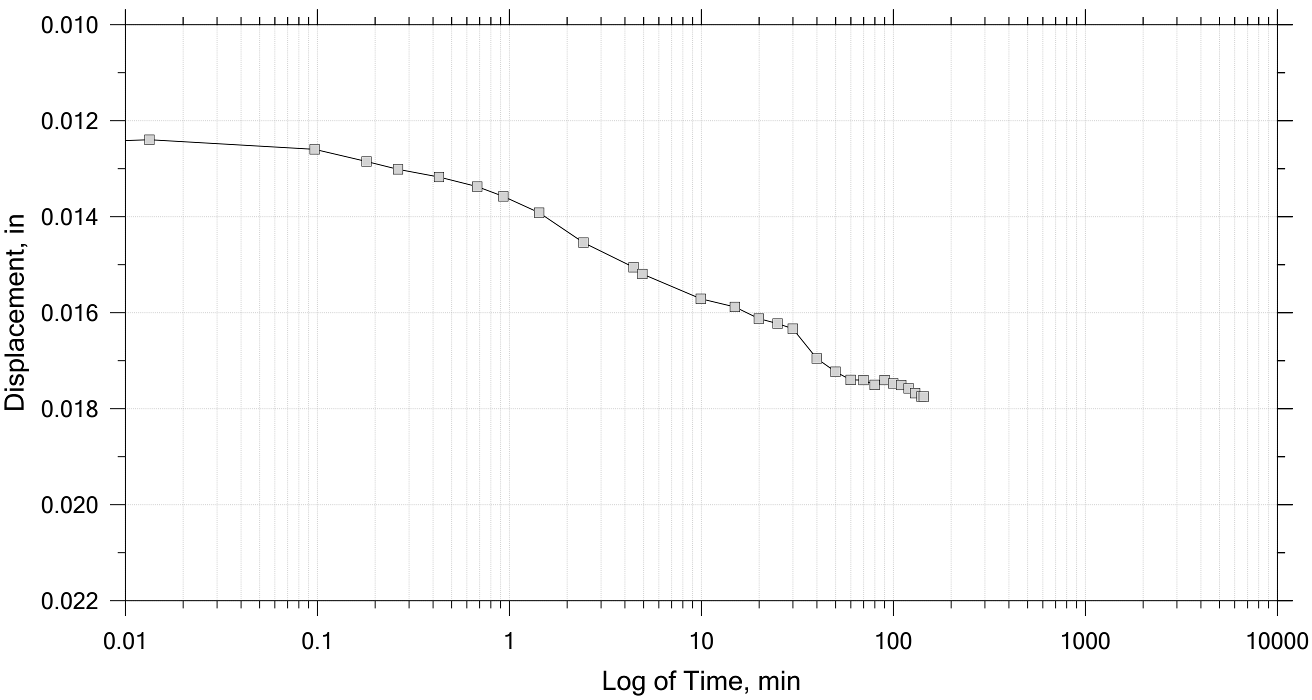


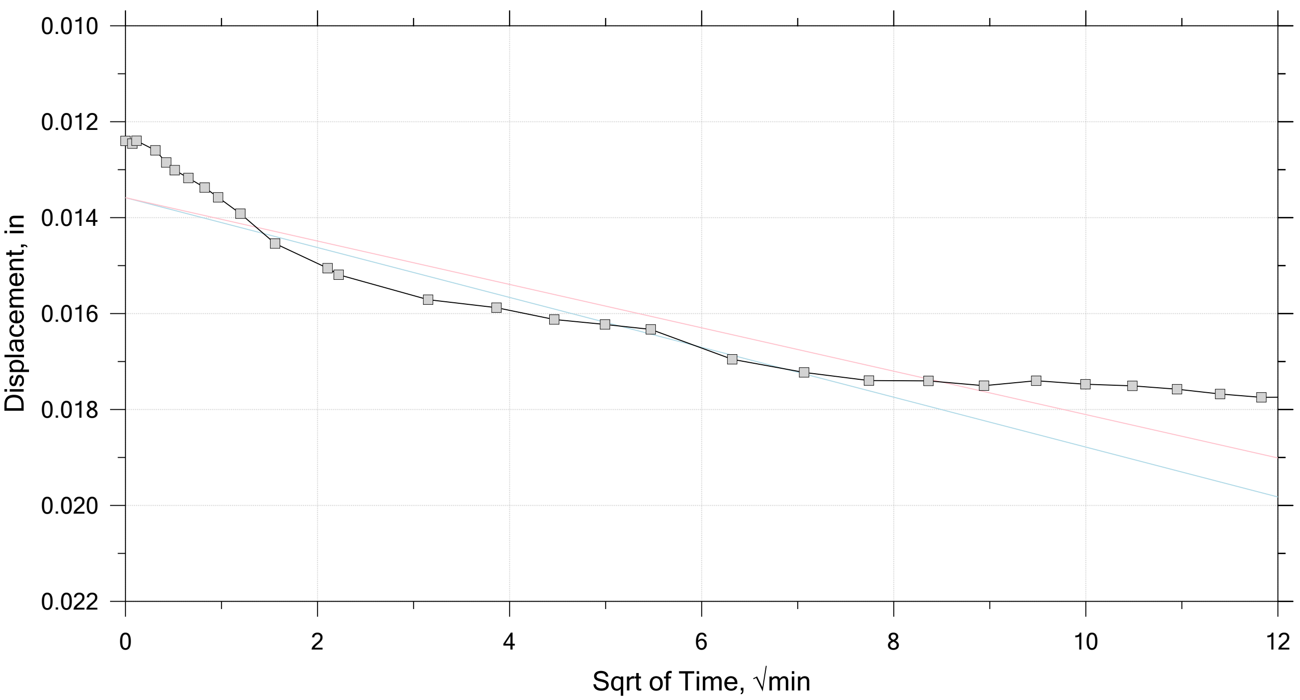


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 26
Constant Load Step
Stress: 7.96e+03 psf

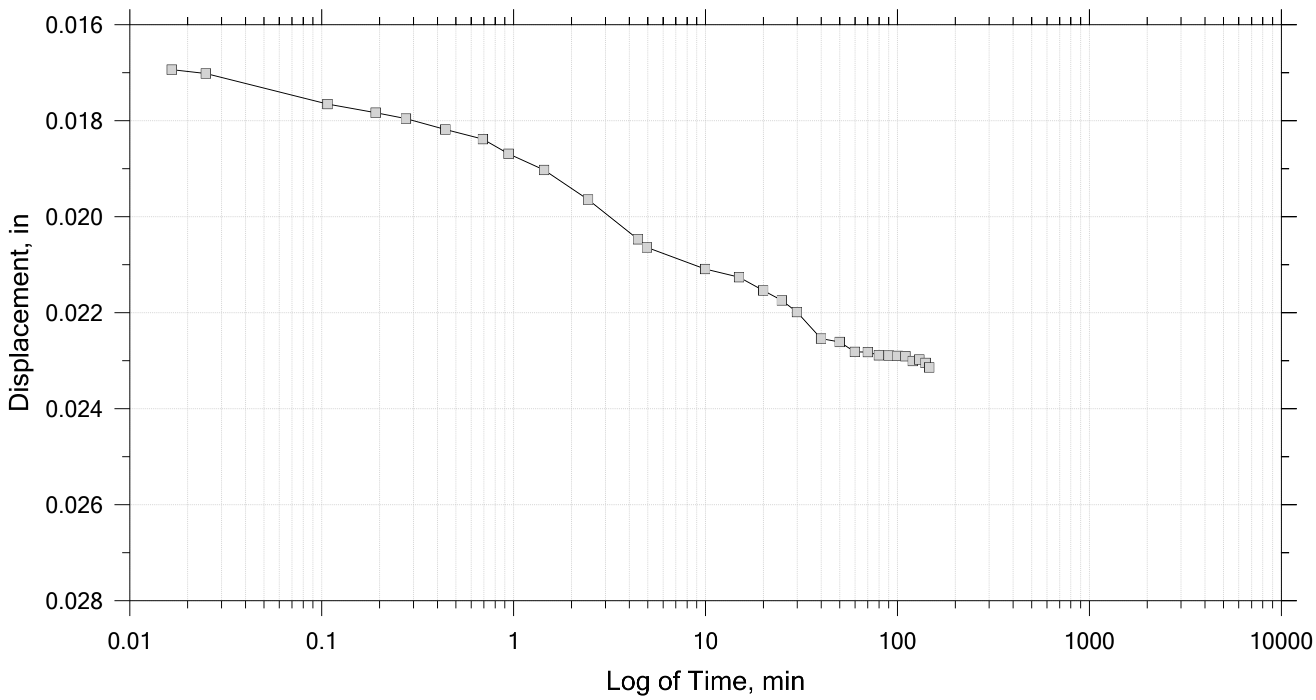


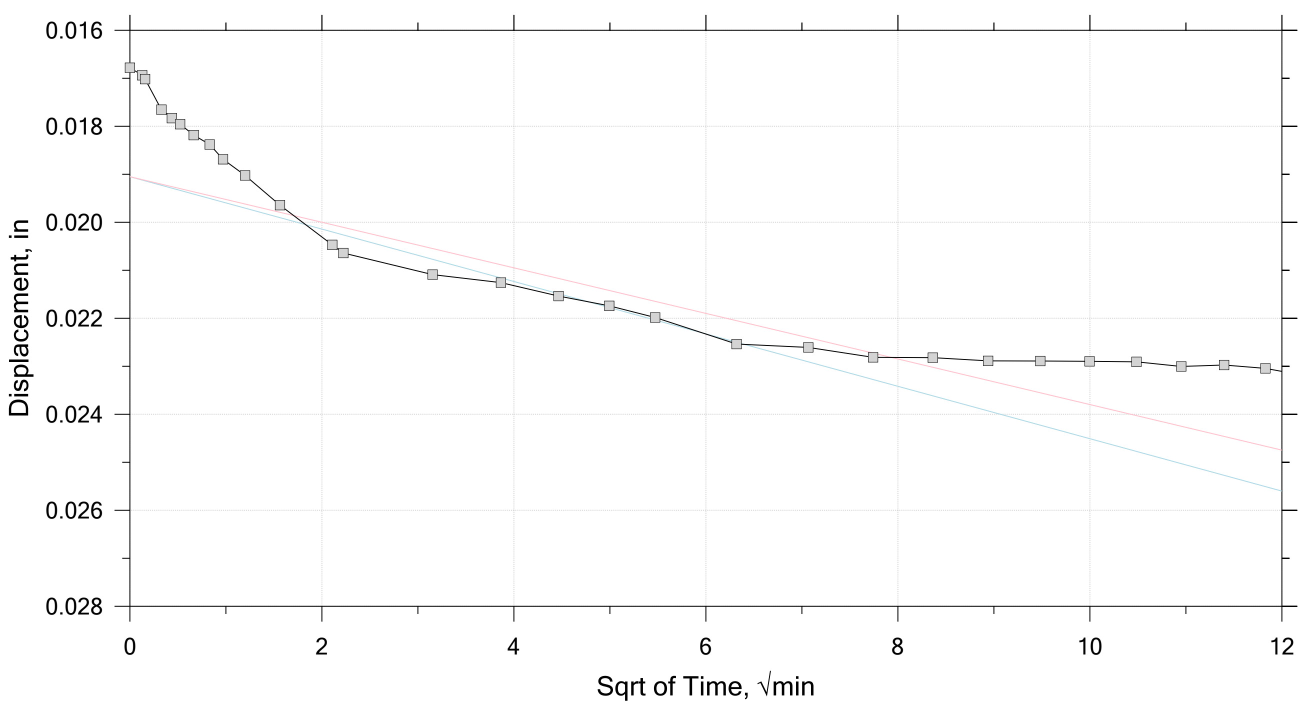


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 26
Constant Load Step
Stress: 1.19e+04 psf

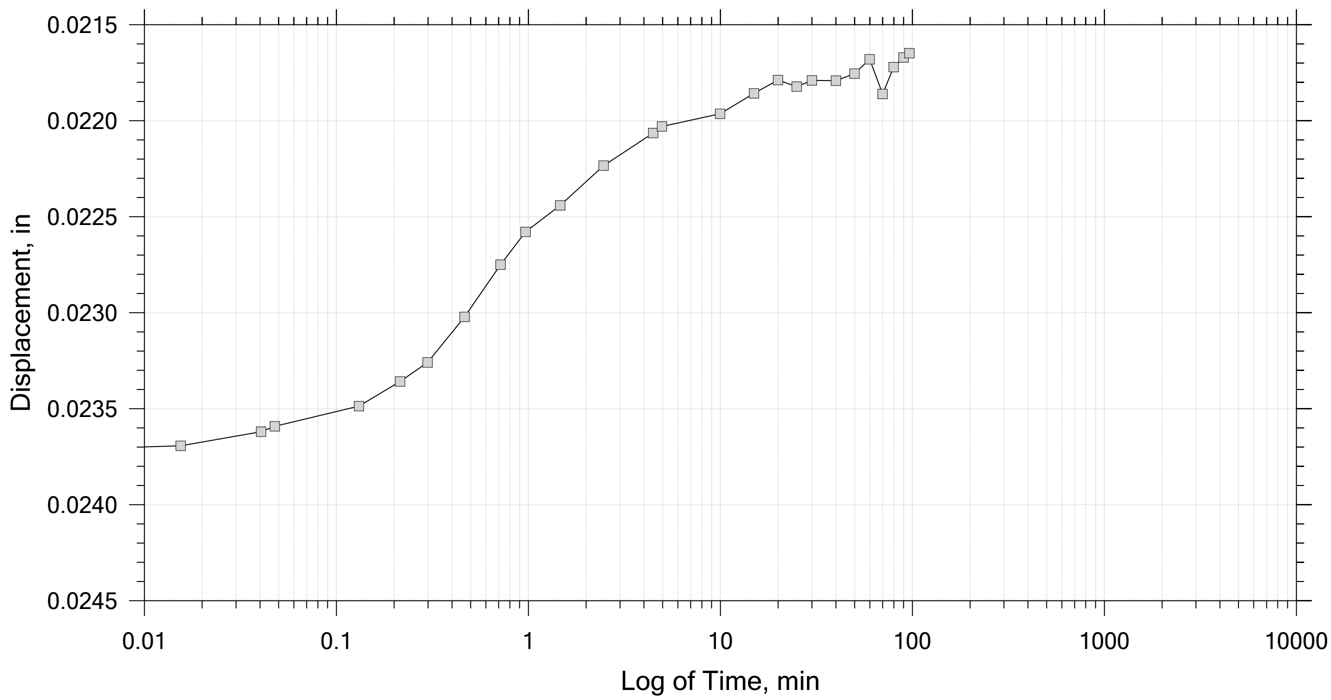


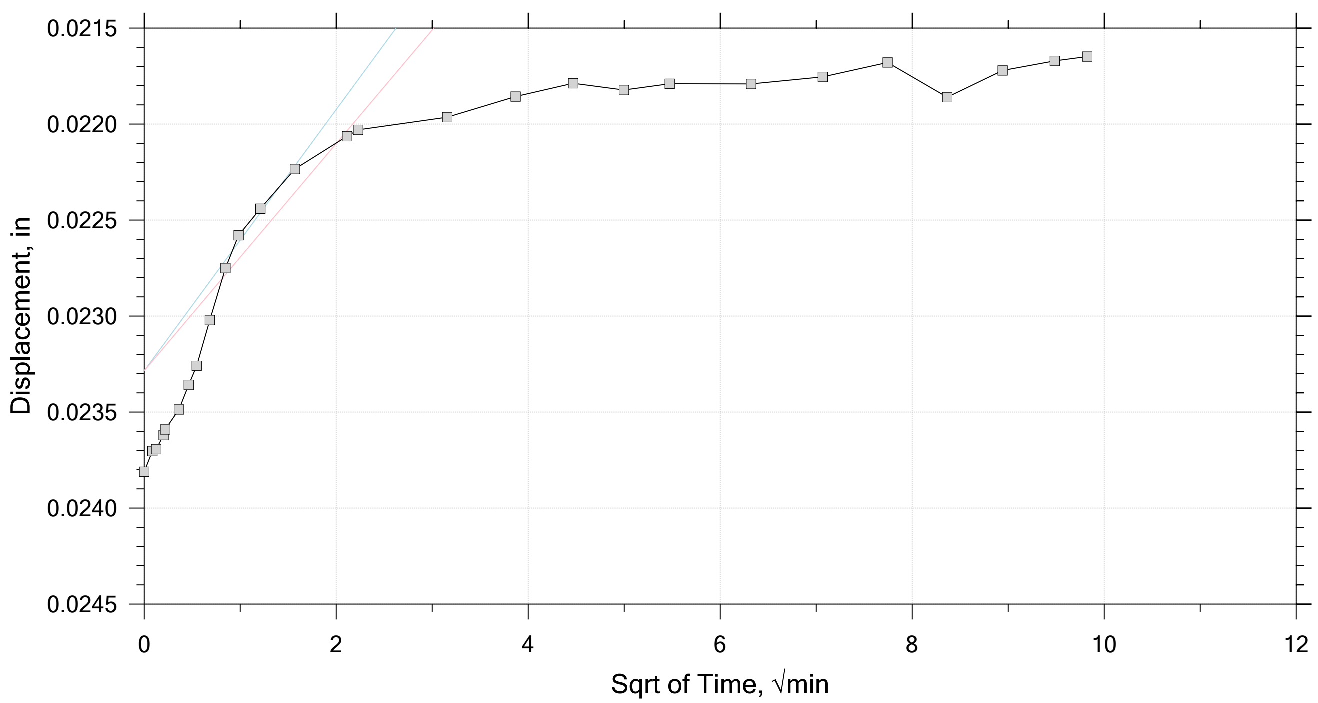


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 26
Constant Load Step
Stress: 5.97e+03 psf





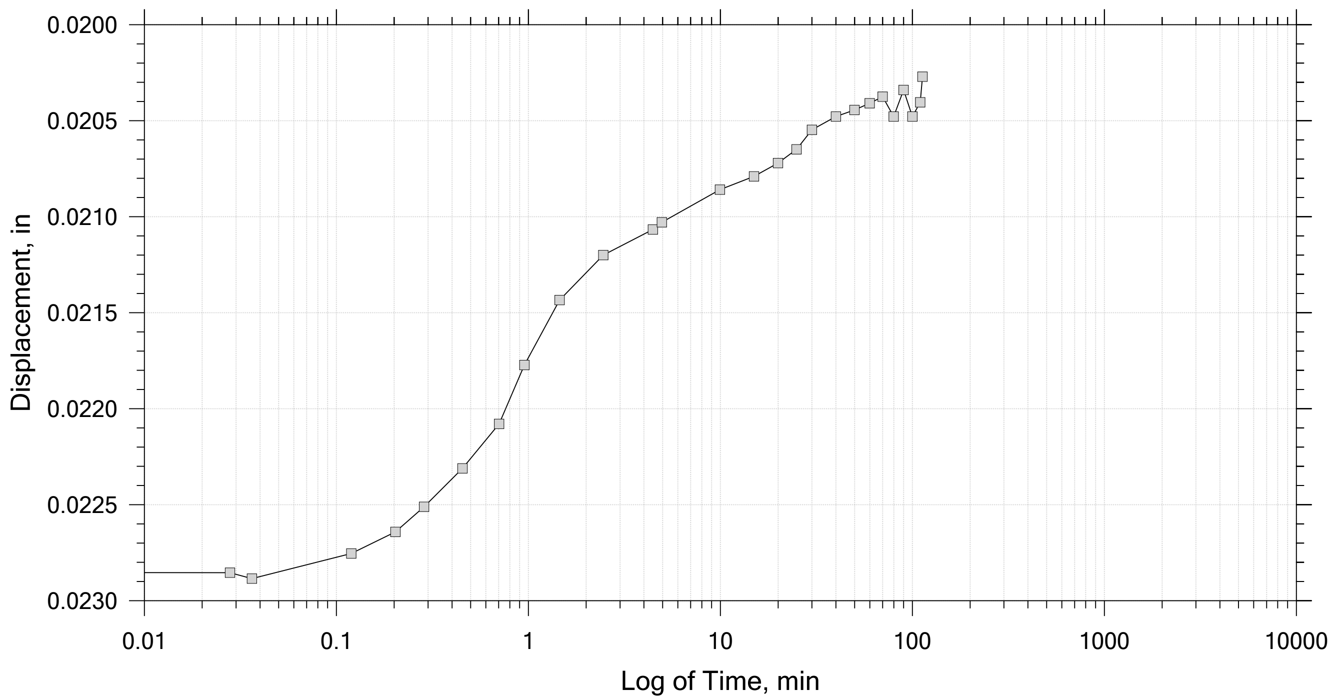
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

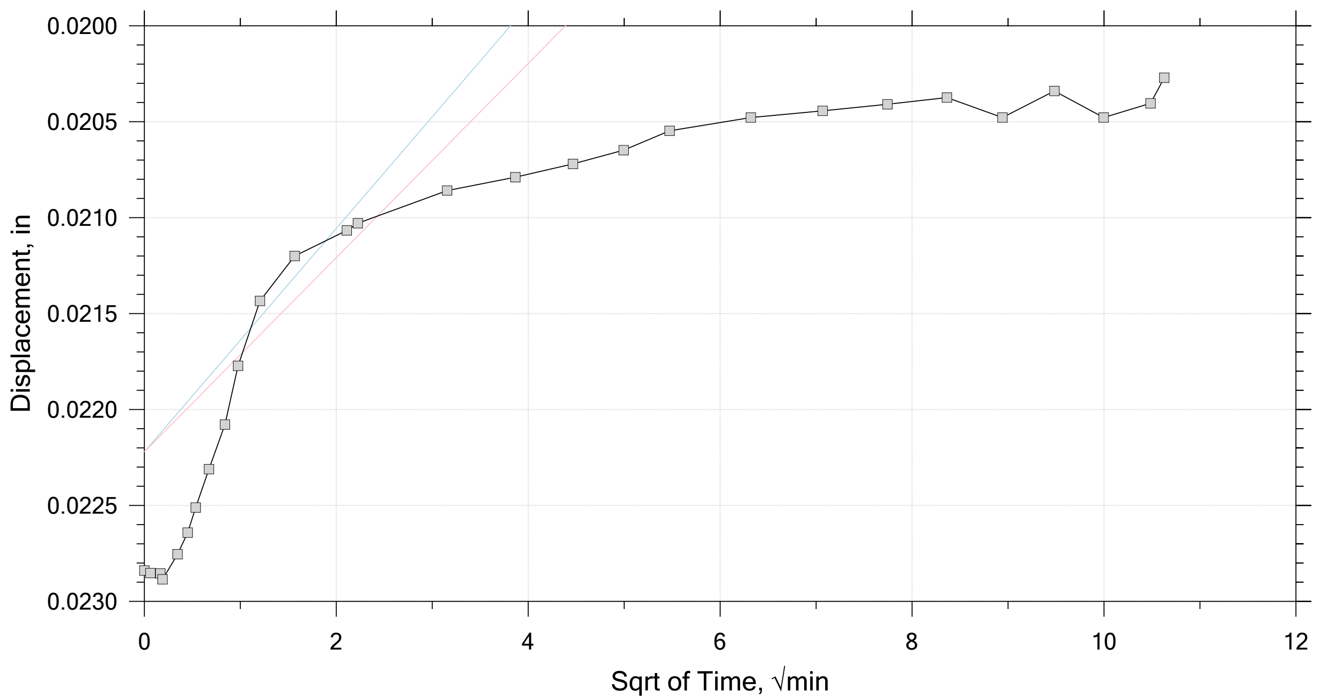
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 26

Constant Load Step

Stress: 2.98e+03 psf

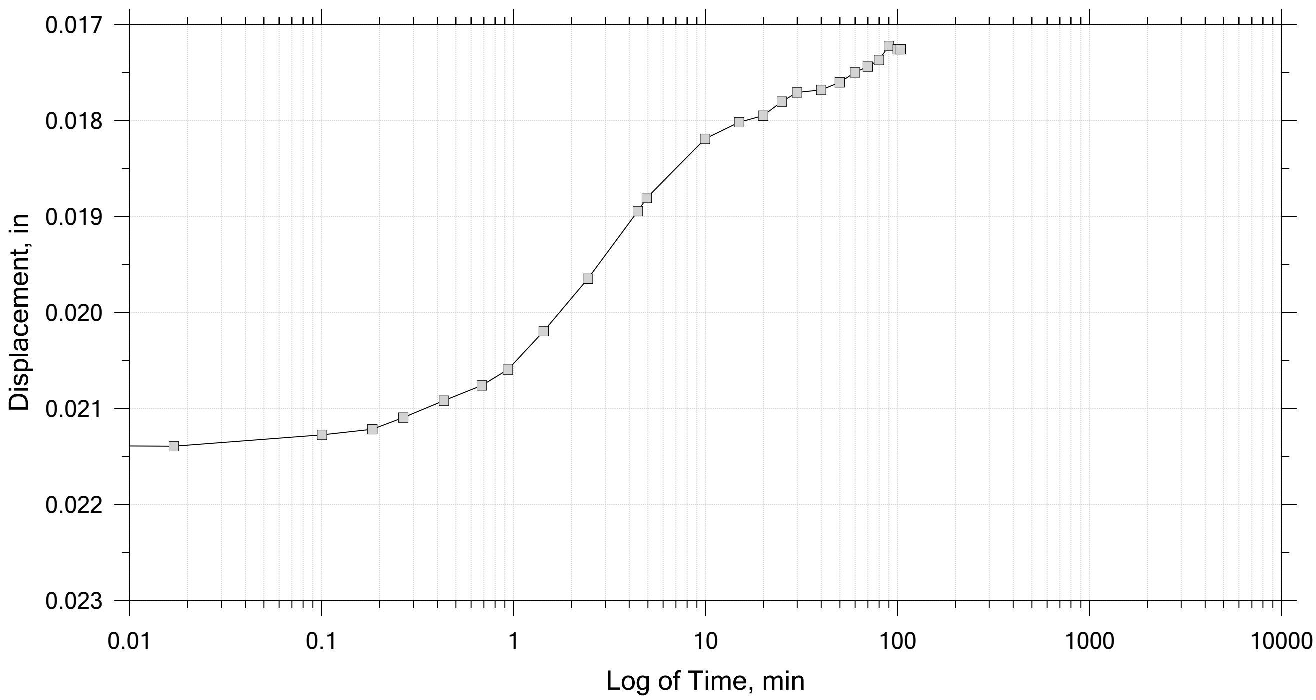


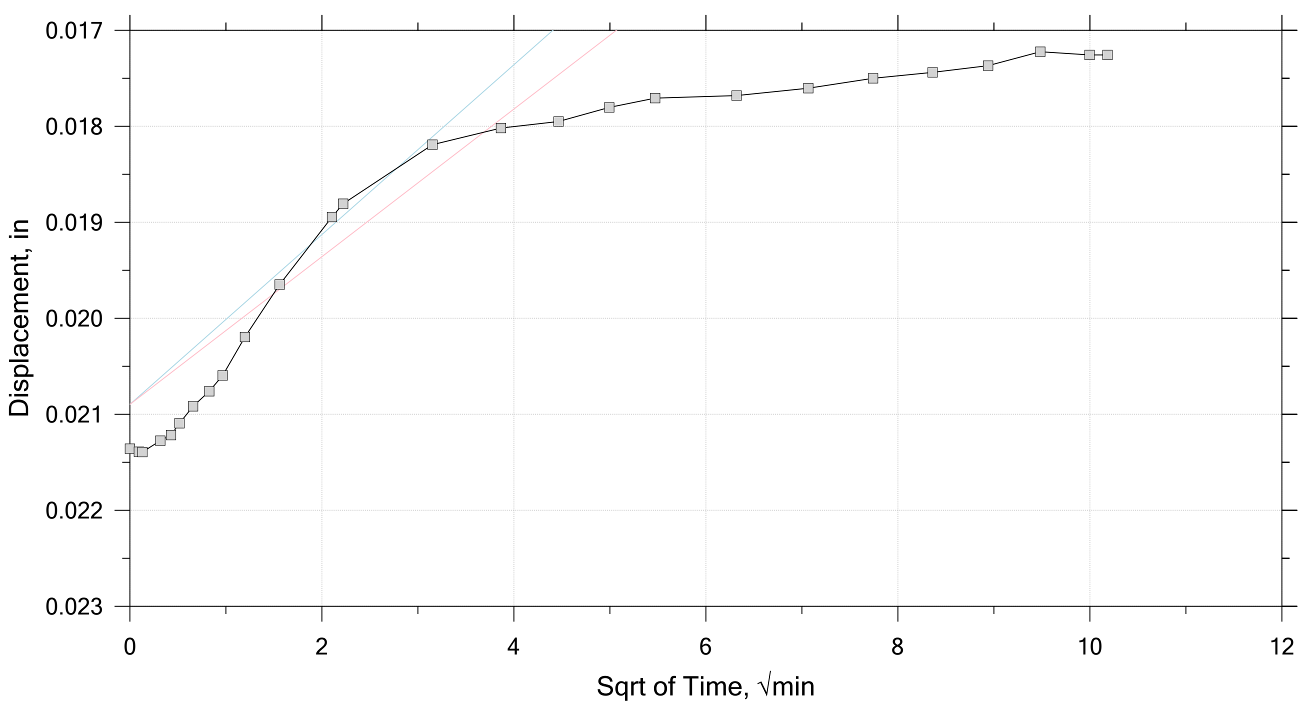


Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 26
Constant Load Step
Stress: 1.49e+03 psf





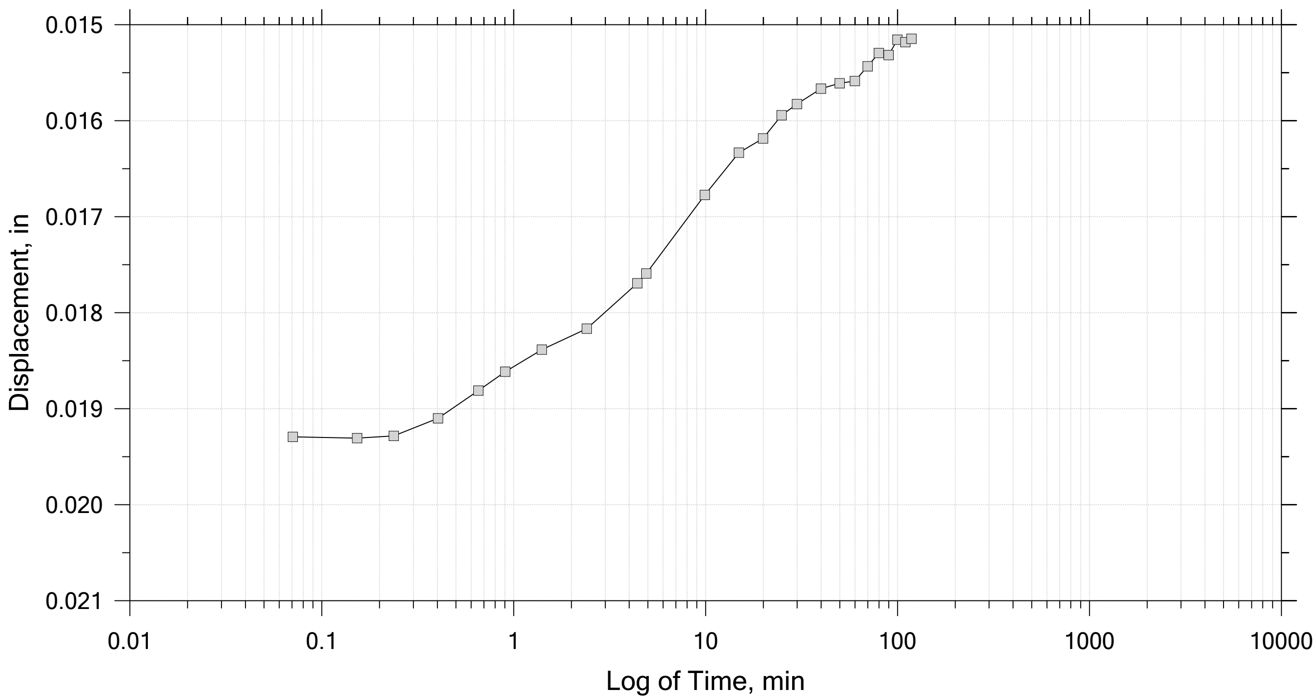
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

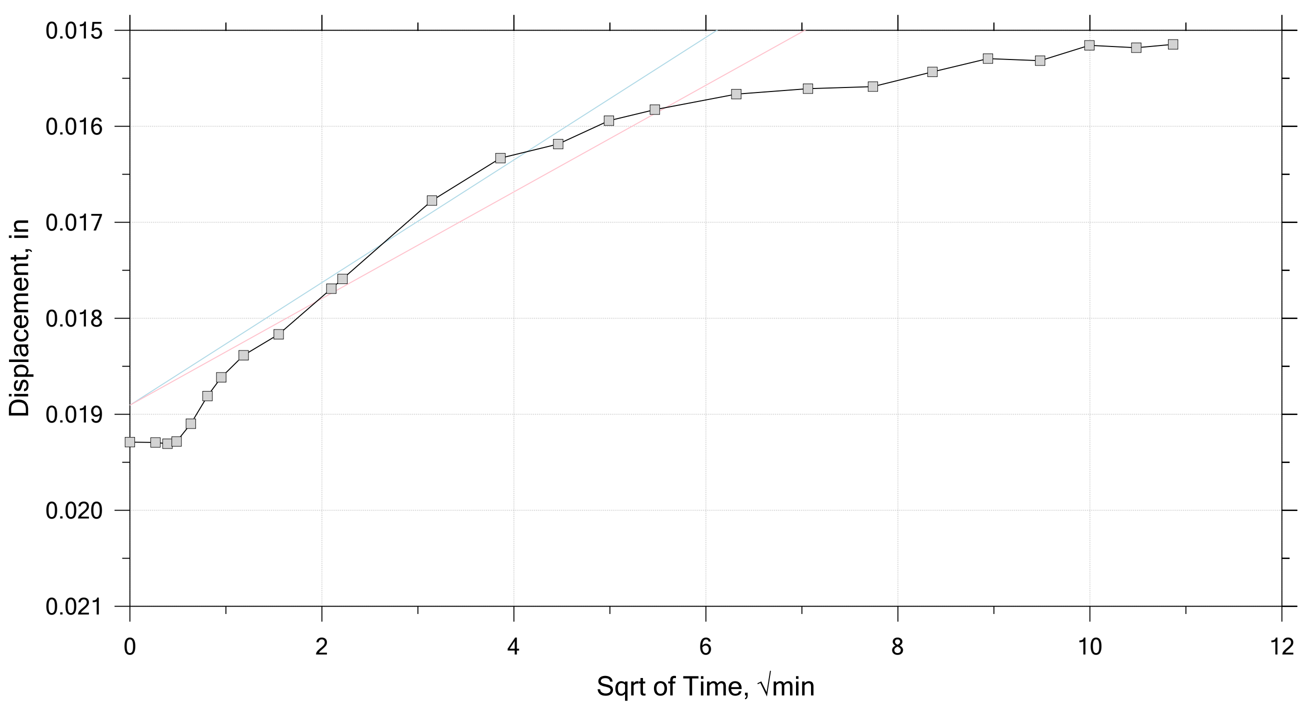
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 26

Constant Load Step

Stress: 746 psf

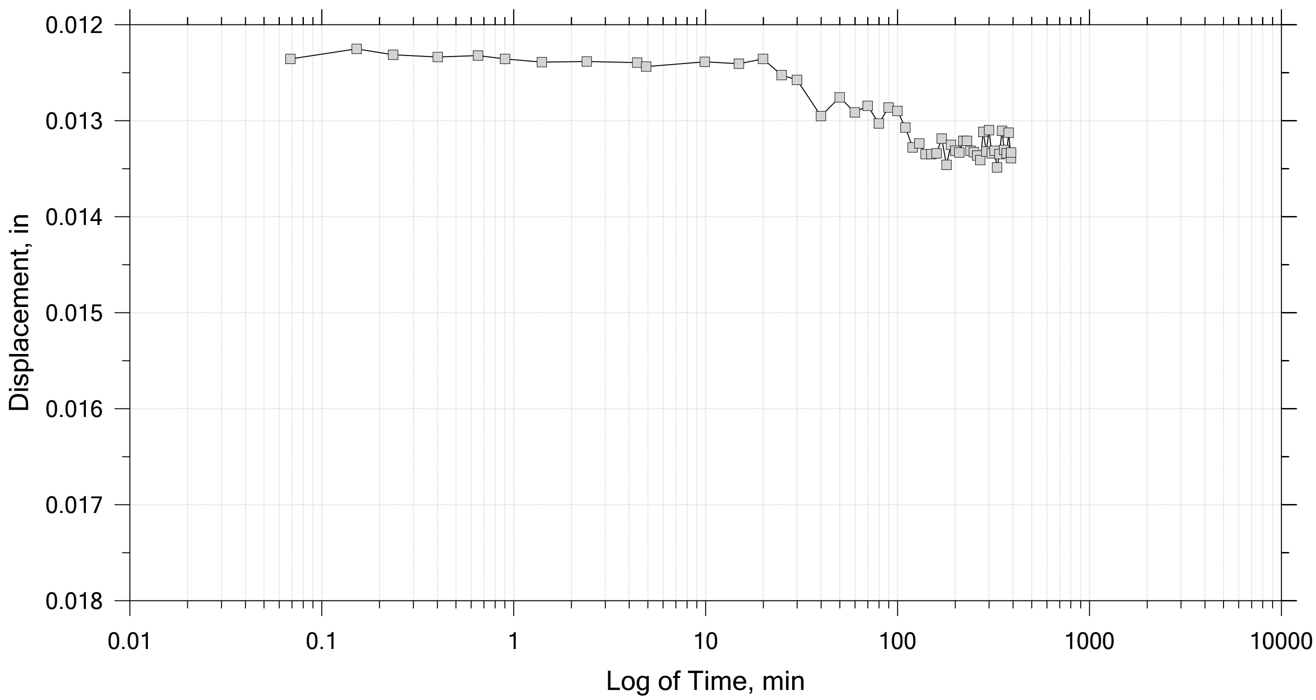


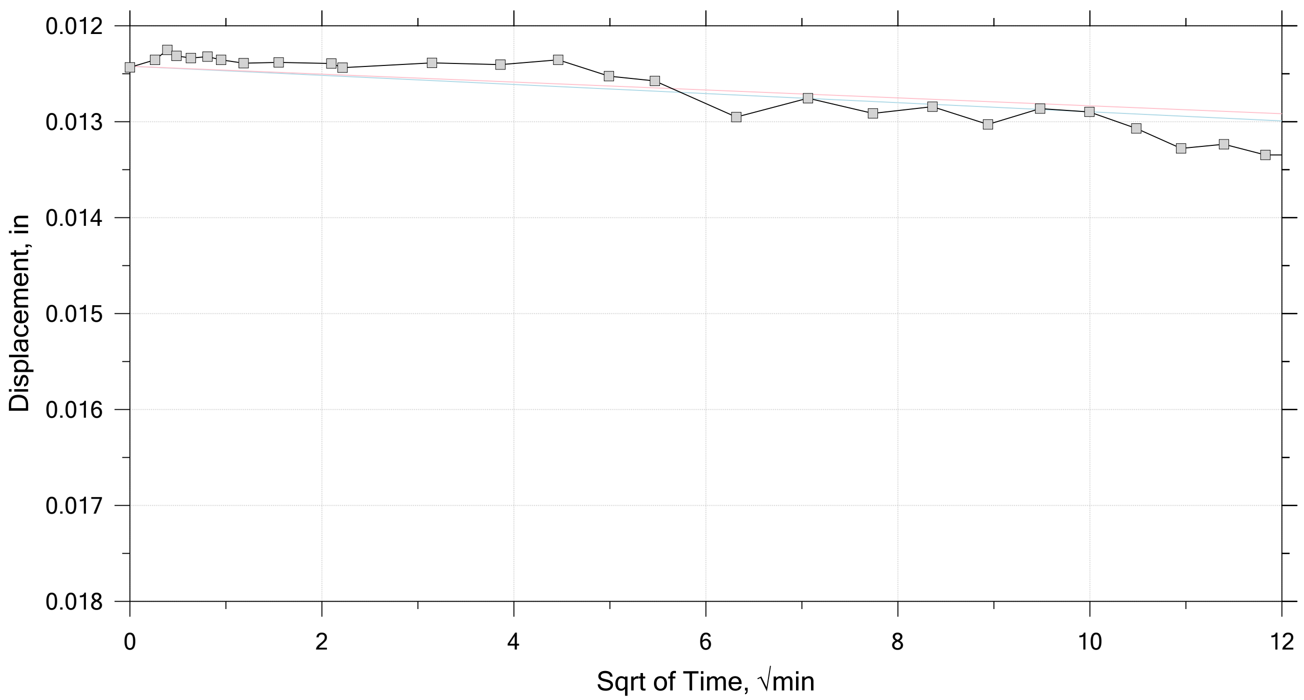


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 16 of 26
Constant Load Step
Stress: 1.49e+03 psf

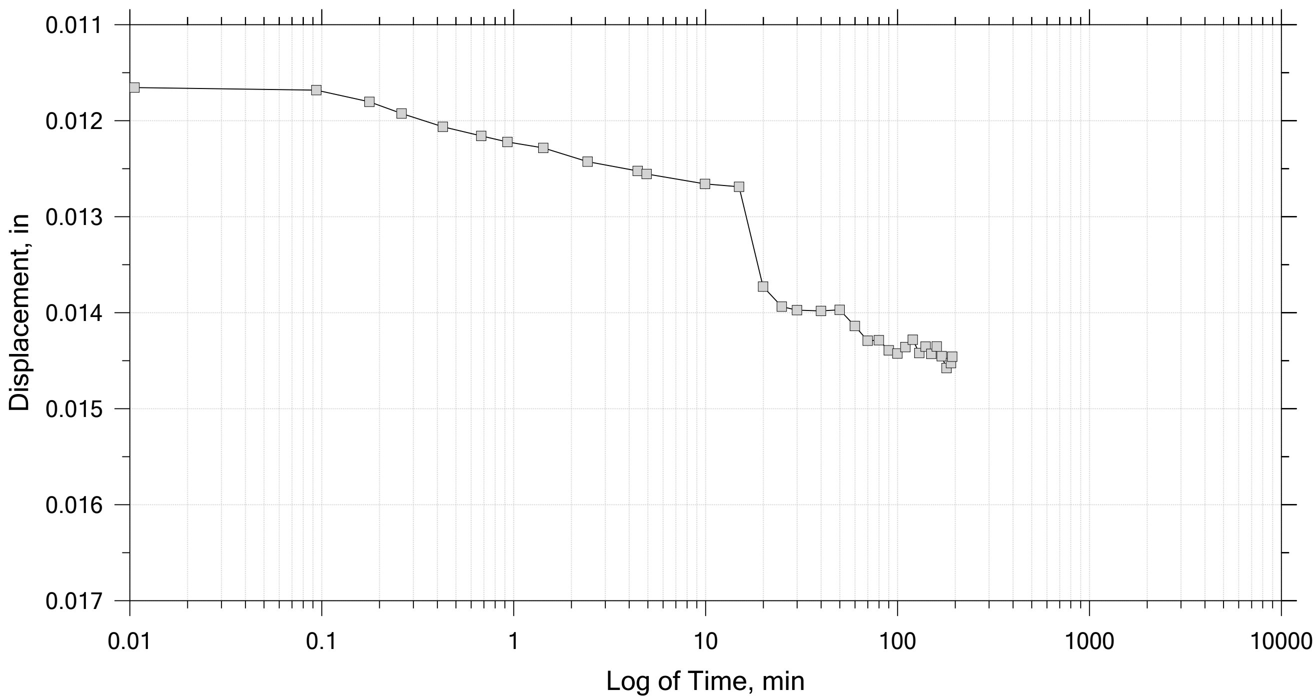


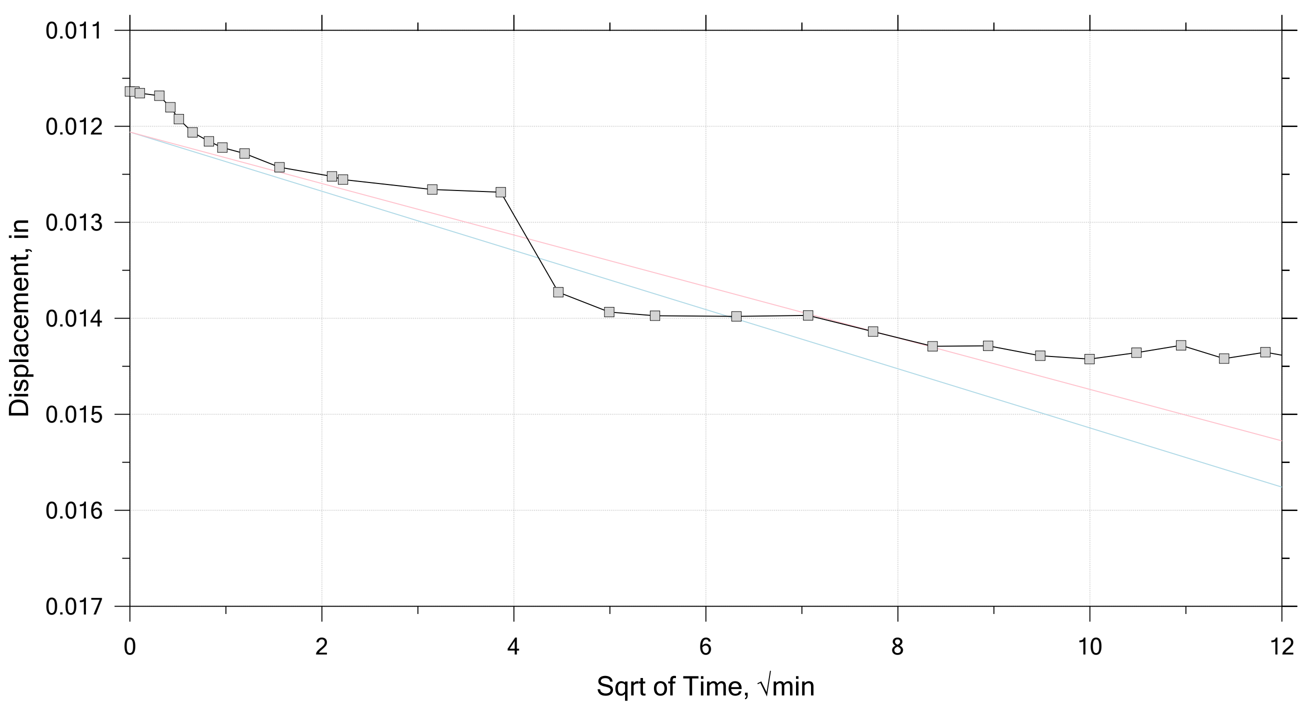


Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 17 of 26
Constant Load Step
Stress: 2.98e+03 psf

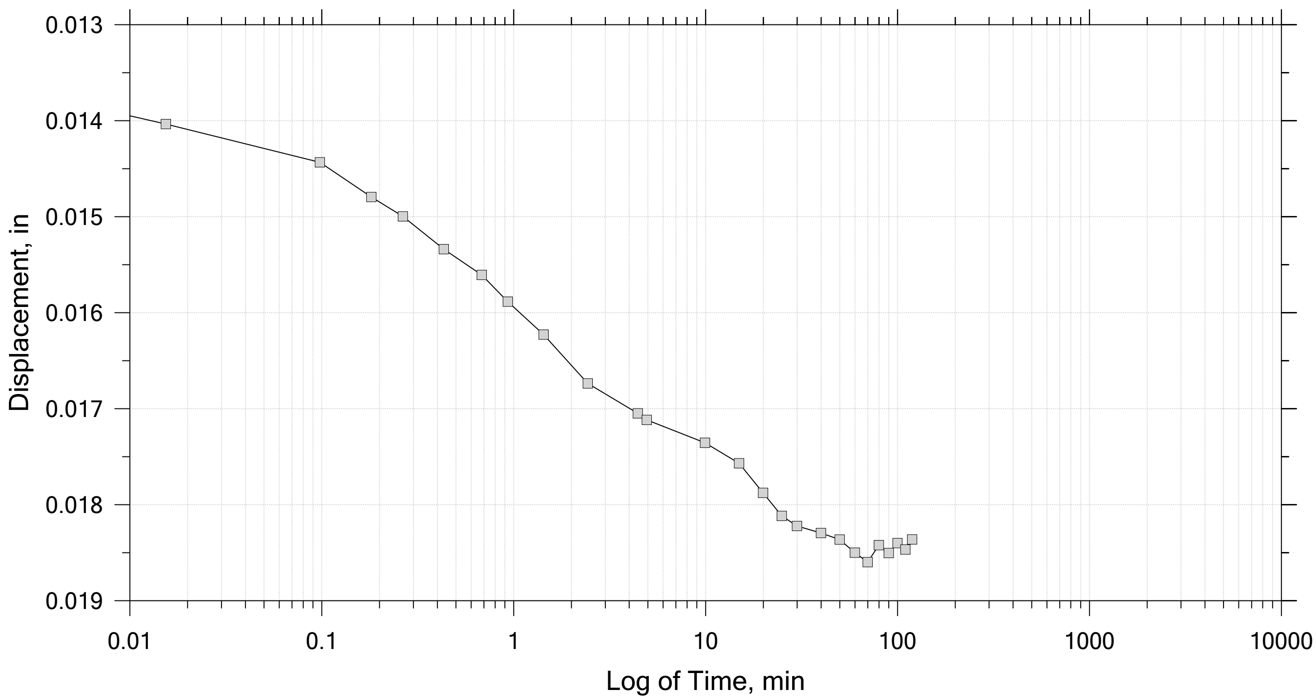


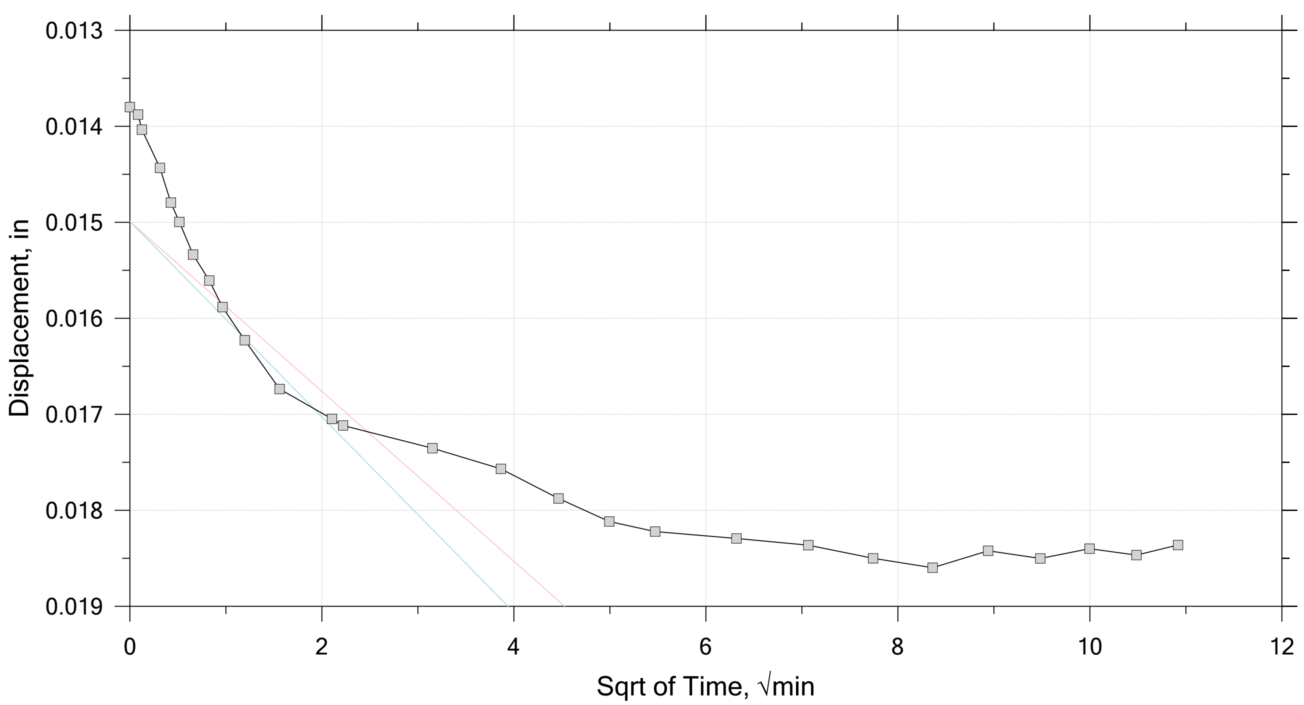


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 18 of 26
Constant Load Step
Stress: 5.97e+03 psf





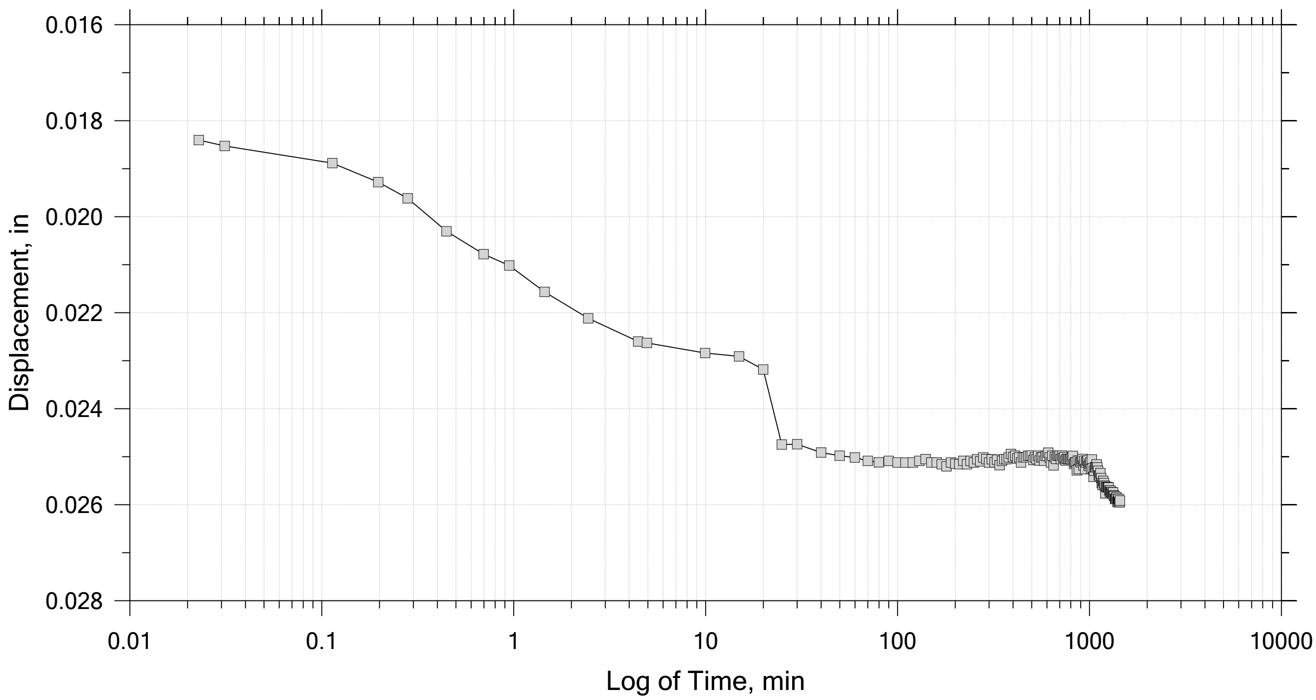
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

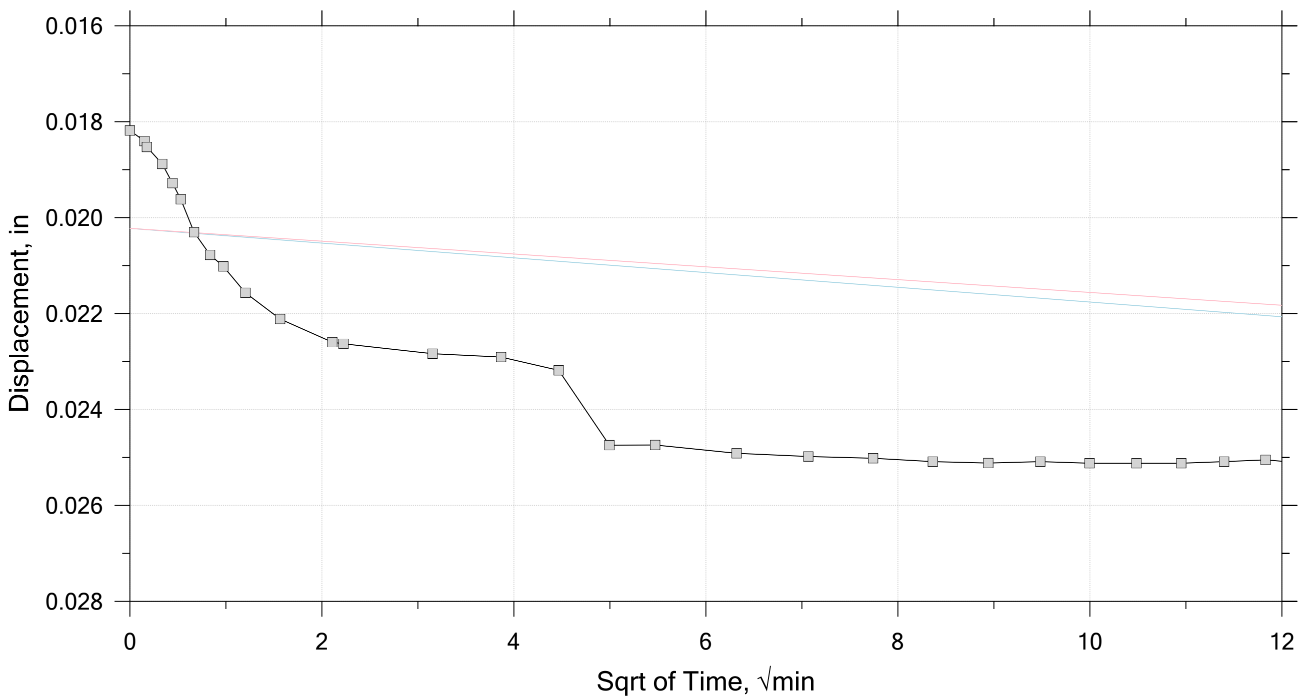
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 19 of 26

Constant Load Step

Stress: 1.19e+04 psf

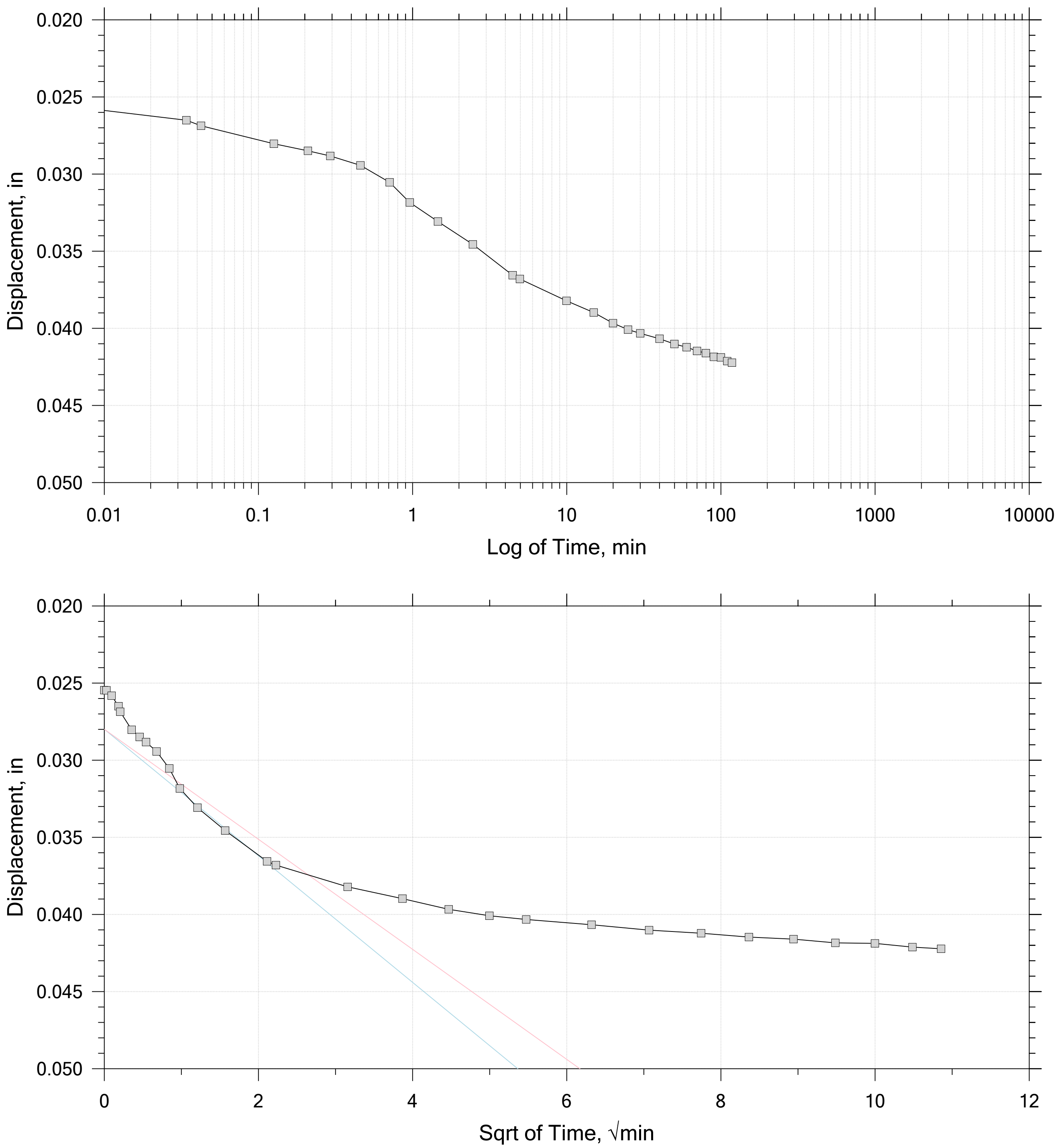




Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 20 of 26
Constant Load Step
Stress: 2.39e+04 psf



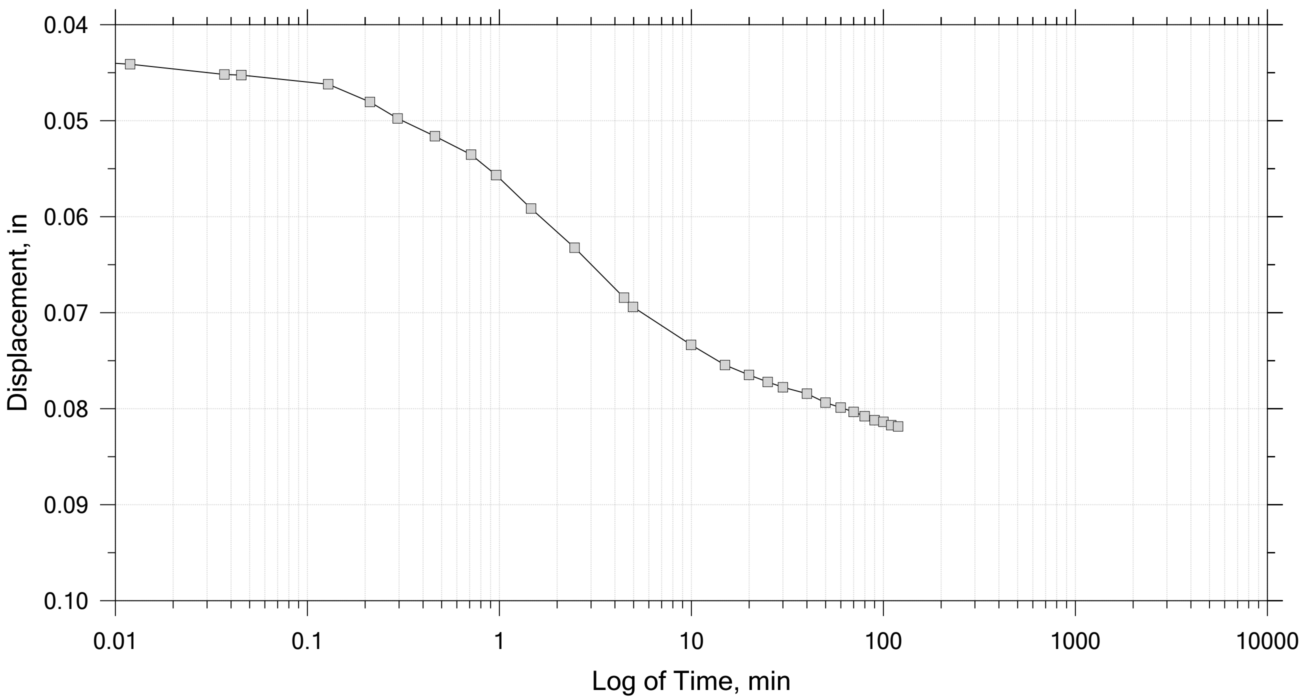
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

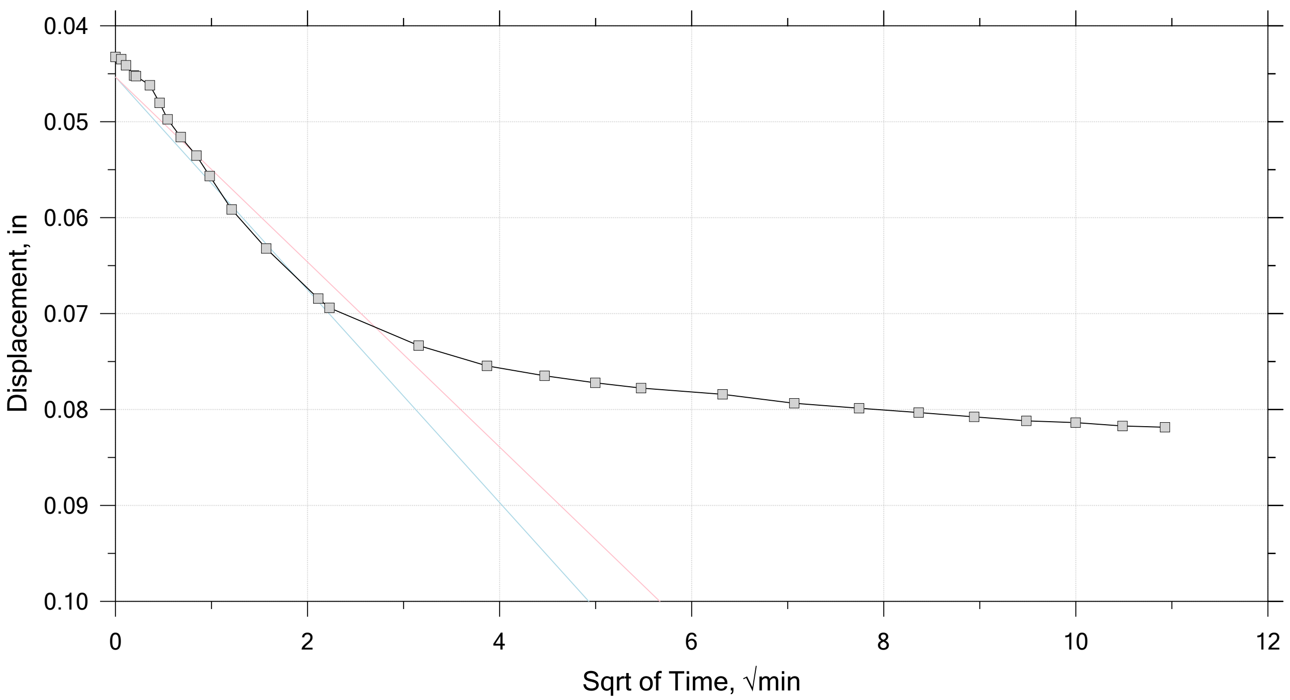
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 21 of 26

Constant Load Step

Stress: 4.77e+04 psf

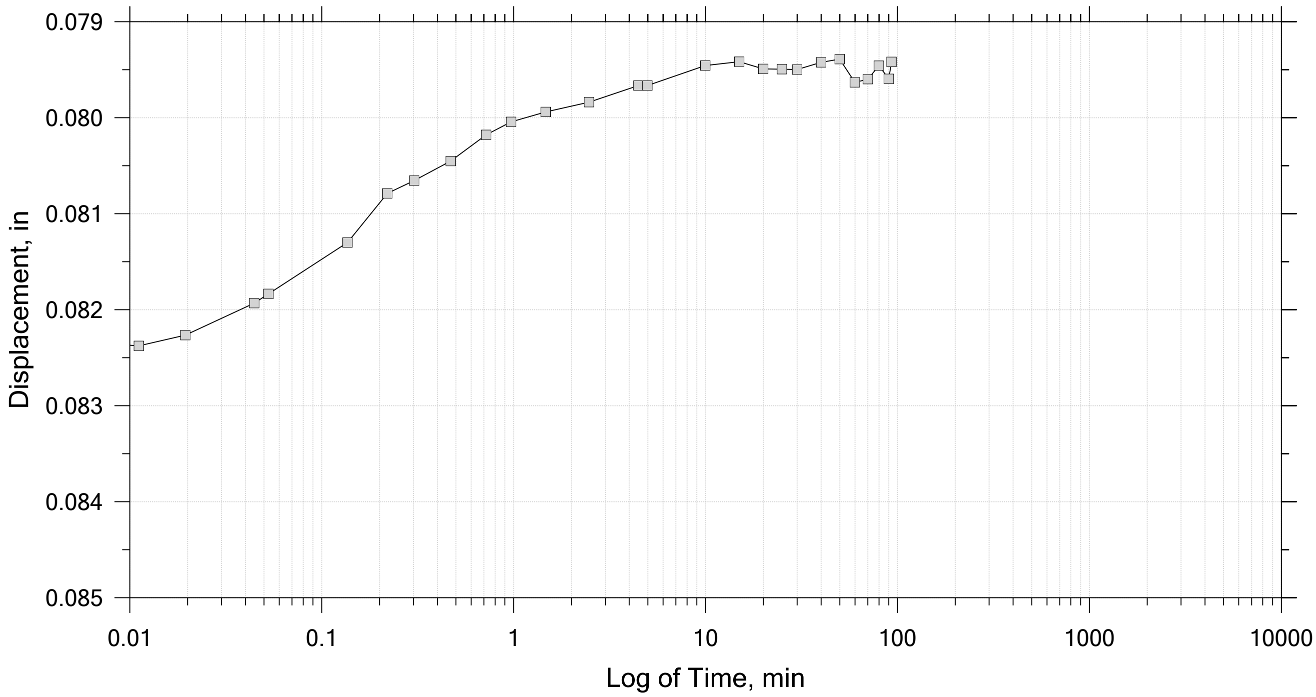


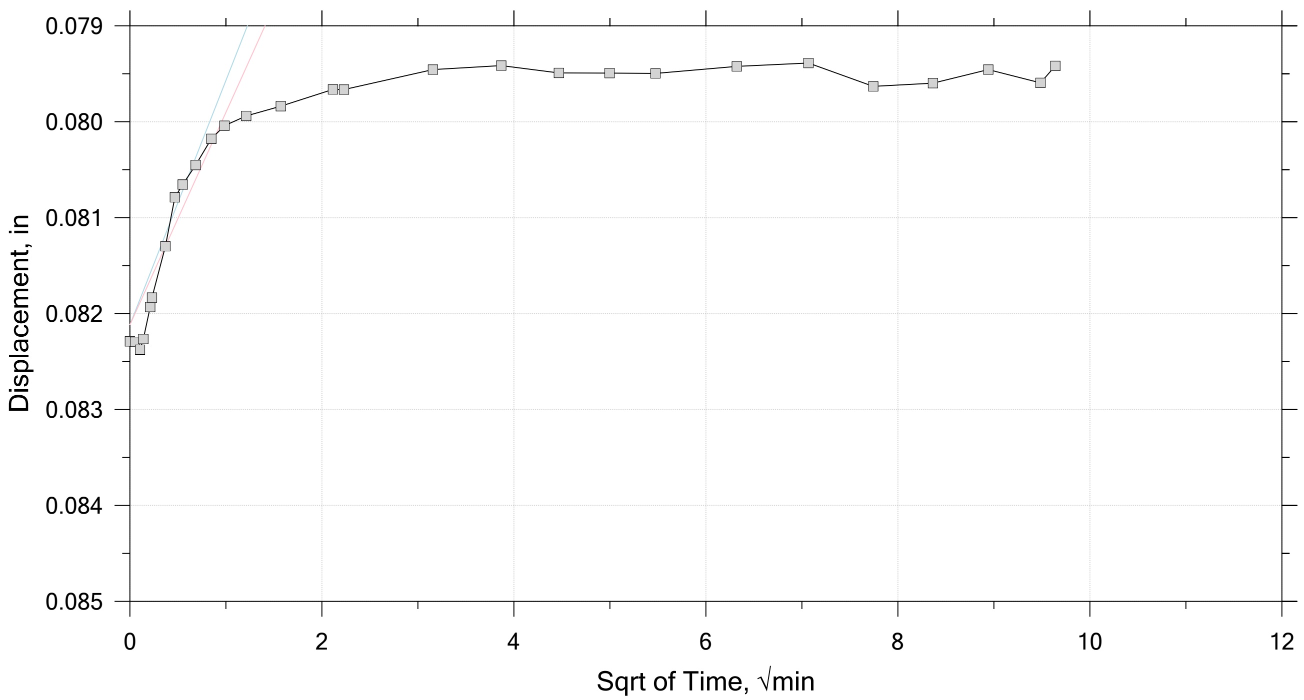


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 22 of 26
Constant Load Step
Stress: 2.39e+04 psf

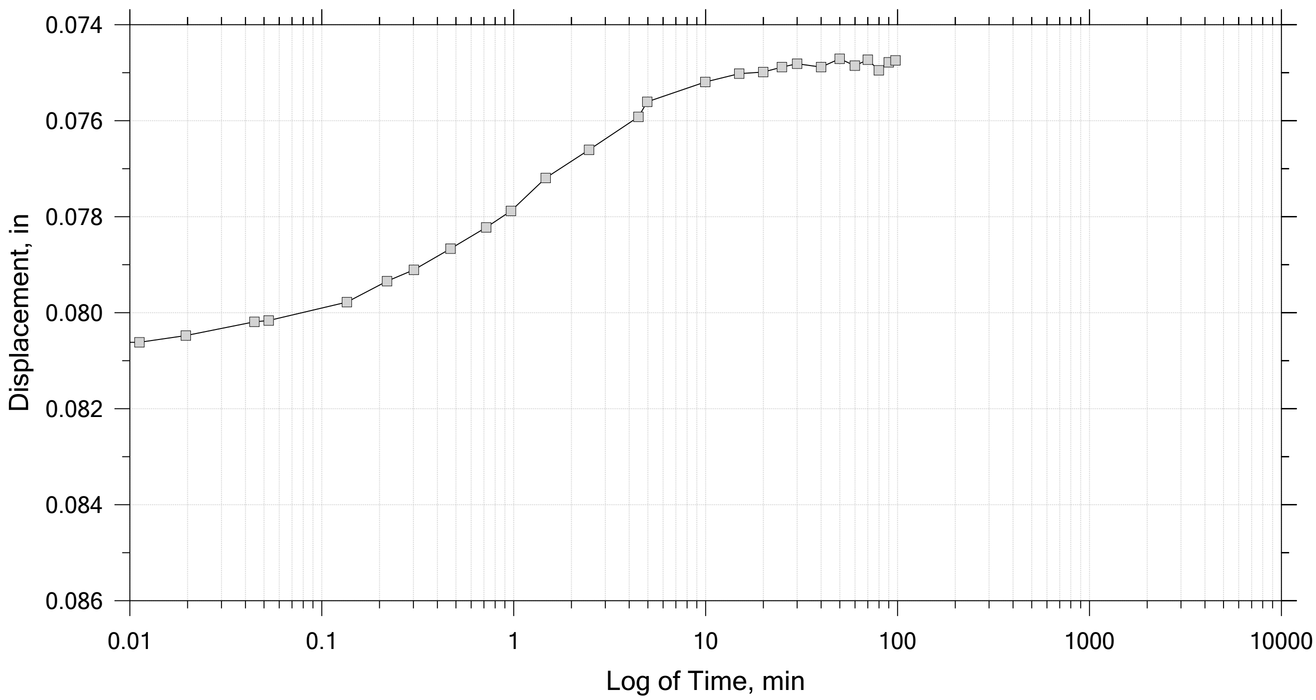


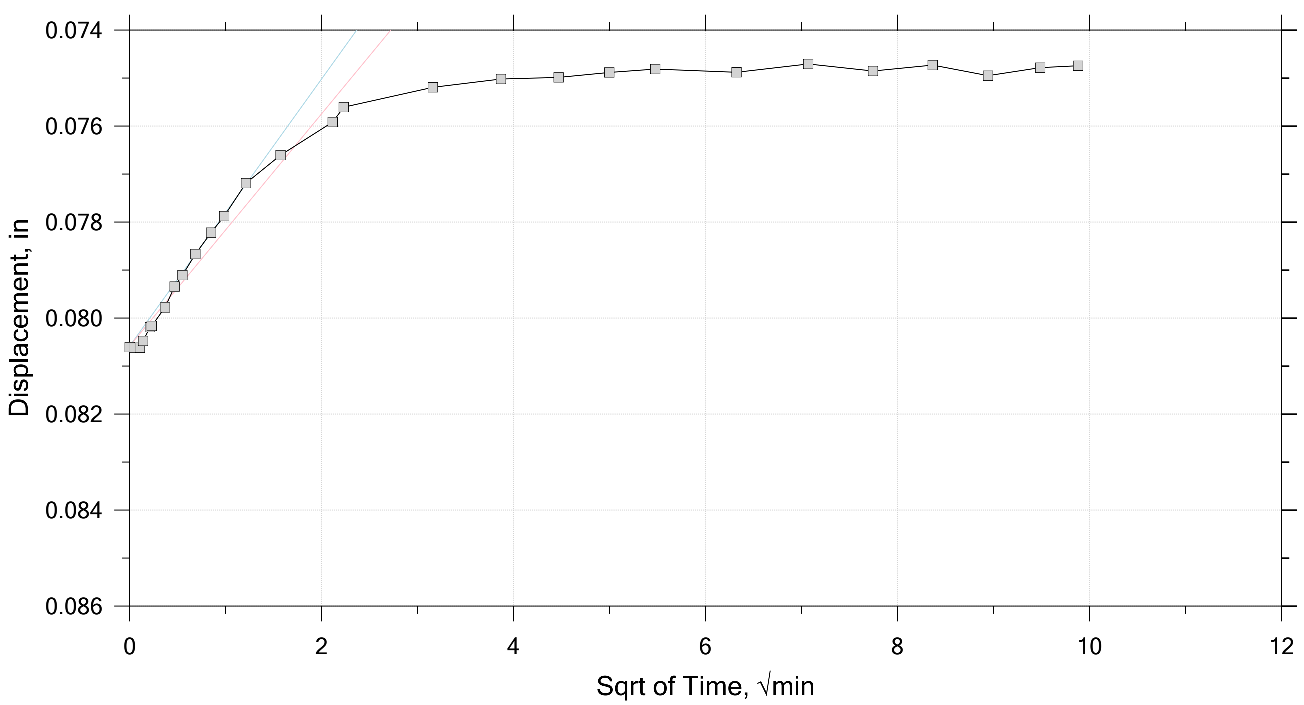


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 23 of 26
Constant Load Step
Stress: 1.19e+04 psf

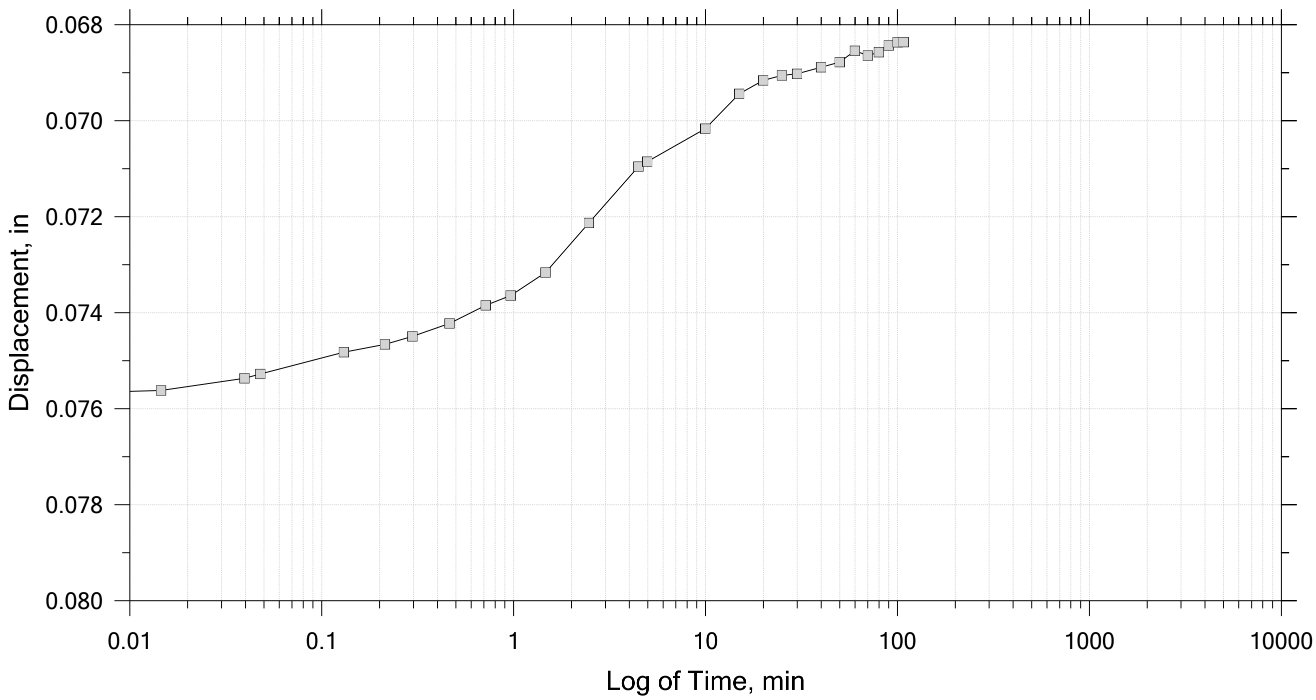


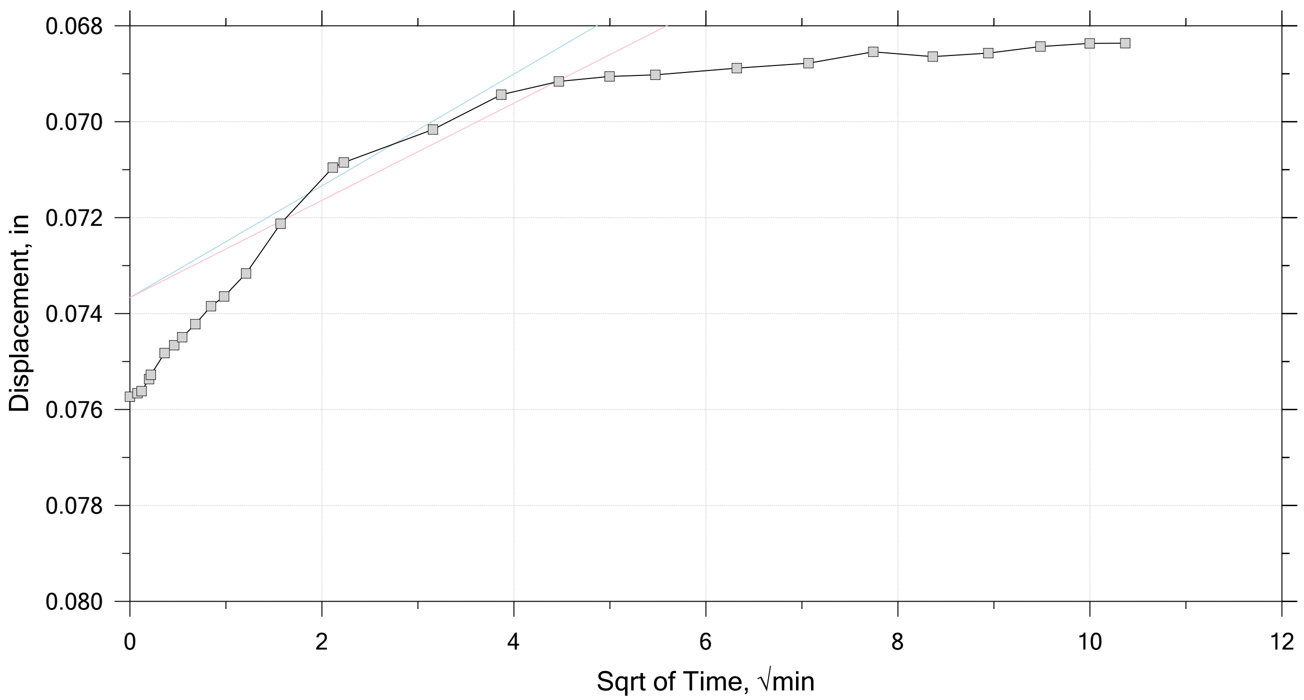


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 24 of 26
Constant Load Step
Stress: 5.97e+03 psf





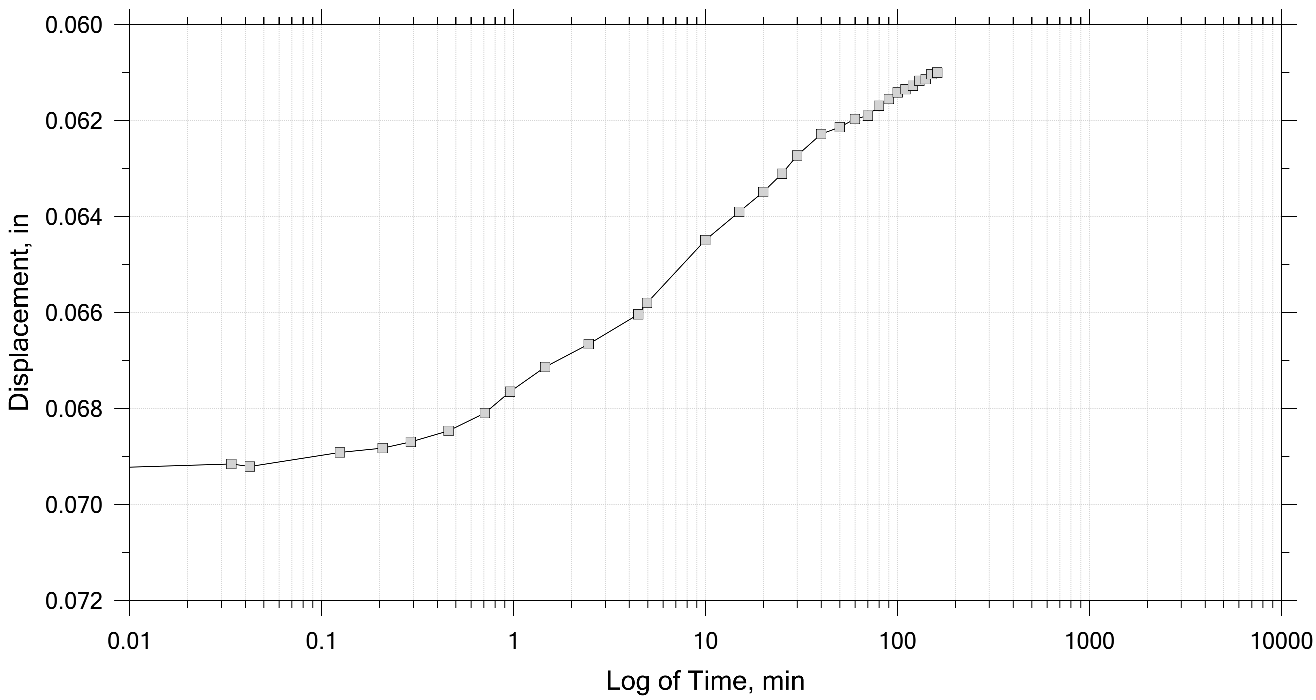
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

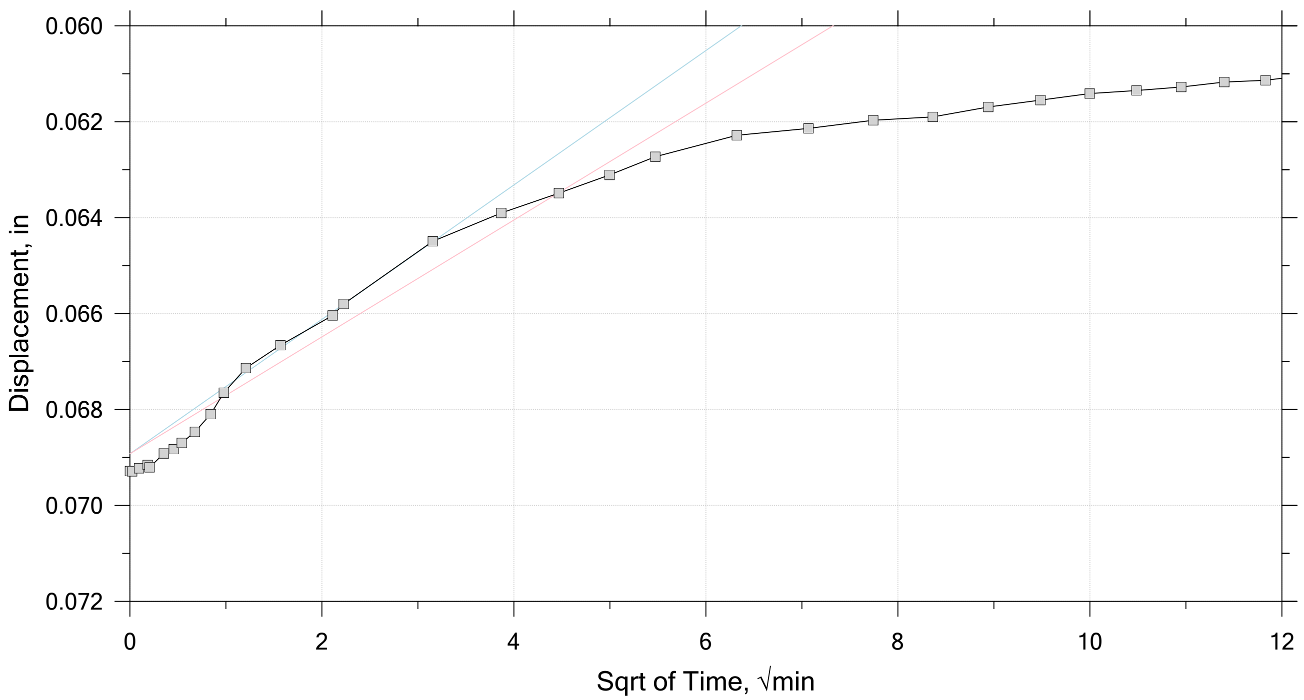
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 25 of 26

Constant Load Step

Stress: 2.98e+03 psf





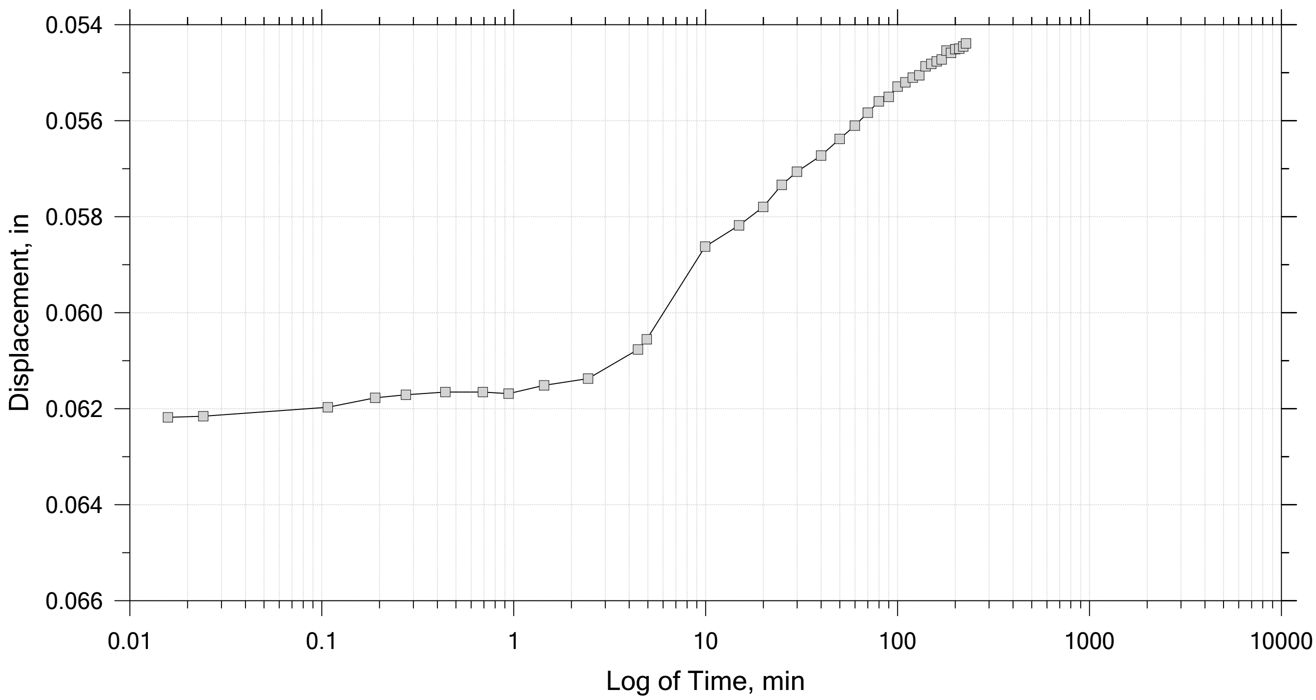
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

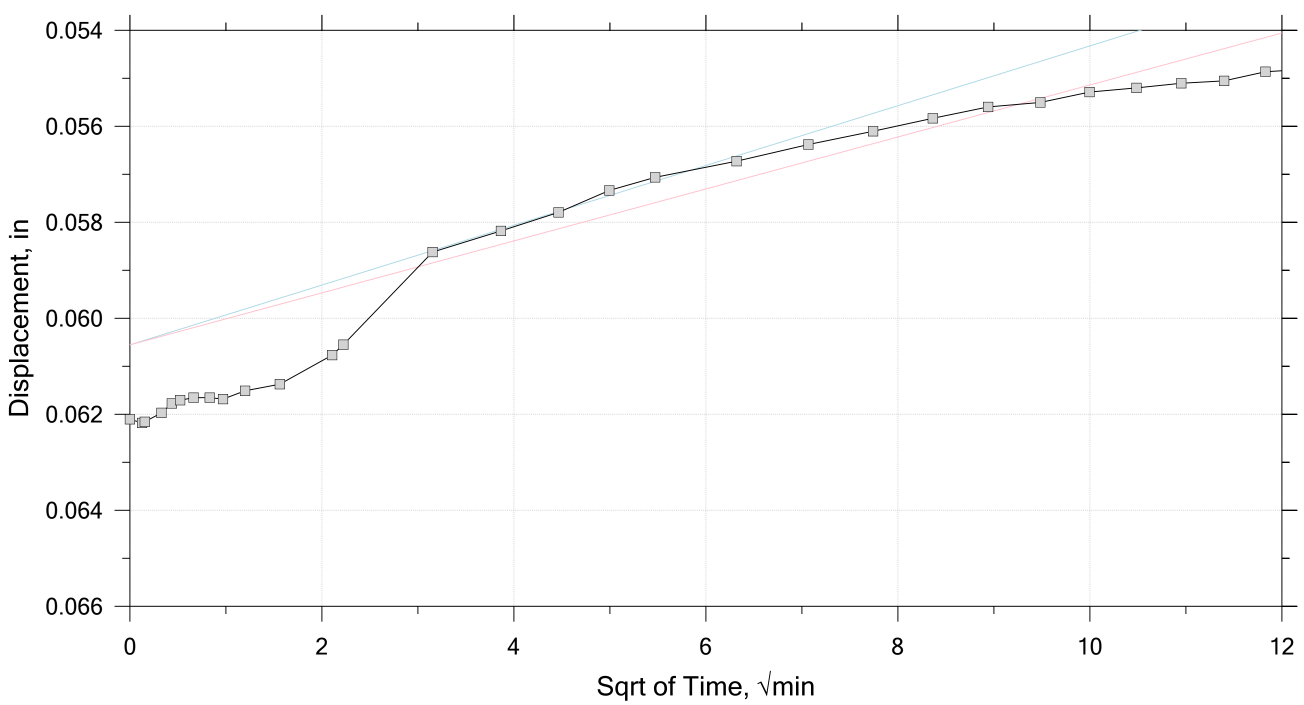
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 26 of 26

Constant Load Step

Stress: 1.49e+03 psf





Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter, in: 2.50	Specific Gravity: 2.82 (Implied)	Liquid Limit: 46
Specimen Height, in: 1.00	Initial Void Ratio: 0.992	Plastic Limit: 24
Final Height, in: 0.95	Final Void Ratio: 0.884	Plasticity Index: 22

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	208	---	"ring"	318
Mass Container, gm	36.89	110.26	110.26	60.52
Mass Container + Wet Soil, gm	135.39	263.94	259.9	210.04
Mass Container + Dry Soil, gm	110.58	224.18	224.18	174.35
Mass Dry Soil, gm	73.69	113.92	113.92	113.83
Water Content, %	33.67	34.90	31.35	31.35
Void Ratio	---	0.99	0.88	---
Degree of Saturation, %	---	99.16	100.00	---
Dry Unit Weight, pcf	---	88.324	93.399	---

Preconsolidation Stress, psf	---
Compression Ratio	0
Rebound Ratio	0
Compression Index	0
Rebound Index	0

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Log of Time Coefficients

Step	Applied Stress psf	EOP Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/day	Mv ft²/ton	k cm/s	Ca %
1	207.	6.881e-05	0.992	0.00687	0.000	0.00e+00	6.64e+02	0.00e+00	0.00e+00
2	311.	-0.0004044	0.993	-0.0404	0.000	0.00e+00	-9.09e+03	-0.00e+00	0.00e+00
3	466.	5.603e-05	0.992	0.00560	0.000	0.00e+00	5.93e+03	0.00e+00	0.00e+00
4	699.	0.0009268	0.990	0.0926	0.000	0.00e+00	7.47e+03	0.00e+00	0.00e+00
5	1.05e+03	0.002237	0.987	0.223	0.000	0.00e+00	7.50e+03	0.00e+00	0.00e+00
6	1.57e+03	0.003541	0.985	0.354	0.000	0.00e+00	4.97e+03	0.00e+00	0.00e+00
7	2.36e+03	0.006365	0.979	0.636	0.000	0.00e+00	7.18e+03	0.00e+00	0.00e+00
8	3.54e+03	0.008372	0.975	0.836	0.000	0.00e+00	3.40e+03	0.00e+00	0.00e+00
9	5.30e+03	0.01220	0.967	1.22	0.000	0.00e+00	4.32e+03	0.00e+00	0.00e+00
10	7.96e+03	0.01774	0.956	1.77	0.000	0.00e+00	4.18e+03	0.00e+00	0.00e+00
11	1.19e+04	0.02307	0.946	2.30	0.000	0.00e+00	2.67e+03	0.00e+00	0.00e+00
12	5.97e+03	0.02191	0.948	2.19	0.000	0.00e+00	3.90e+02	0.00e+00	0.00e+00
13	2.98e+03	0.02081	0.950	2.08	0.000	0.00e+00	7.31e+02	0.00e+00	0.00e+00
14	1.49e+03	0.01771	0.957	1.77	2.444	1.94e-01	4.16e+03	8.90e-09	0.00e+00
15	746.	0.01543	0.961	1.54	5.333	8.95e-02	6.10e+03	6.01e-09	0.00e+00
16	1.49e+03	0.01339	0.965	1.34	0.000	0.00e+00	-5.47e+03	-0.00e+00	0.00e+00
17	2.98e+03	0.01436	0.963	1.43	0.000	0.00e+00	1.31e+03	0.00e+00	0.00e+00
18	5.97e+03	0.01752	0.957	1.75	0.000	0.00e+00	2.11e+03	0.00e+00	0.00e+00
19	1.19e+04	0.02591	0.940	2.59	0.000	0.00e+00	2.81e+03	0.00e+00	0.00e+00
20	2.39e+04	0.03909	0.914	3.91	1.630	2.83e-01	2.21e+03	6.88e-09	0.00e+00
21	4.77e+04	0.07576	0.841	7.57	1.927	2.28e-01	3.07e+03	7.69e-09	0.00e+00
22	2.39e+04	0.07378	0.845	7.37	0.000	0.00e+00	1.66e+02	0.00e+00	0.00e+00
23	1.19e+04	0.07547	0.842	7.54	0.000	0.00e+00	-2.82e+02	-0.00e+00	0.00e+00
24	5.97e+03	0.06884	0.855	6.88	2.260	1.88e-01	2.22e+03	4.59e-09	0.00e+00
25	2.98e+03	0.06222	0.868	6.22	5.997	7.19e-02	4.44e+03	3.51e-09	0.00e+00
26	1.49e+03	0.05456	0.883	5.45	8.517	5.14e-02	1.03e+04	5.80e-09	0.00e+00

Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B

Sqrt of Time Coefficients

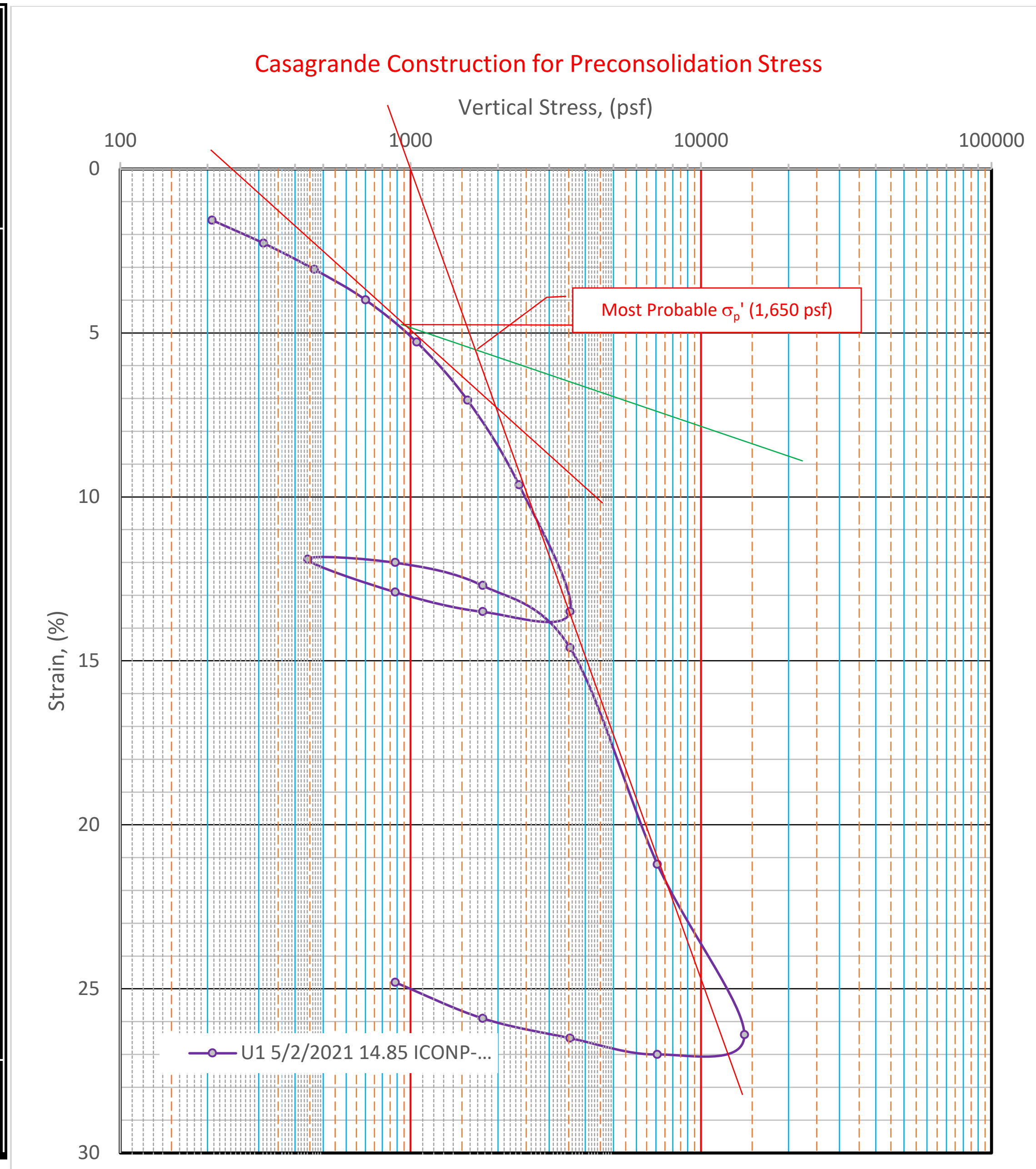
Step	Applied Stress psf	EOP Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv ft²/day	Mv ft²/ton	k cm/s
1	207.	6.881e-05	0.992	0.00687	0.000	0.00e+00	6.64e+02	0.00e+00
2	311.	-0.0004044	0.993	-0.0404	0.000	0.00e+00	-9.09e+03	-0.00e+00
3	466.	5.603e-05	0.992	0.00560	98.883	2.15e-02	5.93e+03	1.40e-09
4	699.	0.0009268	0.990	0.0926	169.918	1.25e-02	7.47e+03	1.03e-09
5	1.05e+03	0.002237	0.987	0.223	97.846	2.16e-02	7.50e+03	1.79e-09
6	1.57e+03	0.003541	0.985	0.354	89.810	2.35e-02	4.97e+03	1.29e-09
7	2.36e+03	0.006365	0.979	0.636	79.803	2.64e-02	7.18e+03	2.08e-09
8	3.54e+03	0.008372	0.975	0.836	88.543	2.36e-02	3.40e+03	8.86e-10
9	5.30e+03	0.01220	0.967	1.22	79.627	2.61e-02	4.32e+03	1.24e-09
10	7.96e+03	0.01774	0.956	1.77	72.186	2.86e-02	4.18e+03	1.31e-09
11	1.19e+04	0.02307	0.946	2.30	62.930	3.24e-02	2.67e+03	9.54e-10
12	5.97e+03	0.02191	0.948	2.19	4.038	5.03e-01	3.90e+02	2.16e-09
13	2.98e+03	0.02081	0.950	2.08	5.892	3.45e-01	7.31e+02	2.78e-09
14	1.49e+03	0.01771	0.957	1.77	13.584	1.50e-01	4.16e+03	6.89e-09
15	746.	0.01543	0.961	1.54	31.168	6.59e-02	6.10e+03	4.42e-09
16	1.49e+03	0.01339	0.965	1.34	117.932	1.75e-02	-5.47e+03	-1.05e-09
17	2.98e+03	0.01436	0.963	1.43	62.768	3.29e-02	1.31e+03	4.73e-10
18	5.97e+03	0.01752	0.957	1.75	6.118	3.36e-01	2.11e+03	7.82e-09
19	1.19e+04	0.02591	0.940	2.59	1042.540	1.95e-03	2.81e+03	6.03e-11
20	2.39e+04	0.03909	0.914	3.91	7.020	2.83e-01	2.21e+03	6.88e-09
21	4.77e+04	0.07576	0.841	7.57	7.317	2.58e-01	3.07e+03	8.72e-09
22	2.39e+04	0.07378	0.845	7.37	0.807	2.25e+00	1.66e+02	4.12e-09
23	1.19e+04	0.07547	0.842	7.54	2.965	6.14e-01	-2.82e+02	-1.90e-09
24	5.97e+03	0.06884	0.855	6.88	19.637	9.31e-02	2.22e+03	2.27e-09
25	2.98e+03	0.06222	0.868	6.22	19.806	9.37e-02	4.44e+03	4.57e-09
26	1.49e+03	0.05456	0.883	5.45	85.679	2.20e-02	1.03e+04	2.48e-09

Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-202	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/27/2021	Depth: 40.65
	Test Number: ICON 65-369	Preparation: Shelby Tube	Elevation:
	Description: Gray Silt		
	Remarks:		
	Displacement at End of Primary		

Consolidation Test Data
Summary Report

Project Name:	Pleasant Cove
Project Number:	166-21
Project Location:	Woolwich, ME
Client:	GZA
Sample Description:	Brown Organic Silt
Preparation:	Trimmed Shelby Tube

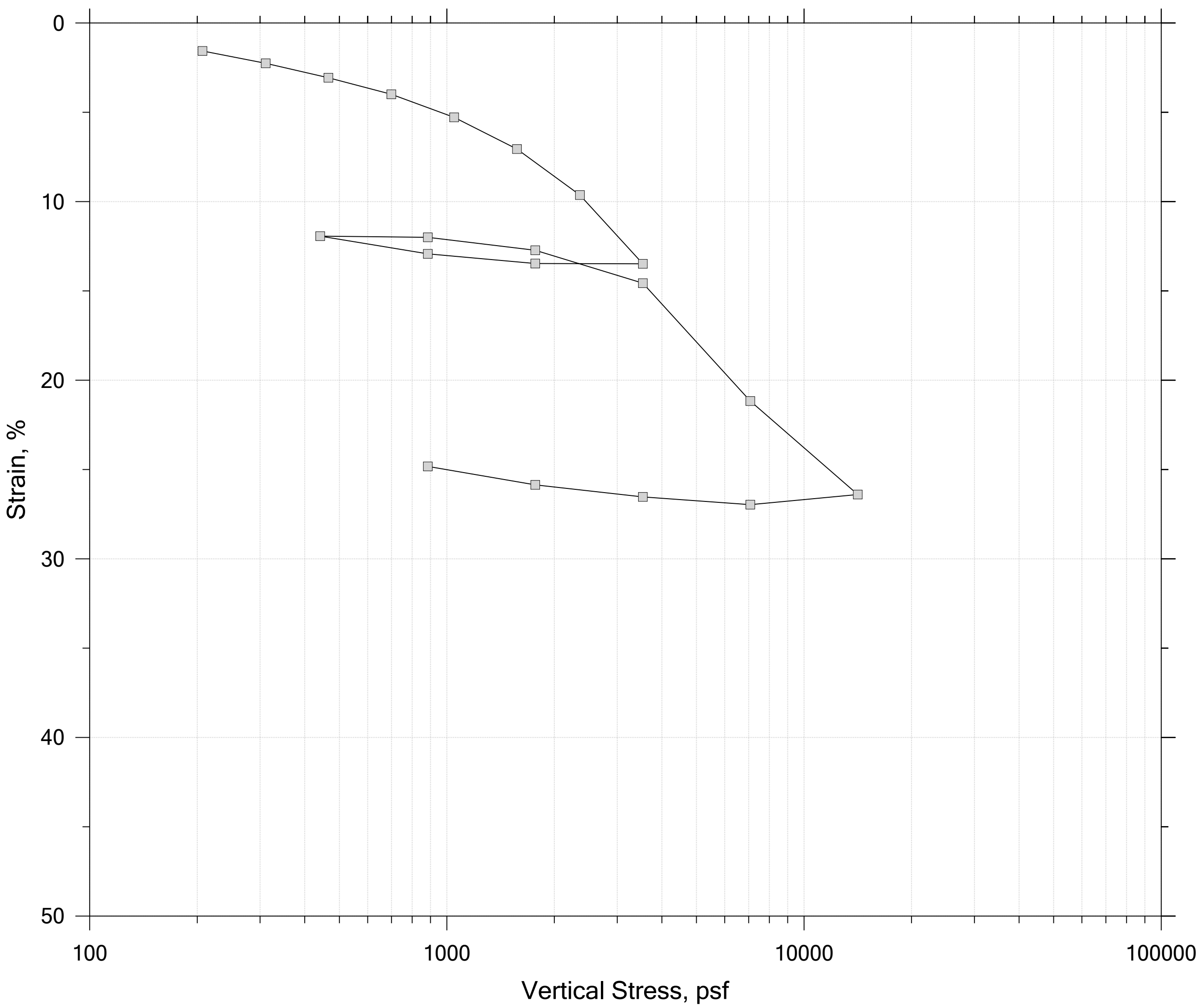
Lab Test No:	ICON 68-361			
Boring No.	HB-WPC-203			
Sample No:	U1			
Boring Elevation (ft).				
Sample Depth (ft):	13-15			
Test Specimen Depth (Ft):	14.85			
Test Specimen Elevation:				
Water Content (%):	69.3			
Dry Unit Weight (pcf):	55.7			
Wet Unit Weight (pcf):	94.4			
Saturation Before (%):	91.9			
Saturation After (%):	100			
Void Ratio Before:	2.27			
Void Ratio After:	1.46			
Overburden Pressure (psf):	--			
Max Previous stress (psf):	1,650			
Max Prev. stress (Work) (psf):	1,550			
OCR:	--			
Compression Index (C_{CE}):	0.25			
Recompression Index (C_{RE}):	0.028			
Liquid Limit:	71			
Plastic Limit:	61.4			
Plasticity Index:	9.6			
Liquidity Index:	0.82			
Specific Gravity (implied)	2.92			
Organic Content (%)	6.02			
Tested By:	sjr			
Date Tested:	5/12/2021			
Checked By:	sjr			



Soil Metrics LLC Geotechnical Engineering

One-Dimensional Consolidation by ASTM D2435 - Method B

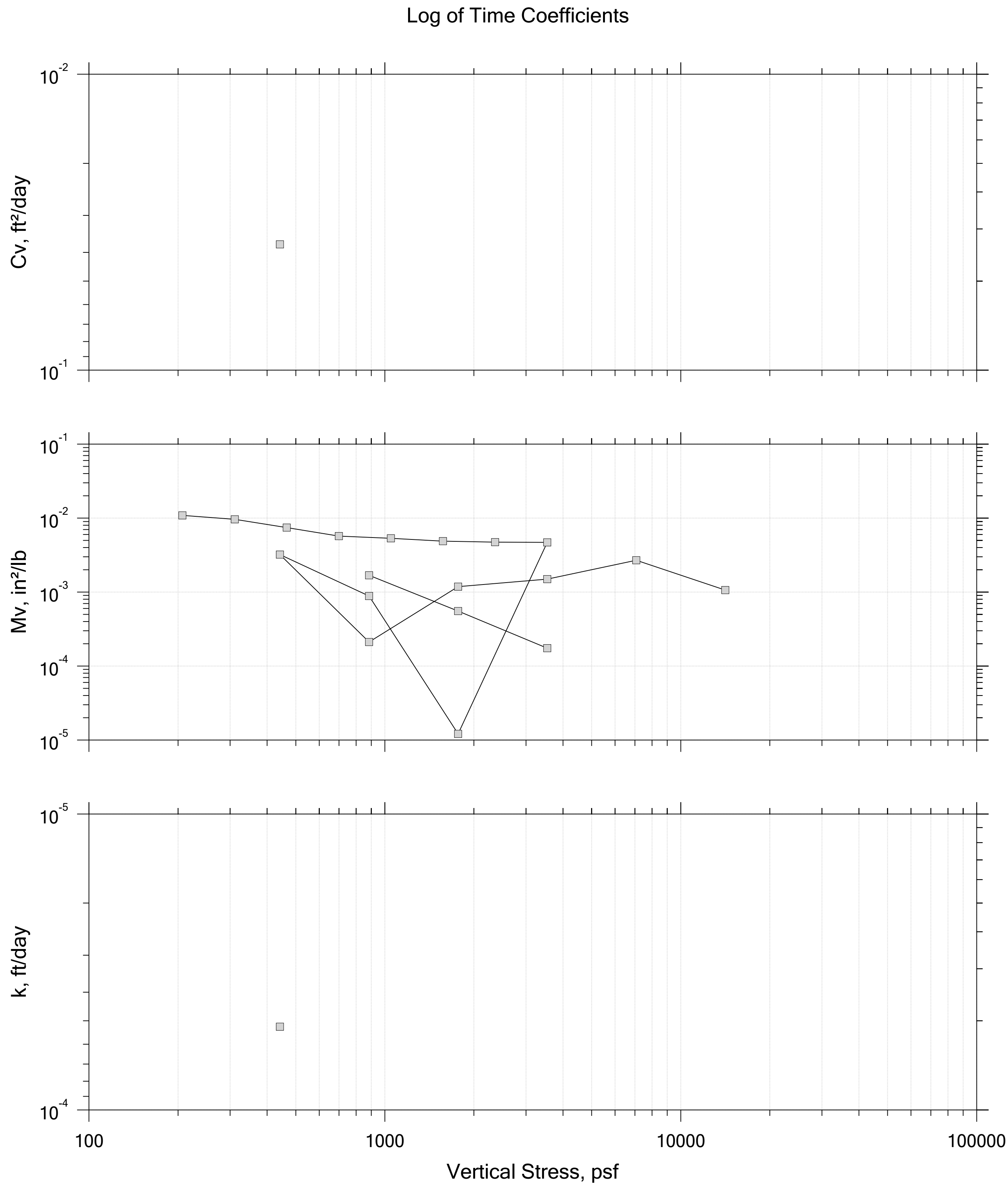
Summary Report



					Before Test	After Test
Current Vertical Effective Stress: 0 psf				Water Content, %	71.41	50.02
Preconsolidation Stress: 0 psf				Dry Unit Weight, pcf	55.737	74.04
Compression Ratio: 0				Saturation, %	91.90	100.00
Diameter: 2.5 in		Height: 1.001 in		Void Ratio	2.27	1.46
LL: 71	PL: 61	PI: 10	GS: 2.92			

Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		
	Displacement at End of Primary		

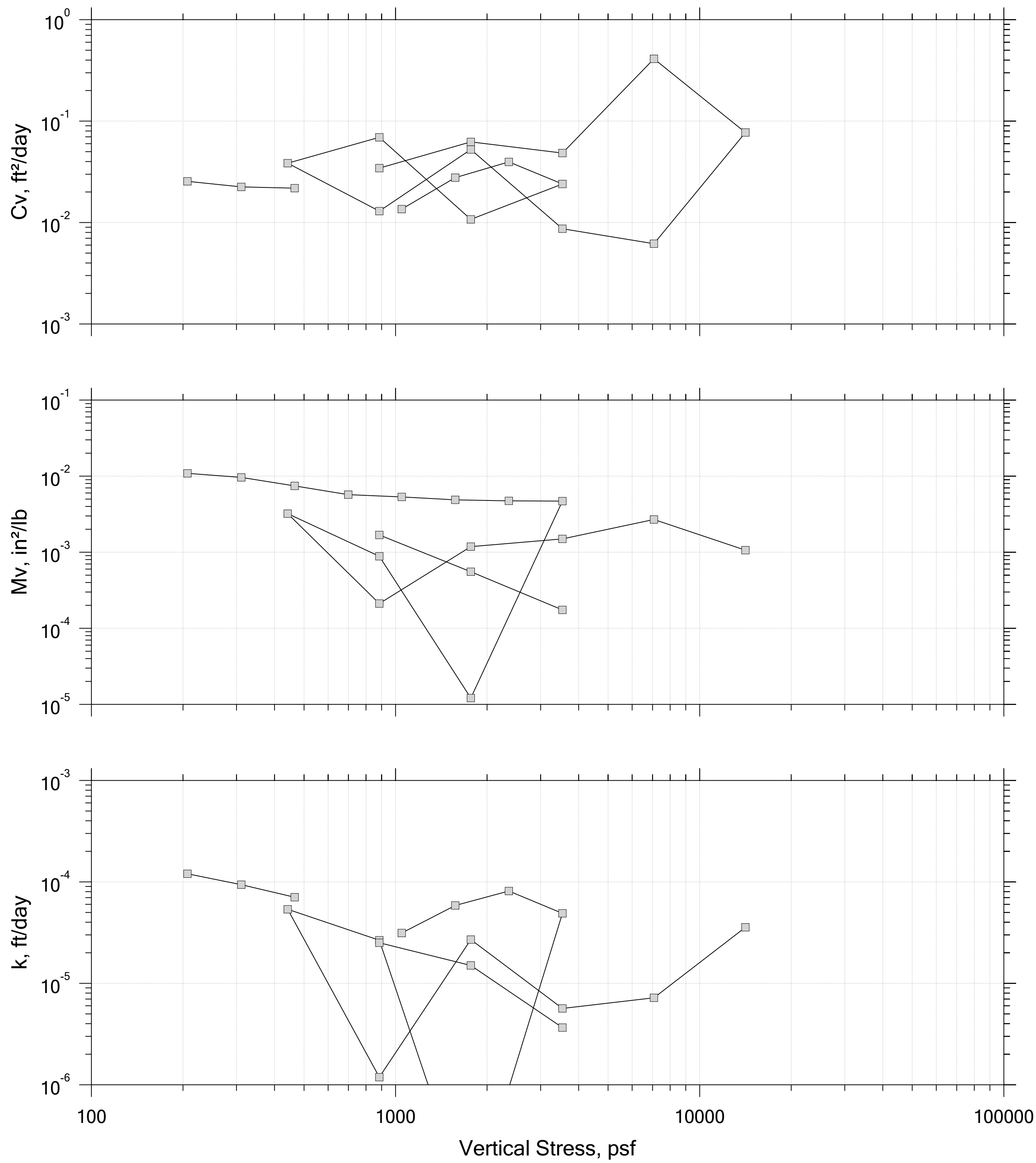
One-Dimensional Consolidation by ASTM D2435 - Method B



Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

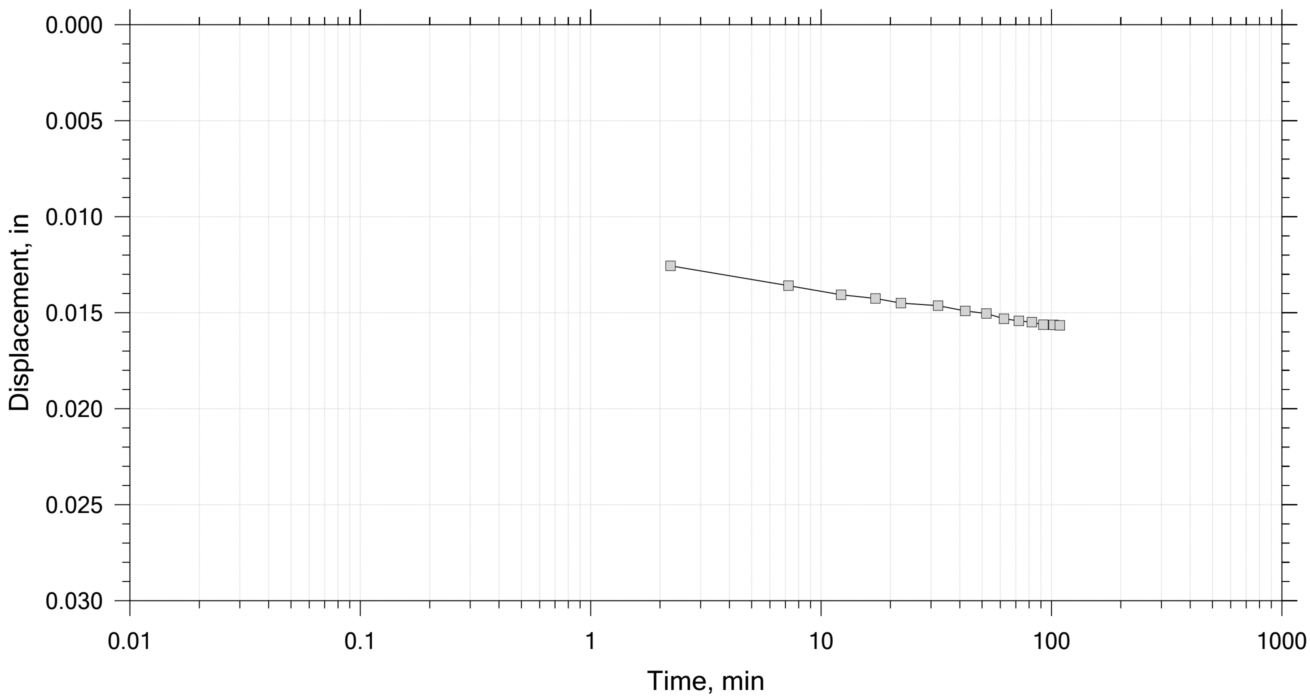
Square Root of Time Coefficients

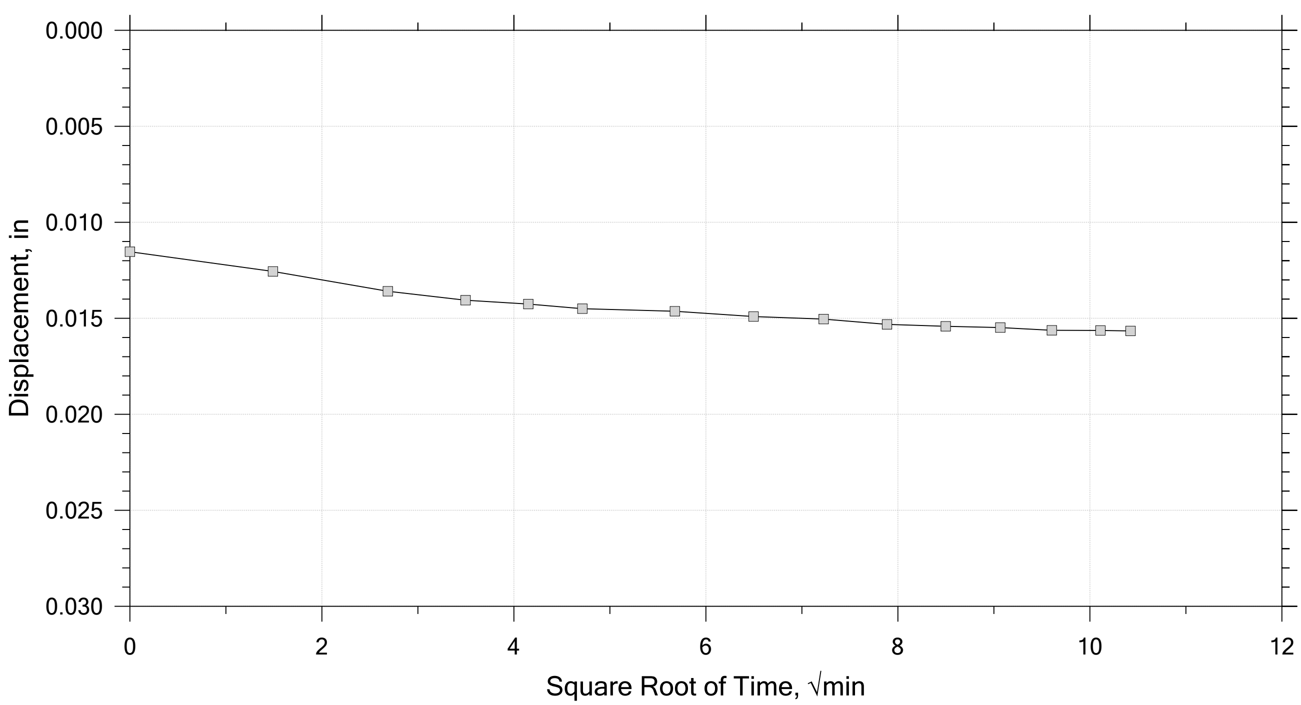


Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 20
Constant Load Step
Stress: 207 psf

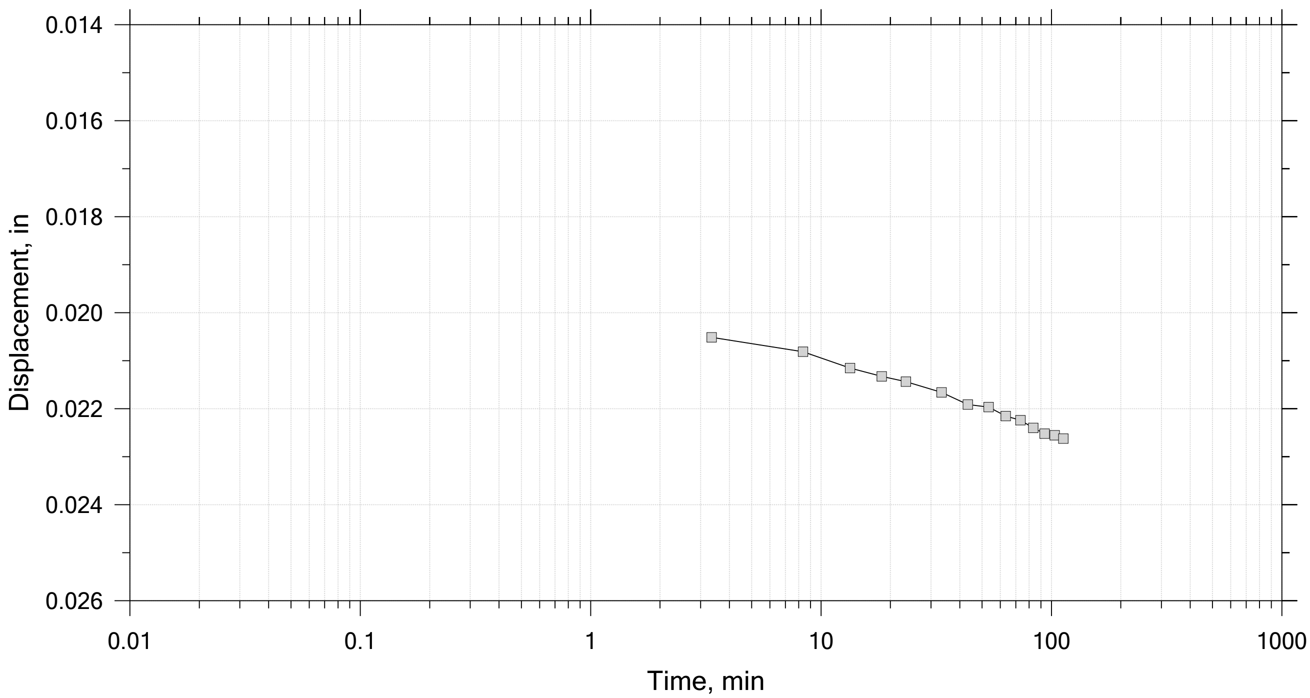


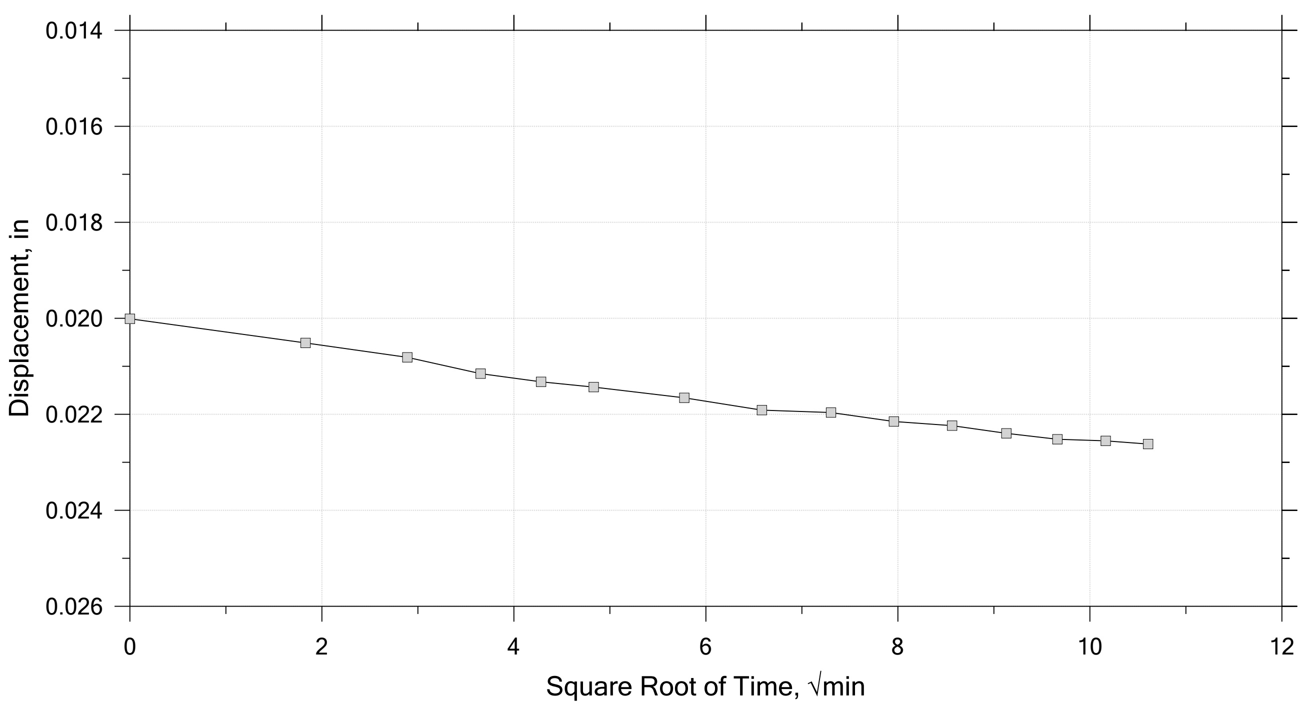


Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 20
Constant Load Step
Stress: 311 psf





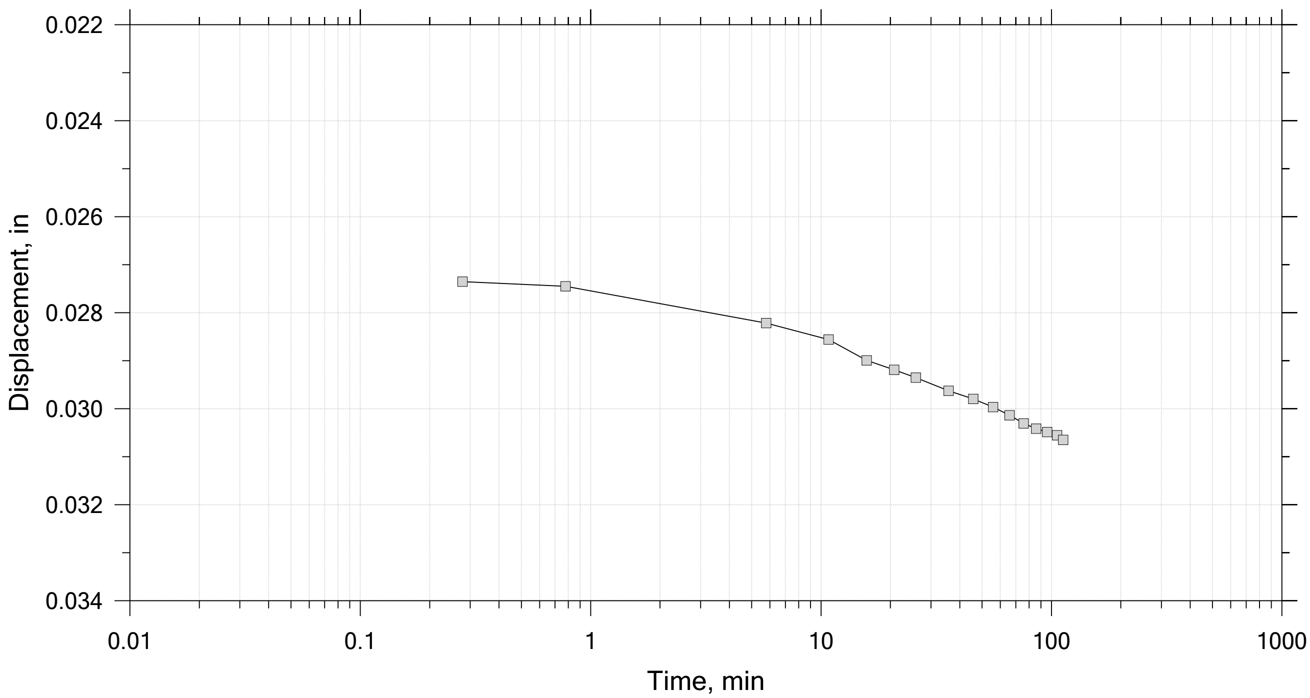
Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

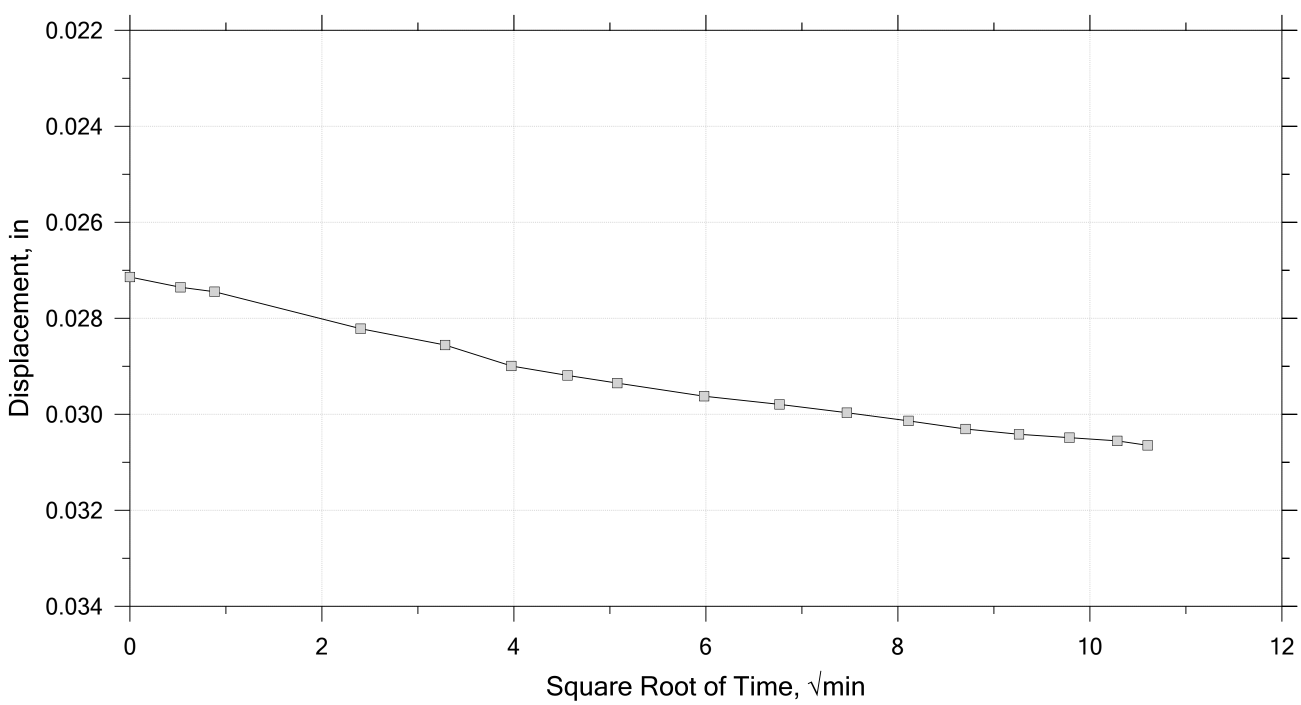
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 20

Constant Load Step

Stress: 466 psf





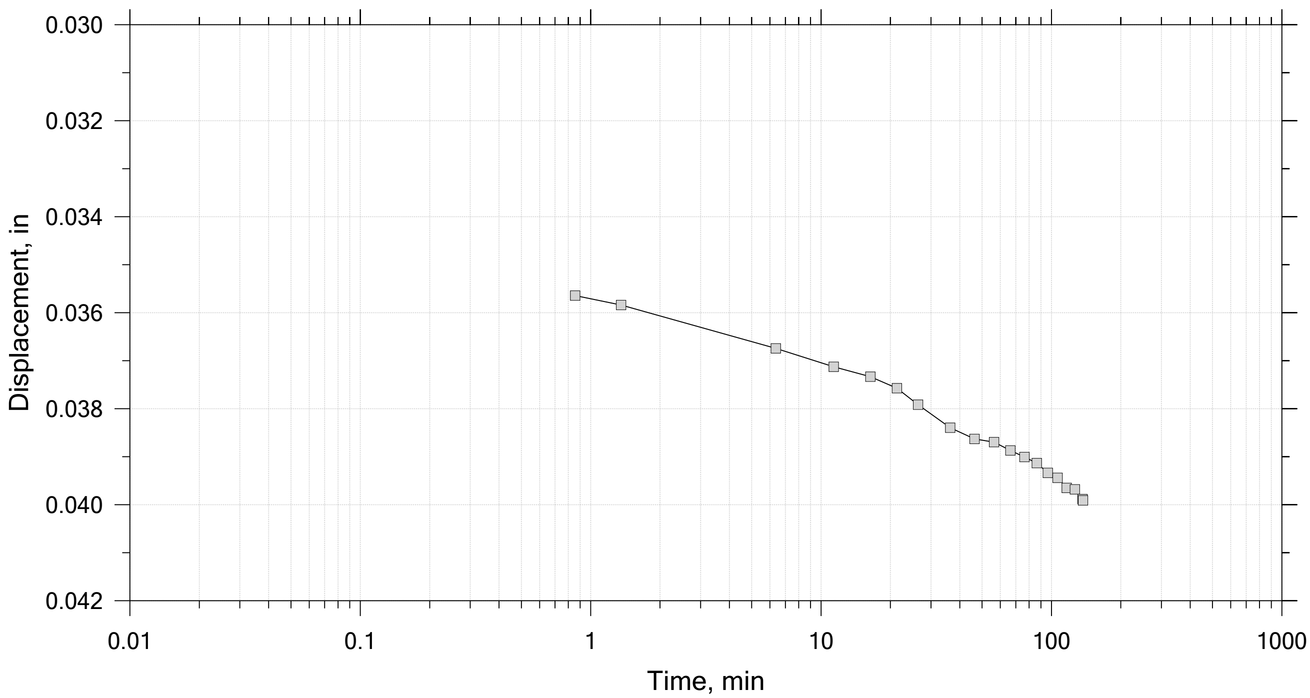
Soil Metrics LLC			
	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

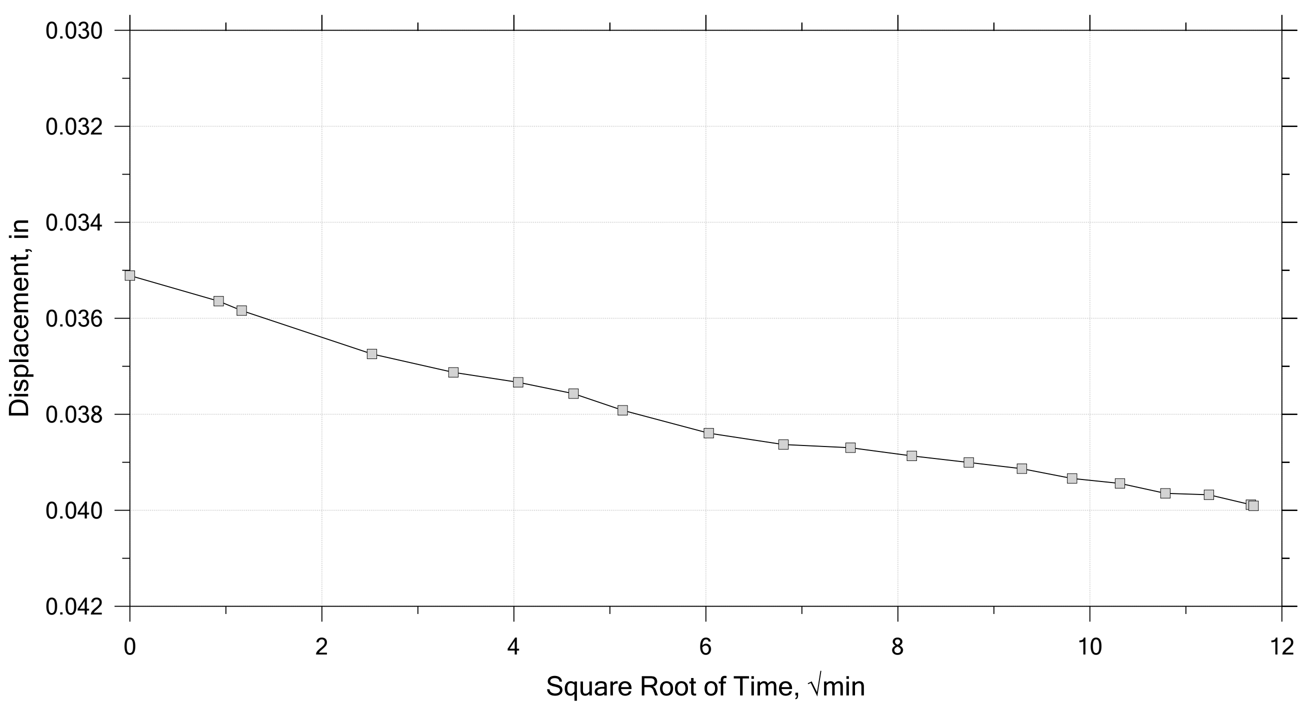
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 20

Constant Load Step

Stress: 699 psf





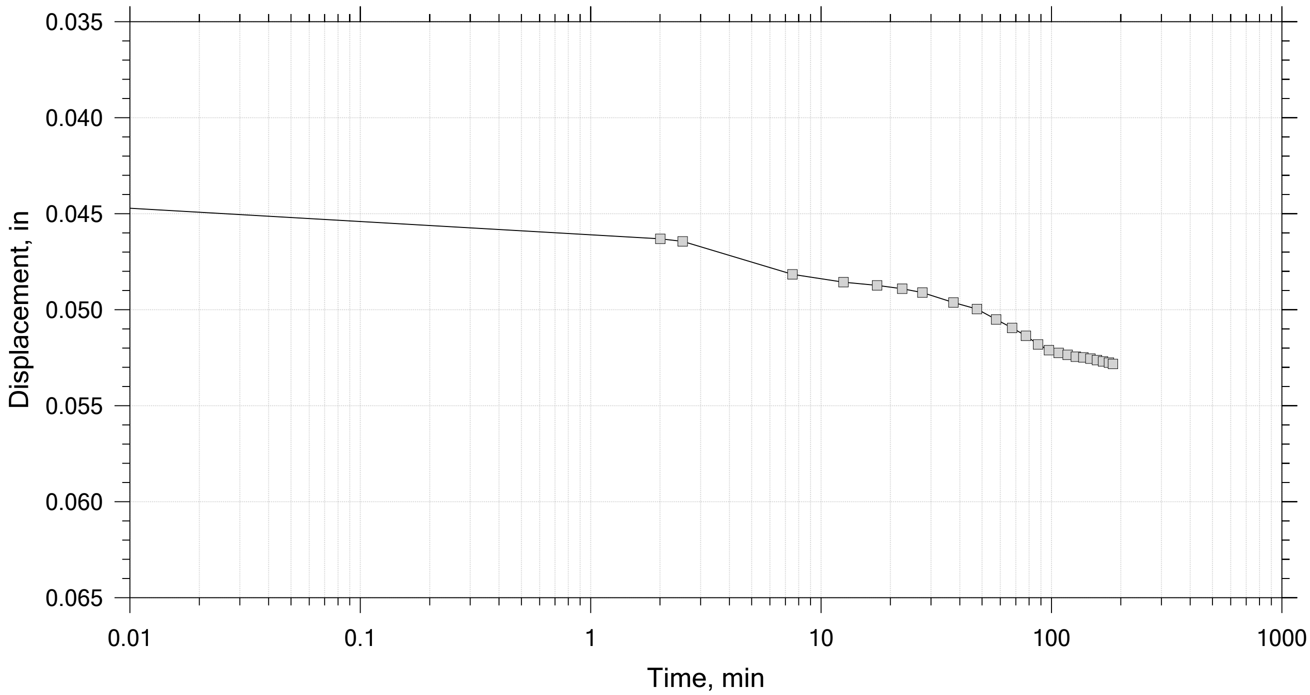
Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

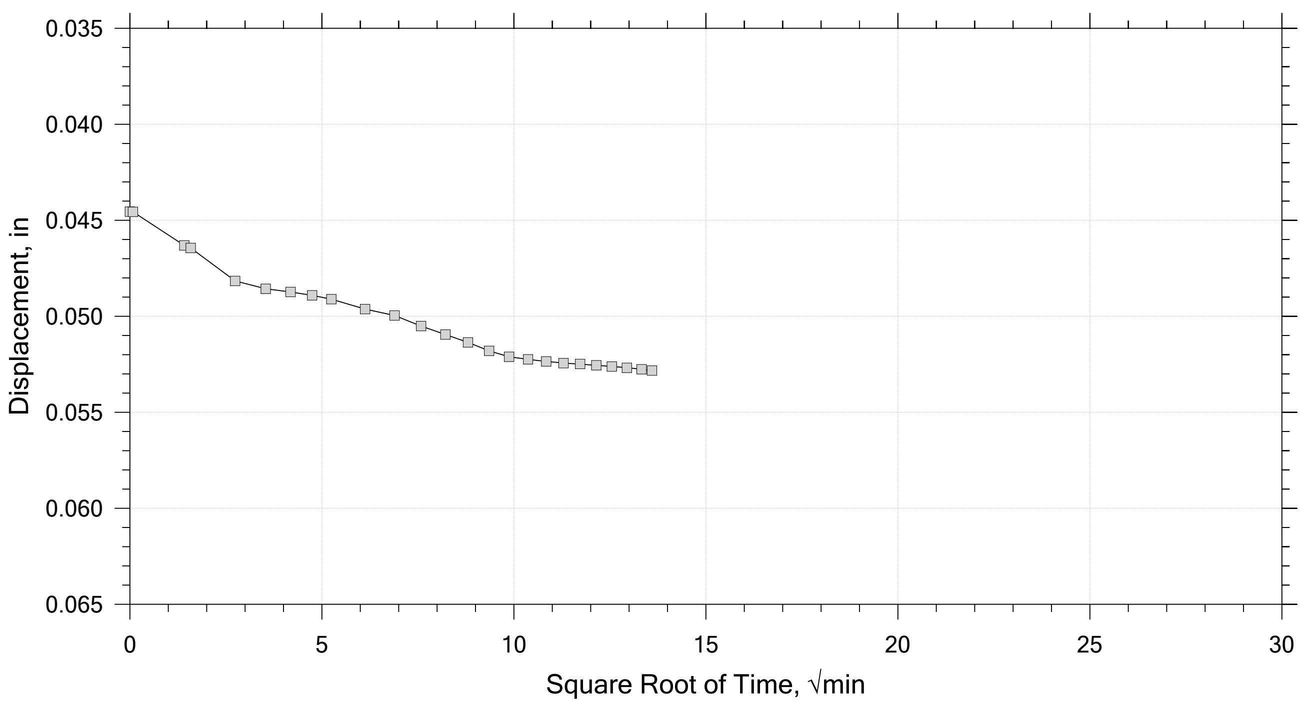
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 20

Constant Load Step

Stress: 1.05e+03 psf

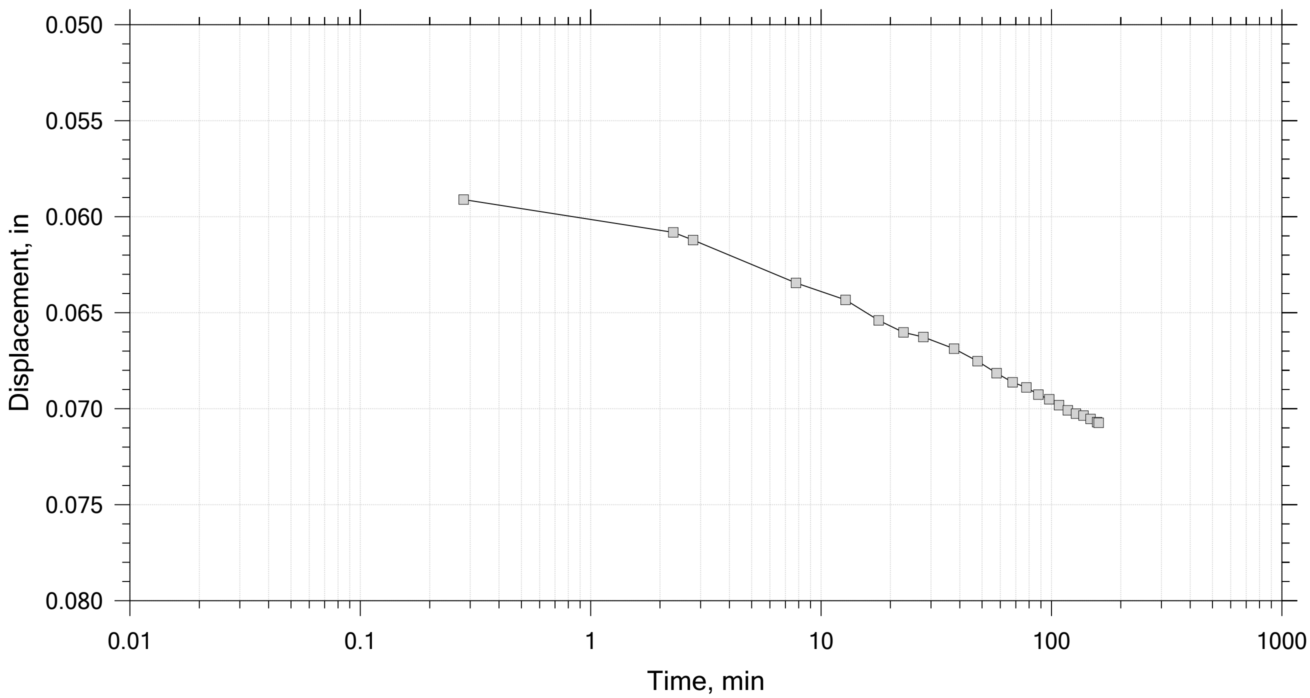


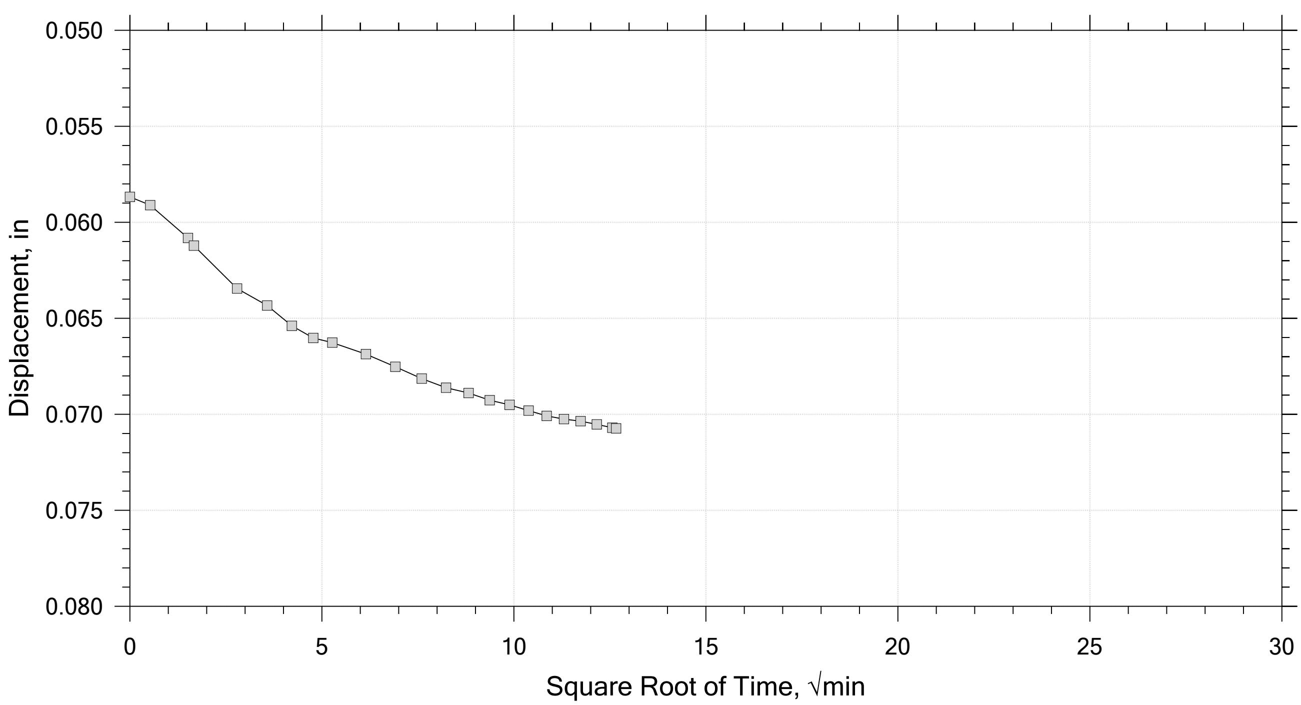


Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 20
Constant Load Step
Stress: 1.57e+03 psf

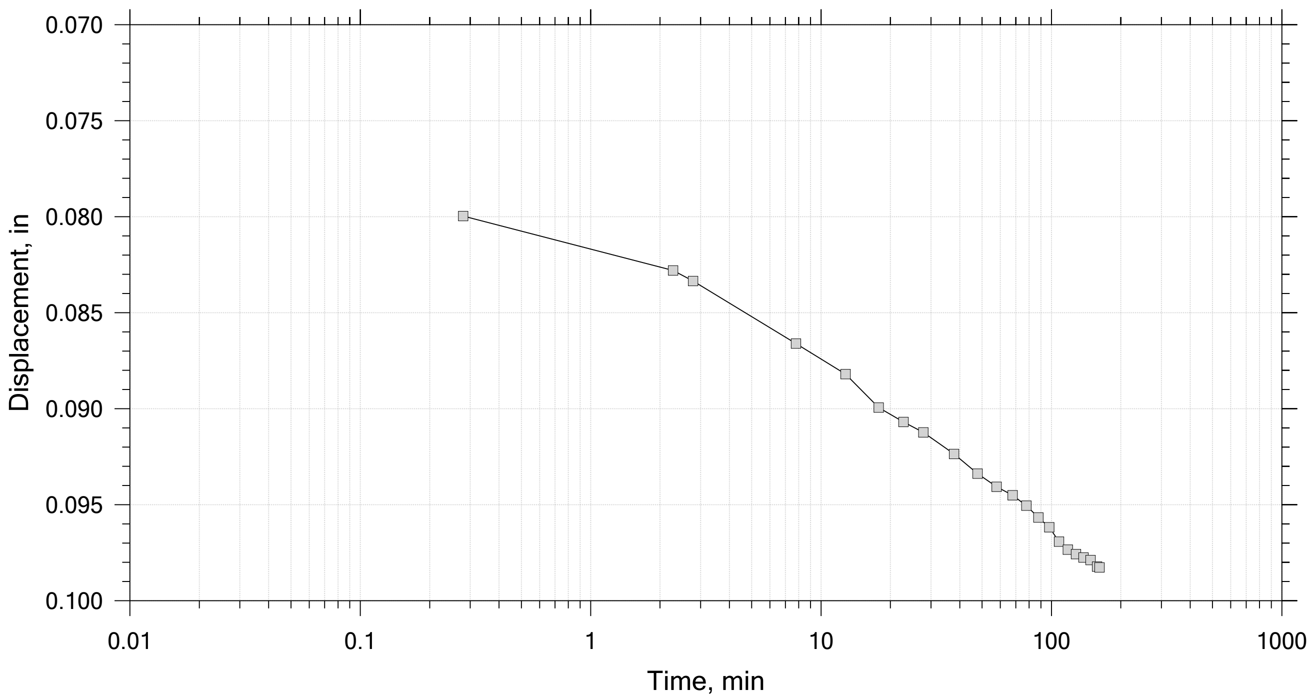


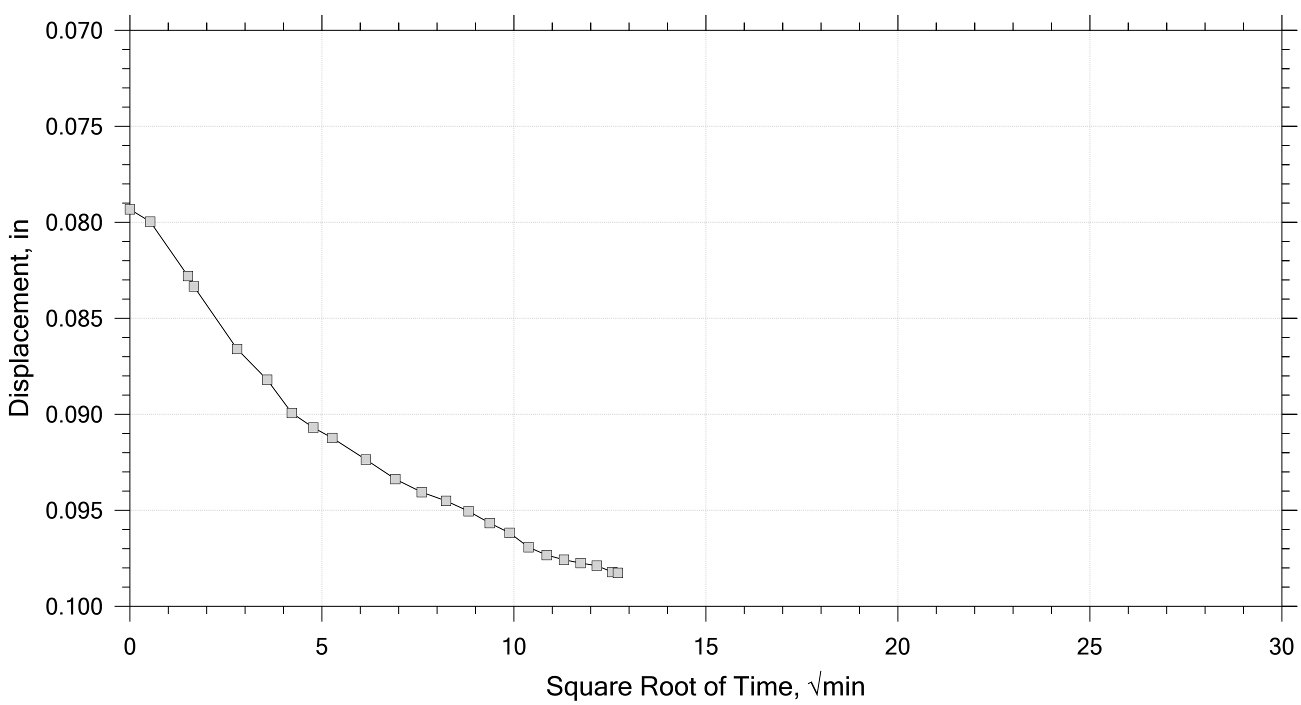


Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 20
Constant Load Step
Stress: 2.36e+03 psf





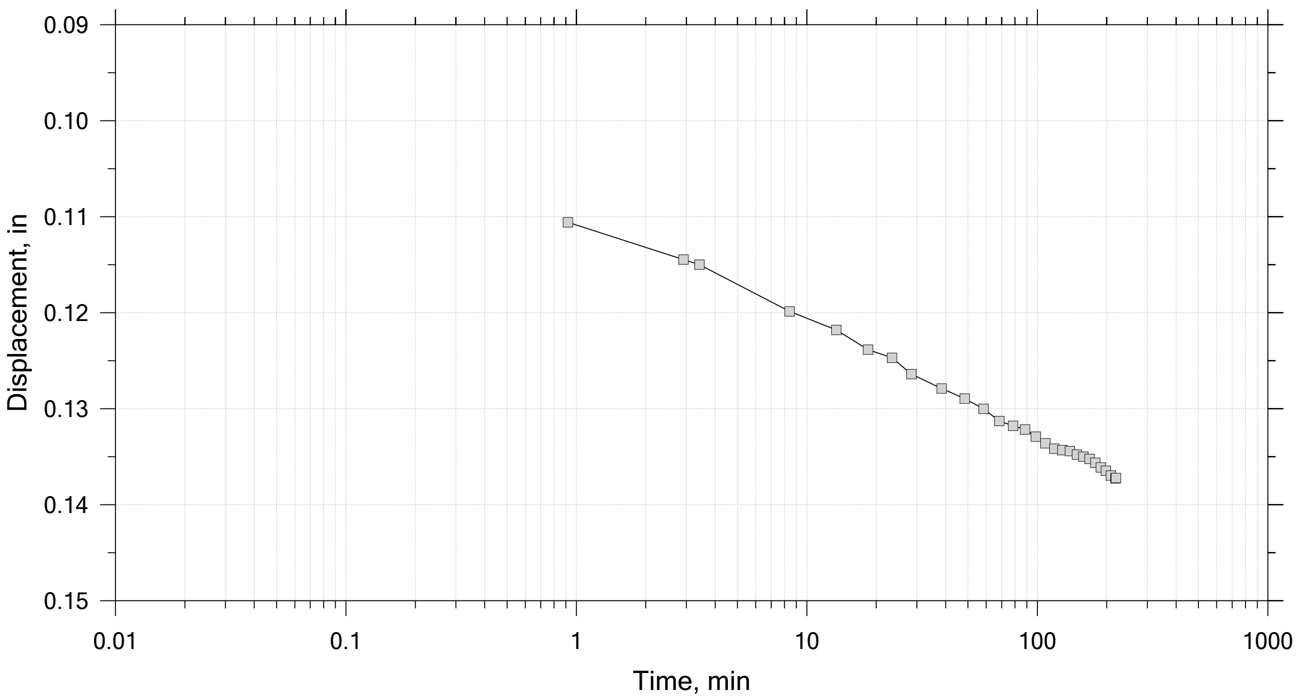
Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

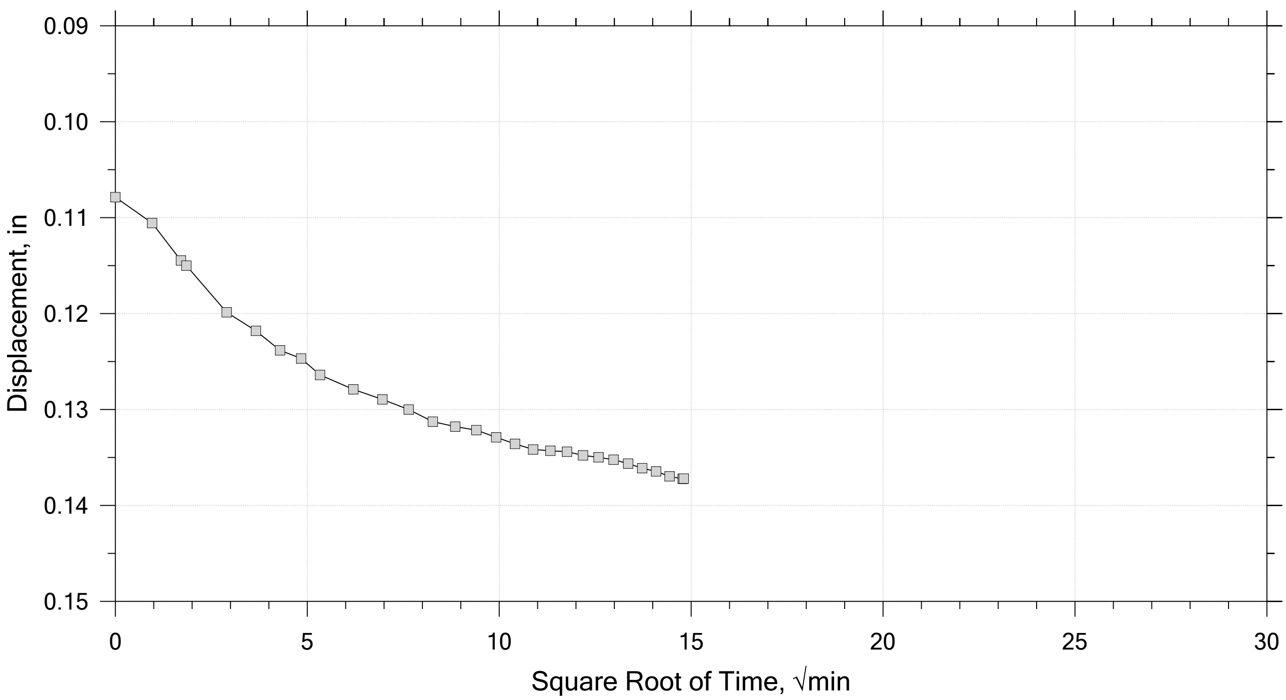
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 20

Constant Load Step

Stress: 3.54e+03 psf





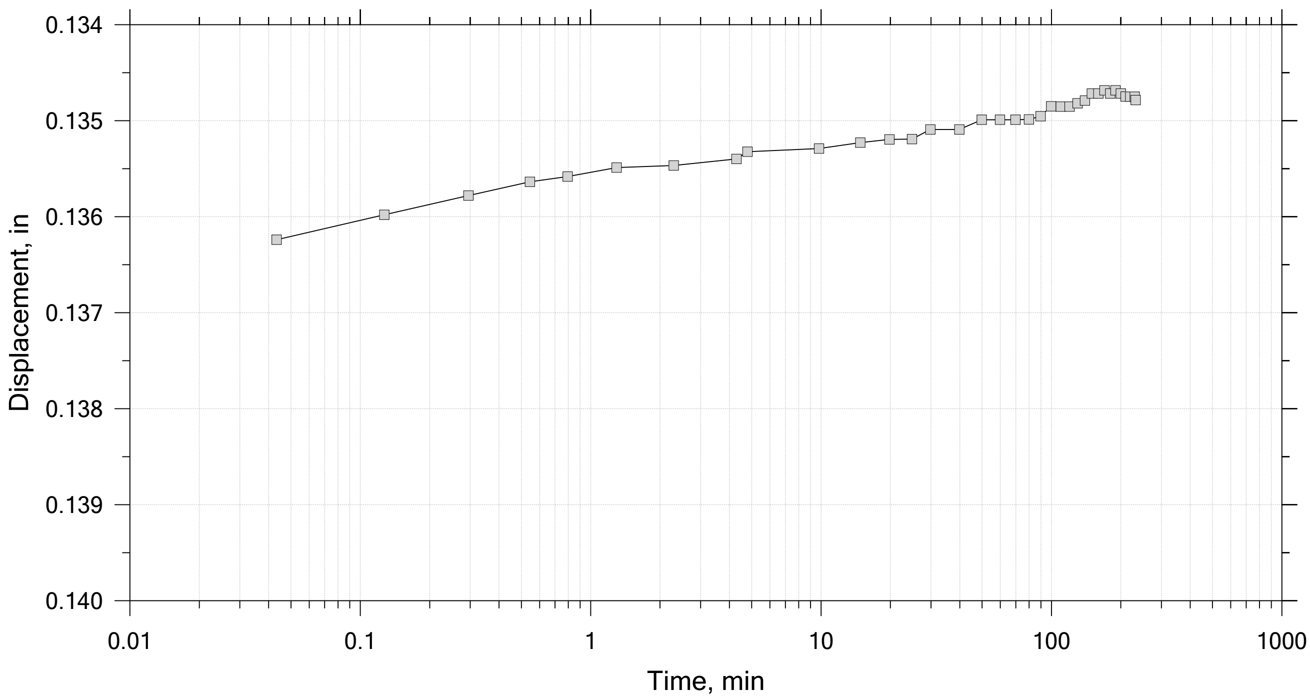
Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

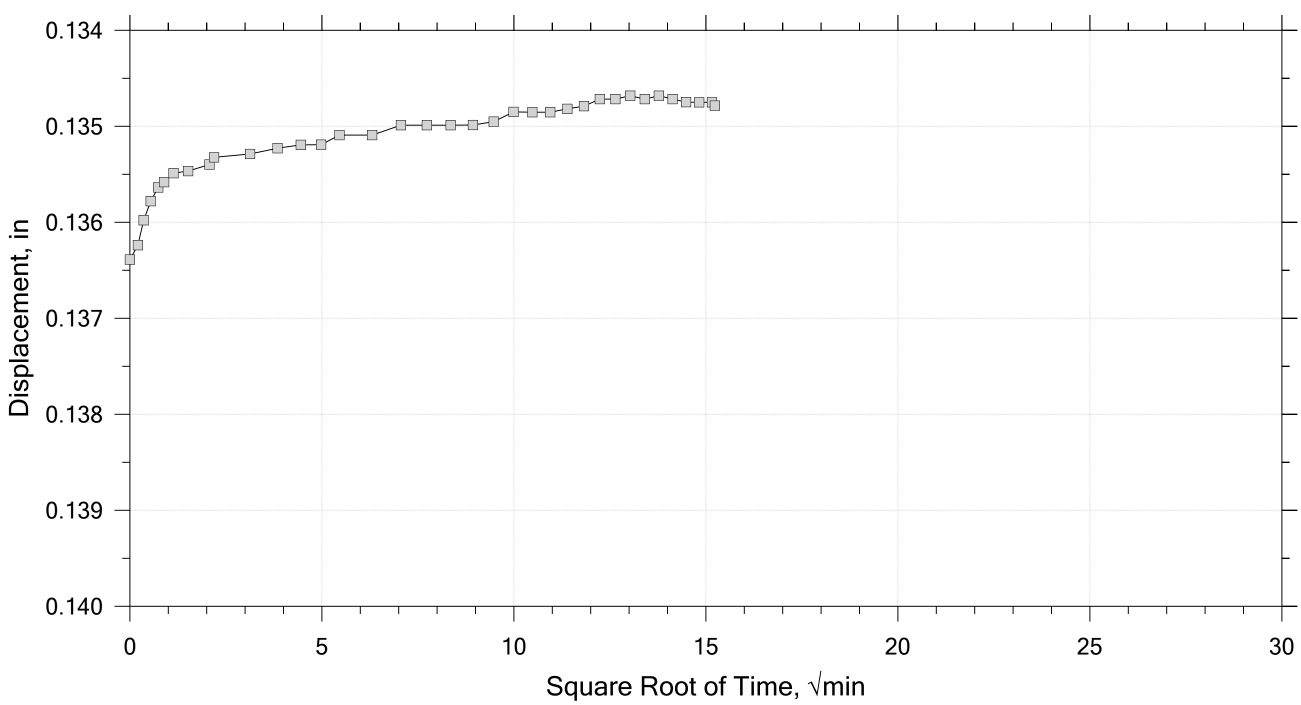
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 20

Constant Load Step

Stress: 1.77e+03 psf





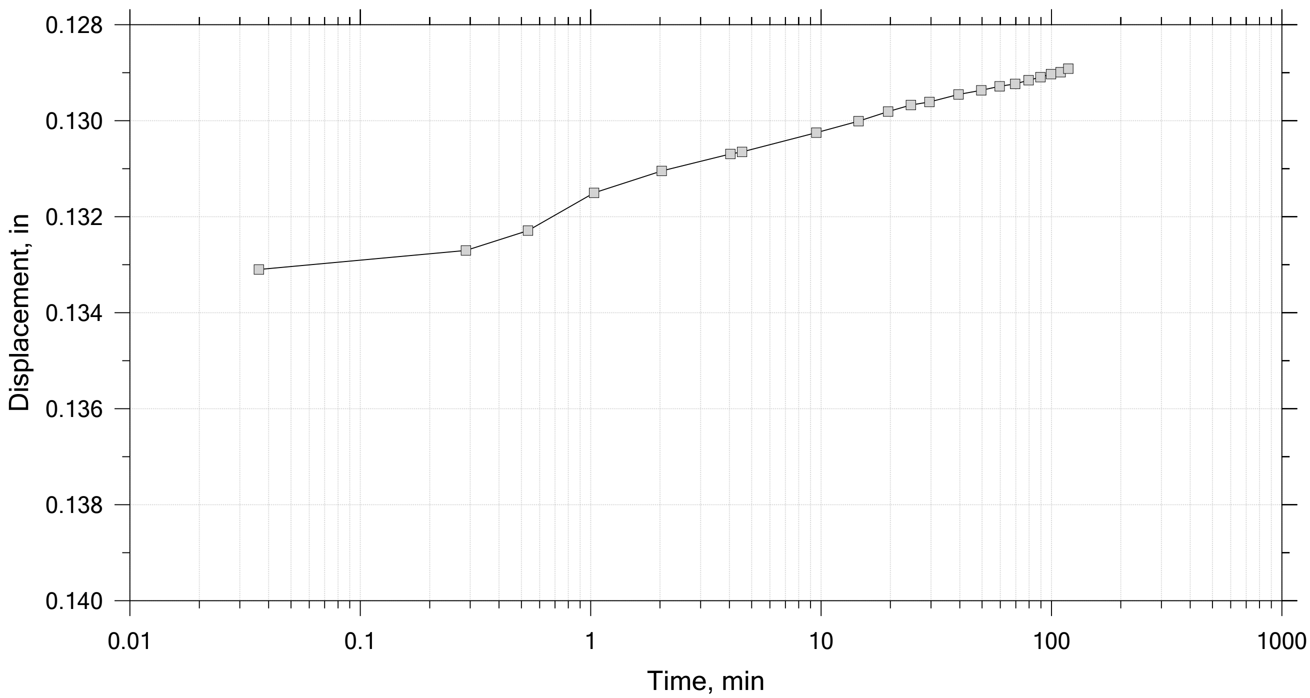
Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

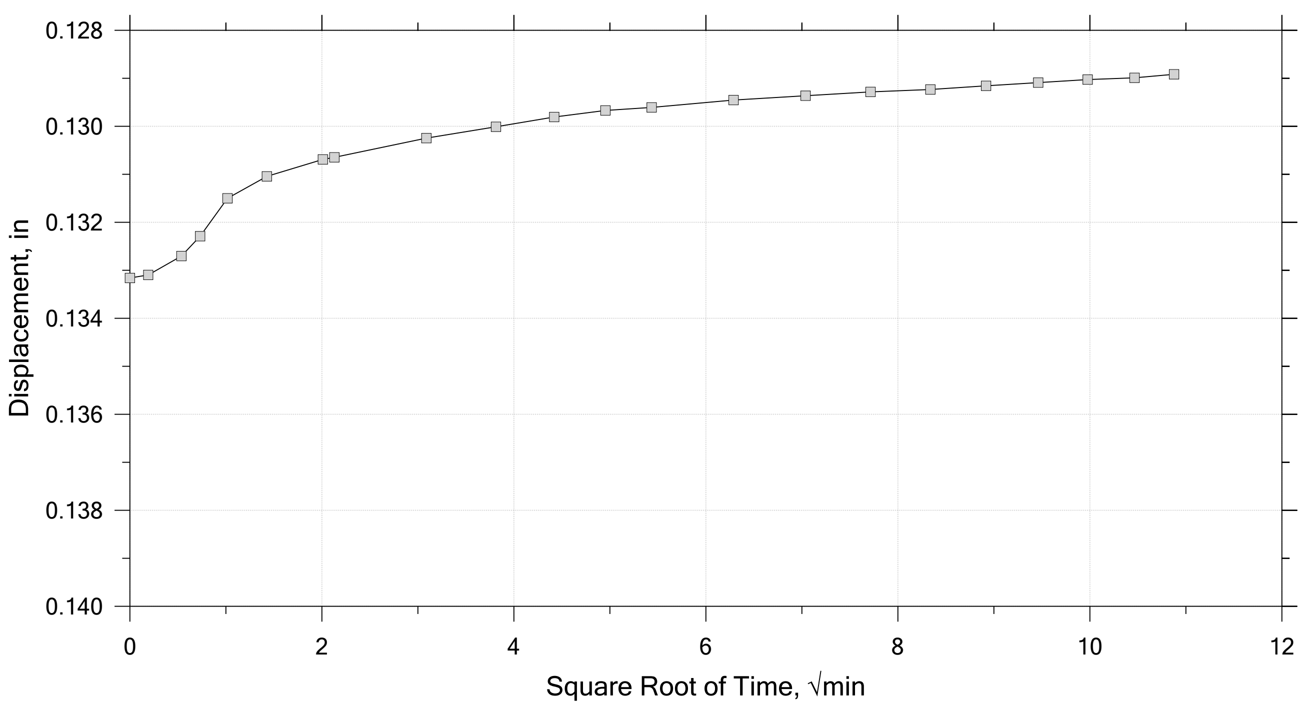
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 20

Constant Load Step

Stress: 884 psf





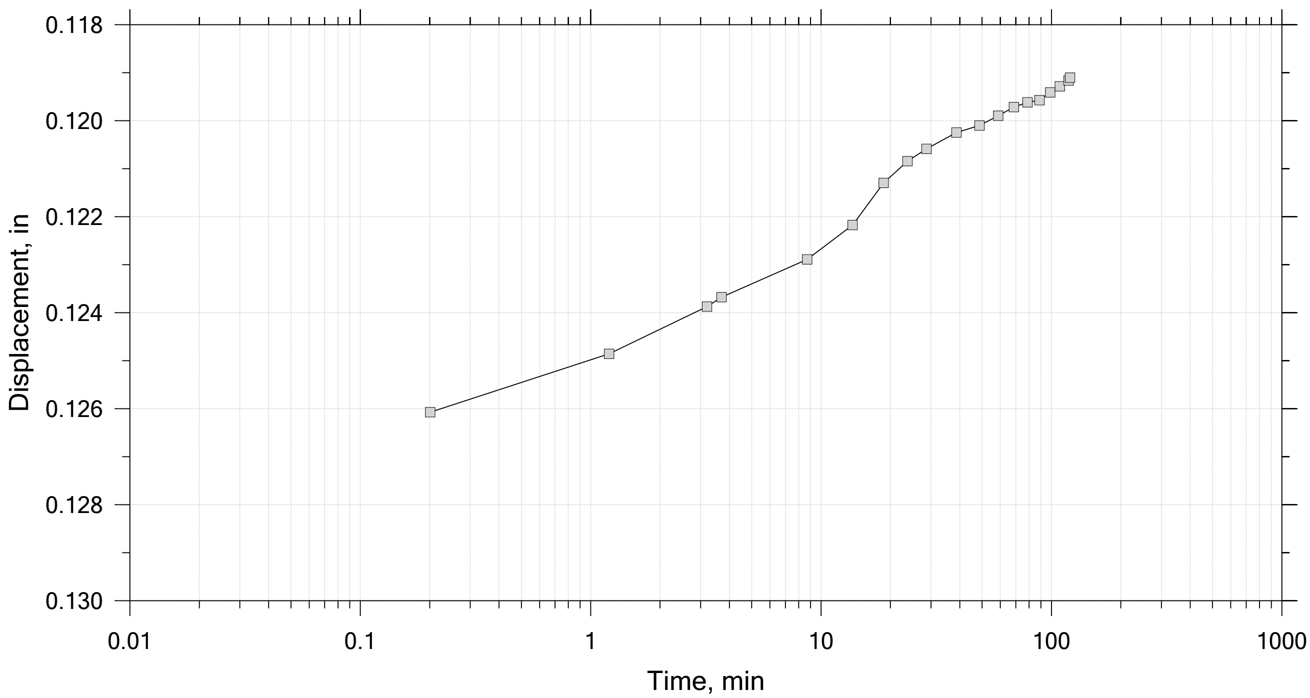
Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

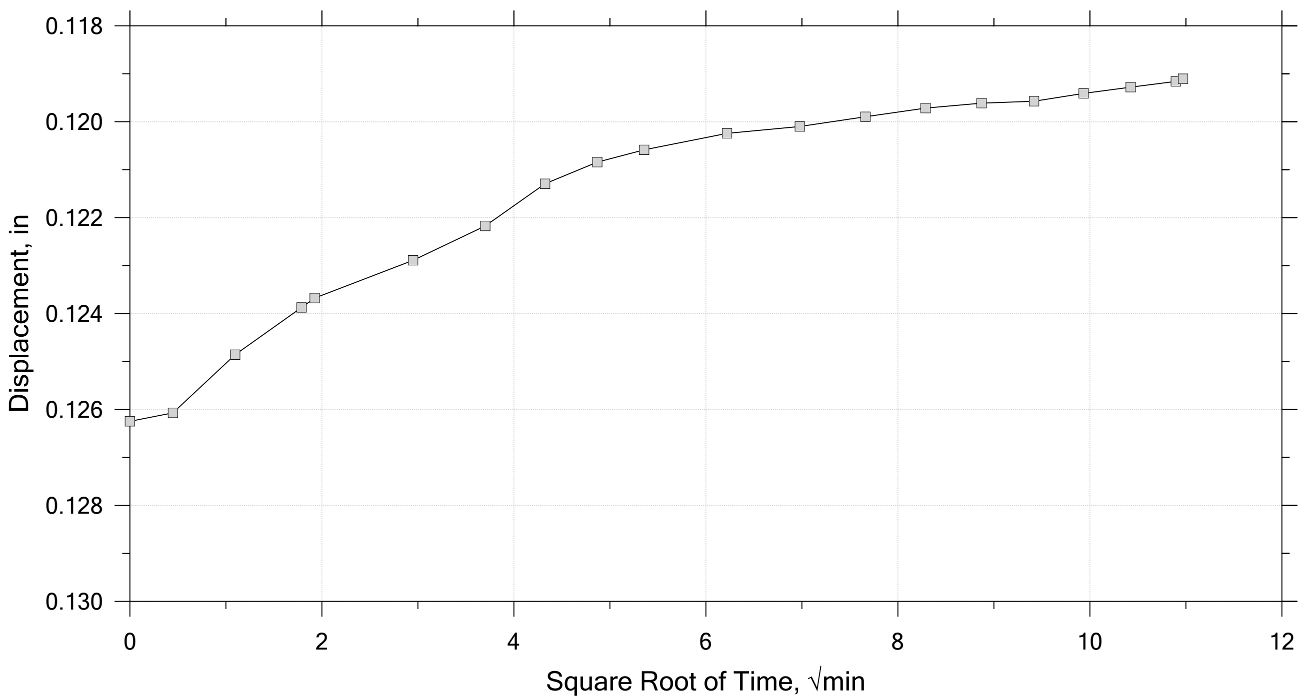
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 20

Constant Load Step

Stress: 442 psf

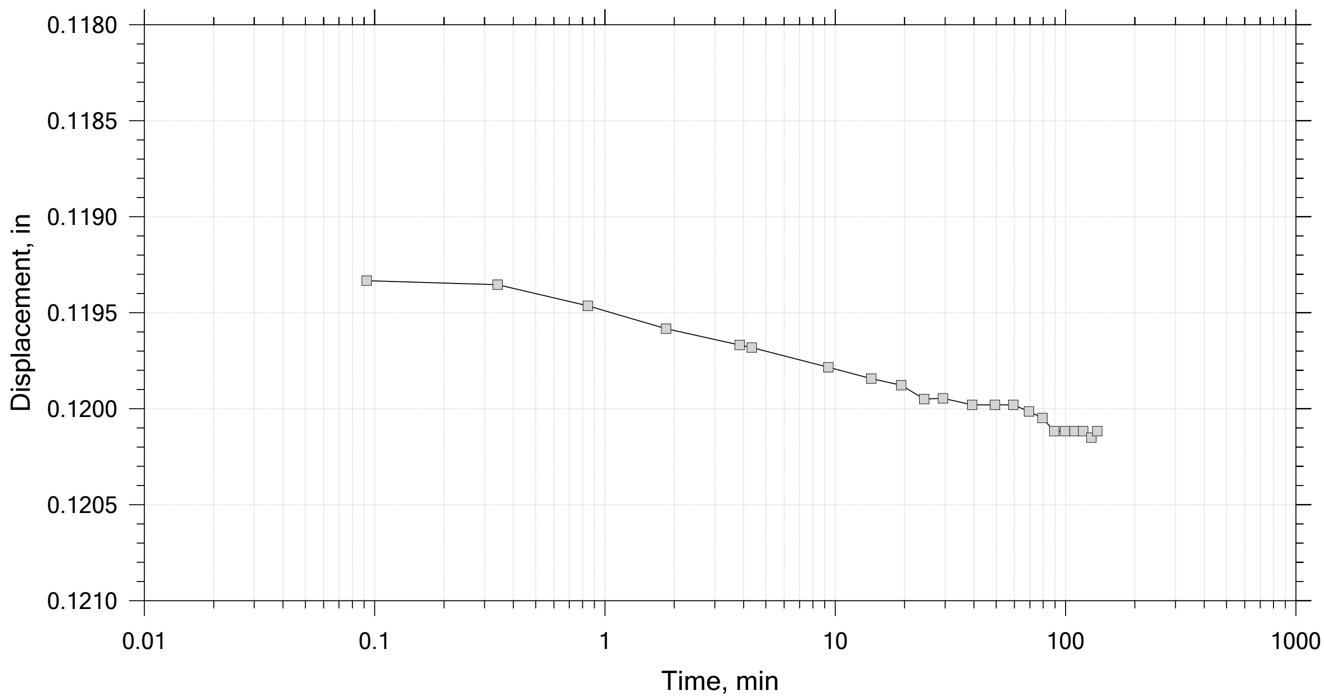


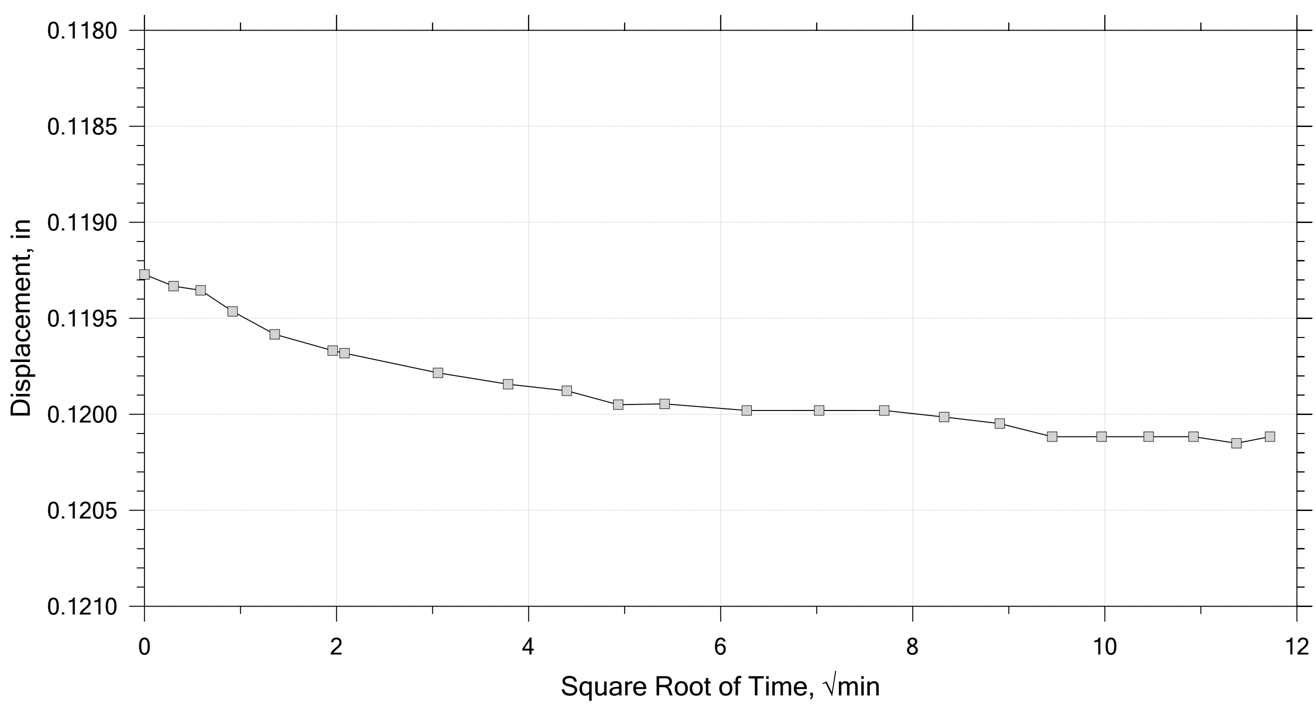


Soil Metrics LLC			
	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 20
Constant Load Step
Stress: 884 psf

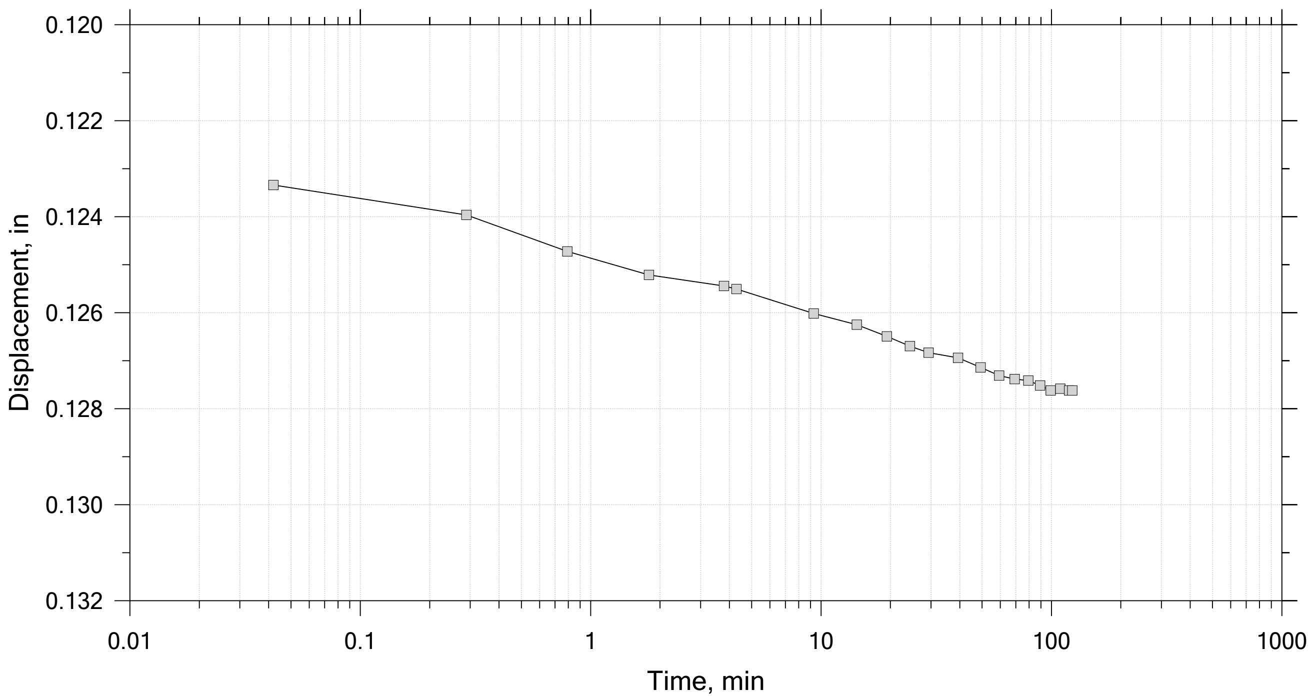


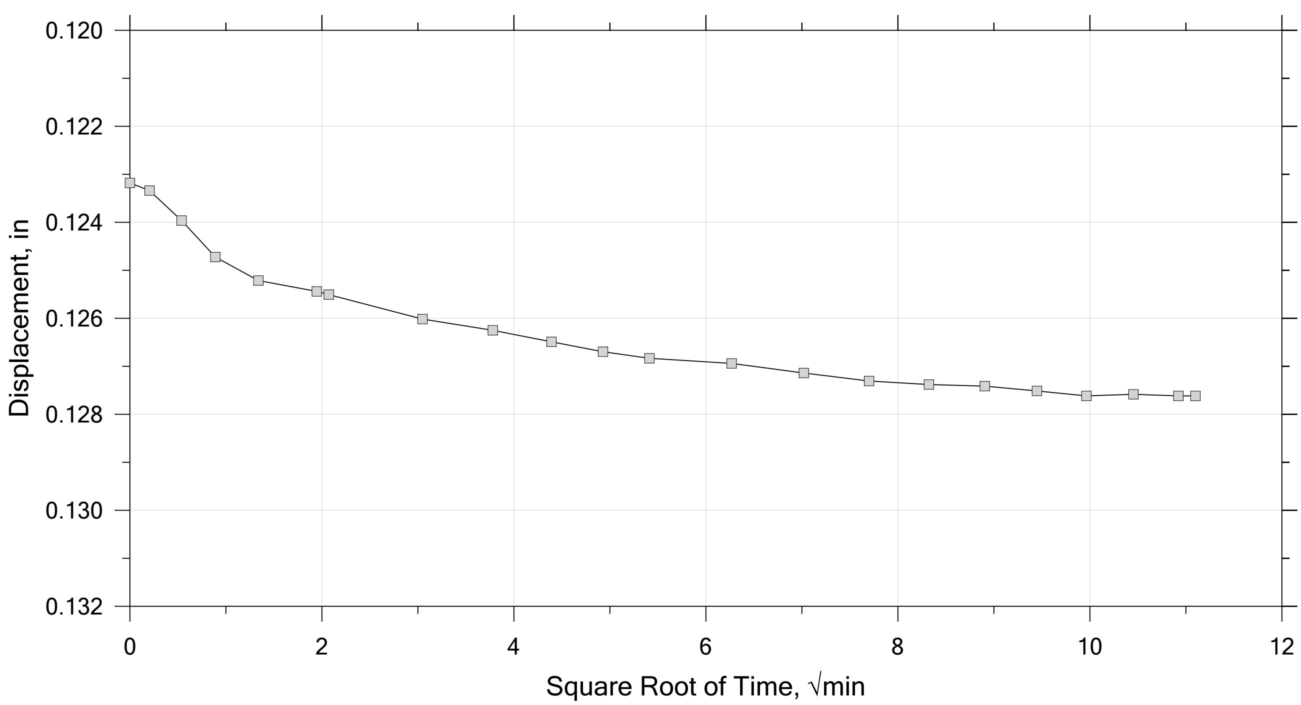


Soil Metrics LLC			
	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 20
Constant Load Step
Stress: 1.77e+03 psf

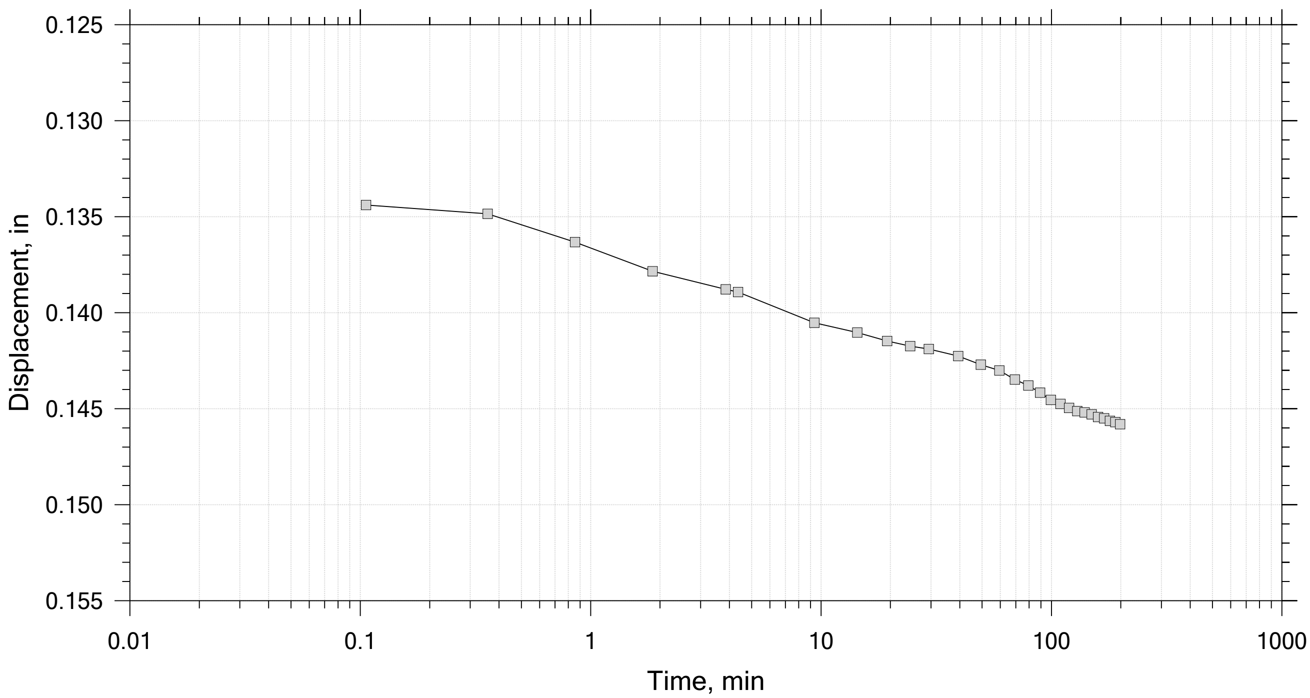


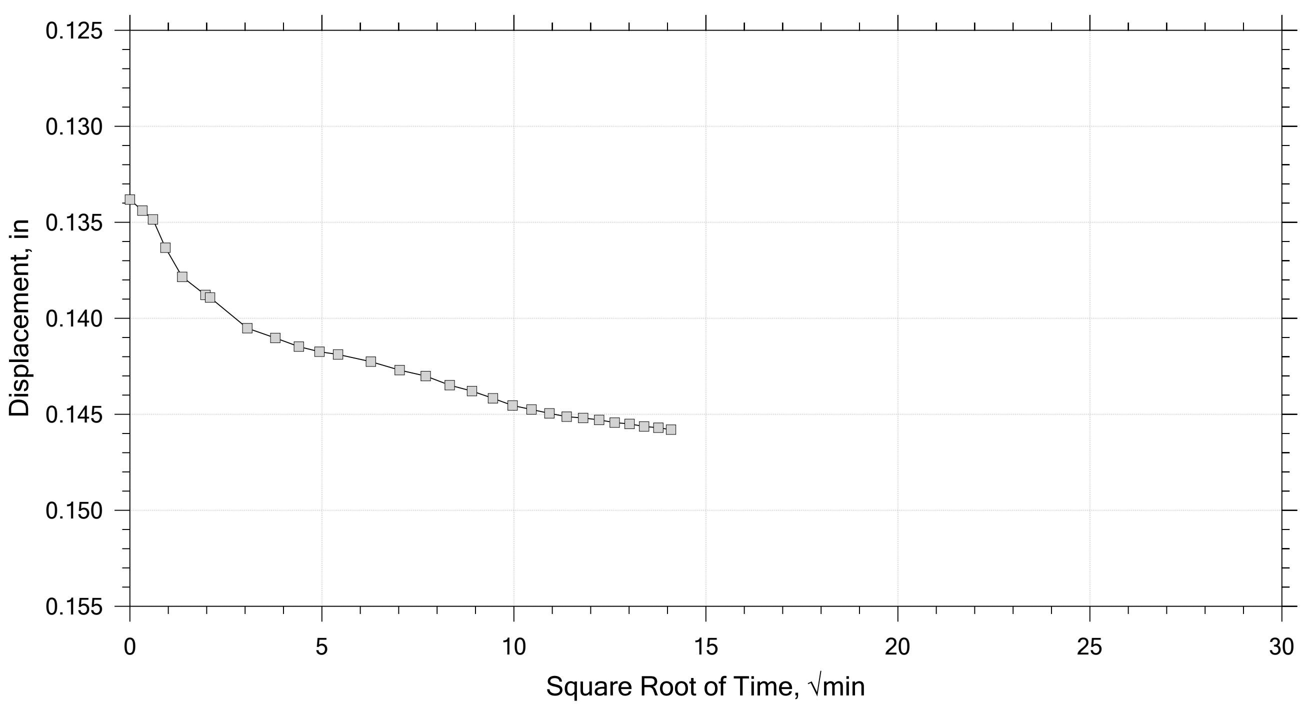


Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 20
Constant Load Step
Stress: 3.54e+03 psf

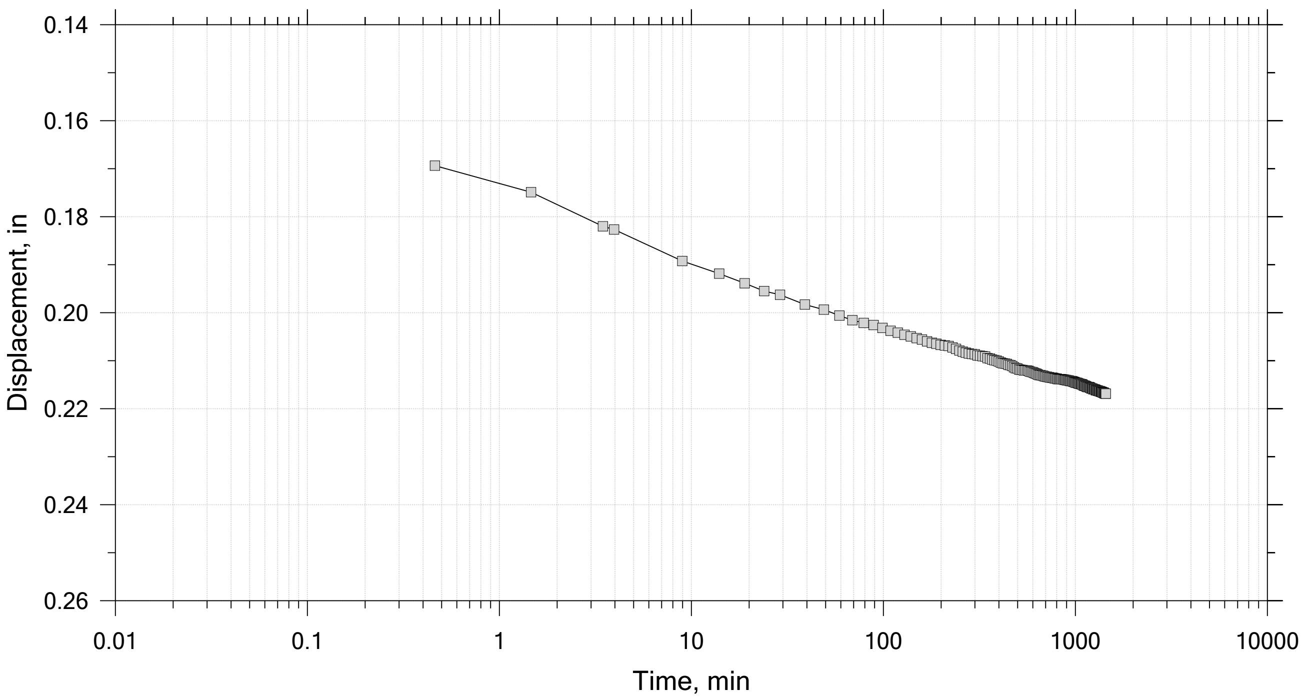


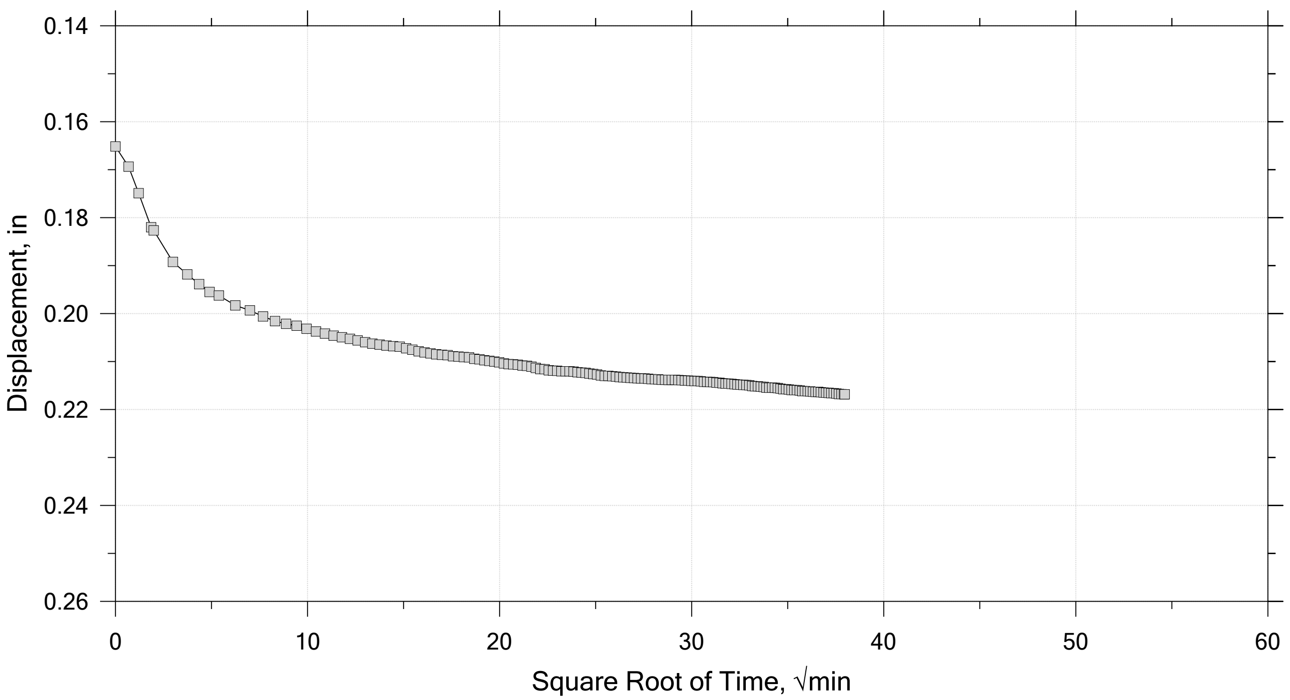


Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 20
Constant Load Step
Stress: 7.07e+03 psf

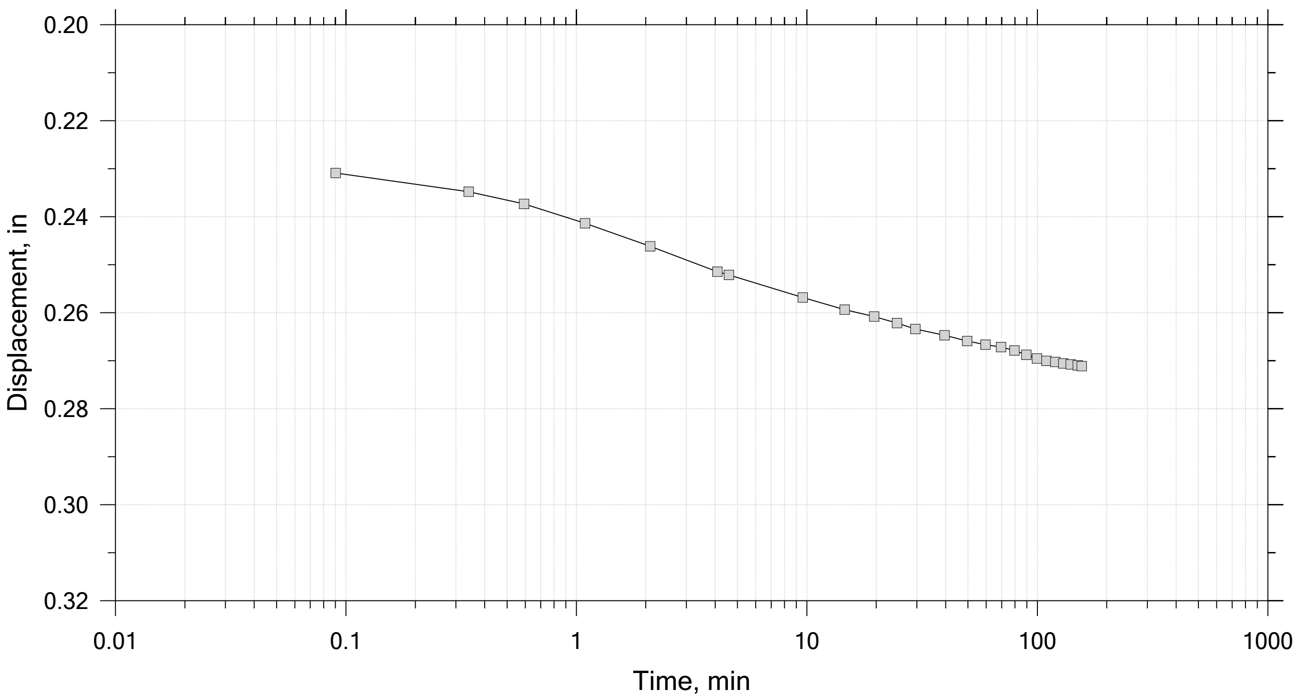


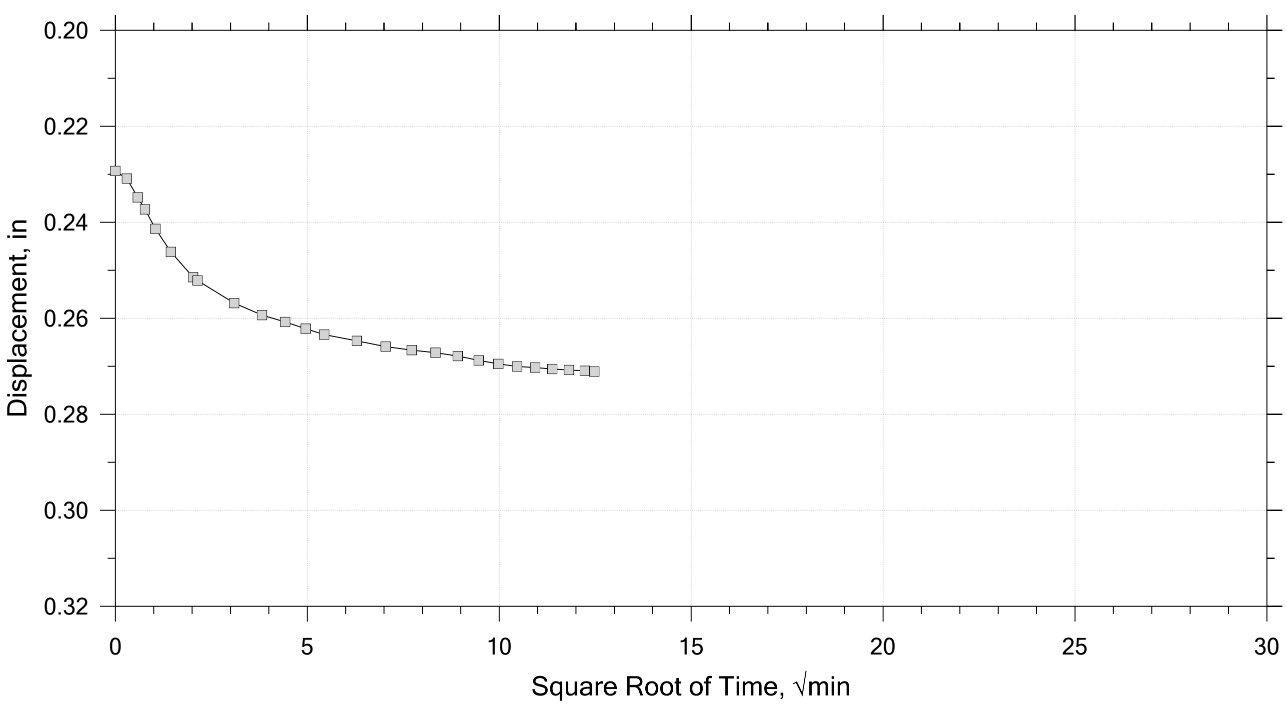


Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 16 of 20
Constant Load Step
Stress: 1.41e+04 psf





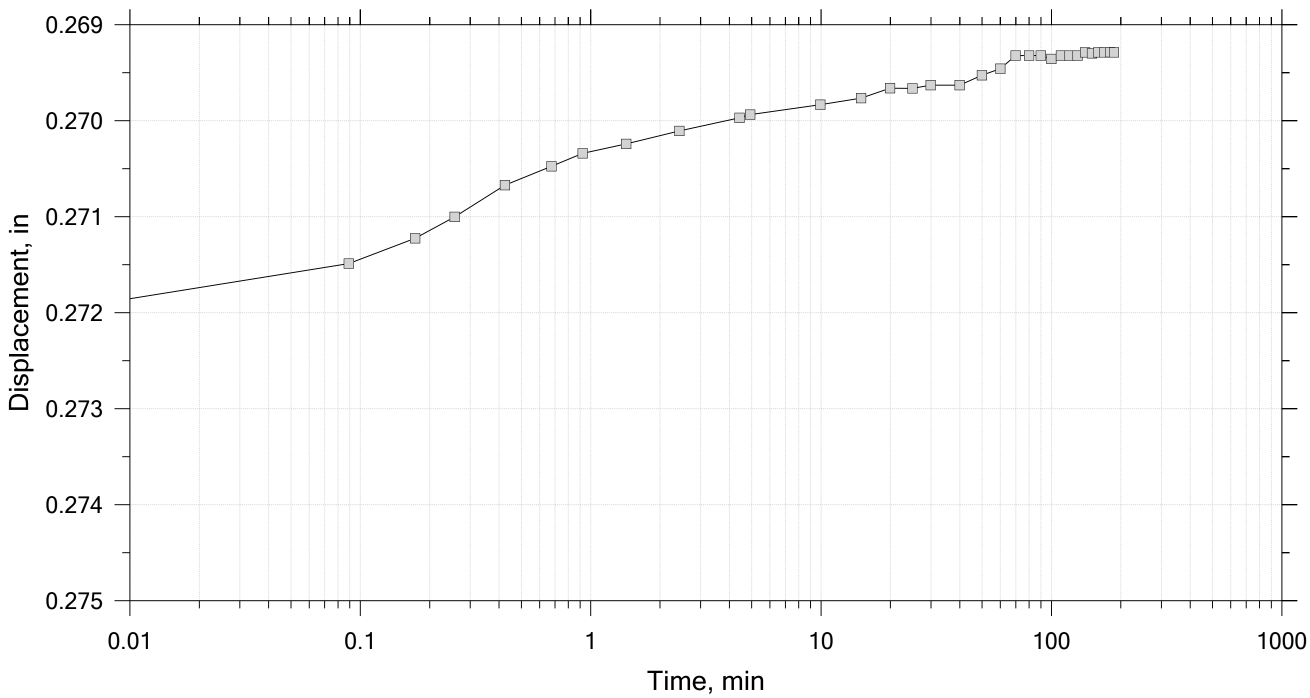
Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

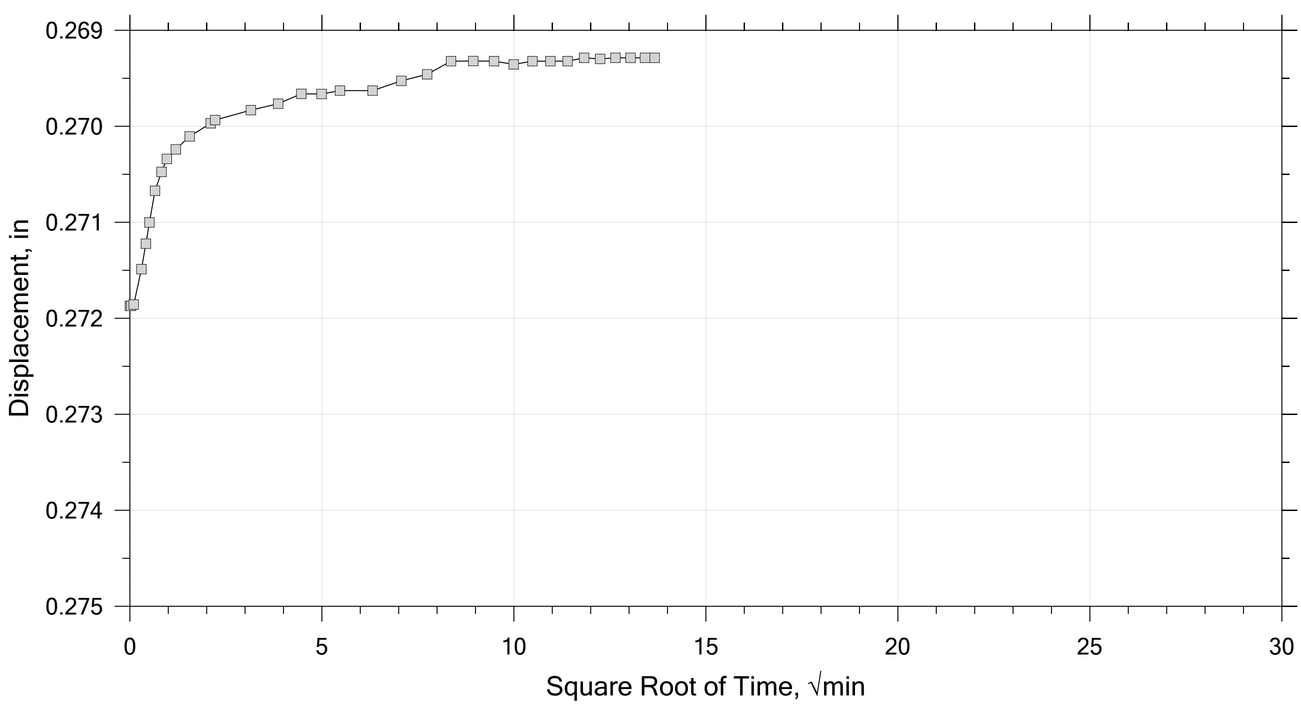
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 17 of 20

Constant Load Step

Stress: 7.07e+03 psf

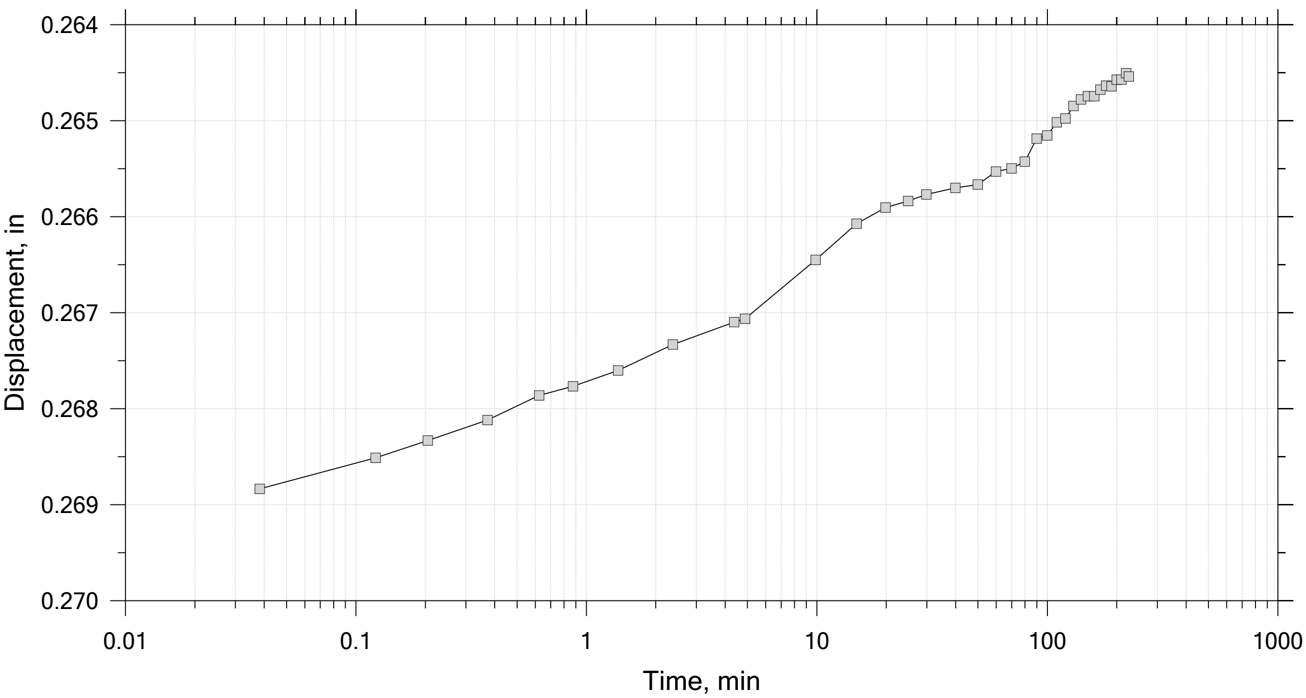


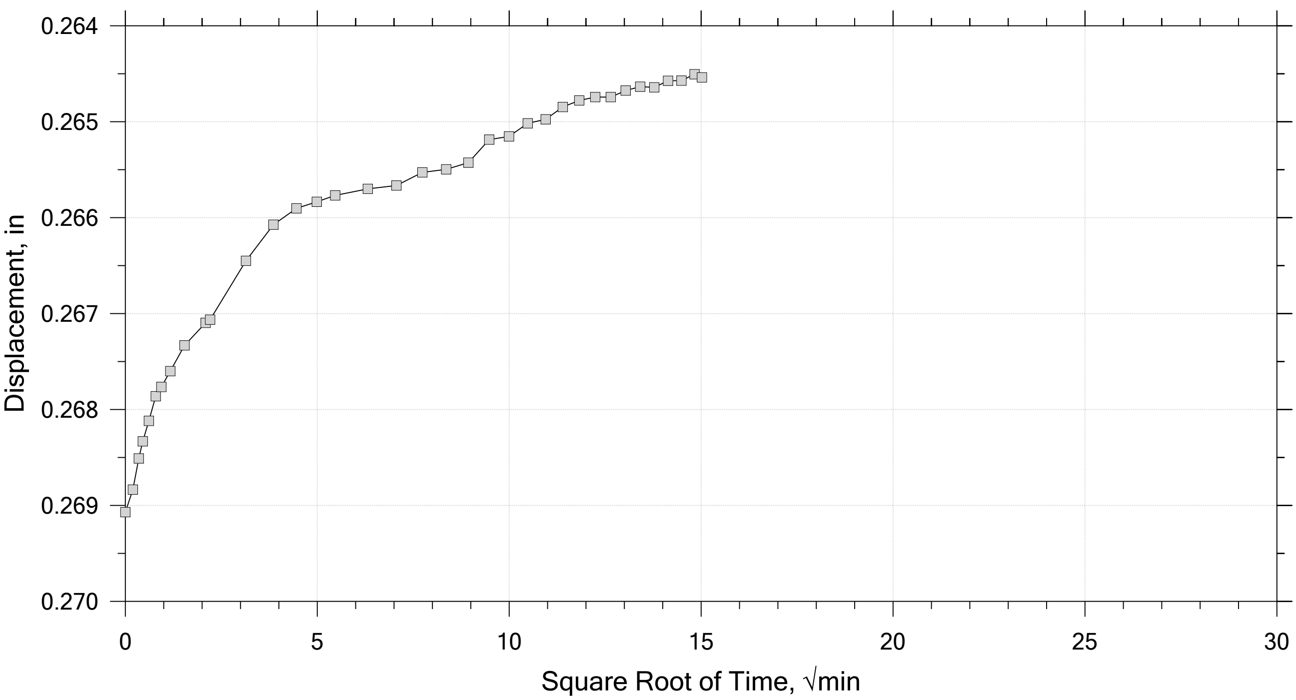


Soil Metrics LLC			
	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 18 of 20
Constant Load Step
Stress: 3.54e+03 psf

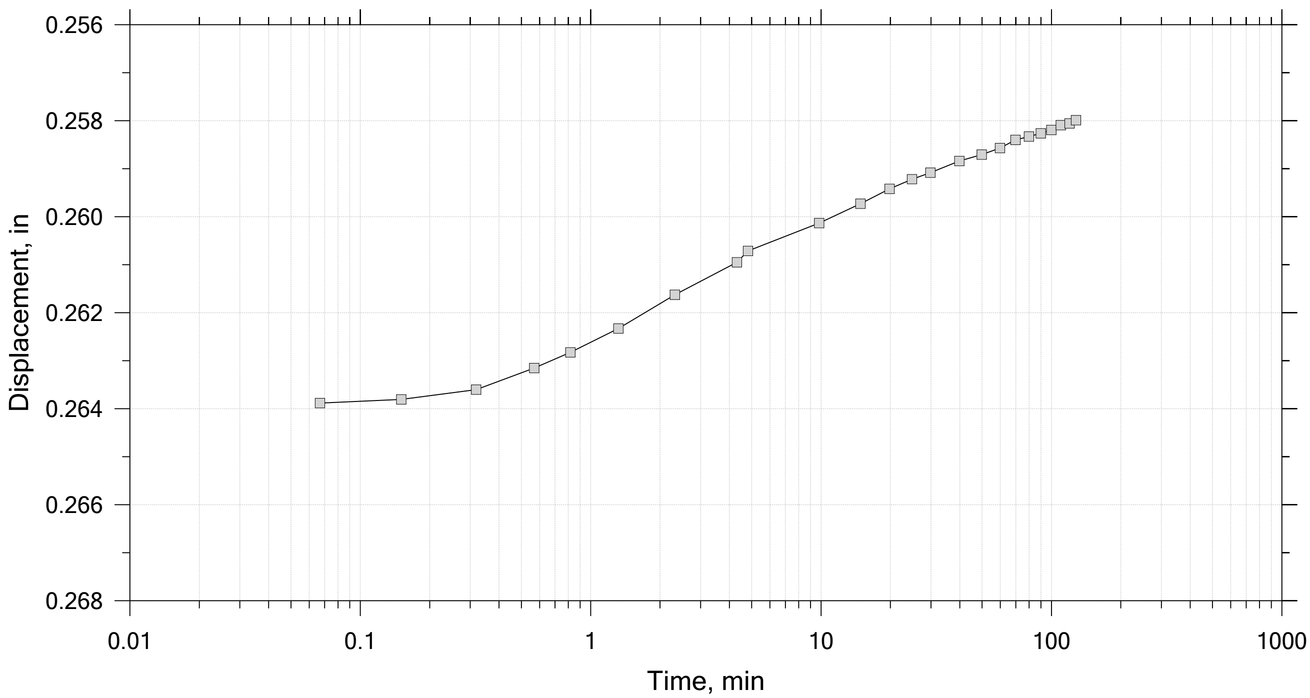


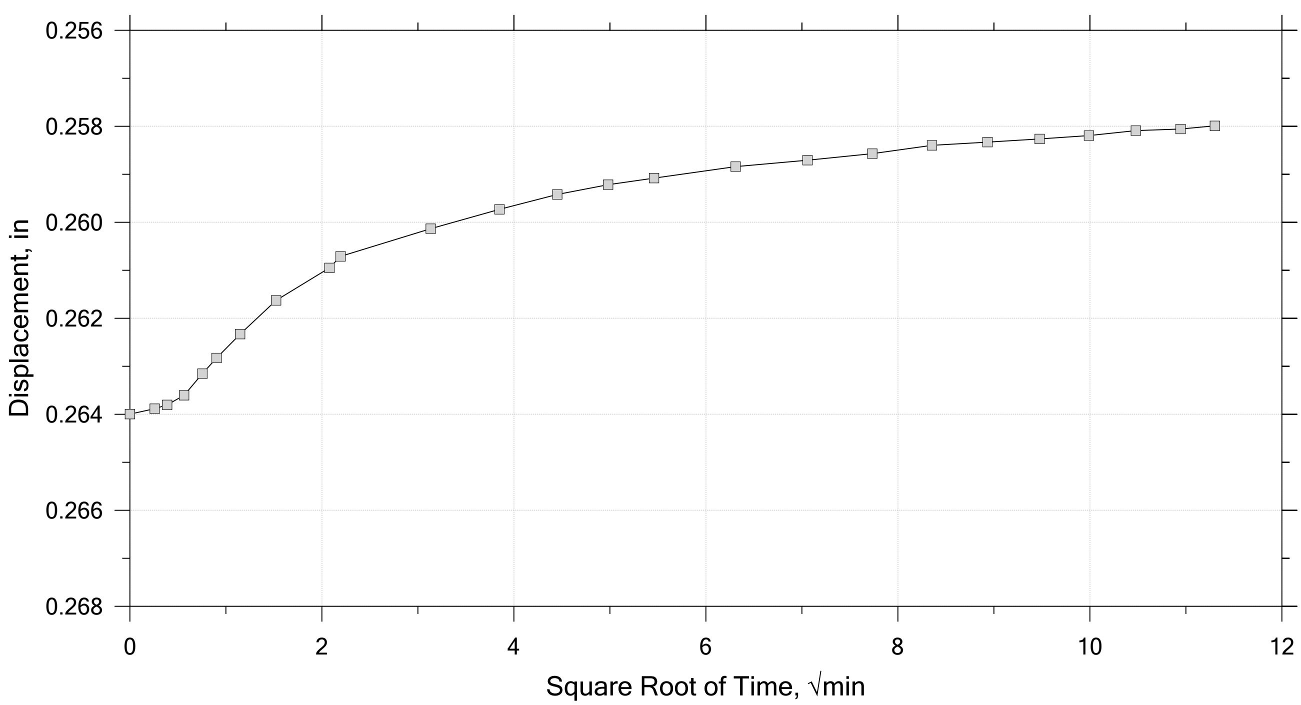


Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 19 of 20
Constant Load Step
Stress: 1.77e+03 psf

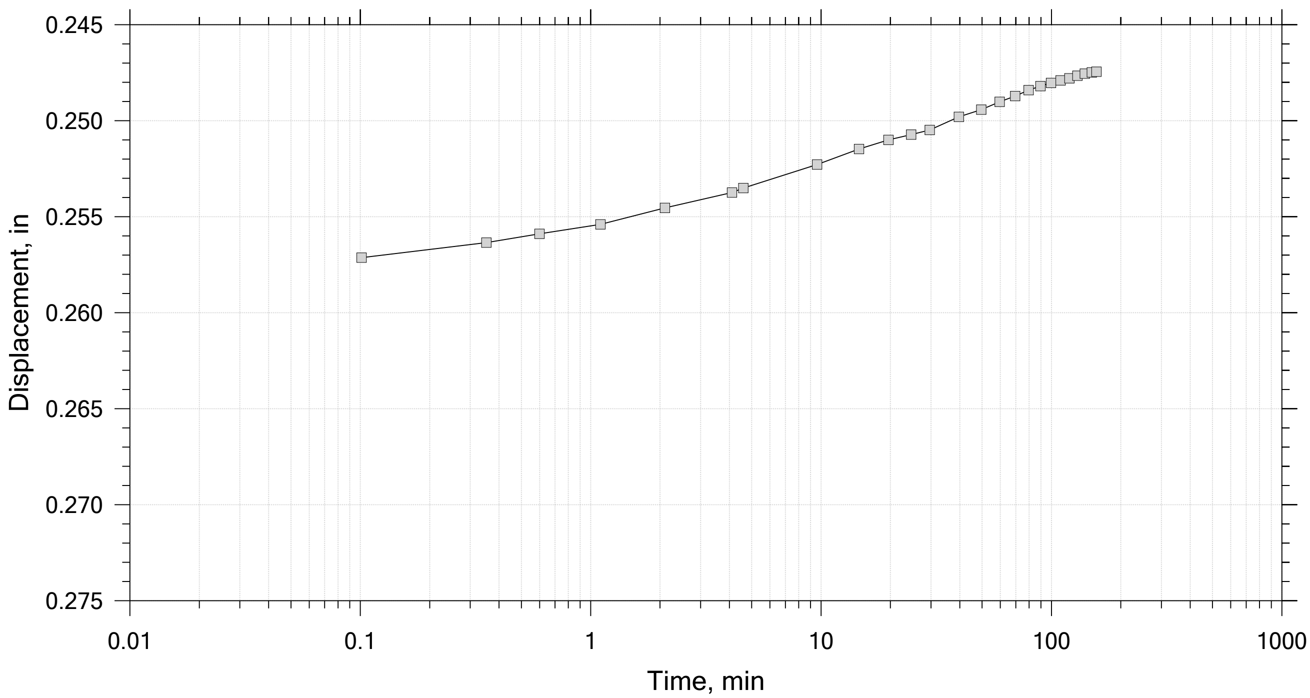


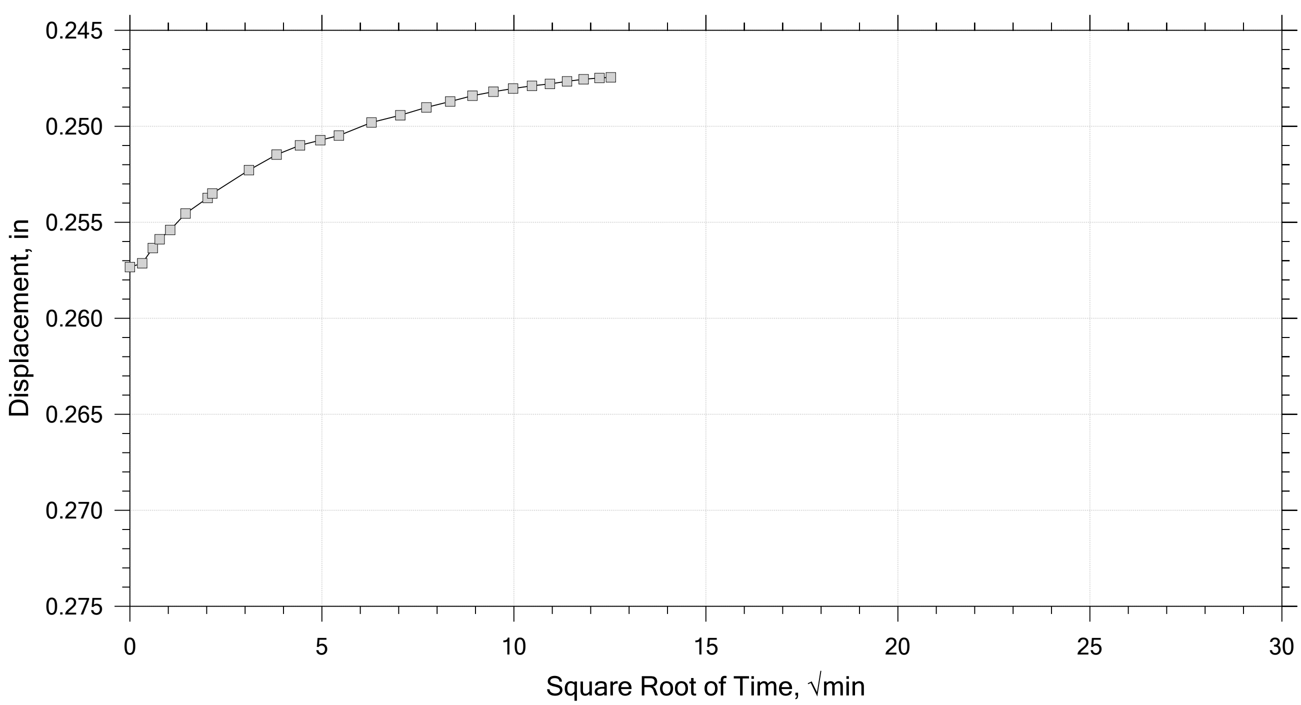


Soil Metrics LLC	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 20 of 20
Constant Load Step
Stress: 884 psf





Soil Metrics LLC			
	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter: 2.50 in	Implied Specific Gravity: 2.92	Liquid Limit: 71
Initial Height: 1.00 in	Initial Void Ratio: 2.27	Plastic Limit: 61
Final Height: 0.75 in	Final Void Ratio: 1.46	Plasticity Index: 10

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	208	RING	"ring"	310
Mass Container, gm	36.9	109.53	109.53	60.35
Mass Container + Wet Soil, gm	130.42	232.76	217.38	168.11
Mass Container + Dry Soil, gm	92.14	181.42	181.42	132.18
Mass Dry Soil, gm	55.24	71.89	71.89	71.83
Water Content, %	69.30	71.41	50.02	50.02
Void Ratio	---	2.27	1.46	---
Degree of Saturation, %	---	91.90	100.00	---
Dry Unit Weight, pcf	---	55.737	74.04	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Soil Metrics LLC			
	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Log of Time Coefficients

Step	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/day	Mv 1/psf	k ft/day	Ca %
1	207.	0.01566	2.21	1.56	0.000	0.00e+00	7.56e-05	0.00e+00	0.00e+00
2	311.	0.02262	2.19	2.26	0.000	0.00e+00	6.69e-05	0.00e+00	0.00e+00
3	466.	0.03065	2.17	3.06	0.000	0.00e+00	5.17e-05	0.00e+00	0.00e+00
4	699.	0.03991	2.14	3.99	0.000	0.00e+00	3.97e-05	0.00e+00	0.00e+00
5	1.05e+03	0.05283	2.09	5.28	0.000	0.00e+00	3.70e-05	0.00e+00	0.00e+00
6	1.57e+03	0.07060	2.04	7.05	0.000	0.00e+00	3.39e-05	0.00e+00	0.00e+00
7	2.36e+03	0.09644	1.95	9.63	0.000	0.00e+00	3.28e-05	0.00e+00	0.00e+00
8	3.54e+03	0.1349	1.83	13.5	0.000	0.00e+00	3.26e-05	0.00e+00	0.00e+00
9	1.77e+03	0.1348	1.83	13.5	0.000	0.00e+00	8.42e-08	0.00e+00	0.00e+00
10	884.	0.1293	1.84	12.9	0.000	0.00e+00	6.15e-06	0.00e+00	0.00e+00
11	442.	0.1195	1.88	11.9	10.072	3.76e-02	2.23e-05	5.24e-05	0.00e+00
12	884.	0.1201	1.87	12.0	0.000	0.00e+00	1.47e-06	0.00e+00	0.00e+00
13	1.77e+03	0.1274	1.85	12.7	0.000	0.00e+00	8.21e-06	0.00e+00	0.00e+00
14	3.54e+03	0.1458	1.79	14.6	0.000	0.00e+00	1.04e-05	0.00e+00	0.00e+00
15	7.07e+03	0.2119	1.57	21.2	0.000	0.00e+00	1.87e-05	0.00e+00	0.00e+00
16	1.41e+04	0.2642	1.40	26.4	0.000	0.00e+00	7.39e-06	0.00e+00	0.00e+00
17	7.07e+03	0.2699	1.39	27.0	0.000	0.00e+00	-8.02e-07	-0.00e+00	0.00e+00
18	3.54e+03	0.2656	1.40	26.5	0.000	0.00e+00	1.21e-06	0.00e+00	0.00e+00
19	1.77e+03	0.2588	1.42	25.9	0.000	0.00e+00	3.85e-06	0.00e+00	0.00e+00
20	884.	0.2485	1.46	24.8	0.000	0.00e+00	1.17e-05	0.00e+00	0.00e+00

Soil Metrics LLC			
	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B

Square Root of Time Coefficients

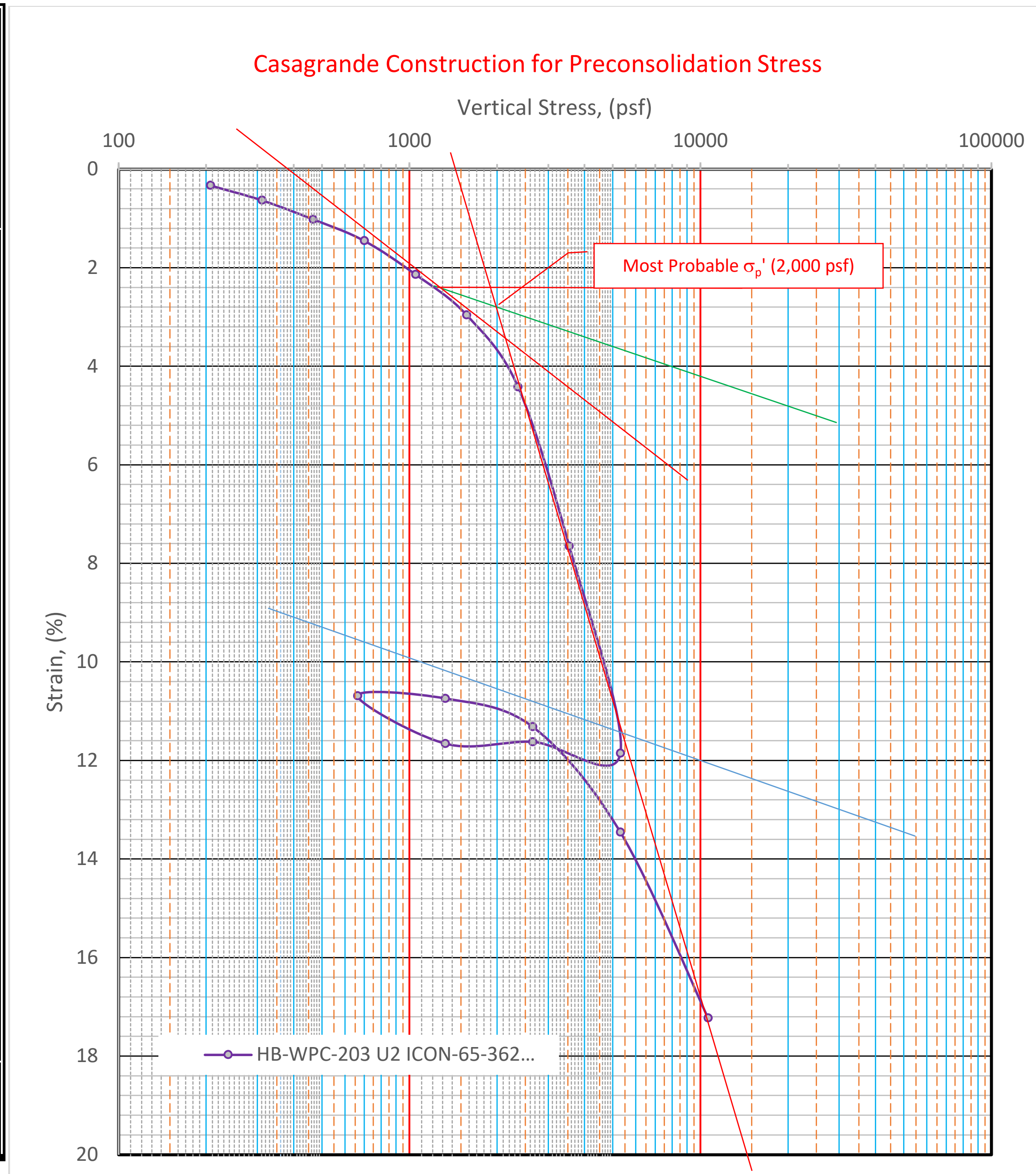
Step	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv ft²/day	Mv 1/psf	k ft/day
1	207.	0.01566	2.21	1.56	82.074	2.55e-02	7.56e-05	1.20e-04
2	311.	0.02262	2.19	2.26	90.838	2.25e-02	6.69e-05	9.39e-05
3	466.	0.03065	2.17	3.06	92.244	2.18e-02	5.17e-05	7.05e-05
4	699.	0.03991	2.14	3.99	0.000	0.00e+00	3.97e-05	0.00e+00
5	1.05e+03	0.05283	2.09	5.28	142.482	1.36e-02	3.70e-05	3.13e-05
6	1.57e+03	0.07060	2.04	7.05	67.529	2.77e-02	3.39e-05	5.86e-05
7	2.36e+03	0.09644	1.95	9.63	45.016	3.96e-02	3.28e-05	8.13e-05
8	3.54e+03	0.1349	1.83	13.5	69.164	2.40e-02	3.26e-05	4.89e-05
9	1.77e+03	0.1348	1.83	13.5	148.060	1.07e-02	8.42e-08	5.65e-08
10	884.	0.1293	1.84	12.9	23.131	6.92e-02	6.15e-06	2.66e-05
11	442.	0.1195	1.88	11.9	42.271	3.85e-02	2.23e-05	5.37e-05
12	884.	0.1201	1.87	12.0	127.002	1.30e-02	1.47e-06	1.19e-06
13	1.77e+03	0.1274	1.85	12.7	31.029	5.26e-02	8.21e-06	2.70e-05
14	3.54e+03	0.1458	1.79	14.6	182.141	8.70e-03	1.04e-05	5.65e-06
15	7.07e+03	0.2119	1.57	21.2	231.869	6.18e-03	1.87e-05	7.20e-06
16	1.41e+04	0.2642	1.40	26.4	15.984	7.72e-02	7.39e-06	3.56e-05
17	7.07e+03	0.2699	1.39	27.0	2.779	4.11e-01	-8.02e-07	-2.06e-05
18	3.54e+03	0.2656	1.40	26.5	23.495	4.85e-02	1.21e-06	3.66e-06
19	1.77e+03	0.2588	1.42	25.9	18.547	6.24e-02	3.85e-06	1.50e-05
20	884.	0.2485	1.46	24.8	34.436	3.44e-02	1.17e-05	2.51e-05

Soil Metrics LLC			
	Project: Pleasant Cove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U1	Test Date: 5/02/2021	Depth: 14.85
	Test No.: ICONP-68-361	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		
	Displacement at End of Primary		

Consolidation Test Data
Summary Report

Project Name:	Pleasant Cove
Project Number:	166-21
Project Location:	Woolwich, ME
Client:	GZA
Sample Description:	Brown Organic Silt
Preparation:	Trimmed Shelby Tube

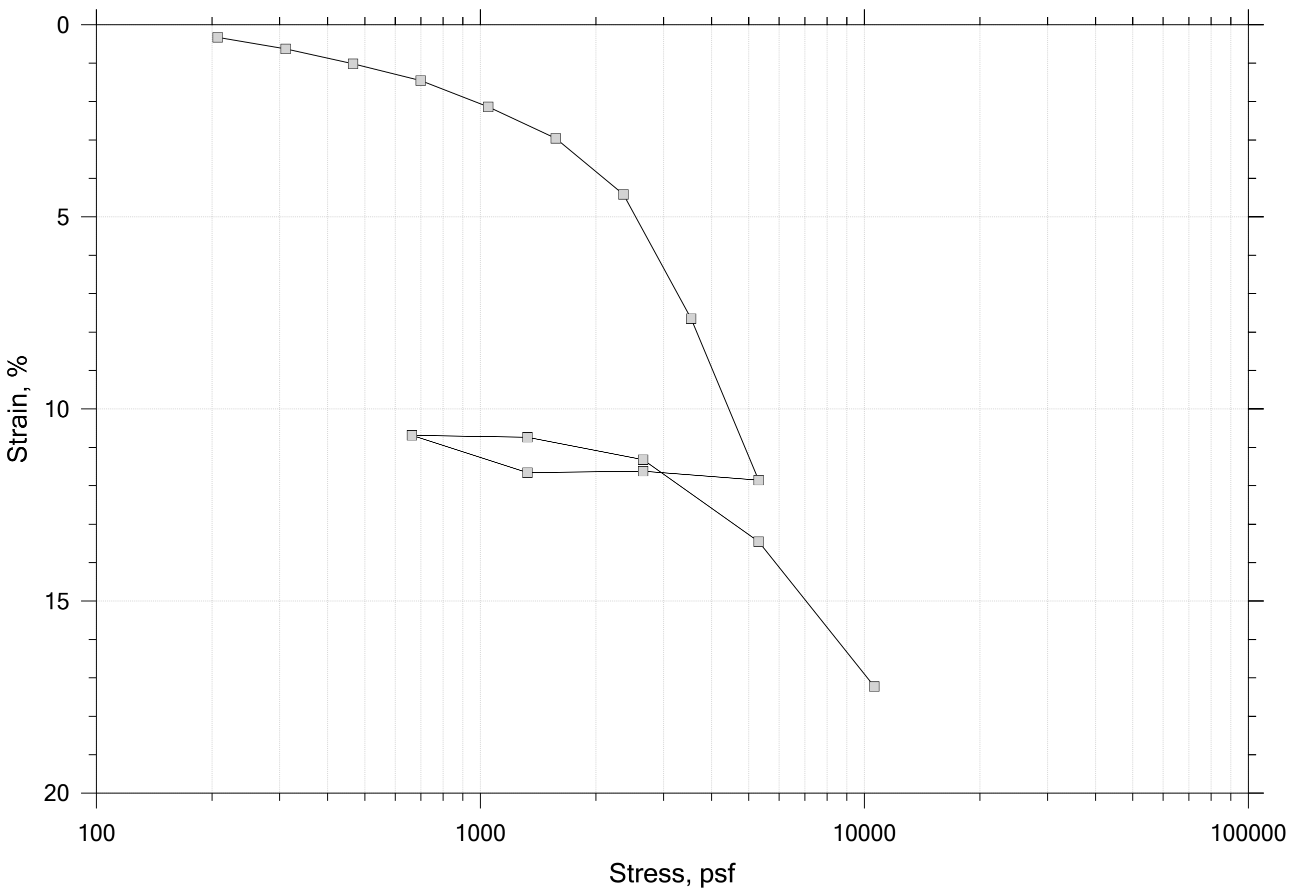
Lab Test No:	ICON 65-362			
Boring No.	HB-WPC-203			
Sample No:	U2			
Boring Elevation (ft).				
Sample Depth (ft):	29-31			
Test Specimen Depth (Ft):	30.8			
Test Specimen Elevation:				
Water Content (%):	66.5			
Dry Unit Weight (pcf):	58.1			
Wet Unit Weight (pcf):	96.7			
Saturation Before (%):	95.8			
Saturation After (%):	100			
Void Ratio Before:	1.95			
Void Ratio After:	1.44			
Overburden Pressure (psf):	--			
Max Previous stress (psf):	2,000			
Max Prev. stress (Work) (psf):	2,000			
OCR:	--			
Compression Index (C_{CE}):	0.2			
Recompression Index (C_{RE}):	0.022			
Liquid Limit:	75			
Plastic Limit:	57.4			
Plasticity Index:	17.6			
Liquidity Index:	0.52			
Specific Gravity (implied)	2.75			
Organic Content (%)	6.03			
Tested By:	sjr			
Date Tested:	5/12/2021			
Checked By:	sjr			

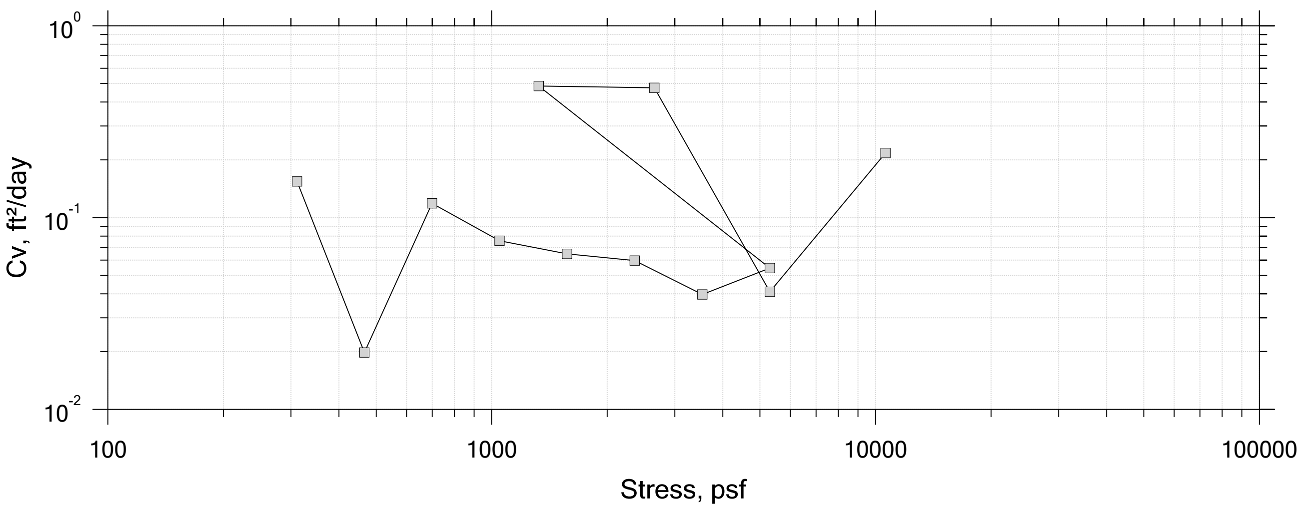


Soil Metrics LLC Geotechnical Engineering

One-Dimensional Consolidation by ASTM D2435 - Method B

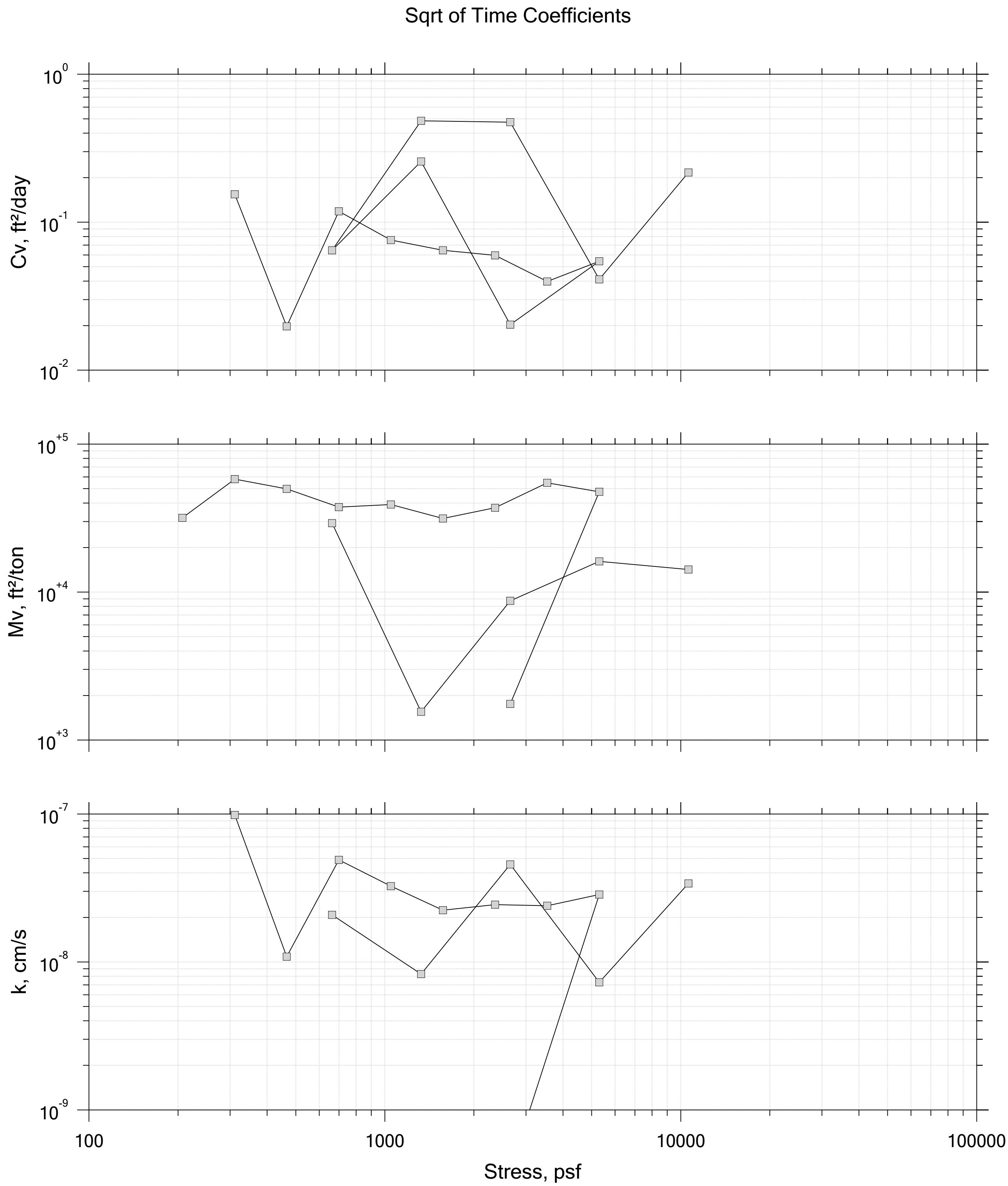
Summary Report





Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B



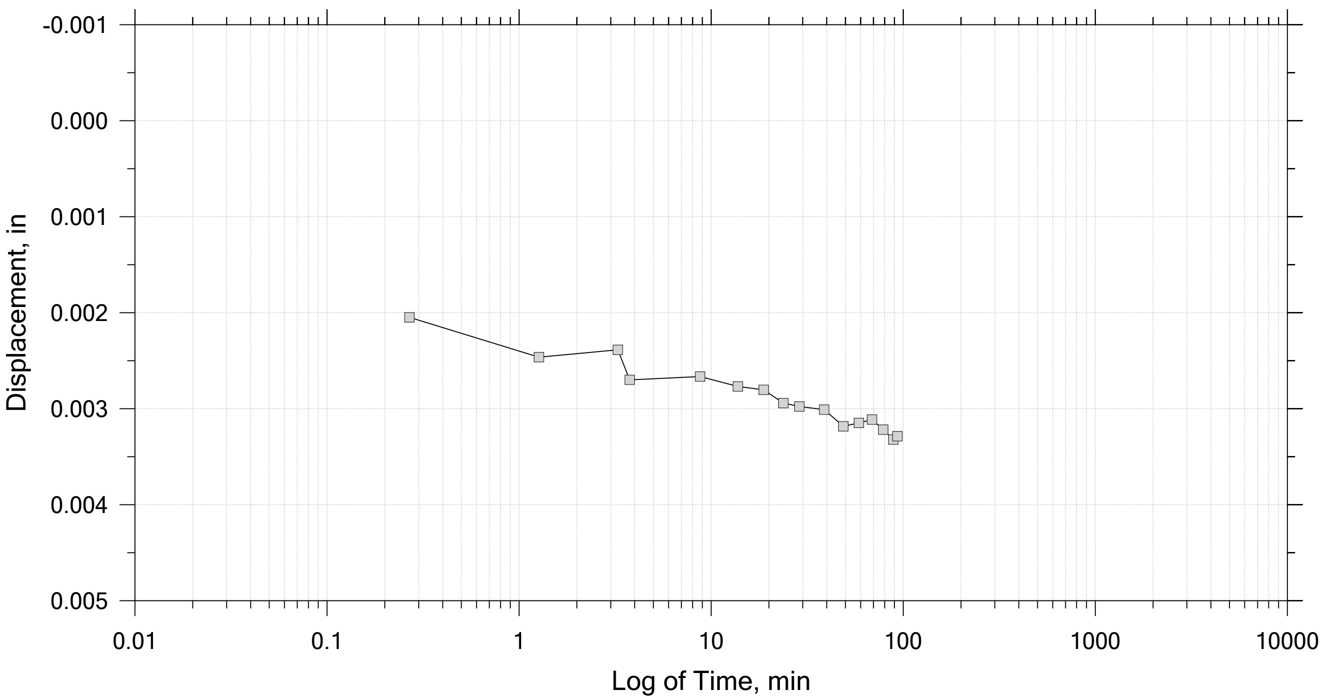
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

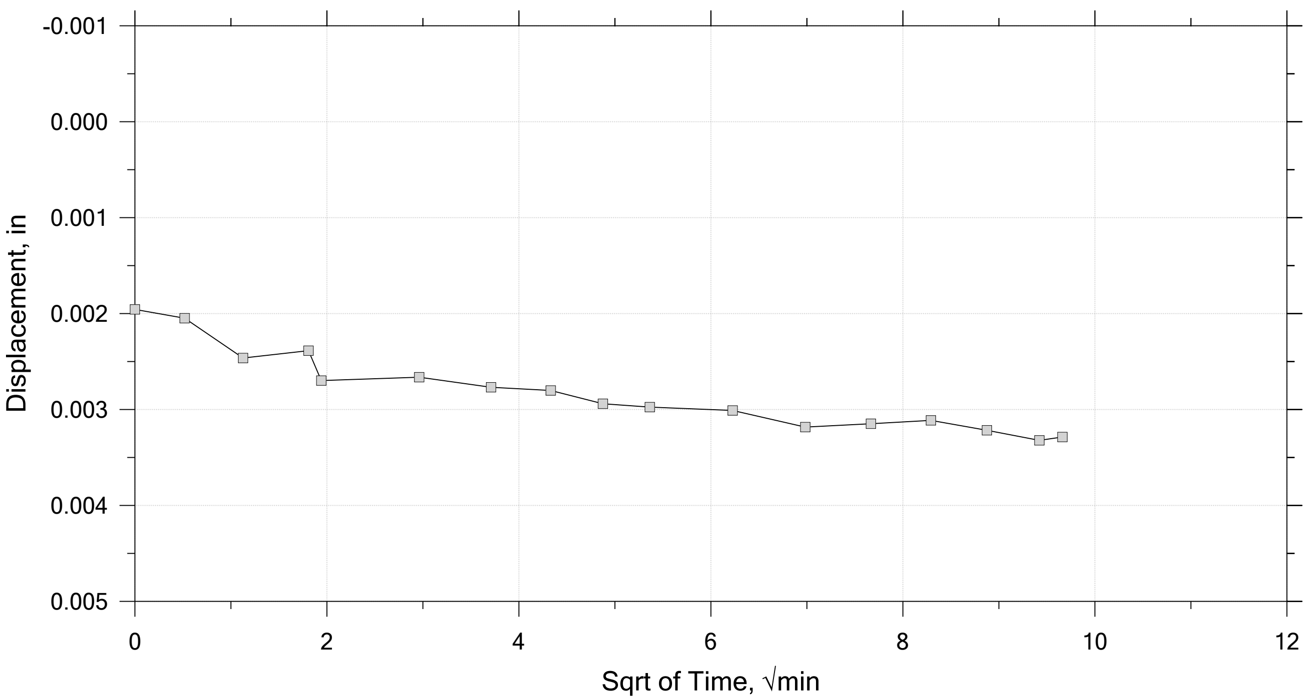
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 16

Constant Load Step

Stress: 207 psf





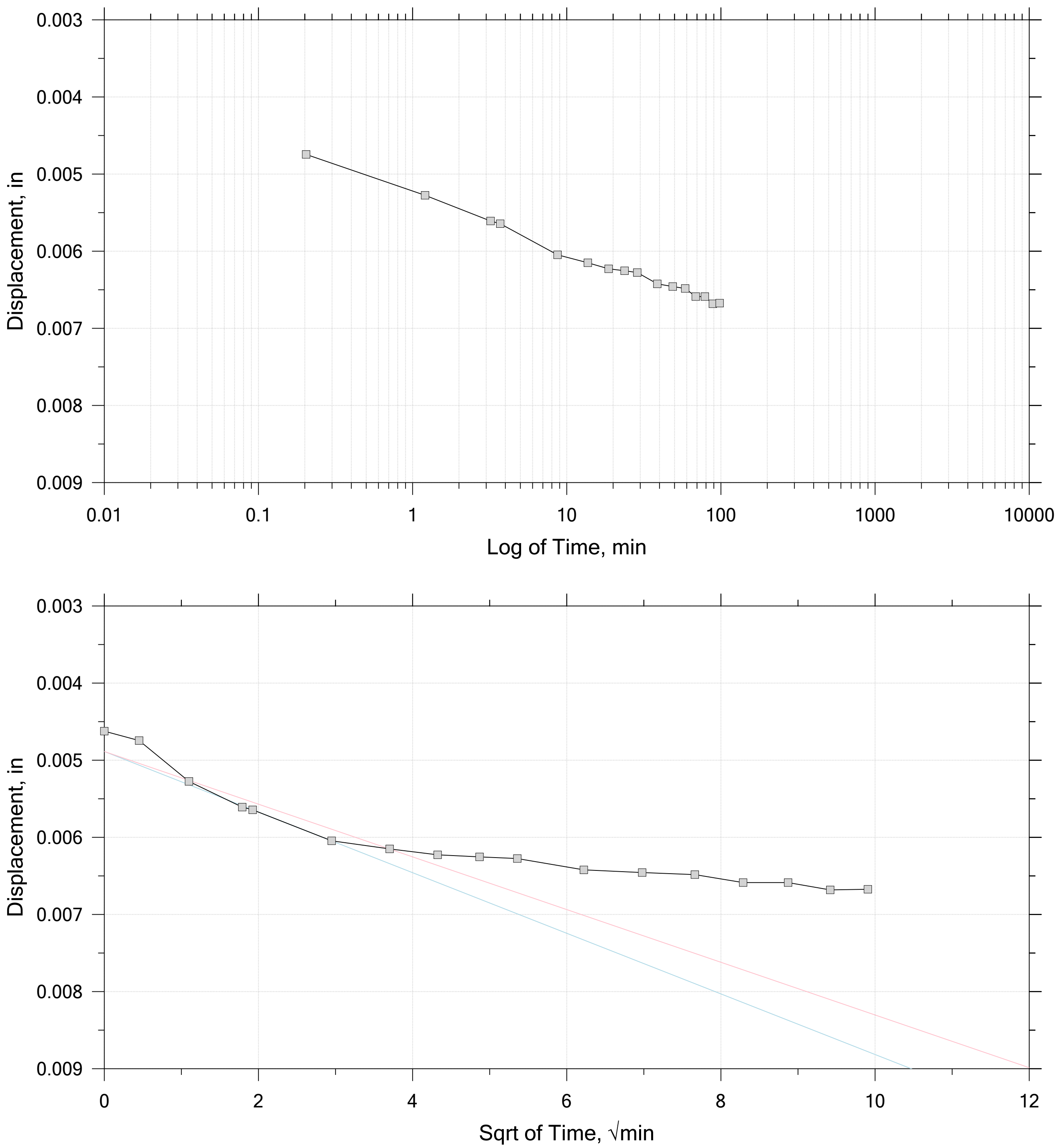
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 16

Constant Load Step

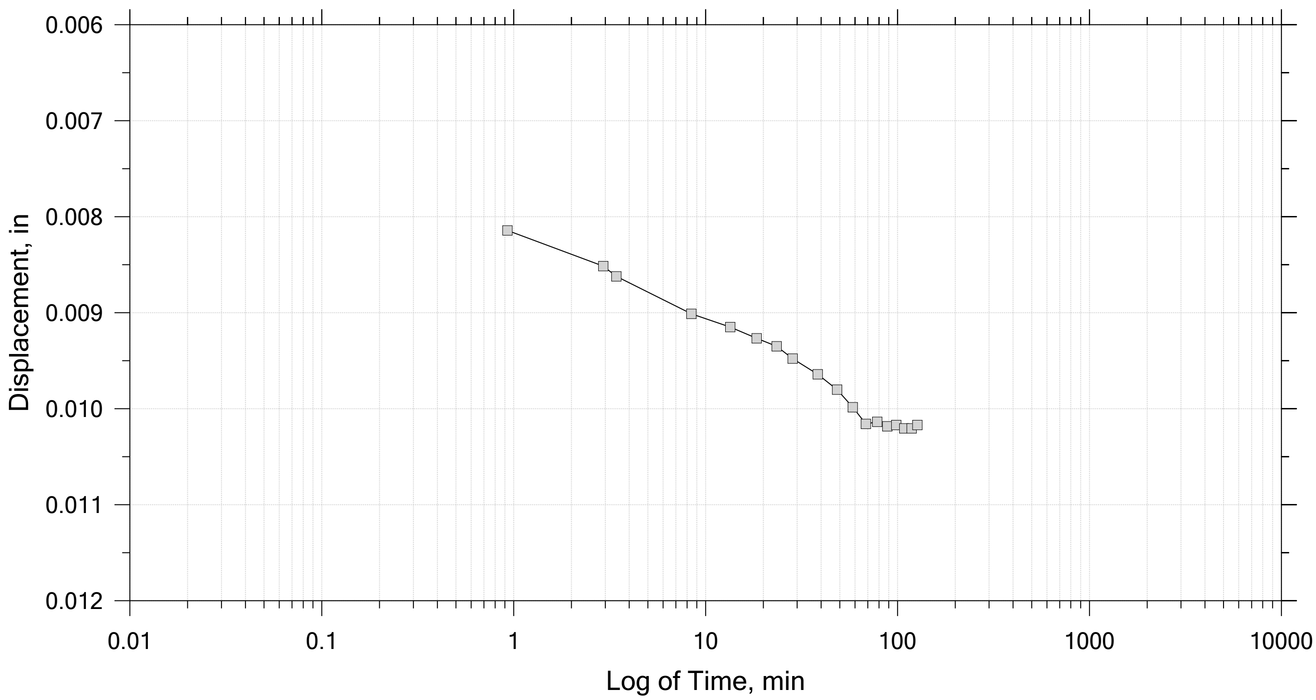
Stress: 311 psf

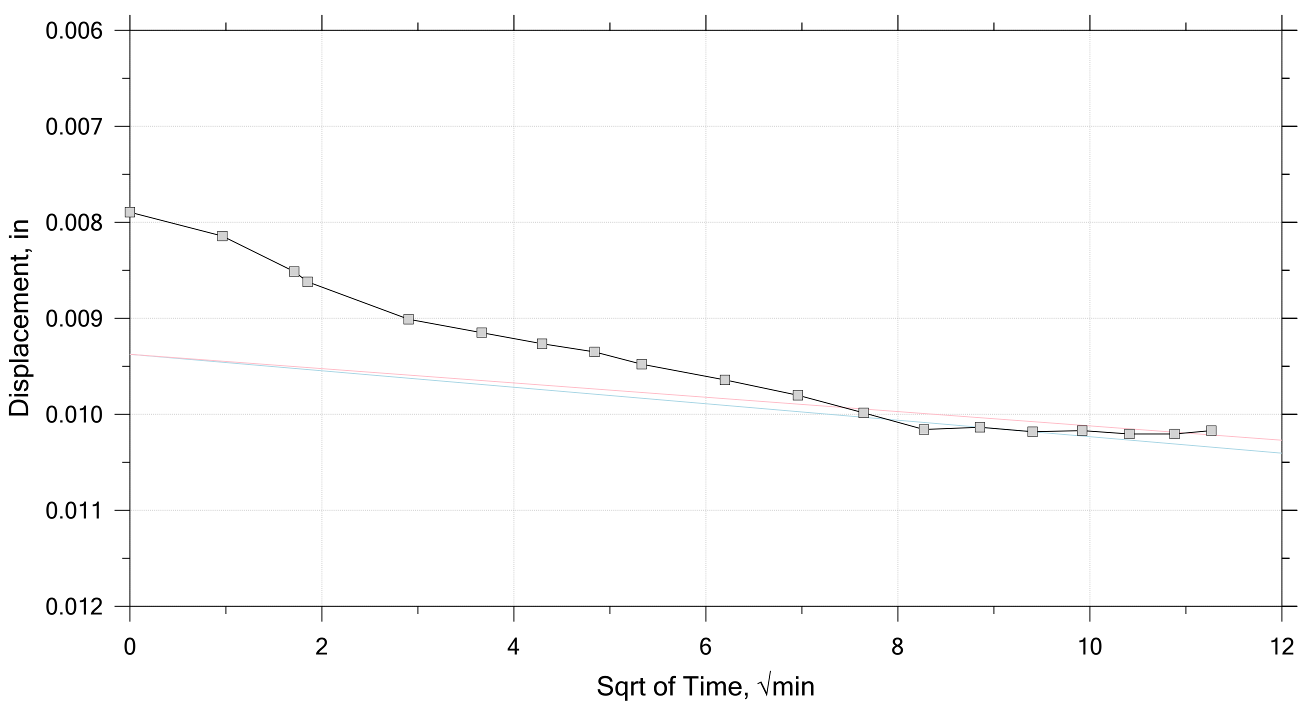


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 16
Constant Load Step
Stress: 466 psf





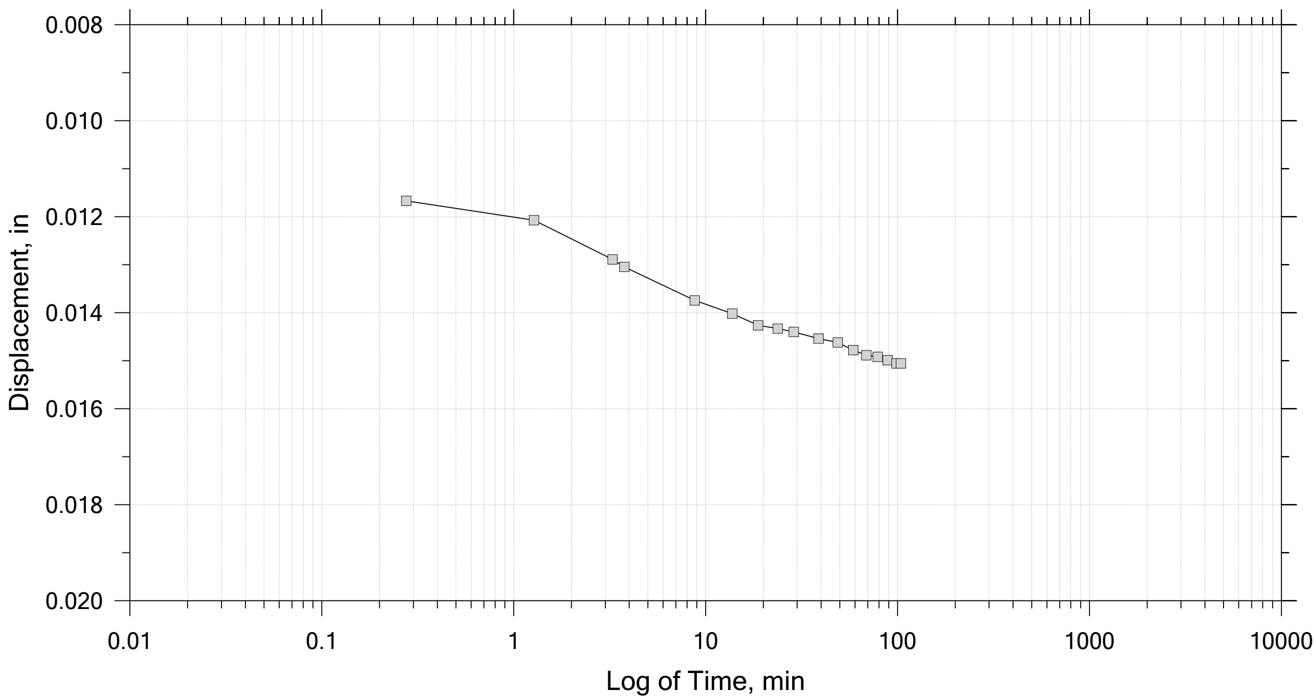
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

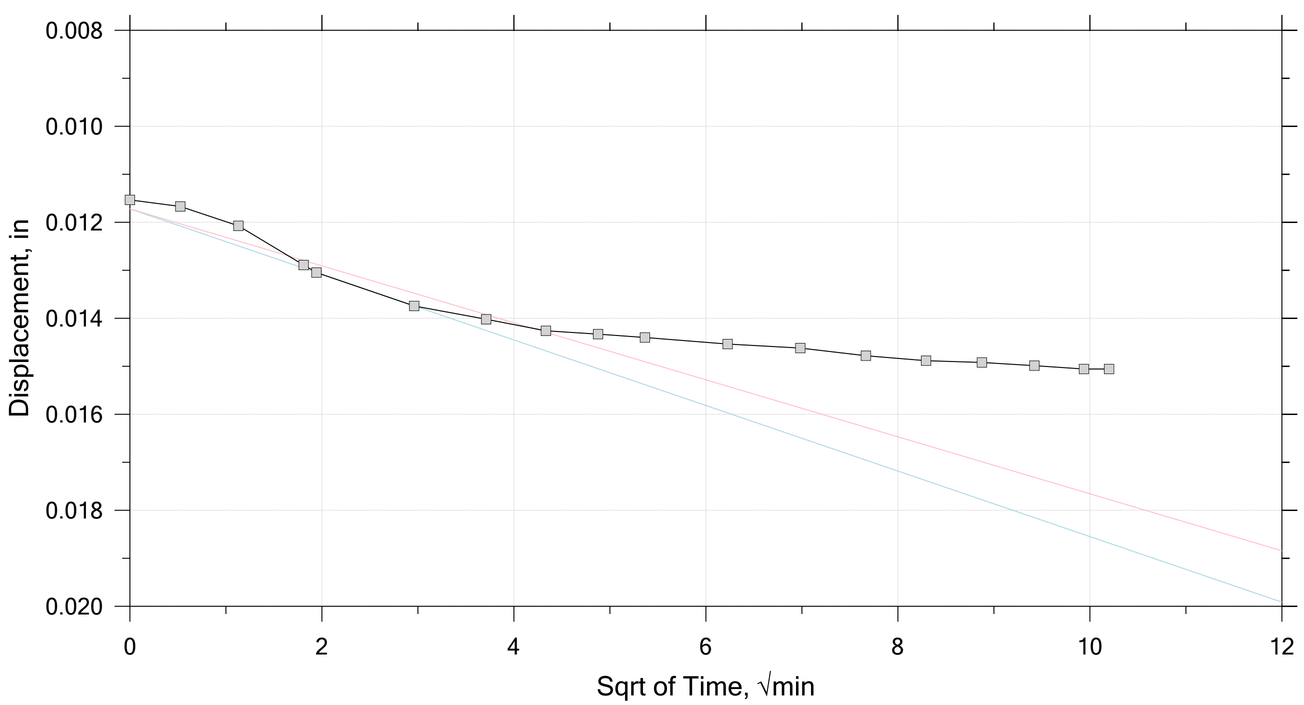
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 16

Constant Load Step

Stress: 699 psf

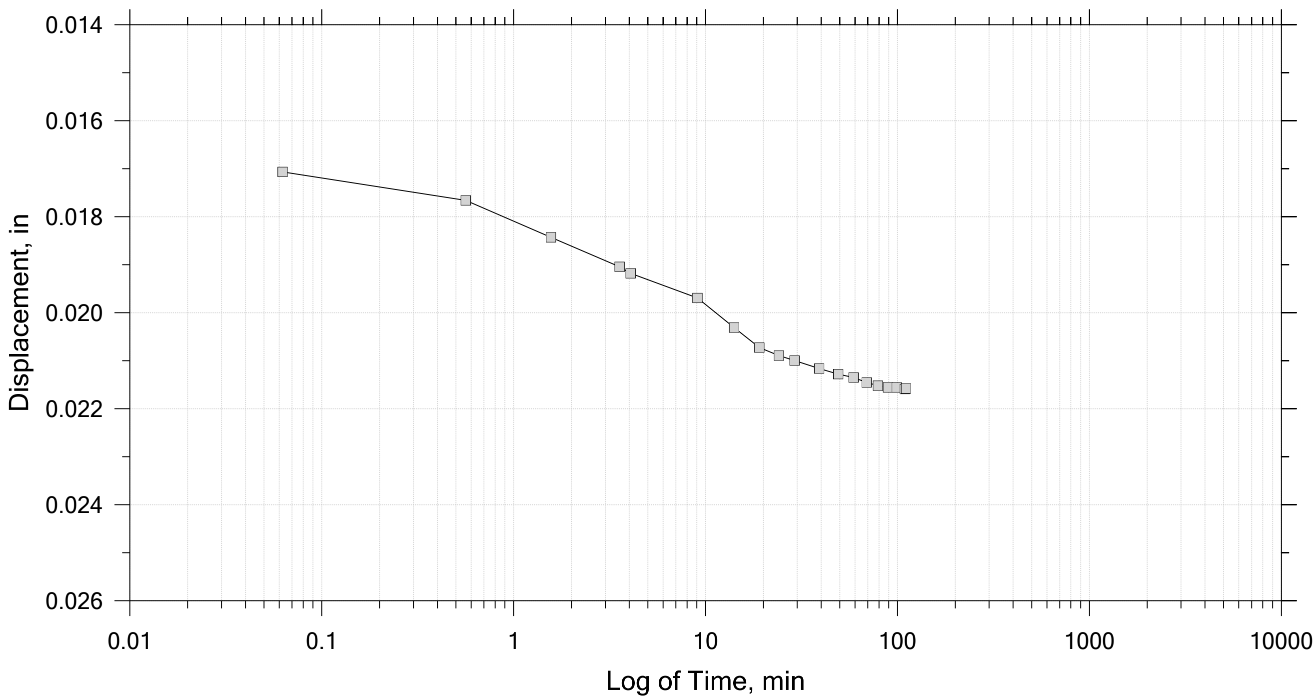


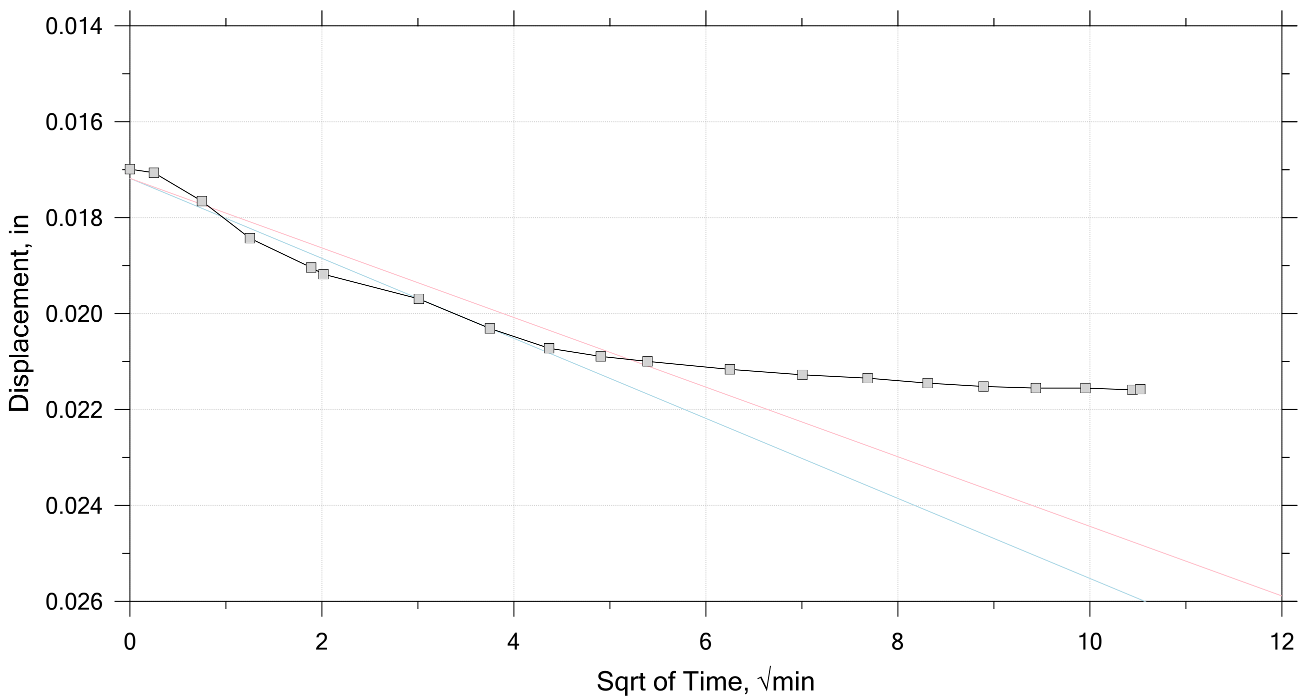


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 16
Constant Load Step
Stress: 1.05e+03 psf

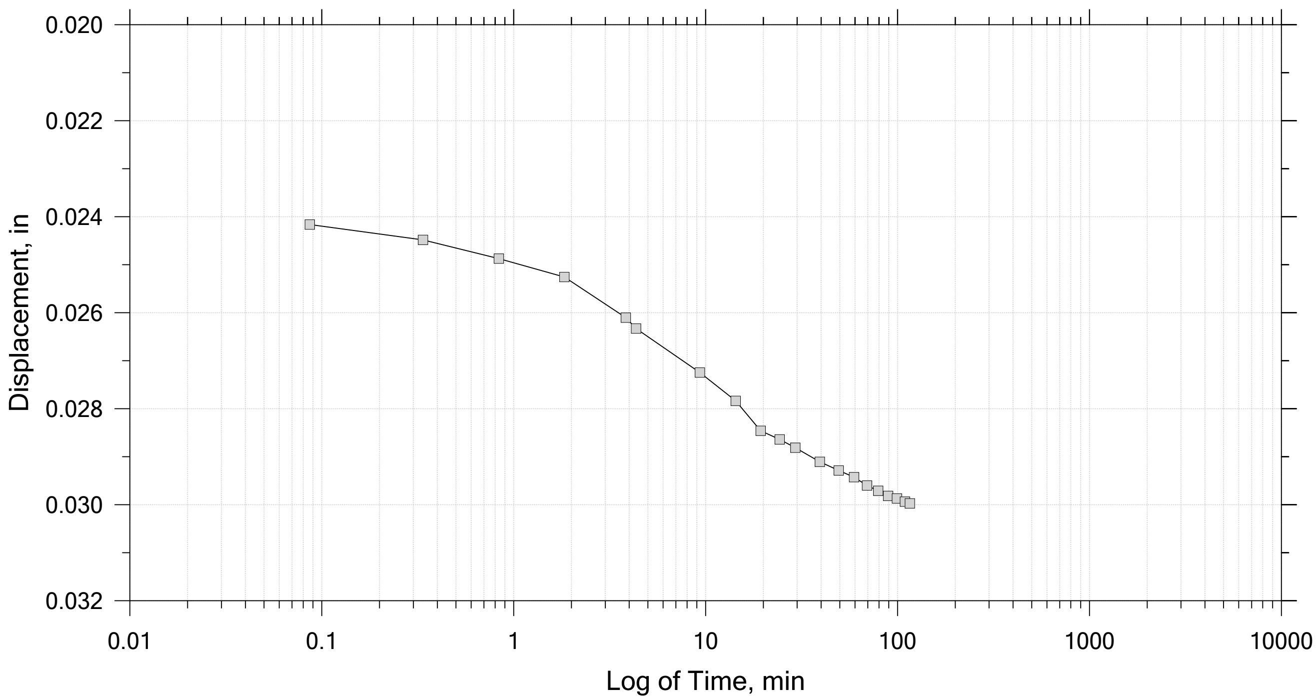


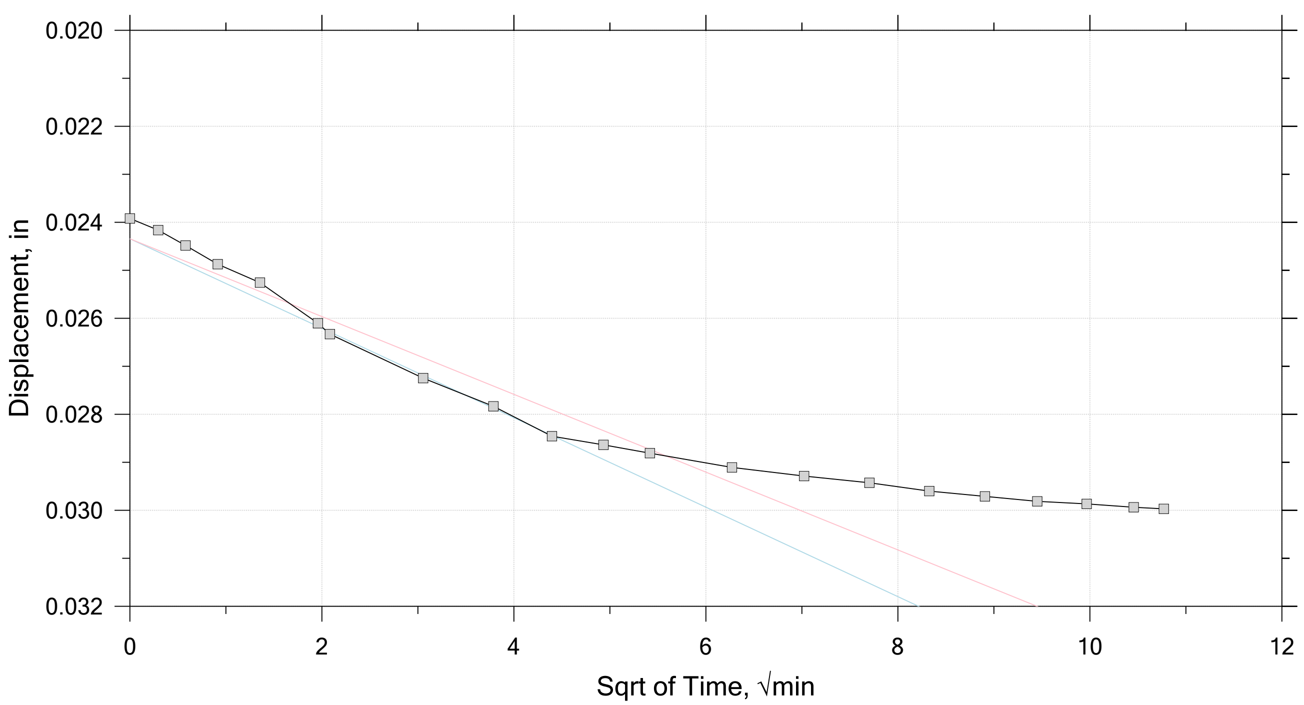


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 16
Constant Load Step
Stress: 1.57e+03 psf





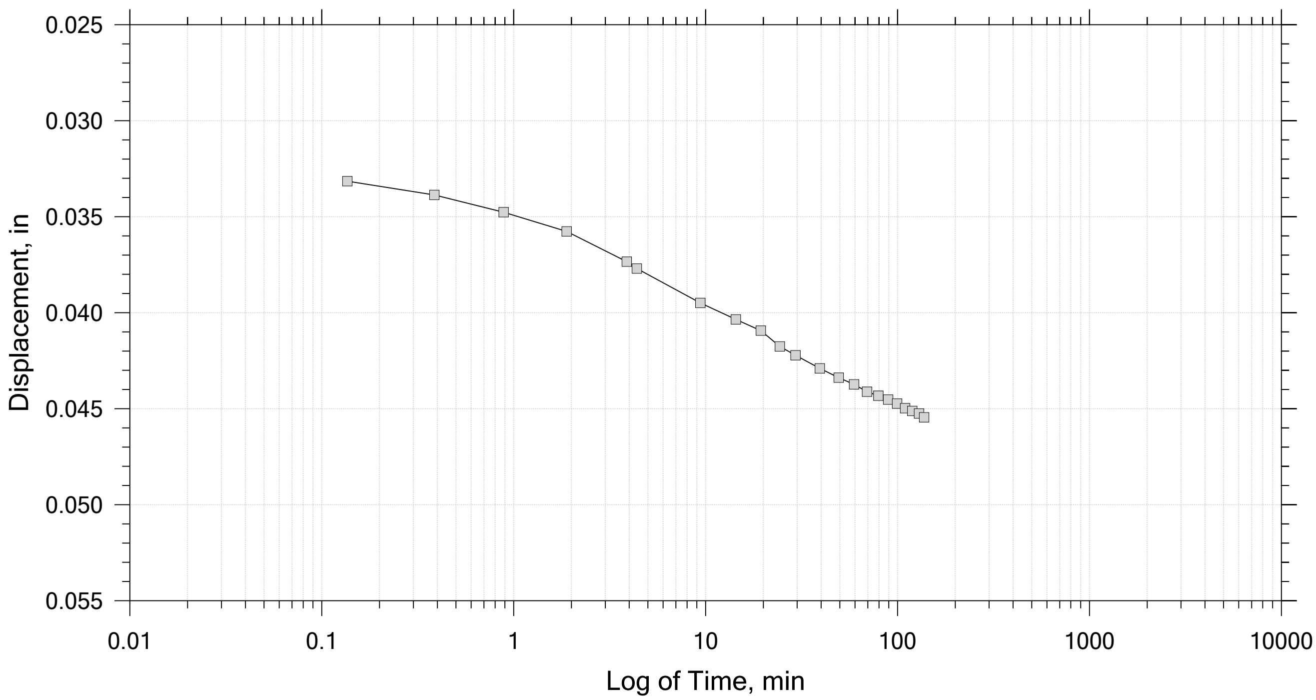
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

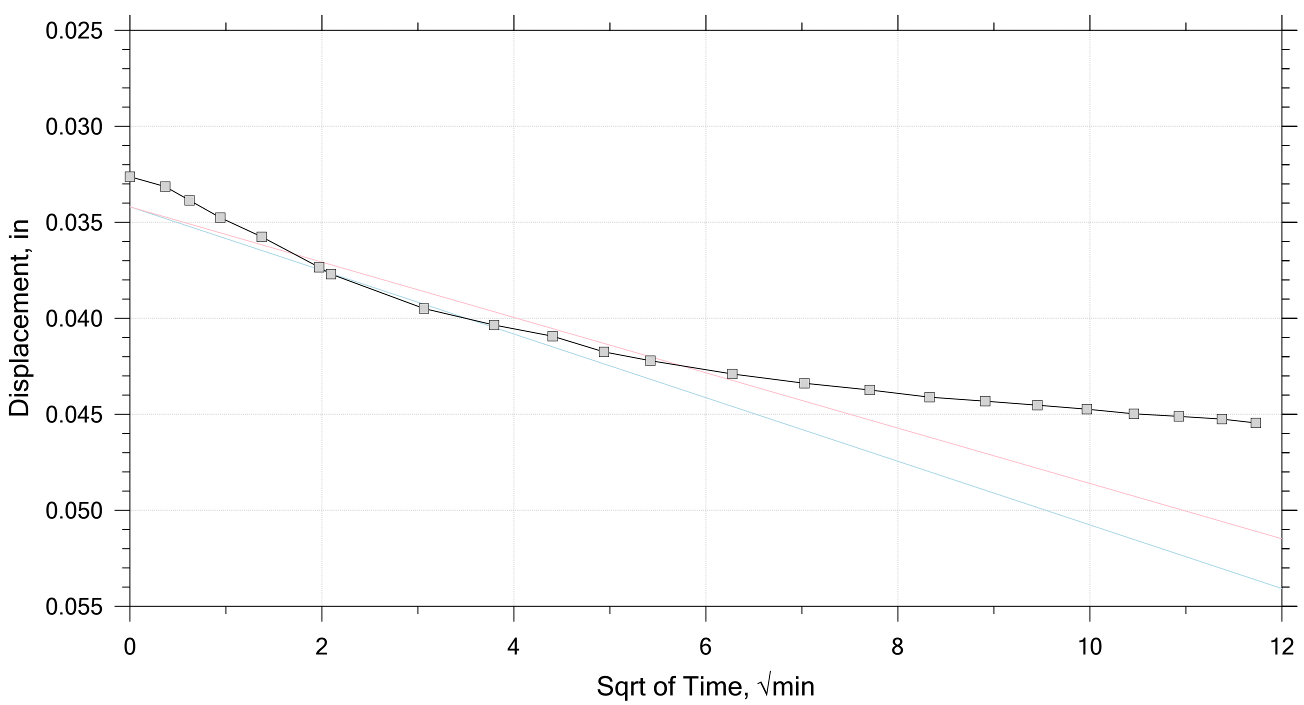
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 16

Constant Load Step

Stress: 2.36e+03 psf





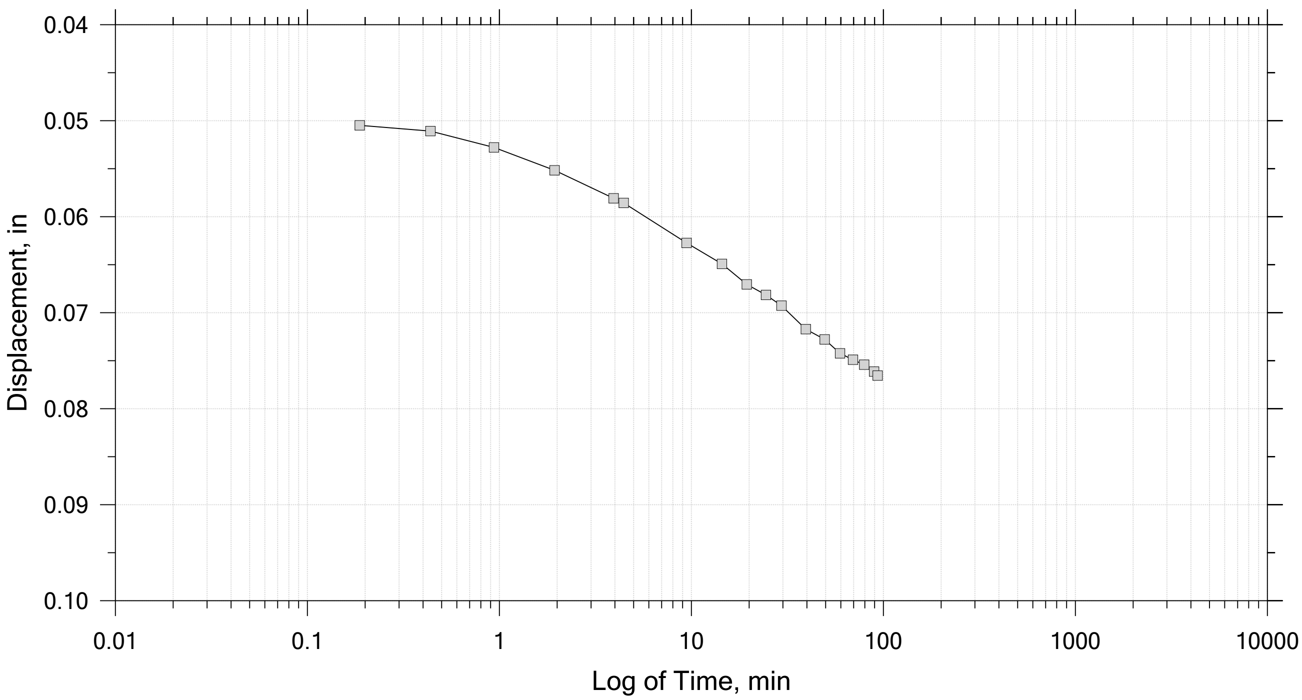
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

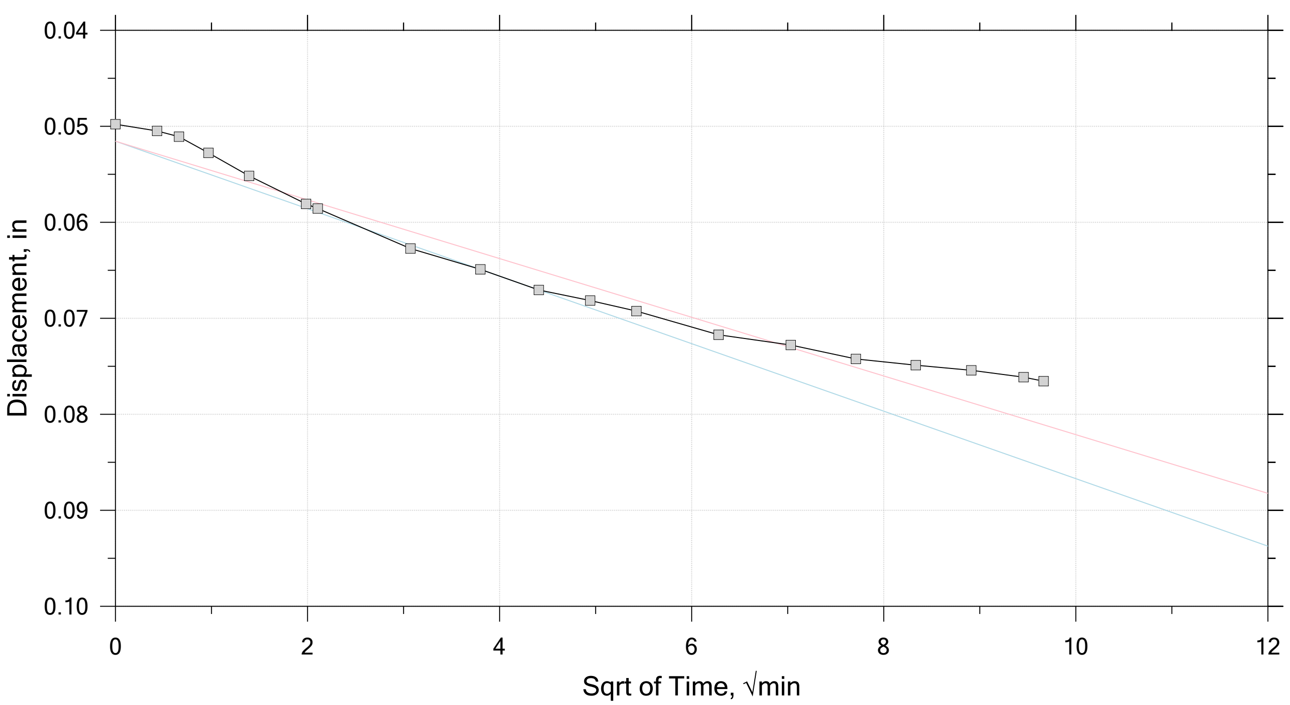
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 16

Constant Load Step

Stress: 3.54e+03 psf





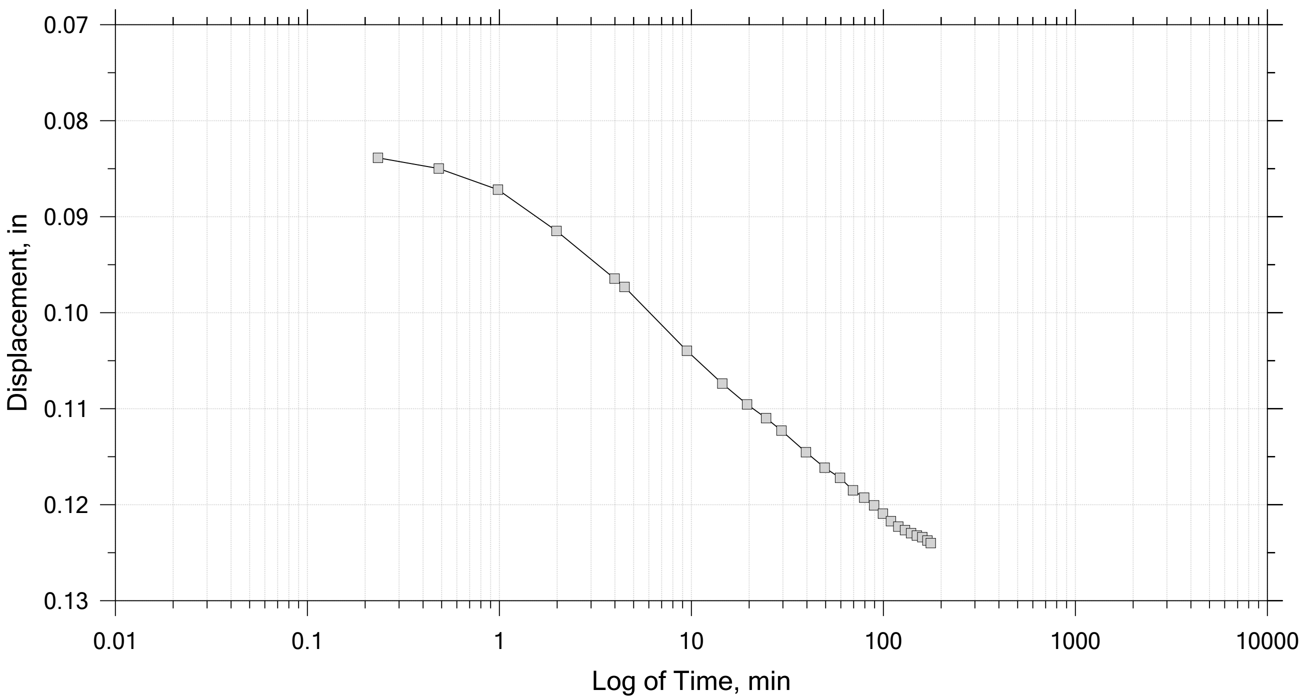
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

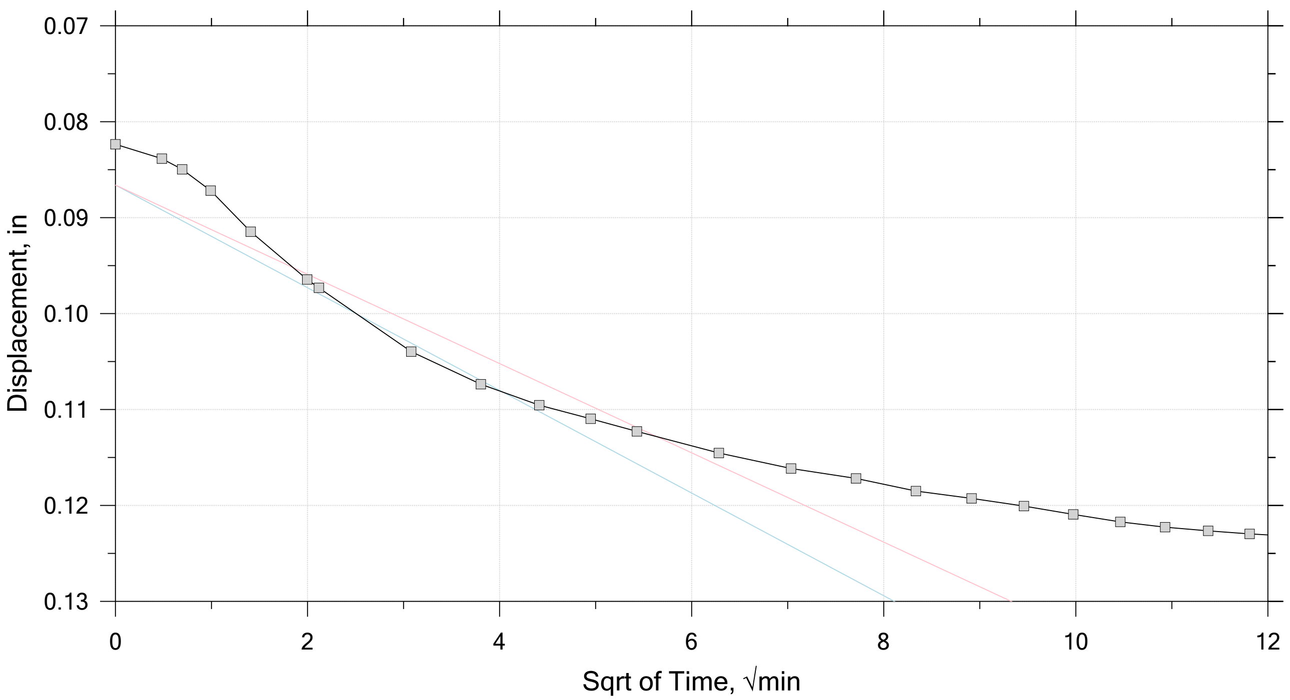
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 16

Constant Load Step

Stress: 5.3e+03 psf





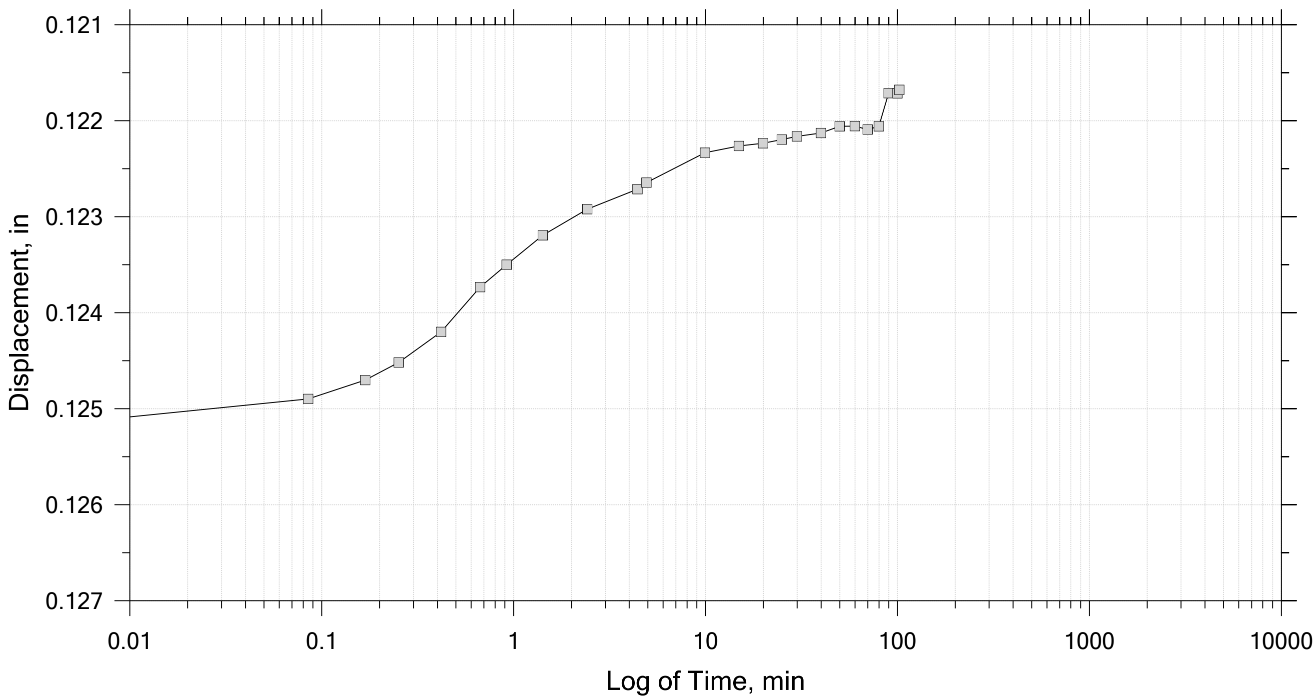
Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

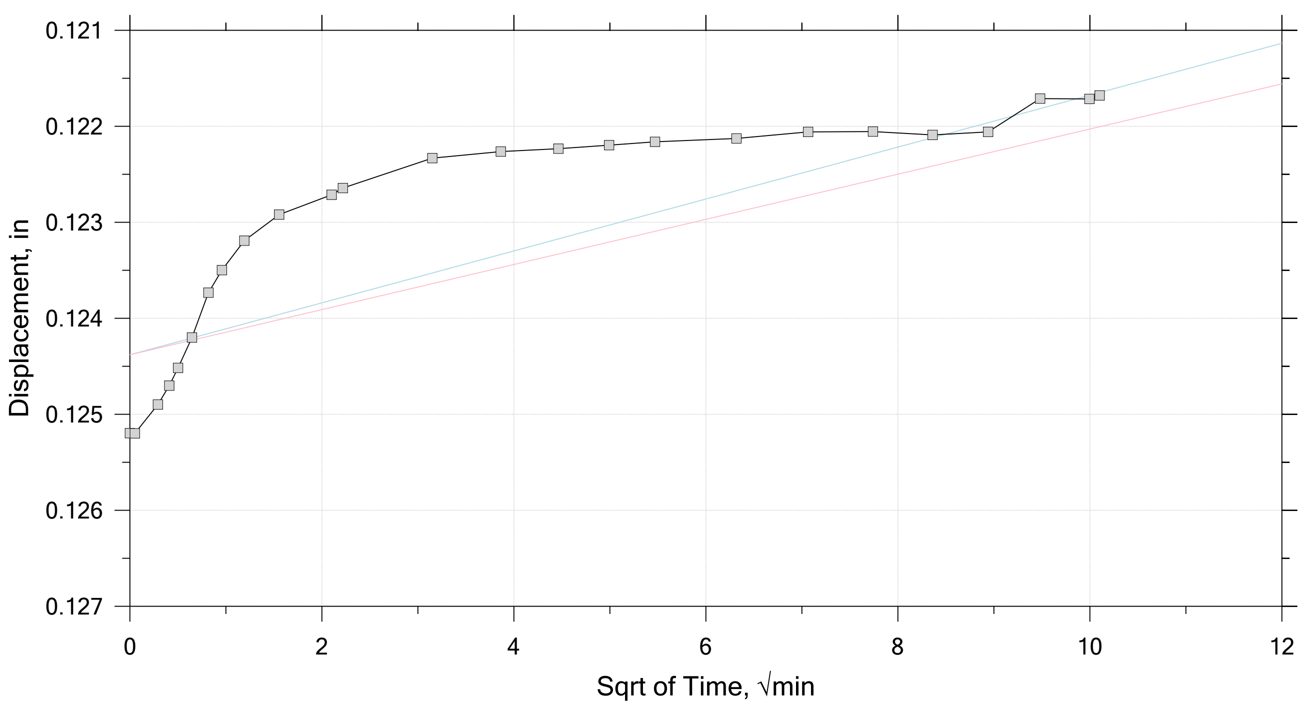
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 16

Constant Load Step

Stress: 2.65e+03 psf

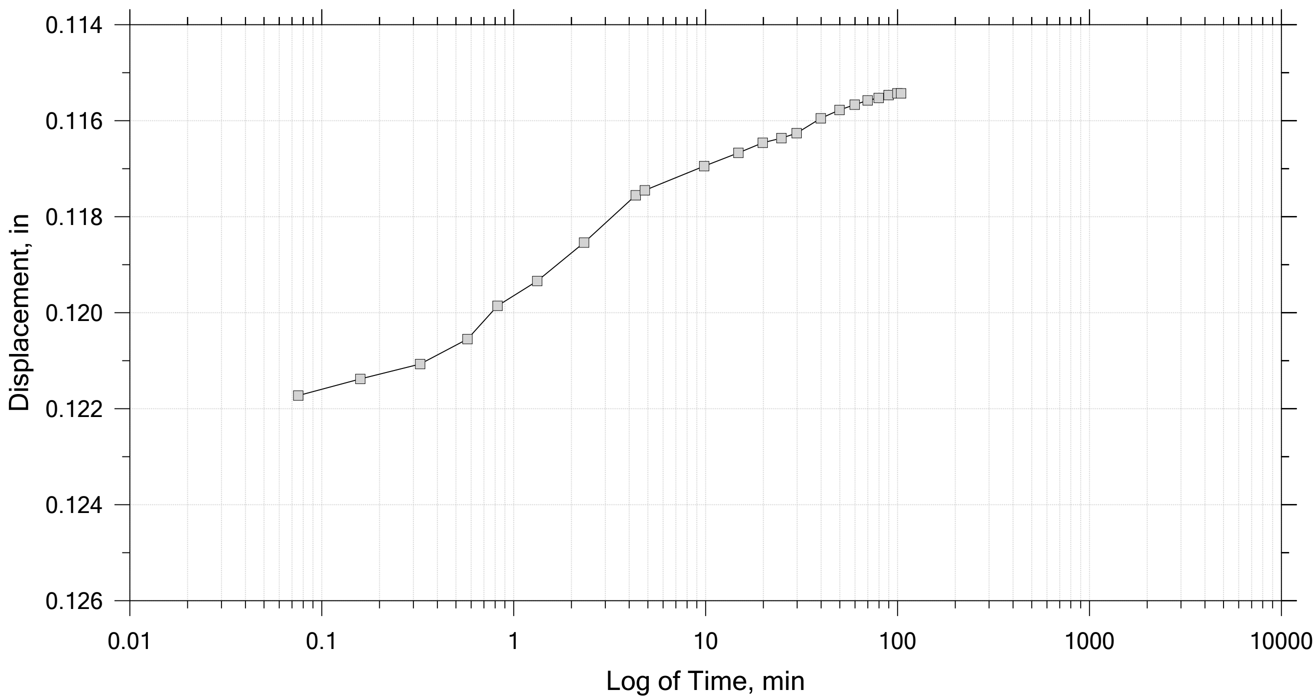


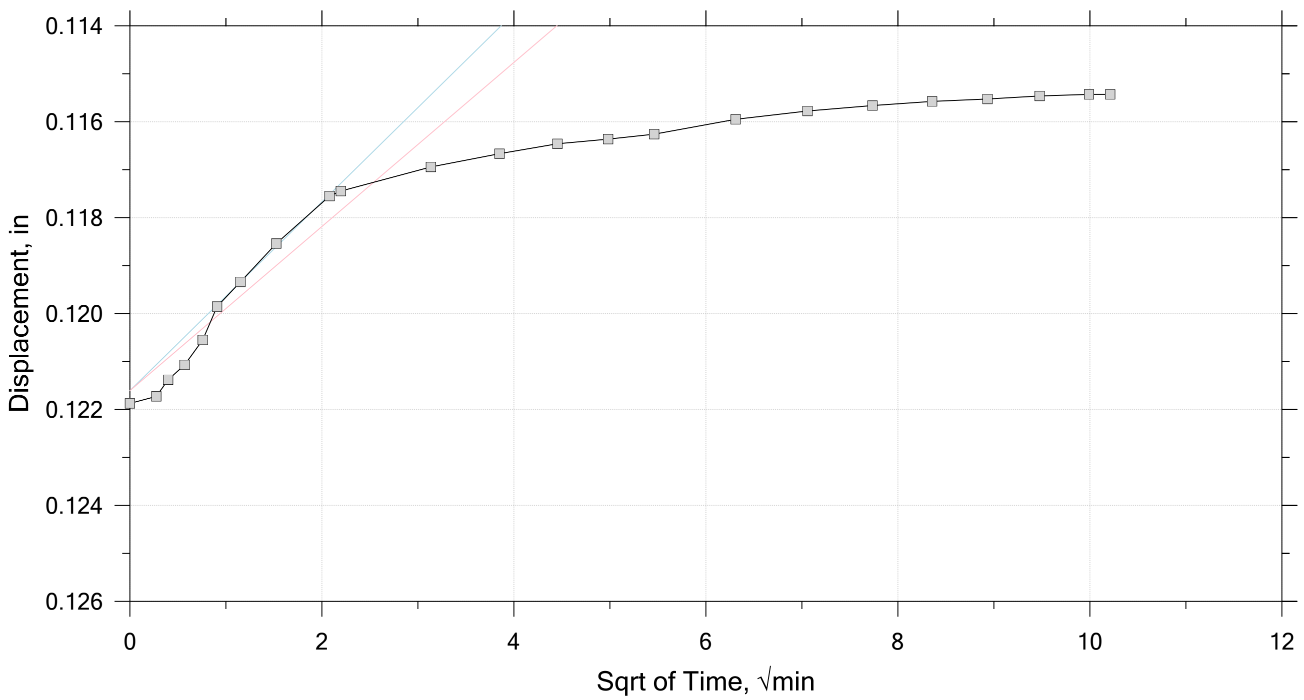


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 16
Constant Load Step
Stress: 1.33e+03 psf





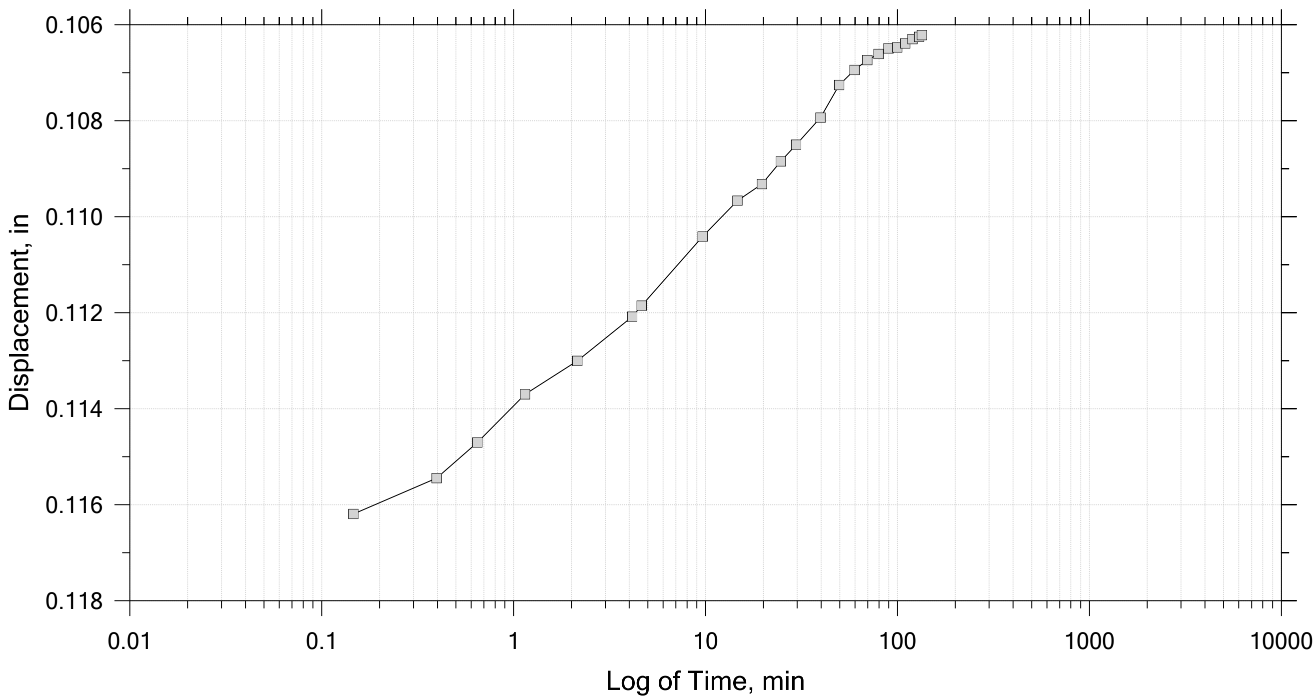
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

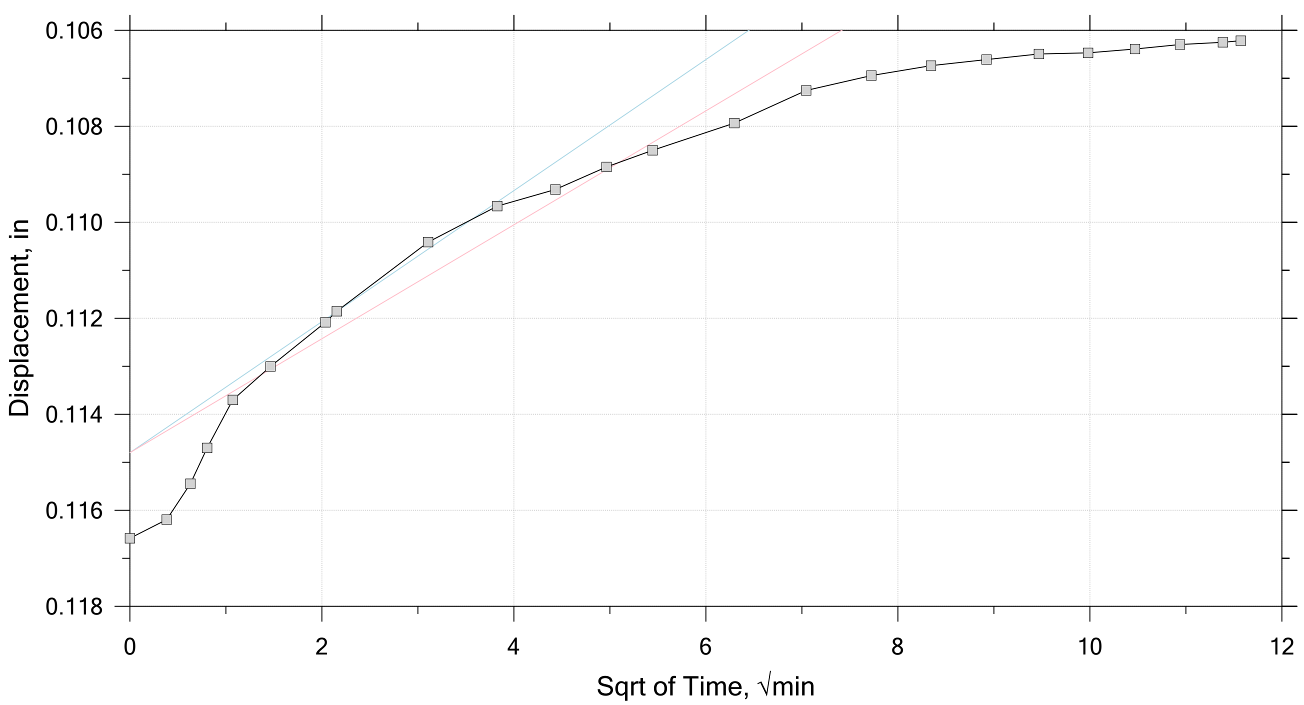
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 16

Constant Load Step

Stress: 663 psf





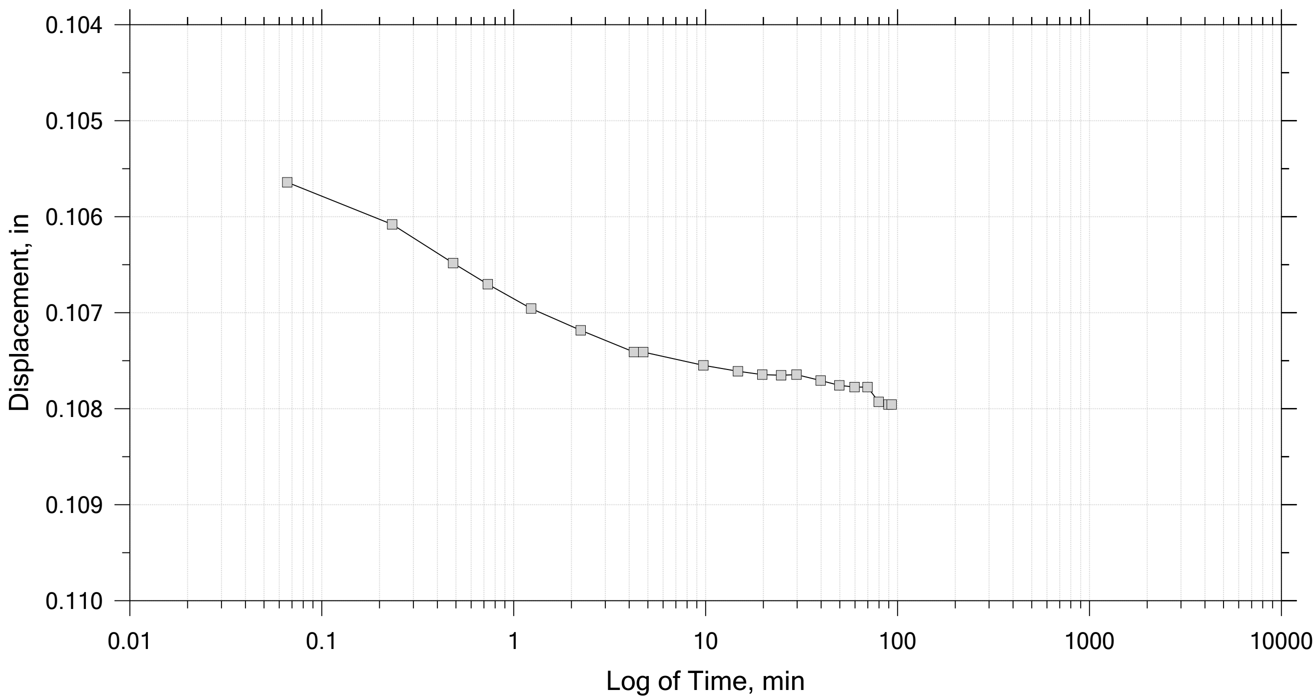
Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

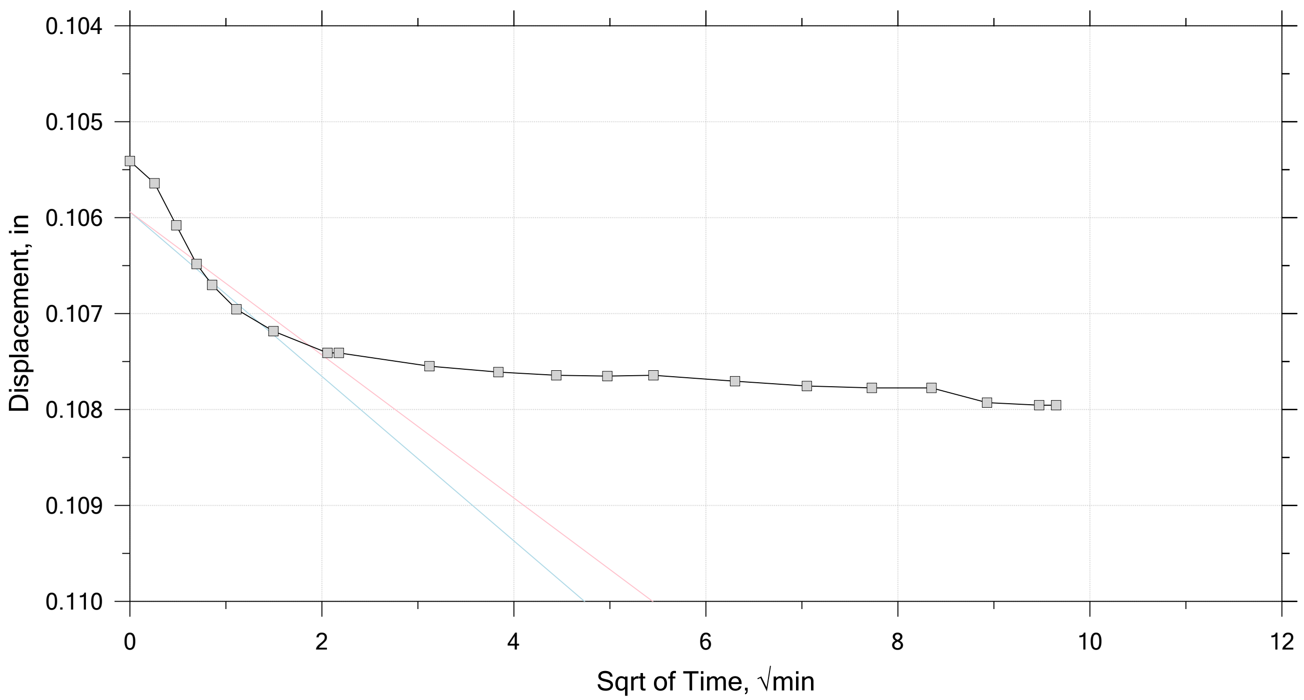
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 16

Constant Load Step

Stress: 1.33e+03 psf

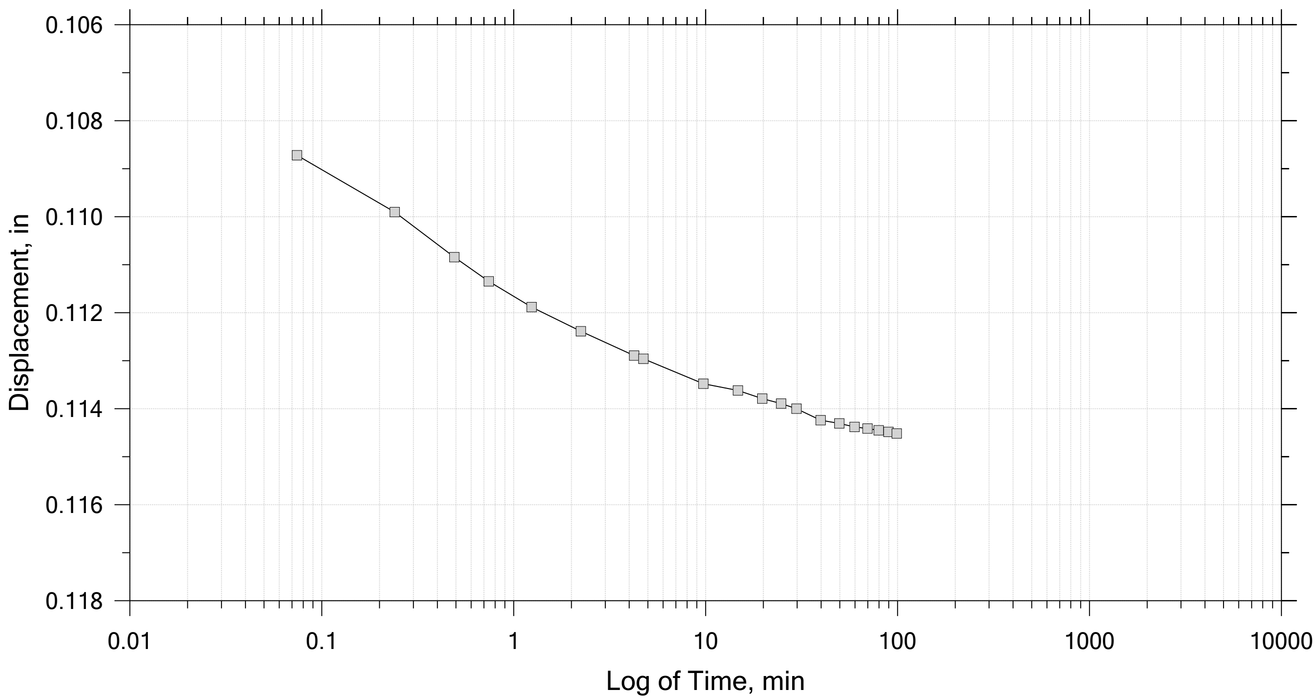


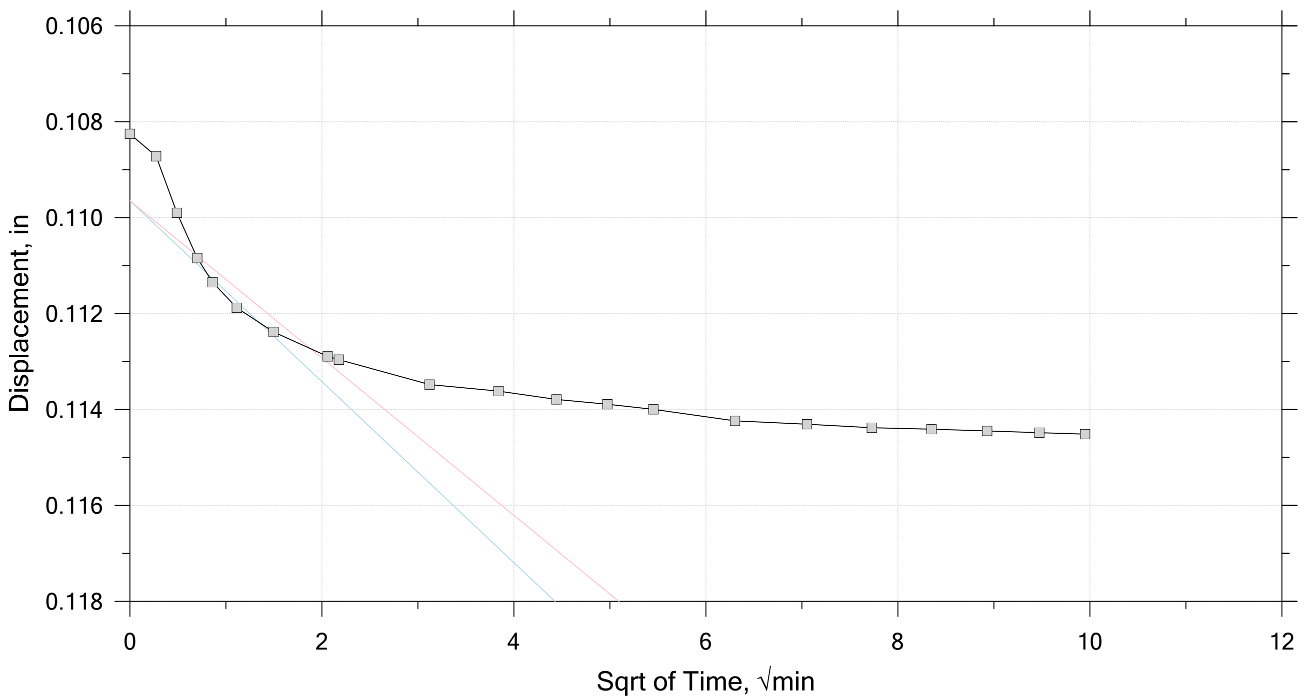


Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
Description: Brown organic silt		
Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 16
Constant Load Step
Stress: 2.65e+03 psf





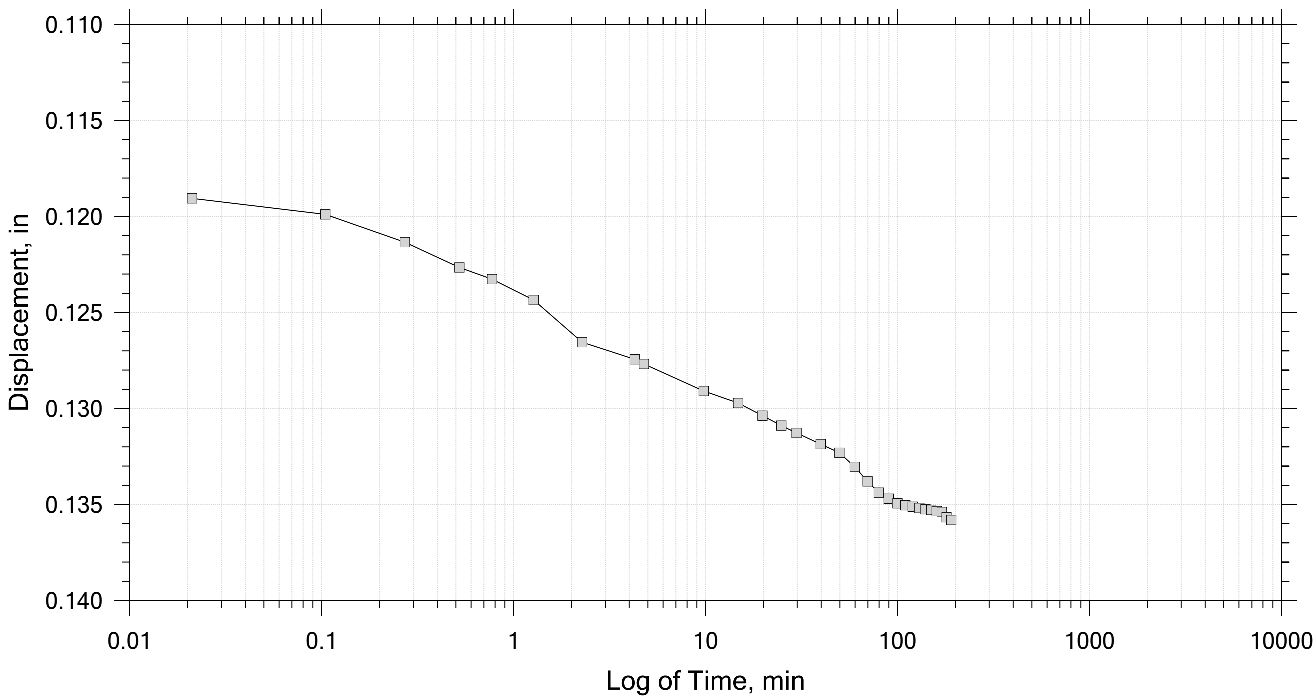
Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

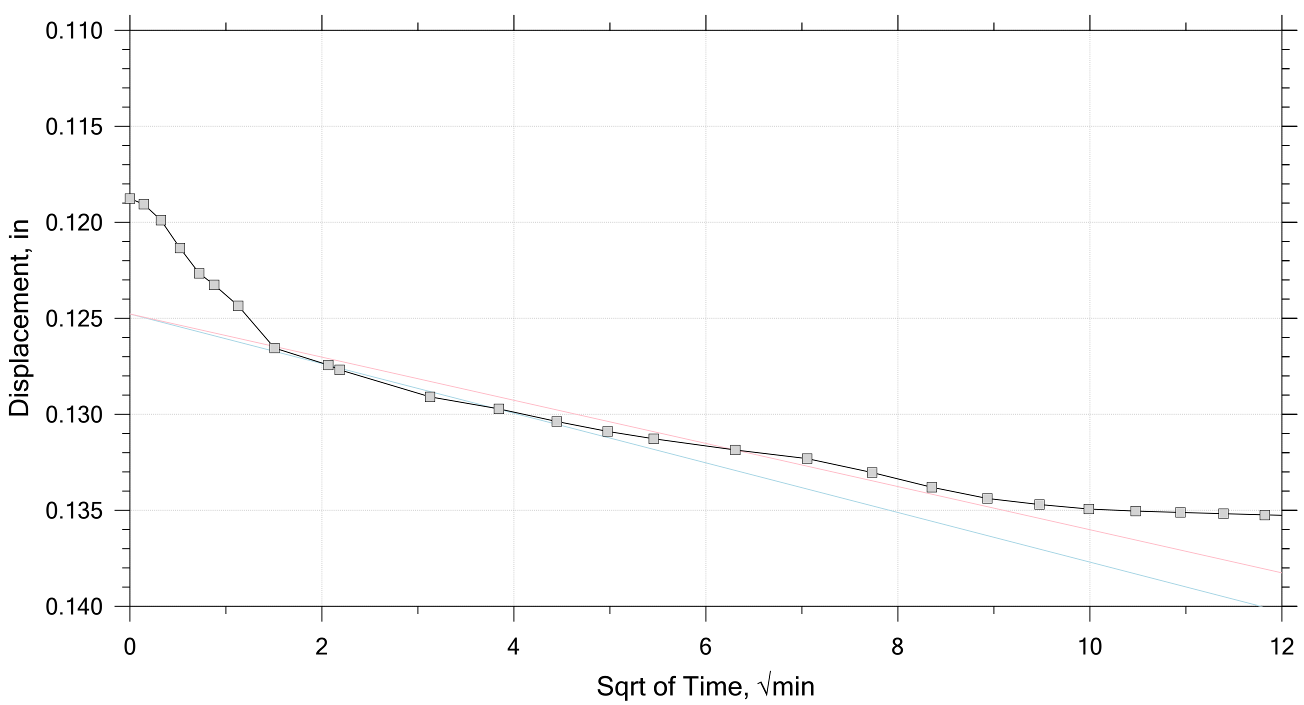
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 16

Constant Load Step

Stress: 5.3e+03 psf





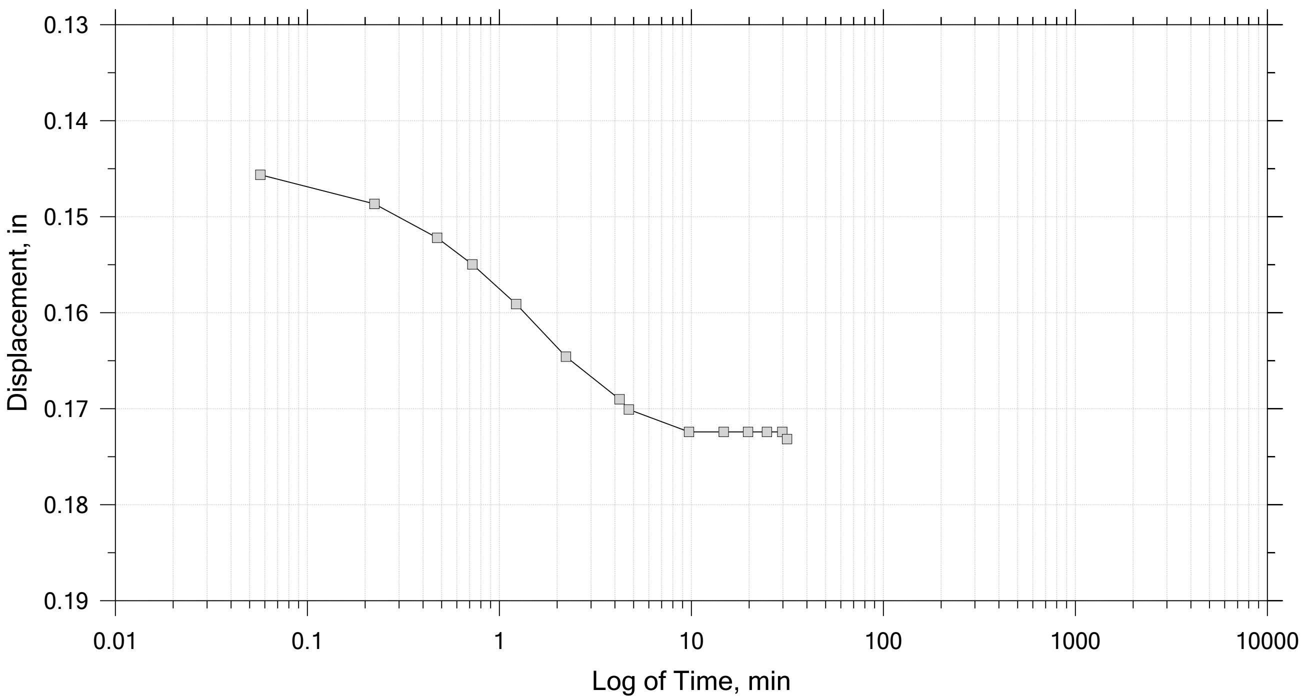
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

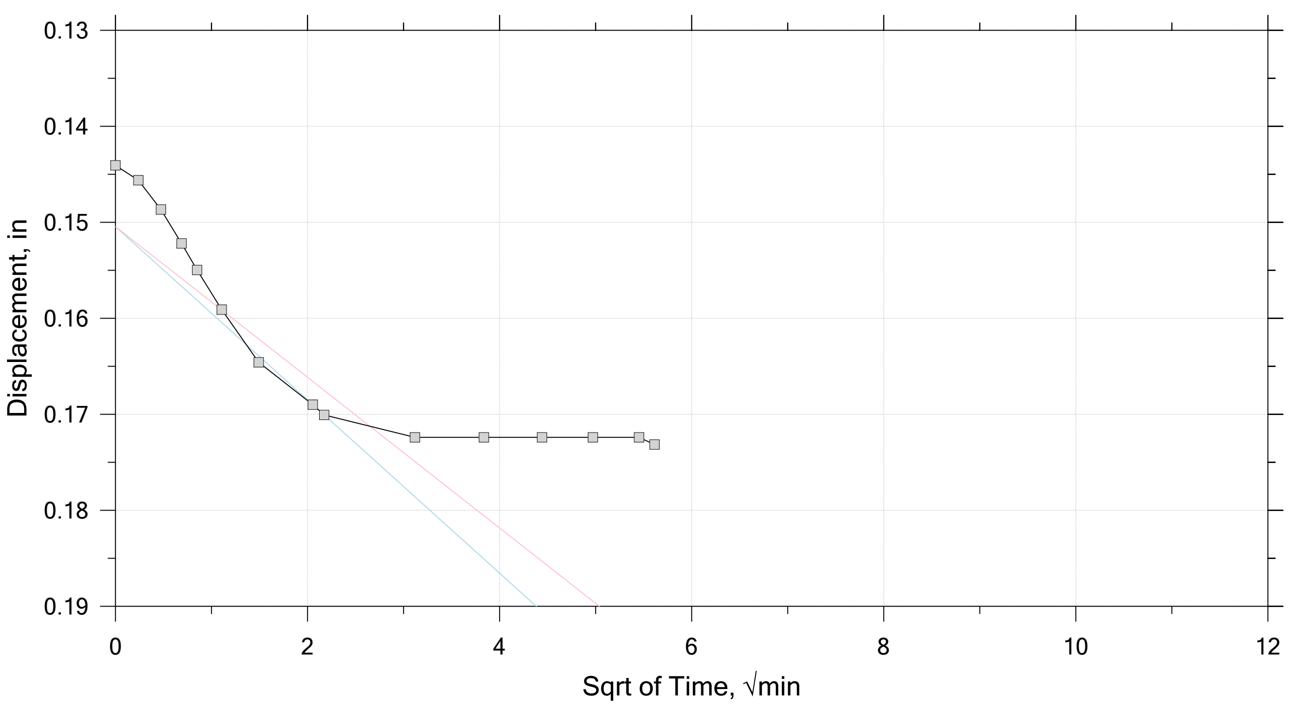
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 16 of 16

Constant Load Step

Stress: 1.06e+04 psf





Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter, in: 2.50	Specific Gravity: 2.75 (Implied)	Liquid Limit: 75
Specimen Height, in: 1.00	Initial Void Ratio: 1.95	Plastic Limit: 57
Final Height, in: 0.83	Final Void Ratio: 1.44	Plasticity Index: 18

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	222	---	"ring"	314
Mass Container, gm	36.95	110.26	110.26	60.12
Mass Container + Wet Soil, gm	143.13	236.2	224.49	174.24
Mass Container + Dry Soil, gm	100.73	185.18	185.18	134.97
Mass Dry Soil, gm	63.78	74.922	74.922	74.85
Water Content, %	66.48	68.09	52.46	52.46
Void Ratio	---	1.95	1.44	---
Degree of Saturation, %	---	95.83	100.00	---
Dry Unit Weight, pcf	---	58.088	70.238	---

Preconsolidation Stress, psf	---
Compression Ratio	0
Rebound Ratio	0
Compression Index	0
Rebound Index	0

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
Description: Brown organic silt		
Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Log of Time Coefficients

Step	Applied Stress psf	EOP Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/day	Mv ft²/ton	k cm/s	Ca %
1	207.	0.003287	1.94	0.328	0.000	0.00e+00	3.17e+04	0.00e+00	0.00e+00
2	311.	0.006305	1.93	0.630	0.000	0.00e+00	5.80e+04	0.00e+00	0.00e+00
3	466.	0.01017	1.92	1.02	0.000	0.00e+00	4.98e+04	0.00e+00	0.00e+00
4	699.	0.01454	1.91	1.45	0.000	0.00e+00	3.75e+04	0.00e+00	0.00e+00
5	1.05e+03	0.02137	1.89	2.13	0.000	0.00e+00	3.91e+04	0.00e+00	0.00e+00
6	1.57e+03	0.02961	1.86	2.96	0.000	0.00e+00	3.14e+04	0.00e+00	0.00e+00
7	2.36e+03	0.04421	1.82	4.42	0.000	0.00e+00	3.71e+04	0.00e+00	0.00e+00
8	3.54e+03	0.07655	1.73	7.65	0.000	0.00e+00	5.48e+04	0.00e+00	0.00e+00
9	5.30e+03	0.1187	1.60	11.9	6.534	6.15e-02	4.76e+04	3.22e-08	0.00e+00
10	2.65e+03	0.1163	1.61	11.6	0.000	0.00e+00	1.75e+03	0.00e+00	0.00e+00
11	1.33e+03	0.1167	1.61	11.7	2.013	1.91e-01	-5.42e+02	-1.14e-09	0.00e+00
12	663.	0.1070	1.64	10.7	0.000	0.00e+00	2.92e+04	0.00e+00	0.00e+00
13	1.33e+03	0.1075	1.63	10.7	0.000	0.00e+00	1.55e+03	0.00e+00	0.00e+00
14	2.65e+03	0.1133	1.62	11.3	0.548	7.12e-01	8.73e+03	6.85e-08	0.00e+00
15	5.30e+03	0.1347	1.55	13.5	0.000	0.00e+00	1.61e+04	0.00e+00	0.00e+00
16	1.06e+04	0.1724	1.44	17.2	0.000	0.00e+00	1.42e+04	0.00e+00	0.00e+00

Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
Description: Brown organic silt		
Remarks:		
Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B

Sqrt of Time Coefficients

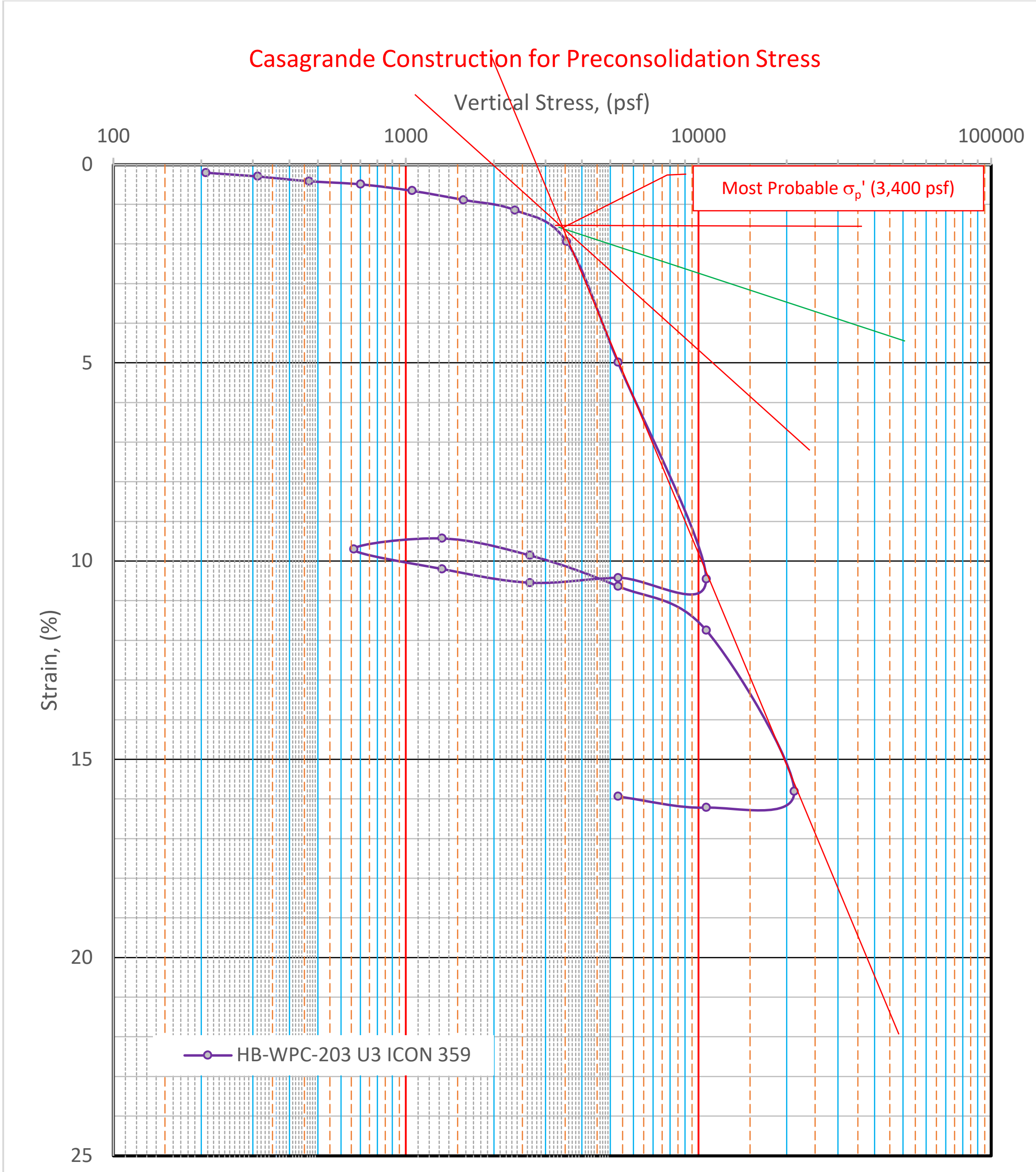
Step	Applied Stress psf	EOP Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv ft²/day	Mv ft²/ton	k cm/s
1	207.	0.003287	1.94	0.328	0.000	0.00e+00	3.17e+04	0.00e+00
2	311.	0.006305	1.93	0.630	13.638	1.54e-01	5.80e+04	9.85e-08
3	466.	0.01017	1.92	1.02	105.667	1.98e-02	4.98e+04	1.08e-08
4	699.	0.01454	1.91	1.45	17.477	1.19e-01	3.75e+04	4.90e-08
5	1.05e+03	0.02137	1.89	2.13	27.070	7.57e-02	3.91e+04	3.26e-08
6	1.57e+03	0.02961	1.86	2.96	31.211	6.46e-02	3.14e+04	2.24e-08
7	2.36e+03	0.04421	1.82	4.42	33.000	5.97e-02	3.71e+04	2.44e-08
8	3.54e+03	0.07655	1.73	7.65	47.183	3.98e-02	5.48e+04	2.40e-08
9	5.30e+03	0.1187	1.60	11.9	31.754	5.45e-02	4.76e+04	2.85e-08
10	2.65e+03	0.1163	1.61	11.6	81.425	2.03e-02	1.75e+03	3.93e-10
11	1.33e+03	0.1167	1.61	11.7	6.444	2.57e-01	-5.42e+02	-1.54e-09
12	663.	0.1070	1.64	10.7	25.958	6.46e-02	2.92e+04	2.08e-08
13	1.33e+03	0.1075	1.63	10.7	3.492	4.85e-01	1.55e+03	8.28e-09
14	2.65e+03	0.1133	1.62	11.3	3.543	4.75e-01	8.73e+03	4.56e-08
15	5.30e+03	0.1347	1.55	13.5	39.726	4.10e-02	1.61e+04	7.28e-09
16	1.06e+04	0.1724	1.44	17.2	7.017	2.17e-01	1.42e+04	3.39e-08

Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 5/3/2021	Depth: 30.8
	Test Number: ICON-65-362	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		
	Displacement at End of Primary		

Consolidation Test Data
Summary Report

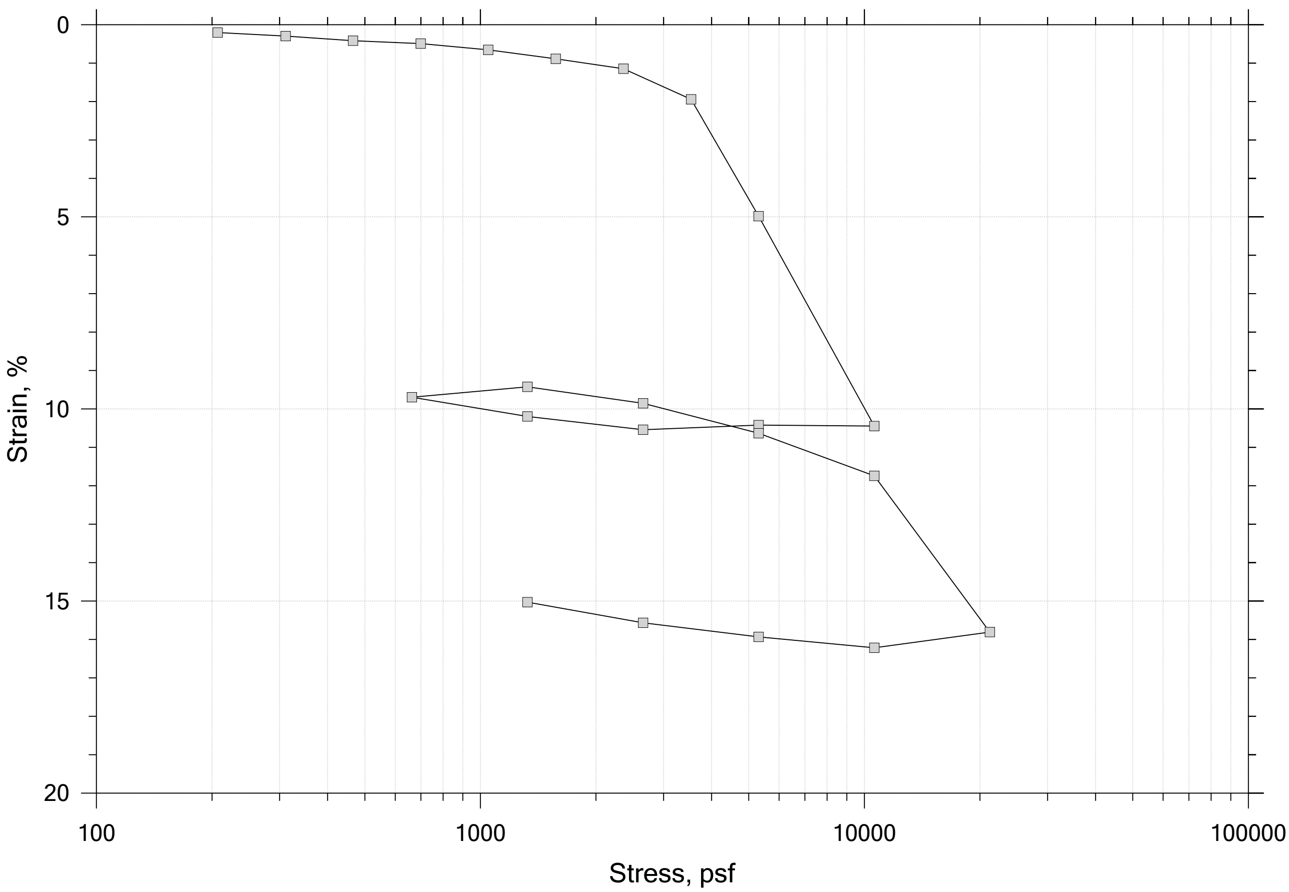
Project Name:	Pleasant Cove
Project Number:	166-21
Project Location:	Woolwich, ME
Client:	GZA
Sample Description:	Gray Silty Clay
Preparation:	Trimmed Shelby Tube

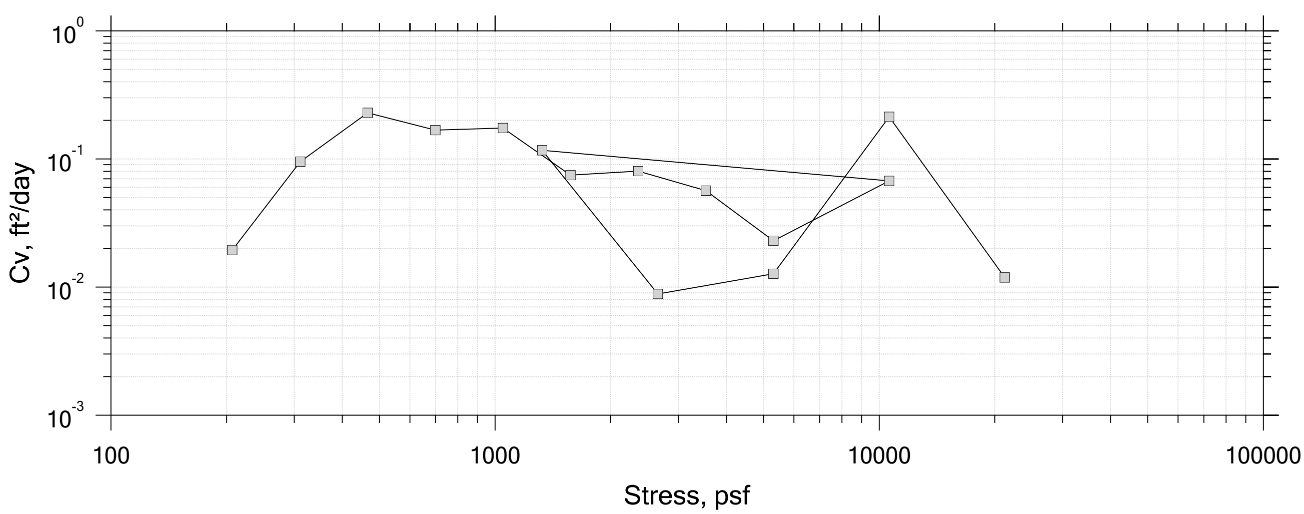
Lab Test No:	ICON 359			
Boring No.	HB-WPC-203			
Sample No:	U3			
Boring Elevation (ft).				
Sample Depth (ft):	49-51			
Test Specimen Depth (Ft):	50.9			
Test Specimen Elevation:				
Water Content (%):	41.9			
Dry Unit Weight (pcf):	77.2			
Wet Unit Weight (pcf):	109.6			
Saturation Before (%):	96.5			
Saturation After (%):	100			
Void Ratio Before:	1.37			
Void Ratio After:	1.02			
Overburden Pressure (psf):	--			
Max Previous stress (psf):	3,400			
Max Prev. stress (Work) (psf):	3,350			
OCR:	--			
Compression Index (C_{CE}):	0.175			
Recompression Index (C_{RE}):	0.015			
Liquid Limit:	47.4			
Plastic Limit:	25.1			
Plasticity Index:	22.3			
Liquidity Index:	0.75			
Specific Gravity (implied)	2.93			
Organic Content (%)	--			
Tested By:	sjr			
Date Tested:	5/3/2021			
Checked By:	sjr			



One-Dimensional Consolidation by ASTM D2435 - Method B

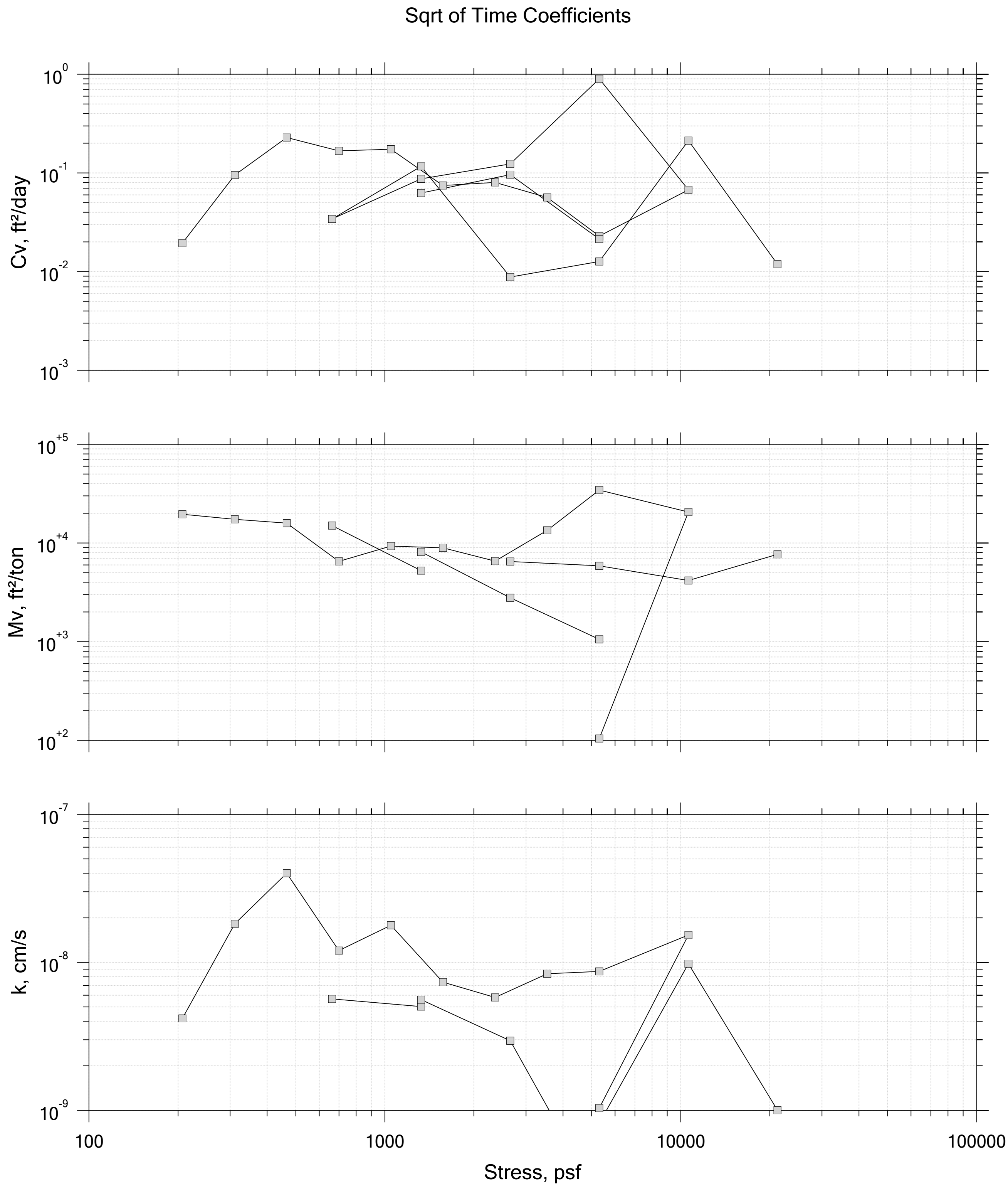
Summary Report





Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		
	Displacement at End of Primary		

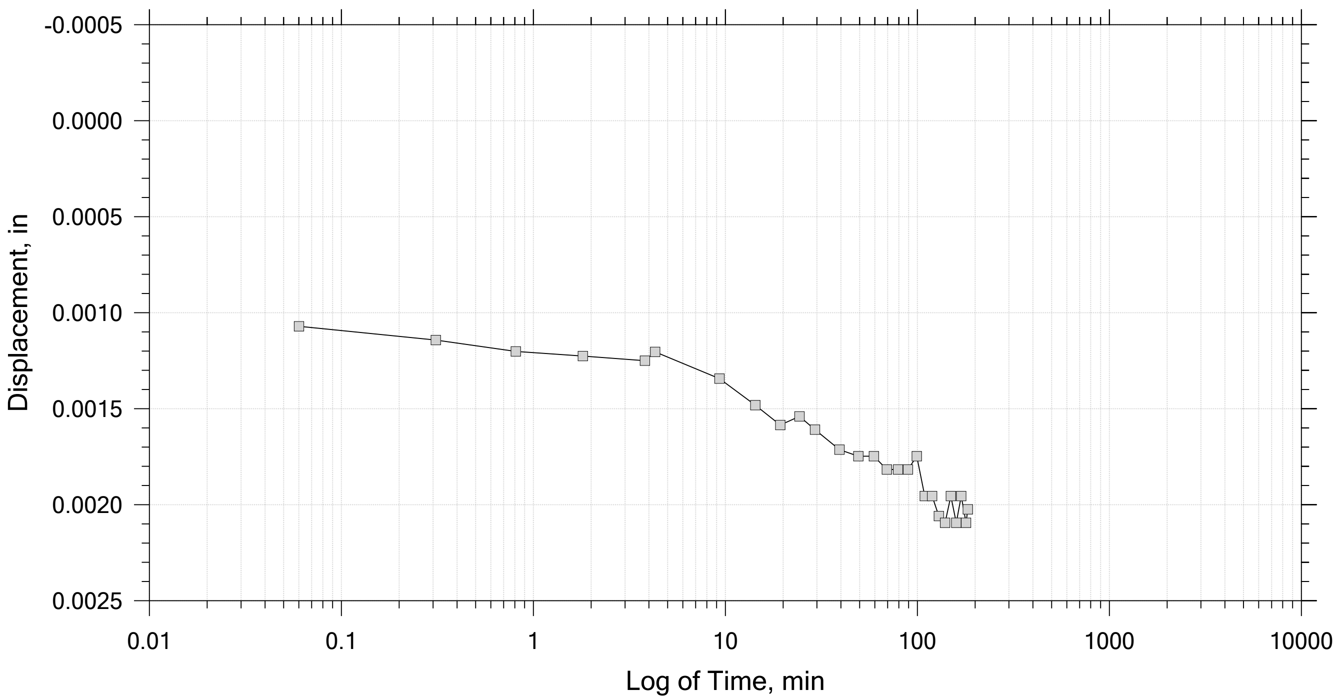
One-Dimensional Consolidation by ASTM D2435 - Method B

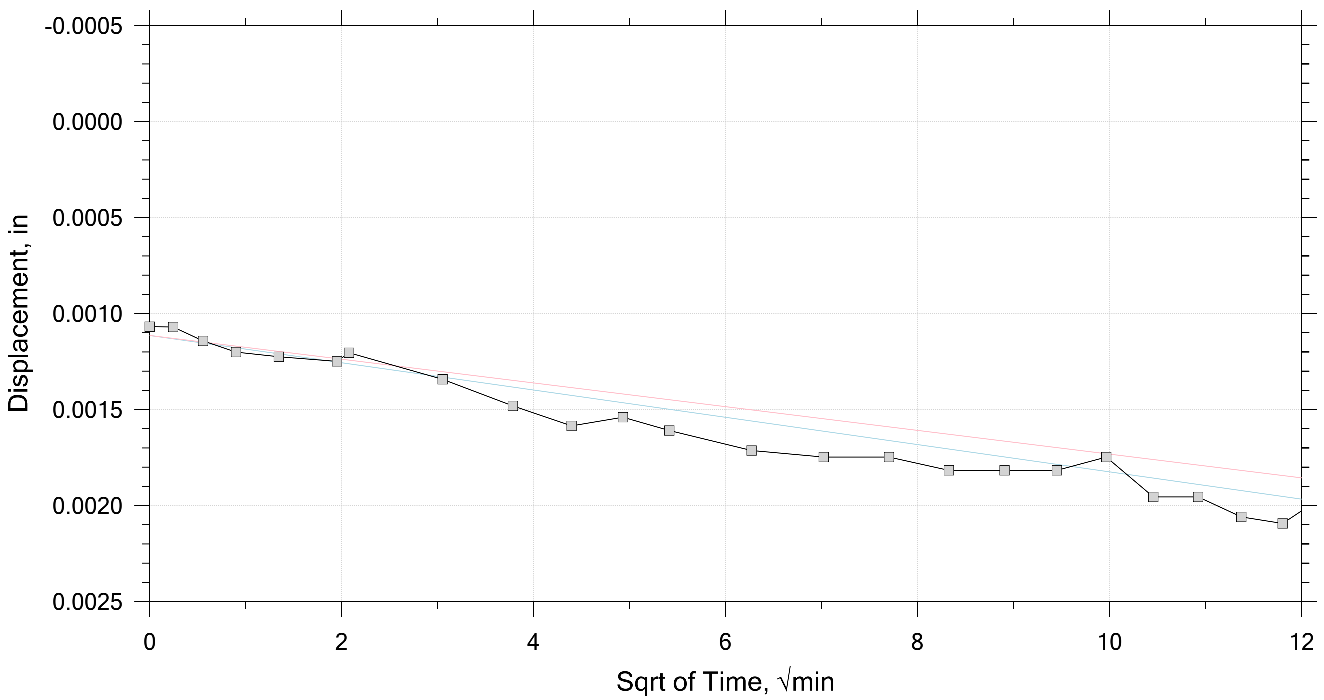


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 23
Constant Load Step
Stress: 207 psf





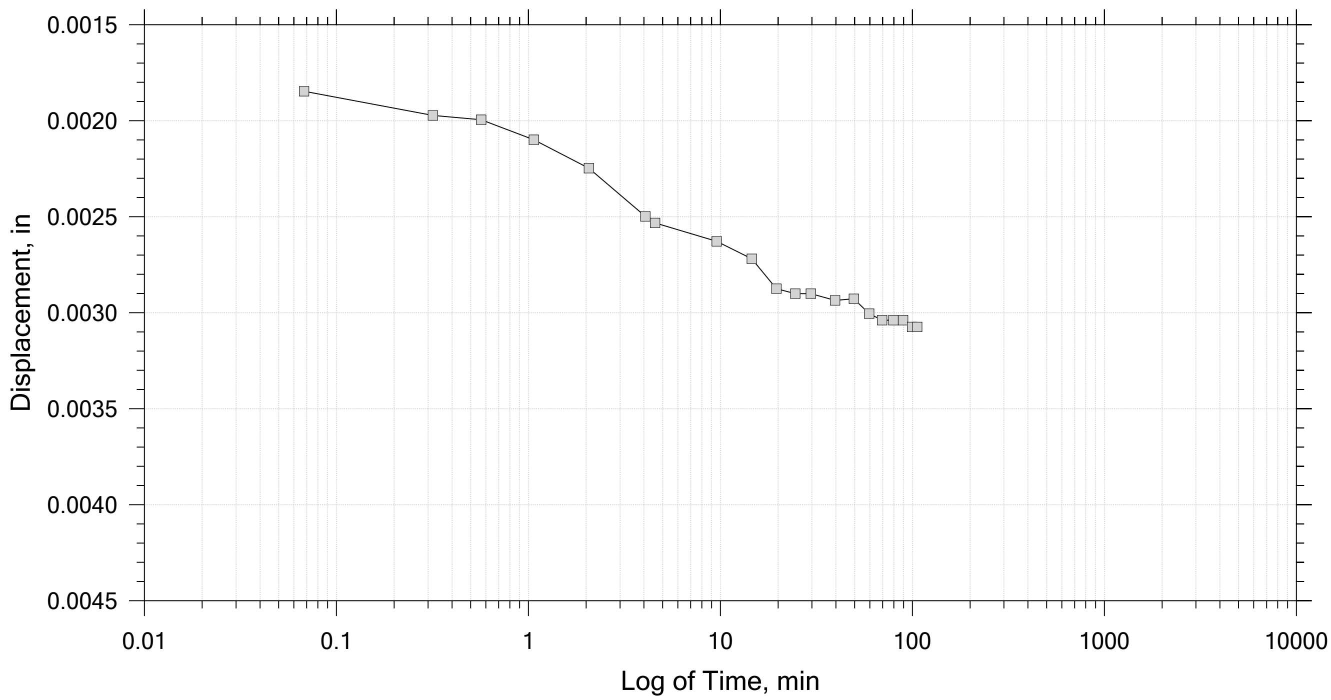
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

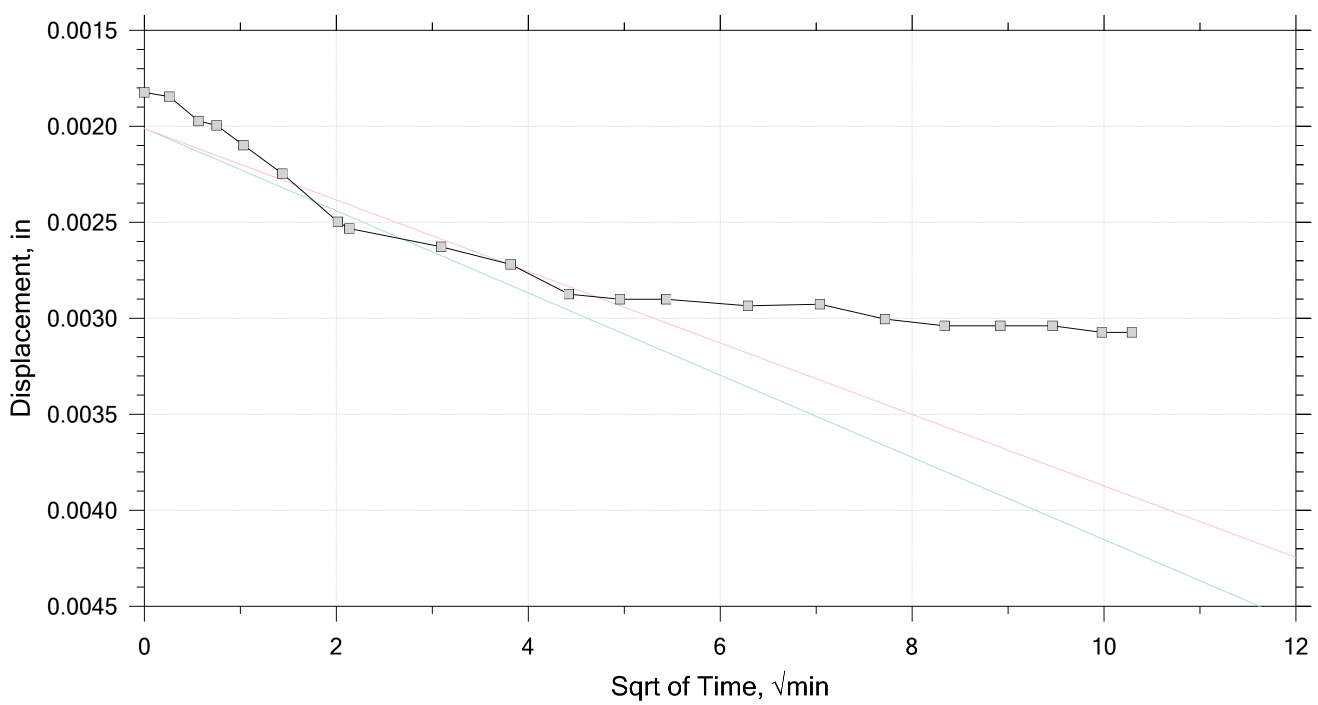
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 23

Constant Load Step

Stress: 311 psf





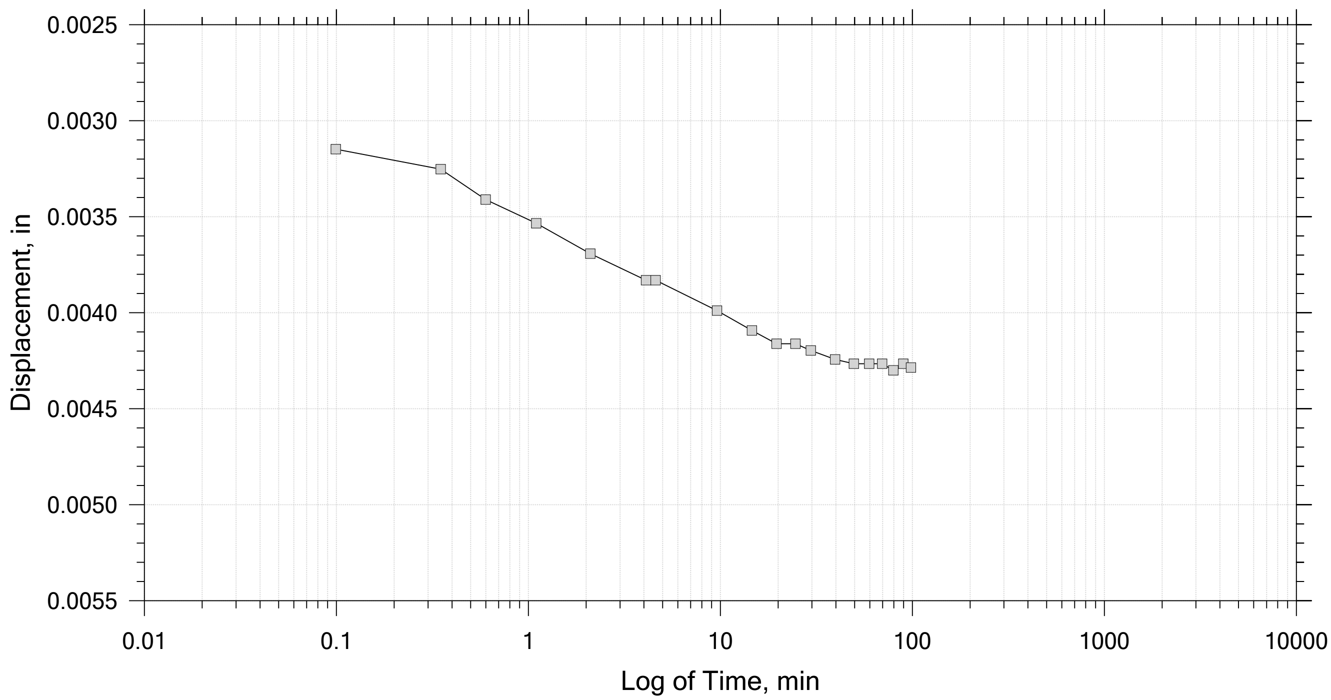
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

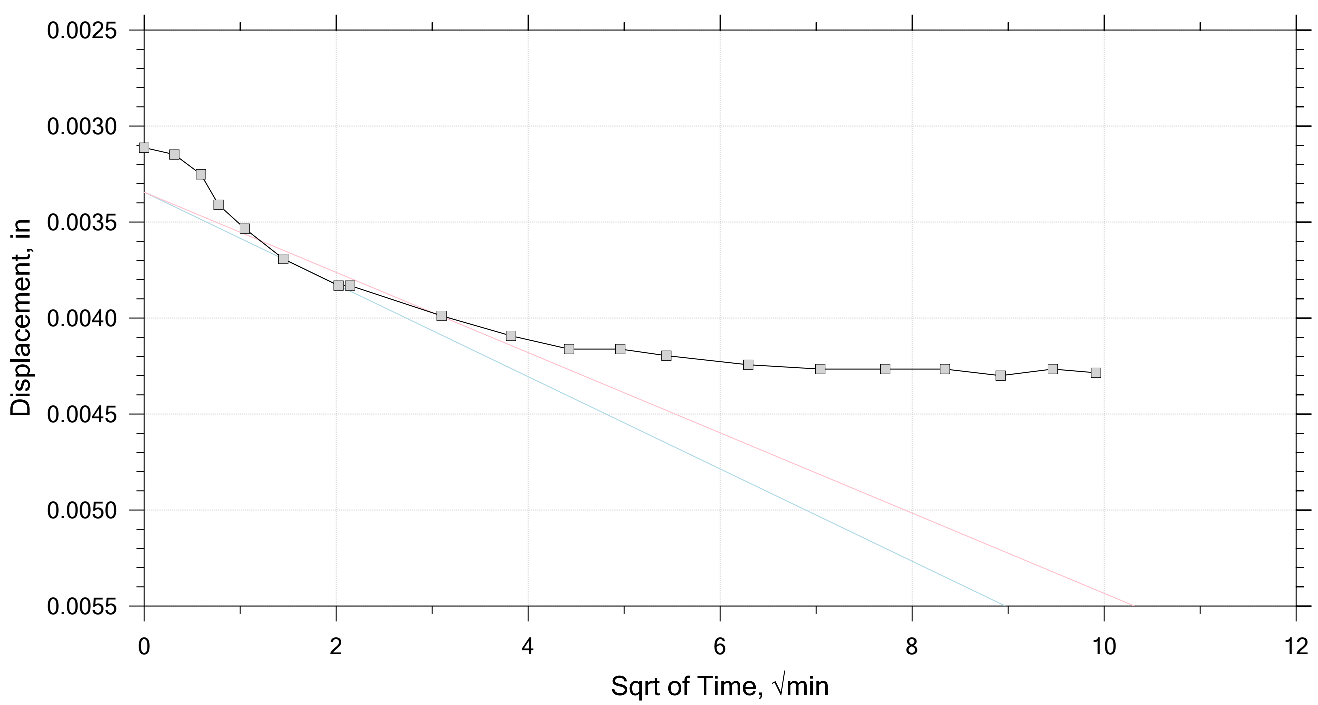
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 23

Constant Load Step

Stress: 466 psf





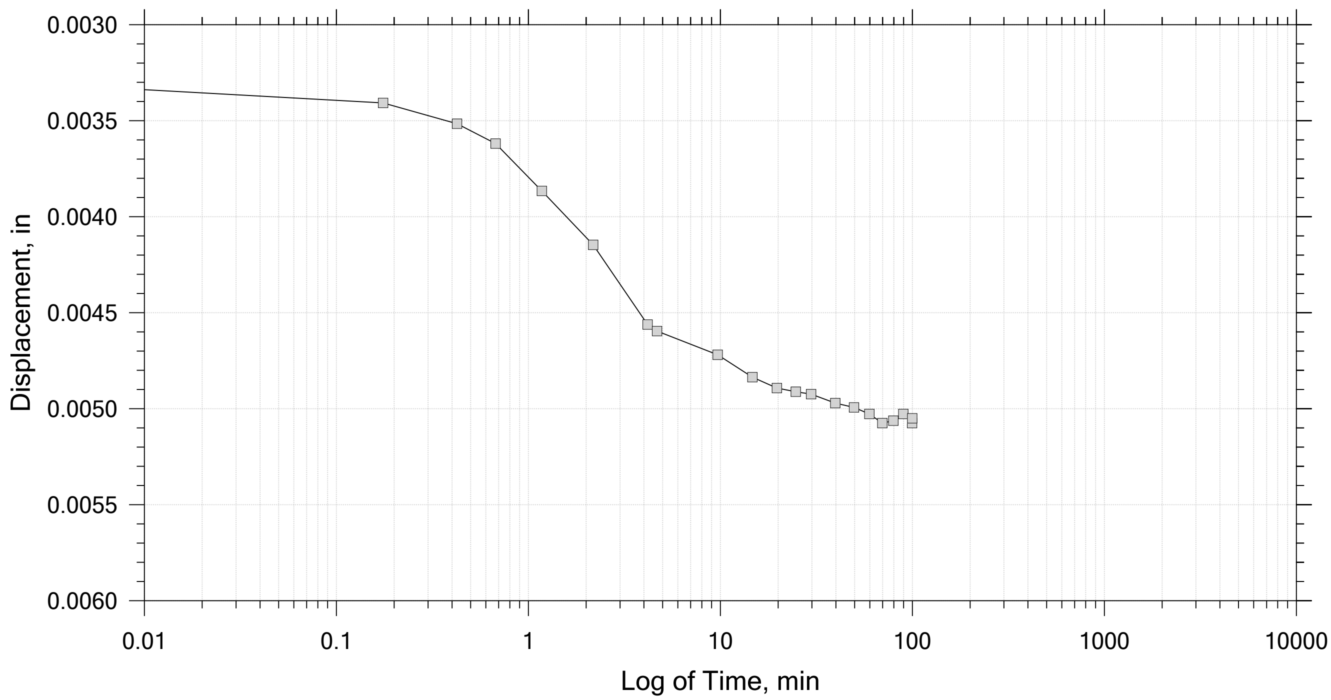
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

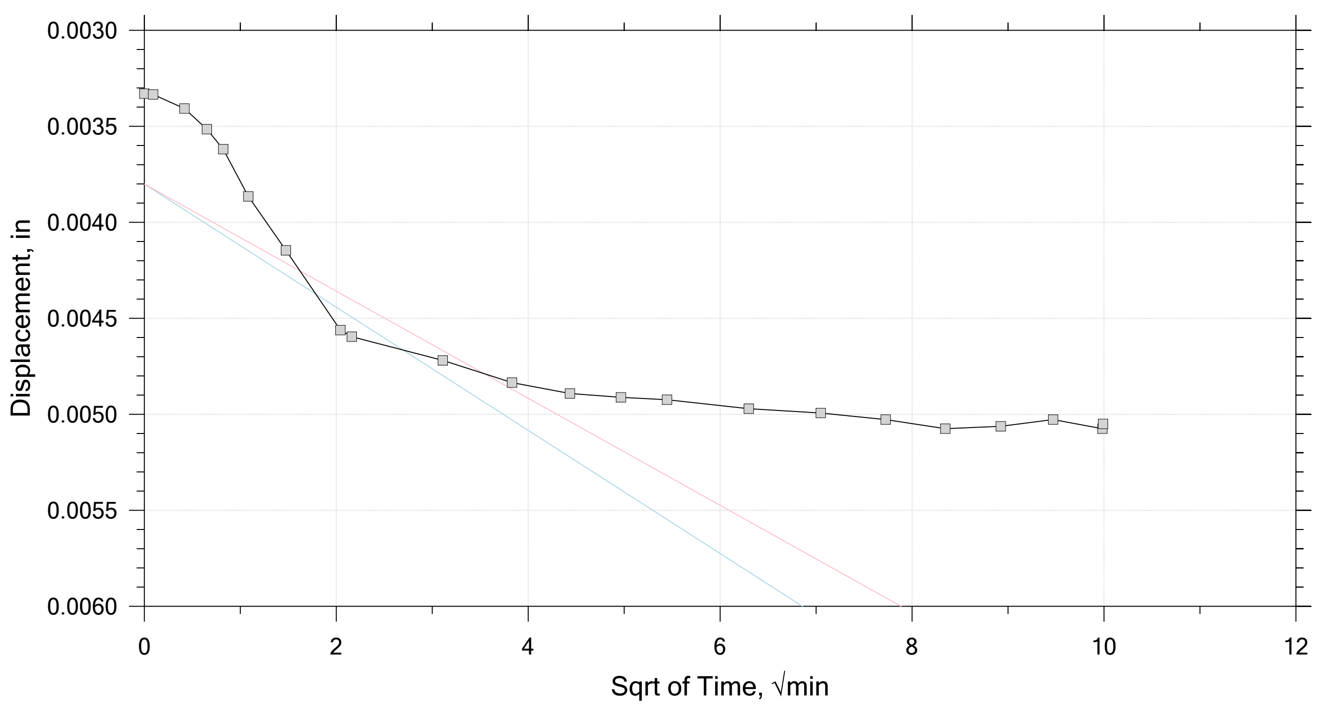
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 23

Constant Load Step

Stress: 699 psf

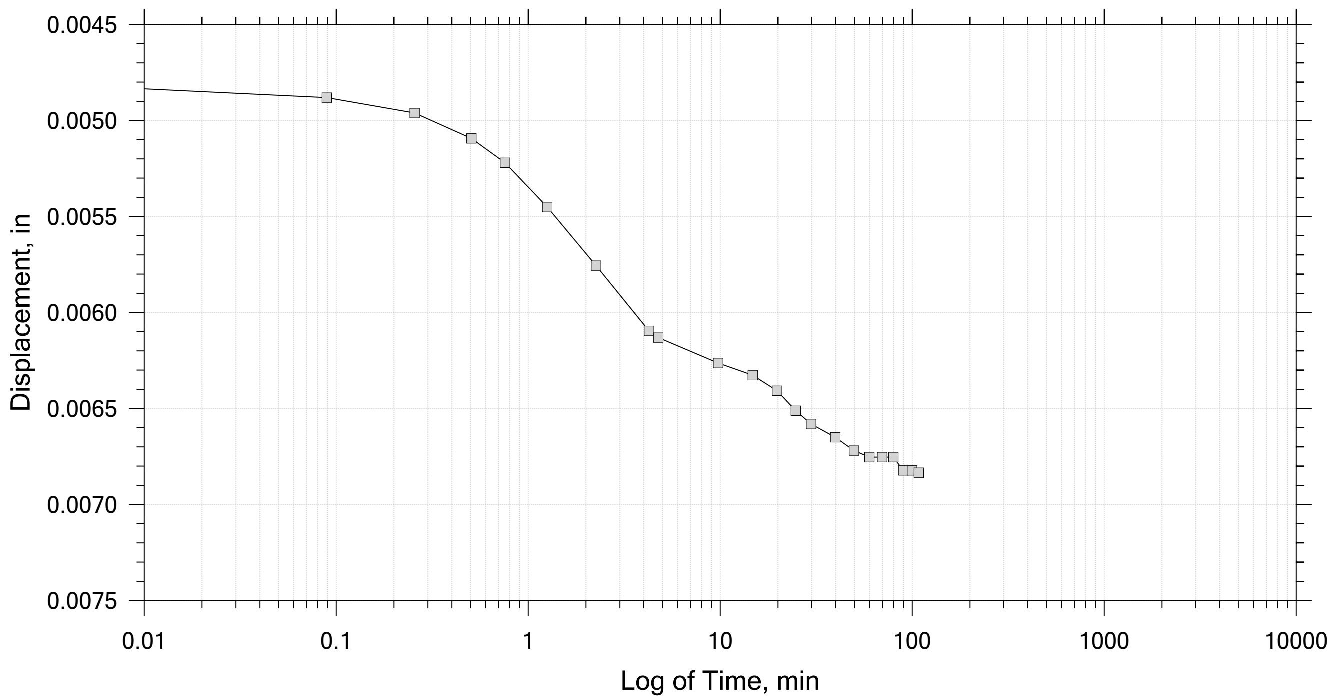


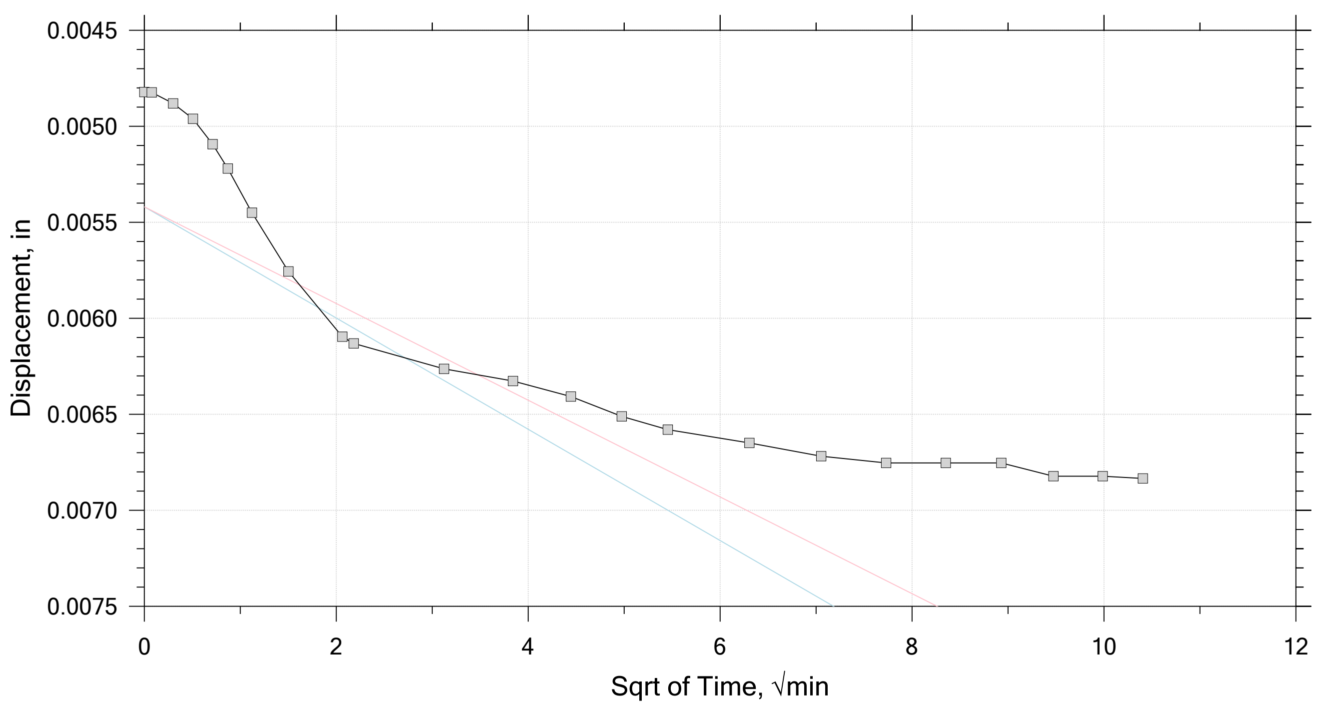


Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 23
Constant Load Step
Stress: 1.05e+03 psf





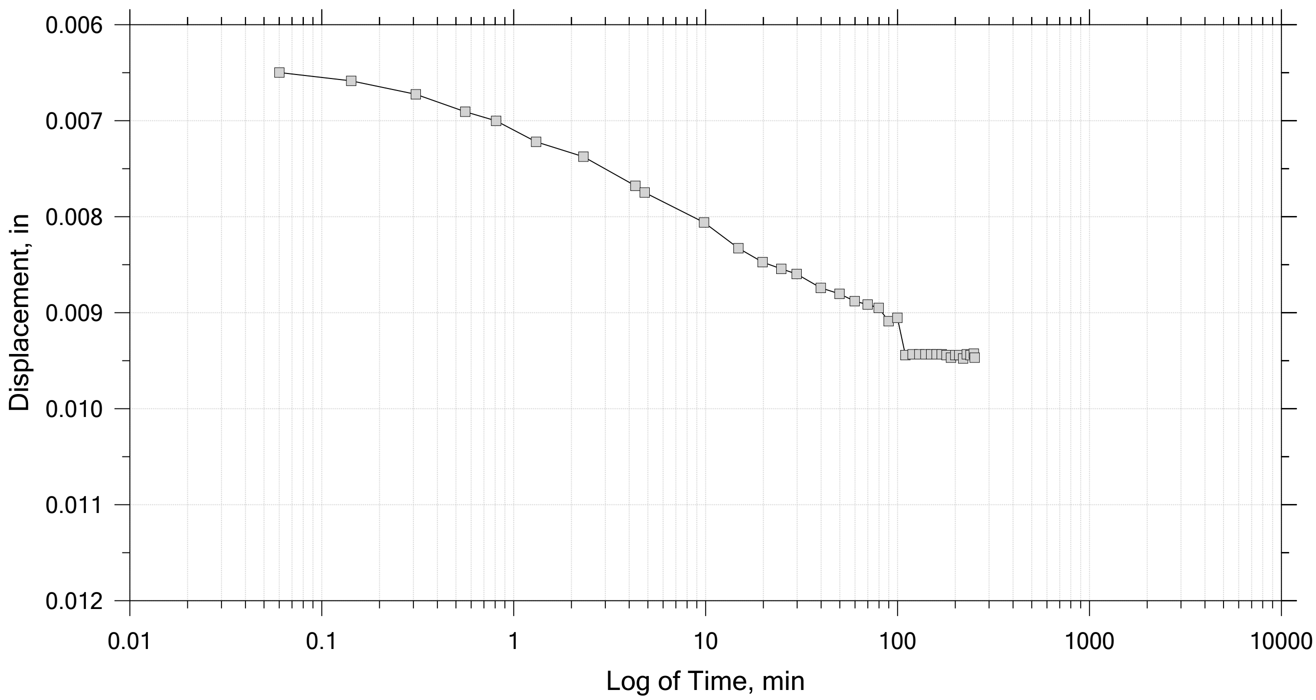
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

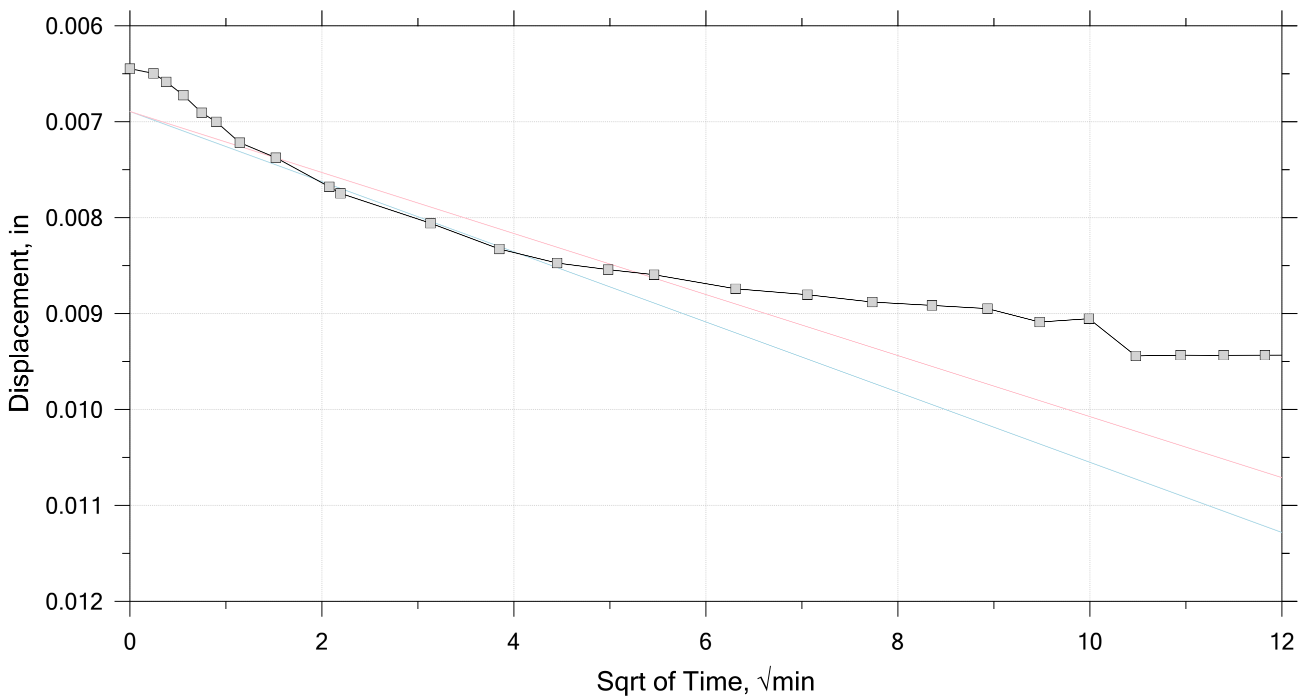
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 23

Constant Load Step

Stress: 1.57e+03 psf





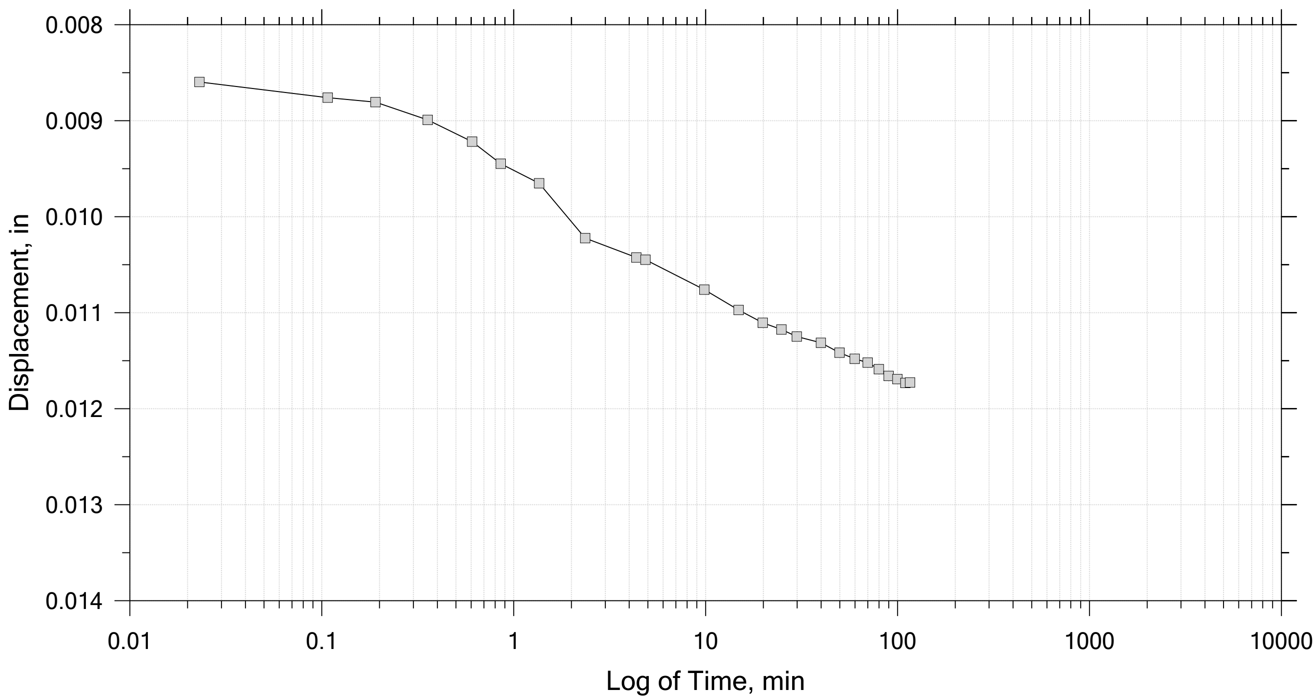
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

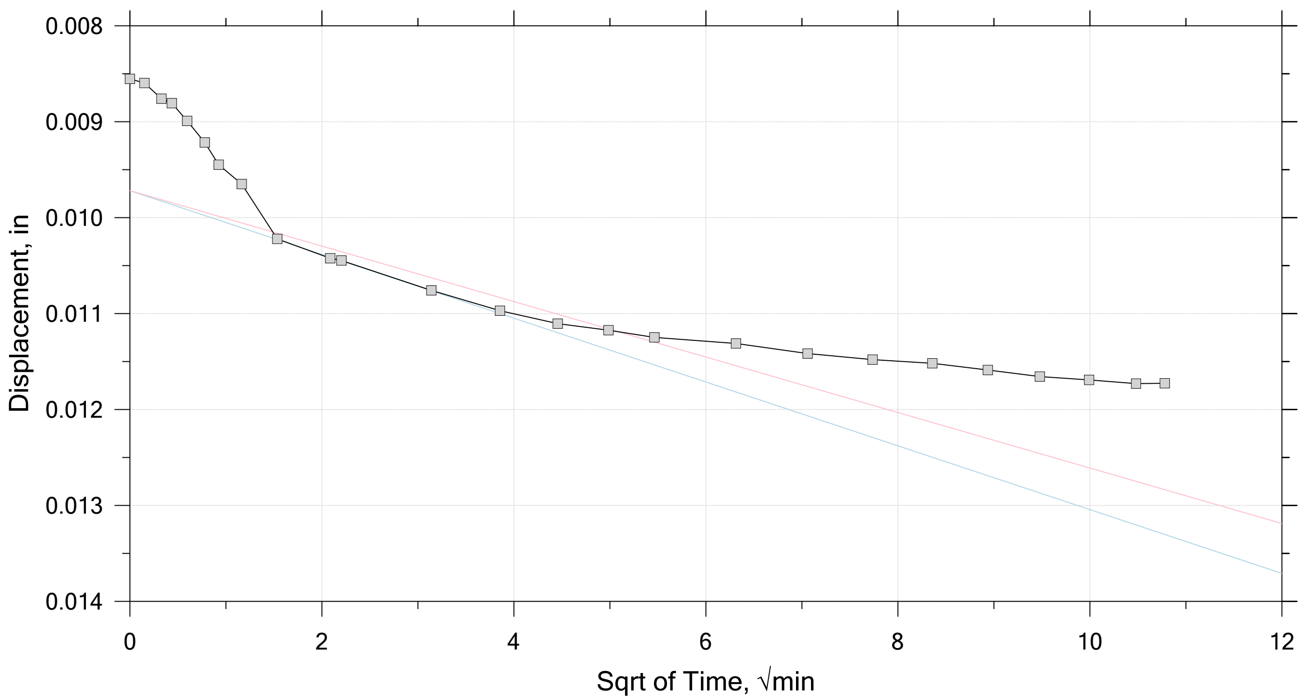
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 23

Constant Load Step

Stress: 2.36e+03 psf

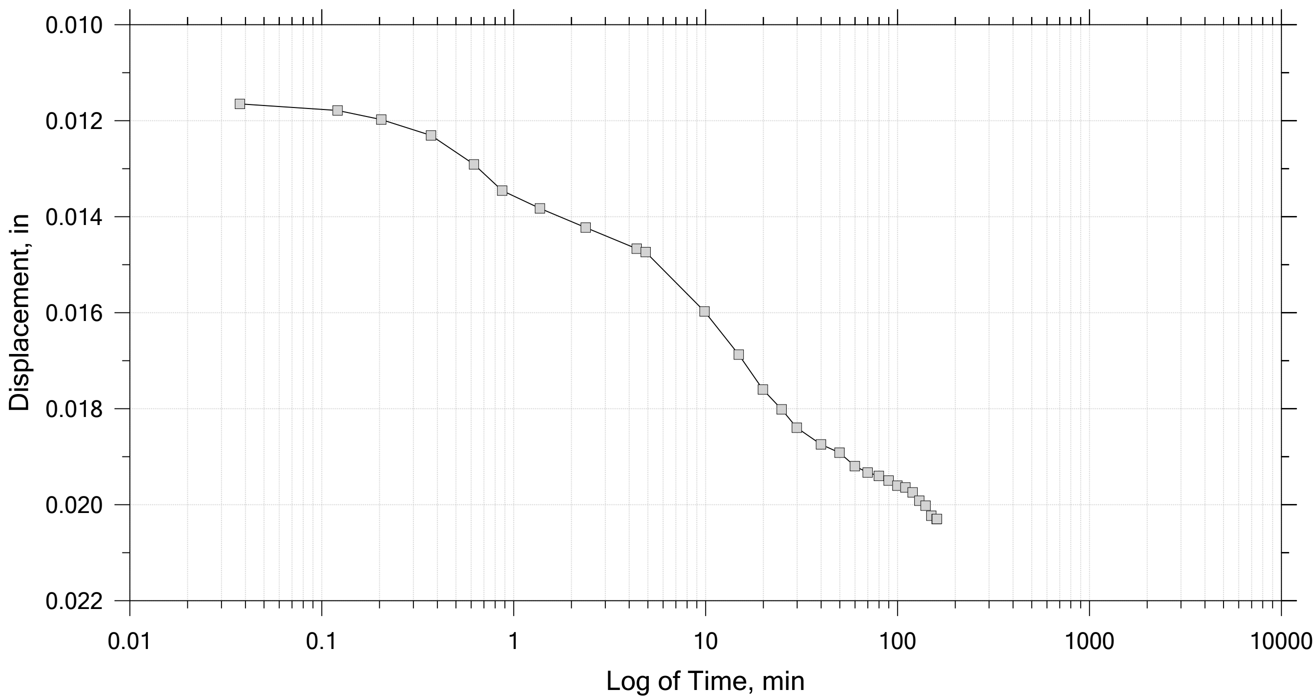


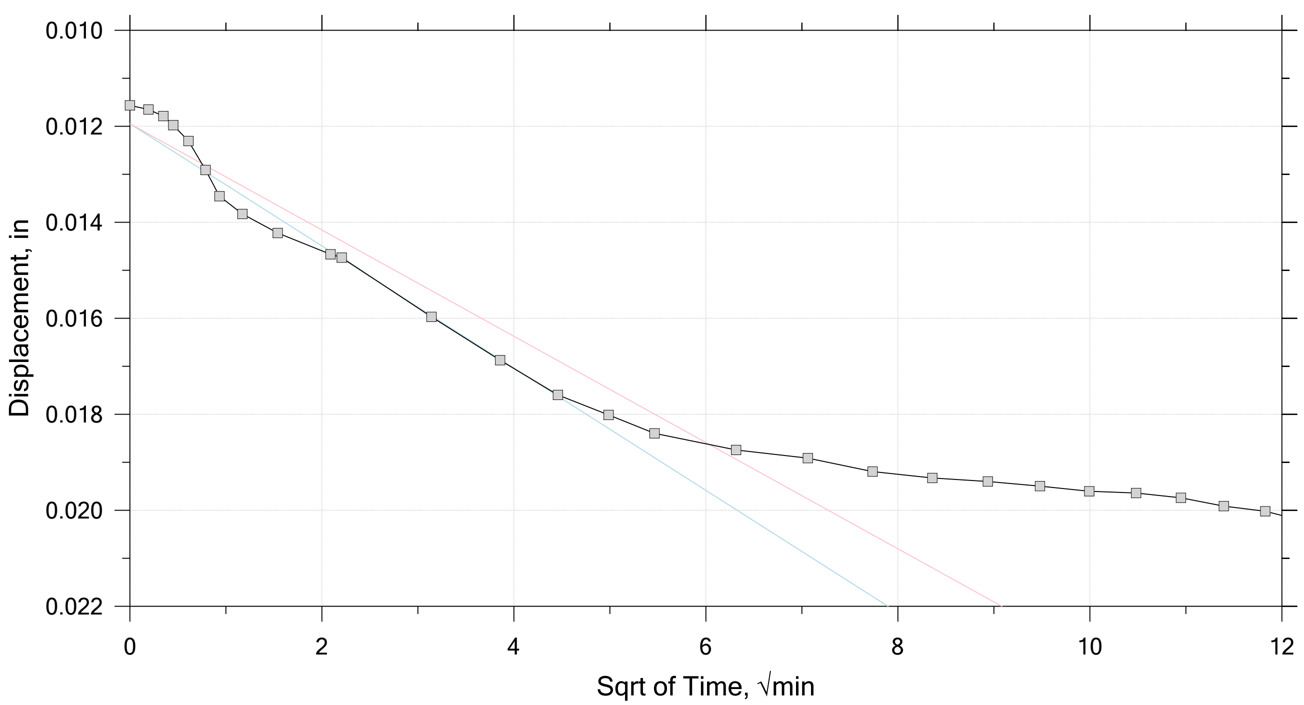


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 23
Constant Load Step
Stress: 3.54e+03 psf





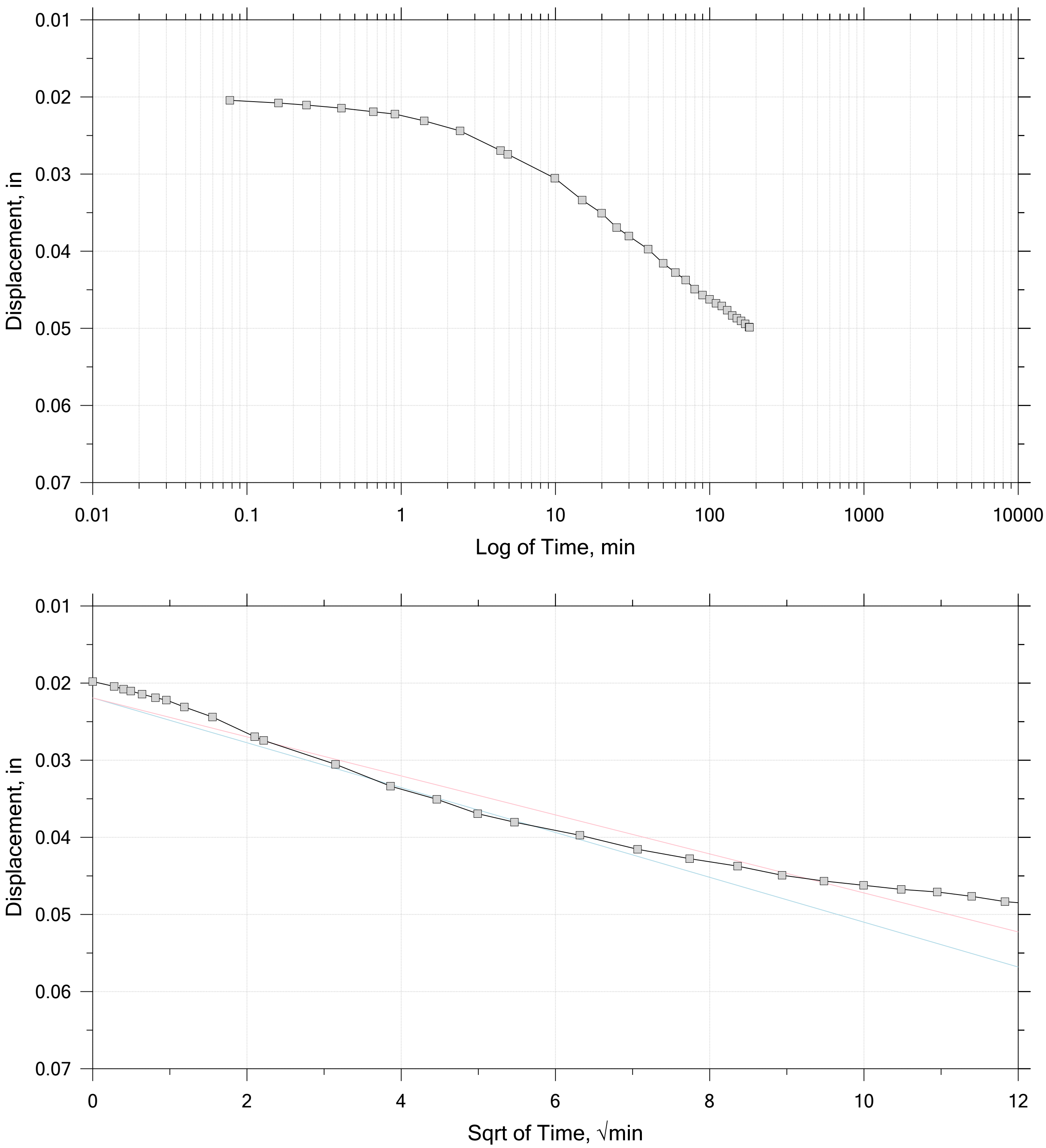
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 23

Constant Load Step

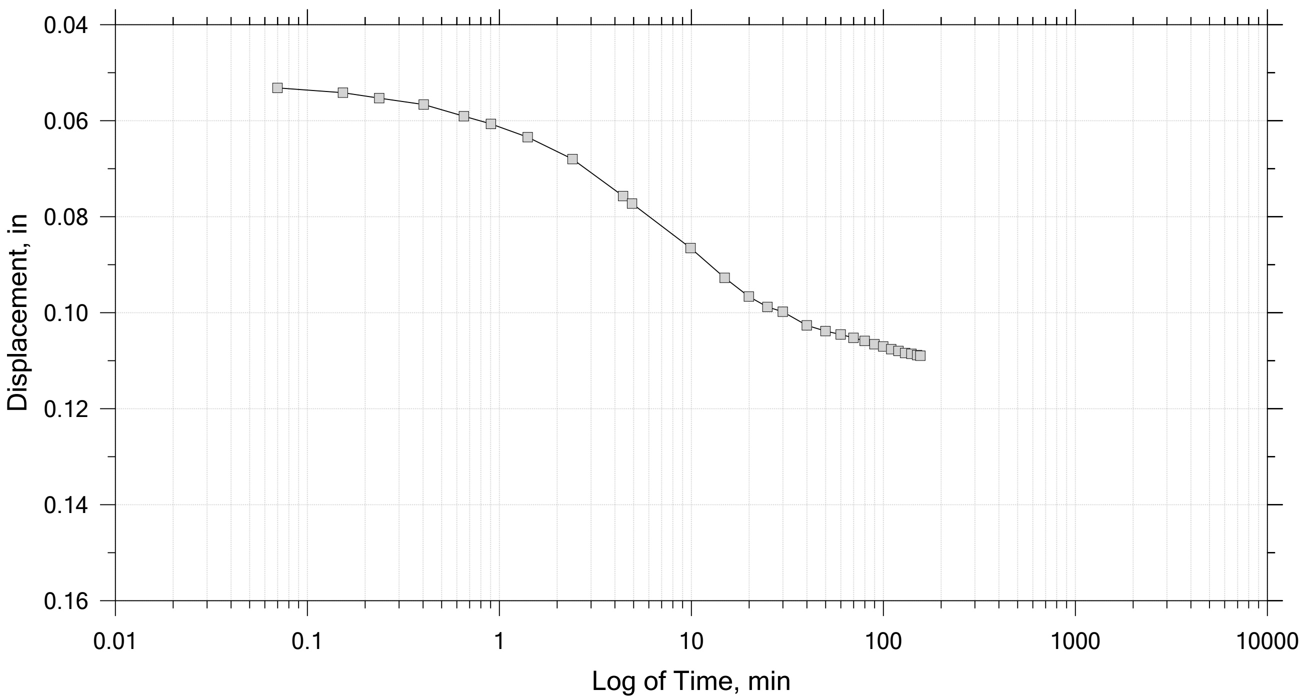
Stress: 5.3e+03 psf

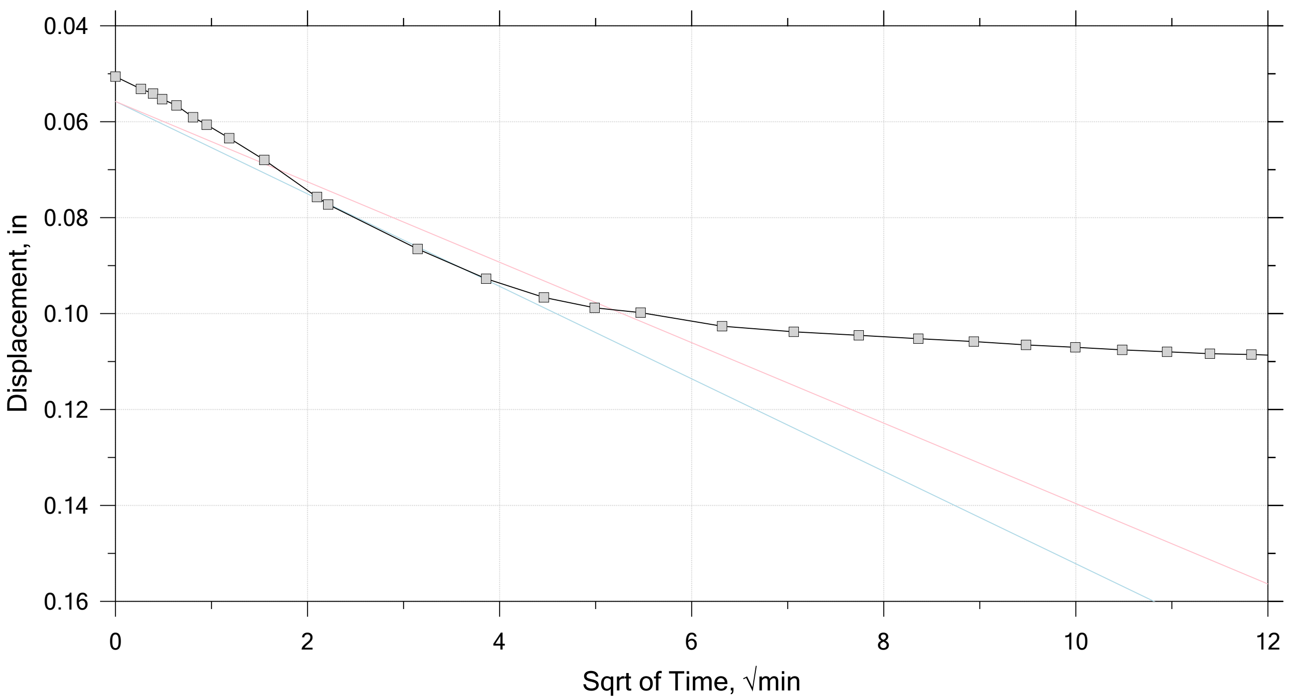


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 23
Constant Load Step
Stress: 1.06e+04 psf

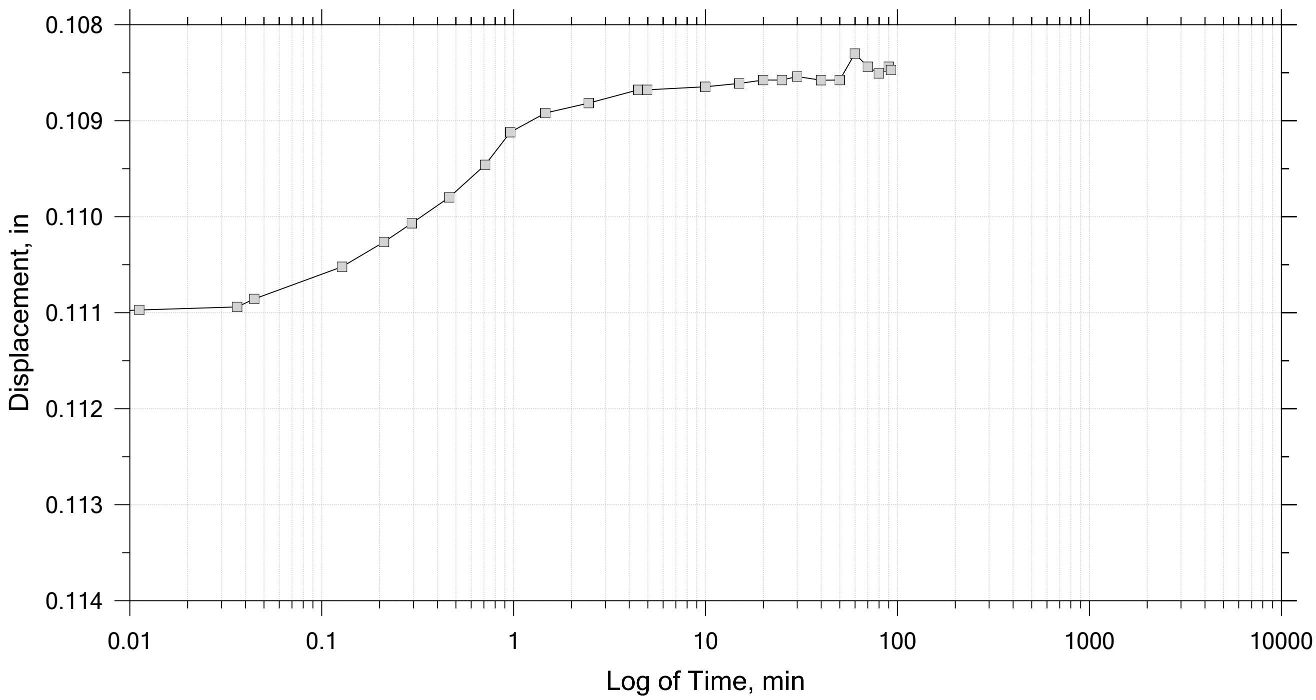


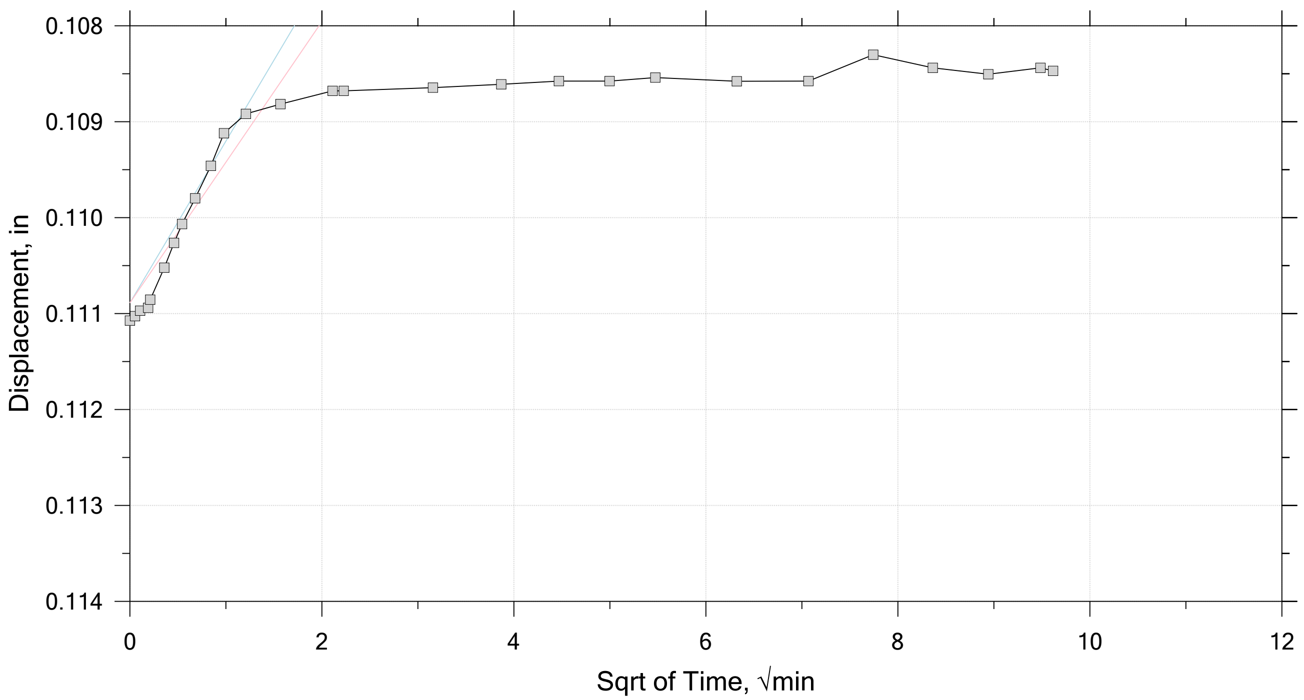


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 23
Constant Load Step
Stress: 5.3e+03 psf

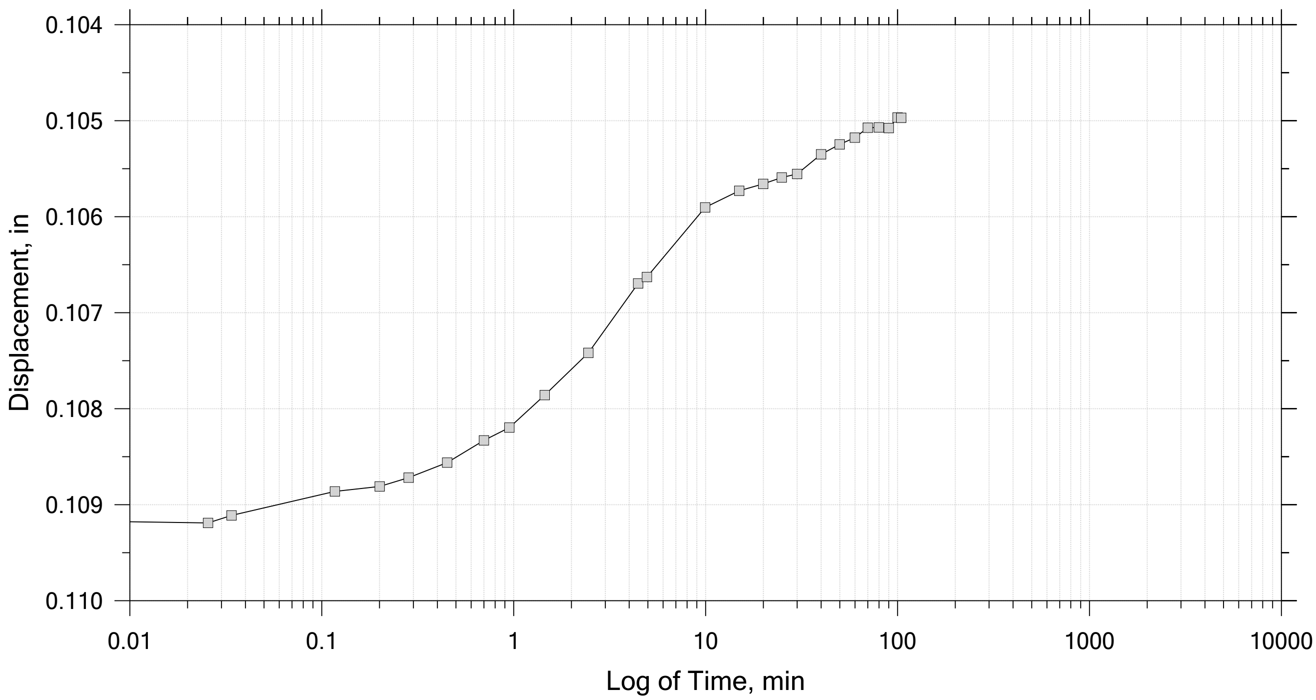


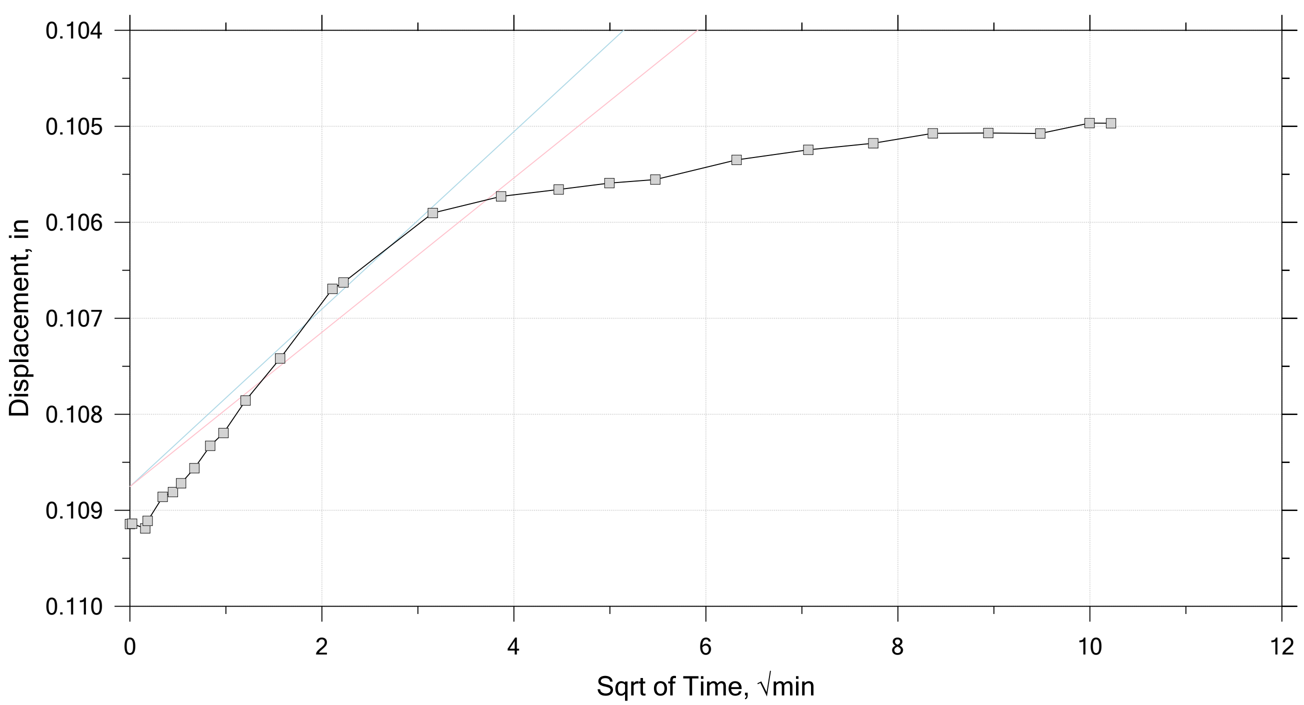


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 23
Constant Load Step
Stress: 2.65e+03 psf

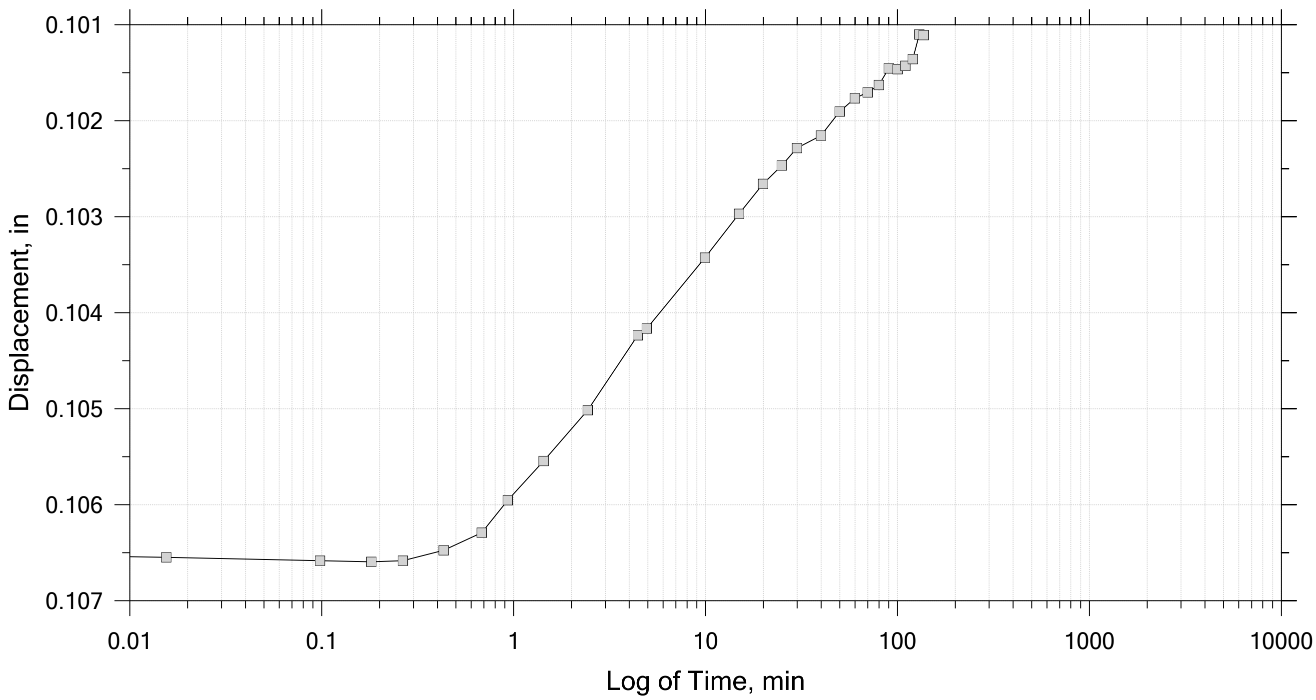


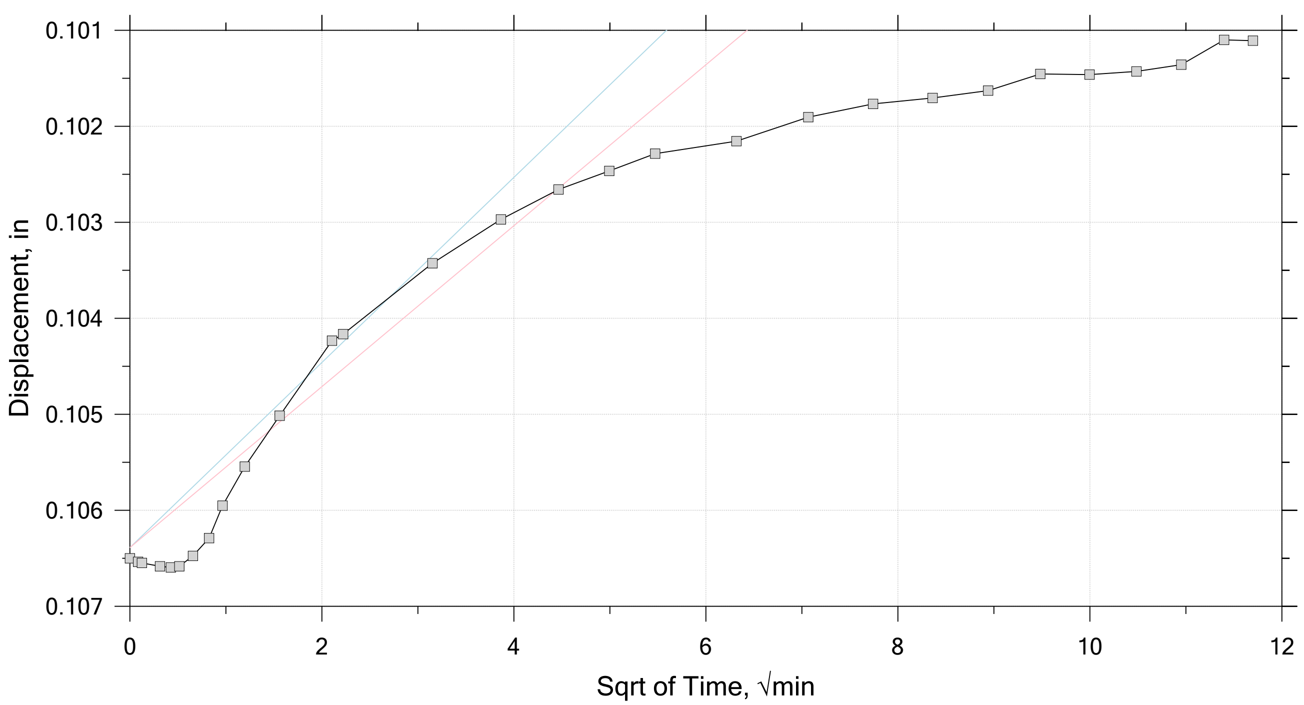


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 23
Constant Load Step
Stress: 1.33e+03 psf

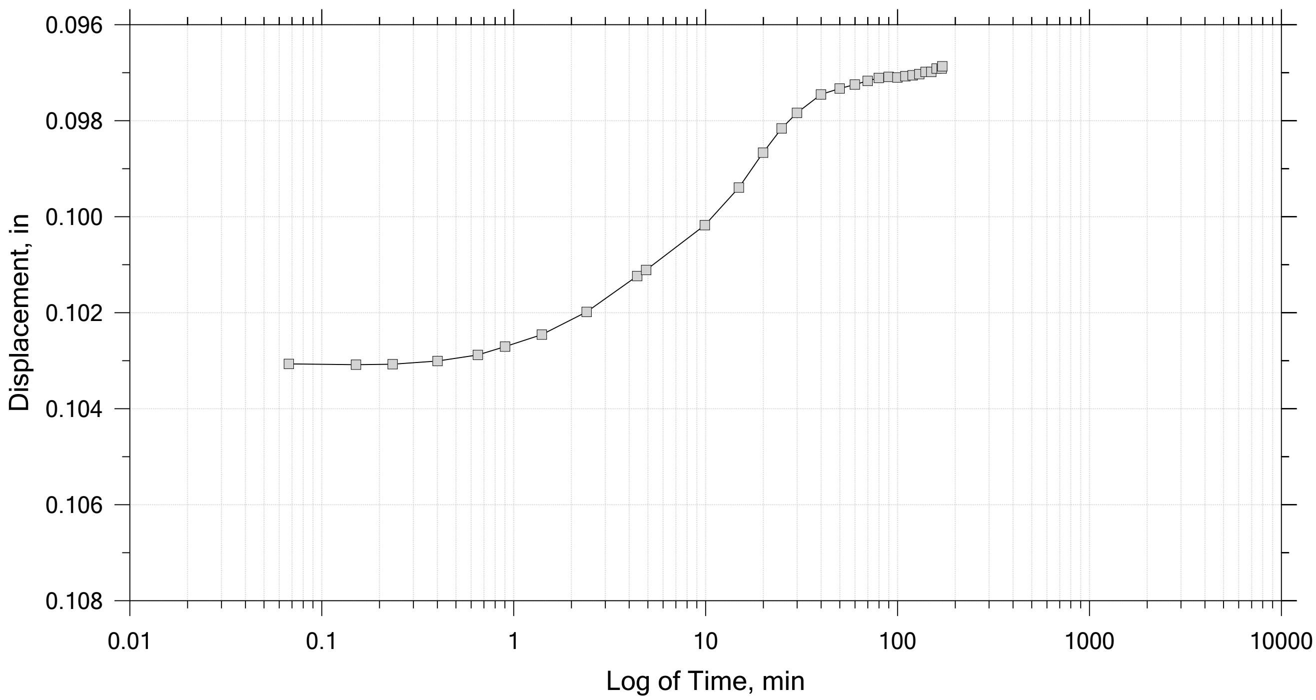


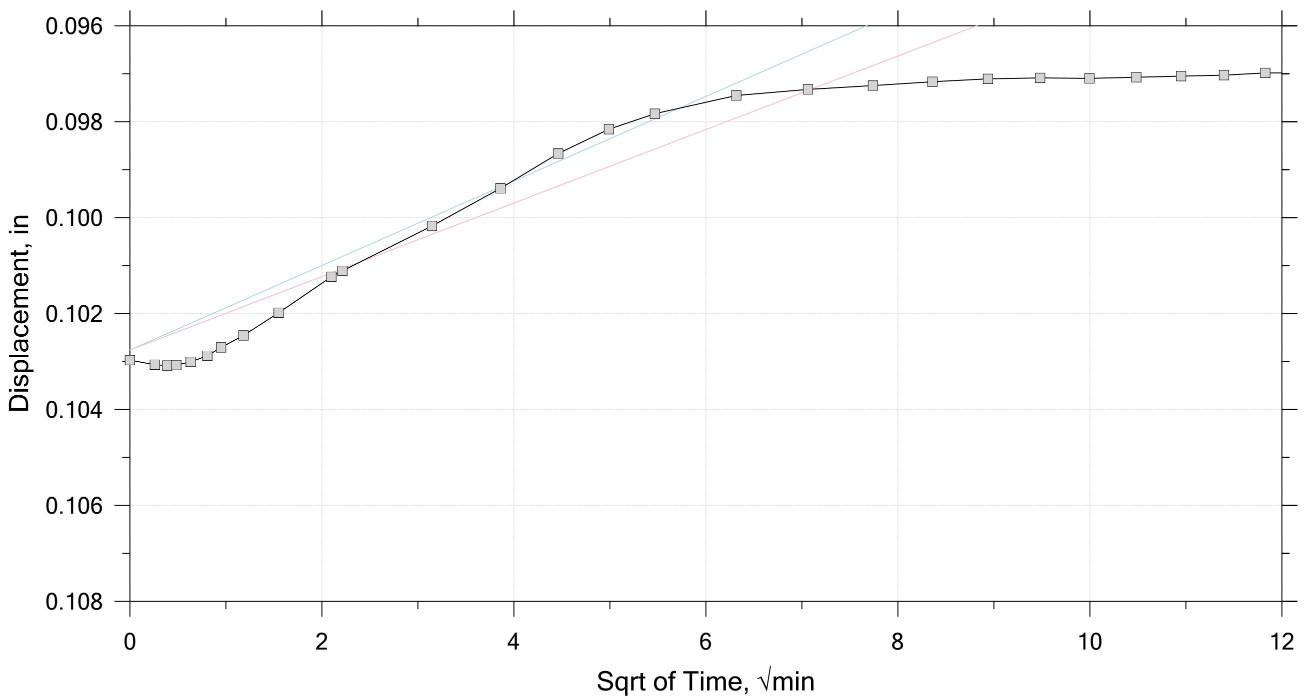


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 23
Constant Load Step
Stress: 663 psf





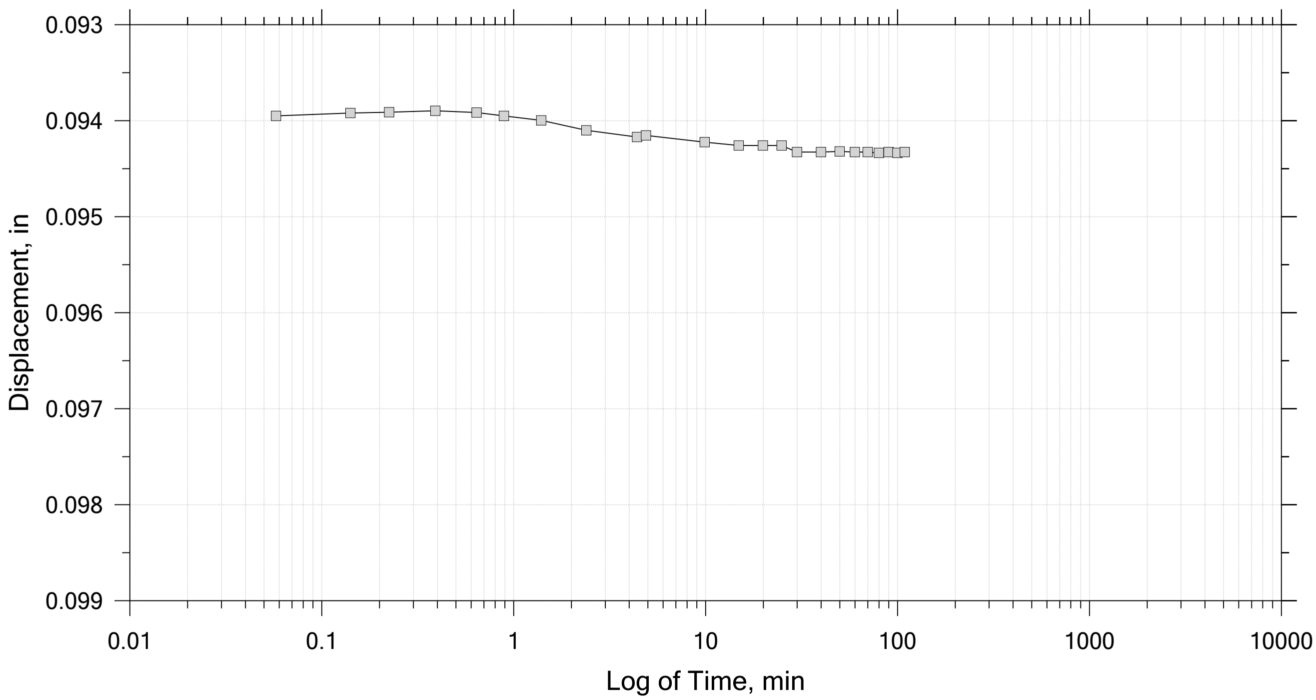
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

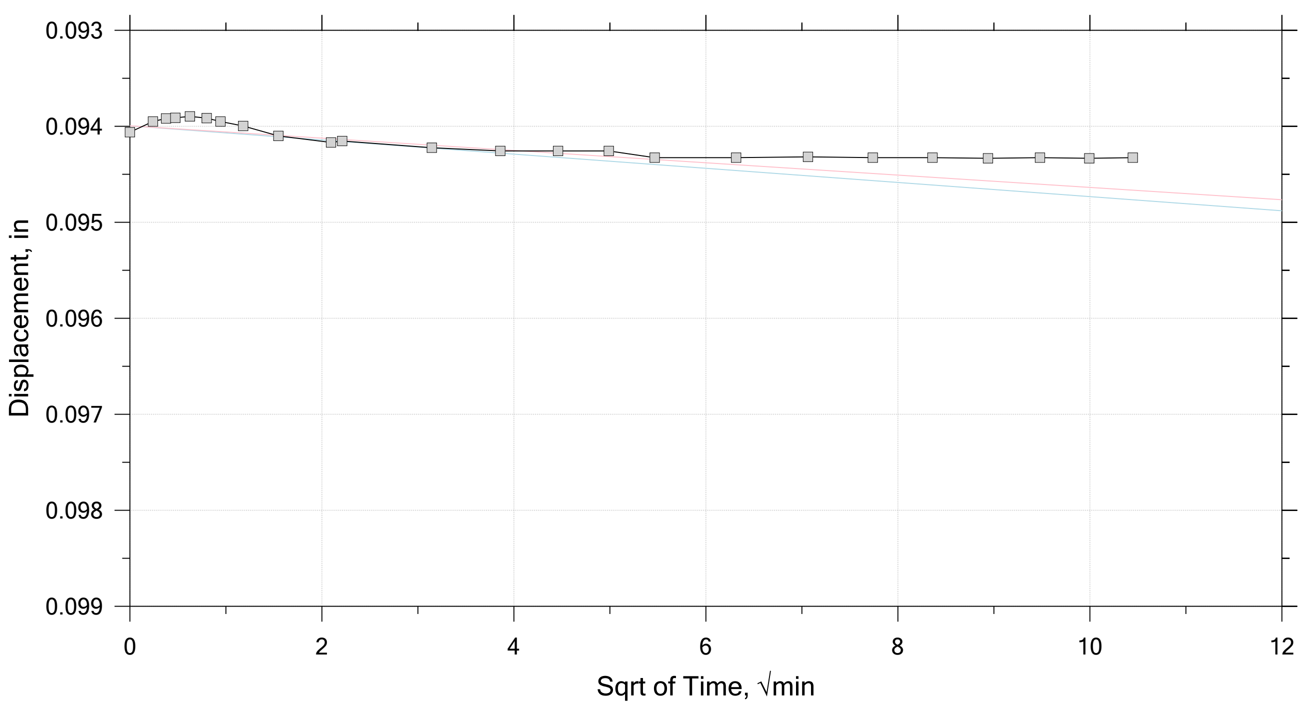
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 23

Constant Load Step

Stress: 1.33e+03 psf

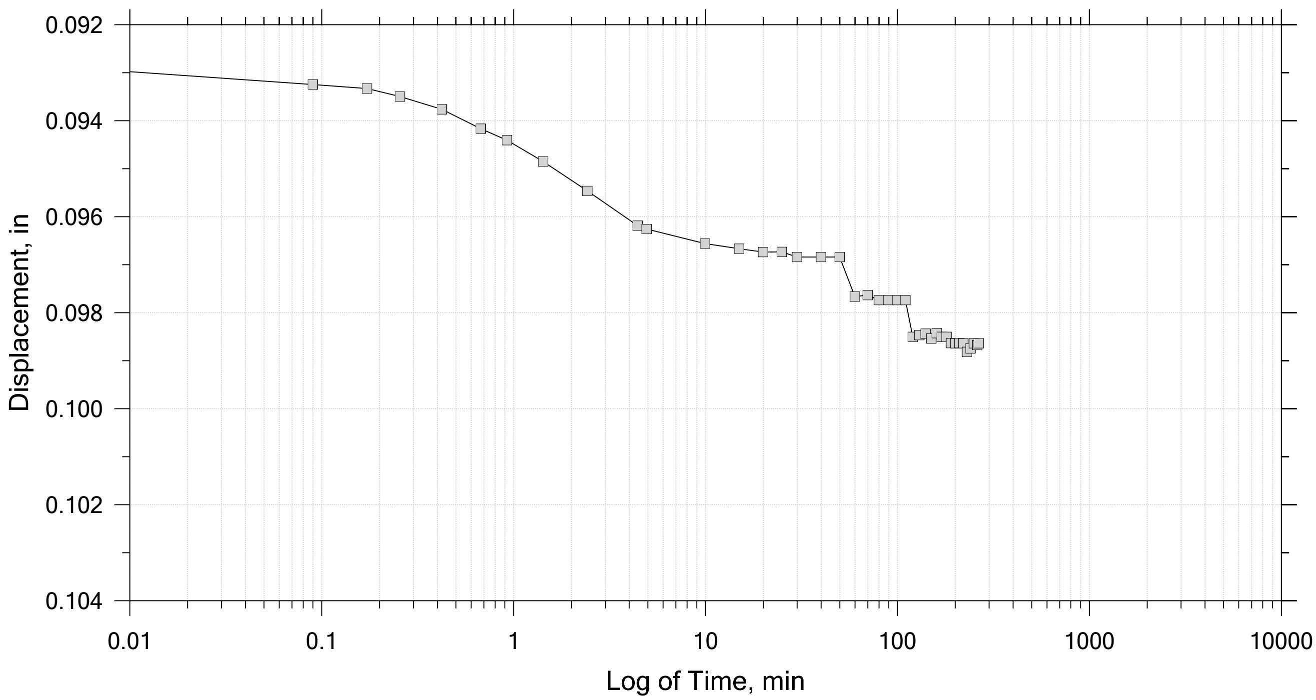


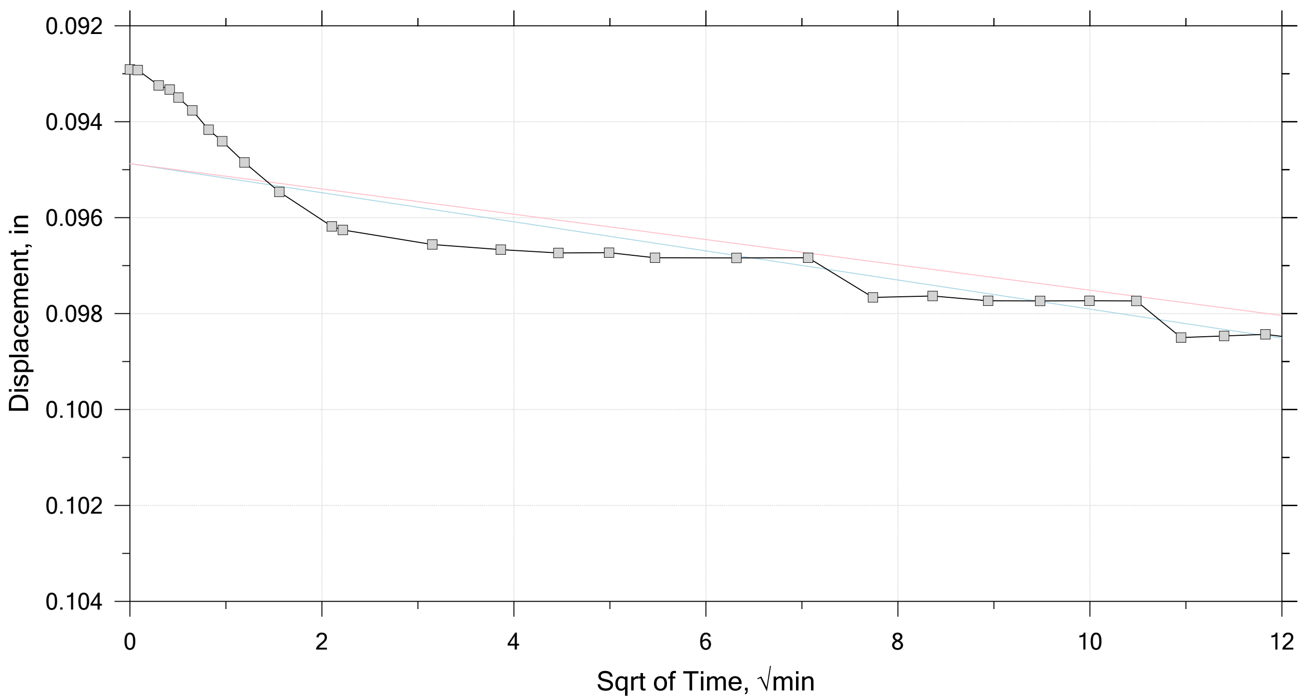


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 16 of 23
Constant Load Step
Stress: 2.65e+03 psf

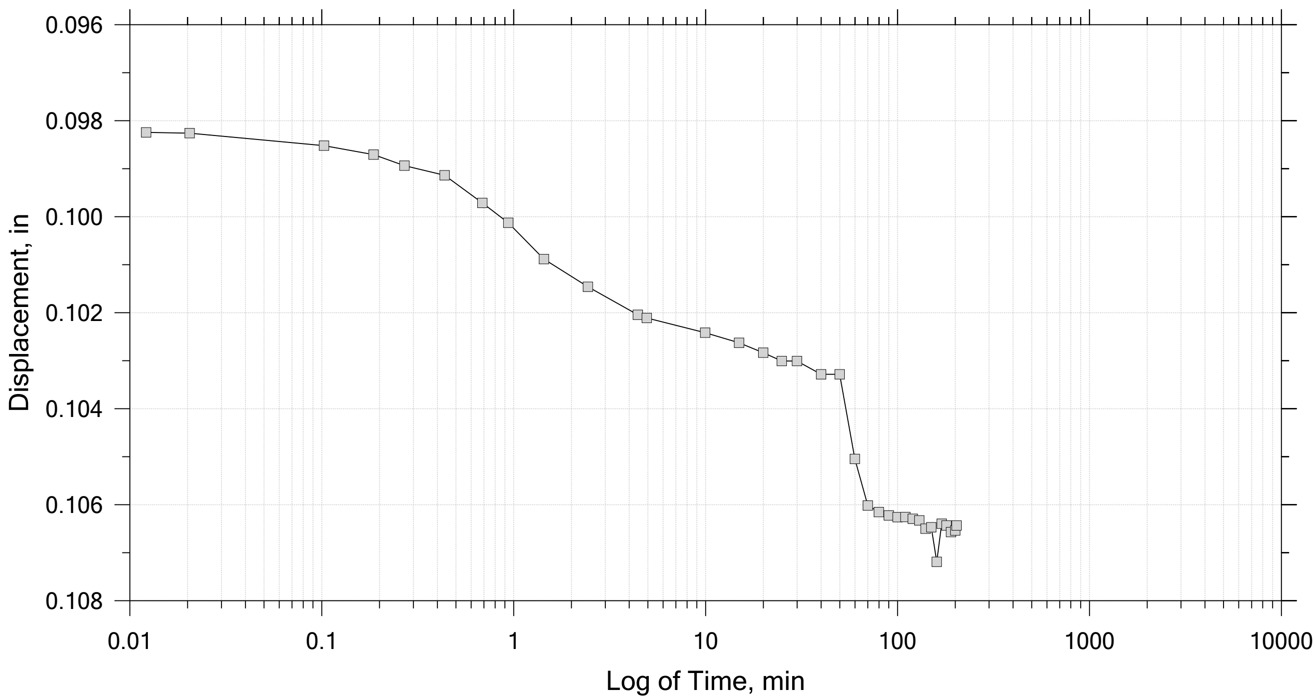


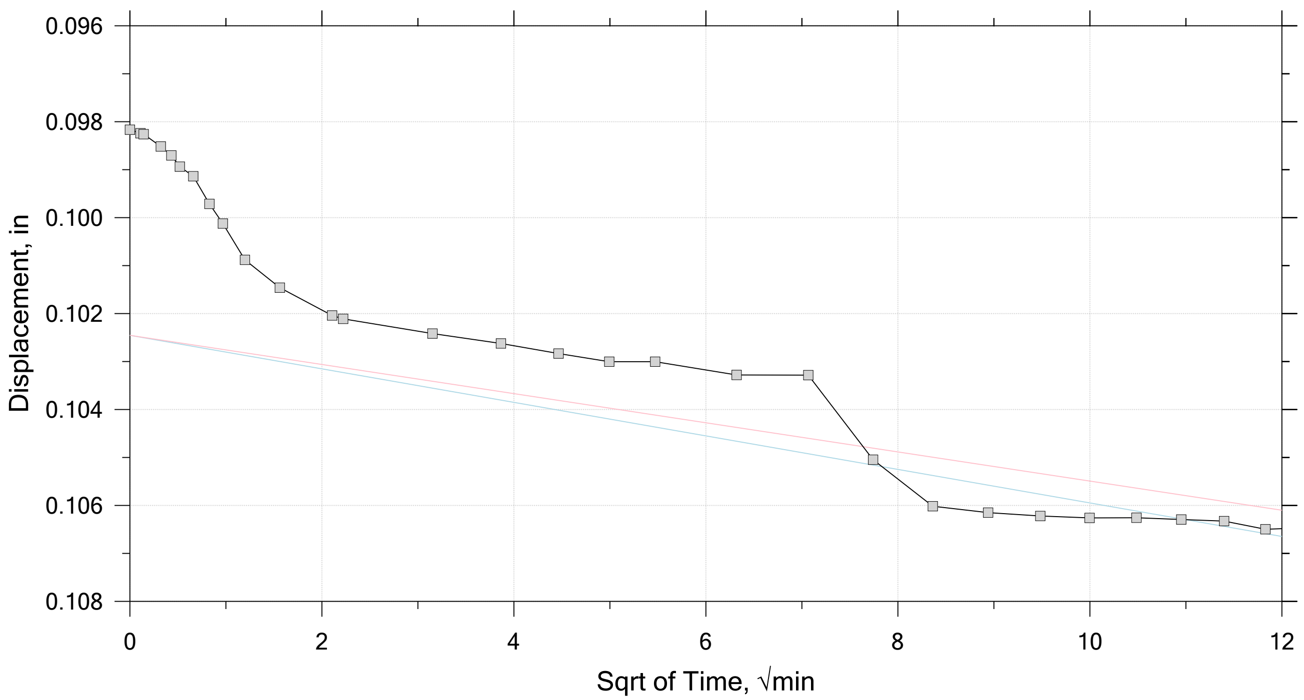


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 17 of 23
Constant Load Step
Stress: 5.3e+03 psf

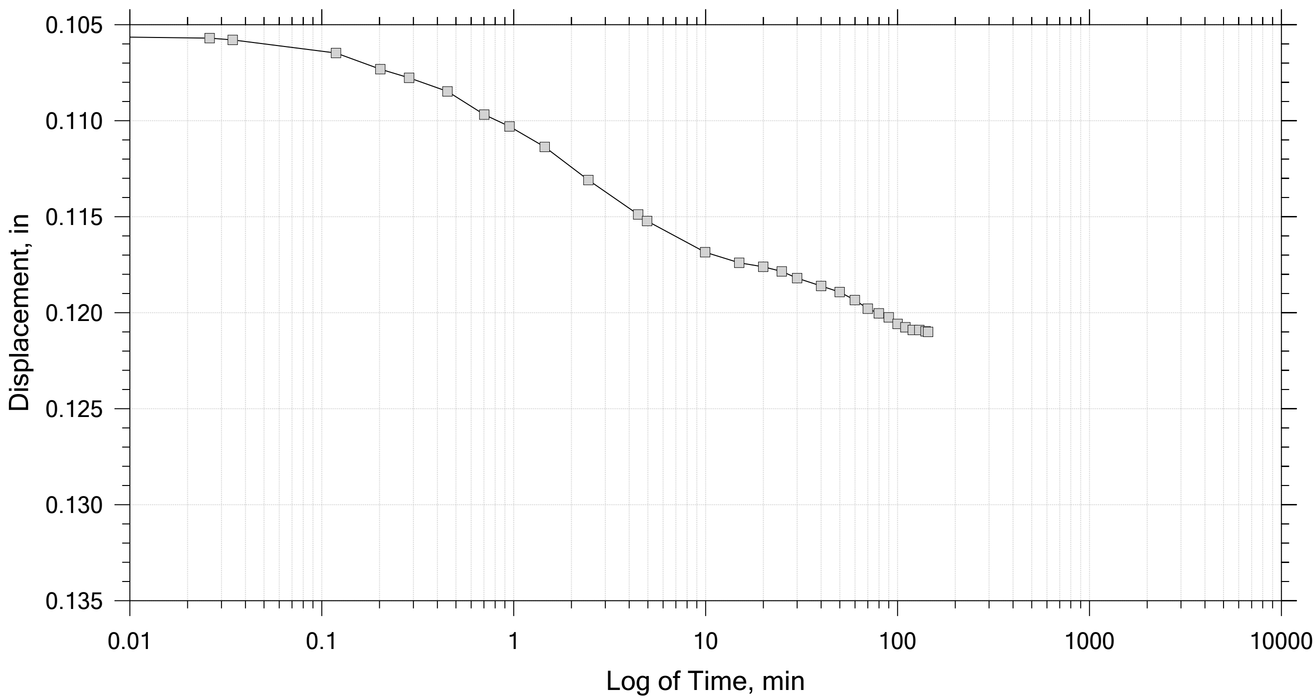


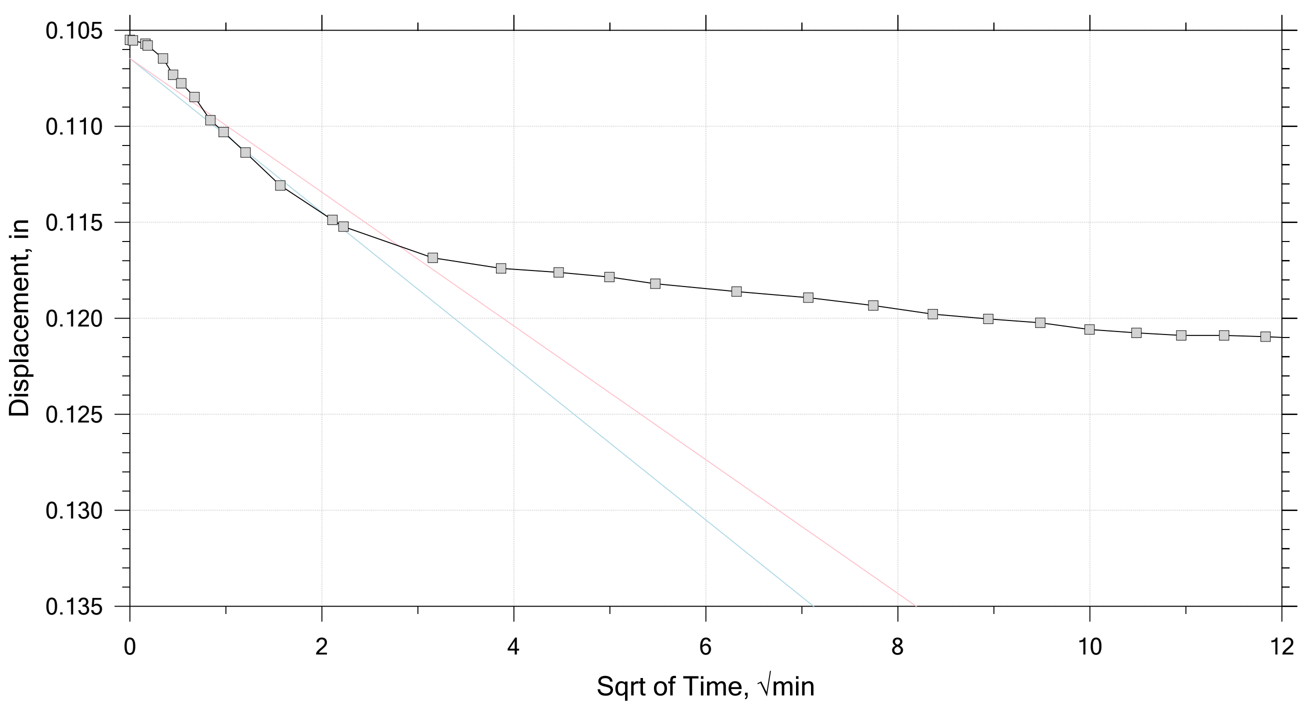


Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 18 of 23
Constant Load Step
Stress: 1.06e+04 psf





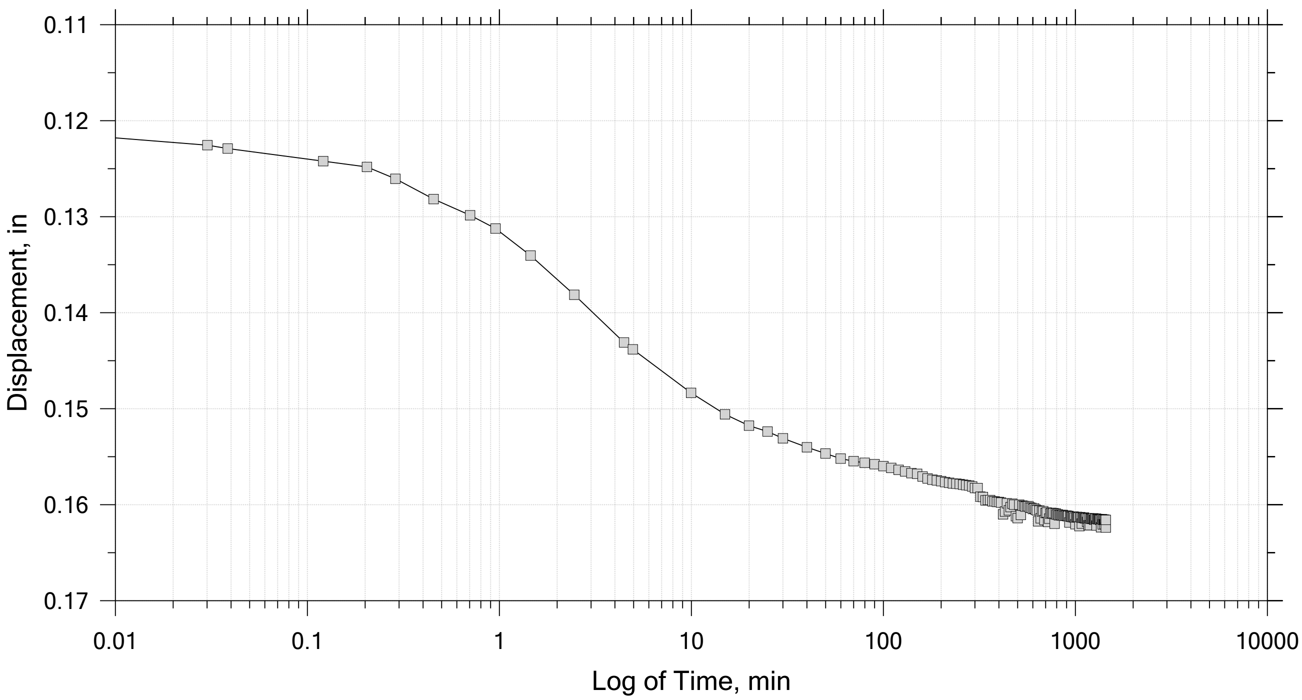
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

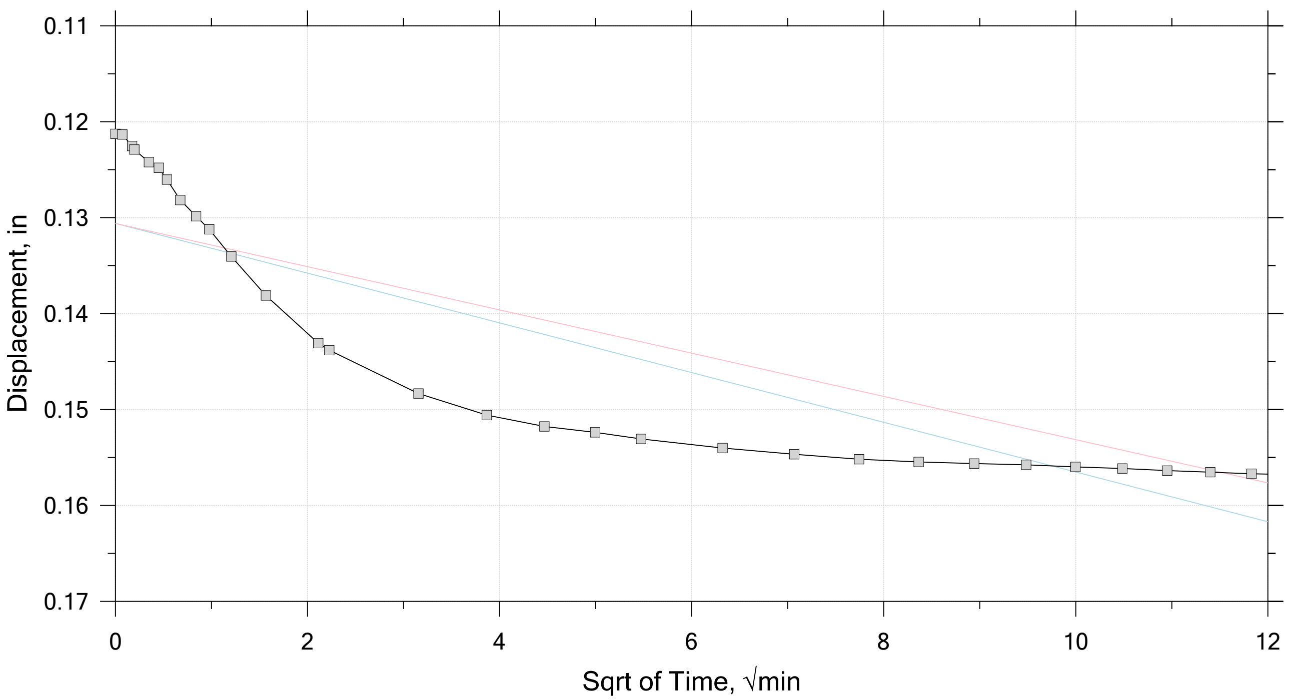
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 19 of 23

Constant Load Step

Stress: 2.12e+04 psf





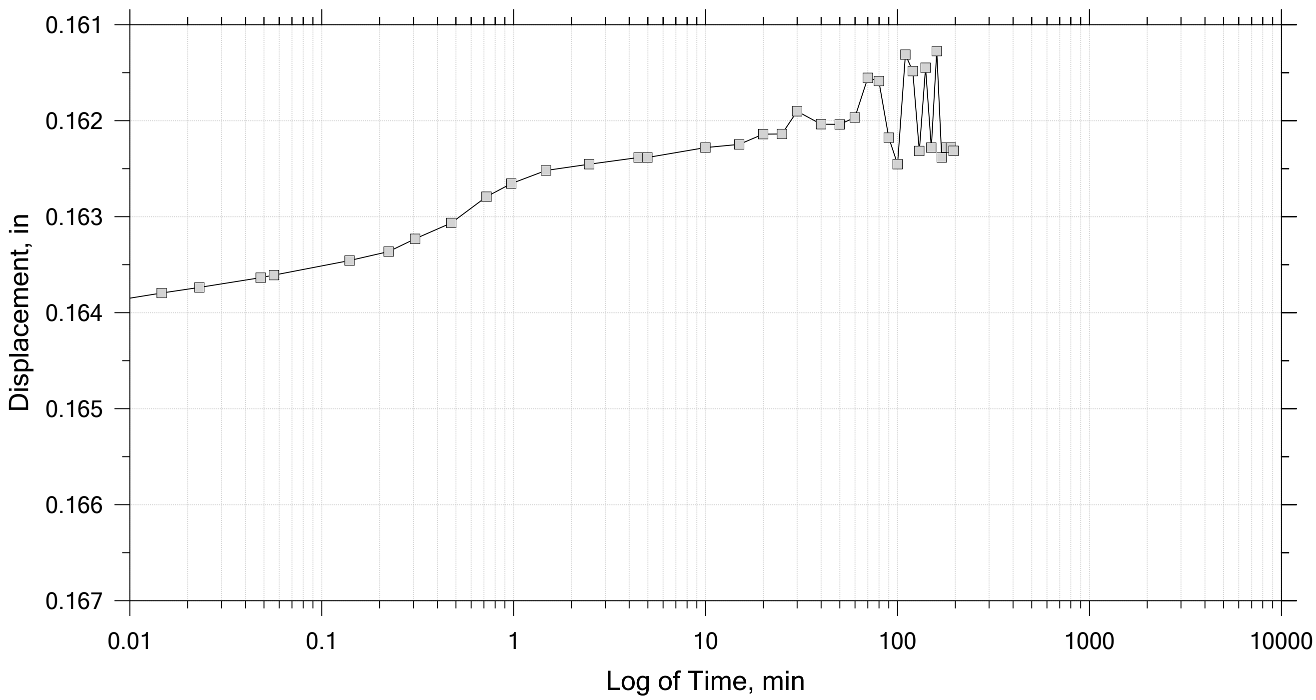
Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

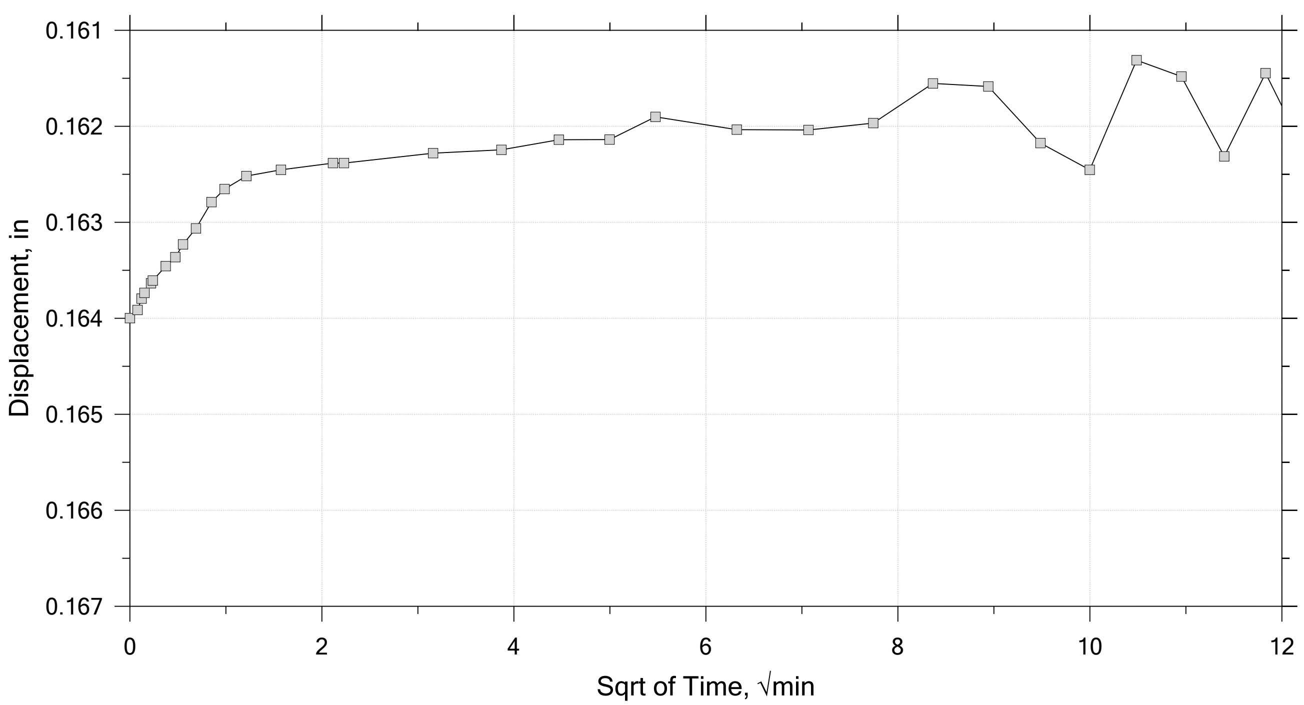
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 20 of 23

Constant Load Step

Stress: 1.06e+04 psf

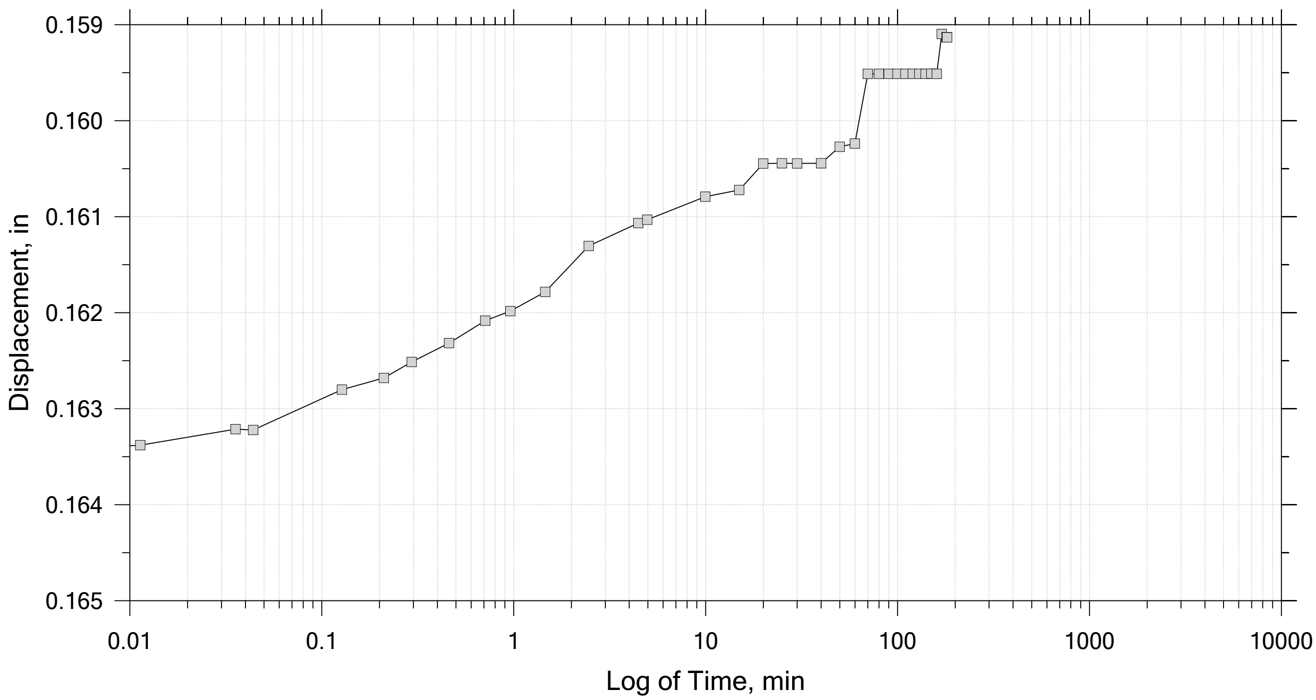


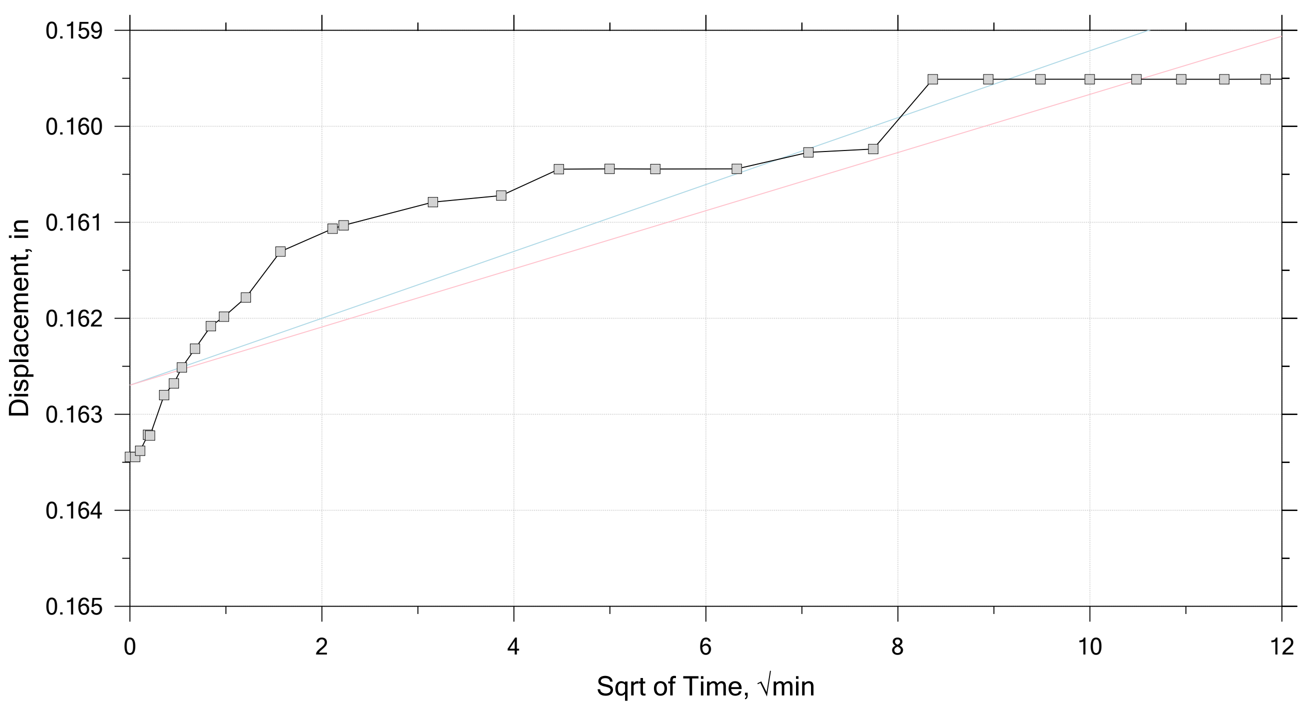


Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 21 of 23
Constant Load Step
Stress: 5.3e+03 psf

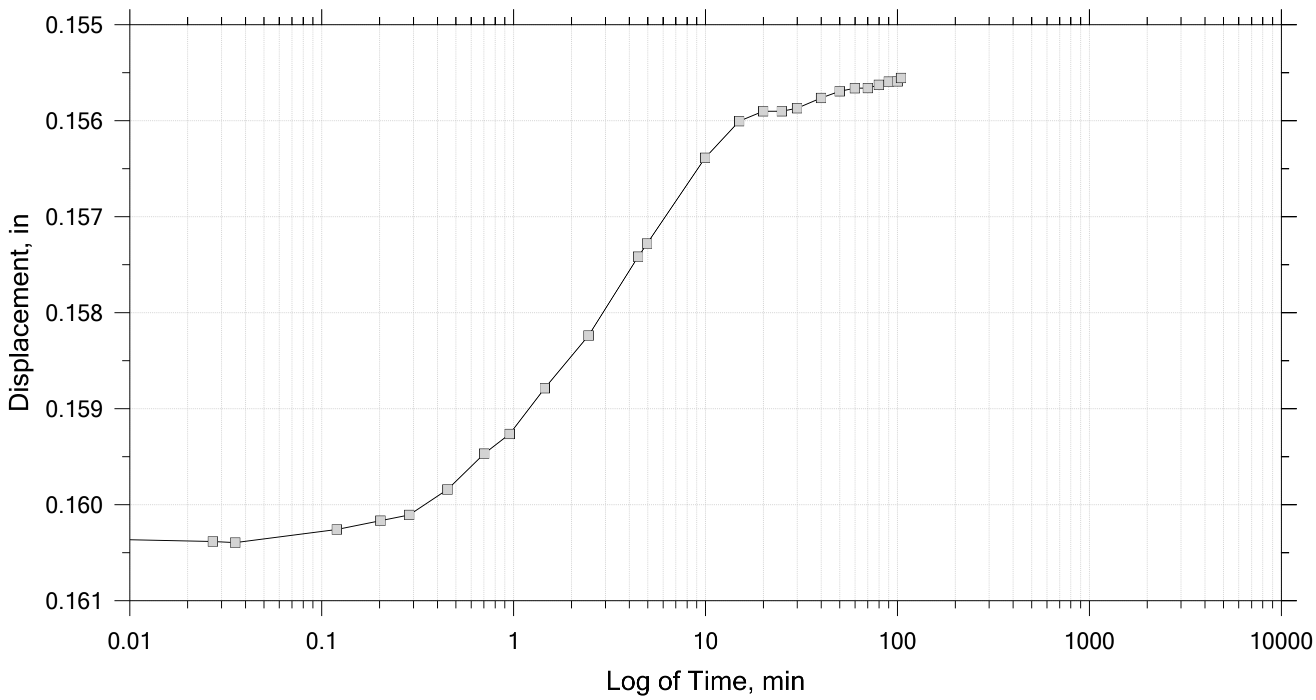


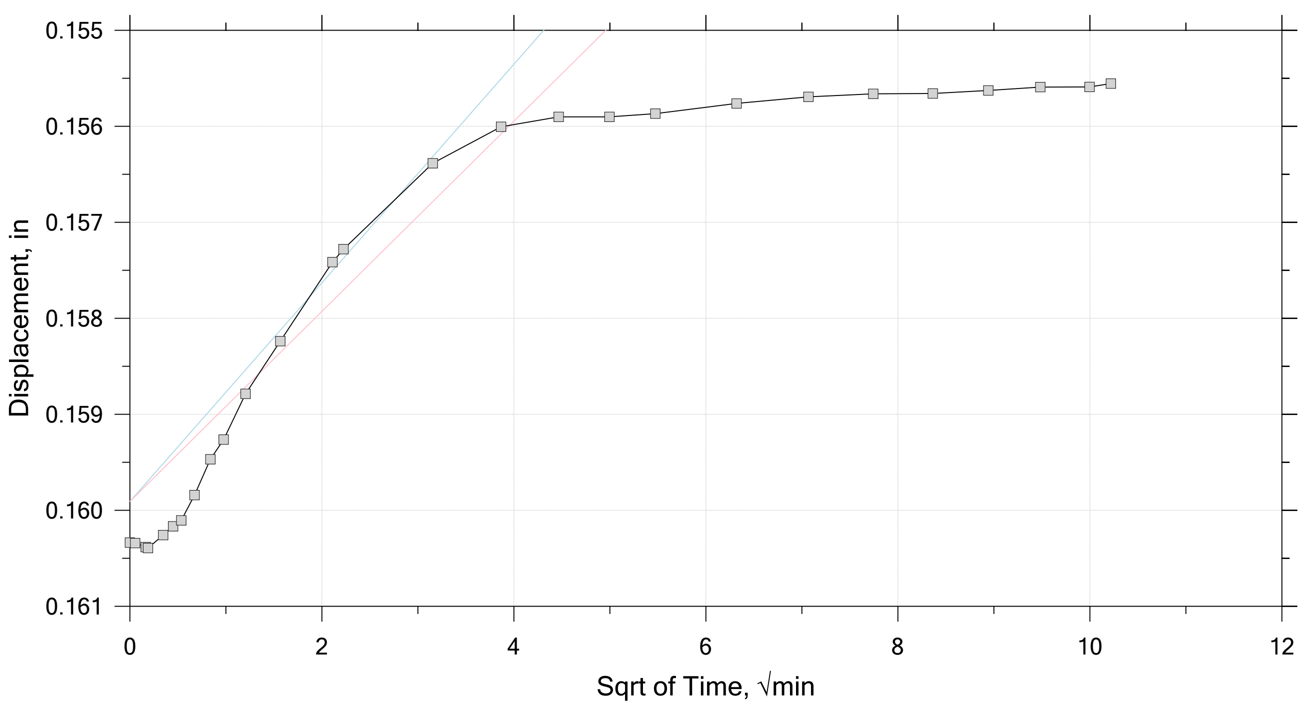


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 22 of 23
Constant Load Step
Stress: 2.65e+03 psf





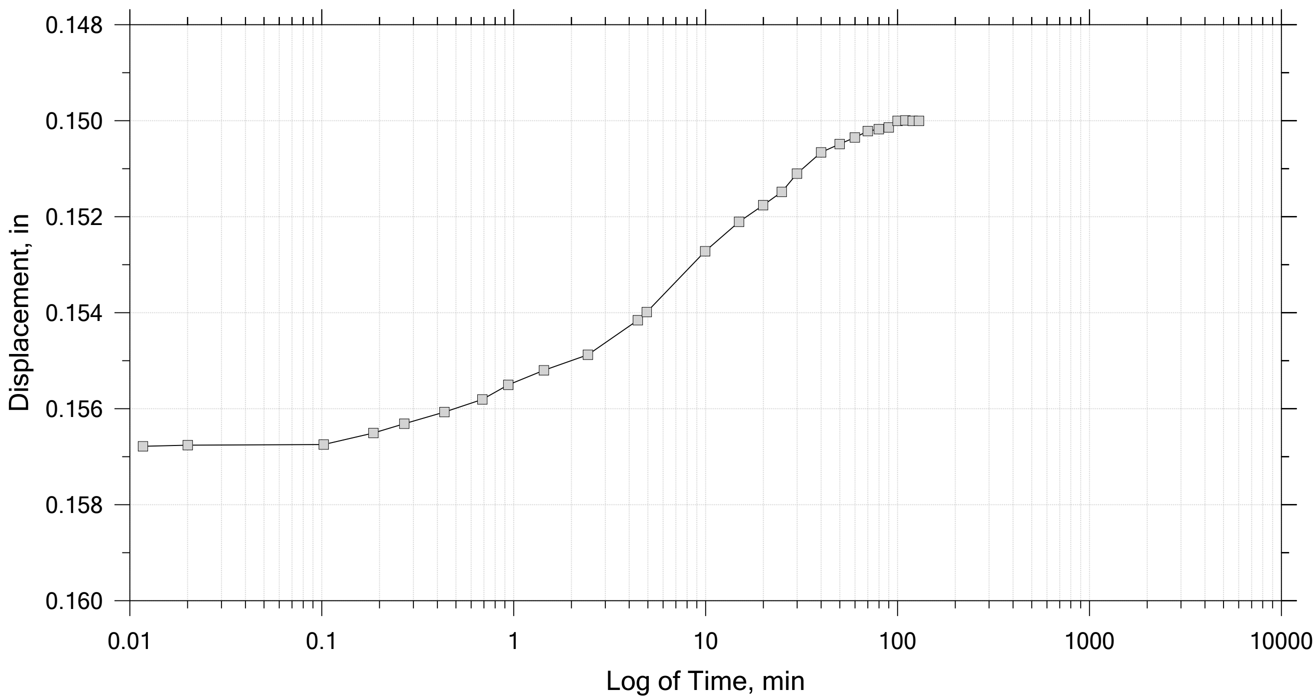
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

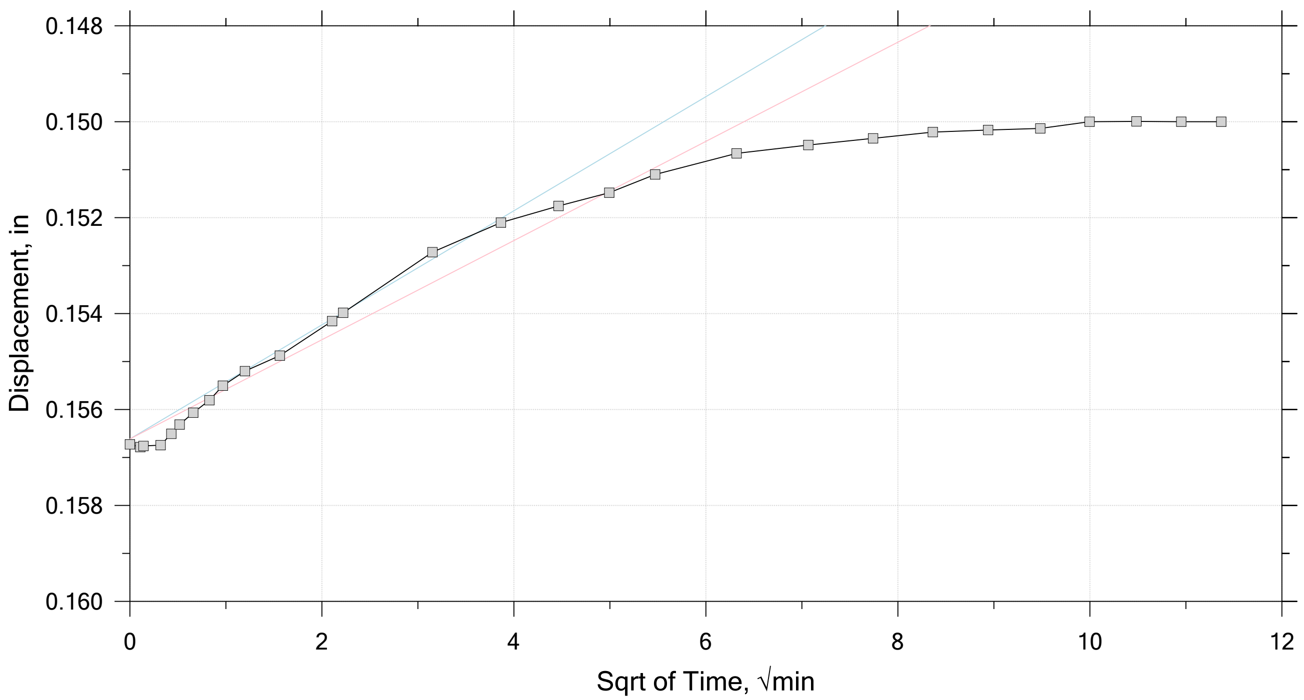
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 23 of 23

Constant Load Step

Stress: 1.33e+03 psf





Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter, in: 2.50	Specific Gravity: 2.93 (Implied)	Liquid Limit: 47
Specimen Height, in: 1.00	Initial Void Ratio: 1.37	Plastic Limit: 25
Final Height, in: 0.85	Final Void Ratio: 1.02	Plasticity Index: 22

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	218	---	"ring"	316
Mass Container, gm	36.96	110.26	110.26	60.5
Mass Container + Wet Soil, gm	160.02	254.8	244.37	194.51
Mass Container + Dry Soil, gm	123.67	209.86	209.86	160.03
Mass Dry Soil, gm	86.71	99.604	99.604	99.53
Water Content, %	41.92	45.11	34.64	34.64
Void Ratio	---	1.37	1.02	---
Degree of Saturation, %	---	96.49	100.00	---
Dry Unit Weight, pcf	---	77.224	90.836	---

Preconsolidation Stress, psf	---
Compression Ratio	0
Rebound Ratio	0
Compression Index	0
Rebound Index	0

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Log of Time Coefficients

Step	Applied Stress psf	EOP Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/day	Mv ft²/ton	k cm/s	Ca %
1	207.	0.002024	1.37	0.202	0.000	0.00e+00	1.95e+04	0.00e+00	0.00e+00
2	311.	0.002930	1.36	0.293	0.000	0.00e+00	1.74e+04	0.00e+00	0.00e+00
3	466.	0.004162	1.36	0.416	0.000	0.00e+00	1.59e+04	0.00e+00	0.00e+00
4	699.	0.004920	1.36	0.492	0.000	0.00e+00	6.50e+03	0.00e+00	0.00e+00
5	1.05e+03	0.006544	1.36	0.654	2.157	2.26e-01	9.30e+03	2.32e-08	0.00e+00
6	1.57e+03	0.008891	1.35	0.888	0.000	0.00e+00	8.95e+03	0.00e+00	0.00e+00
7	2.36e+03	0.01147	1.34	1.15	1.729	2.80e-01	6.56e+03	2.02e-08	0.00e+00
8	3.54e+03	0.01942	1.33	1.94	9.466	5.05e-02	1.35e+04	7.50e-09	0.00e+00
9	5.30e+03	0.04986	1.25	4.98	0.000	0.00e+00	3.44e+04	0.00e+00	0.00e+00
10	1.06e+04	0.1046	1.12	10.4	6.722	6.25e-02	2.06e+04	1.42e-08	0.00e+00
11	5.30e+03	0.1043	1.12	10.4	0.000	0.00e+00	1.04e+02	0.00e+00	0.00e+00
12	2.65e+03	0.1055	1.12	10.5	2.602	1.52e-01	-9.31e+02	-1.56e-09	0.00e+00
13	1.33e+03	0.1021	1.13	10.2	0.000	0.00e+00	5.24e+03	0.00e+00	0.00e+00
14	663.	0.09707	1.14	9.70	0.000	0.00e+00	1.50e+04	0.00e+00	0.00e+00
15	1.33e+03	0.09433	1.15	9.42	0.000	0.00e+00	-8.25e+03	-0.00e+00	0.00e+00
16	2.65e+03	0.09864	1.14	9.85	0.000	0.00e+00	6.49e+03	0.00e+00	0.00e+00
17	5.30e+03	0.1064	1.12	10.6	0.000	0.00e+00	5.87e+03	0.00e+00	0.00e+00
18	1.06e+04	0.1175	1.09	11.7	1.875	2.08e-01	4.17e+03	9.54e-09	0.00e+00
19	2.12e+04	0.1583	0.997	15.8	0.000	0.00e+00	7.67e+03	0.00e+00	0.00e+00
20	1.06e+04	0.1623	0.987	16.2	0.000	0.00e+00	-7.64e+02	-0.00e+00	0.00e+00
21	5.30e+03	0.1595	0.994	15.9	0.000	0.00e+00	1.06e+03	0.00e+00	0.00e+00
22	2.65e+03	0.1558	1.00	15.6	2.606	1.34e-01	2.79e+03	4.12e-09	0.00e+00
23	1.33e+03	0.1504	1.02	15.0	5.228	6.77e-02	8.12e+03	6.06e-09	0.00e+00

Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B

Sqrt of Time Coefficients

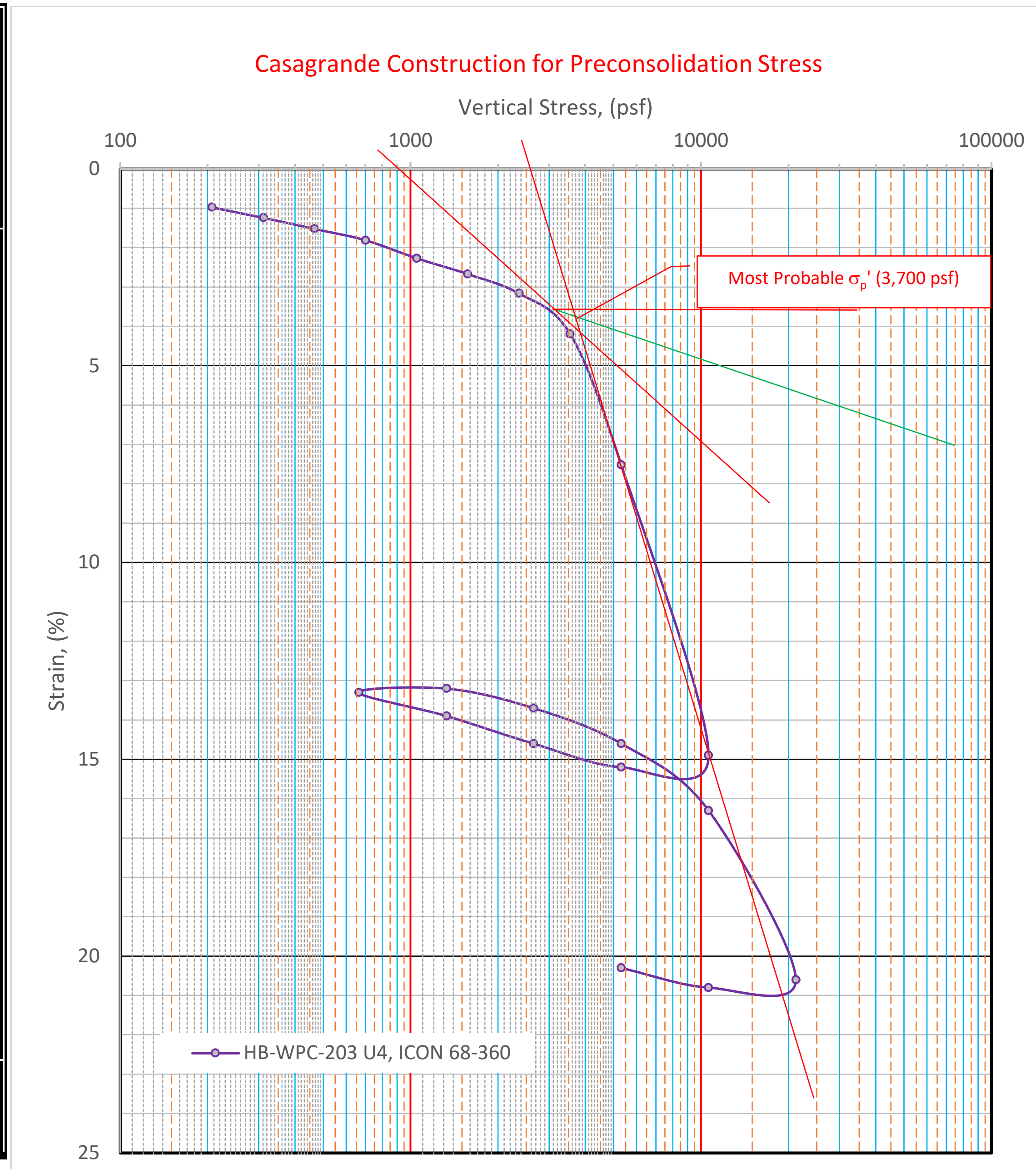
Step	Applied Stress psf	EOP Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv ft²/day	Mv ft²/ton	k cm/s
1	207.	0.002024	1.37	0.202	109.064	1.94e-02	1.95e+04	4.18e-09
2	311.	0.002930	1.36	0.293	22.205	9.52e-02	1.74e+04	1.82e-08
3	466.	0.004162	1.36	0.416	9.220	2.29e-01	1.59e+04	4.00e-08
4	699.	0.004920	1.36	0.492	12.552	1.68e-01	6.50e+03	1.20e-08
5	1.05e+03	0.006544	1.36	0.654	12.060	1.74e-01	9.30e+03	1.78e-08
6	1.57e+03	0.008891	1.35	0.888	28.023	7.46e-02	8.95e+03	7.36e-09
7	2.36e+03	0.01147	1.34	1.15	25.936	8.02e-02	6.56e+03	5.79e-09
8	3.54e+03	0.01942	1.33	1.94	36.437	5.65e-02	1.35e+04	8.38e-09
9	5.30e+03	0.04986	1.25	4.98	86.242	2.30e-02	3.44e+04	8.70e-09
10	1.06e+04	0.1046	1.12	10.4	26.846	6.74e-02	2.06e+04	1.53e-08
11	5.30e+03	0.1043	1.12	10.4	1.892	9.00e-01	1.04e+02	1.04e-09
12	2.65e+03	0.1055	1.12	10.5	13.799	1.23e-01	-9.31e+02	-1.26e-09
13	1.33e+03	0.1021	1.13	10.2	19.591	8.71e-02	5.24e+03	5.03e-09
14	663.	0.09707	1.14	9.70	50.337	3.42e-02	1.50e+04	5.66e-09
15	1.33e+03	0.09433	1.15	9.42	14.891	1.17e-01	-8.25e+03	-1.06e-08
16	2.65e+03	0.09864	1.14	9.85	196.503	8.83e-03	6.49e+03	6.31e-10
17	5.30e+03	0.1064	1.12	10.6	134.931	1.27e-02	5.87e+03	8.20e-10
18	1.06e+04	0.1175	1.09	11.7	7.867	2.13e-01	4.17e+03	9.79e-09
19	2.12e+04	0.1583	0.997	15.8	132.947	1.19e-02	7.67e+03	1.00e-09
20	1.06e+04	0.1623	0.987	16.2	0.000	0.00e+00	-7.64e+02	-0.00e+00
21	5.30e+03	0.1595	0.994	15.9	69.961	2.14e-02	1.06e+03	2.49e-10
22	2.65e+03	0.1558	1.00	15.6	15.665	9.63e-02	2.79e+03	2.95e-09
23	1.33e+03	0.1504	1.02	15.0	24.329	6.26e-02	8.12e+03	5.60e-09

Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: HB-WPC-203	Tester: SJR	Checker: SJR
	Sample Number: U3	Test Date: 4/29/2021	Depth: 50.9
	Test Number: ICON 359	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty clay		
	Remarks:		
	Displacement at End of Primary		

Consolidation Test Data
Summary Report

Project Name:	Pleasant Cove
Project Number:	166-21
Project Location:	Woolwich, ME
Client:	GZA
Sample Description:	Gray Silty Clay
Preparation:	Trimmed Shelby Tube

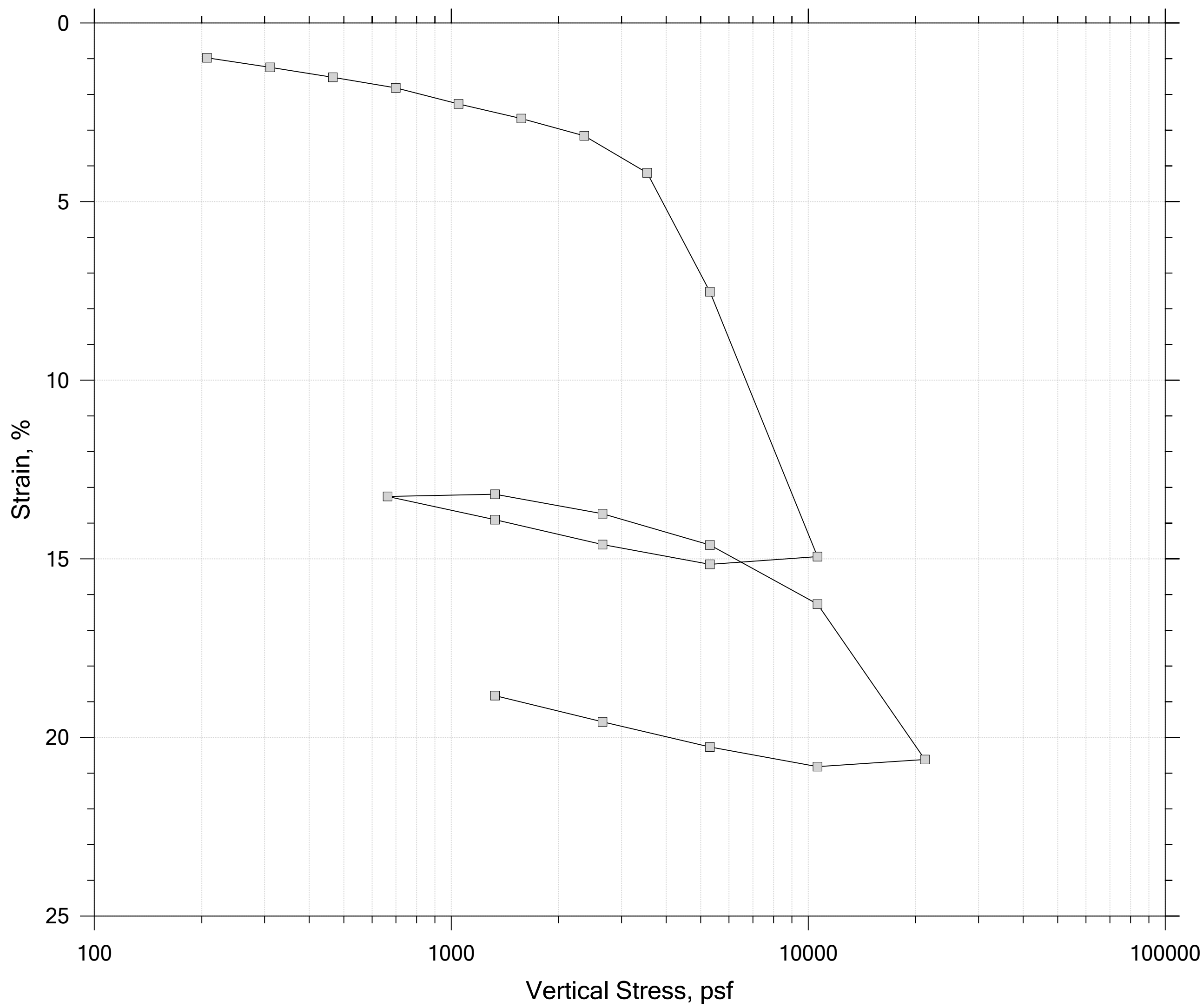
Lab Test No:	ICON 68-360			
Boring No.	HB-WPC-203			
Sample No:	U4			
Boring Elevation (ft).				
Sample Depth (ft):	79-81			
Test Specimen Depth (Ft):	80.9			
Test Specimen Elevation:				
Water Content (%):	39.4			
Dry Unit Weight (pcf):	78.7			
Wet Unit Weight (pcf):	109.7			
Saturation Before (%):	96.3			
Saturation After (%):	100			
Void Ratio Before:	1.3			
Void Ratio After:	0.87			
Overburden Pressure (psf):	--			
Max Previous stress (psf):	3,700			
Max Prev. stress (Work) (psf):	3,700			
OCR:	--			
Compression Index (C_{CE}):	0.24			
Recompression Index (C_{RE}):	0.027			
Liquid Limit:	42.9			
Plastic Limit:	22.8			
Plasticity Index:	20.1			
Liquidity Index:	0.82			
Specific Gravity (implied)	2.9			
Organic Content (%)	--			
Tested By:	sjr			
Date Tested:	5/3/2021			
Checked By:	sjr			



Soil Metrics LLC Geotechnical Engineering

One-Dimensional Consolidation by ASTM D2435 - Method B

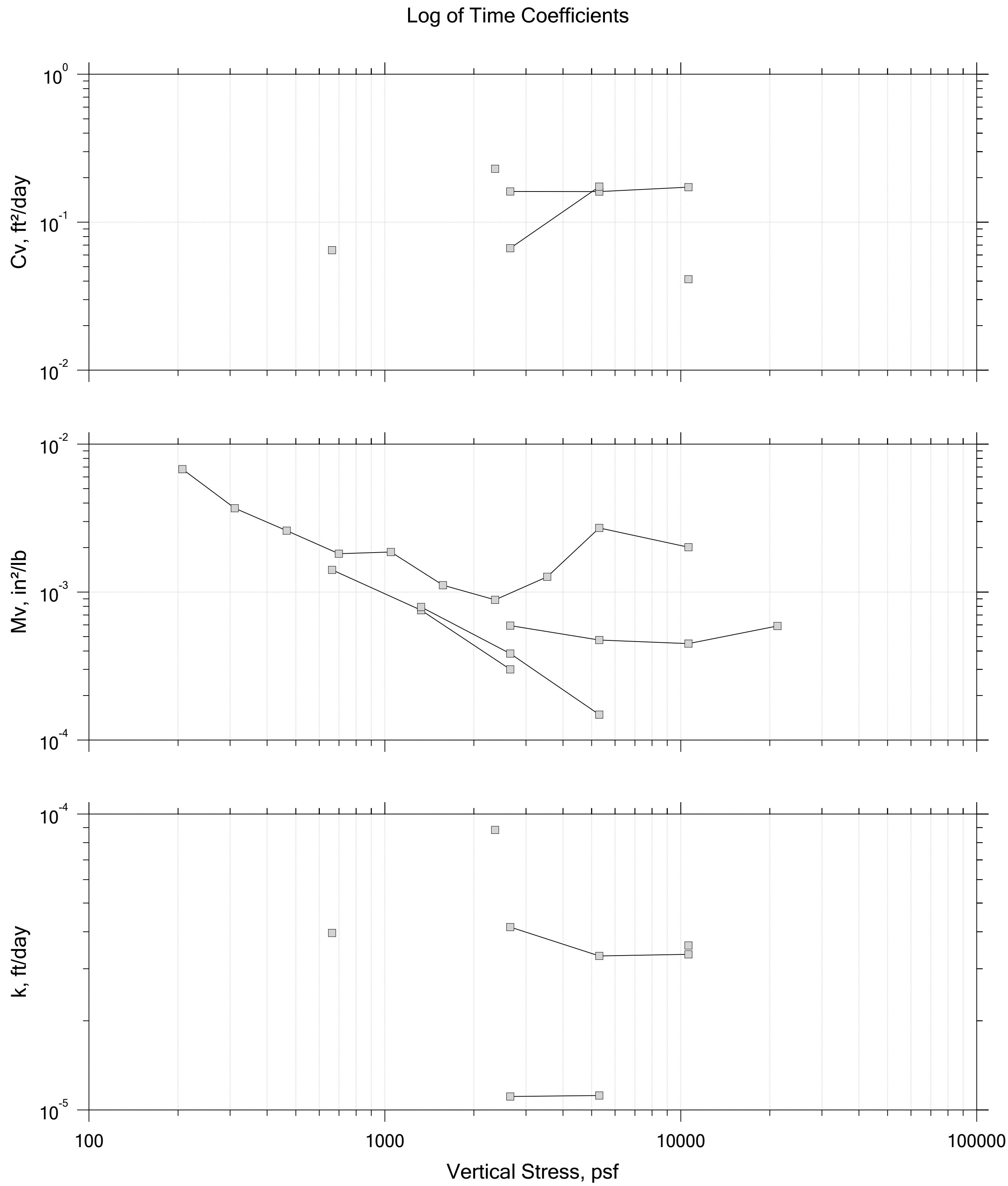
Summary Report



					Before Test	After Test
Current Vertical Effective Stress: 0 psf				Water Content, %	43.17	29.93
Preconsolidation Stress: 0 psf				Dry Unit Weight, pcf	78.744	96.948
Compression Ratio: 0				Saturation, %	96.33	100.00
Diameter: 2.5 in		Height: 1.001 in		Void Ratio	1.30	0.87
LL: 43	PL: 23	PI: 20	GS: 2.90			

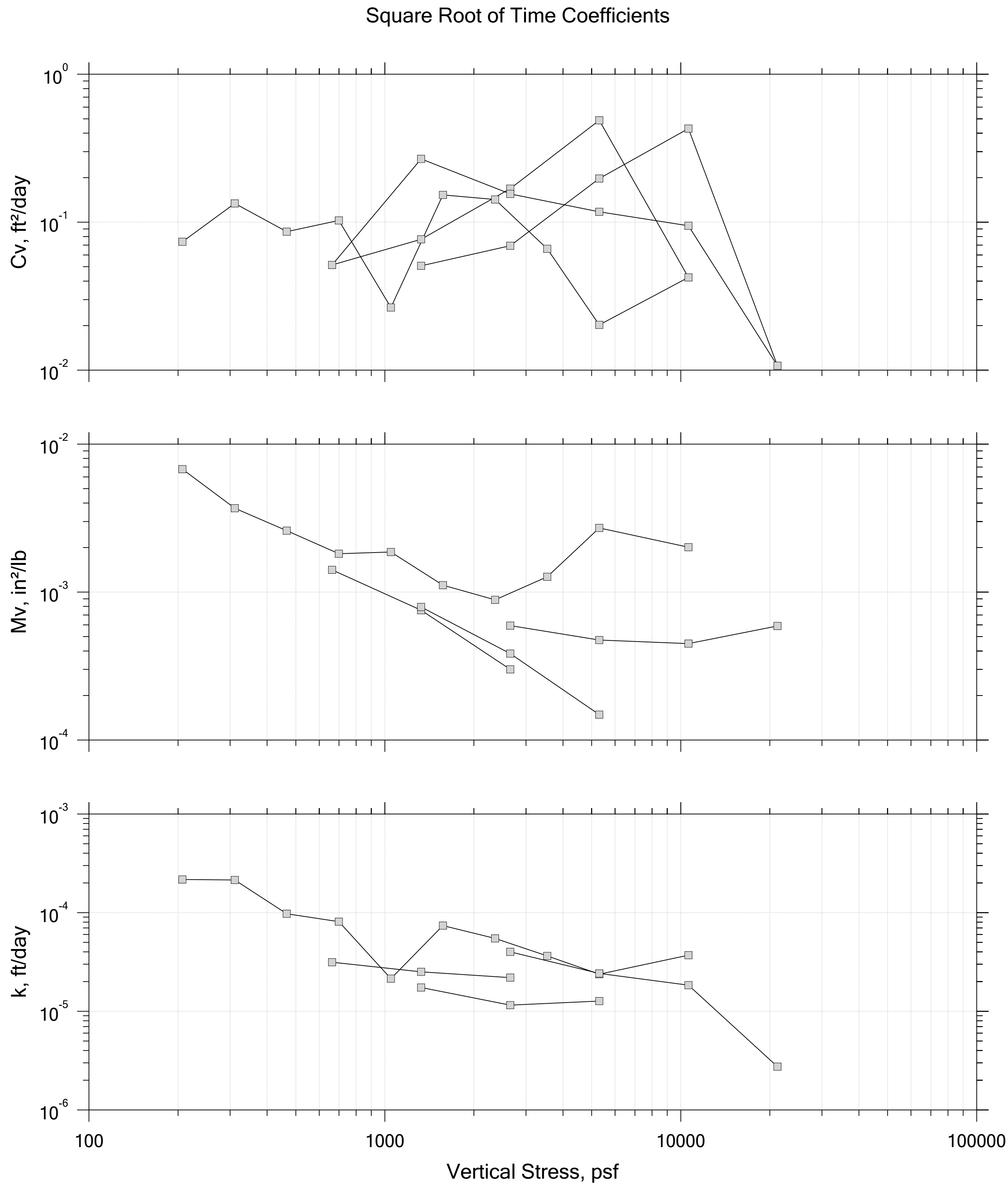
Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B



Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

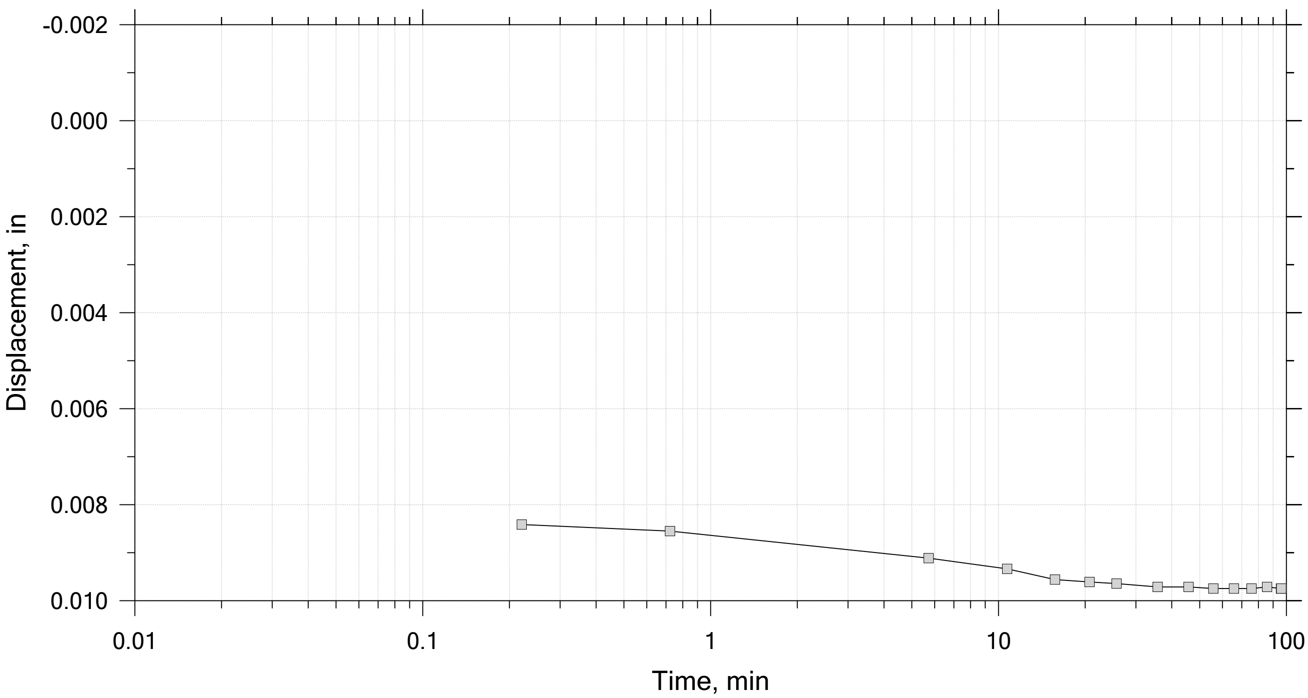
One-Dimensional Consolidation by ASTM D2435 - Method B

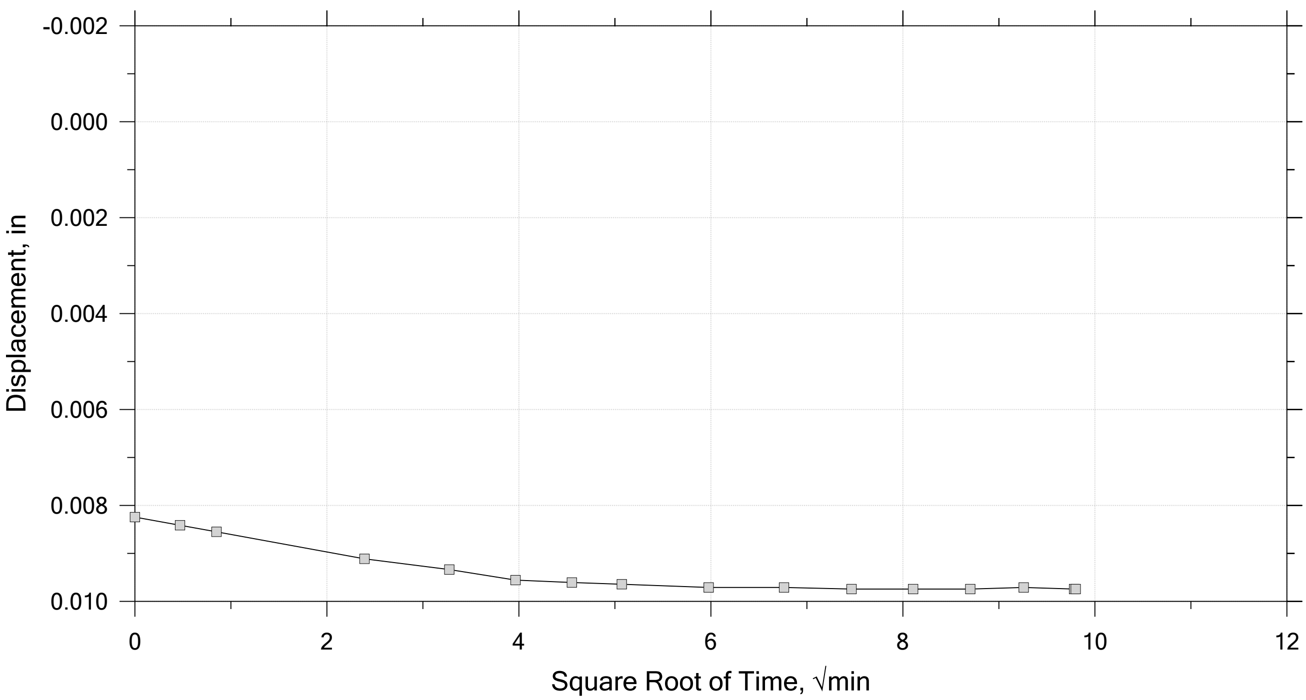


Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 23
Constant Load Step
Stress: 207 psf





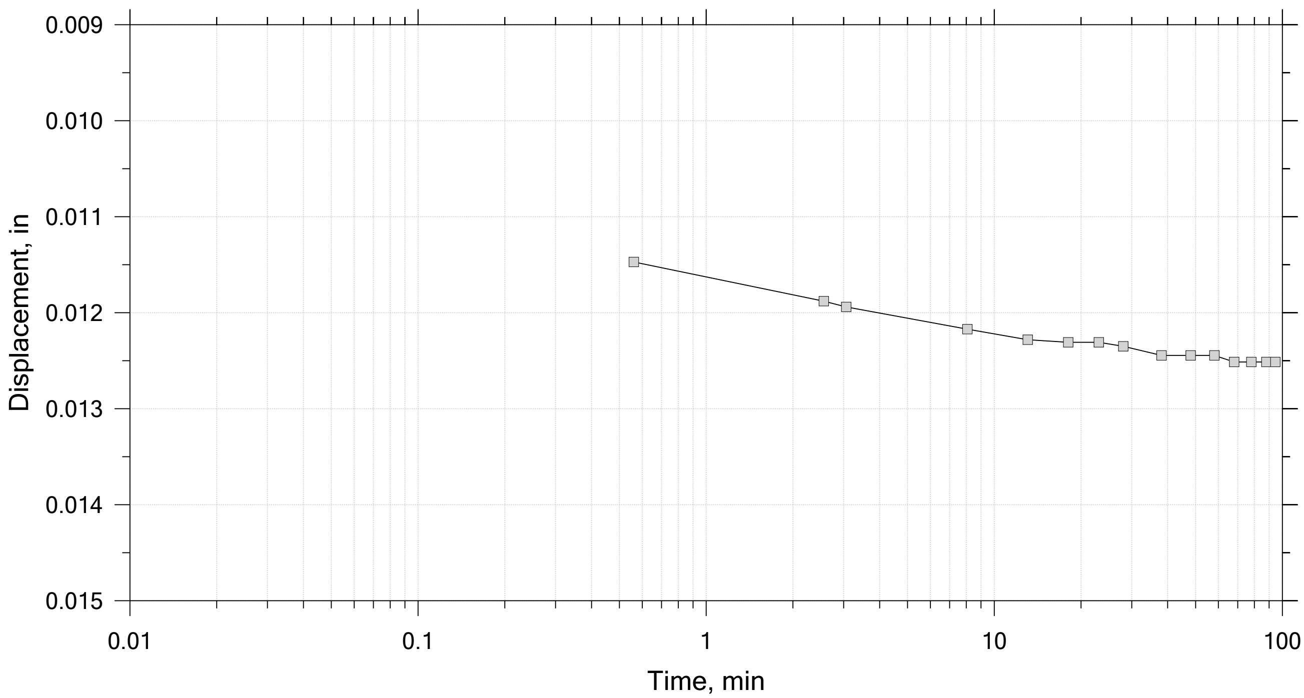
Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

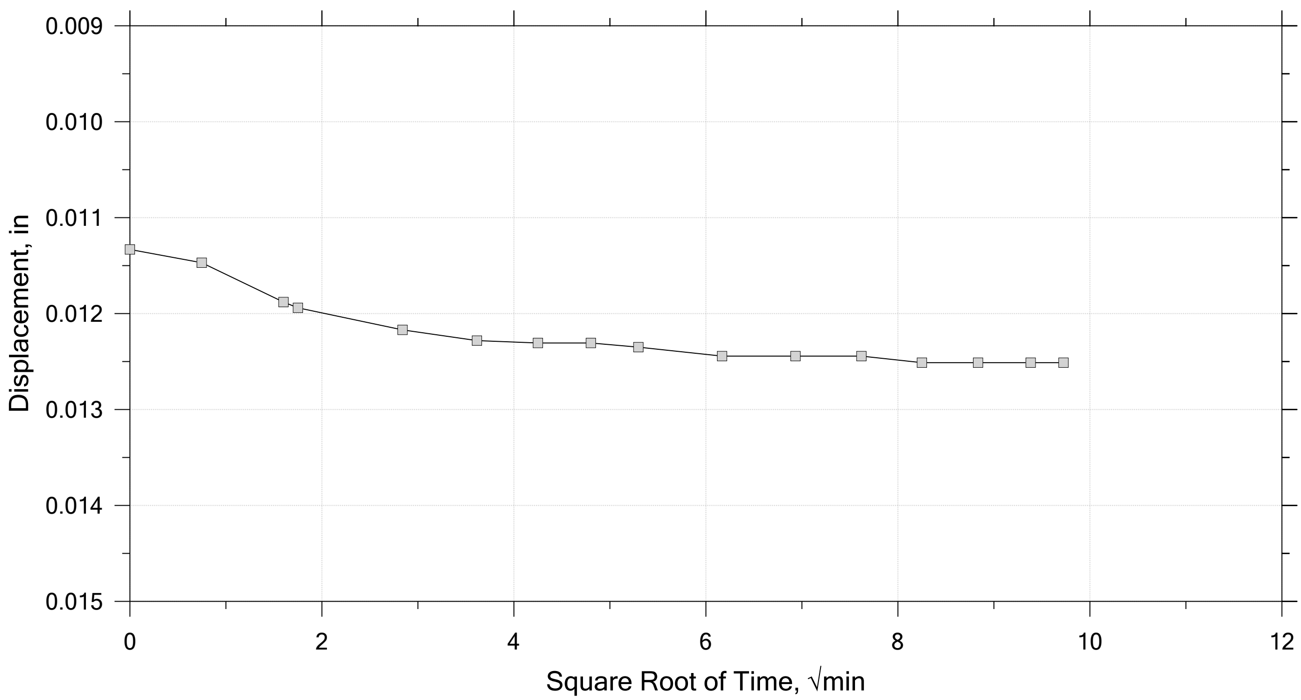
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 23

Constant Load Step

Stress: 311 psf





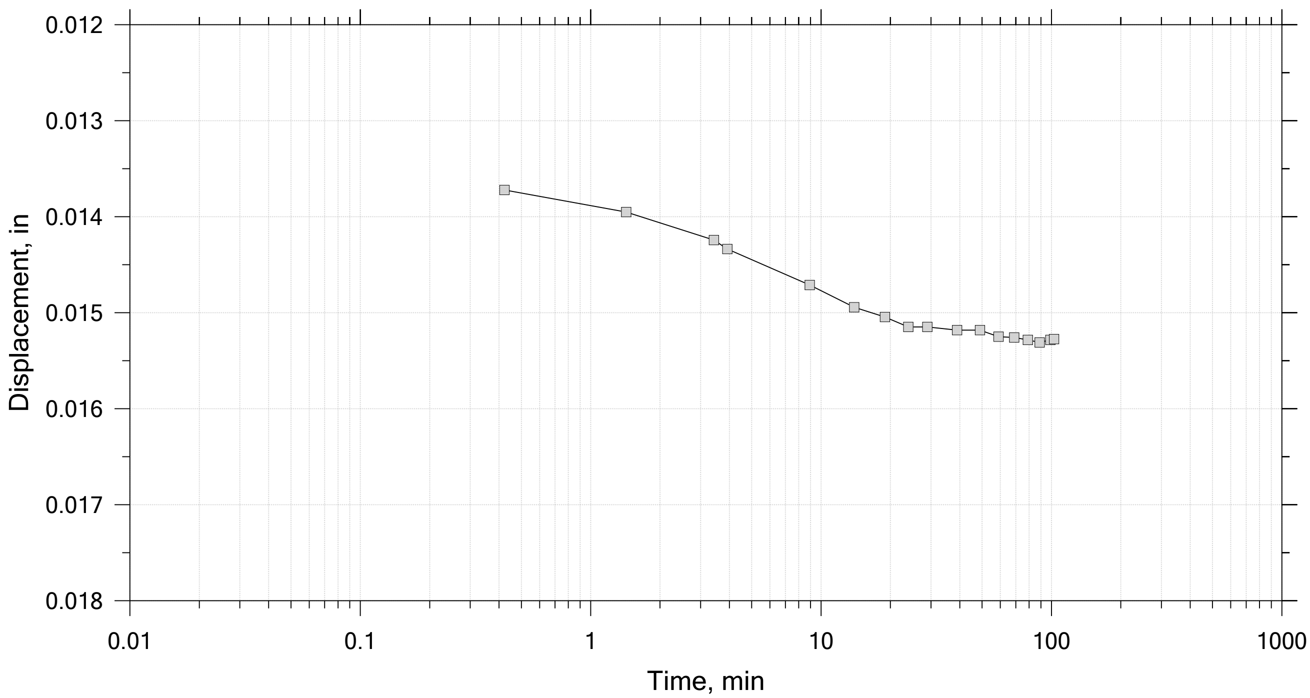
Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

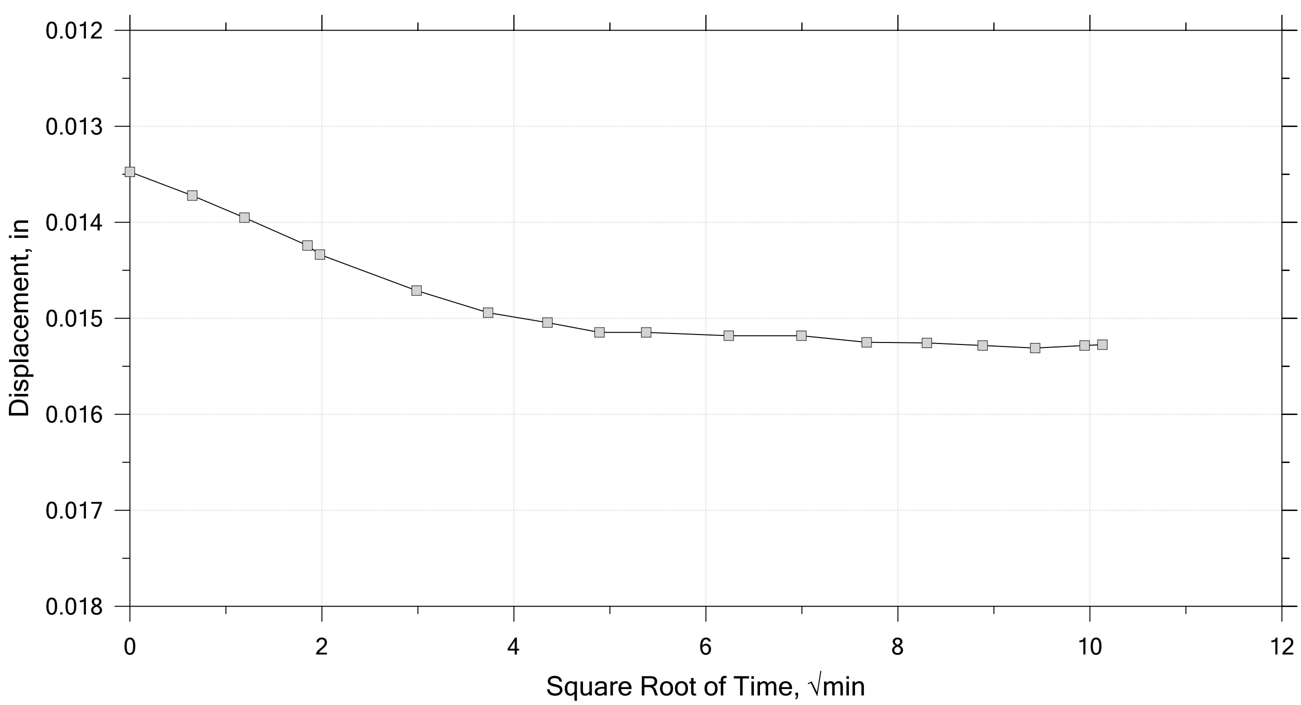
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 23

Constant Load Step

Stress: 466 psf





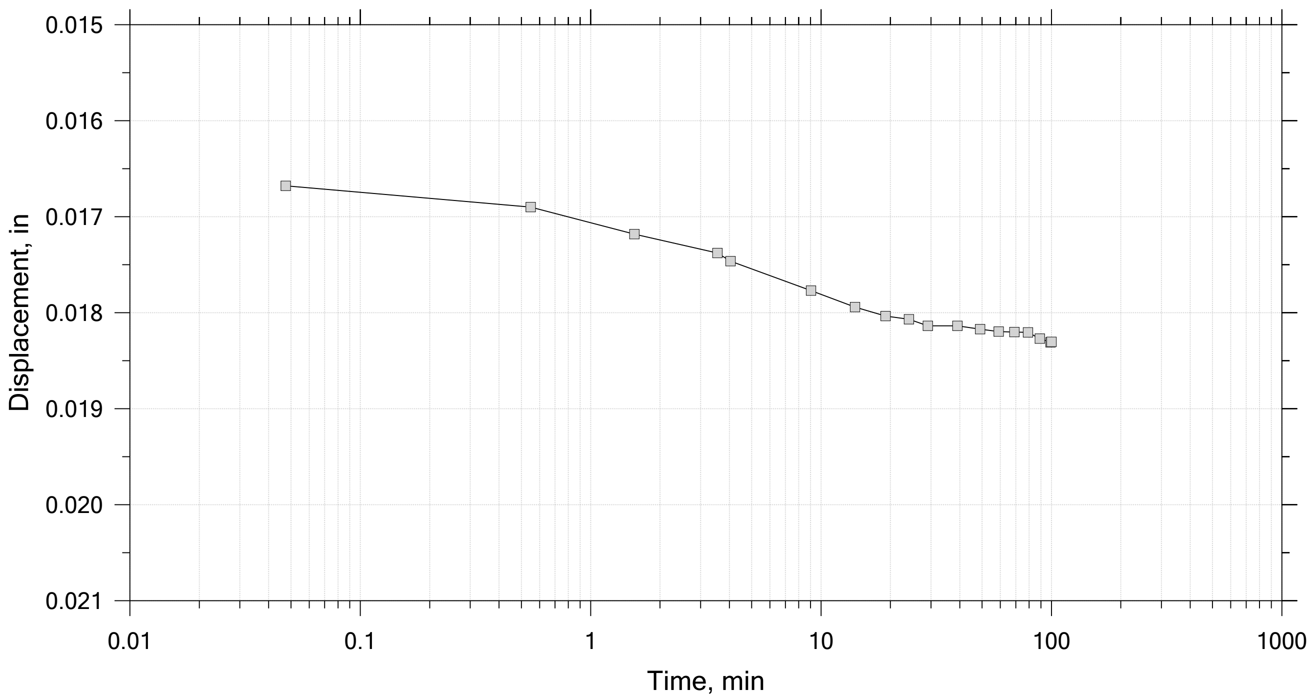
Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

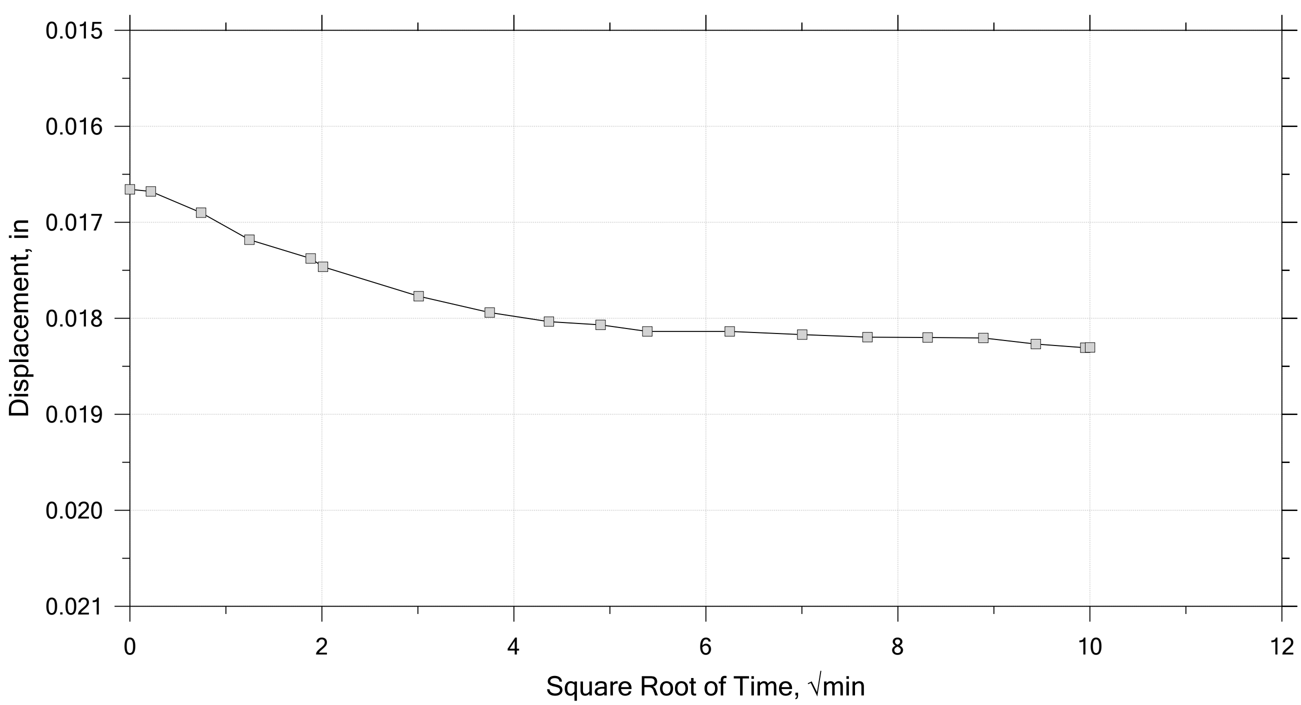
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 23

Constant Load Step

Stress: 699 psf





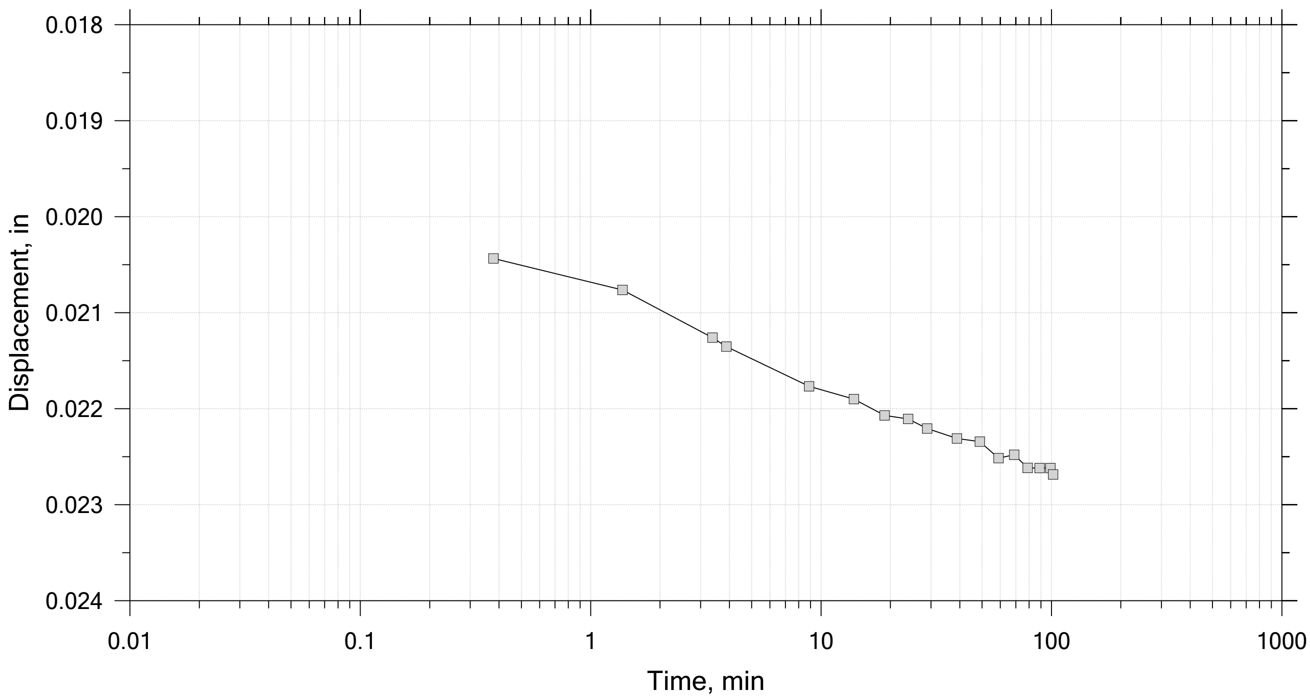
Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

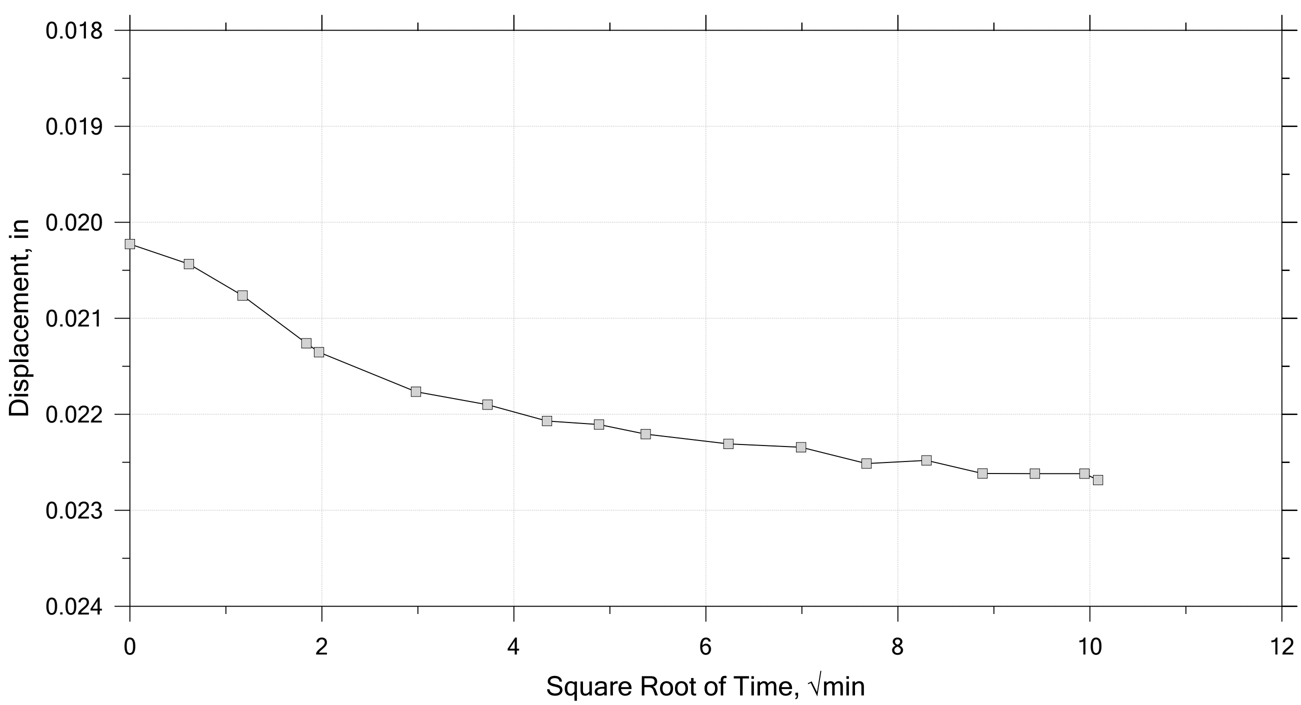
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 23

Constant Load Step

Stress: 1.05e+03 psf

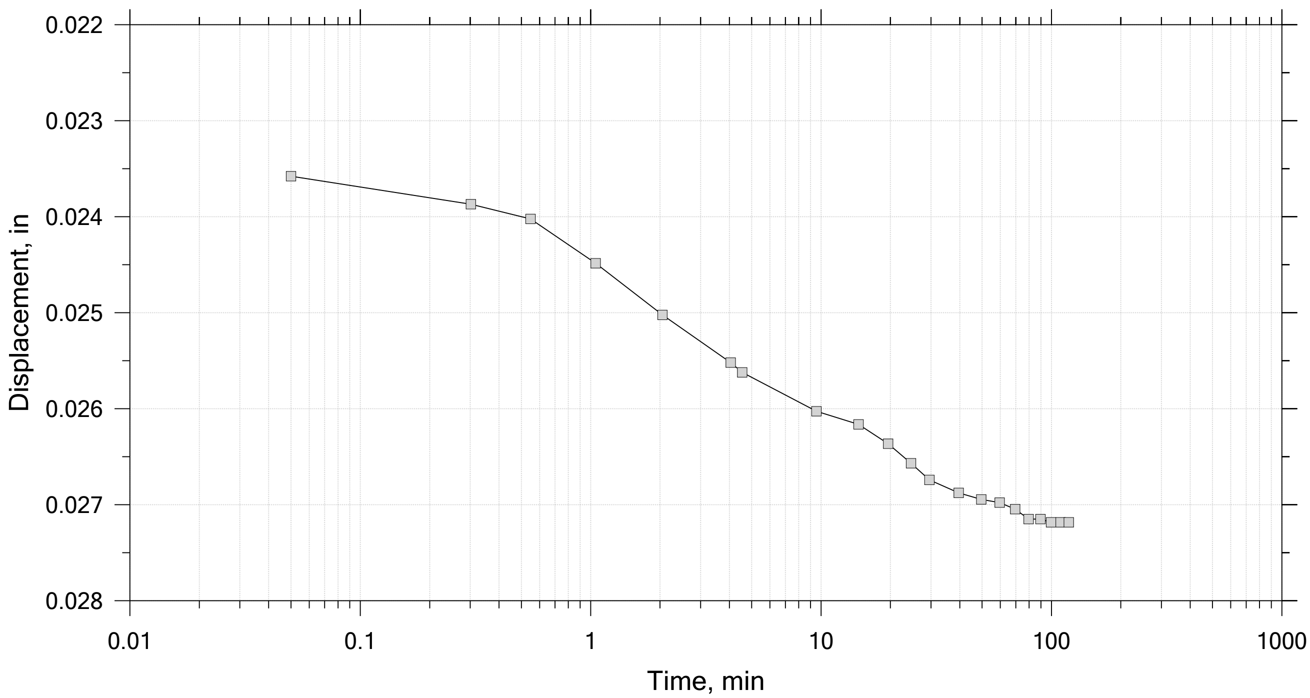


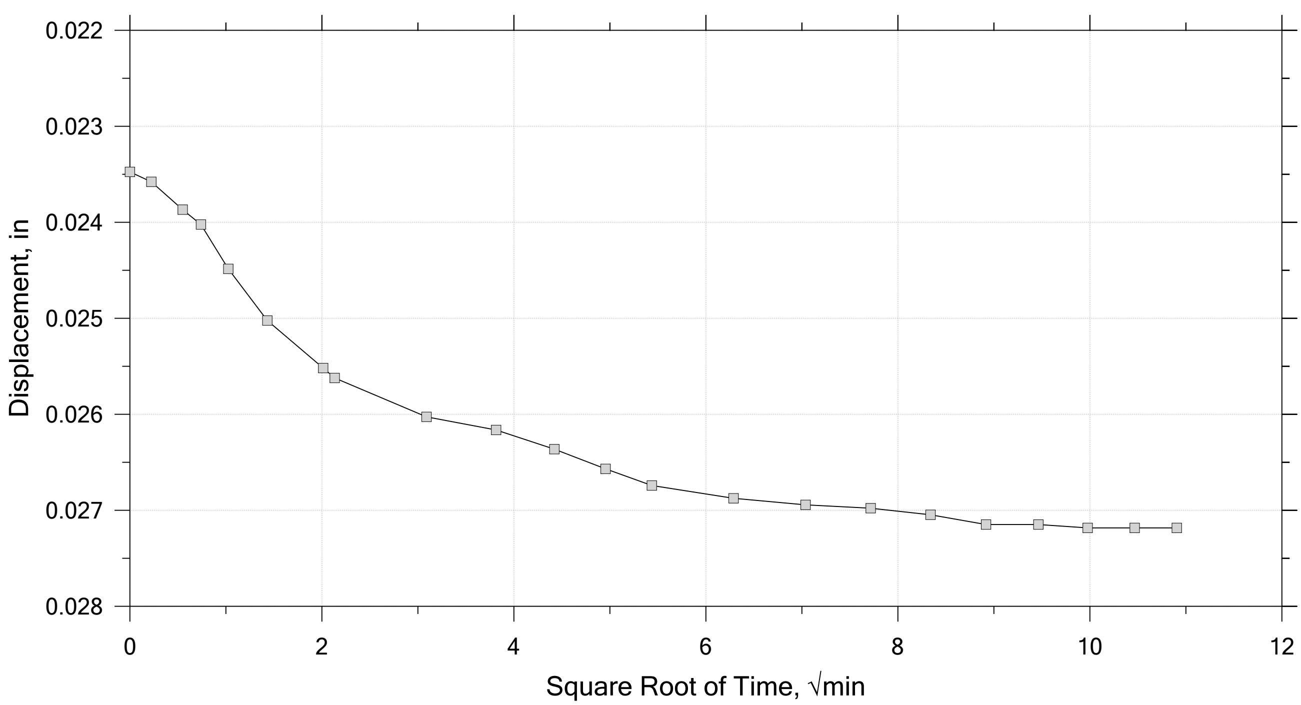


Soil Metrics LLC			
	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 23
Constant Load Step
Stress: 1.57e+03 psf

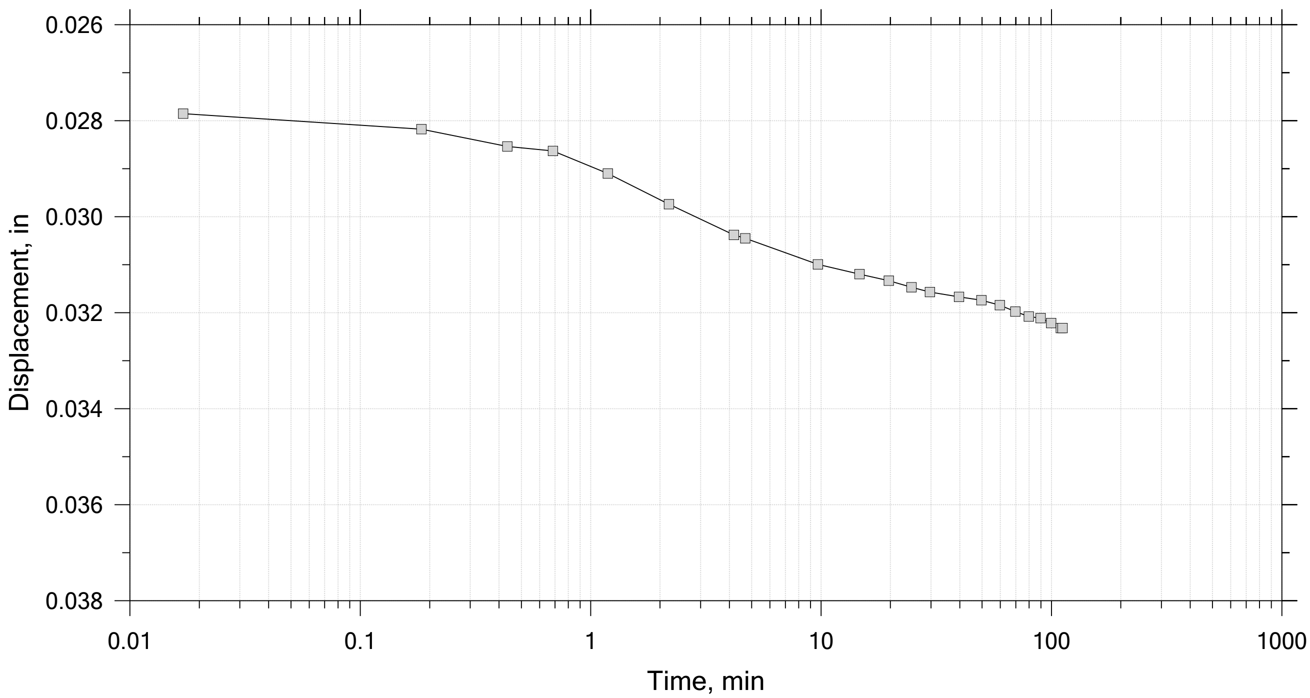


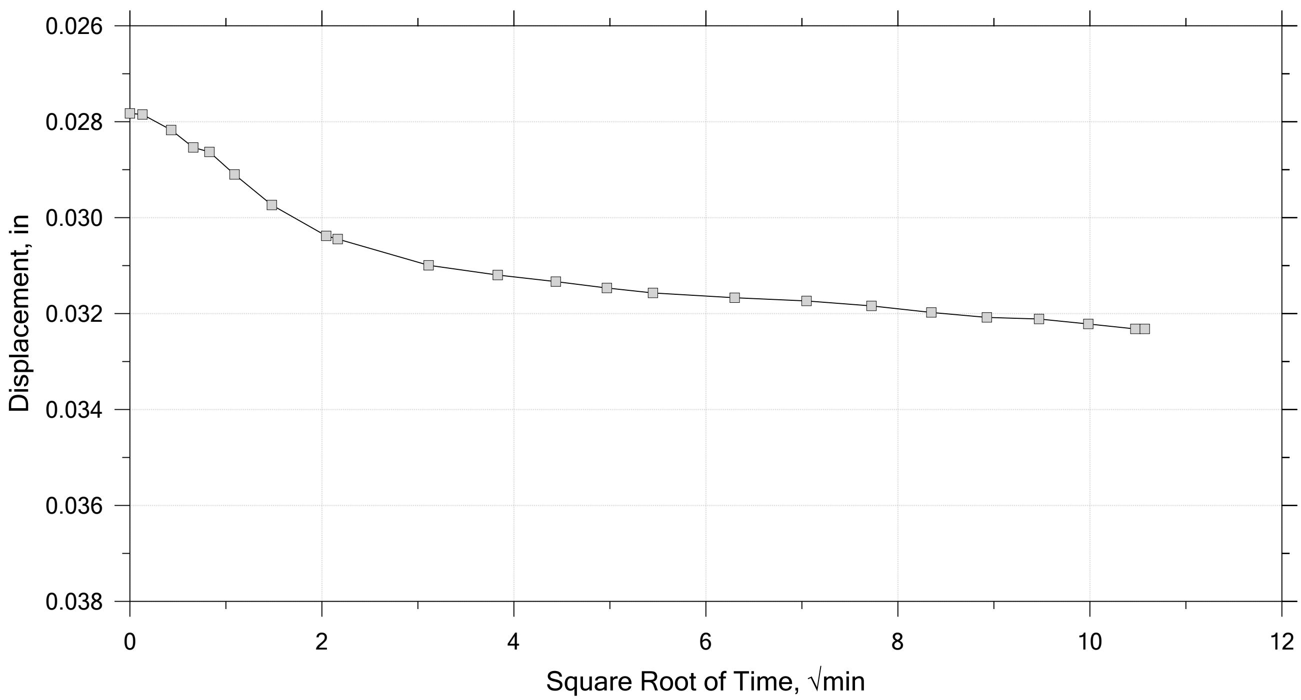


Soil Metrics LLC			
	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 23
Constant Load Step
Stress: 2.36e+03 psf

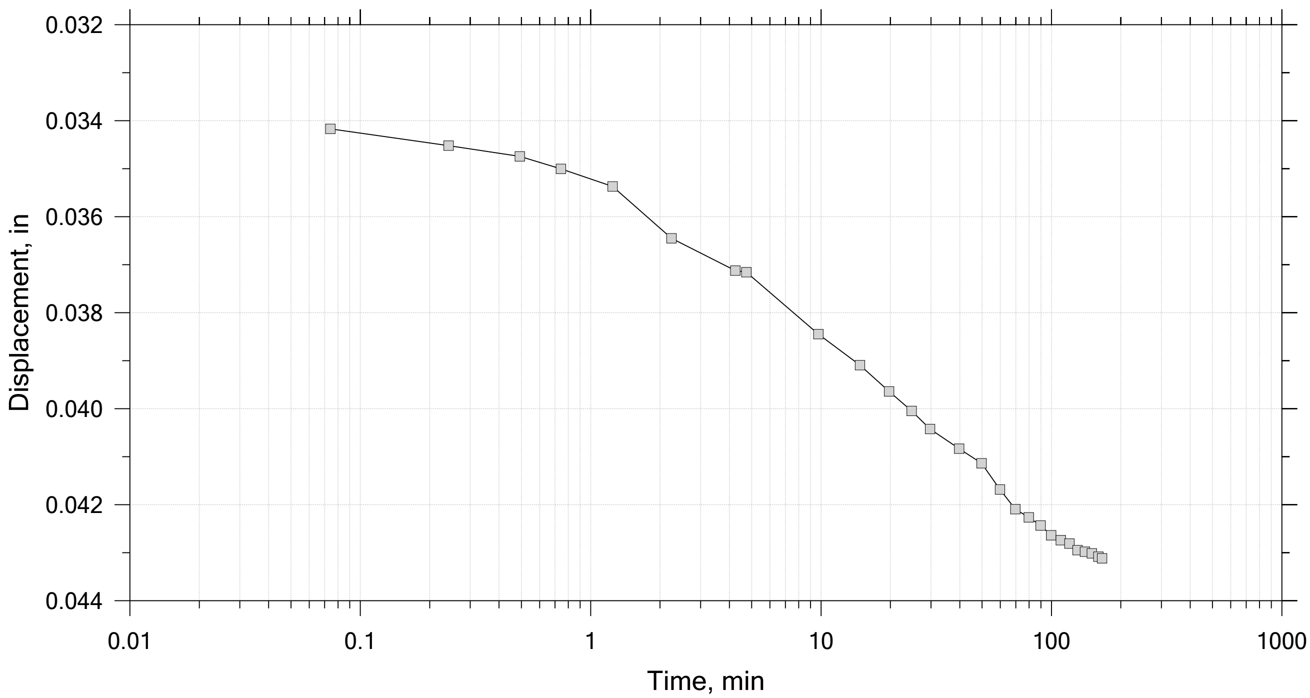


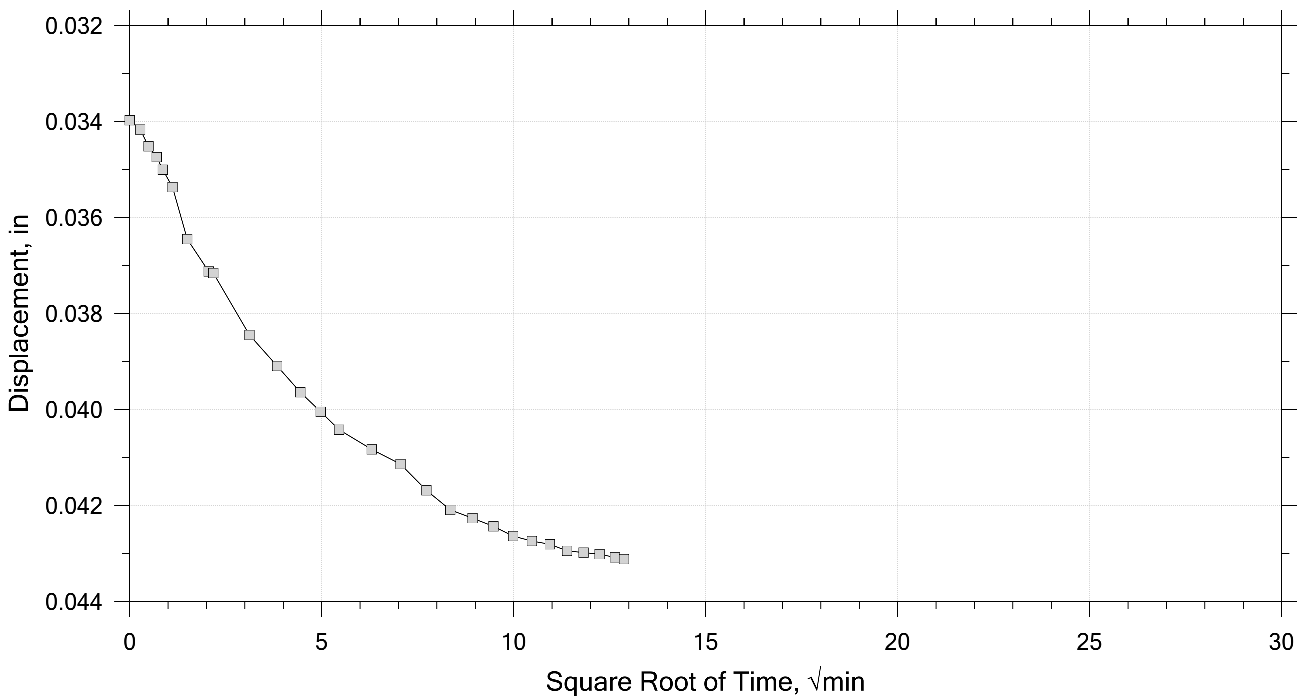


Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 23
Constant Load Step
Stress: 3.54e+03 psf





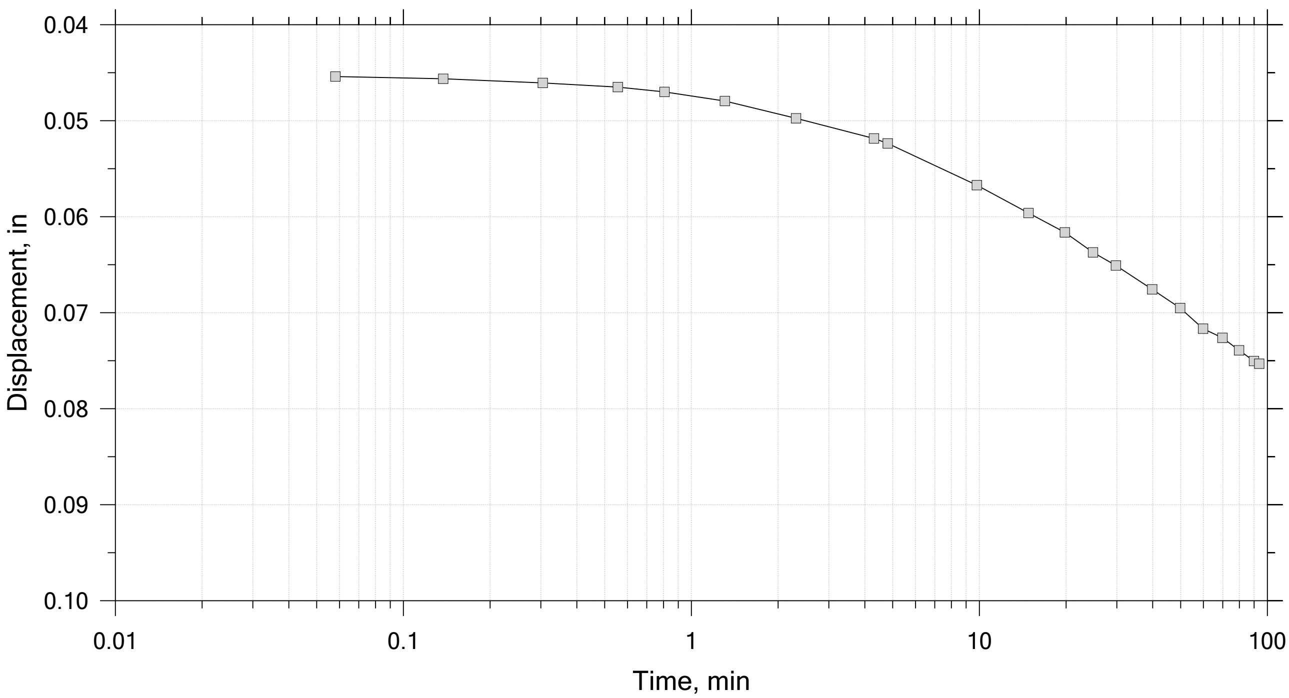
Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

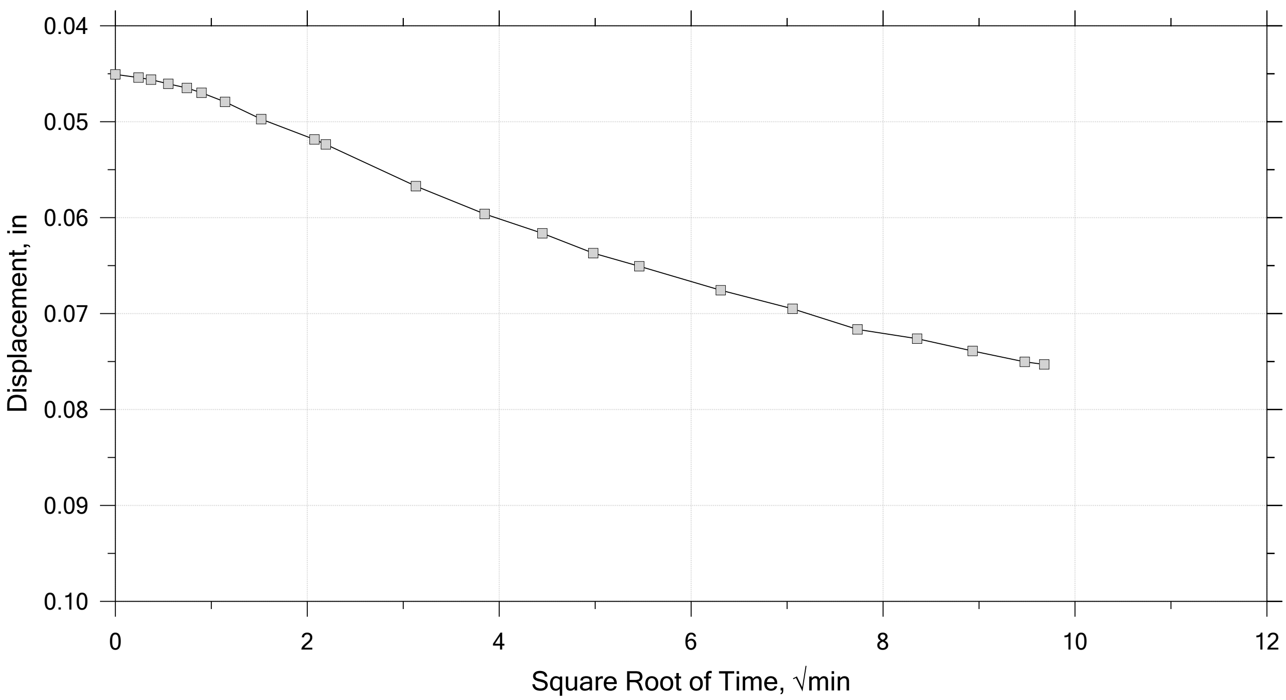
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 23

Constant Load Step

Stress: 5.31e+03 psf

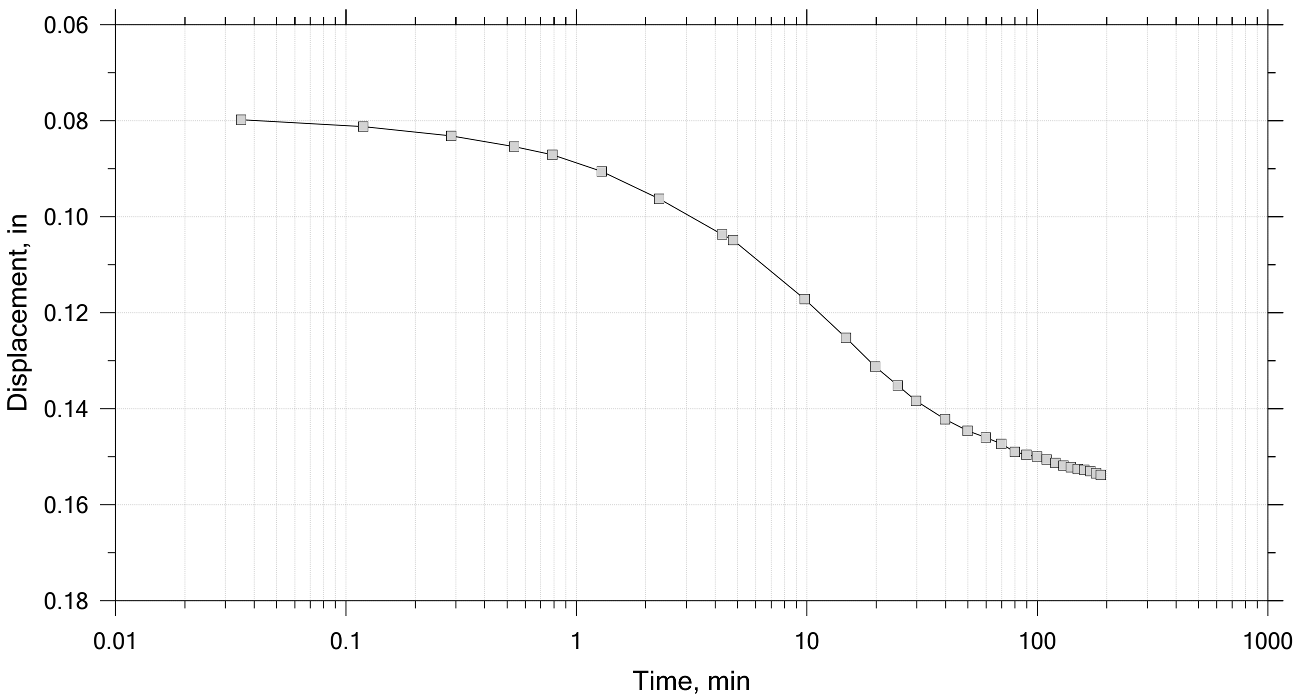


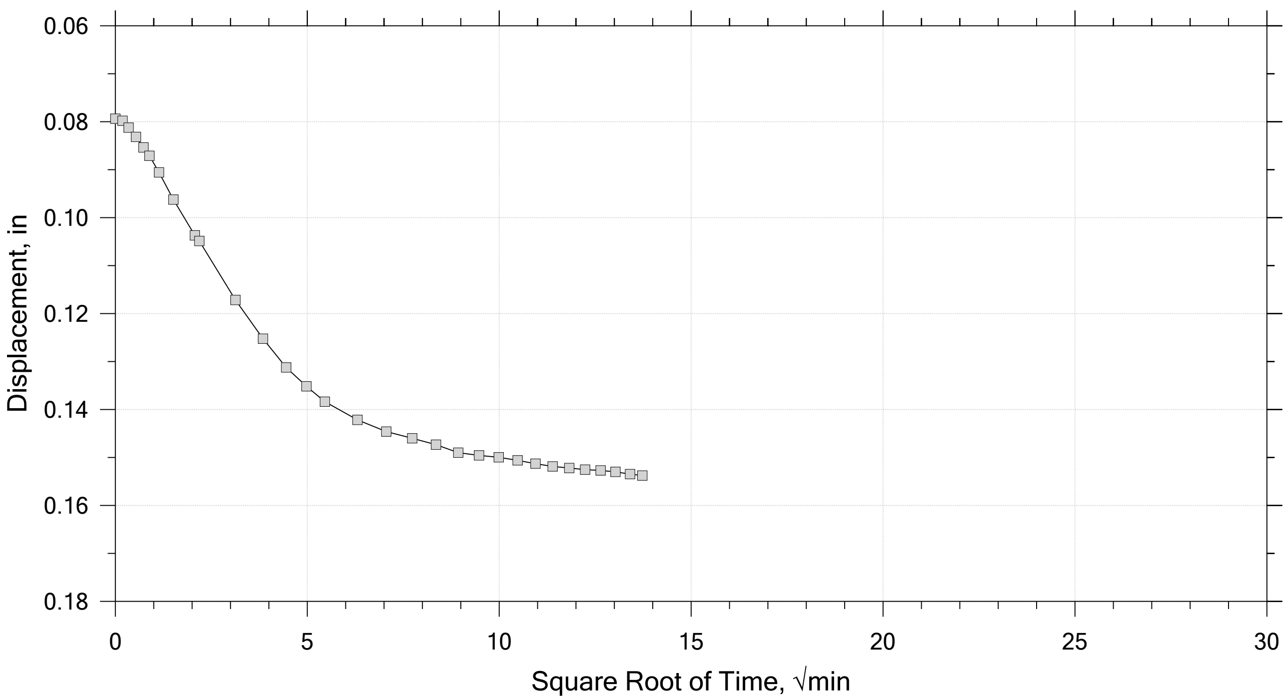


Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 23
Constant Load Step
Stress: 1.06e+04 psf

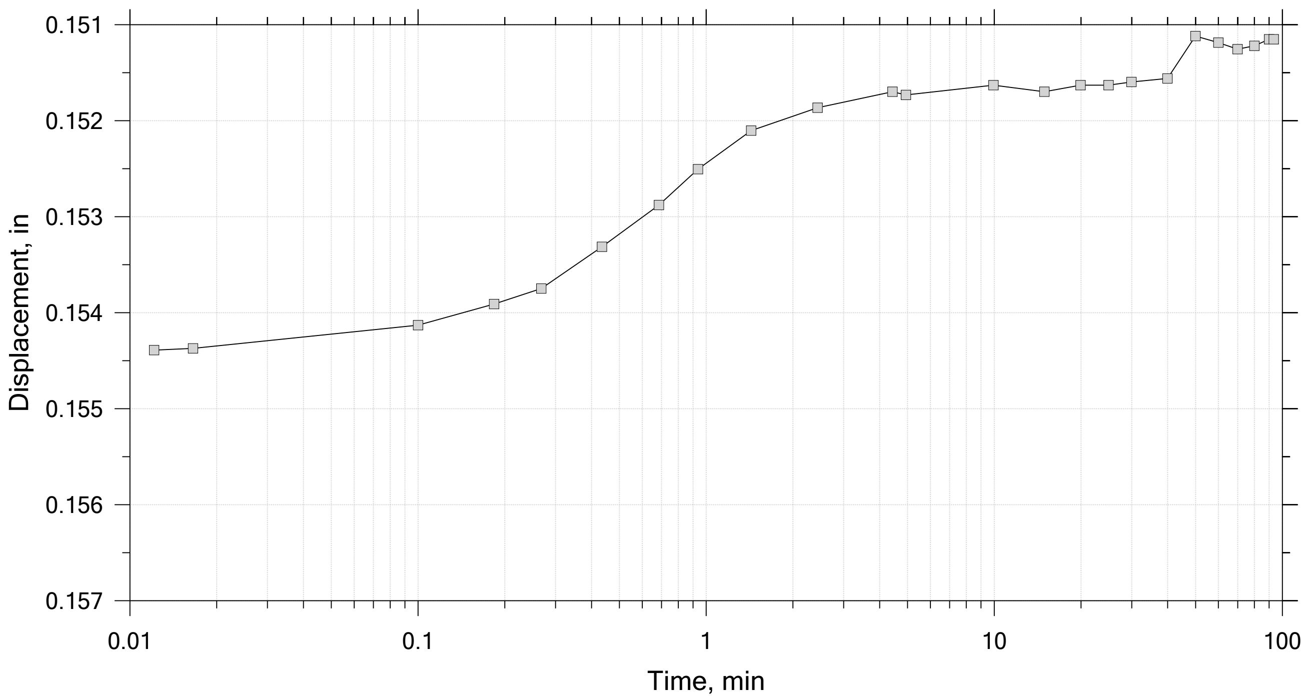


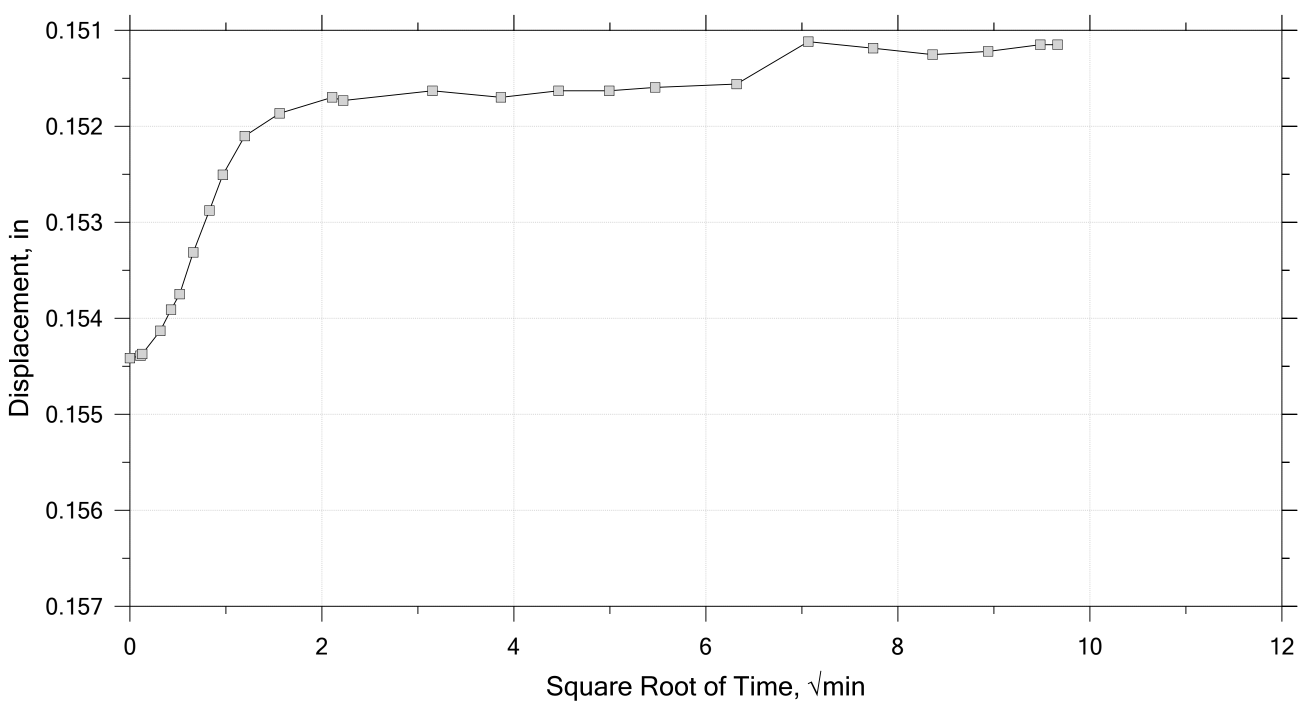


Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 23
Constant Load Step
Stress: 5.31e+03 psf

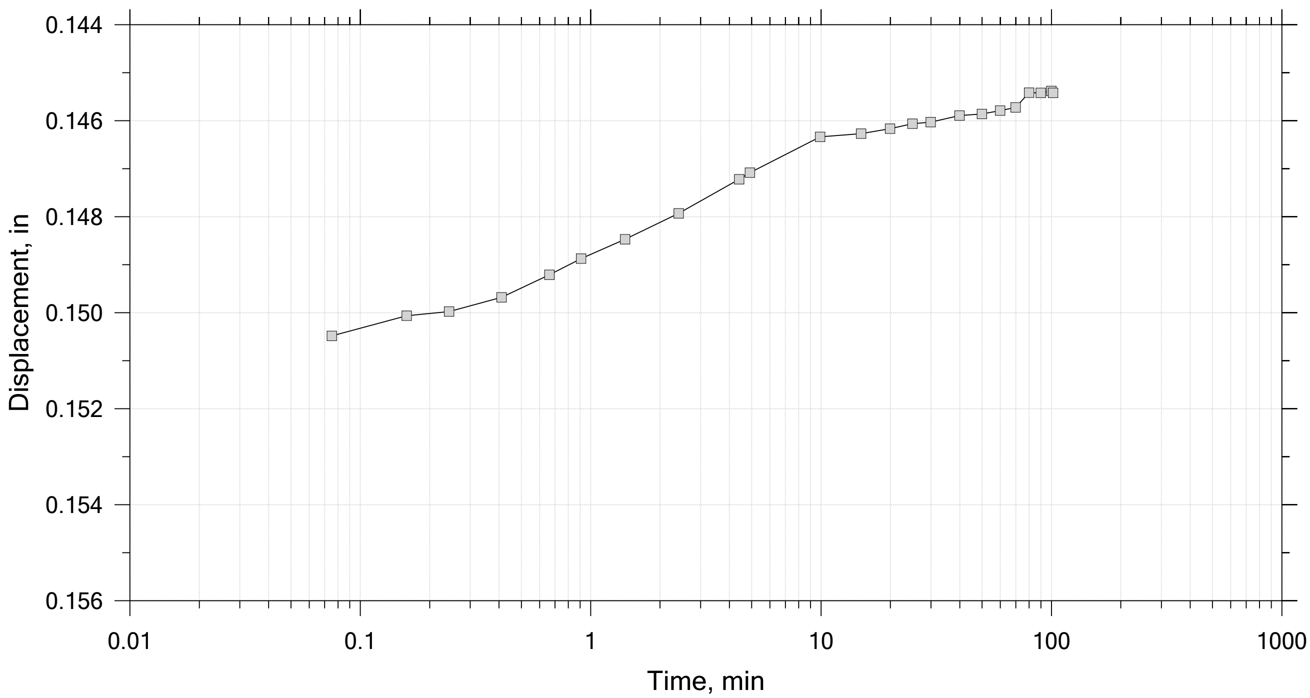


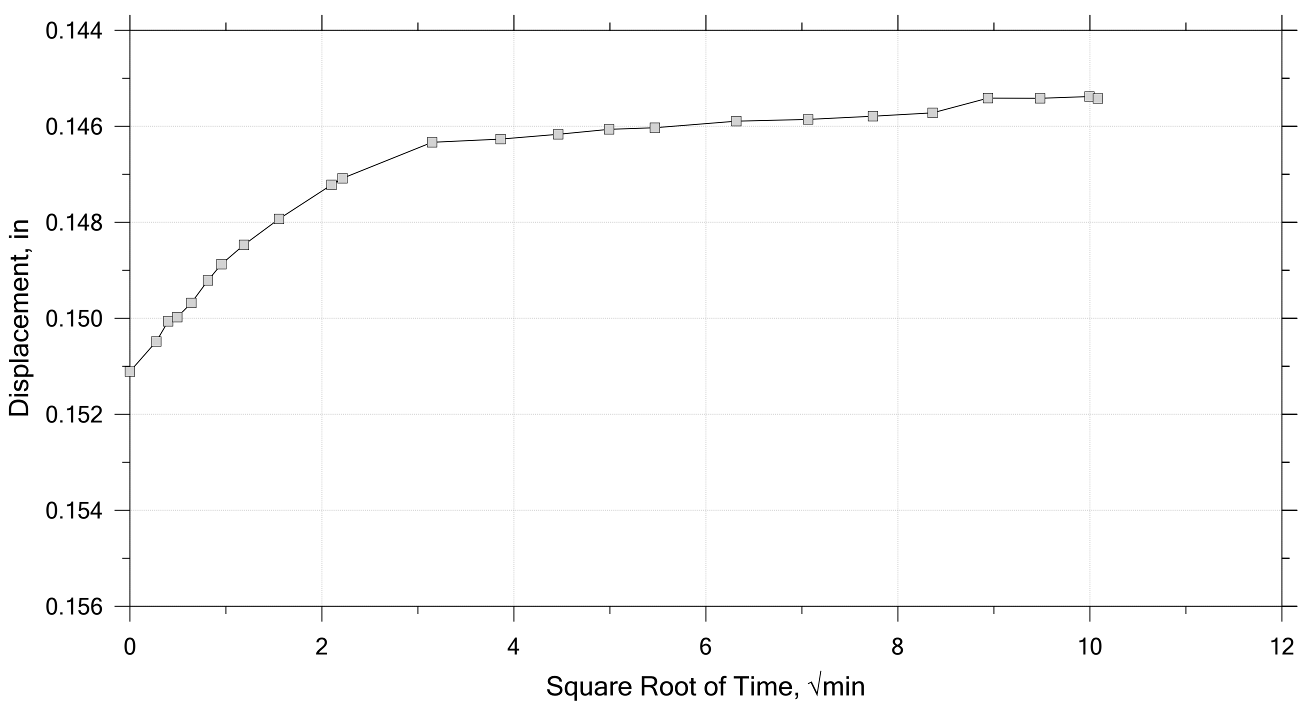


Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 23
Constant Load Step
Stress: 2.65e+03 psf





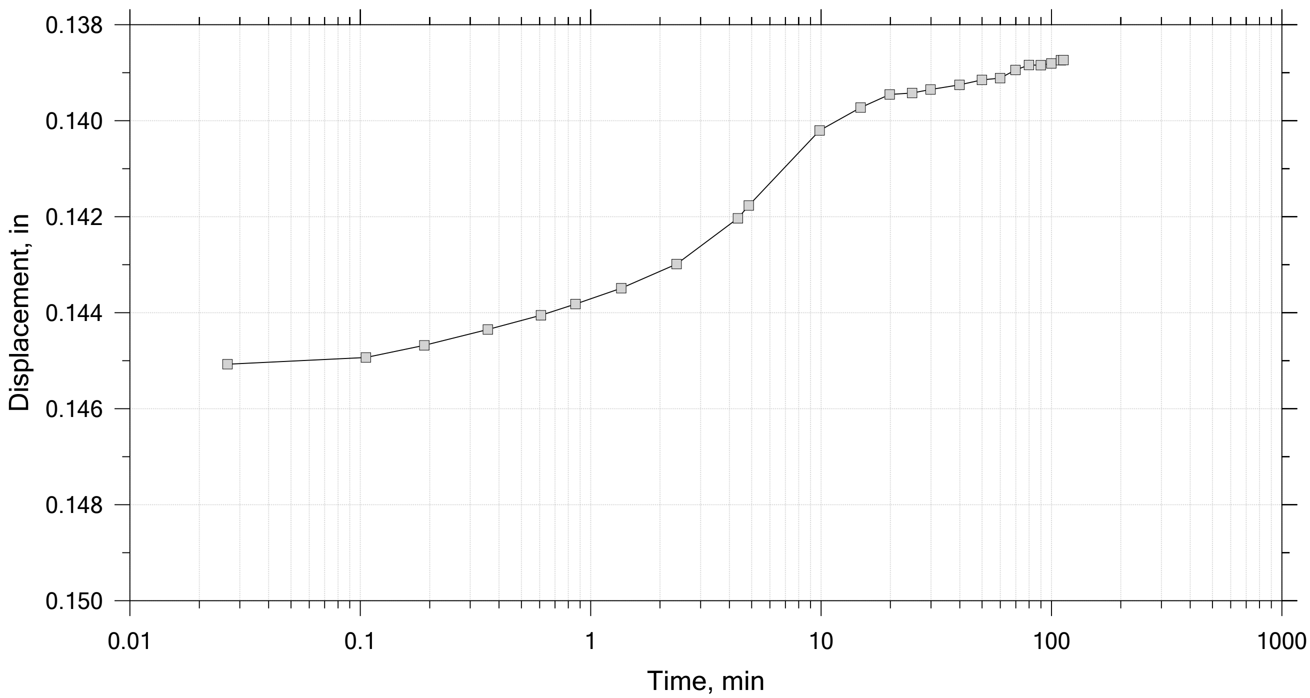
Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

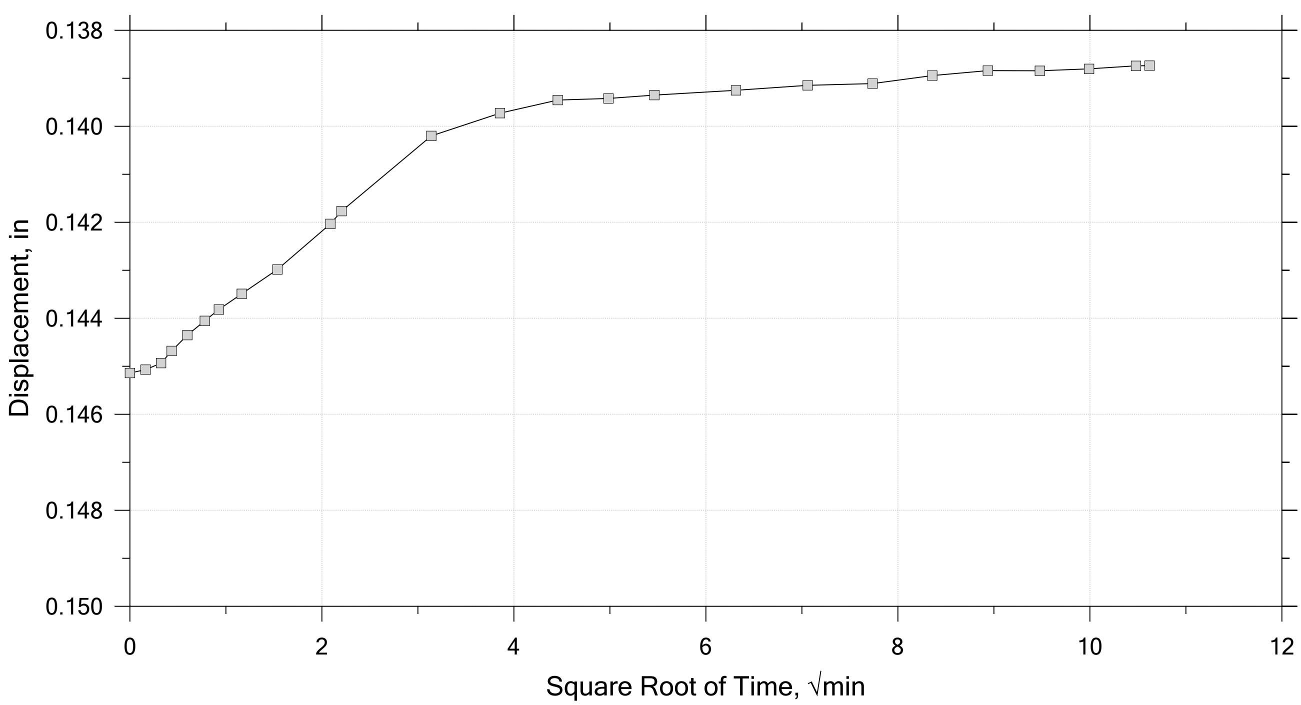
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 23

Constant Load Step

Stress: 1.33e+03 psf

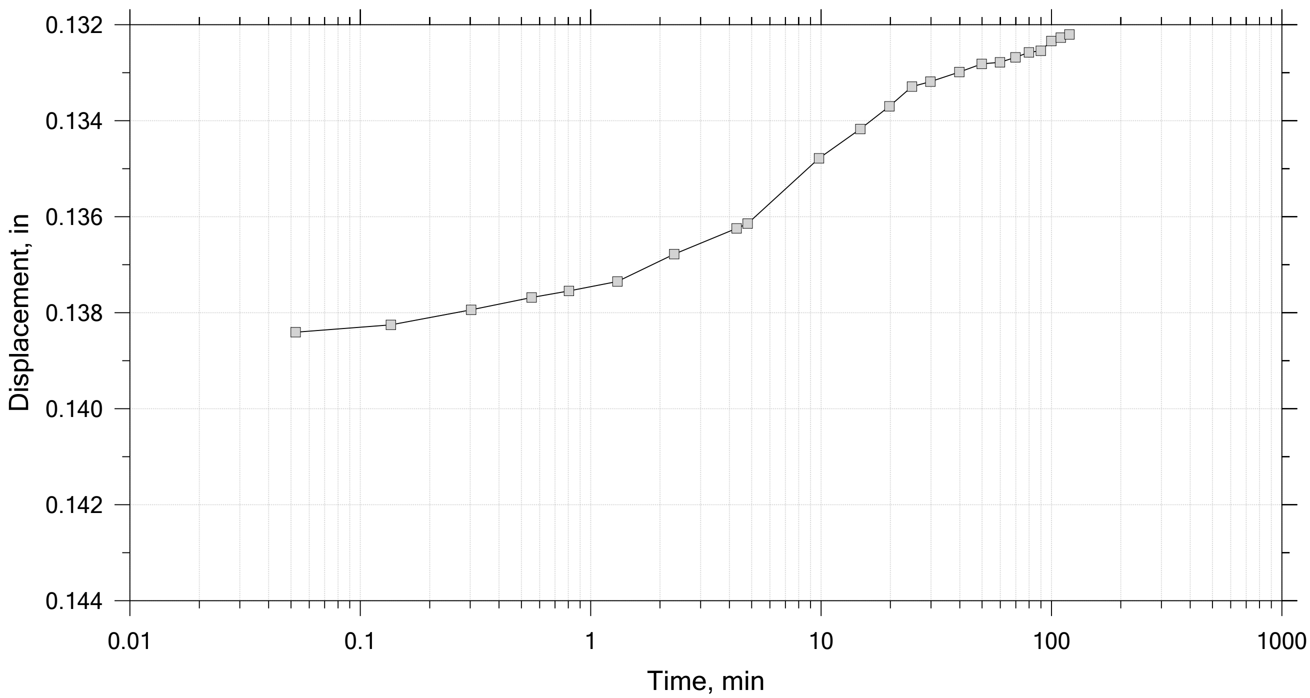


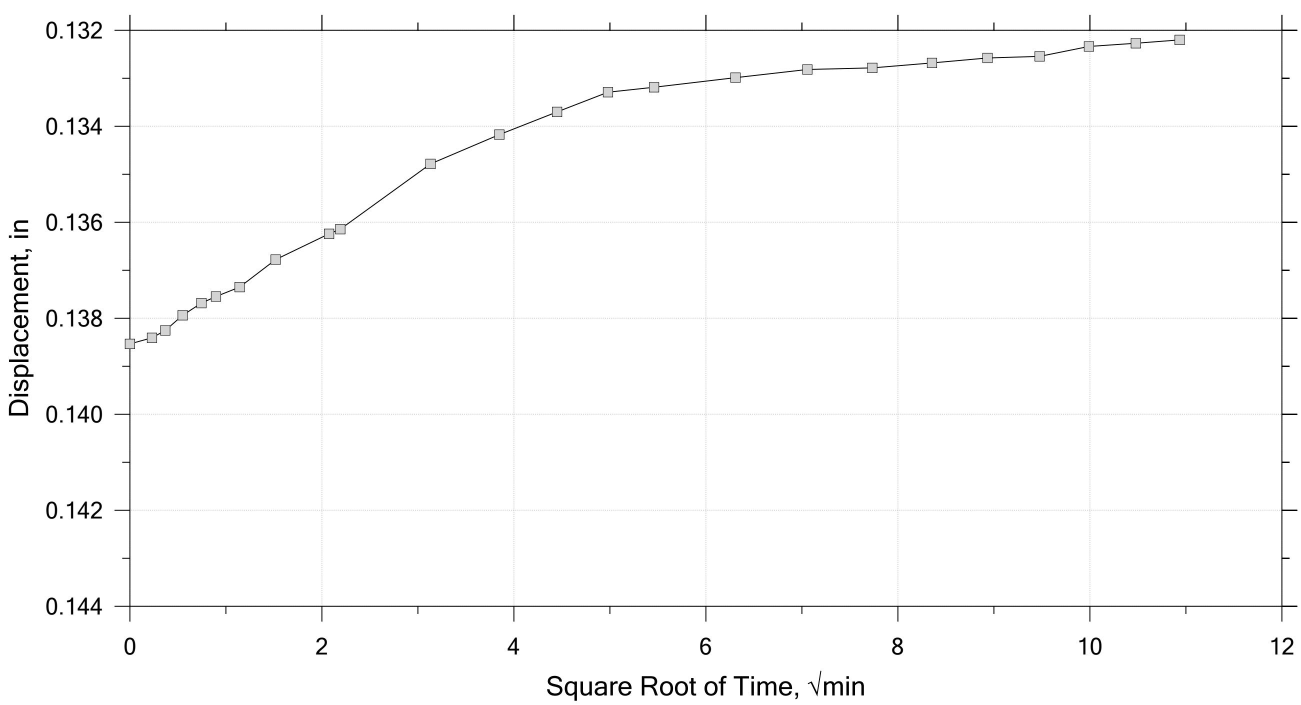


Soil Metrics LLC			
	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 23
Constant Load Step
Stress: 663 psf

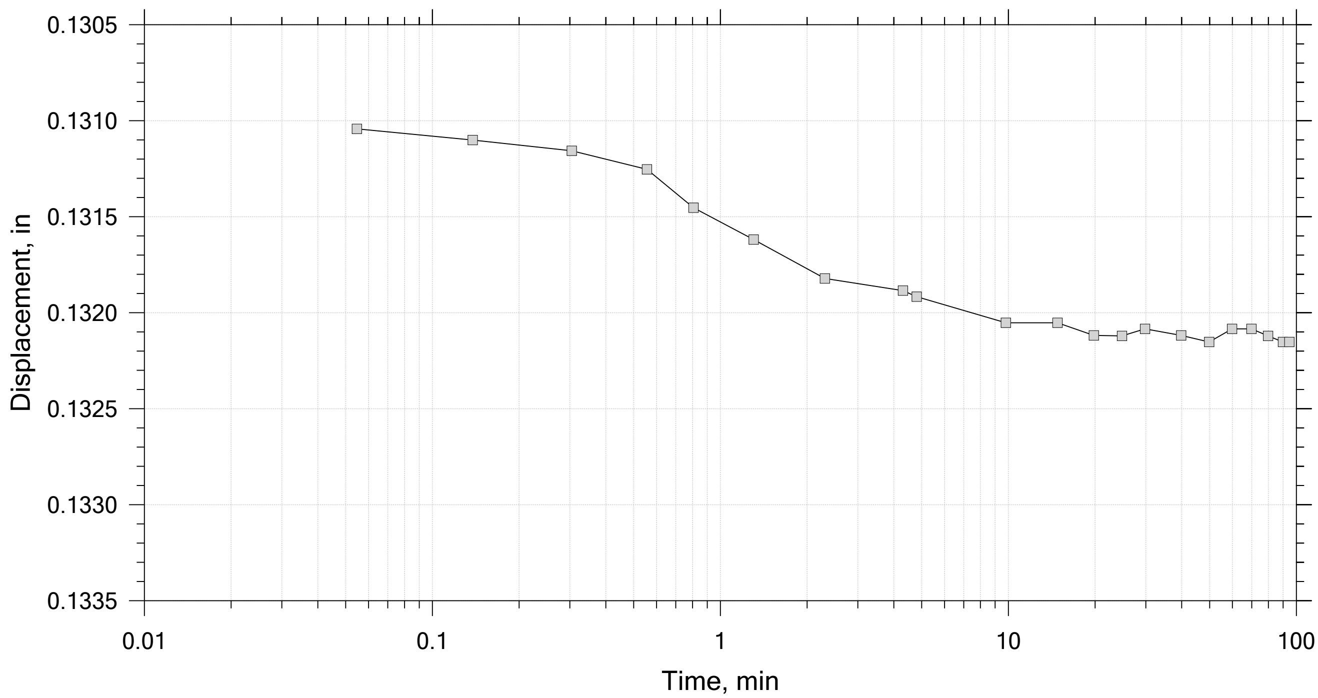


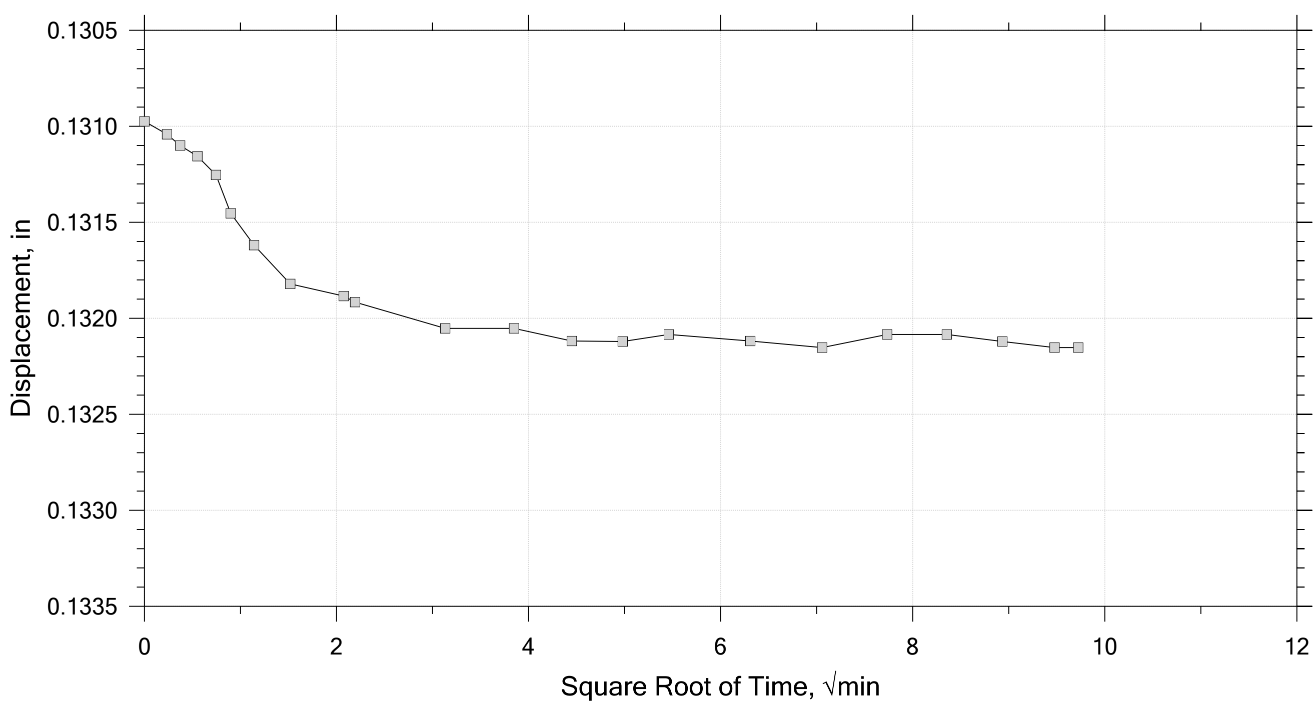


Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 23
Constant Load Step
Stress: 1.33e+03 psf

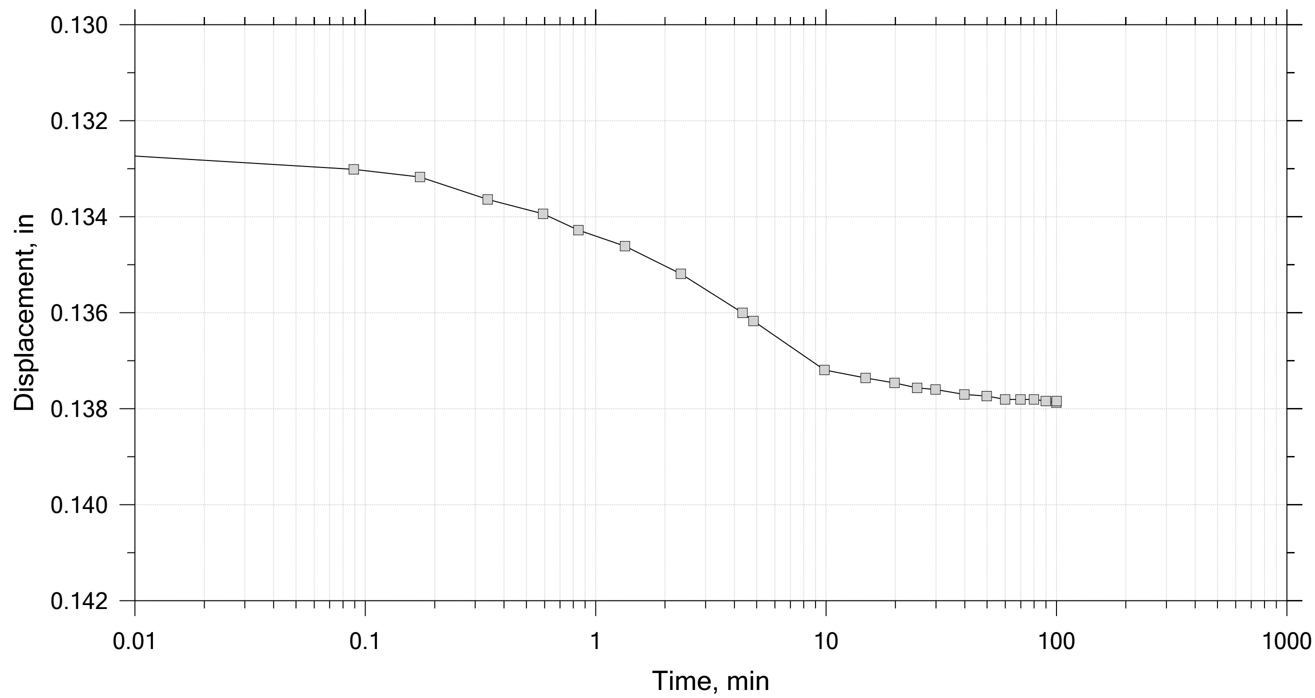


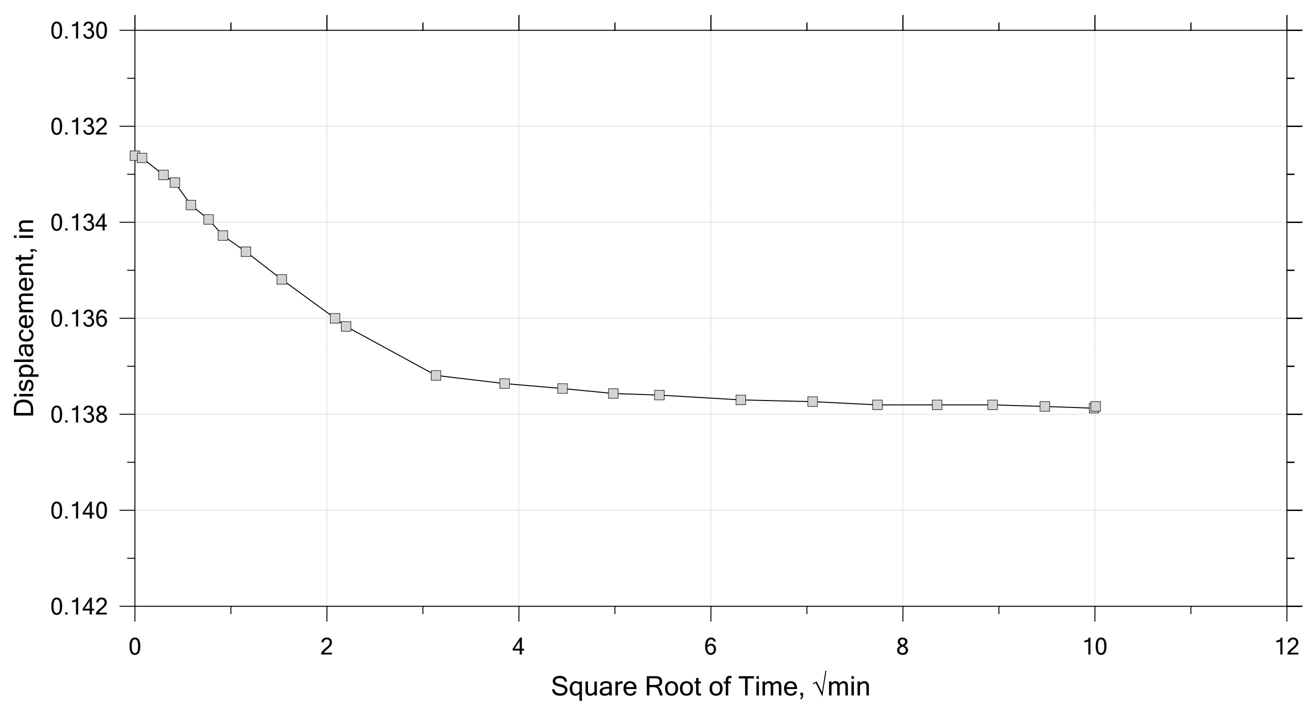


Soil Metrics LLC			
	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 16 of 23
Constant Load Step
Stress: 2.65e+03 psf

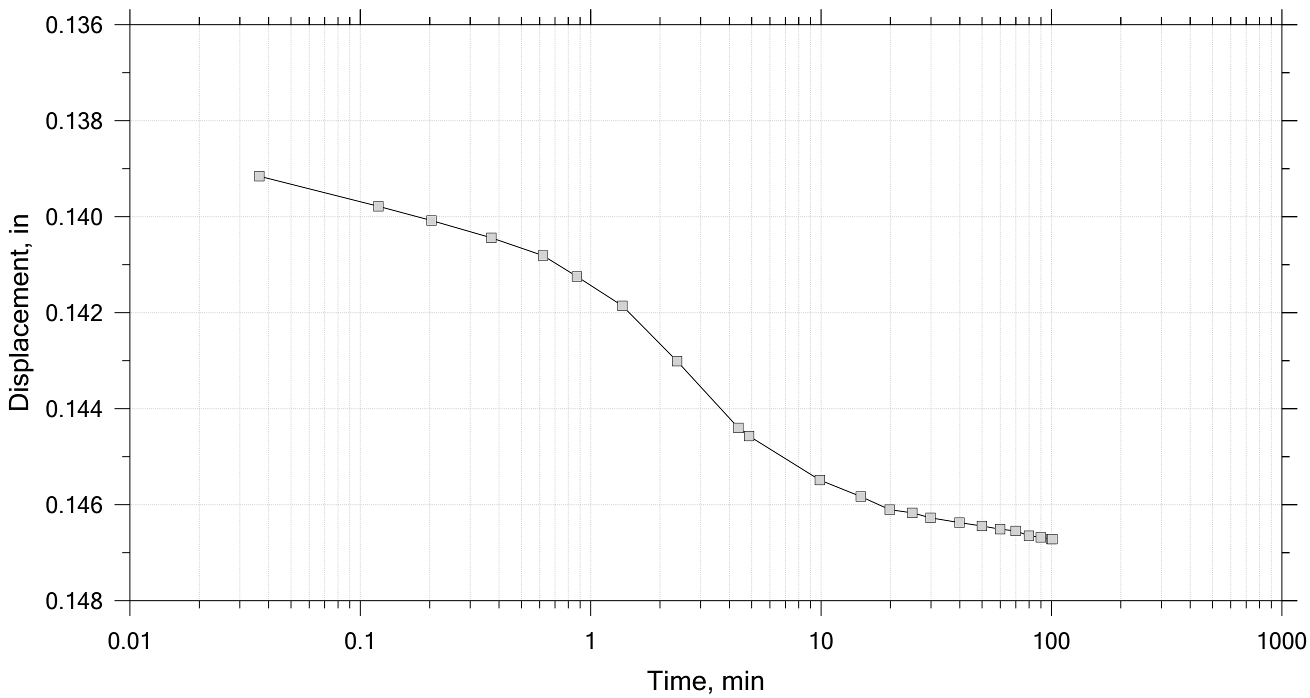


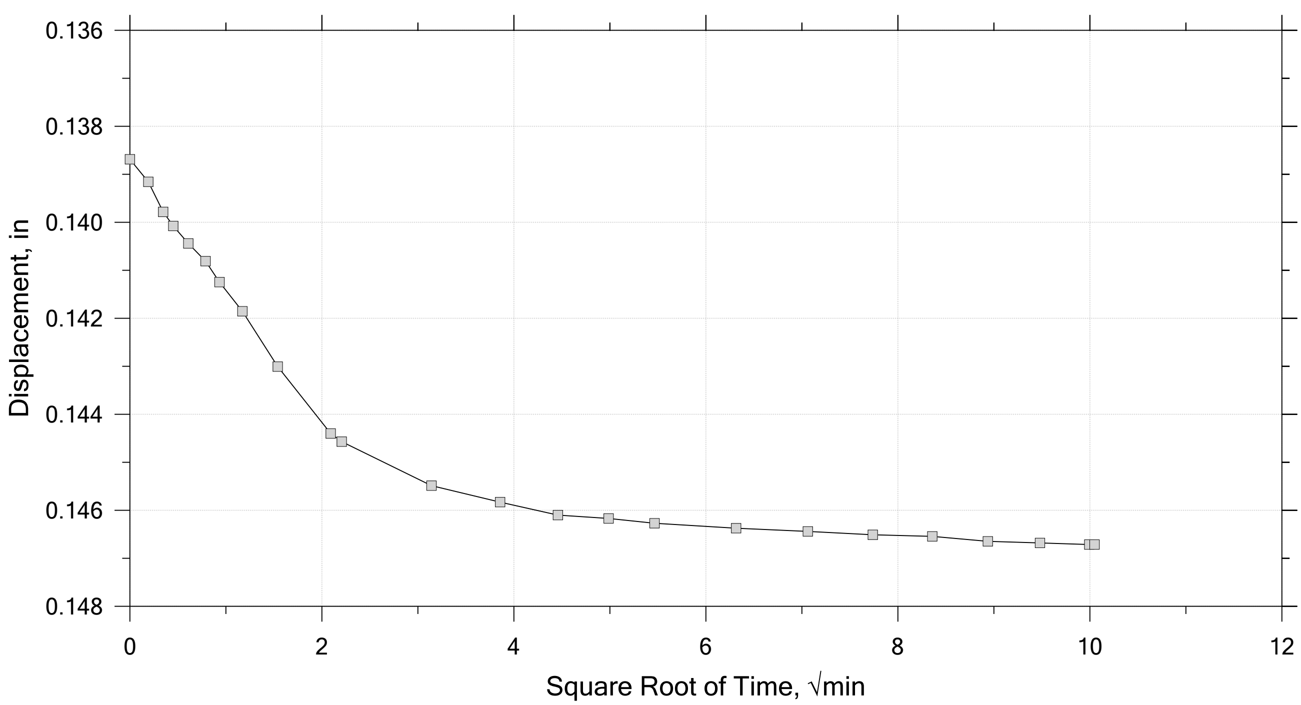


Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 17 of 23
Constant Load Step
Stress: 5.31e+03 psf





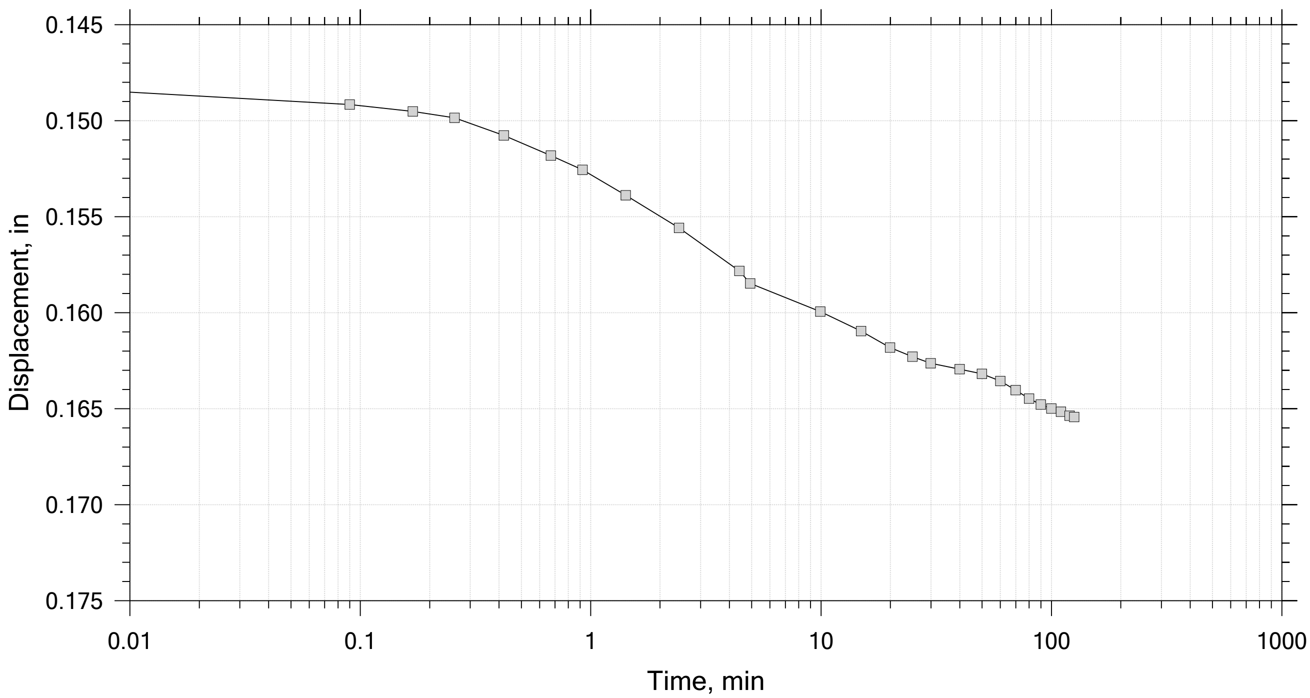
Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

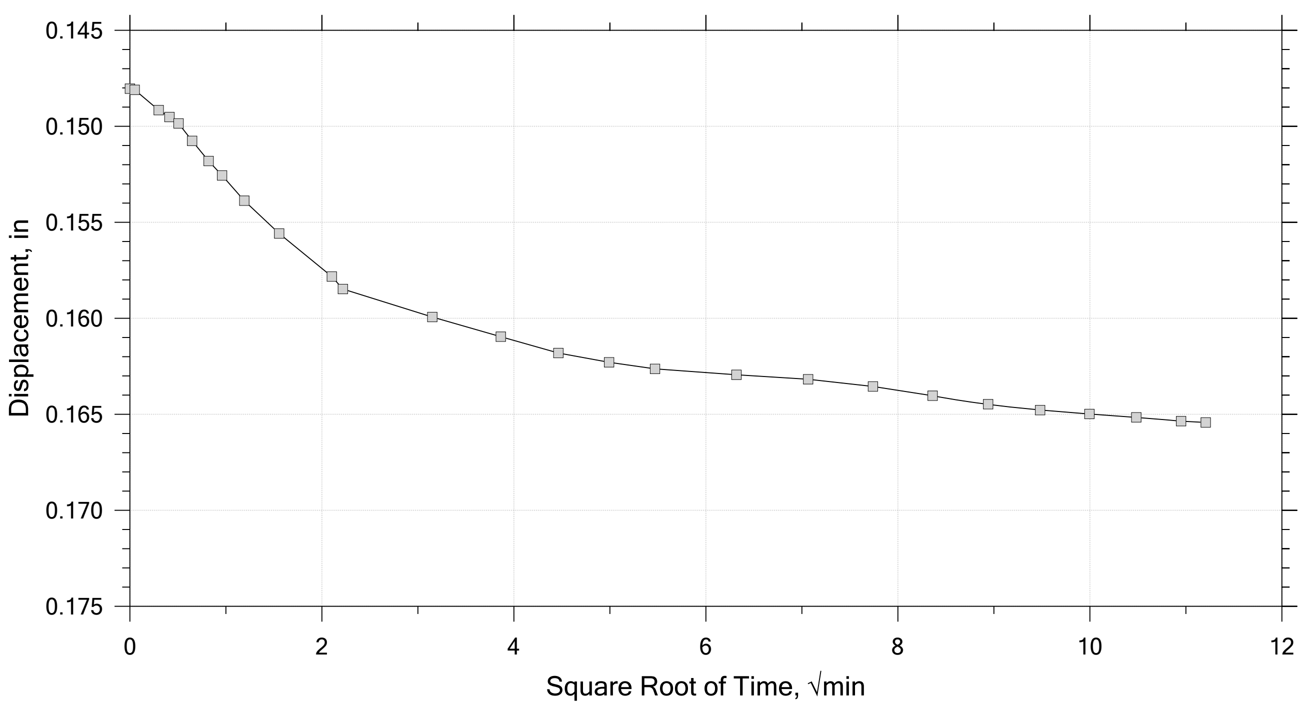
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 18 of 23

Constant Load Step

Stress: 1.06e+04 psf





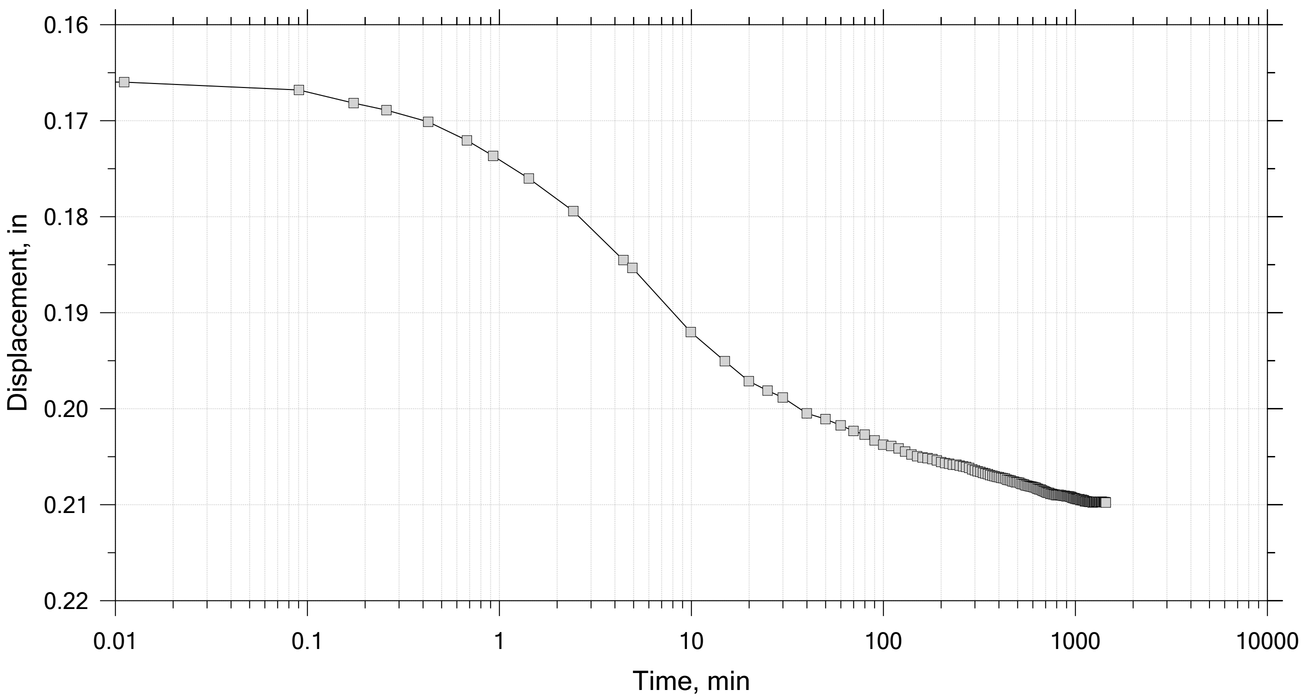
Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

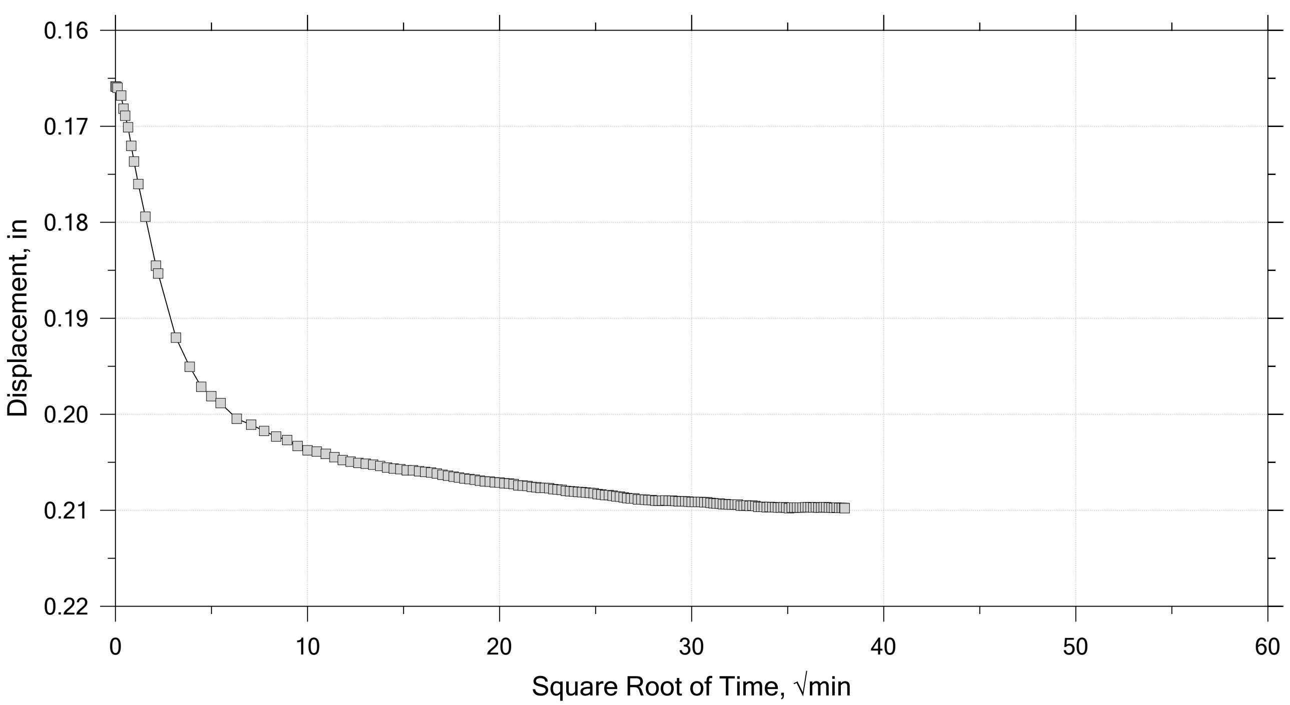
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 19 of 23

Constant Load Step

Stress: 2.12e+04 psf

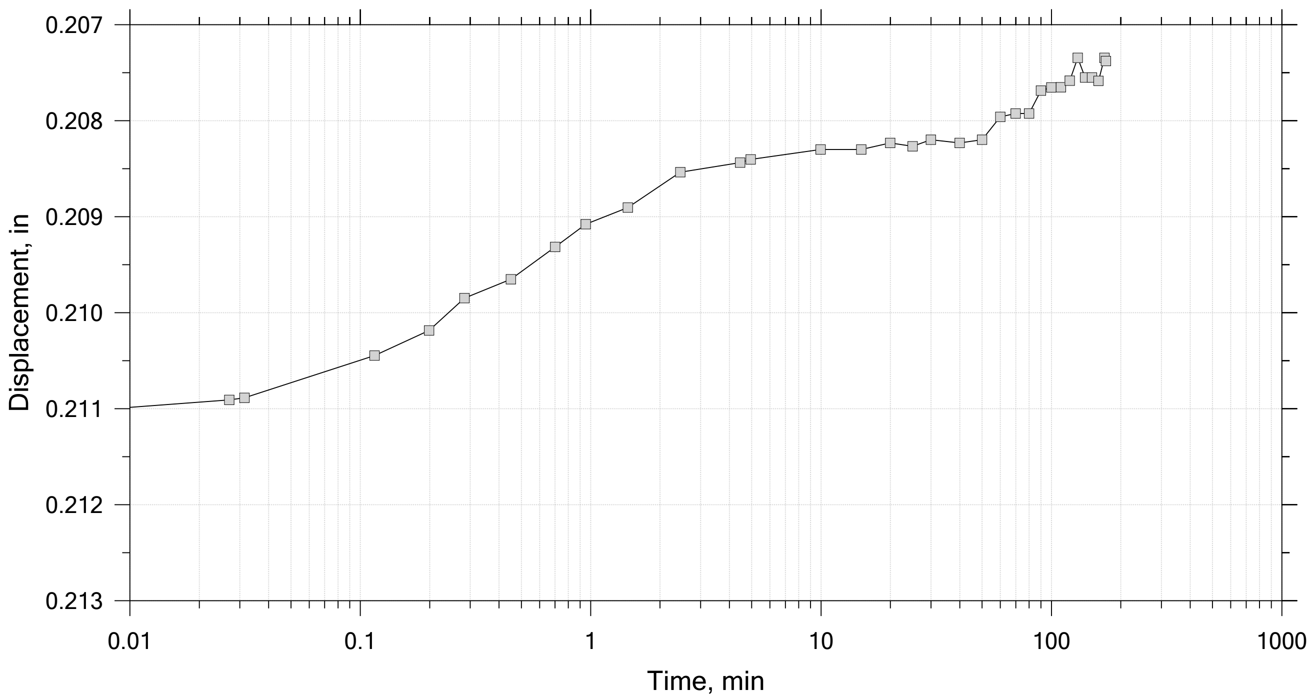


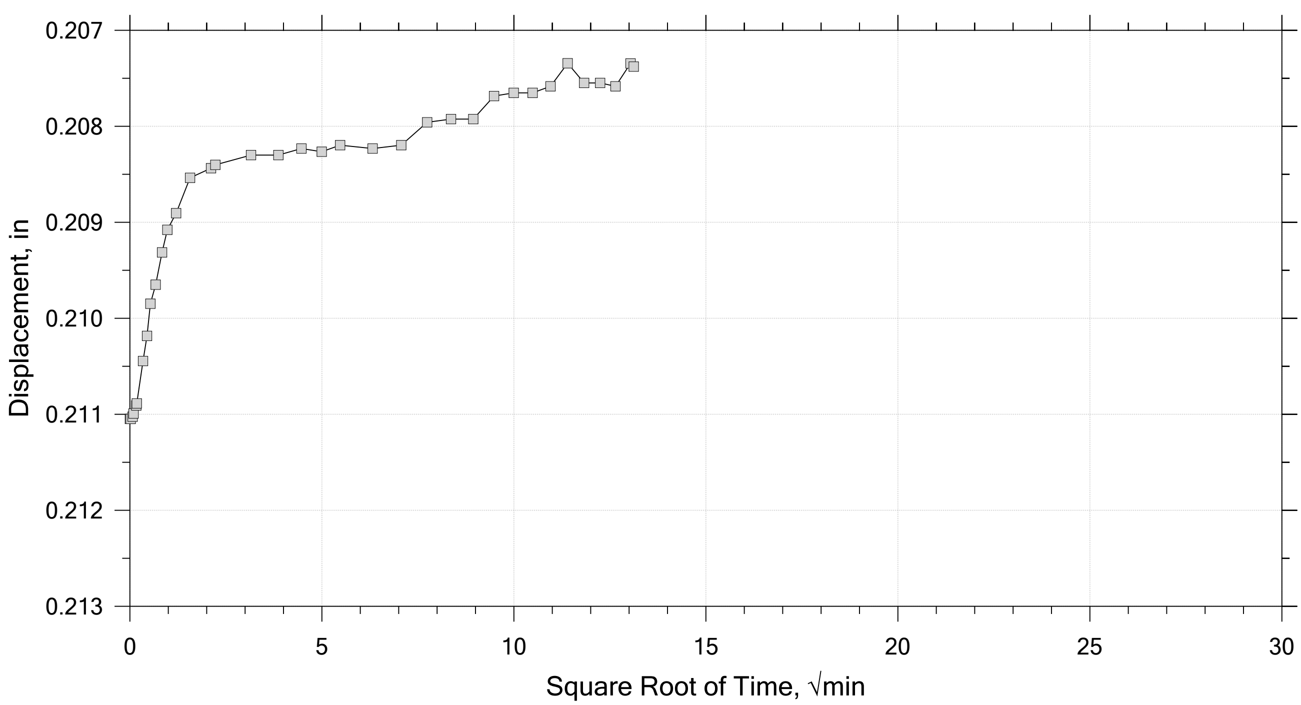


Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 20 of 23
Constant Load Step
Stress: 1.06e+04 psf

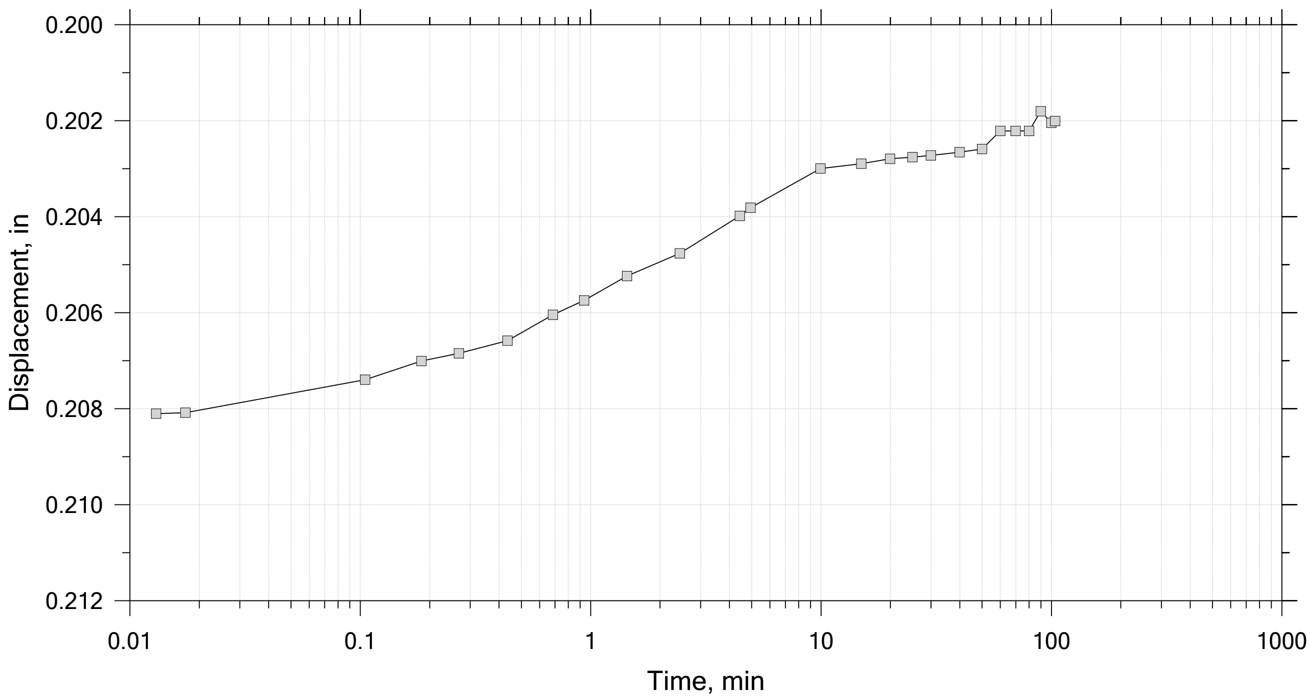


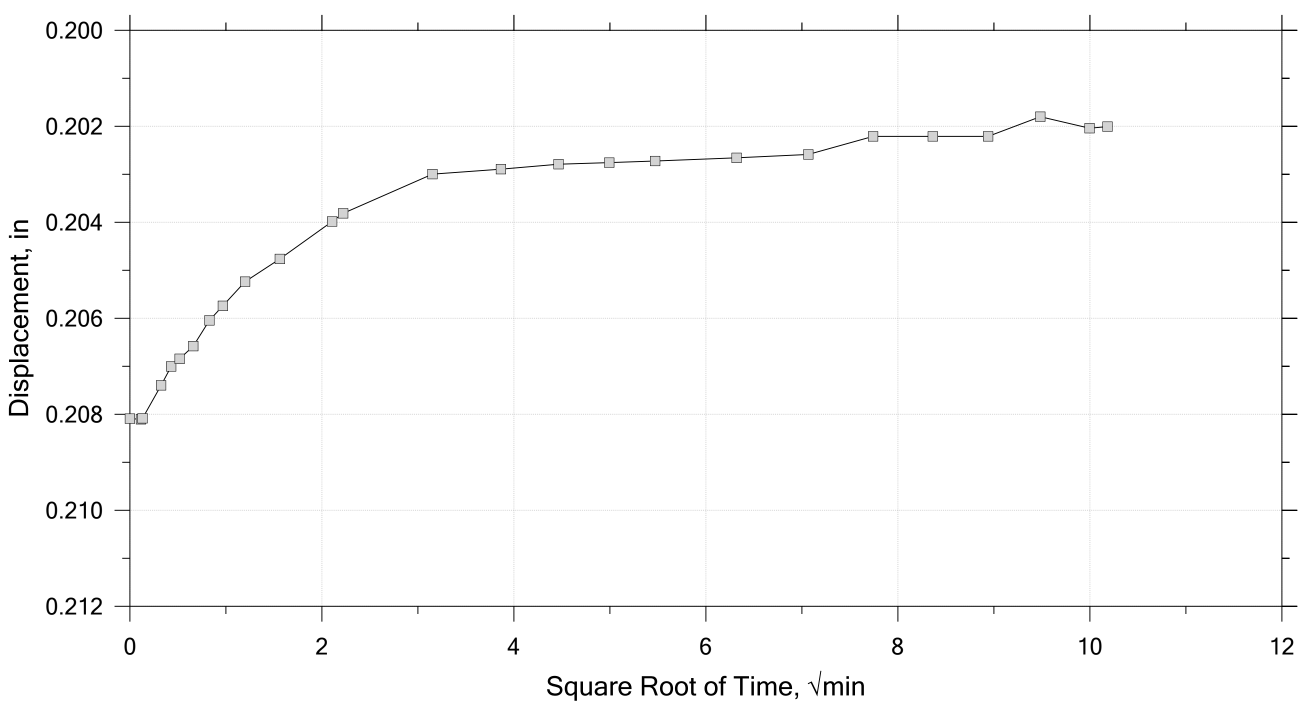


Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 21 of 23
Constant Load Step
Stress: 5.31e+03 psf

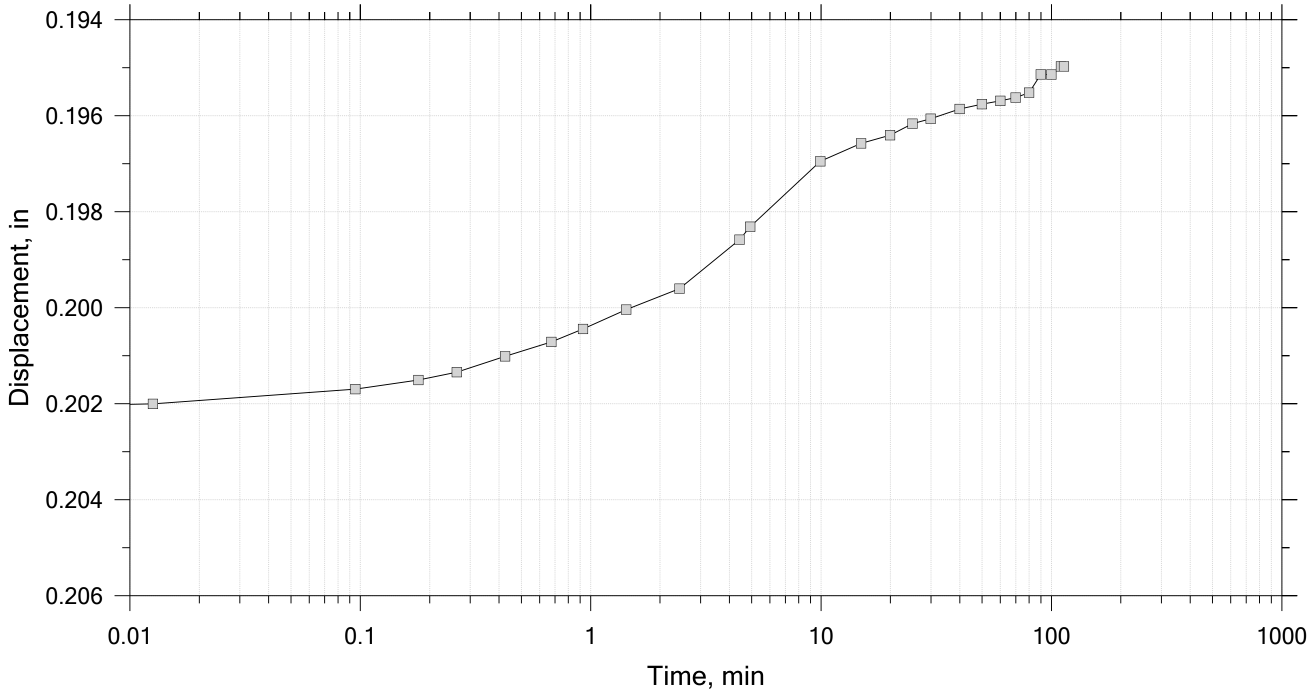


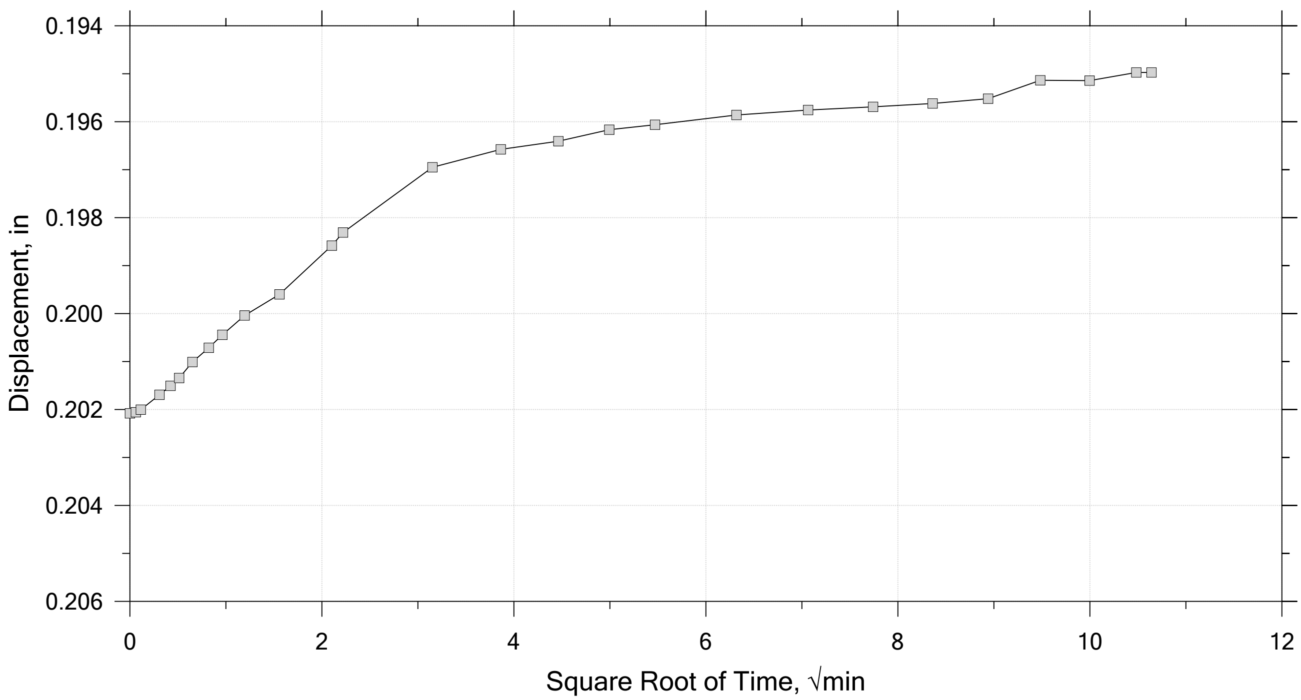


Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 22 of 23
Constant Load Step
Stress: 2.65e+03 psf

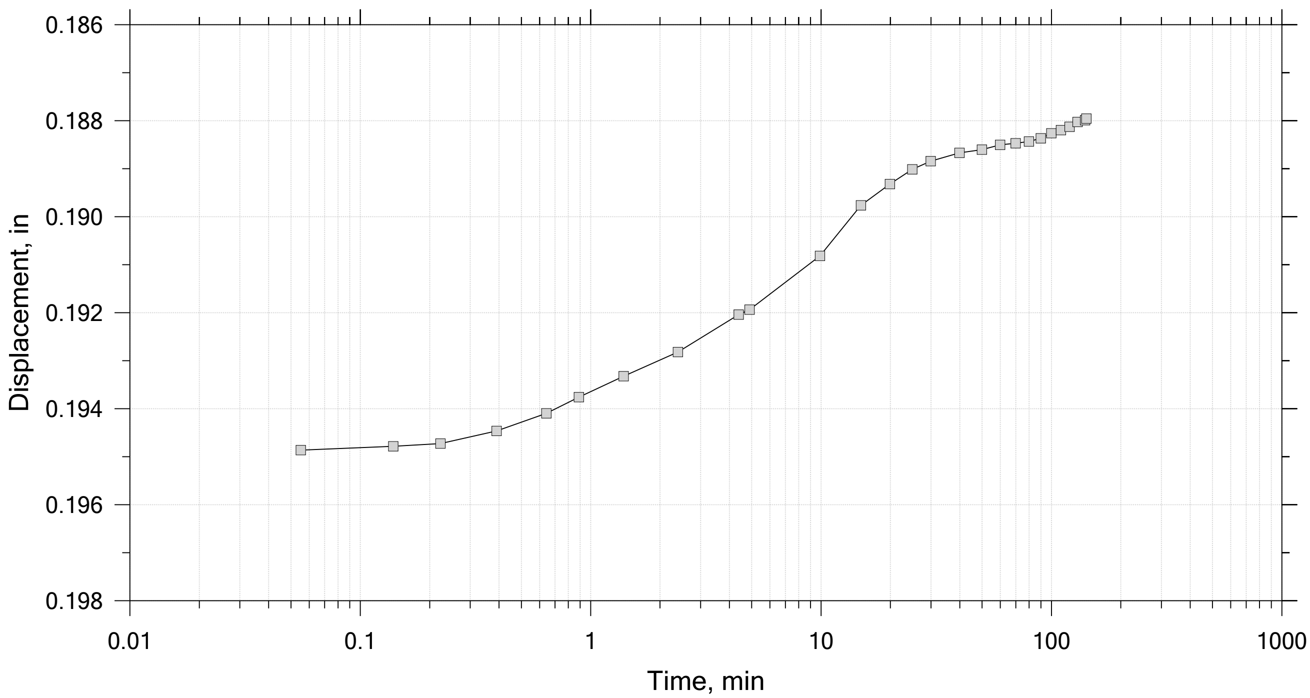


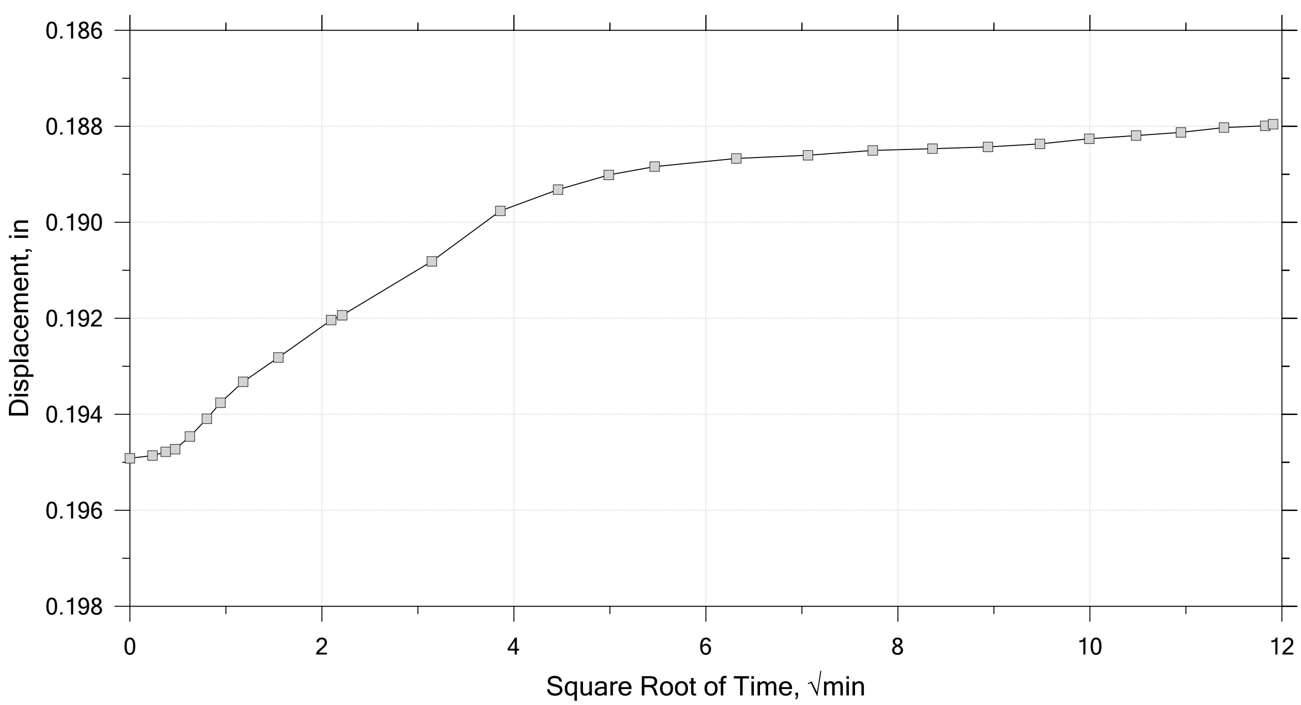


Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 23 of 23
Constant Load Step
Stress: 1.33e+03 psf





Soil Metrics LLC			
	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter: 2.50 in	Implied Specific Gravity: 2.90	Liquid Limit: 43
Initial Height: 1.00 in	Initial Void Ratio: 1.3	Plastic Limit: 23
Final Height: 0.81 in	Final Void Ratio: 0.868	Plasticity Index: 20

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	205	RING	"ring"	308
Mass Container, gm	37.02	109.53	109.53	60.7
Mass Container + Wet Soil, gm	135.89	254.94	241.49	192.55
Mass Container + Dry Soil, gm	107.97	211.09	211.09	162.18
Mass Dry Soil, gm	70.95	101.56	101.56	101.48
Water Content, %	39.35	43.17	29.93	29.93
Void Ratio	---	1.30	0.87	---
Degree of Saturation, %	---	96.33	100.00	---
Dry Unit Weight, pcf	---	78.744	96.948	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Soil Metrics LLC			
	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Log of Time Coefficients

Step	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/day	Mv 1/psf	k ft/day	Ca %
1	207.	0.009746	1.28	0.974	0.000	0.00e+00	4.70e-05	0.00e+00	0.00e+00
2	311.	0.01241	1.27	1.24	0.000	0.00e+00	2.56e-05	0.00e+00	0.00e+00
3	466.	0.01521	1.27	1.52	0.000	0.00e+00	1.81e-05	0.00e+00	0.00e+00
4	699.	0.01816	1.26	1.81	0.000	0.00e+00	1.26e-05	0.00e+00	0.00e+00
5	1.05e+03	0.02268	1.25	2.27	0.000	0.00e+00	1.30e-05	0.00e+00	0.00e+00
6	1.57e+03	0.02674	1.24	2.67	0.000	0.00e+00	7.74e-06	0.00e+00	0.00e+00
7	2.36e+03	0.03159	1.23	3.16	2.024	2.30e-01	6.16e-06	8.84e-05	0.00e+00
8	3.54e+03	0.04198	1.20	4.19	0.000	0.00e+00	8.81e-06	0.00e+00	0.00e+00
9	5.31e+03	0.07531	1.13	7.52	0.000	0.00e+00	1.88e-05	0.00e+00	0.00e+00
10	1.06e+04	0.1495	0.957	14.9	9.441	4.12e-02	1.40e-05	3.59e-05	0.00e+00
11	5.31e+03	0.1517	0.952	15.2	0.000	0.00e+00	-4.06e-07	-0.00e+00	0.00e+00
12	2.65e+03	0.1462	0.964	14.6	0.000	0.00e+00	2.09e-06	0.00e+00	0.00e+00
13	1.33e+03	0.1392	0.980	13.9	0.000	0.00e+00	5.24e-06	0.00e+00	0.00e+00
14	663.	0.1327	0.995	13.3	5.696	6.47e-02	9.80e-06	3.96e-05	0.00e+00
15	1.33e+03	0.1321	0.997	13.2	0.000	0.00e+00	-9.50e-07	-0.00e+00	0.00e+00
16	2.65e+03	0.1375	0.984	13.7	2.292	1.61e-01	4.12e-06	4.15e-05	0.00e+00
17	5.31e+03	0.1463	0.964	14.6	2.256	1.61e-01	3.29e-06	3.31e-05	0.00e+00
18	1.06e+04	0.1628	0.926	16.3	2.047	1.72e-01	3.12e-06	3.35e-05	0.00e+00
19	2.12e+04	0.2064	0.826	20.6	0.000	0.00e+00	4.10e-06	0.00e+00	0.00e+00
20	1.06e+04	0.2084	0.821	20.8	0.000	0.00e+00	-1.87e-07	-0.00e+00	0.00e+00
21	5.31e+03	0.2029	0.834	20.3	1.793	1.74e-01	1.03e-06	1.12e-05	0.00e+00
22	2.65e+03	0.1958	0.850	19.6	4.742	6.67e-02	2.66e-06	1.11e-05	0.00e+00
23	1.33e+03	0.1885	0.867	18.8	0.000	0.00e+00	5.51e-06	0.00e+00	0.00e+00

Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B

Square Root of Time Coefficients

Step	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv ft²/day	Mv 1/psf	k ft/day
1	207.	0.009746	1.28	0.974	28.531	7.37e-02	4.70e-05	2.16e-04
2	311.	0.01241	1.27	1.24	15.504	1.34e-01	2.56e-05	2.14e-04
3	466.	0.01521	1.27	1.52	23.922	8.64e-02	1.81e-05	9.73e-05
4	699.	0.01816	1.26	1.81	19.992	1.03e-01	1.26e-05	8.09e-05
5	1.05e+03	0.02268	1.25	2.27	76.903	2.65e-02	1.30e-05	2.14e-05
6	1.57e+03	0.02674	1.24	2.67	13.215	1.53e-01	7.74e-06	7.39e-05
7	2.36e+03	0.03159	1.23	3.16	14.053	1.42e-01	6.16e-06	5.48e-05
8	3.54e+03	0.04198	1.20	4.19	29.793	6.62e-02	8.81e-06	3.64e-05
9	5.31e+03	0.07531	1.13	7.52	93.079	2.02e-02	1.88e-05	2.38e-05
10	1.06e+04	0.1495	0.957	14.9	39.500	4.24e-02	1.40e-05	3.70e-05
11	5.31e+03	0.1517	0.952	15.2	3.142	4.88e-01	-4.06e-07	-1.24e-05
12	2.65e+03	0.1462	0.964	14.6	9.128	1.69e-01	2.09e-06	2.20e-05
13	1.33e+03	0.1392	0.980	13.9	20.386	7.66e-02	5.24e-06	2.51e-05
14	663.	0.1327	0.995	13.3	30.860	5.14e-02	9.80e-06	3.15e-05
15	1.33e+03	0.1321	0.997	13.2	5.974	2.68e-01	-9.50e-07	-1.59e-05
16	2.65e+03	0.1375	0.984	13.7	10.238	1.55e-01	4.12e-06	4.00e-05
17	5.31e+03	0.1463	0.964	14.6	13.301	1.18e-01	3.29e-06	2.42e-05
18	1.06e+04	0.1628	0.926	16.3	16.054	9.46e-02	3.12e-06	1.84e-05
19	2.12e+04	0.2064	0.826	20.6	131.881	1.07e-02	4.10e-06	2.74e-06
20	1.06e+04	0.2084	0.821	20.8	3.109	4.30e-01	-1.87e-07	-5.01e-06
21	5.31e+03	0.2029	0.834	20.3	6.800	1.97e-01	1.03e-06	1.27e-05
22	2.65e+03	0.1958	0.850	19.6	19.647	6.93e-02	2.66e-06	1.15e-05
23	1.33e+03	0.1885	0.867	18.8	27.359	5.07e-02	5.51e-06	1.74e-05

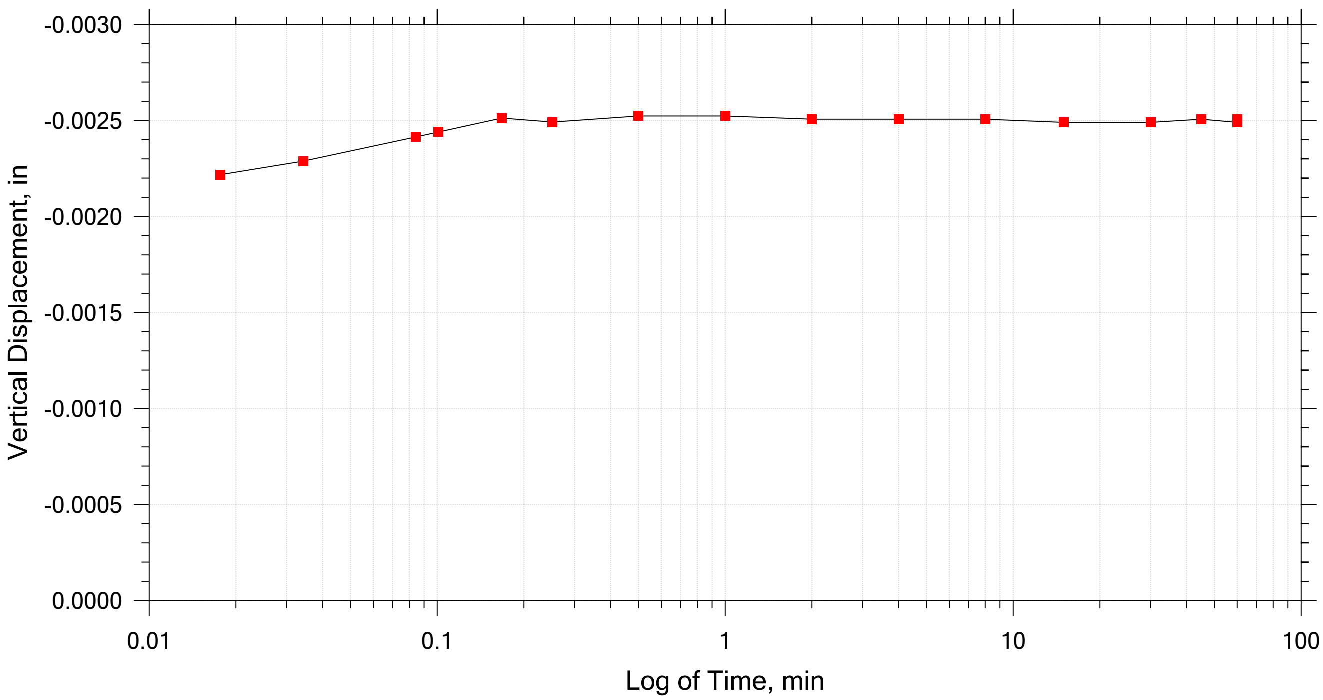
Soil Metrics LLC	Project: PleasantCove Bridge	Location: Woolwich, ME	Project No.: 166-21
	Boring No.: HB-WPC-203	Tested By: sjr	Checked By:
	Sample No.: U4	Test Date: 04/29/2021	Depth: 80.9
	Test No.: ICONP-68-360	Sample Type: wet	Elevation: --
	Description:		
	Remarks:		
	Displacement at End of Primary		

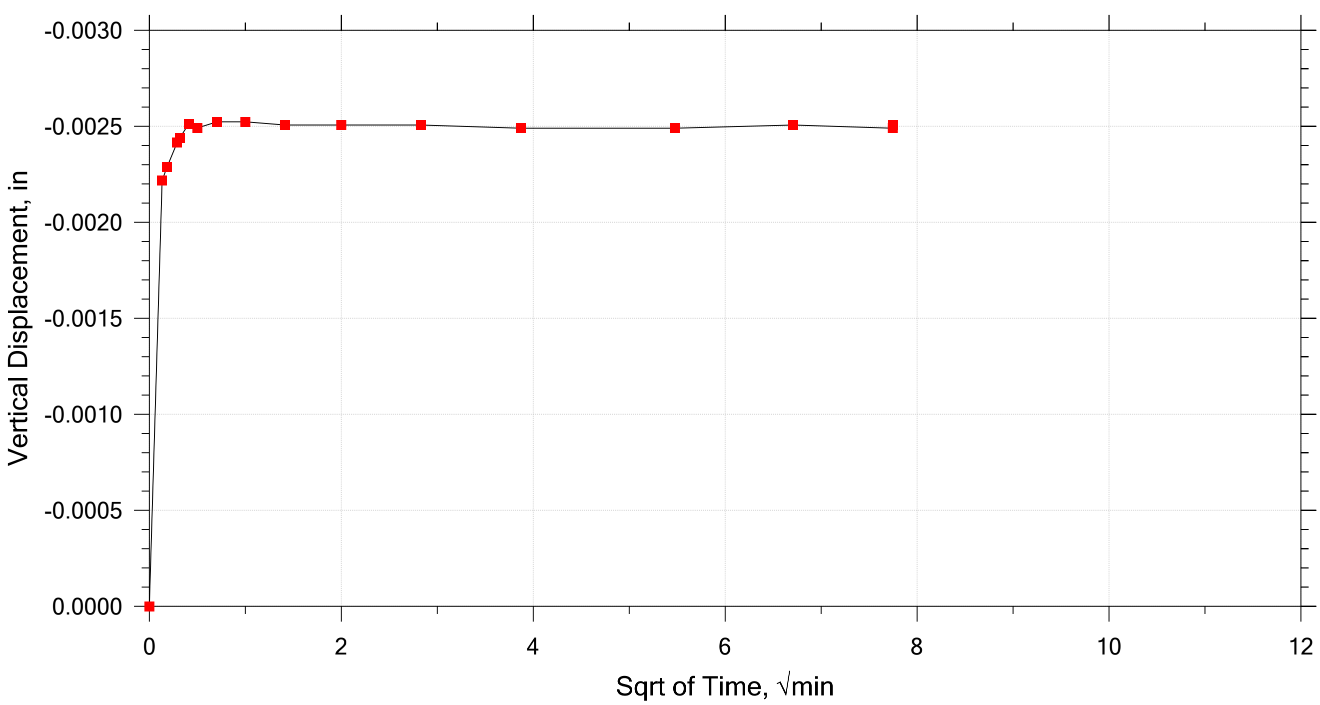
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 1 of 6

Constant Load Step

Stress: 220 psf





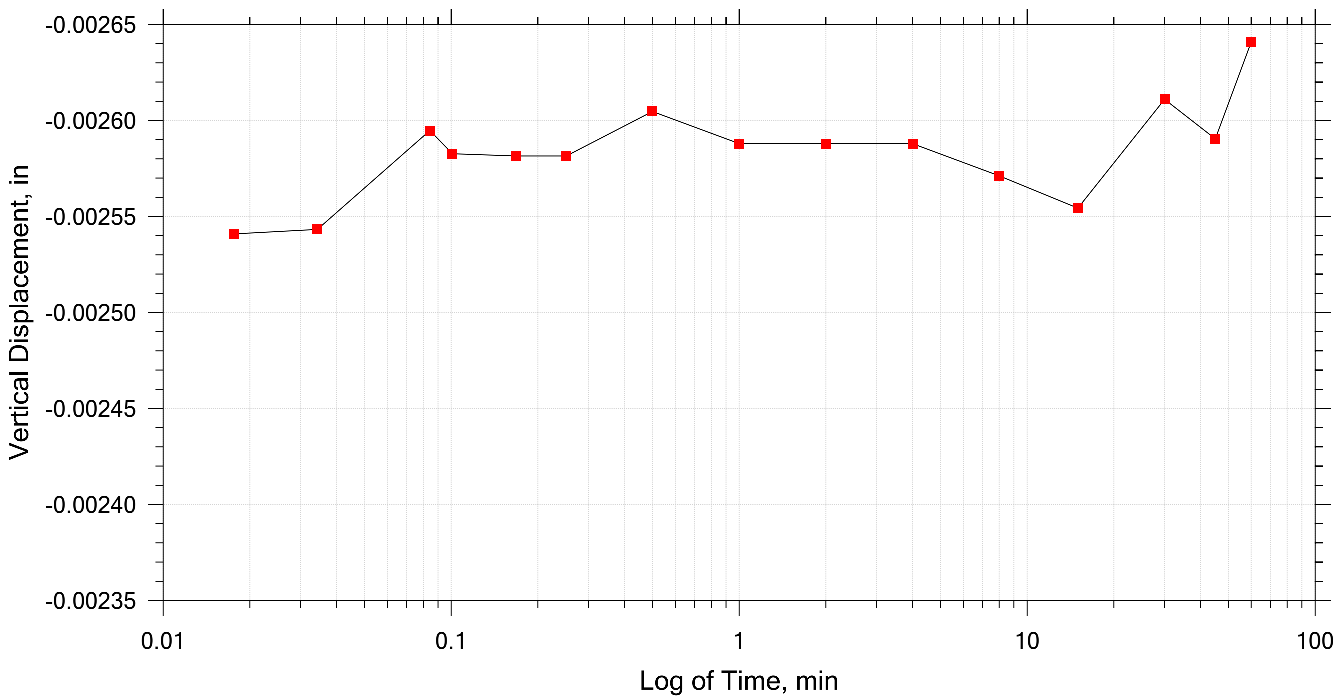
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
	Test Number: DSS 142	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

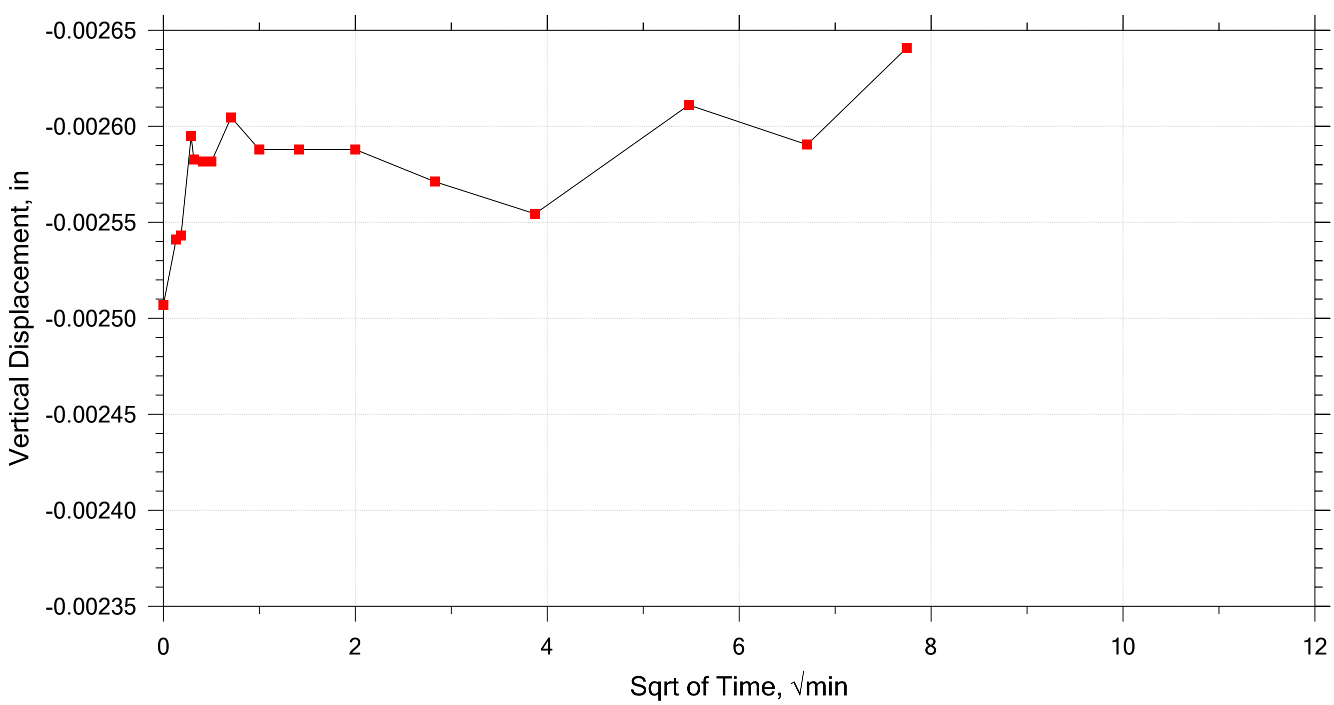
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 2 of 6

Constant Load Step

Stress: 330 psf





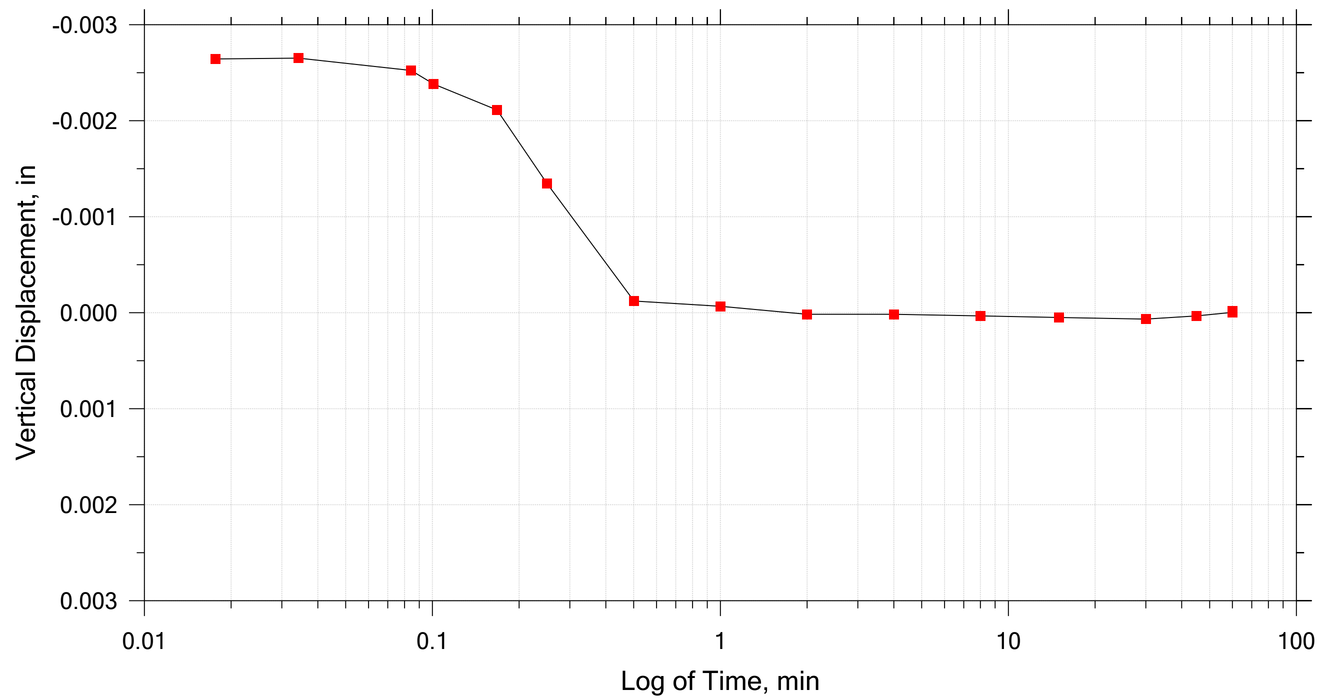
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
	Test Number: DSS 142	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

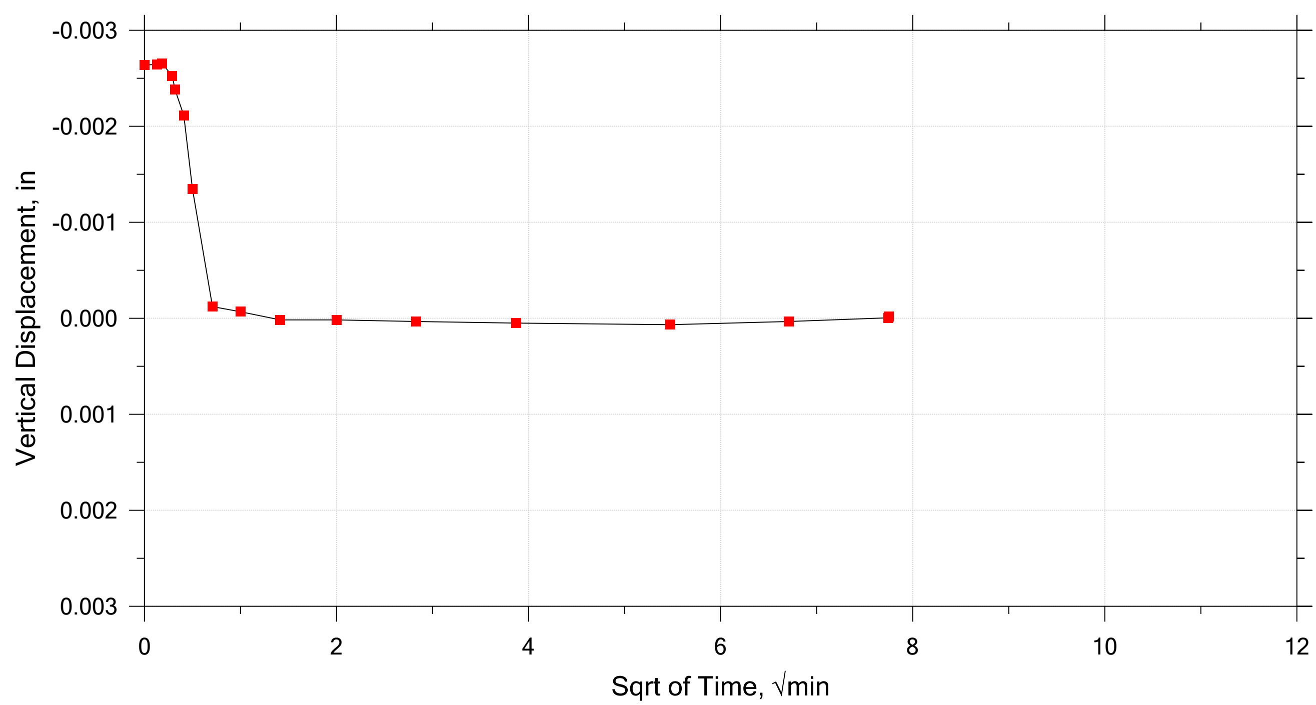
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 3 of 6

Constant Load Step

Stress: 495 psf





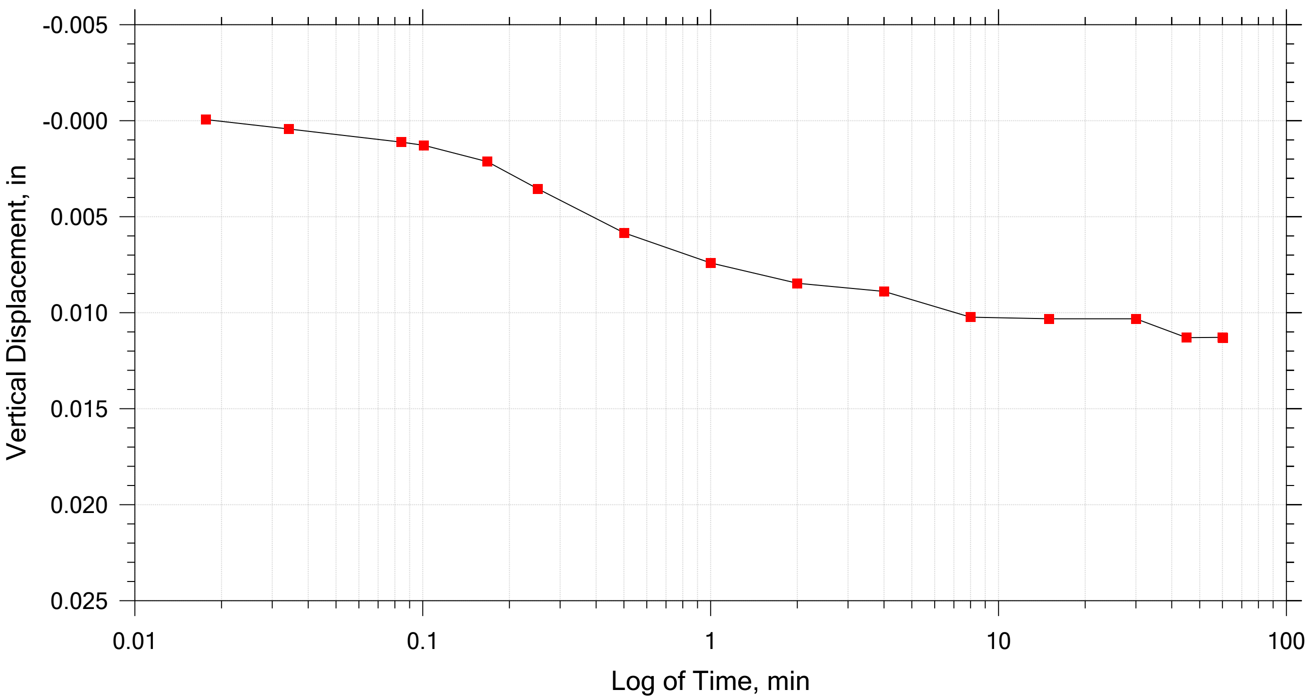
Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
Test Number: DSS 142	Preparation: wet	Elevation:
Description: Brown Organic Silt		
Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

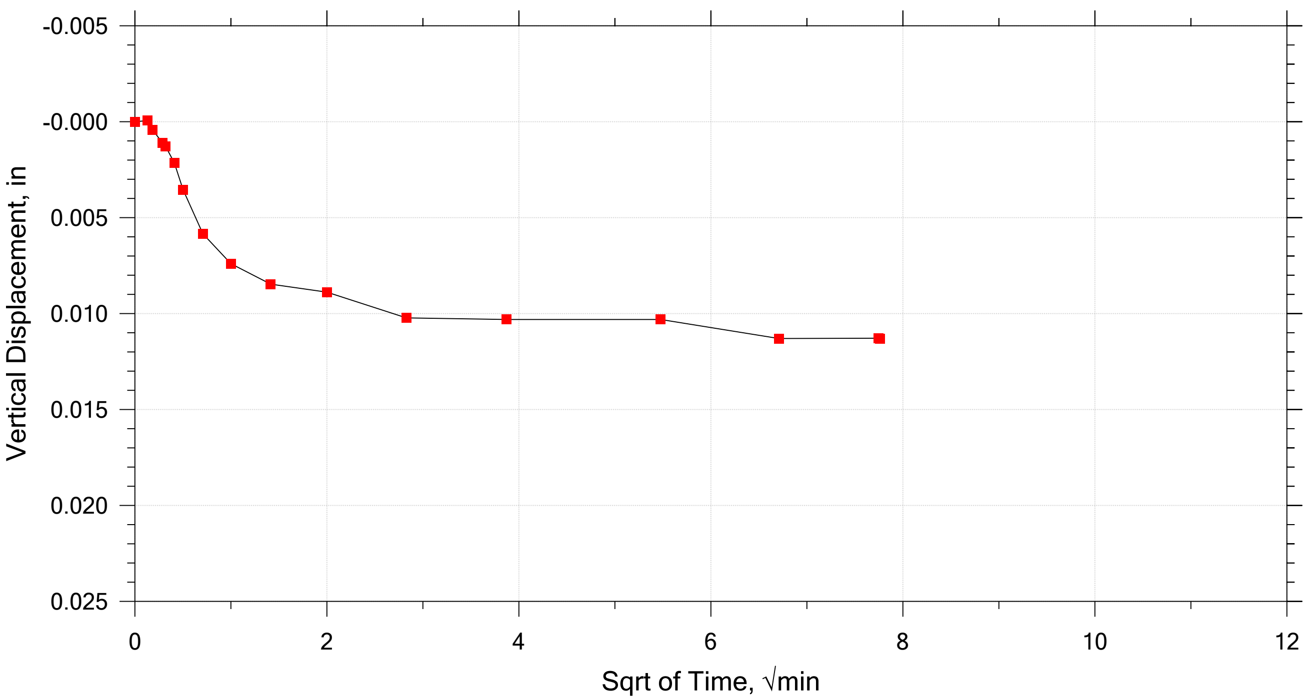
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 4 of 6

Constant Load Step

Stress: 743 psf





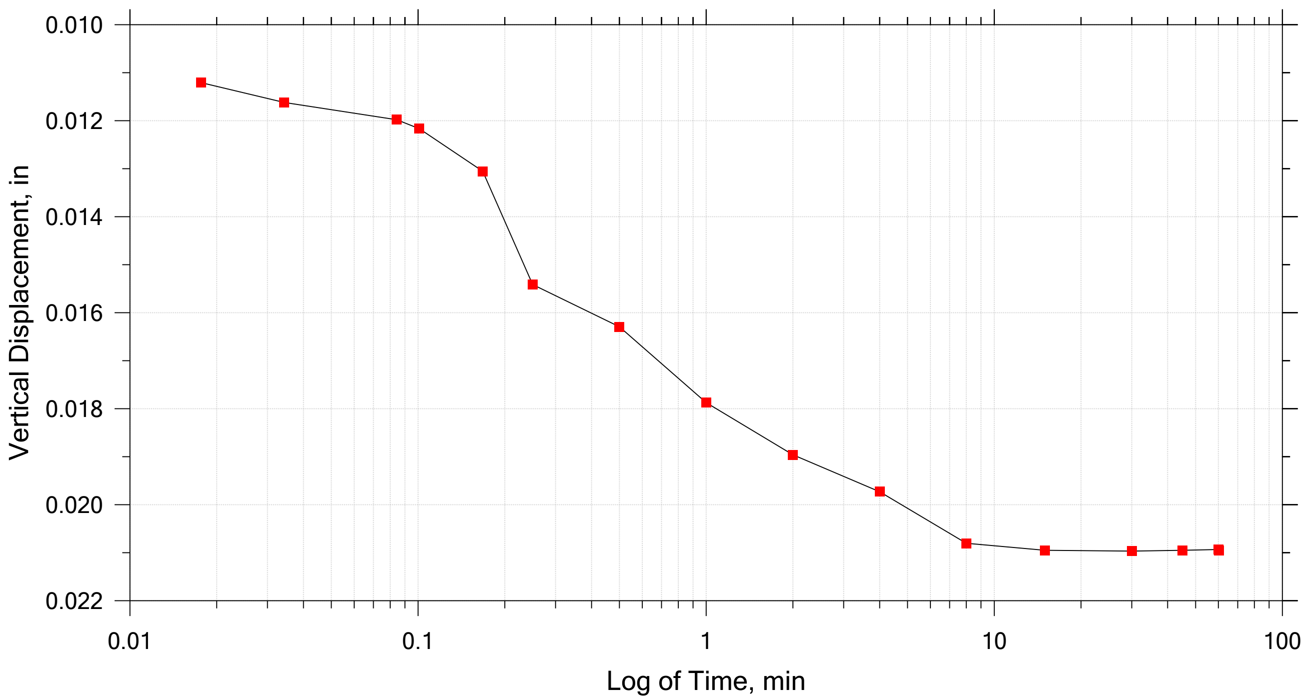
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
	Test Number: DSS 142	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

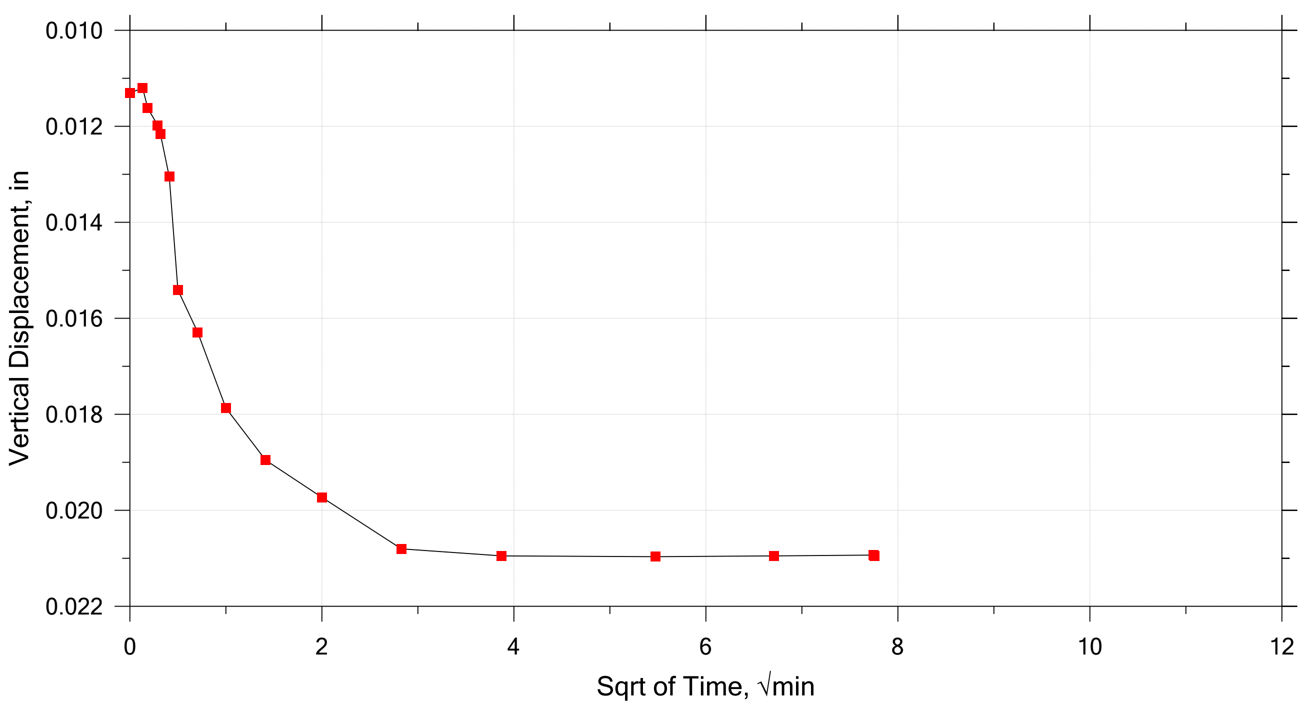
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 5 of 6

Constant Load Step

Stress: 1.11e+03 psf

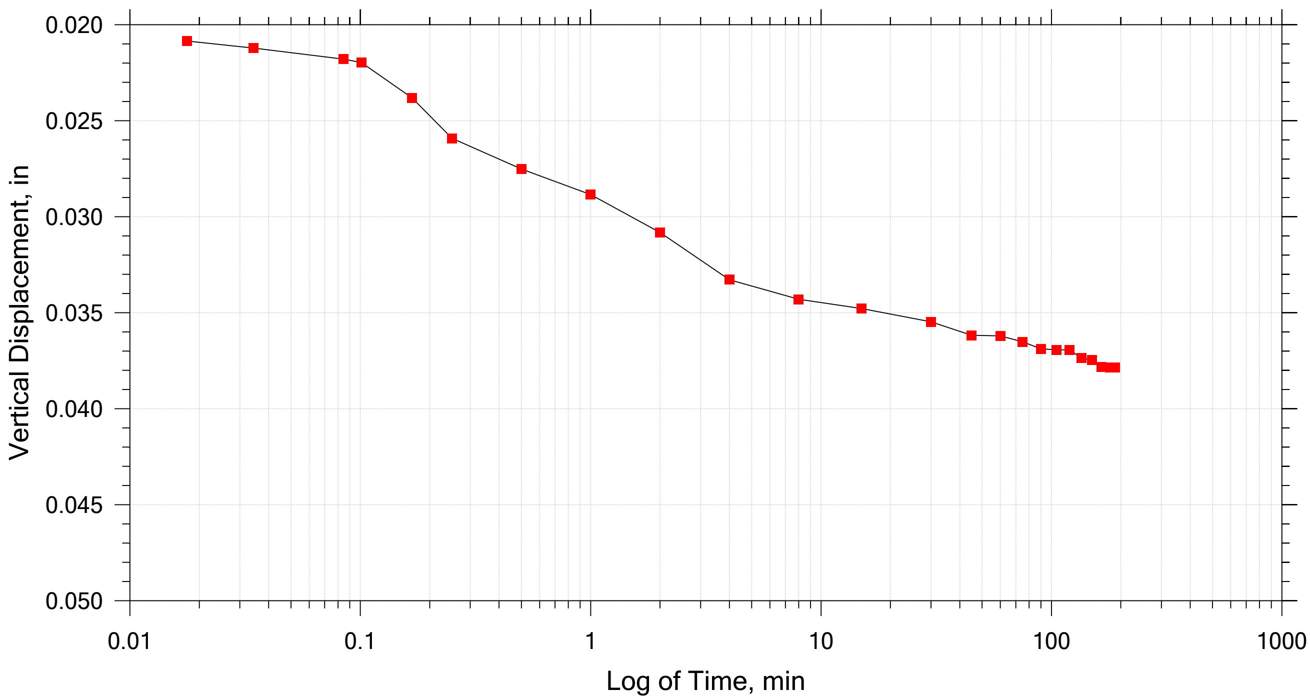


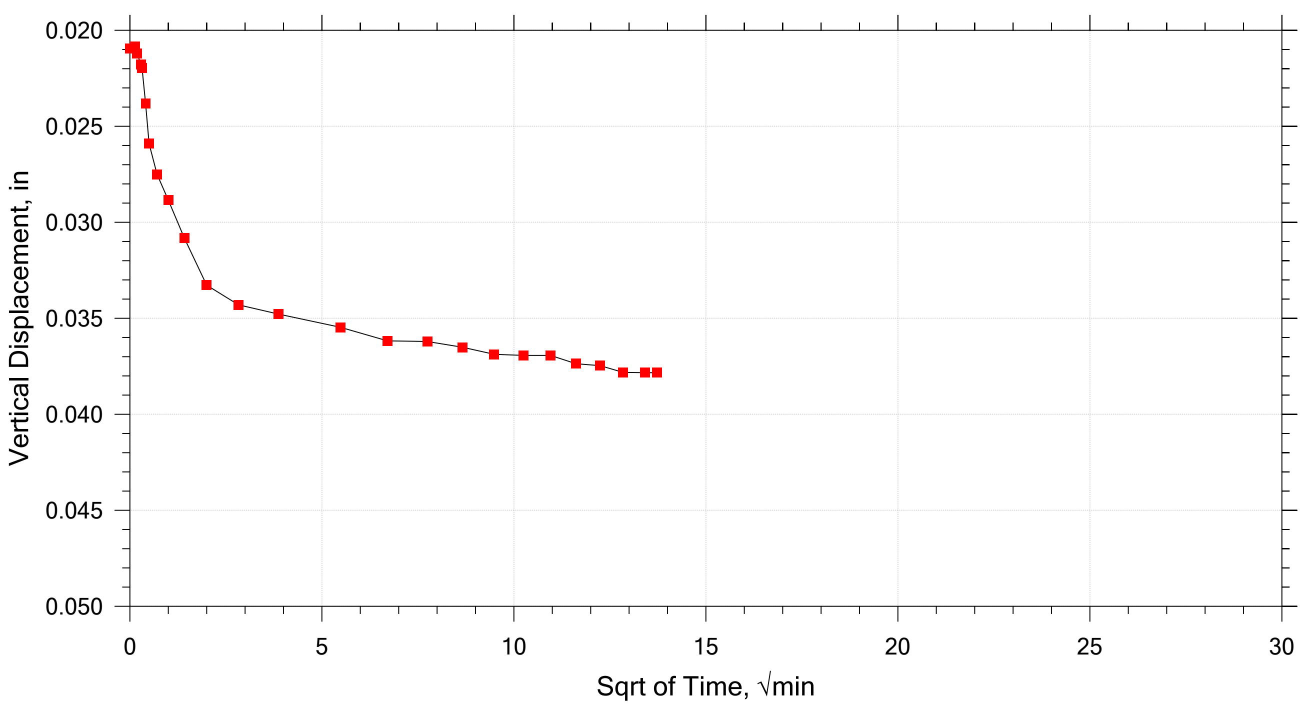


Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
	Test Number: DSS 142	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

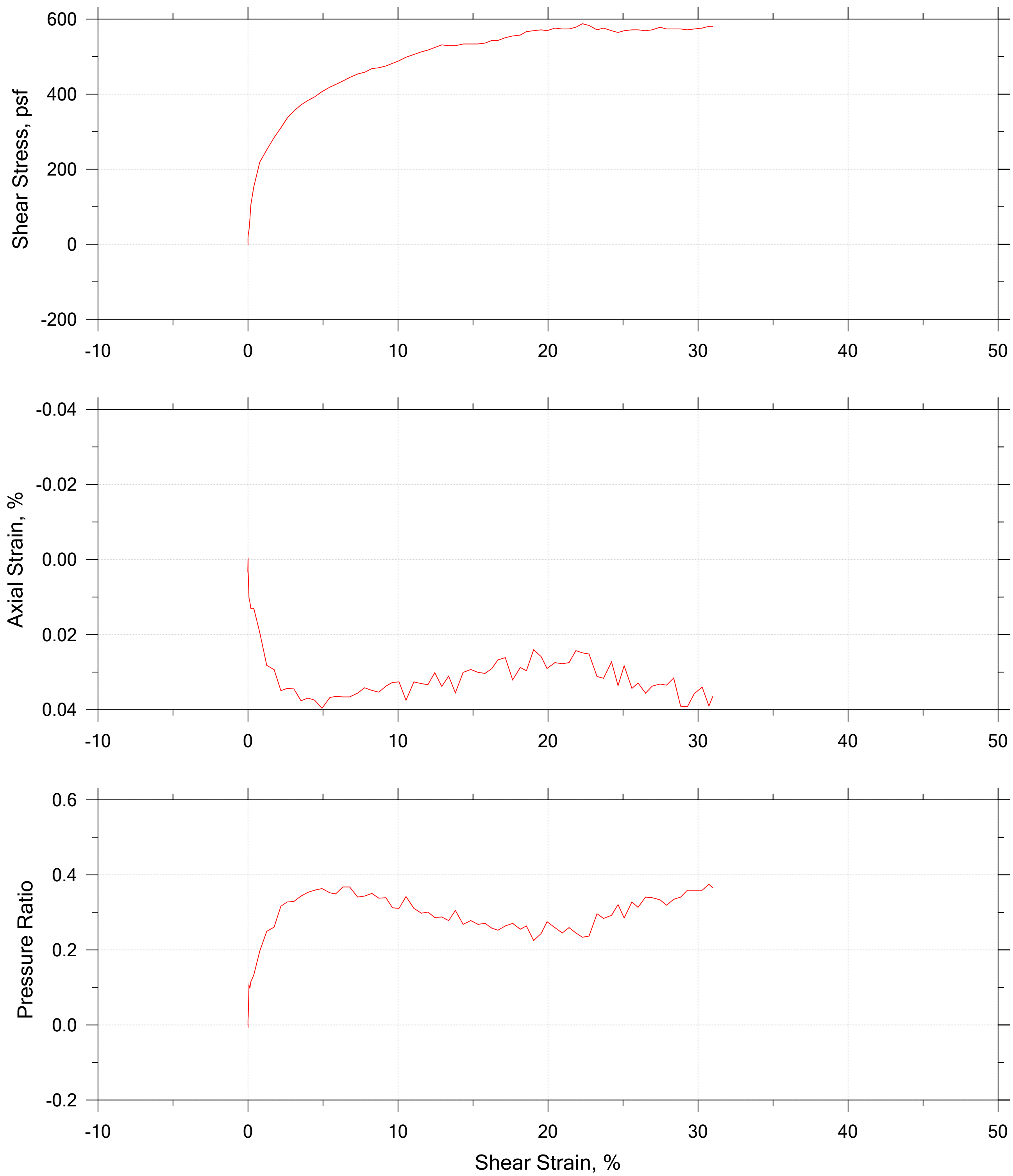
Consolidation Time Curve 6 of 6
Constant Load Step
Stress: 1.65e+03 psf





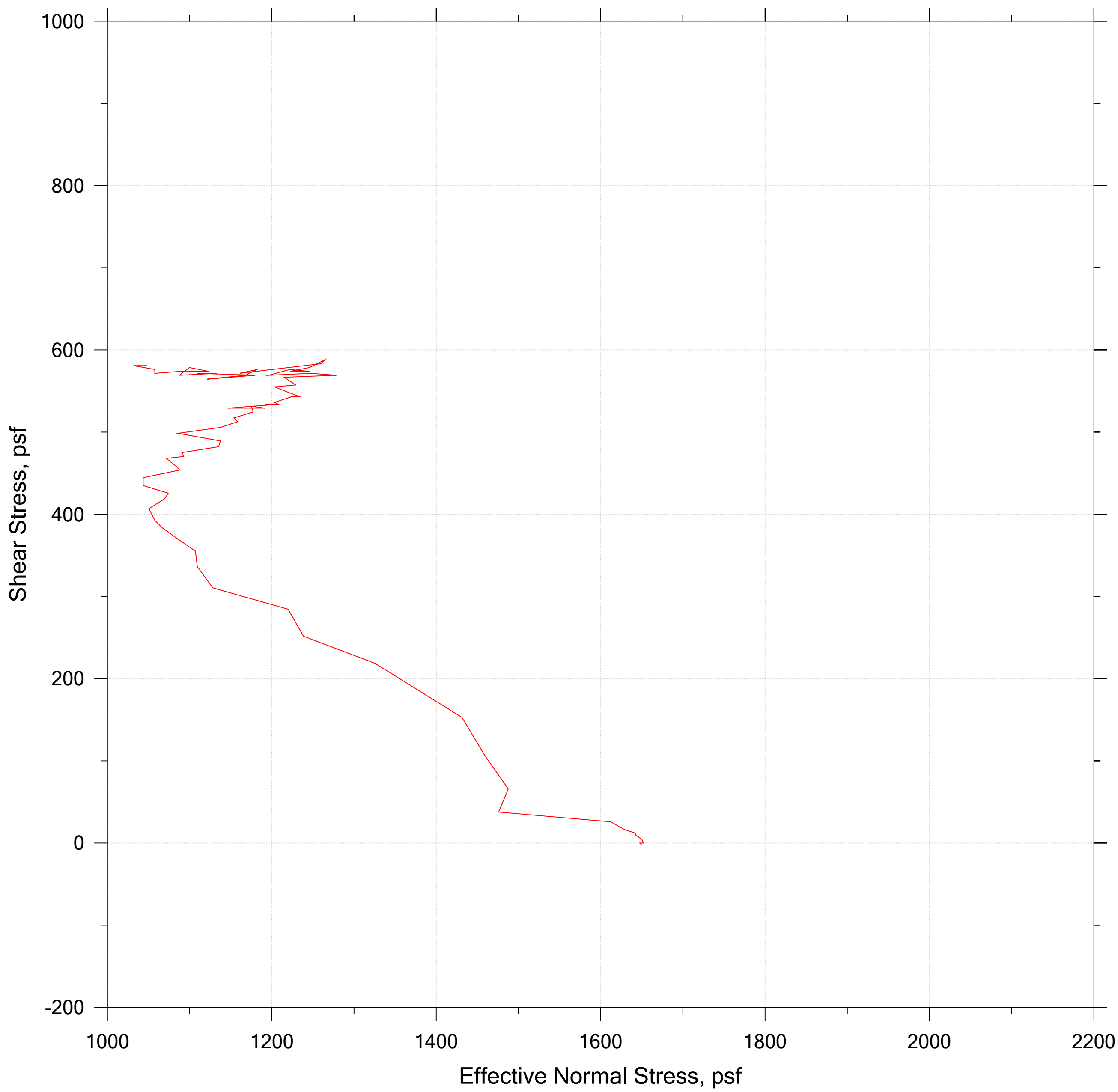
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
	Test Number: DSS 142	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



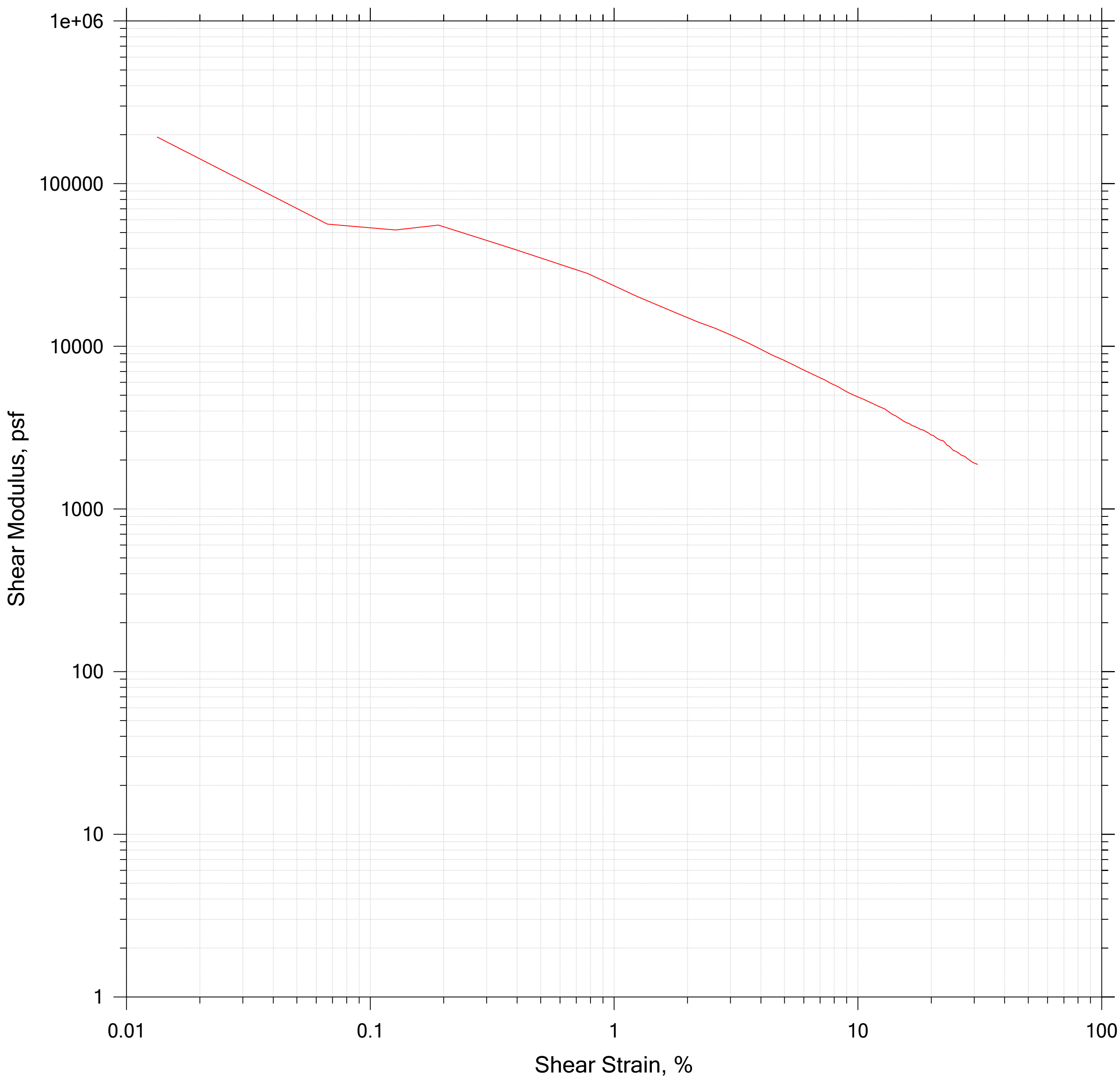
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
	Test Number: DSS 142	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
	Test Number: DSS 142	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
	Test Number: DSS 142	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Specimen Dimension, in: 2.50	Specific Gravity: 2.70 (Implied)	Liquid Limit: 71
Specimen Height, in: 1.00	Initial Void Ratio: 1.87	Plastic Limit: 61
Final Height, in: 0.96	Final Void Ratio: 1.76	Plasticity Index: 10

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	212	---		302
Mass Container, gm	36.72	0	0	60.04
Mass Container + Wet Soil, gm	144.6	125.9	125.17	185.21
Mass Container + Dry Soil, gm	100.63	75.8	75.8	135.84
Mass Dry Soil, gm	63.91	75.8	75.8	75.8
Water Content, %	68.80	66.09	65.13	65.13
Void Ratio	---	1.87	1.76	---
Degree of Saturation, %	---	95.53	100.00	---
Dry Unit Weight, pcf	---	58.768	61.099	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
	Test Number: DSS 142	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 1 of 6

Constant Load Step

Stress: 220 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	0.000	0.0000	0.0000	0.000	1.87
0.018	0.133	37.6	0.002285	-0.002218	-0.222	1.87
0.034	0.185	82.3	0.002406	-0.002289	-0.229	1.87
0.084	0.290	160.	0.002616	-0.002415	-0.241	1.87
0.101	0.318	169.	0.002641	-0.002440	-0.244	1.87
0.168	0.409	202.	0.002731	-0.002513	-0.251	1.87
0.251	0.501	200.	0.002727	-0.002492	-0.249	1.87
0.500	0.707	219.	0.002775	-0.002524	-0.252	1.87
1.001	1.000	219.	0.002775	-0.002524	-0.252	1.87
2.000	1.414	219.	0.002775	-0.002507	-0.250	1.87
4.000	2.000	219.	0.002775	-0.002507	-0.250	1.87
8.000	2.829	219.	0.002775	-0.002507	-0.250	1.87
15.000	3.873	219.	0.002775	-0.002490	-0.249	1.87
30.000	5.477	219.	0.002775	-0.002490	-0.249	1.87
45.000	6.708	219.	0.002775	-0.002507	-0.250	1.87
60.000	7.746	219.	0.002775	-0.002490	-0.249	1.87
60.071	7.751	219.	0.002775	-0.002507	-0.250	1.87

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
Test Number: DSS 142	Preparation: wet	Elevation:
Description: Brown Organic Silt		
Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 2 of 6

Constant Load Step

Stress: 330 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	219.	0.002775	-0.002507	-0.250	1.87
0.018	0.133	237.	0.002826	-0.002541	-0.254	1.87
0.034	0.185	244.	0.002845	-0.002543	-0.254	1.87
0.084	0.290	282.	0.002947	-0.002595	-0.259	1.88
0.101	0.318	296.	0.002985	-0.002583	-0.258	1.88
0.168	0.410	327.	0.003068	-0.002582	-0.258	1.88
0.251	0.501	327.	0.003068	-0.002582	-0.258	1.88
0.500	0.707	329.	0.003074	-0.002605	-0.260	1.88
1.001	1.000	329.	0.003074	-0.002588	-0.259	1.88
2.000	1.414	329.	0.003074	-0.002588	-0.259	1.88
4.000	2.000	329.	0.003074	-0.002588	-0.259	1.88
8.001	2.829	329.	0.003074	-0.002571	-0.257	1.88
15.001	3.873	329.	0.003074	-0.002554	-0.255	1.87
30.001	5.477	331.	0.003081	-0.002611	-0.261	1.88
45.000	6.708	329.	0.003077	-0.002590	-0.259	1.88
60.001	7.746	329.	0.003077	-0.002641	-0.264	1.88
60.050	7.749	329.	0.003077	-0.002641	-0.264	1.88

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
Test Number: DSS 142	Preparation: wet	Elevation:
Description: Brown Organic Silt		
Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 3 of 6

Constant Load Step

Stress: 495 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	329.	0.003077	-0.002641	-0.264	1.88
0.018	0.133	362.	0.003163	-0.002643	-0.264	1.88
0.034	0.185	390.	0.003240	-0.002653	-0.265	1.88
0.084	0.290	423.	0.003329	-0.002524	-0.252	1.87
0.101	0.318	418.	0.003321	-0.002382	-0.238	1.87
0.168	0.409	444.	0.003386	-0.002112	-0.211	1.87
0.250	0.500	465.	0.003443	-0.001347	-0.135	1.87
0.501	0.708	496.	0.003526	-0.0001217	-0.0122	1.87
1.001	1.000	494.	0.003522	-6.750e-05	-0.00674	1.87
2.000	1.414	494.	0.003522	1.636e-05	0.00163	1.87
4.000	2.000	494.	0.003522	1.636e-05	0.00163	1.87
8.001	2.829	494.	0.003522	3.313e-05	0.00331	1.87
15.000	3.873	494.	0.003522	4.990e-05	0.00499	1.87
30.000	5.477	494.	0.003522	6.667e-05	0.00666	1.87
45.000	6.708	494.	0.003522	3.313e-05	0.00331	1.87
60.000	7.746	496.	0.003526	-4.262e-06	-0.000426	1.87
60.072	7.751	494.	0.003522	-1.718e-05	-0.00172	1.87

Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
	Test Number: DSS 142	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 4 of 6

Constant Load Step

Stress: 743 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	494.	0.003522	-4.122e-07	-4.12e-05	1.87
0.018	0.133	548.	0.003666	-6.043e-05	-0.00604	1.87
0.034	0.185	400.	0.003424	0.0004337	0.0433	1.87
0.084	0.290	505.	0.003597	0.001116	0.111	1.86
0.101	0.318	519.	0.003620	0.001277	0.128	1.86
0.168	0.409	573.	0.003736	0.002134	0.213	1.86
0.251	0.501	653.	0.003953	0.003544	0.354	1.86
0.500	0.707	703.	0.004086	0.005842	0.584	1.85
1.000	1.000	733.	0.004169	0.007403	0.740	1.85
2.000	1.414	743.	0.004194	0.008468	0.846	1.84
4.001	2.000	743.	0.004194	0.008887	0.888	1.84
8.000	2.829	743.	0.004194	0.01023	1.02	1.84
15.001	3.873	743.	0.004194	0.01031	1.03	1.84
30.001	5.477	743.	0.004194	0.01031	1.03	1.84
45.000	6.708	743.	0.004194	0.01130	1.13	1.84
60.000	7.746	743.	0.004194	0.01129	1.13	1.84
60.269	7.763	743.	0.004194	0.01132	1.13	1.84

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
Test Number: DSS 142	Preparation: wet	Elevation:
Description: Brown Organic Silt		
Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 5 of 6

Constant Load Step

Stress: 1114 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	743.	0.004194	0.01130	1.13	1.84
0.018	0.133	834.	0.004443	0.01120	1.12	1.84
0.034	0.185	745.	0.004296	0.01162	1.16	1.83
0.084	0.290	858.	0.004506	0.01198	1.20	1.83
0.101	0.318	888.	0.004589	0.01217	1.22	1.83
0.168	0.410	1.00e+03	0.004893	0.01305	1.30	1.83
0.250	0.500	1.08e+03	0.005048	0.01541	1.54	1.82
0.500	0.707	1.10e+03	0.005090	0.01629	1.63	1.82
1.000	1.000	1.10e+03	0.005088	0.01787	1.79	1.82
2.000	1.414	1.11e+03	0.005108	0.01896	1.89	1.81
4.001	2.000	1.11e+03	0.005108	0.01973	1.97	1.81
8.000	2.828	1.11e+03	0.005106	0.02080	2.08	1.81
15.000	3.873	1.11e+03	0.005112	0.02095	2.09	1.81
30.000	5.477	1.11e+03	0.005112	0.02097	2.09	1.81
45.001	6.708	1.11e+03	0.005112	0.02095	2.09	1.81
60.001	7.746	1.11e+03	0.005112	0.02093	2.09	1.81
60.192	7.758	1.11e+03	0.005112	0.02095	2.09	1.81

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
	Test Number: DSS 142	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 6 of 6

Constant Load Step

Stress: 1650 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	1.11e+03	0.005112	0.02095	2.09	1.81
0.018	0.133	1.25e+03	0.005387	0.02084	2.08	1.81
0.034	0.185	1.19e+03	0.005349	0.02122	2.12	1.81
0.084	0.290	1.37e+03	0.005615	0.02179	2.18	1.81
0.101	0.318	1.42e+03	0.005706	0.02197	2.19	1.80
0.168	0.410	1.53e+03	0.005912	0.02381	2.38	1.80
0.250	0.500	1.60e+03	0.006053	0.02591	2.59	1.79
0.500	0.707	1.63e+03	0.006113	0.02751	2.75	1.79
1.000	1.000	1.62e+03	0.006106	0.02884	2.88	1.79
2.000	1.414	1.64e+03	0.006127	0.03082	3.08	1.78
4.001	2.000	1.65e+03	0.006149	0.03328	3.32	1.77
8.001	2.829	1.65e+03	0.006154	0.03430	3.43	1.77
15.001	3.873	1.65e+03	0.006154	0.03478	3.47	1.77
30.001	5.477	1.65e+03	0.006154	0.03547	3.54	1.77
45.001	6.708	1.65e+03	0.006153	0.03618	3.61	1.76
60.001	7.746	1.65e+03	0.006154	0.03621	3.62	1.76
75.001	8.660	1.65e+03	0.006154	0.03651	3.65	1.76
90.001	9.487	1.65e+03	0.006154	0.03688	3.68	1.76
105.000	10.247	1.65e+03	0.006154	0.03693	3.69	1.76
120.001	10.954	1.65e+03	0.006153	0.03693	3.69	1.76
135.001	11.619	1.65e+03	0.006154	0.03737	3.73	1.76
150.001	12.247	1.65e+03	0.006154	0.03747	3.74	1.76
165.001	12.845	1.65e+03	0.006154	0.03782	3.78	1.76
180.000	13.416	1.65e+03	0.006154	0.03784	3.78	1.76
188.502	13.730	1.65e+03	0.006154	0.03784	3.78	1.76

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
Test Number: DSS 142	Preparation: wet	Elevation:
Description: Brown Organic Silt		
Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Shear Phase

Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
0.00000	0.00000	-2.3517	0.00000	0.00000	1649.8	0.00000
0.00020000	0.00000	-2.3517	0.00000	0.0017412	1649.8	0.00000
0.017617	0.0033375	0.00000	0.00000	0.0018843	1647.5	0.0014245
0.034283	0.0033375	0.00000	0.00000	-0.00047429	1652.2	-0.0014245
0.084317	0.00000	4.7035	0.00000	0.0014101	1649.8	0.00000
0.10098	0.00000	4.7035	0.00000	0.0031513	1649.8	0.00000
0.16767	-0.0033375	9.4069	0.00000	0.0018394	1642.8	0.0042735
0.25103	-0.0033375	11.759	0.00000	0.0035806	1642.8	0.0042735
0.50007	0.00000	16.462	0.00000	0.0026980	1628.7	0.012821
1.0002	0.013350	25.869	1.9377e+05	0.0036997	1612.2	0.022792
2.0007	0.066751	37.628	56370.	0.010259	1475.9	0.10541
4.0008	0.12683	65.849	51920.	0.011284	1487.7	0.098291
8.0001	0.19024	105.83	55629.	0.013002	1459.5	0.11538
15.000	0.38382	152.86	39827.	0.012978	1431.3	0.13248
30.001	0.78099	218.71	28005.	0.019417	1325.5	0.19658
45.001	1.2449	251.64	20213.	0.028195	1238.5	0.24929
60.000	1.7389	284.56	16365.	0.029339	1219.7	0.26068
75.000	2.1894	310.43	14179.	0.034920	1128.1	0.31624
90.000	2.6133	336.30	12869.	0.034324	1109.3	0.32764
105.00	3.0572	355.11	11616.	0.034467	1106.9	0.32906
120.00	3.5345	371.57	10513.	0.037639	1083.4	0.34330
135.00	3.9984	383.33	9587.2	0.036900	1067.0	0.35328
150.00	4.4389	392.74	8847.6	0.037472	1057.6	0.35897
165.00	4.9296	406.85	8253.3	0.039643	1050.5	0.36325
180.00	5.4569	418.61	7671.2	0.036757	1069.3	0.35185
195.00	5.8374	425.66	7292.1	0.036471	1074.0	0.34900
210.00	6.3246	435.07	6879.0	0.036590	1043.5	0.36752
225.00	6.7752	444.48	6560.4	0.036590	1043.5	0.36752
240.00	7.3092	453.88	6209.8	0.035612	1088.1	0.34046
255.00	7.7765	458.59	5897.1	0.034157	1083.4	0.34330
270.00	8.2571	468.00	5667.8	0.034872	1071.7	0.35043
285.00	8.7243	470.35	5391.2	0.035326	1092.8	0.33761
300.00	9.1949	475.05	5166.4	0.033728	1090.5	0.33903
315.00	9.6355	482.11	5003.4	0.032750	1135.1	0.31197
330.00	10.069	489.16	4857.9	0.032607	1137.5	0.31054
345.00	10.533	498.57	4733.3	0.037496	1085.8	0.34188
360.00	11.057	505.62	4572.8	0.032607	1137.5	0.31054
375.00	11.561	512.68	4434.5	0.033060	1158.6	0.29772
390.00	11.988	517.38	4315.7	0.033346	1153.9	0.30057
405.00	12.449	524.44	4212.7	0.030174	1177.4	0.28632
420.00	12.916	531.49	4114.9	0.033800	1175.1	0.28775
435.00	13.374	529.14	3956.6	0.031057	1191.5	0.27778
450.00	13.824	529.14	3827.7	0.035517	1146.9	0.30484
465.00	14.345	533.84	3721.5	0.030055	1208.0	0.26781
480.00	14.849	533.84	3595.2	0.029315	1191.5	0.27778
495.00	15.333	533.84	3481.7	0.030055	1208.0	0.26781
510.00	15.797	536.20	3394.4	0.030341	1203.3	0.27066
525.00	16.254	543.25	3342.3	0.029053	1224.4	0.25783
540.00	16.654	543.25	3261.9	0.026740	1233.8	0.25214
555.00	17.148	550.31	3209.1	0.026143	1215.0	0.26353

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
	Test Number: DSS 142	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Shear Phase

Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
570.00	17.642	555.01	3145.9	0.032082	1203.3	0.27066
585.00	18.146	557.36	3071.5	0.028767	1229.1	0.25499
600.00	18.560	566.77	3053.7	0.029626	1215.0	0.26353
615.00	19.044	569.12	2988.4	0.024021	1278.5	0.22507
630.00	19.541	571.47	2924.4	0.025881	1247.9	0.24359
645.00	19.935	569.12	2854.9	0.029029	1196.2	0.27493
660.00	20.459	576.17	2816.2	0.027455	1222.1	0.25926
675.00	20.950	573.82	2739.0	0.027765	1245.6	0.24501
690.00	21.400	573.82	2681.4	0.027455	1222.1	0.25926
705.00	21.861	578.53	2646.4	0.024283	1245.6	0.24501
720.00	22.295	587.93	2637.1	0.024879	1264.4	0.23362
735.00	22.735	583.23	2565.3	0.025165	1259.7	0.23647
750.00	23.266	571.47	2456.2	0.031176	1161.0	0.29630
765.00	23.697	576.17	2431.5	0.031629	1182.1	0.28348
780.00	24.231	569.12	2348.8	0.027264	1168.0	0.29202
795.00	24.664	564.42	2288.4	0.033609	1121.0	0.32051
810.00	25.078	569.12	2269.4	0.028290	1179.8	0.28490
825.00	25.589	571.47	2233.3	0.034324	1109.3	0.32764
840.00	25.999	571.47	2198.0	0.032893	1132.8	0.31339
855.00	26.497	569.12	2147.9	0.035612	1088.1	0.34046
870.00	26.944	571.47	2121.0	0.033728	1090.5	0.33903
885.00	27.471	578.53	2105.9	0.033155	1099.9	0.33333
900.00	27.902	573.82	2056.6	0.033465	1123.4	0.31909
915.00	28.372	573.82	2022.5	0.031557	1097.5	0.33476
930.00	28.846	573.82	1989.2	0.039094	1088.1	0.34046
945.00	29.294	571.47	1950.8	0.039214	1057.6	0.35897
960.00	29.748	573.82	1929.0	0.035731	1057.6	0.35897
975.00	30.275	576.17	1903.1	0.033990	1057.6	0.35897
990.00	30.729	580.88	1890.3	0.039046	1031.7	0.37464
999.12	31.002	580.88	1873.7	0.036304	1048.2	0.36467

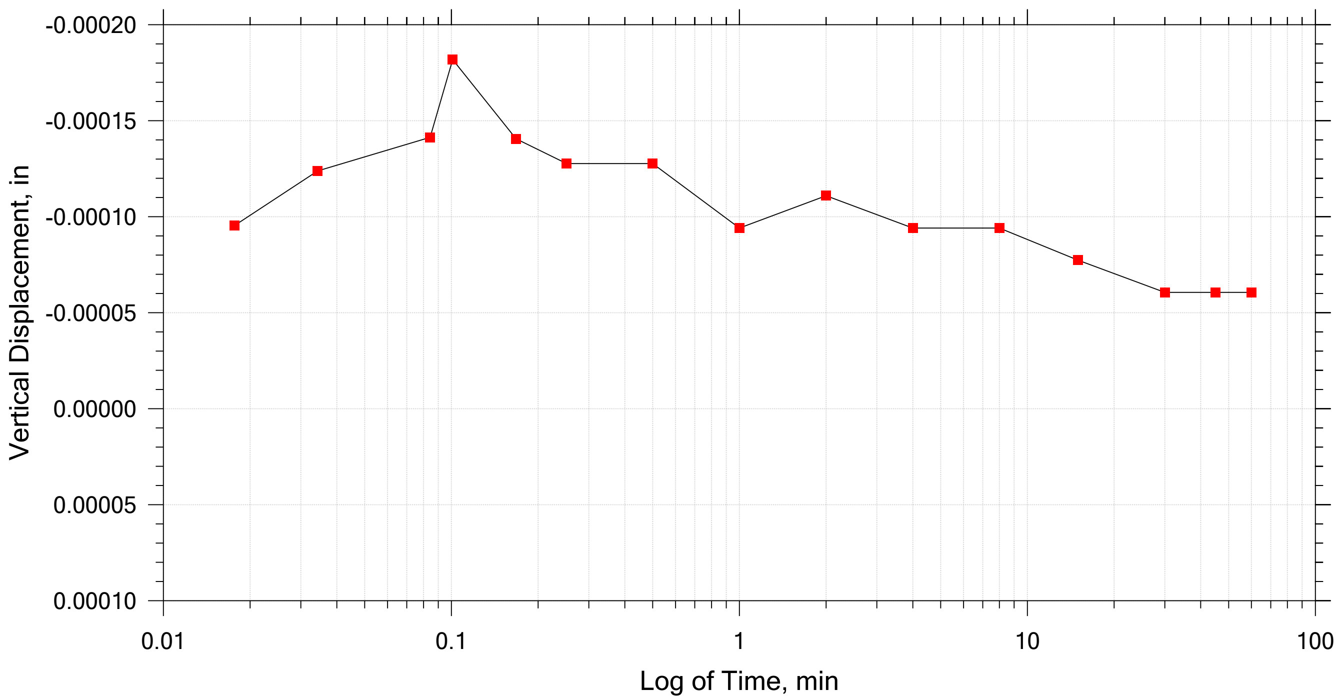
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/23/2021	Depth: 14.6
	Test Number: DSS 142	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1650 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

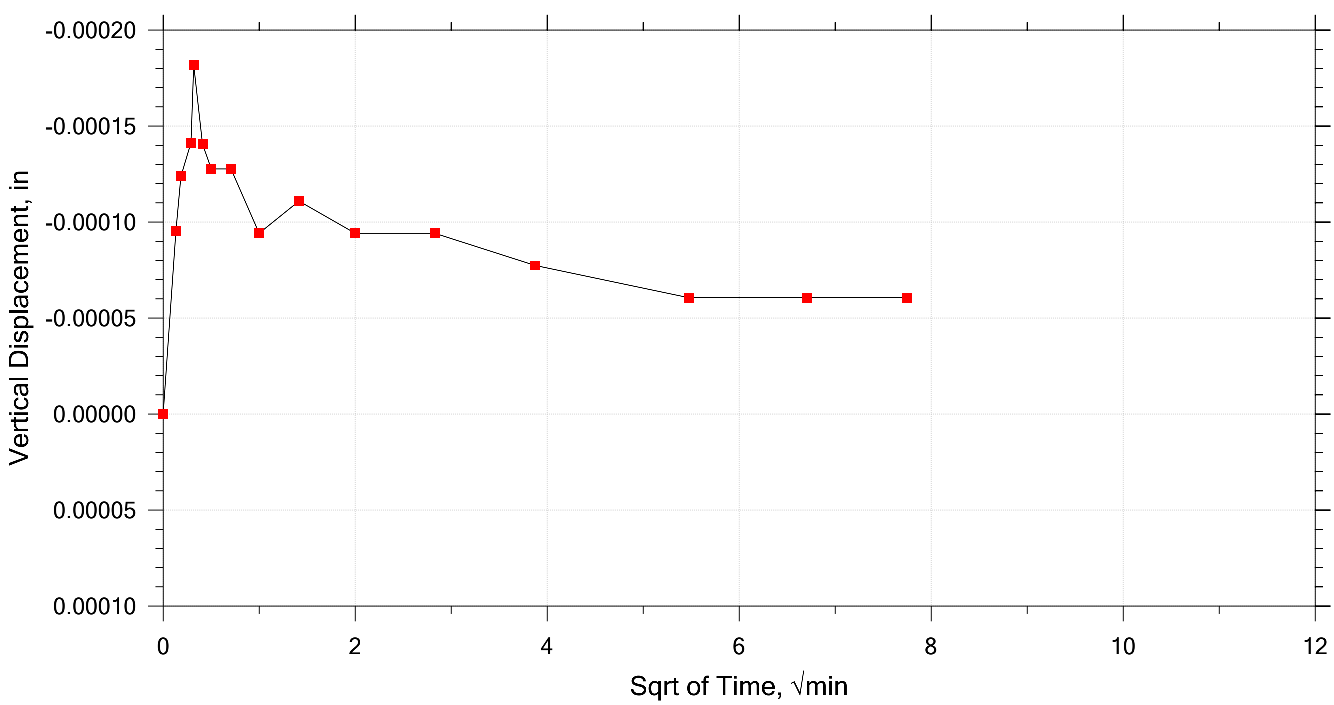
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 1 of 6

Constant Load Step

Stress: 180 psf





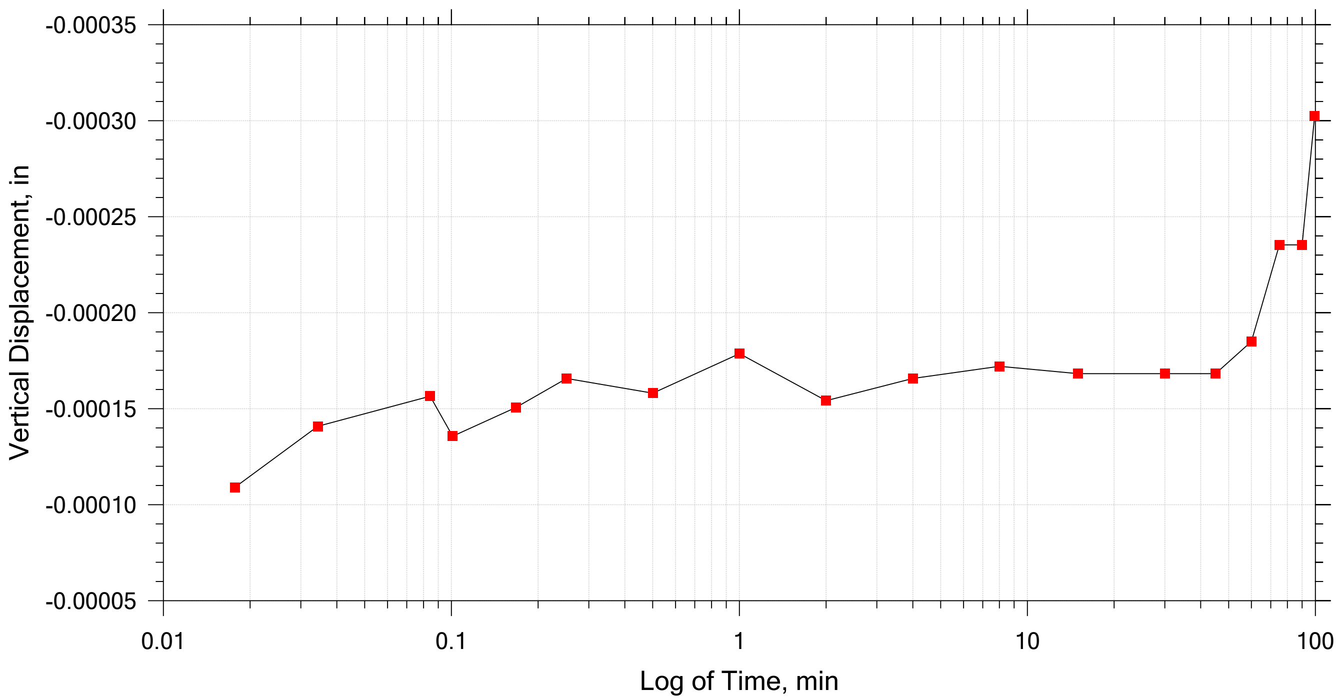
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
	Test Number: DSS 143	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

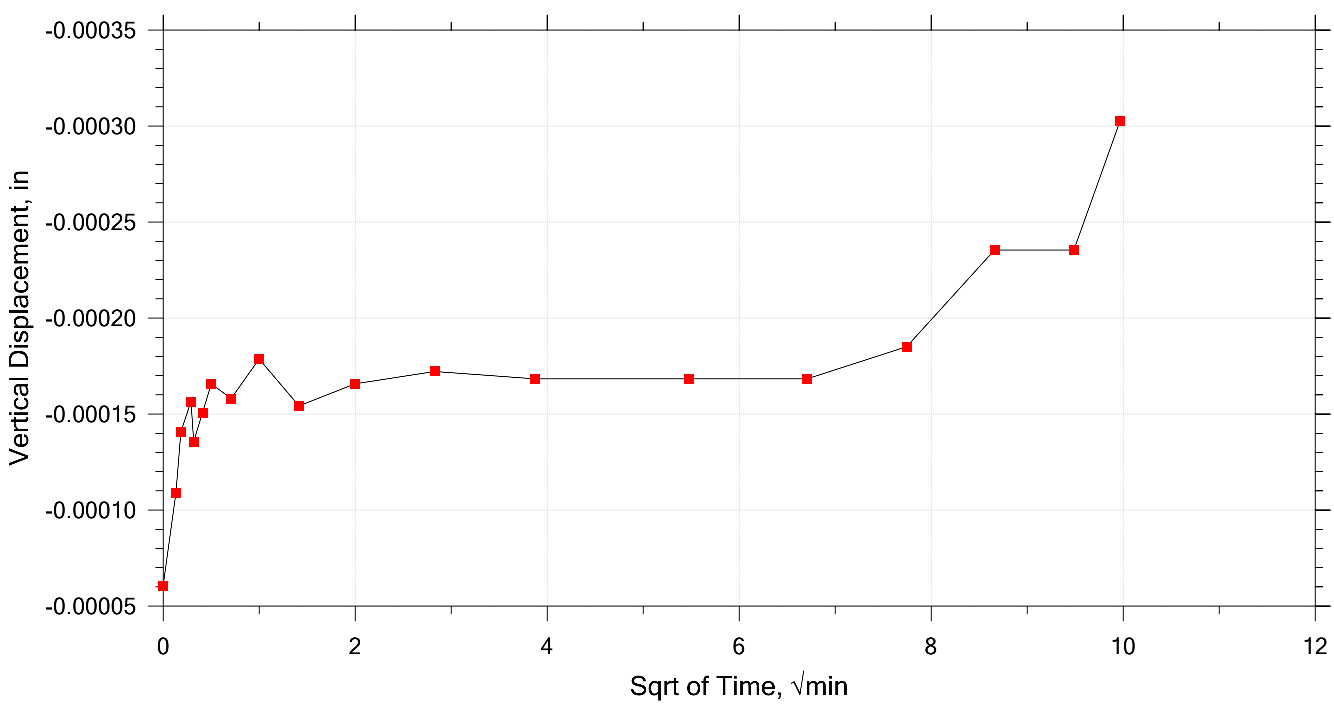
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 2 of 6

Constant Load Step

Stress: 270 psf





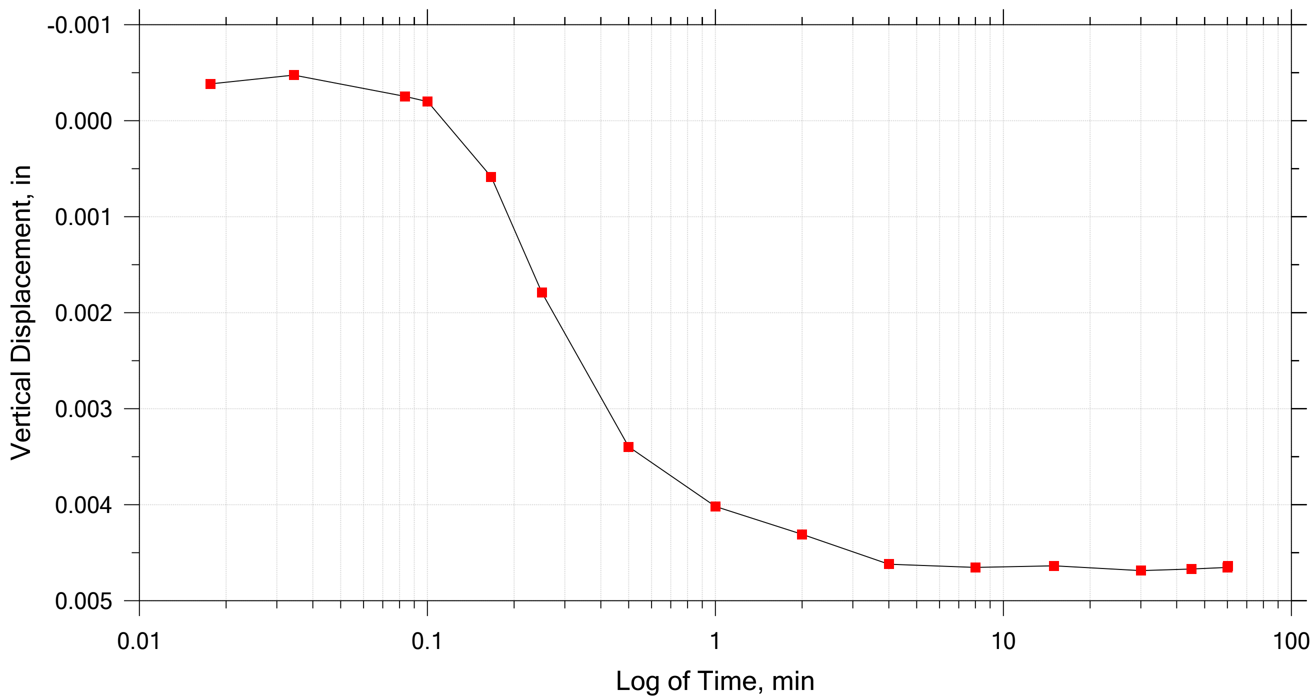
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
	Test Number: DSS 143	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

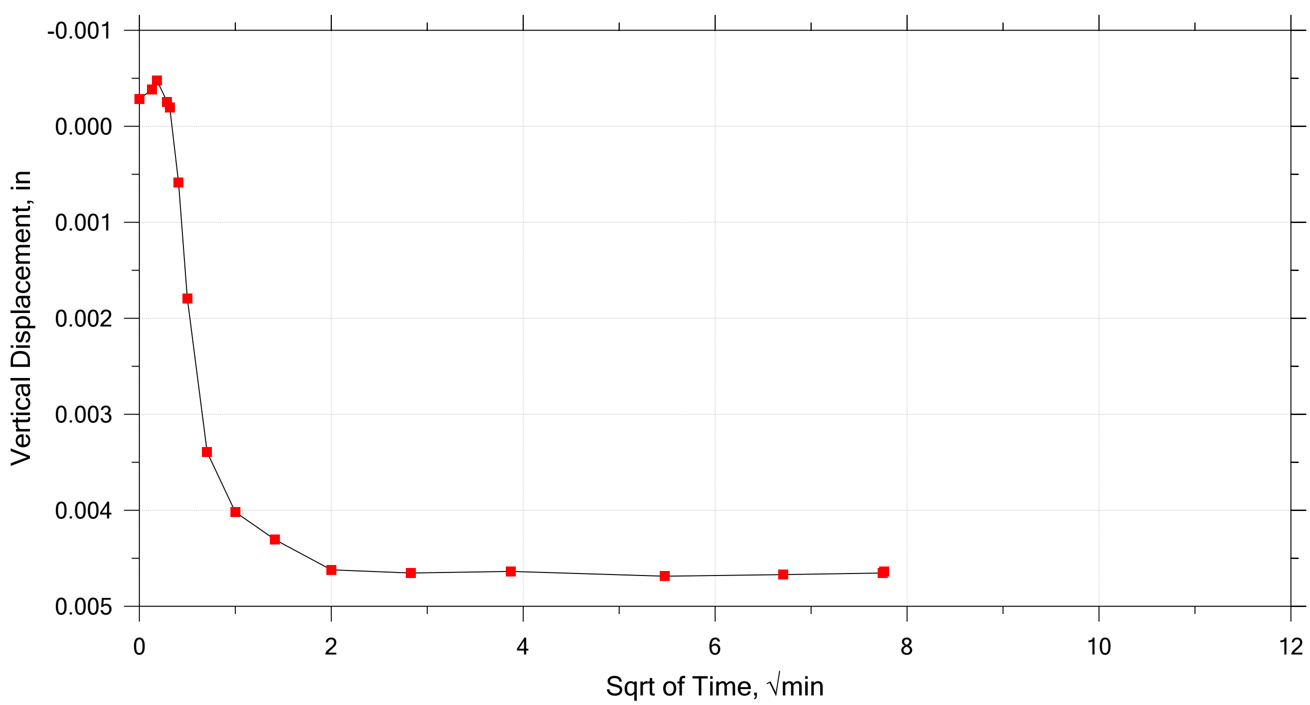
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 3 of 6

Constant Load Step

Stress: 608 psf





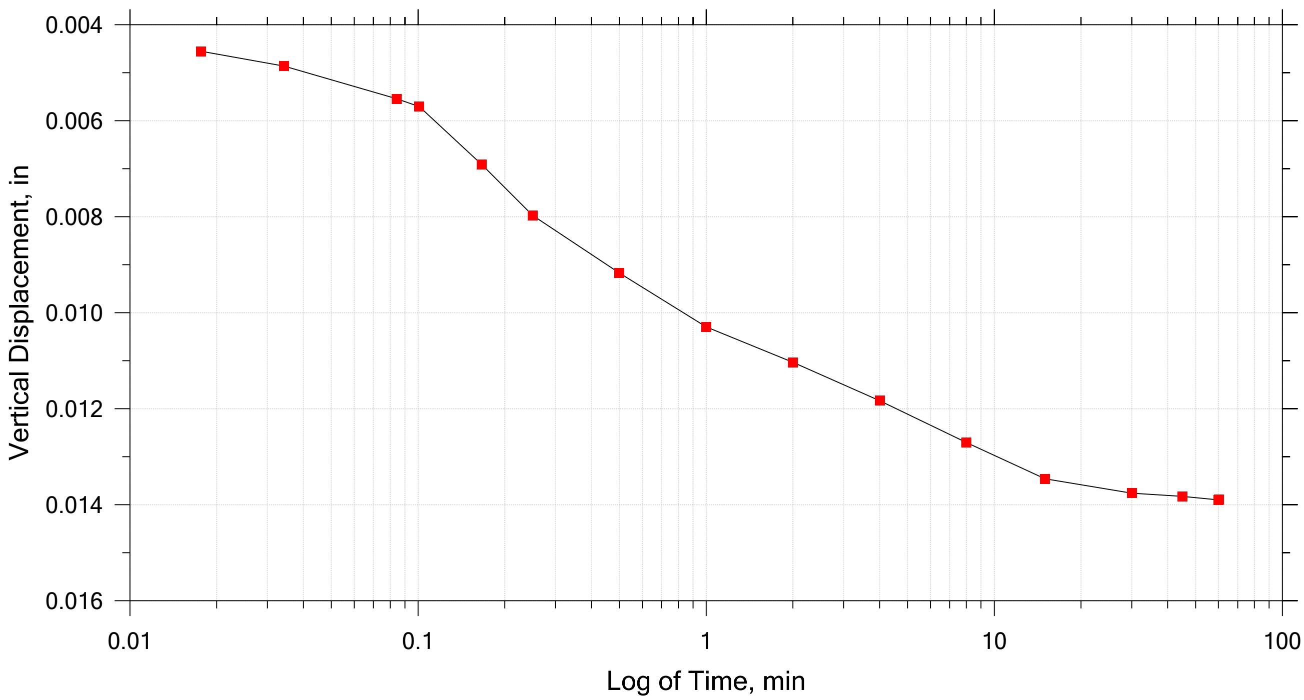
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
	Test Number: DSS 143	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

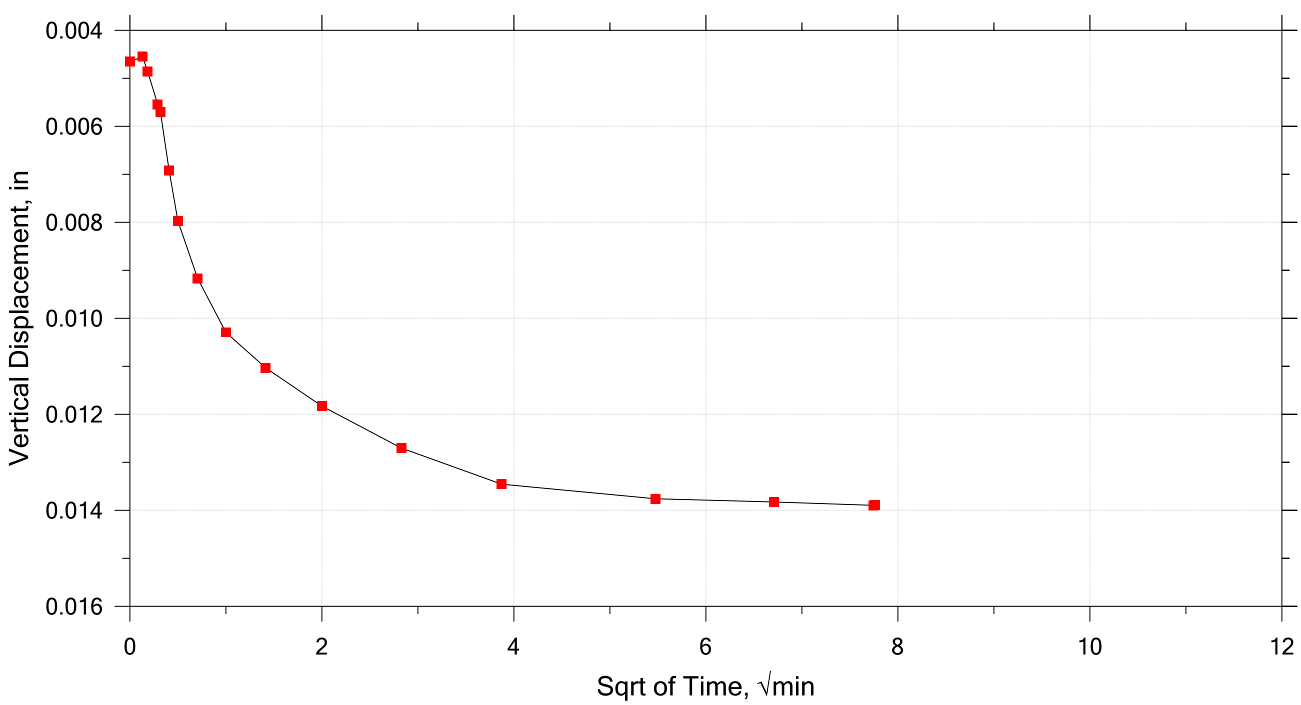
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 4 of 6

Constant Load Step

Stress: 911 psf





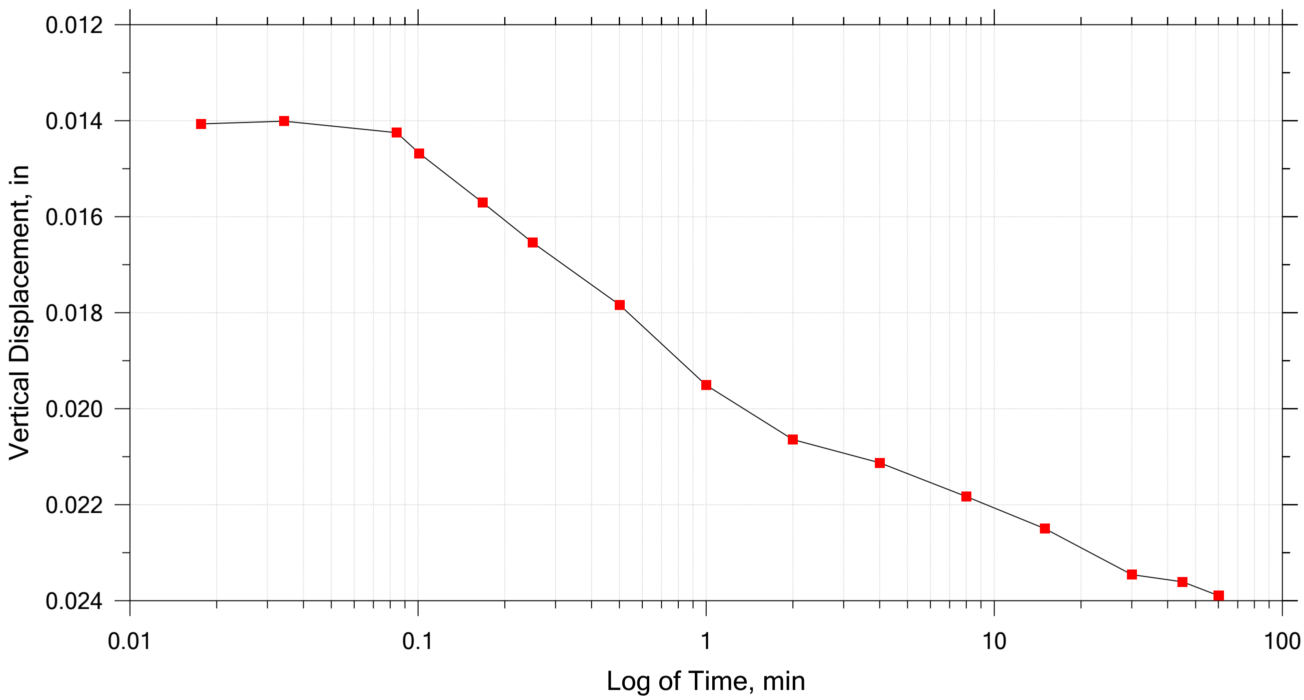
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
	Test Number: DSS 143	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

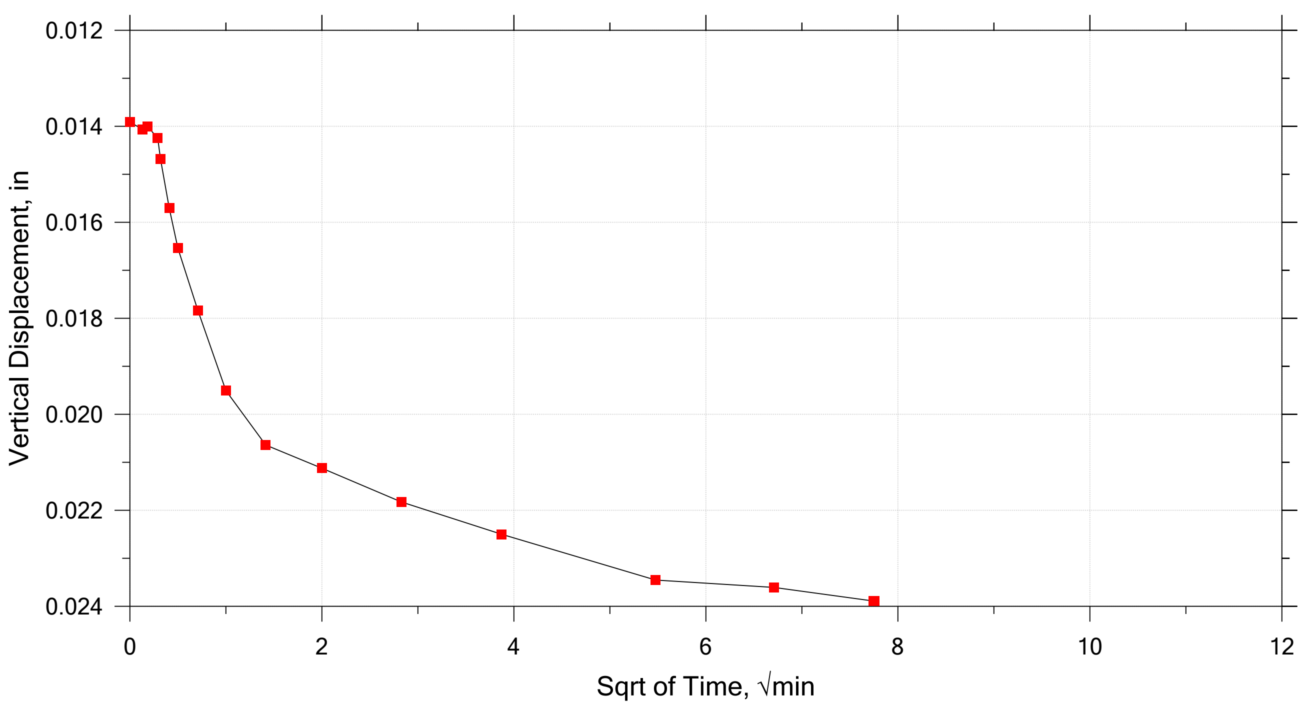
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 5 of 6

Constant Load Step

Stress: 1.37e+03 psf





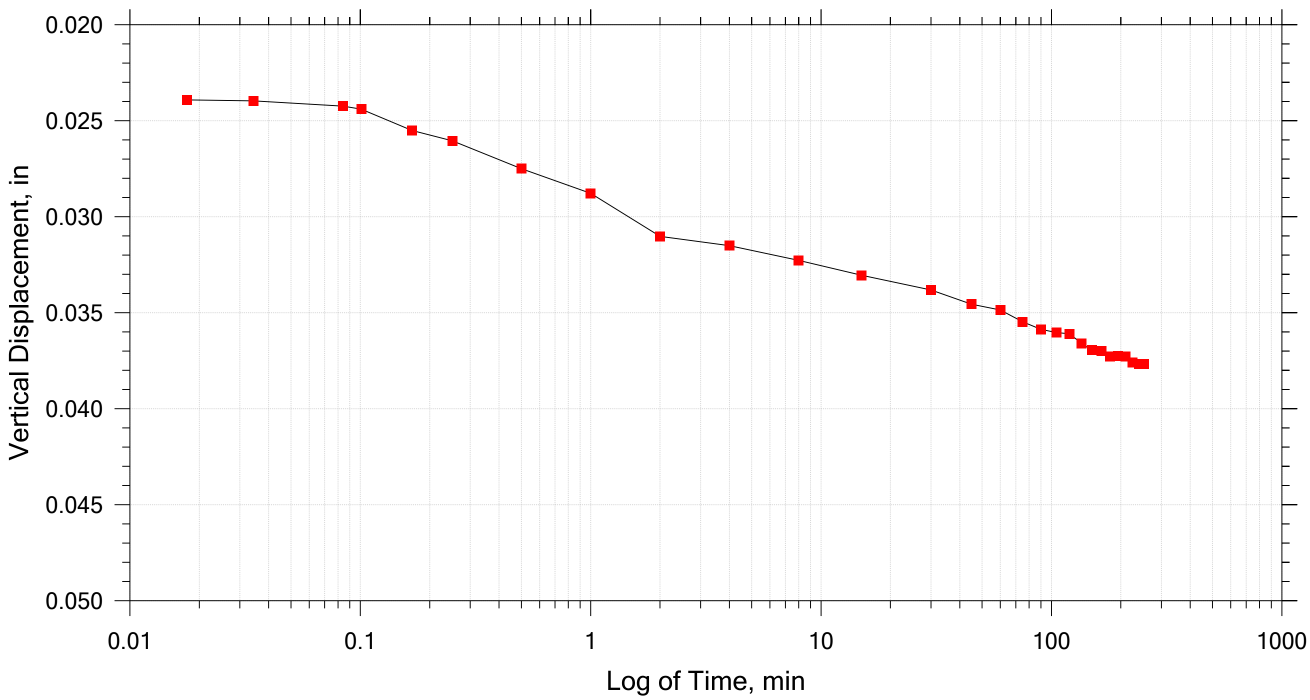
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
	Test Number: DSS 143	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

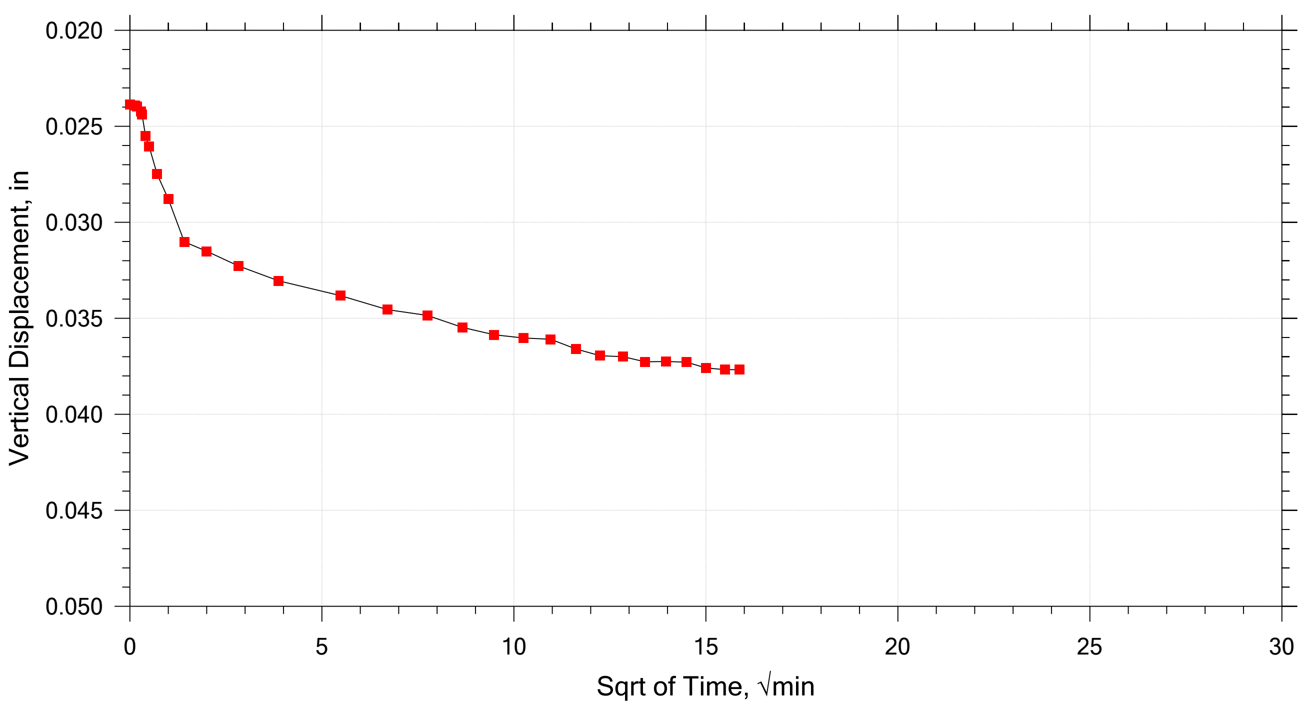
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 6 of 6

Constant Load Step

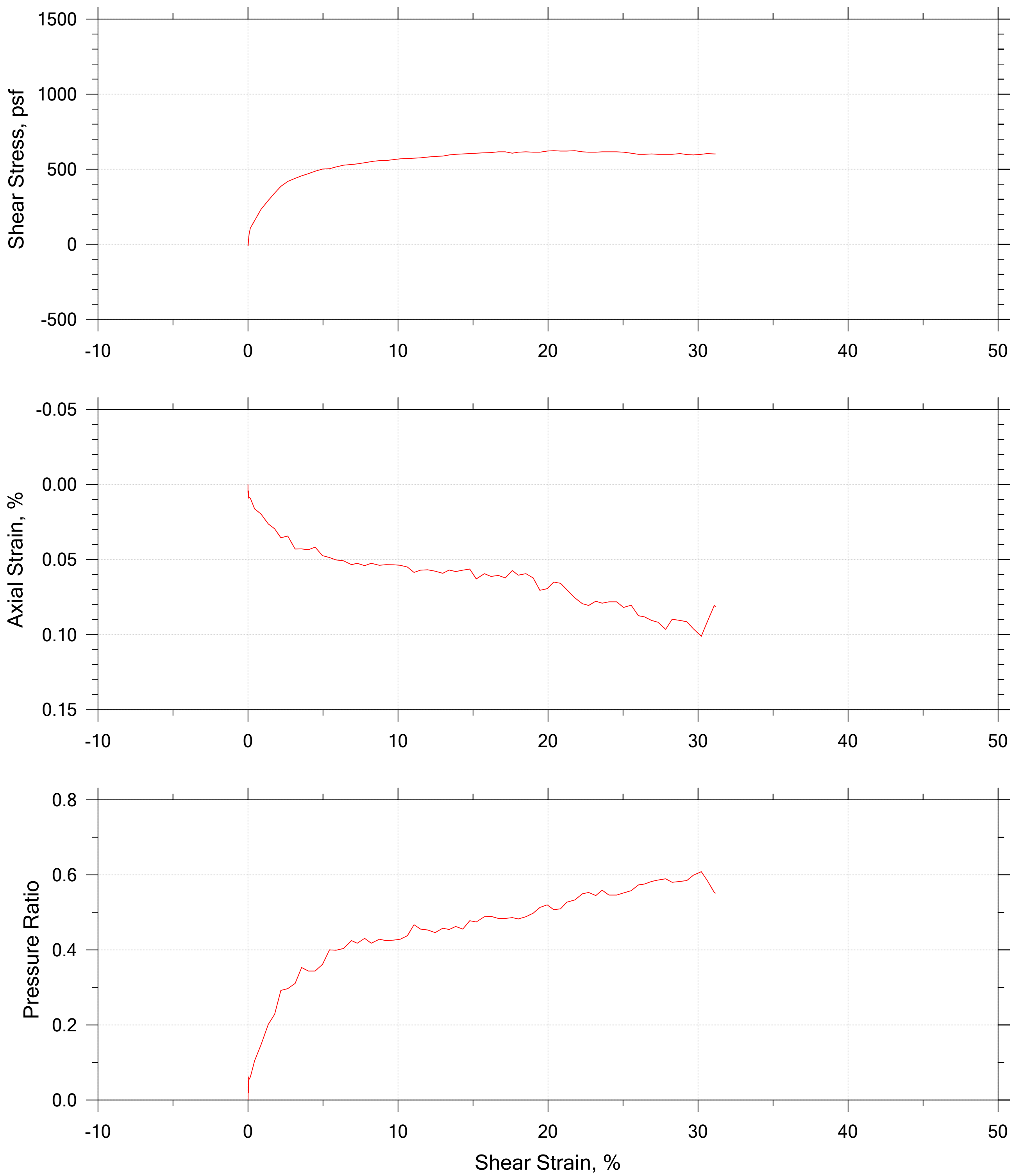
Stress: 2e+03 psf





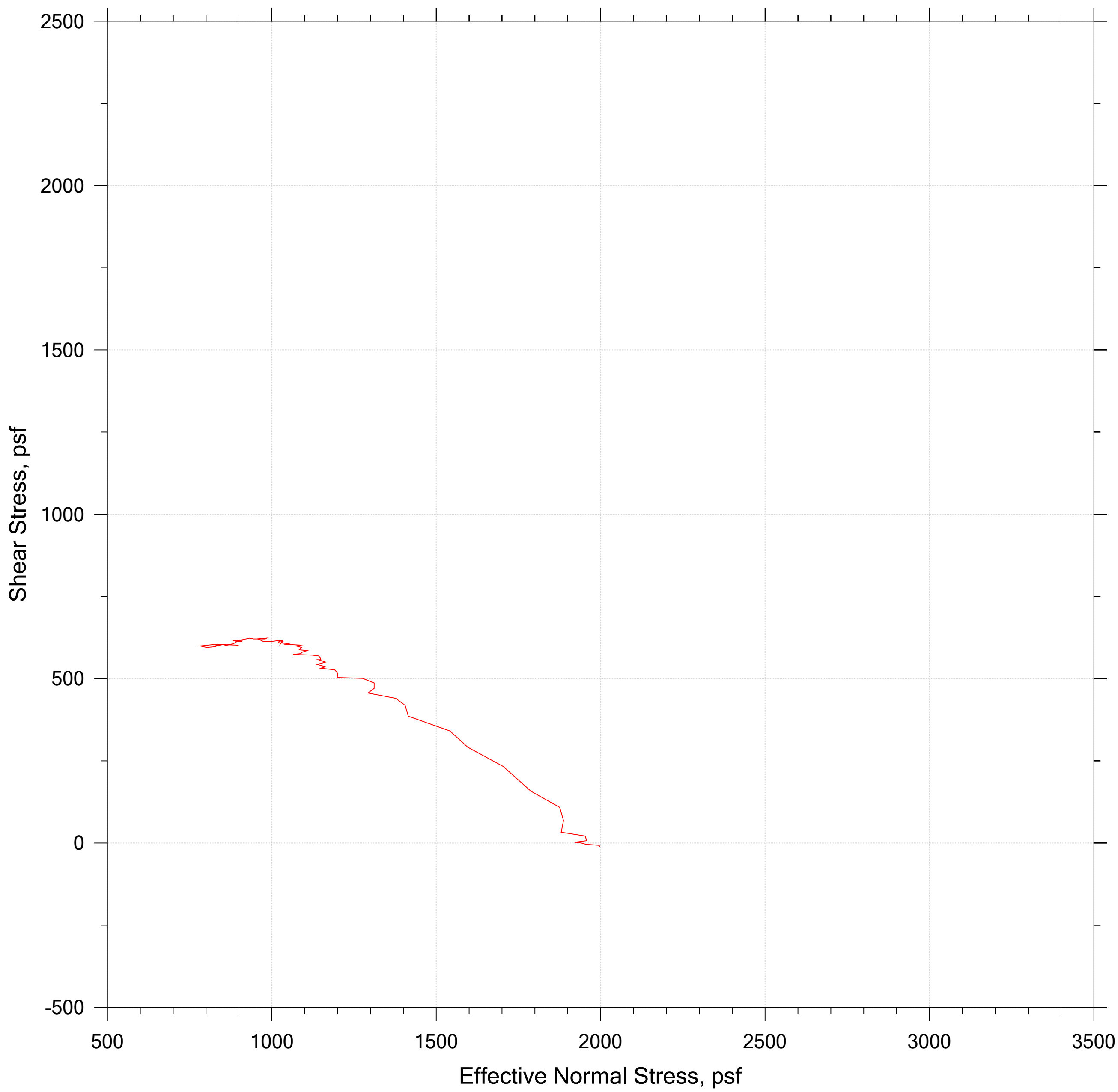
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
	Test Number: DSS 143	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



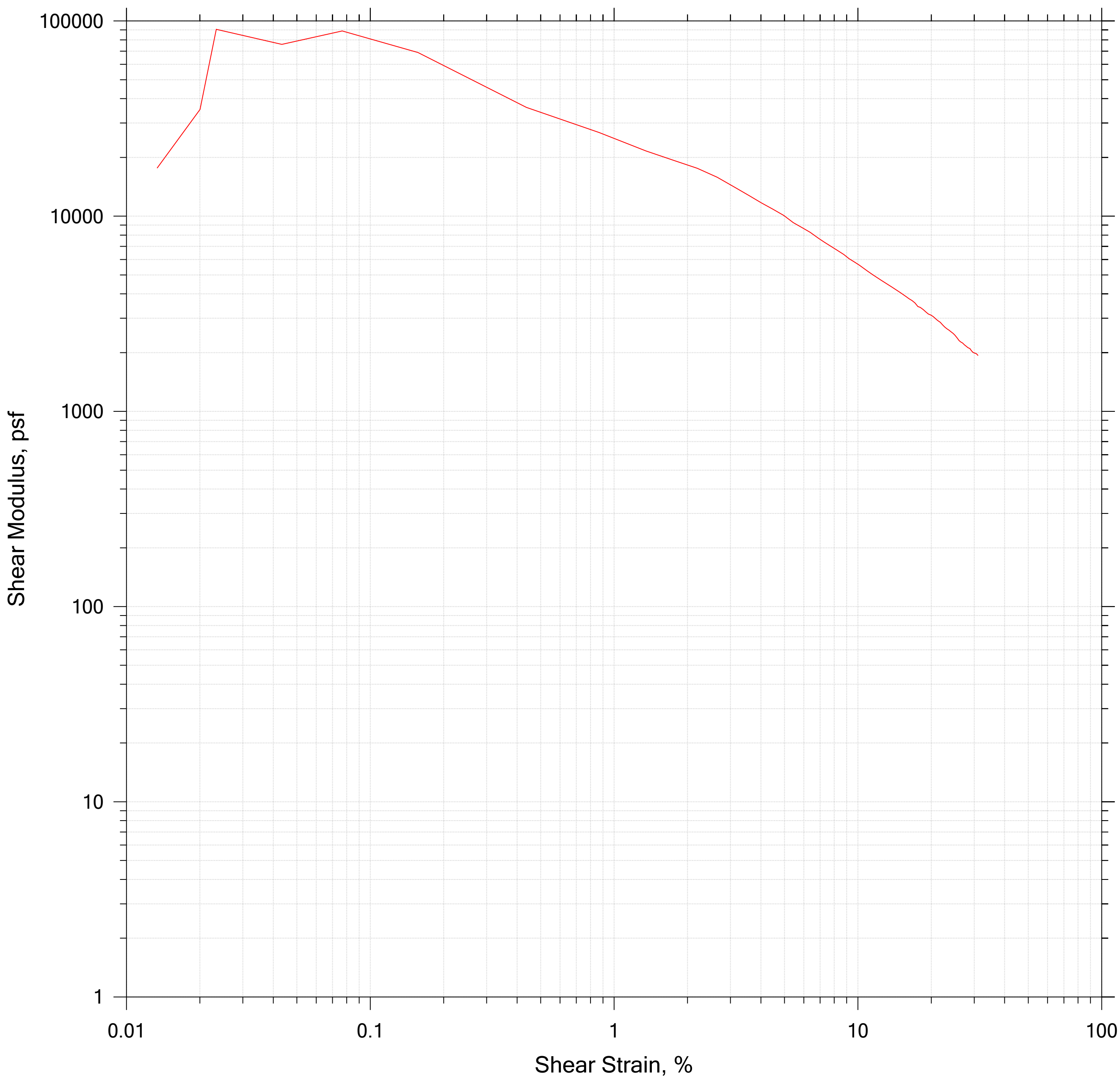
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
	Test Number: DSS 143	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
	Test Number: DSS 143	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
	Test Number: DSS 143	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Specimen Dimension, in: 2.50	Specific Gravity: 2.73 (Implied)	Liquid Limit: 75
Specimen Height, in: 1.00	Initial Void Ratio: 1.93	Plastic Limit: 57
Final Height, in: 0.96	Final Void Ratio: 1.81	Plasticity Index: 18

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	205	---		306
Mass Container, gm	36.97	0	0	60.87
Mass Container + Wet Soil, gm	130.87	125.91	125.03	185.9
Mass Container + Dry Soil, gm	93.48	75.13	75.13	136
Mass Dry Soil, gm	56.51	75.13	75.13	75.13
Water Content, %	66.17	67.59	66.42	66.42
Void Ratio	---	1.93	1.81	---
Degree of Saturation, %	---	95.82	100.00	---
Dry Unit Weight, pcf	---	58.249	60.576	---

Warning: The change in the sample wet weight during the test is not consistent with the change in the moisture content.

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
	Test Number: DSS 143	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 1 of 6

Constant Load Step

Stress: 180 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	2.35	0.002190	0.0000	0.000	1.93
0.018	0.133	37.6	0.002285	-9.547e-05	-0.00954	1.93
0.034	0.185	72.9	0.002381	-0.0001239	-0.0124	1.93
0.084	0.290	160.	0.002616	-0.0001413	-0.0141	1.93
0.101	0.318	181.	0.002673	-0.0001818	-0.0182	1.93
0.168	0.409	176.	0.002666	-0.0001406	-0.0140	1.93
0.251	0.501	179.	0.002669	-0.0001277	-0.0128	1.93
0.500	0.707	179.	0.002669	-0.0001277	-0.0128	1.93
1.000	1.000	179.	0.002669	-9.413e-05	-0.00940	1.93
2.000	1.414	179.	0.002669	-0.0001109	-0.0111	1.93
4.001	2.000	179.	0.002669	-9.413e-05	-0.00940	1.93
8.001	2.829	179.	0.002669	-9.413e-05	-0.00940	1.93
15.000	3.873	179.	0.002669	-7.736e-05	-0.00773	1.93
30.001	5.477	179.	0.002669	-6.059e-05	-0.00605	1.93
45.001	6.708	179.	0.002669	-6.059e-05	-0.00605	1.93
60.000	7.746	179.	0.002669	-6.059e-05	-0.00605	1.93
60.051	7.749	179.	0.002669	-6.059e-05	-0.00605	1.93

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
	Test Number: DSS 143	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 2 of 6

Constant Load Step

Stress: 270 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	179.	0.002669	-6.059e-05	-0.00605	1.93
0.018	0.133	197.	0.002718	-0.0001090	-0.0109	1.93
0.034	0.185	209.	0.002750	-0.0001408	-0.0141	1.93
0.084	0.290	240.	0.002832	-0.0001565	-0.0156	1.93
0.101	0.318	244.	0.002845	-0.0001357	-0.0136	1.93
0.168	0.409	256.	0.002877	-0.0001507	-0.0151	1.93
0.251	0.501	268.	0.002909	-0.0001658	-0.0166	1.93
0.501	0.708	263.	0.002901	-0.0001581	-0.0158	1.93
1.001	1.000	266.	0.002905	-0.0001787	-0.0179	1.93
2.001	1.414	261.	0.002897	-0.0001542	-0.0154	1.93
4.000	2.000	268.	0.002909	-0.0001658	-0.0166	1.93
8.000	2.828	270.	0.002915	-0.0001721	-0.0172	1.93
15.001	3.873	268.	0.002911	-0.0001683	-0.0168	1.93
30.001	5.477	268.	0.002911	-0.0001683	-0.0168	1.93
45.001	6.708	268.	0.002911	-0.0001683	-0.0168	1.93
60.000	7.746	268.	0.002911	-0.0001851	-0.0185	1.93
75.001	8.660	268.	0.002911	-0.0002354	-0.0235	1.93
90.001	9.487	268.	0.002911	-0.0002354	-0.0235	1.93
99.340	9.967	268.	0.002911	-0.0003025	-0.0302	1.93

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
	Test Number: DSS 143	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 3 of 6

Constant Load Step

Stress: 608 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	268.	0.002911	-0.0002857	-0.0285	1.93
0.018	0.133	317.	0.003042	-0.0003833	-0.0383	1.93
0.034	0.185	357.	0.003151	-0.0004747	-0.0474	1.93
0.084	0.289	418.	0.003316	-0.0002545	-0.0254	1.93
0.100	0.317	435.	0.003361	-0.0001984	-0.0198	1.93
0.167	0.408	486.	0.003501	0.0005840	0.0583	1.92
0.250	0.500	555.	0.003685	0.001791	0.179	1.92
0.500	0.707	588.	0.003774	0.003396	0.339	1.92
1.000	1.000	599.	0.003806	0.004018	0.401	1.91
2.000	1.414	597.	0.003802	0.004307	0.430	1.91
4.001	2.000	606.	0.003825	0.004620	0.462	1.91
8.001	2.829	606.	0.003825	0.004653	0.465	1.91
15.001	3.873	606.	0.003825	0.004637	0.463	1.91
30.001	5.477	606.	0.003825	0.004687	0.468	1.91
45.001	6.708	606.	0.003825	0.004670	0.467	1.91
60.000	7.746	606.	0.003825	0.004653	0.465	1.91
60.226	7.761	606.	0.003825	0.004637	0.463	1.91

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
Test Number: DSS 143	Preparation: wet	Elevation:
Description: Brown organic Silt		
Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 4 of 6

Constant Load Step

Stress: 911 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	606.	0.003825	0.004653	0.465	1.91
0.018	0.133	644.	0.003927	0.004552	0.455	1.91
0.034	0.185	609.	0.003869	0.004861	0.486	1.91
0.084	0.290	675.	0.004010	0.005542	0.554	1.91
0.101	0.318	700.	0.004080	0.005707	0.570	1.91
0.167	0.408	780.	0.004296	0.006916	0.691	1.90
0.250	0.500	879.	0.004564	0.007974	0.797	1.90
0.500	0.707	888.	0.004589	0.009172	0.916	1.90
1.001	1.000	907.	0.004640	0.01030	1.03	1.90
2.001	1.414	907.	0.004640	0.01103	1.10	1.89
4.001	2.000	910.	0.004646	0.01183	1.18	1.89
8.001	2.829	910.	0.004646	0.01270	1.27	1.89
15.001	3.873	910.	0.004646	0.01346	1.34	1.89
30.001	5.477	910.	0.004646	0.01376	1.37	1.88
45.001	6.708	910.	0.004646	0.01383	1.38	1.88
60.001	7.746	907.	0.004643	0.01390	1.39	1.88
60.217	7.760	910.	0.004646	0.01389	1.39	1.88

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
Test Number: DSS 143	Preparation: wet	Elevation:
Description: Brown organic Silt		
Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 5 of 6

Constant Load Step

Stress: 1367 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	910.	0.004646	0.01391	1.39	1.88
0.018	0.133	914.	0.004659	0.01407	1.41	1.88
0.034	0.185	973.	0.004818	0.01401	1.40	1.88
0.084	0.290	1.11e+03	0.005099	0.01425	1.42	1.88
0.101	0.318	1.14e+03	0.005172	0.01468	1.47	1.88
0.168	0.410	1.27e+03	0.005419	0.01571	1.57	1.88
0.250	0.500	1.30e+03	0.005473	0.01654	1.65	1.88
0.500	0.707	1.37e+03	0.005601	0.01784	1.78	1.87
1.000	1.000	1.35e+03	0.005590	0.01951	1.95	1.87
2.000	1.414	1.36e+03	0.005597	0.02064	2.06	1.86
4.001	2.000	1.36e+03	0.005600	0.02113	2.11	1.86
8.001	2.829	1.37e+03	0.005601	0.02183	2.18	1.86
15.000	3.873	1.37e+03	0.005601	0.02250	2.25	1.86
30.001	5.477	1.37e+03	0.005601	0.02346	2.34	1.86
45.001	6.708	1.37e+03	0.005601	0.02361	2.36	1.86
60.001	7.746	1.37e+03	0.005601	0.02389	2.39	1.86
60.182	7.758	1.37e+03	0.005601	0.02389	2.39	1.86

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
	Test Number: DSS 143	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 6 of 6

Constant Load Step

Stress: 2000 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	1.37e+03	0.005601	0.02387	2.39	1.86
0.018	0.133	1.45e+03	0.005761	0.02392	2.39	1.86
0.034	0.185	1.54e+03	0.005935	0.02396	2.39	1.86
0.084	0.290	1.74e+03	0.006328	0.02424	2.42	1.85
0.101	0.318	1.79e+03	0.006423	0.02439	2.44	1.85
0.168	0.409	1.96e+03	0.006752	0.02551	2.55	1.85
0.251	0.501	1.90e+03	0.006718	0.02605	2.60	1.85
0.500	0.707	1.94e+03	0.006744	0.02749	2.75	1.84
1.000	1.000	1.98e+03	0.006798	0.02878	2.88	1.84
2.000	1.414	1.99e+03	0.006807	0.03102	3.10	1.83
4.001	2.000	2.00e+03	0.006825	0.03151	3.15	1.83
8.001	2.829	2.00e+03	0.006825	0.03228	3.22	1.83
15.000	3.873	2.00e+03	0.006825	0.03305	3.30	1.83
30.001	5.477	2.00e+03	0.006830	0.03382	3.38	1.83
45.000	6.708	2.00e+03	0.006830	0.03455	3.45	1.82
60.001	7.746	2.00e+03	0.006830	0.03486	3.48	1.82
75.001	8.660	2.00e+03	0.006830	0.03548	3.54	1.82
90.001	9.487	2.00e+03	0.006830	0.03586	3.58	1.82
105.000	10.247	2.00e+03	0.006830	0.03603	3.60	1.82
120.000	10.954	2.00e+03	0.006830	0.03610	3.61	1.82
135.000	11.619	2.00e+03	0.006830	0.03660	3.66	1.82
150.001	12.247	2.00e+03	0.006830	0.03695	3.69	1.82
165.001	12.845	2.00e+03	0.006830	0.03700	3.70	1.82
180.001	13.416	2.00e+03	0.006830	0.03727	3.72	1.82
195.001	13.964	2.00e+03	0.006830	0.03725	3.72	1.82
210.000	14.491	2.00e+03	0.006830	0.03729	3.72	1.82
225.000	15.000	2.00e+03	0.006830	0.03759	3.76	1.82
240.001	15.492	2.00e+03	0.006830	0.03767	3.76	1.82
251.886	15.871	2.00e+03	0.006830	0.03767	3.76	1.82

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
Test Number: DSS 143	Preparation: wet	Elevation:
Description: Brown organic Silt		
Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Shear Phase

Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
0.00000	0.00000	-11.759	0.00000	0.00000	1997.7	0.00000
0.00025000	0.00000	-11.759	0.00000	0.00000	1997.7	0.00000
0.017650	-0.0033370	-7.0552	0.00000	0.0053659	1995.3	0.0011765
0.034317	0.0033370	-7.0552	-2.1143e+05	0.0036250	1995.3	0.0011765
0.084350	0.010011	-4.7035	-46983.	0.0056281	1962.4	0.017647
0.10102	0.013348	-4.7035	-35238.	0.0059142	1957.7	0.020000
0.16668	0.016685	0.00000	0.00000	0.0051749	1941.2	0.028235
0.25005	0.013348	2.3517	17619.	0.0063195	1922.4	0.037647
0.50010	0.020022	7.0552	35238.	0.0041733	1957.7	0.020000
1.0002	0.023359	21.166	90611.	0.0044595	1953.0	0.022353
2.0004	0.043381	32.924	75896.	0.0088949	1880.1	0.058824
4.0005	0.076750	68.200	88860.	0.0084657	1887.2	0.055294
8.0008	0.15684	108.18	68976.	0.0091811	1875.4	0.061176
15.000	0.43714	157.57	36044.	0.016216	1788.5	0.10471
30.001	0.86761	232.82	26835.	0.019626	1703.9	0.14706
45.001	1.3515	291.62	21578.	0.026208	1595.8	0.20118
60.000	1.7719	341.00	19245.	0.029498	1541.7	0.22824
75.001	2.1924	385.68	17592.	0.035484	1414.8	0.29176
90.001	2.6462	418.61	15819.	0.034315	1405.4	0.29647
105.00	3.1368	439.77	14020.	0.042996	1377.2	0.31059
120.00	3.5772	456.24	12754.	0.042924	1292.6	0.35294
135.00	4.0177	470.35	11707.	0.043520	1311.4	0.34353
150.00	4.4749	486.81	10879.	0.041779	1311.4	0.34353
165.00	4.9654	500.92	10088.	0.047407	1276.1	0.36118
180.00	5.4326	503.27	9263.9	0.048647	1198.6	0.40000
195.00	5.8697	515.03	8774.3	0.050245	1200.9	0.39882
210.00	6.3670	526.79	8273.8	0.050817	1191.5	0.40353
225.00	6.9009	531.49	7701.8	0.053393	1149.2	0.42471
240.00	7.2813	536.20	7364.0	0.052534	1163.3	0.41765
255.00	7.7752	543.25	6987.0	0.054108	1137.5	0.43059
270.00	8.2156	550.31	6698.3	0.052534	1163.3	0.41765
285.00	8.7596	557.36	6362.9	0.053822	1142.2	0.42824
300.00	9.2034	557.36	6056.0	0.053393	1149.2	0.42471
315.00	9.7173	564.42	5808.4	0.053536	1146.9	0.42588
330.00	10.148	569.12	5608.3	0.053822	1142.2	0.42824
345.00	10.625	571.47	5378.6	0.054967	1123.4	0.43765
360.00	11.069	573.82	5184.2	0.058544	1064.6	0.46706
375.00	11.503	576.17	5009.1	0.057113	1088.1	0.45529
390.00	11.976	580.88	4850.2	0.056827	1092.8	0.45294
405.00	12.477	585.58	4693.3	0.057709	1106.9	0.44588
420.00	12.981	587.93	4529.2	0.059140	1083.4	0.45765
435.00	13.408	594.99	4437.6	0.056970	1090.5	0.45412
450.00	13.852	599.69	4329.3	0.057971	1074.0	0.46235
465.00	14.319	602.04	4204.5	0.057113	1088.1	0.45529
480.00	14.786	604.40	4087.6	0.056350	1043.5	0.47765
495.00	15.217	606.75	3987.4	0.062884	1050.5	0.47412
510.00	15.757	609.10	3865.5	0.059378	1022.3	0.48824
525.00	16.198	611.45	3774.9	0.061262	1020.0	0.48941
540.00	16.692	616.15	3691.4	0.060547	1031.7	0.48353
555.00	17.149	616.15	3593.0	0.062288	1031.7	0.48353

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
Test Number: DSS 143	Preparation: wet	Elevation:
Description: Brown organic Silt		
Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Shear Phase

Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
570.00	17.619	606.75	3443.7	0.057351	1027.0	0.48588
585.00	18.013	613.80	3407.6	0.060404	1034.1	0.48235
600.00	18.524	616.15	3326.3	0.059378	1022.3	0.48824
615.00	19.011	613.80	3228.7	0.062264	1003.5	0.49765
630.00	19.461	613.80	3154.0	0.070481	972.97	0.51294
645.00	19.945	620.86	3112.8	0.069398	958.87	0.52000
660.00	20.382	623.21	3057.6	0.065001	984.73	0.50706
675.00	20.836	620.86	2979.7	0.065801	980.02	0.50941
690.00	21.247	620.86	2922.2	0.070055	944.77	0.52706
705.00	21.780	623.21	2861.3	0.075535	933.02	0.53294
720.00	22.294	616.15	2763.7	0.079390	900.12	0.54941
735.00	22.711	613.80	2702.6	0.080589	893.07	0.55294
750.00	23.185	613.80	2647.4	0.077791	909.52	0.54471
765.00	23.612	616.15	2609.4	0.079105	881.32	0.55882
780.00	24.060	616.15	2561.0	0.078191	907.17	0.54588
795.00	24.577	616.15	2507.1	0.078191	907.17	0.54588
810.00	25.037	613.80	2451.5	0.081930	895.42	0.55176
825.00	25.541	606.75	2375.6	0.080447	883.67	0.55765
840.00	26.022	599.69	2304.6	0.087383	853.12	0.57294
855.00	26.426	599.69	2269.4	0.088183	848.41	0.57529
870.00	26.906	602.04	2237.6	0.090581	834.31	0.58235
885.00	27.323	599.69	2194.8	0.091780	827.26	0.58588
900.00	27.840	599.69	2154.0	0.096461	820.21	0.58941
915.00	28.274	599.69	2121.0	0.089782	839.01	0.58000
930.00	28.798	604.40	2098.7	0.090581	834.31	0.58235
945.00	29.252	597.34	2042.1	0.091380	829.61	0.58471
960.00	29.696	594.99	2003.6	0.096176	801.41	0.59882
975.00	30.216	599.69	1984.7	0.10111	782.61	0.60824
990.00	30.620	604.40	1973.9	0.091380	829.61	0.58471
1005.0	31.081	602.04	1937.0	0.080589	893.07	0.55294
1006.9	31.164	602.04	1931.9	0.081530	897.77	0.55059

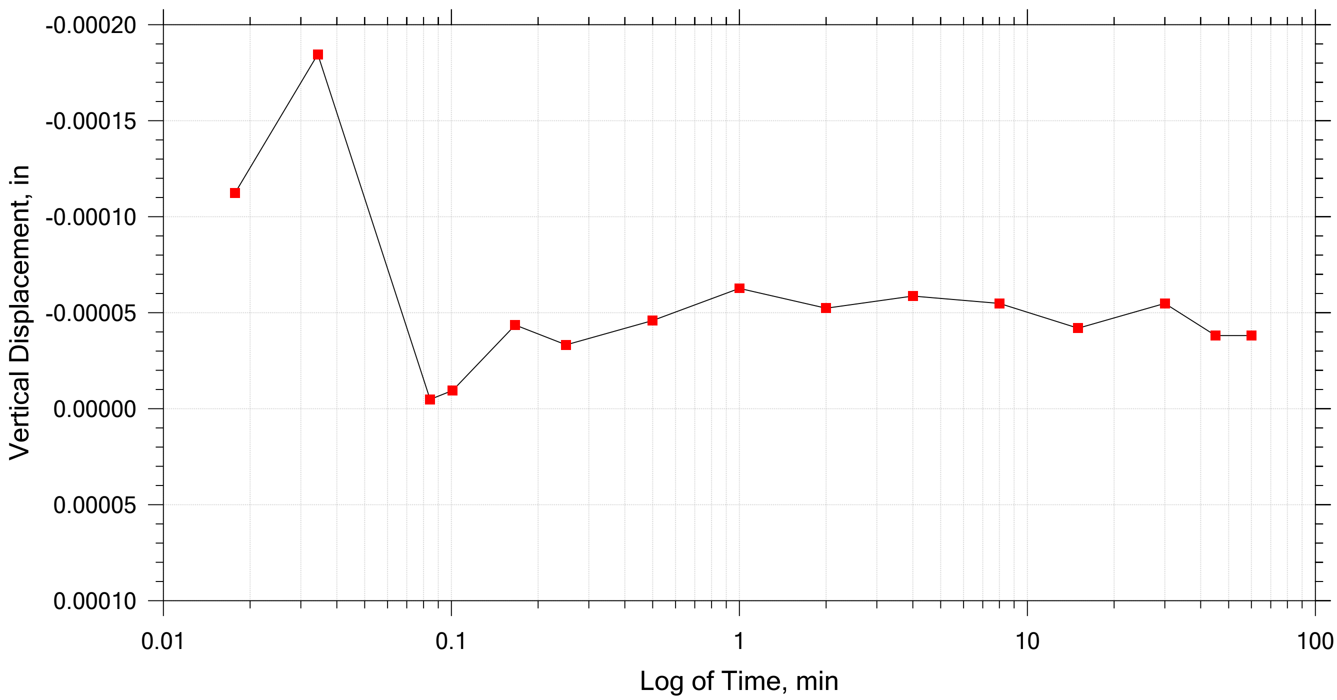
Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U2	Test Date: 5/25/2021	Depth: 30.45
Test Number: DSS 143	Preparation: wet	Elevation:
Description: Brown organic Silt		
Remarks: Sample consolidated to 2000 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

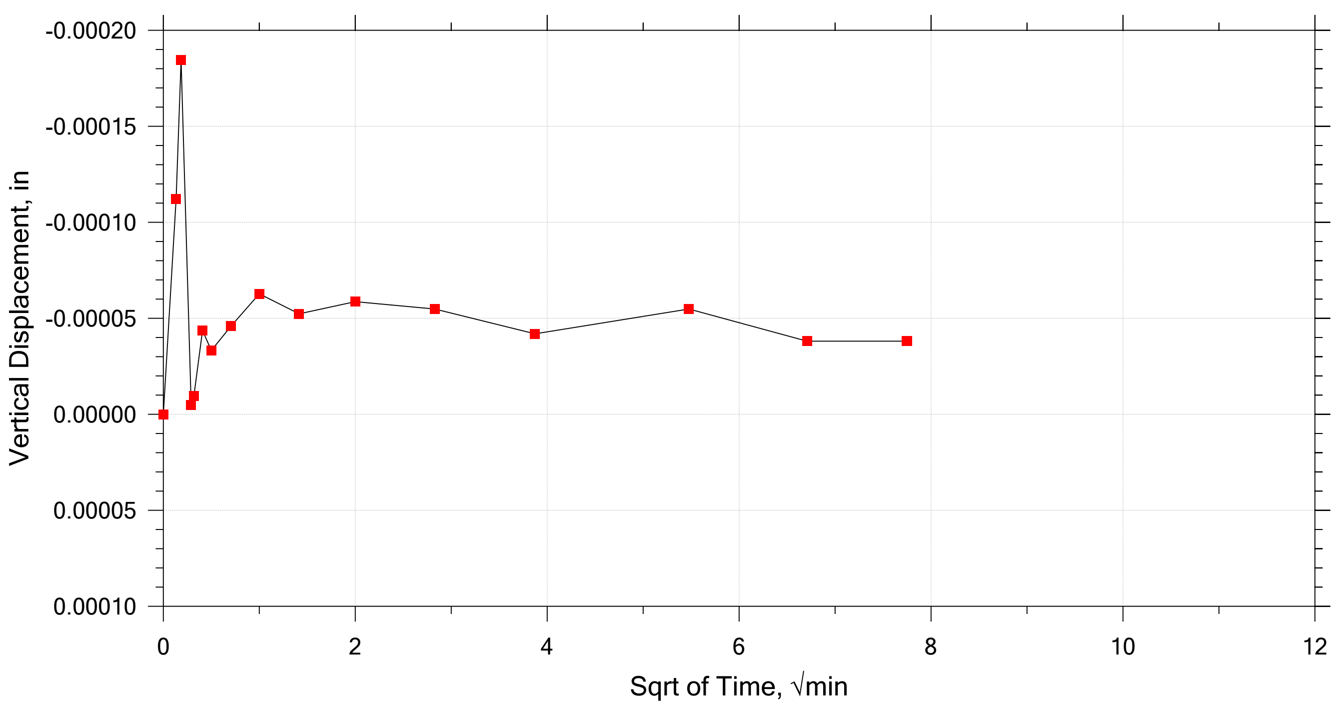
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 1 of 8

Constant Load Step

Stress: 200 psf





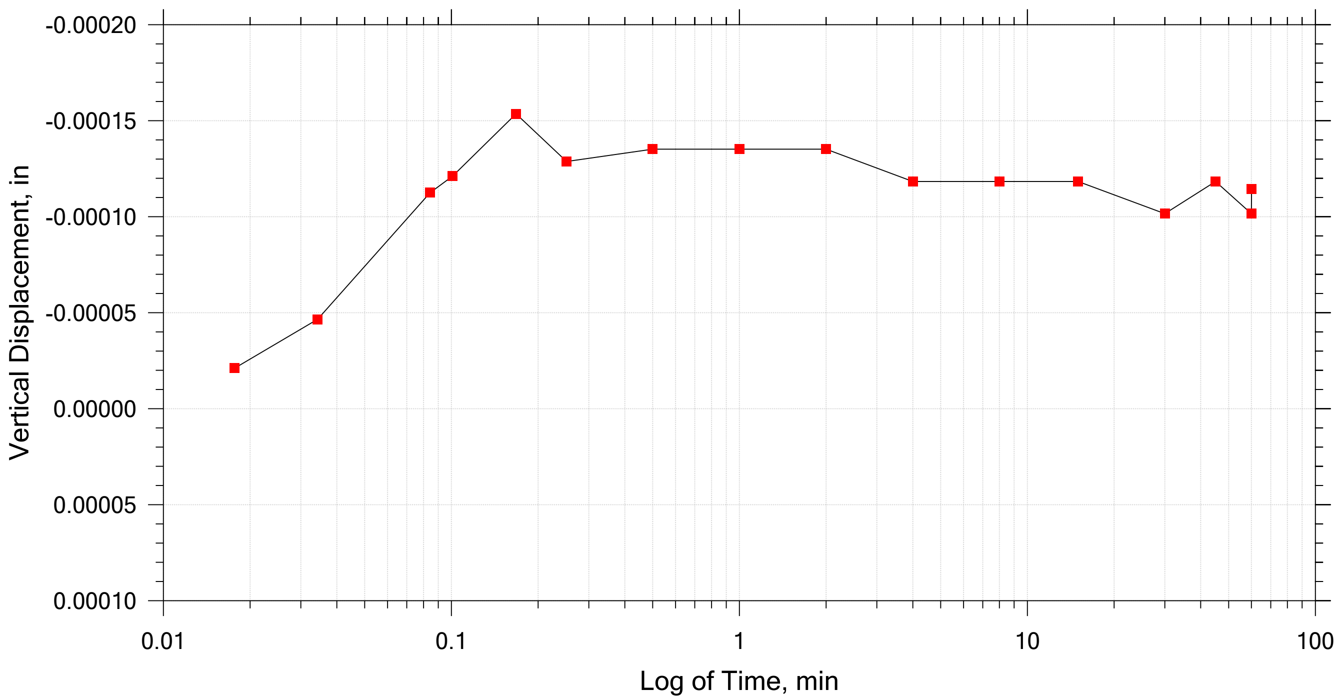
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

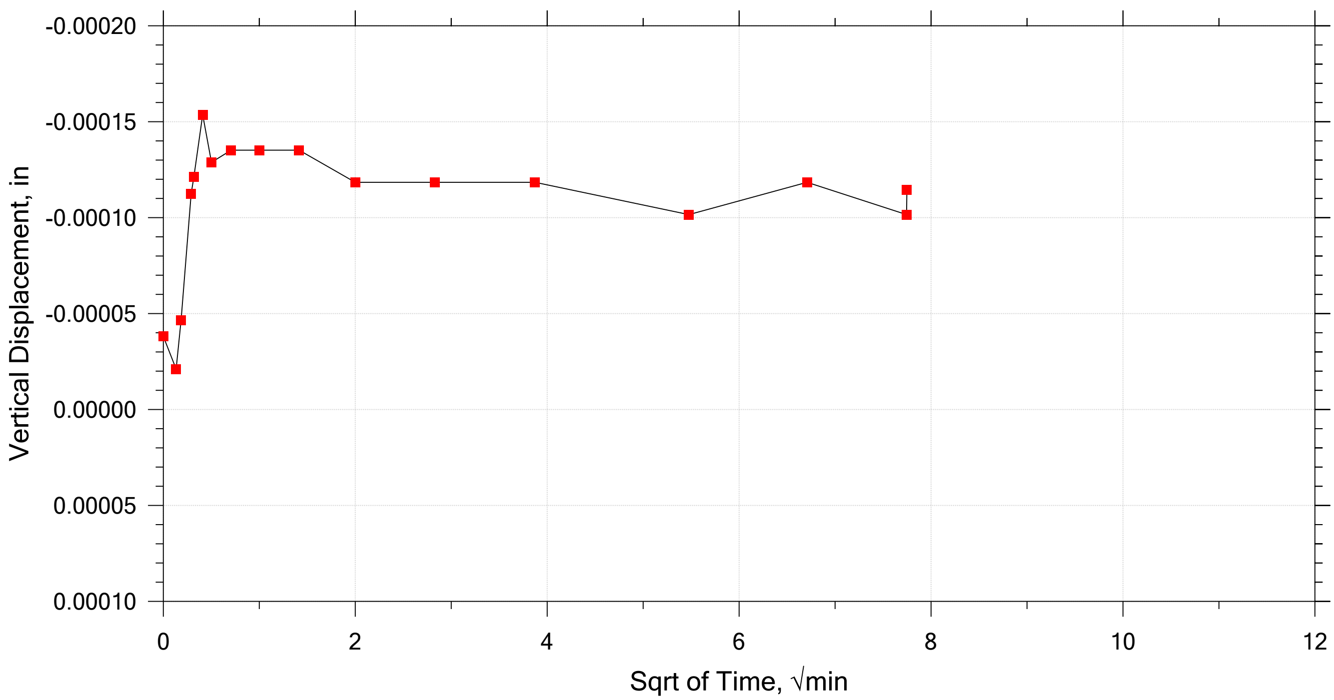
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 2 of 8

Constant Load Step

Stress: 300 psf





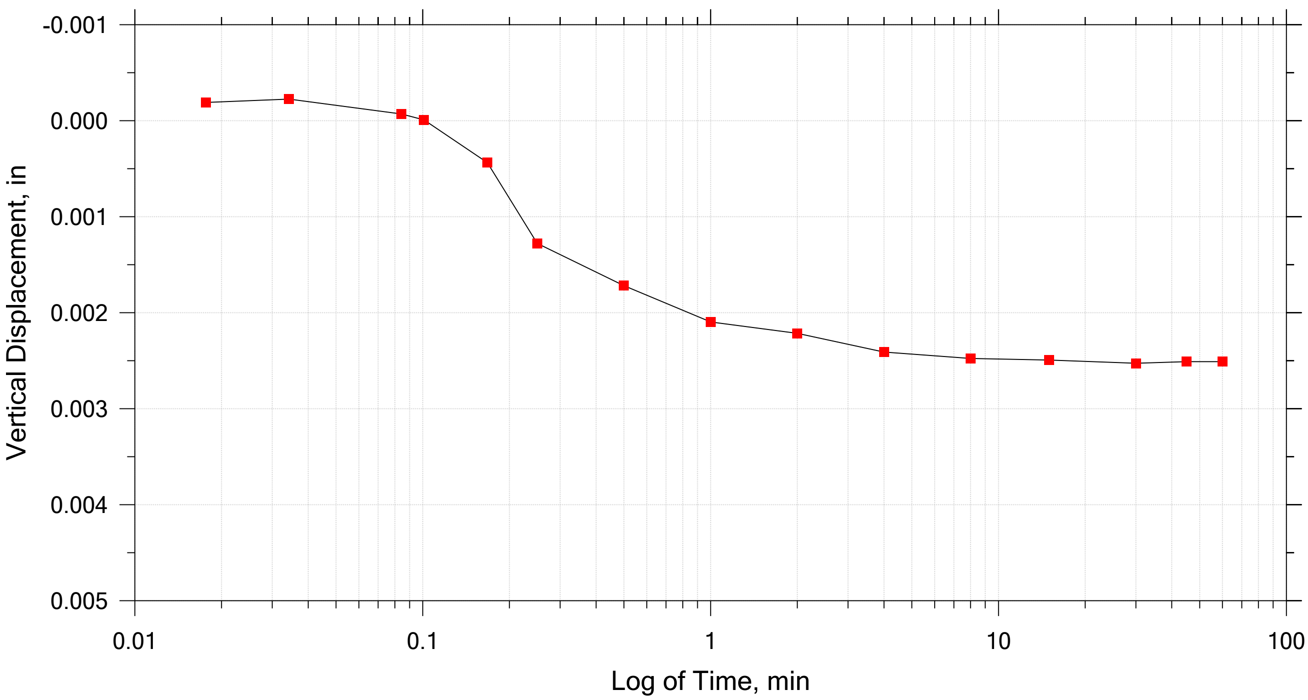
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

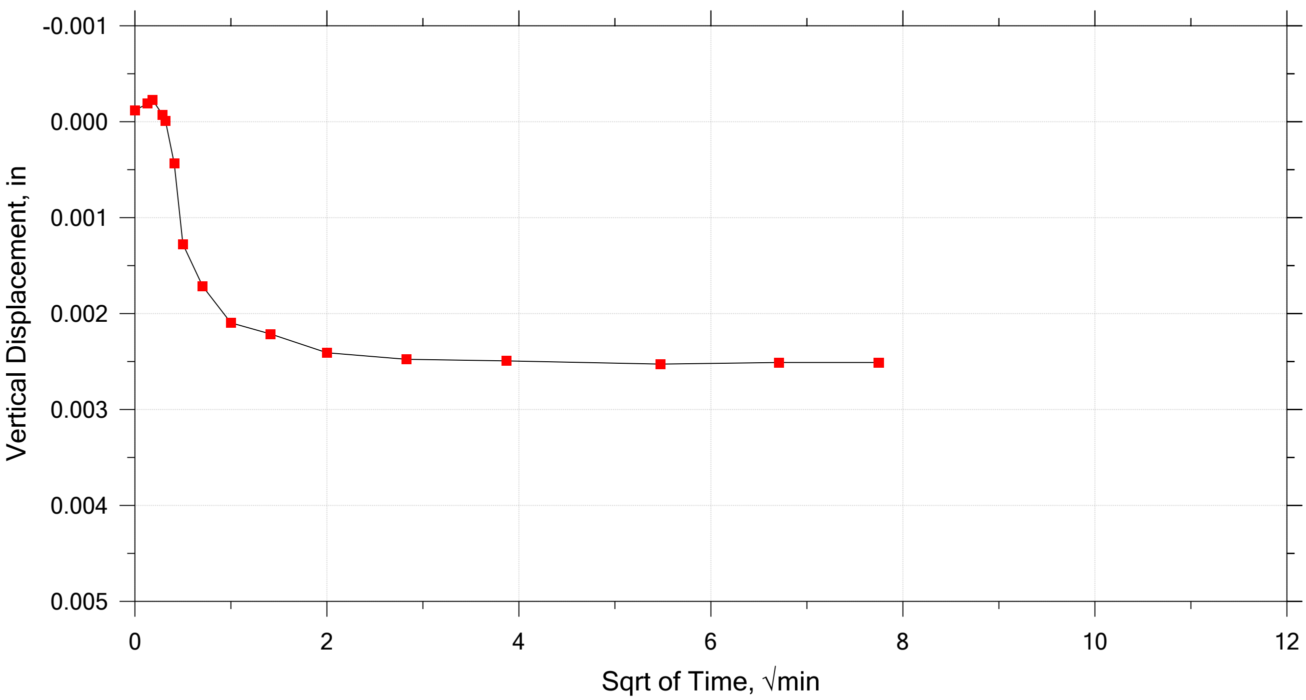
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 3 of 8

Constant Load Step

Stress: 450 psf





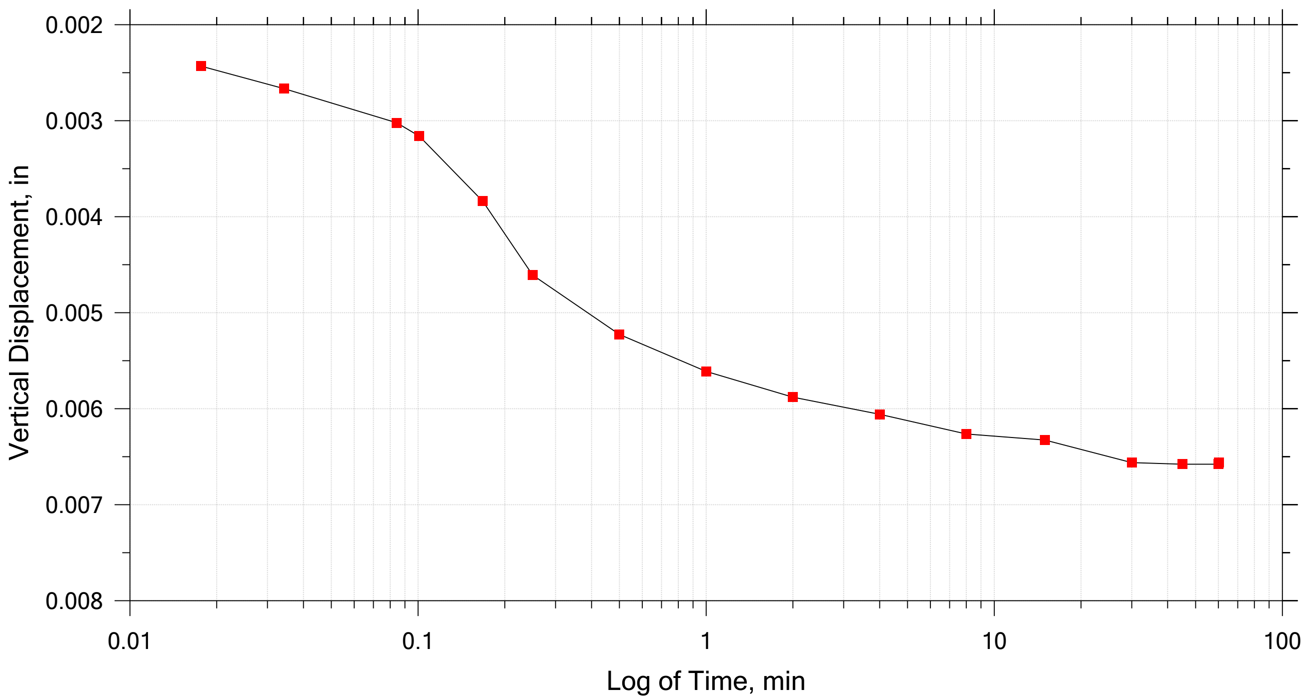
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

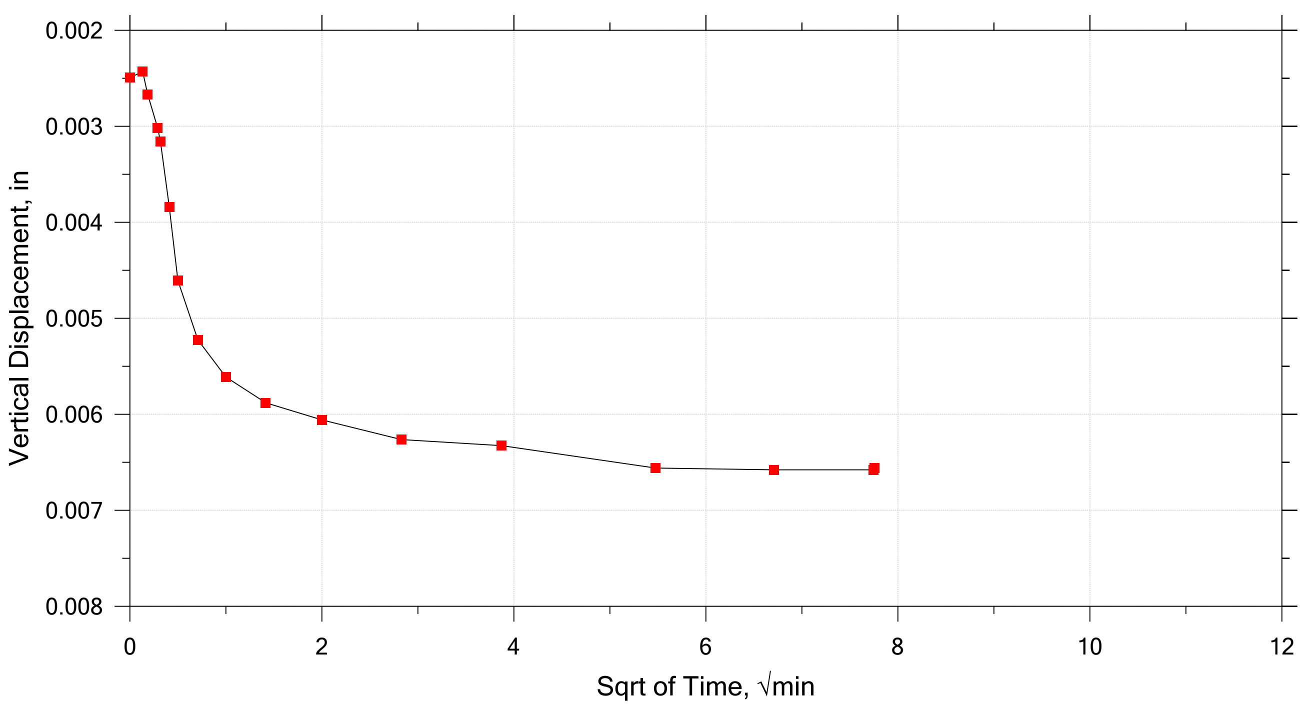
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 4 of 8

Constant Load Step

Stress: 675 psf





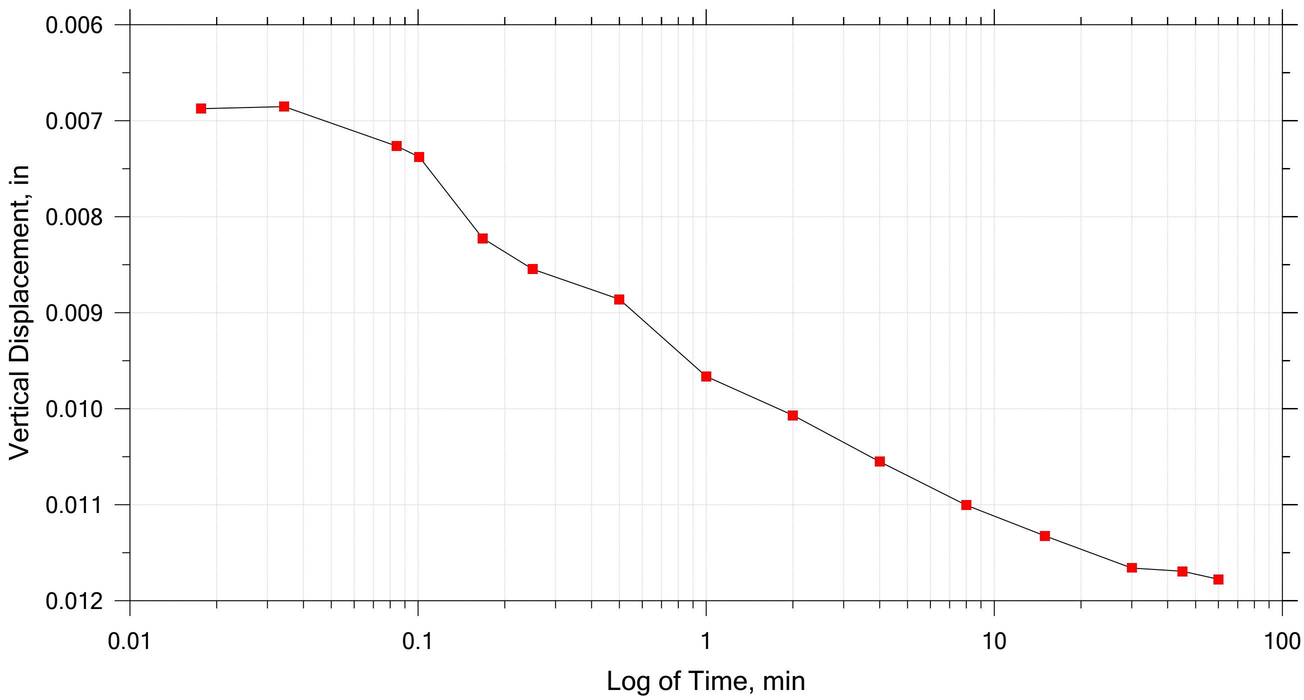
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

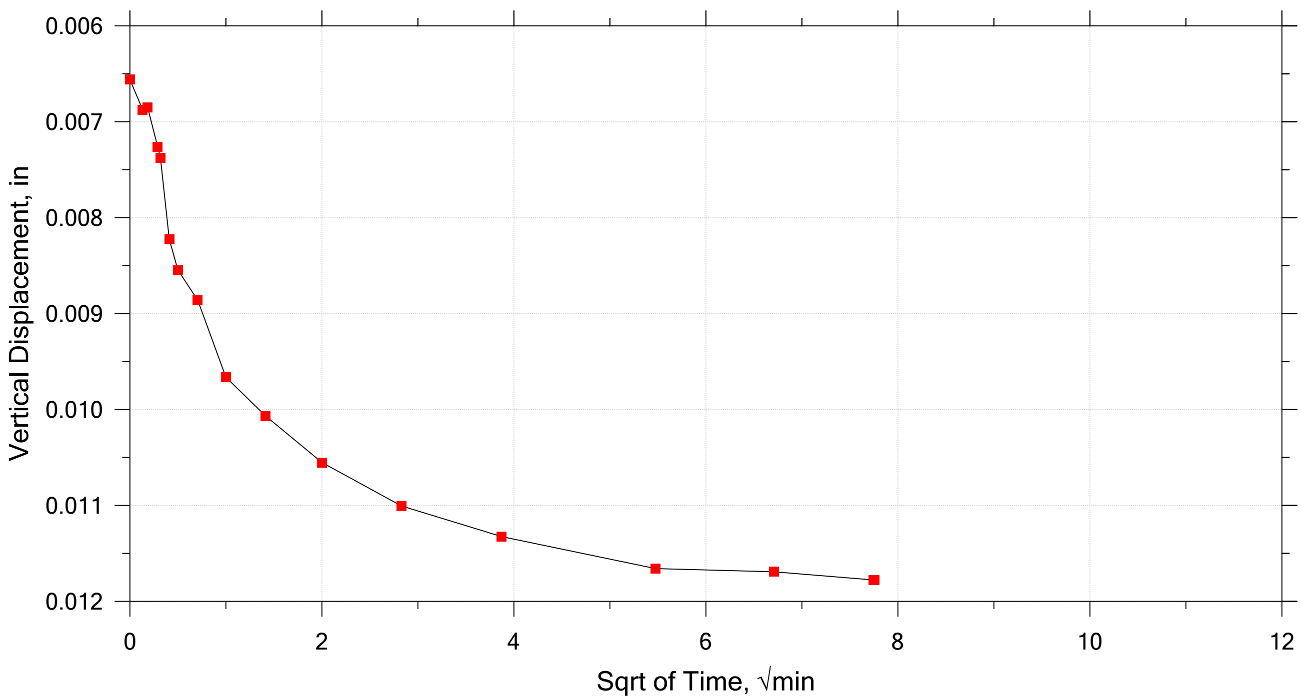
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 5 of 8

Constant Load Step

Stress: 1.01e+03 psf





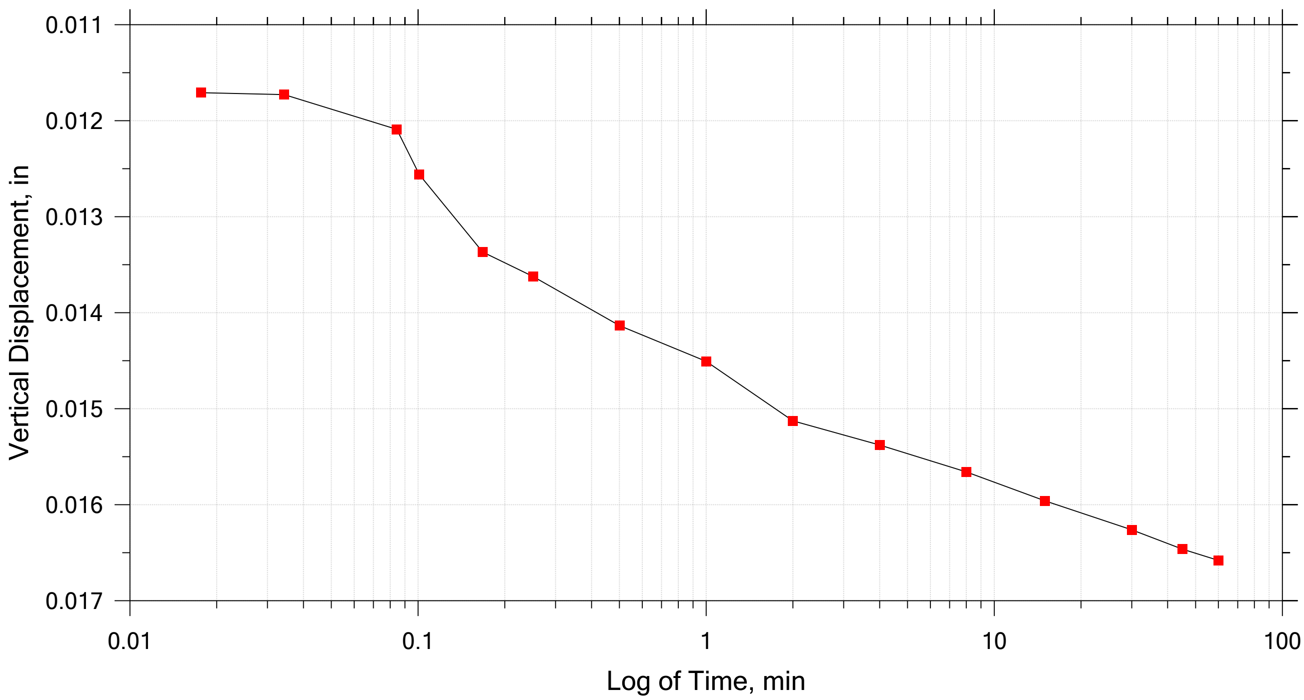
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

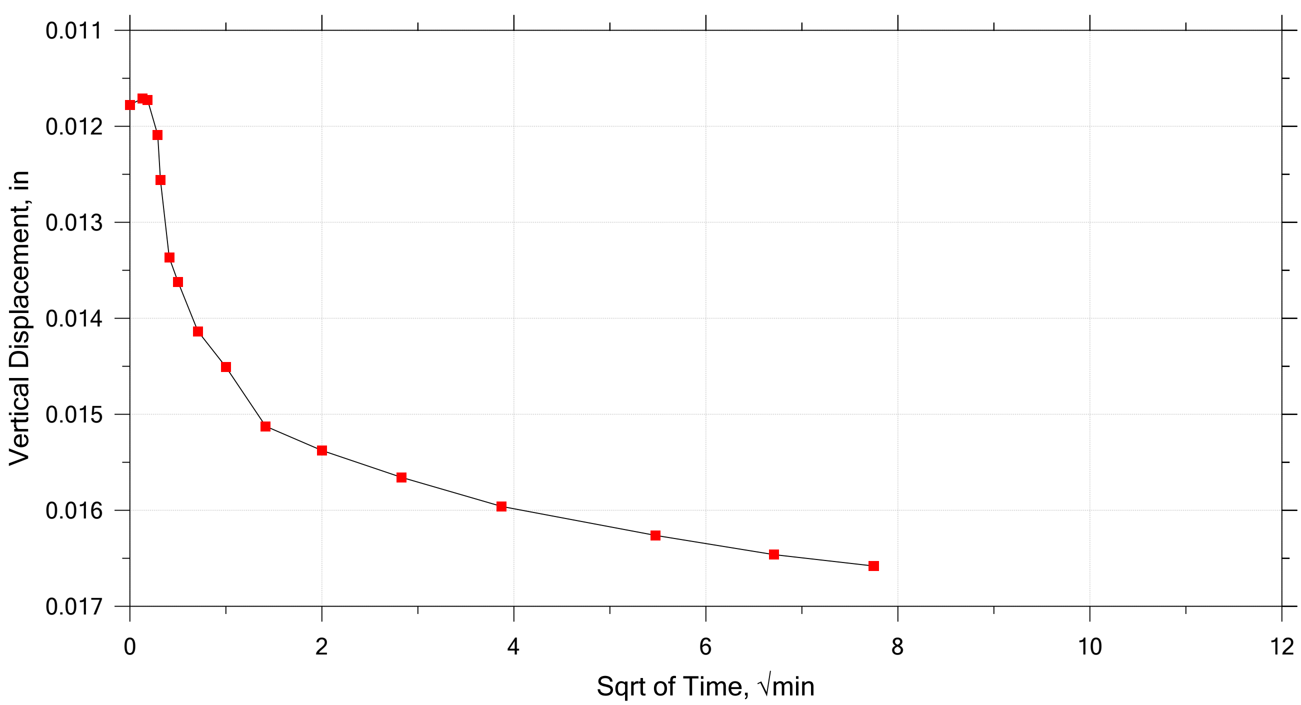
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 6 of 8

Constant Load Step

Stress: 1.52e+03 psf





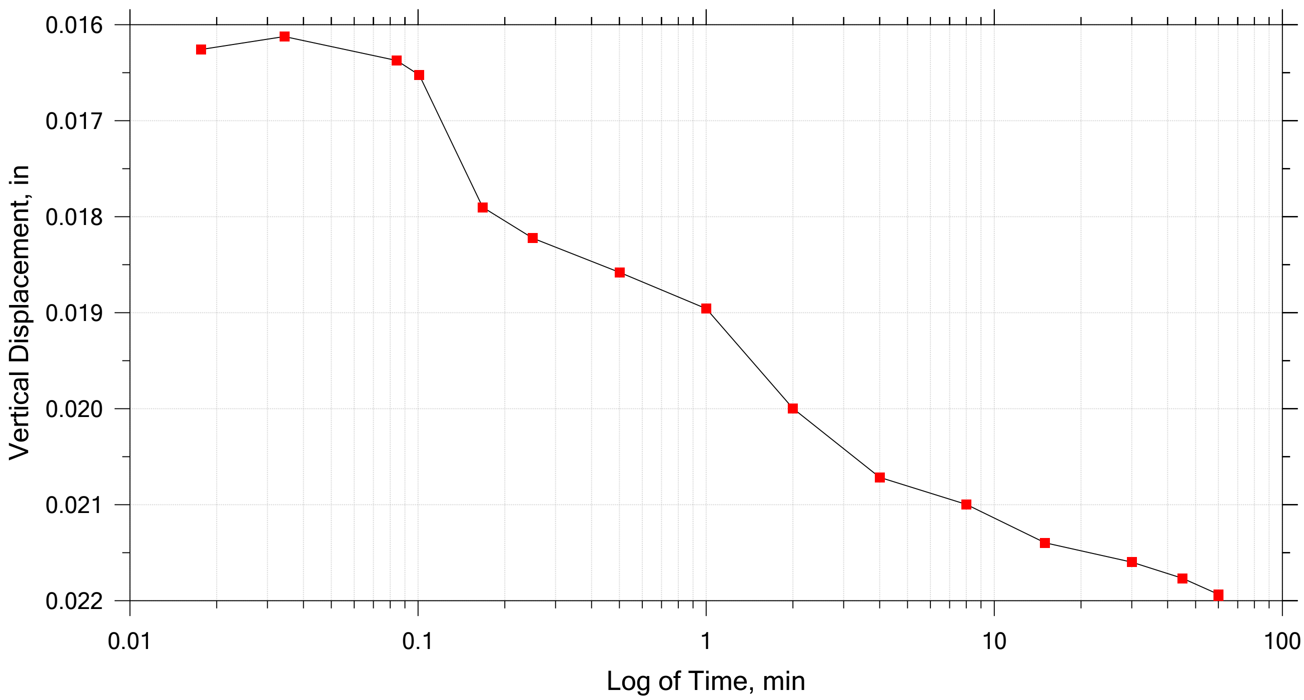
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

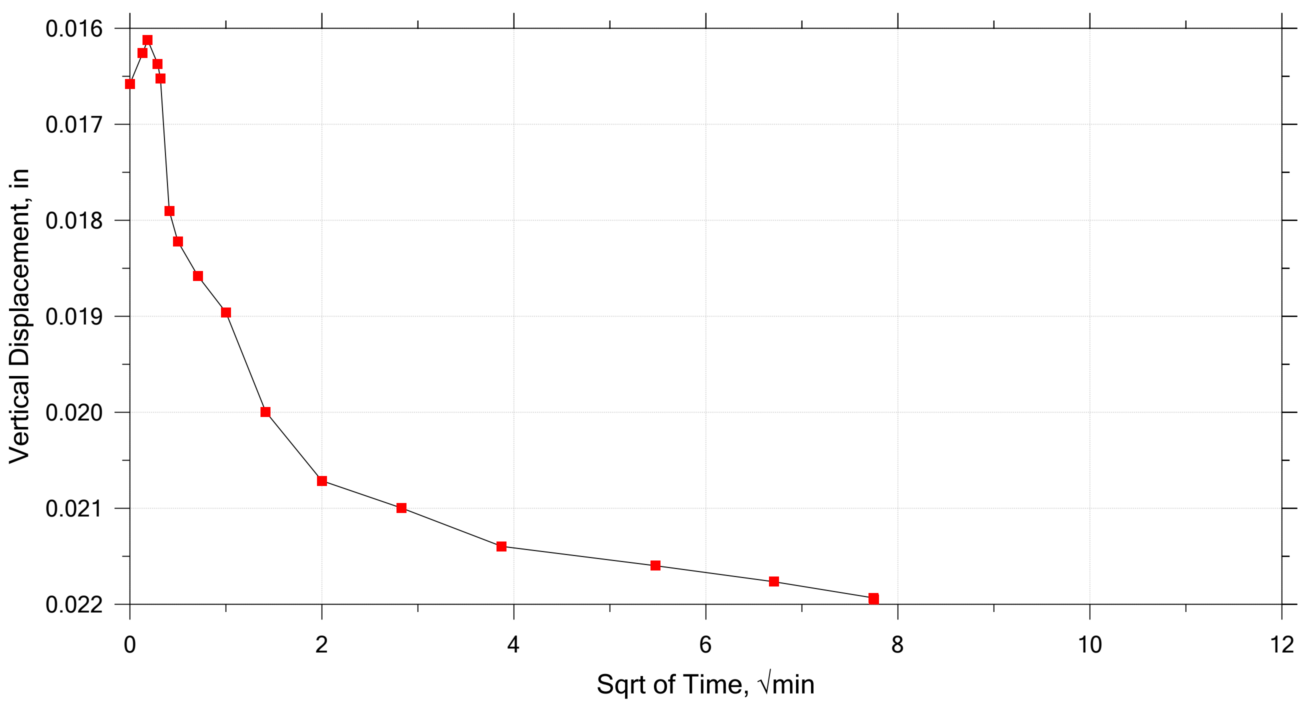
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 7 of 8

Constant Load Step

Stress: 2.28e+03 psf





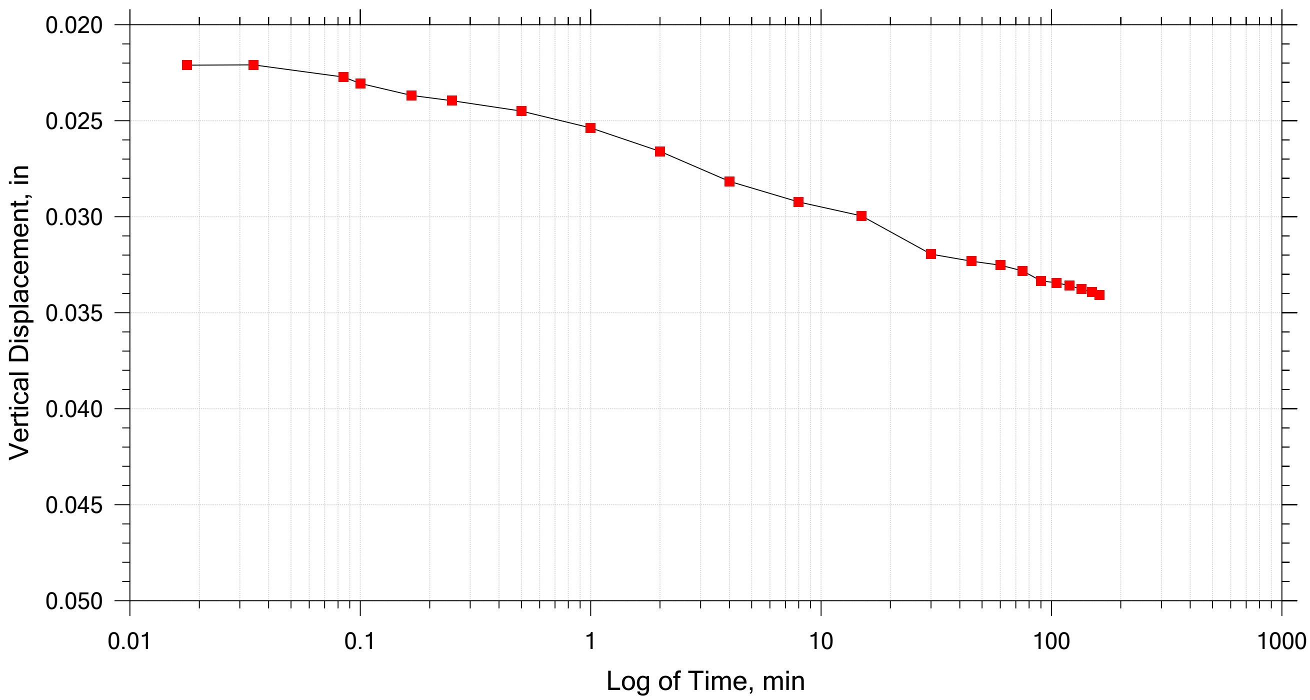
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

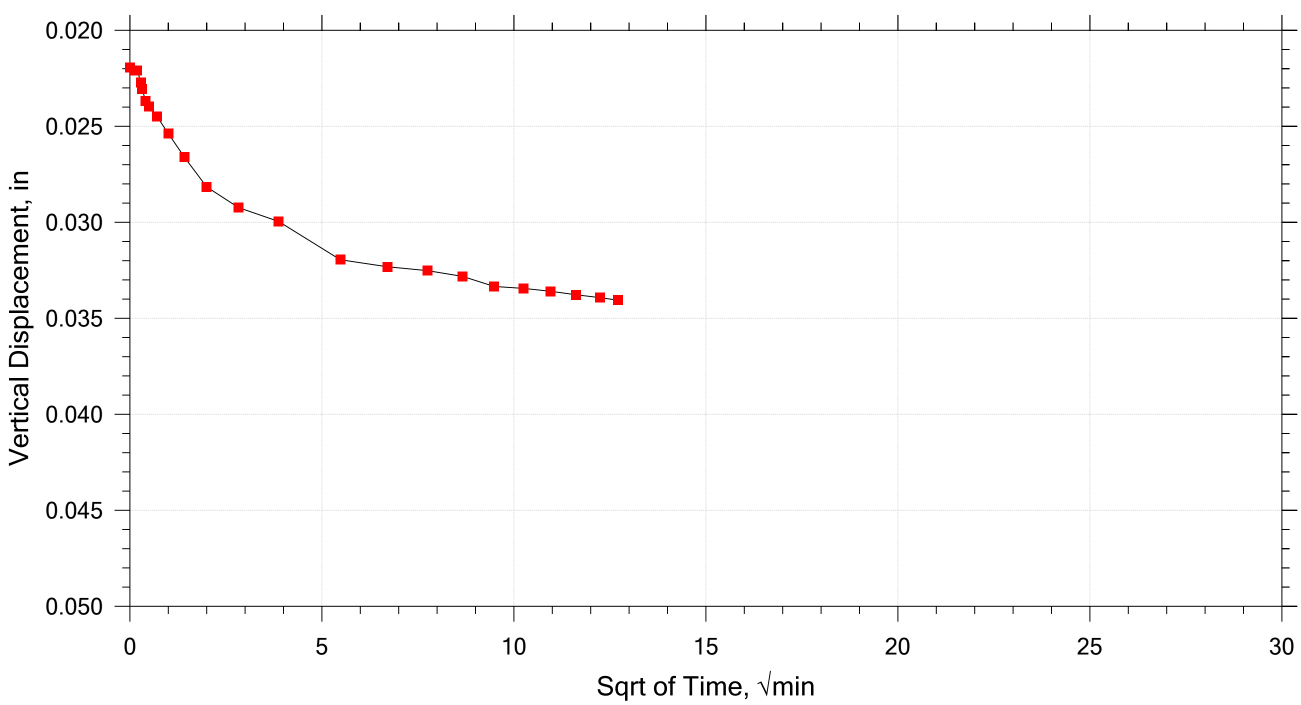
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 8 of 8

Constant Load Step

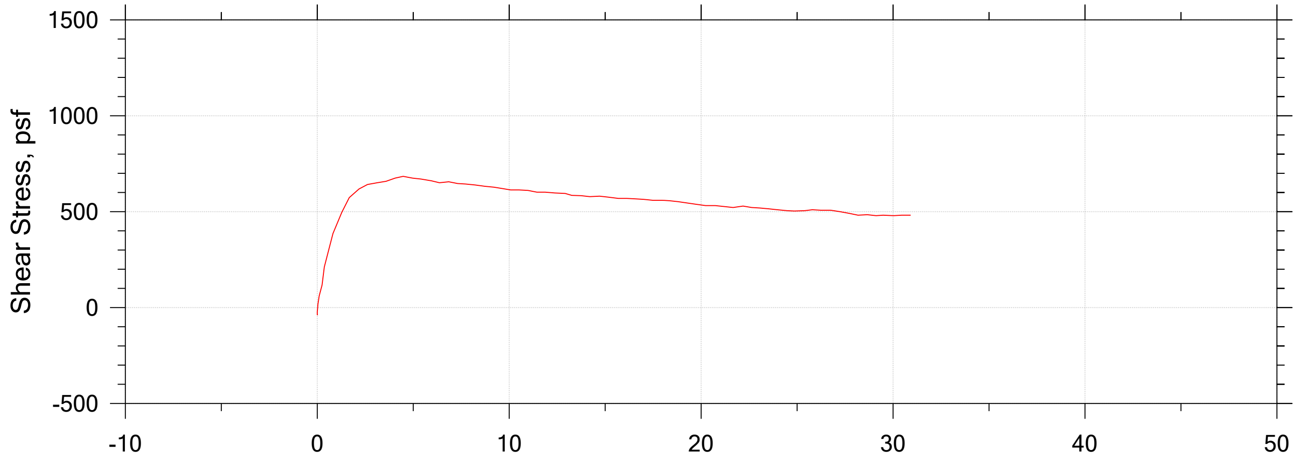
Stress: 3.4e+03 psf

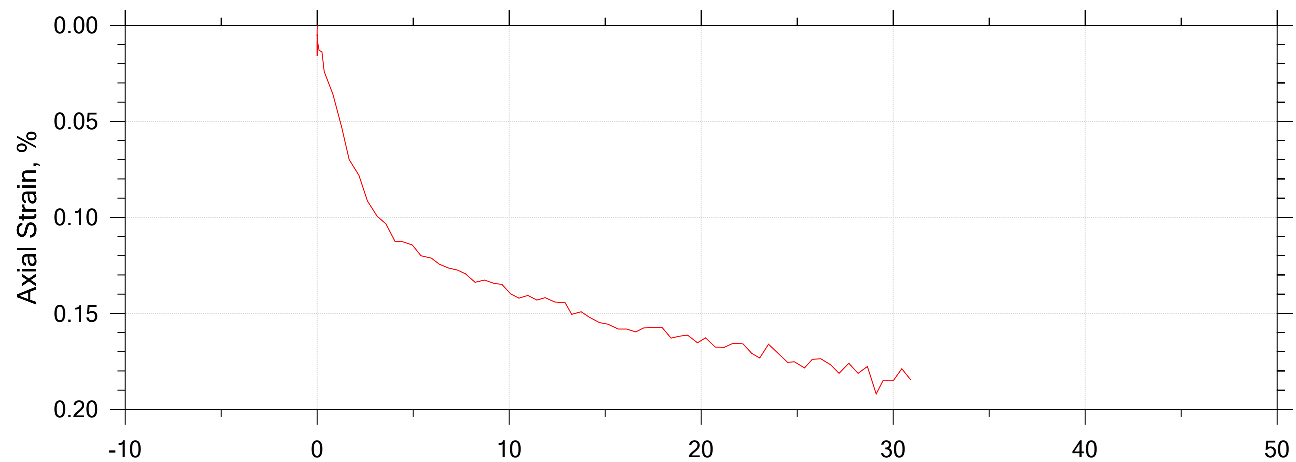


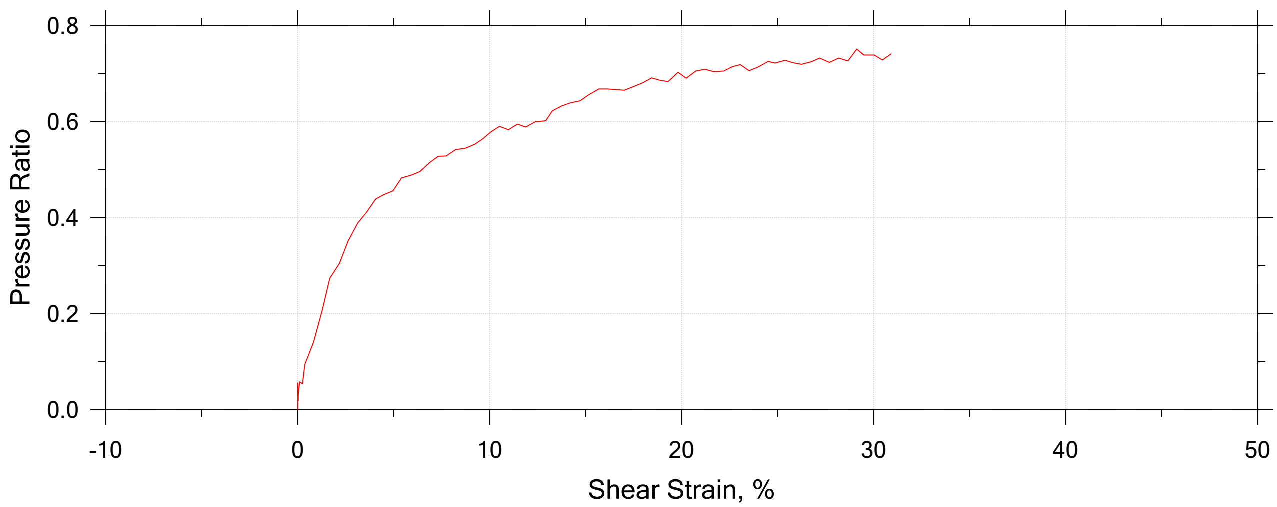


Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

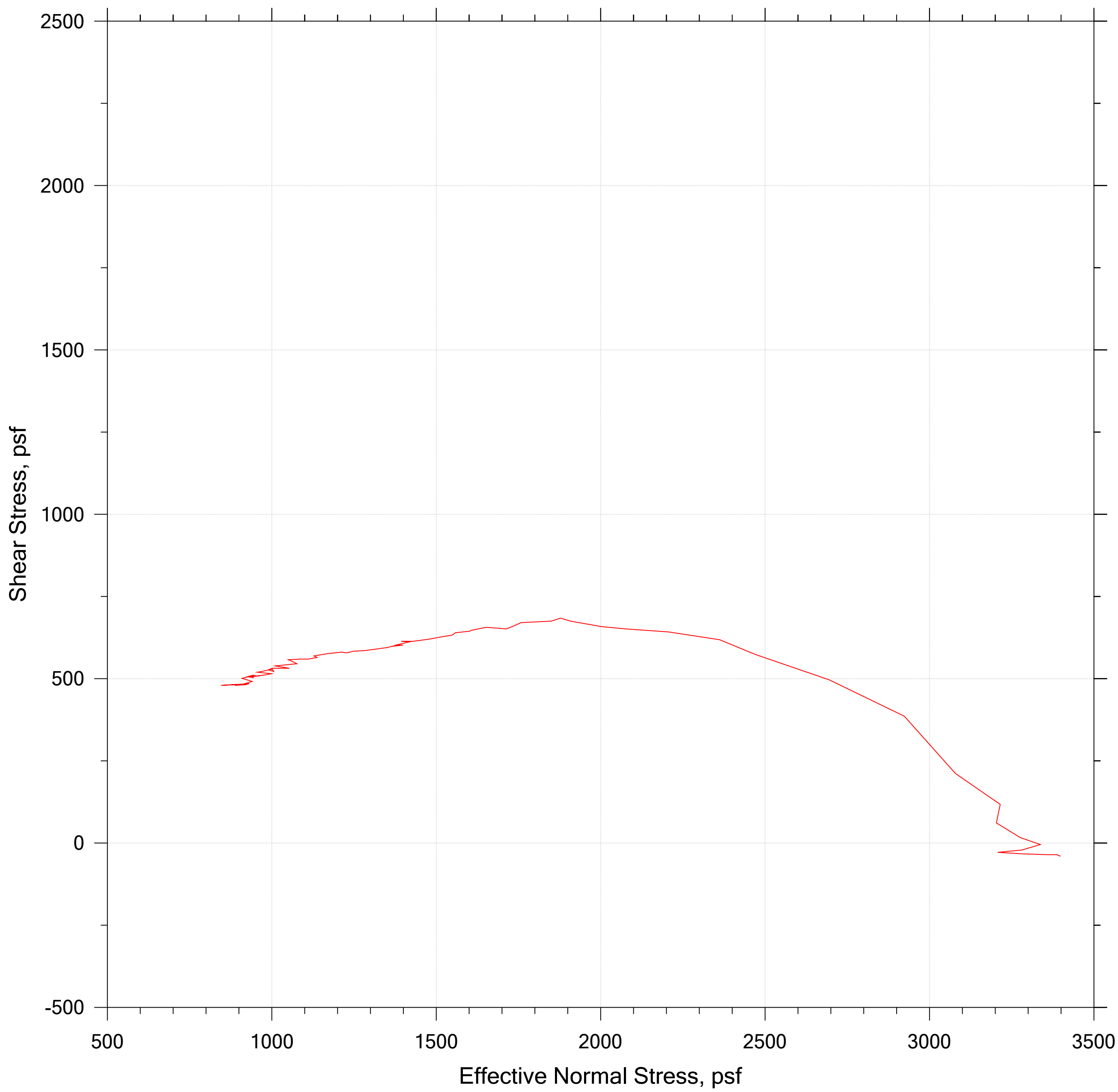






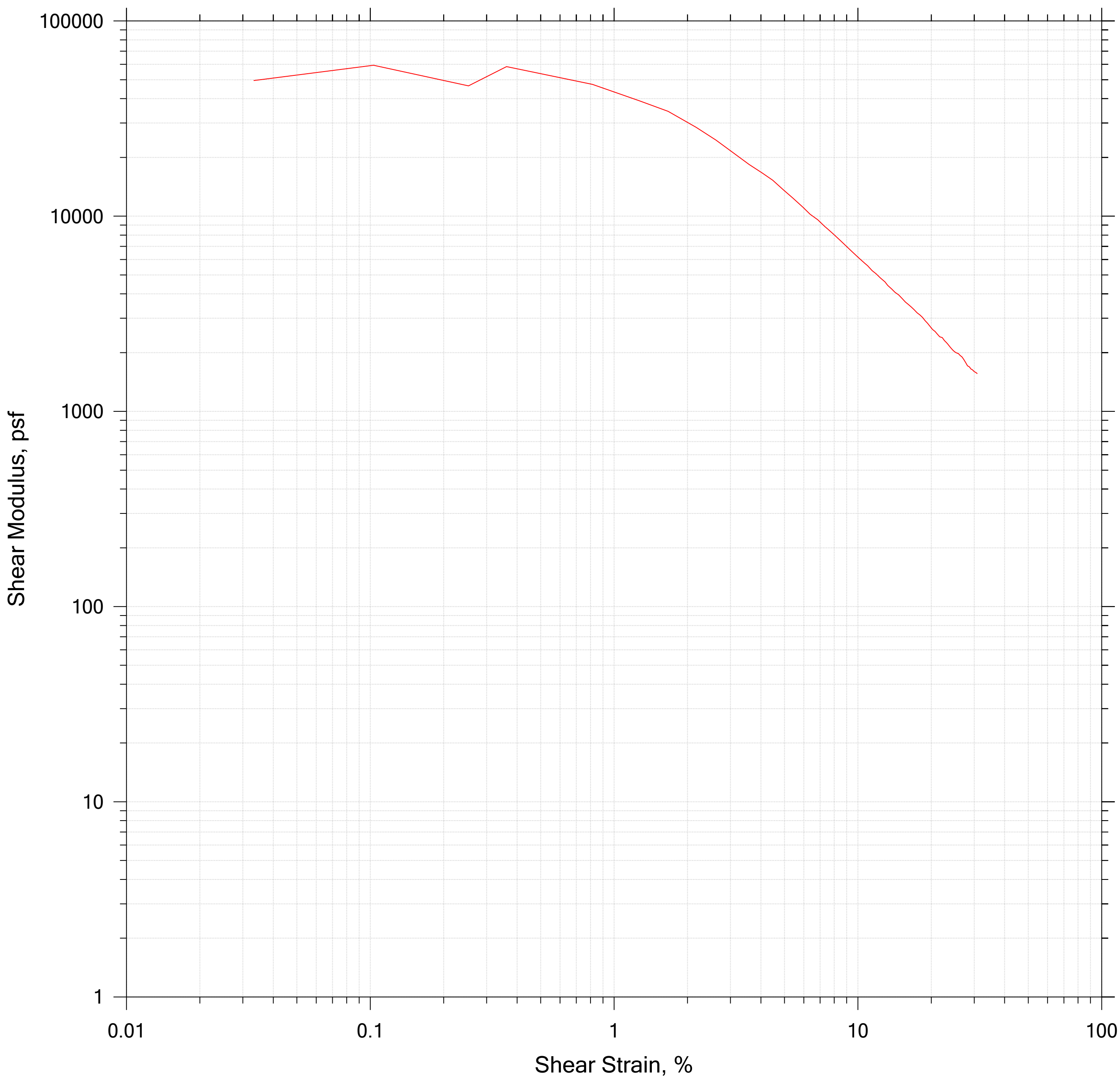
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Specimen Dimension, in: 2.50	Specific Gravity: 2.88 (Implied)	Liquid Limit: 47
Specimen Height, in: 1.00	Initial Void Ratio: 1.31	Plastic Limit: 25
Final Height, in: 0.97	Final Void Ratio: 1.23	Plasticity Index: 22

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	308	---		310
Mass Container, gm	60.7	0	0	60.33
Mass Container + Wet Soil, gm	291.32	144.86	142.94	203.27
Mass Container + Dry Soil, gm	222.67	100.11	100.11	160.44
Mass Dry Soil, gm	161.97	100.11	100.11	100.11
Water Content, %	42.38	44.70	42.78	42.78
Void Ratio	---	1.31	1.23	---
Degree of Saturation, %	---	97.89	100.00	---
Dry Unit Weight, pcf	---	77.616	80.499	---

Warning: The change in the sample wet weight during the test is not consistent with the change in the moisture content.

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 1 of 8

Constant Load Step

Stress: 200 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	7.05	0.002202	0.0000	0.000	1.31
0.018	0.133	42.3	0.002298	-0.0001122	-0.0112	1.31
0.034	0.185	75.2	0.002387	-0.0001846	-0.0184	1.31
0.084	0.290	157.	0.002610	-4.838e-06	-0.000483	1.31
0.101	0.318	172.	0.002648	-9.484e-06	-0.000947	1.31
0.167	0.408	190.	0.002699	-4.363e-05	-0.00436	1.31
0.250	0.500	193.	0.002705	-3.322e-05	-0.00332	1.31
0.500	0.707	197.	0.002718	-4.595e-05	-0.00459	1.31
1.000	1.000	197.	0.002718	-6.272e-05	-0.00627	1.31
2.001	1.415	200.	0.002724	-5.232e-05	-0.00523	1.31
4.001	2.000	202.	0.002731	-5.868e-05	-0.00586	1.31
8.001	2.829	200.	0.002727	-5.483e-05	-0.00548	1.31
15.001	3.873	202.	0.002731	-4.191e-05	-0.00419	1.31
30.001	5.477	200.	0.002727	-5.483e-05	-0.00548	1.31
45.000	6.708	200.	0.002727	-3.806e-05	-0.00380	1.31
60.001	7.746	200.	0.002727	-3.806e-05	-0.00380	1.31
60.063	7.750	200.	0.002727	-3.806e-05	-0.00380	1.31

Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 2 of 8

Constant Load Step

Stress: 300 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	200.	0.002727	-3.806e-05	-0.00380	1.31
0.018	0.133	207.	0.002743	-2.110e-05	-0.00211	1.31
0.034	0.185	216.	0.002769	-4.656e-05	-0.00465	1.31
0.084	0.290	247.	0.002852	-0.0001125	-0.0112	1.31
0.101	0.318	256.	0.002877	-0.0001212	-0.0121	1.31
0.168	0.409	287.	0.002960	-0.0001536	-0.0153	1.31
0.251	0.501	296.	0.002985	-0.0001288	-0.0129	1.31
0.500	0.707	298.	0.002992	-0.0001352	-0.0135	1.31
1.000	1.000	298.	0.002992	-0.0001352	-0.0135	1.31
2.000	1.414	298.	0.002992	-0.0001352	-0.0135	1.31
4.001	2.000	298.	0.002992	-0.0001184	-0.0118	1.31
8.000	2.828	298.	0.002992	-0.0001184	-0.0118	1.31
15.001	3.873	298.	0.002992	-0.0001184	-0.0118	1.31
30.000	5.477	298.	0.002992	-0.0001016	-0.0102	1.31
45.001	6.708	298.	0.002992	-0.0001184	-0.0118	1.31
60.000	7.746	298.	0.002992	-0.0001016	-0.0102	1.31
60.047	7.749	296.	0.002988	-0.0001145	-0.0114	1.31

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
Test Number: DSS 140	Preparation: wet	Elevation:
Description: Gray Silty Clay		
Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 3 of 8

Constant Load Step

Stress: 450 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	298.	0.002992	-0.0001184	-0.0118	1.31
0.018	0.133	331.	0.003081	-0.0001907	-0.0191	1.31
0.034	0.185	350.	0.003132	-0.0002249	-0.0225	1.31
0.084	0.290	348.	0.003128	-7.008e-05	-0.00700	1.31
0.101	0.318	357.	0.003151	-9.166e-06	-0.000916	1.31
0.168	0.410	397.	0.003259	0.0004361	0.0436	1.31
0.250	0.500	439.	0.003373	0.001277	0.128	1.31
0.500	0.707	444.	0.003386	0.001718	0.172	1.31
1.001	1.000	447.	0.003393	0.002097	0.209	1.31
2.000	1.414	447.	0.003393	0.002214	0.221	1.31
4.001	2.000	449.	0.003399	0.002409	0.241	1.31
8.000	2.828	449.	0.003399	0.002476	0.247	1.31
15.001	3.873	449.	0.003399	0.002493	0.249	1.31
30.000	5.477	449.	0.003399	0.002527	0.252	1.31
45.000	6.708	449.	0.003399	0.002510	0.251	1.31
60.000	7.746	449.	0.003399	0.002510	0.251	1.31
60.130	7.754	449.	0.003399	0.002510	0.251	1.31

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 4 of 8

Constant Load Step

Stress: 675 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	449.	0.003399	0.002493	0.249	1.31
0.018	0.133	503.	0.003545	0.002431	0.243	1.31
0.034	0.185	451.	0.003461	0.002666	0.266	1.31
0.084	0.290	526.	0.003609	0.003021	0.302	1.31
0.101	0.318	543.	0.003653	0.003161	0.316	1.31
0.168	0.410	609.	0.003832	0.003838	0.383	1.30
0.250	0.500	665.	0.003984	0.004608	0.460	1.30
0.500	0.707	672.	0.004004	0.005226	0.522	1.30
1.000	1.000	672.	0.004004	0.005612	0.561	1.30
2.000	1.414	672.	0.004004	0.005880	0.587	1.30
4.001	2.000	675.	0.004010	0.006058	0.605	1.30
8.000	2.828	672.	0.004006	0.006263	0.626	1.30
15.000	3.873	675.	0.004010	0.006326	0.632	1.30
30.001	5.477	675.	0.004010	0.006561	0.655	1.30
45.001	6.708	675.	0.004010	0.006578	0.657	1.30
60.001	7.746	675.	0.004010	0.006578	0.657	1.30
60.163	7.757	675.	0.004010	0.006561	0.655	1.30

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
Test Number: DSS 140	Preparation: wet	Elevation:
Description: Gray Silty Clay		
Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 5 of 8

Constant Load Step

Stress: 1013 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	675.	0.004010	0.006561	0.655	1.30
0.018	0.133	667.	0.003998	0.006875	0.687	1.30
0.034	0.185	740.	0.004188	0.006853	0.685	1.30
0.084	0.290	848.	0.004481	0.007264	0.726	1.30
0.101	0.318	874.	0.004551	0.007379	0.737	1.30
0.168	0.410	971.	0.004812	0.008225	0.822	1.29
0.250	0.500	968.	0.004808	0.008547	0.854	1.29
0.500	0.707	1.00e+03	0.004898	0.008860	0.885	1.29
1.000	1.000	1.01e+03	0.004916	0.009663	0.965	1.29
2.000	1.414	1.01e+03	0.004913	0.01007	1.01	1.29
4.001	2.000	1.01e+03	0.004916	0.01055	1.05	1.29
8.001	2.829	1.01e+03	0.004916	0.01100	1.10	1.29
15.000	3.873	1.01e+03	0.004915	0.01133	1.13	1.29
30.001	5.477	1.01e+03	0.004916	0.01166	1.16	1.29
45.000	6.708	1.01e+03	0.004916	0.01169	1.17	1.29
60.000	7.746	1.01e+03	0.004916	0.01178	1.18	1.29
60.147	7.755	1.01e+03	0.004916	0.01178	1.18	1.29

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
Test Number: DSS 140	Preparation: wet	Elevation:
Description: Gray Silty Clay		
Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 6 of 8

Constant Load Step

Stress: 1519 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	1.01e+03	0.004916	0.01178	1.18	1.29
0.018	0.133	1.10e+03	0.005085	0.01171	1.17	1.29
0.034	0.185	1.18e+03	0.005249	0.01173	1.17	1.29
0.084	0.290	1.36e+03	0.005592	0.01209	1.21	1.29
0.101	0.318	1.40e+03	0.005674	0.01256	1.25	1.28
0.168	0.409	1.47e+03	0.005807	0.01337	1.34	1.28
0.251	0.501	1.48e+03	0.005821	0.01362	1.36	1.28
0.501	0.708	1.50e+03	0.005862	0.01413	1.41	1.28
1.000	1.000	1.51e+03	0.005875	0.01451	1.45	1.28
2.000	1.414	1.52e+03	0.005894	0.01513	1.51	1.28
4.000	2.000	1.52e+03	0.005894	0.01538	1.54	1.28
8.001	2.829	1.52e+03	0.005898	0.01566	1.56	1.28
15.001	3.873	1.52e+03	0.005898	0.01596	1.59	1.28
30.000	5.477	1.52e+03	0.005898	0.01626	1.62	1.28
45.000	6.708	1.52e+03	0.005898	0.01646	1.64	1.28
60.000	7.746	1.52e+03	0.005898	0.01658	1.66	1.28
60.123	7.754	1.52e+03	0.005898	0.01658	1.66	1.28

Soil Metrics LLC

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
Test Number: DSS 140	Preparation: wet	Elevation:

Description: Gray Silty Clay

Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 7 of 8

Constant Load Step

Stress: 2278 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	1.52e+03	0.005898	0.01658	1.66	1.28
0.018	0.133	1.73e+03	0.006305	0.01626	1.62	1.28
0.034	0.185	1.87e+03	0.006574	0.01612	1.61	1.28
0.084	0.290	2.11e+03	0.006945	0.01637	1.64	1.28
0.101	0.318	2.16e+03	0.006993	0.01653	1.65	1.28
0.168	0.410	2.25e+03	0.007092	0.01790	1.79	1.27
0.250	0.500	2.23e+03	0.007073	0.01822	1.82	1.27
0.501	0.708	2.26e+03	0.007102	0.01858	1.86	1.27
1.001	1.000	2.27e+03	0.007109	0.01896	1.89	1.27
2.000	1.414	2.27e+03	0.007112	0.02000	2.00	1.27
4.000	2.000	2.27e+03	0.007114	0.02071	2.07	1.27
8.000	2.828	2.27e+03	0.007116	0.02100	2.10	1.26
15.001	3.873	2.28e+03	0.007119	0.02140	2.14	1.26
30.000	5.477	2.28e+03	0.007119	0.02160	2.16	1.26
45.000	6.708	2.28e+03	0.007119	0.02177	2.17	1.26
60.001	7.746	2.28e+03	0.007119	0.02193	2.19	1.26
60.126	7.754	2.28e+03	0.007119	0.02195	2.19	1.26

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
Test Number: DSS 140	Preparation: wet	Elevation:
Description: Gray Silty Clay		
Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 8 of 8

Constant Load Step

Stress: 3400 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	2.28e+03	0.007119	0.02195	2.19	1.26
0.018	0.133	2.55e+03	0.007402	0.02210	2.21	1.26
0.034	0.185	2.71e+03	0.007564	0.02209	2.21	1.26
0.084	0.290	3.19e+03	0.008055	0.02273	2.27	1.26
0.100	0.316	3.34e+03	0.008212	0.02305	2.30	1.26
0.167	0.408	3.31e+03	0.008192	0.02368	2.37	1.26
0.250	0.500	3.39e+03	0.008263	0.02396	2.39	1.26
0.500	0.707	3.36e+03	0.008241	0.02450	2.45	1.26
1.000	1.000	3.38e+03	0.008254	0.02538	2.54	1.25
2.000	1.414	3.40e+03	0.008270	0.02660	2.66	1.25
4.001	2.000	3.40e+03	0.008273	0.02816	2.81	1.25
8.000	2.828	3.40e+03	0.008273	0.02923	2.92	1.25
15.000	3.873	3.40e+03	0.008271	0.02996	2.99	1.24
30.000	5.477	3.40e+03	0.008271	0.03195	3.19	1.24
45.000	6.708	3.40e+03	0.008273	0.03232	3.23	1.24
60.001	7.746	3.40e+03	0.008273	0.03252	3.25	1.24
75.000	8.660	3.40e+03	0.008273	0.03282	3.28	1.24
90.001	9.487	3.40e+03	0.008273	0.03334	3.33	1.24
105.001	10.247	3.40e+03	0.008273	0.03344	3.34	1.24
120.001	10.954	3.40e+03	0.008273	0.03359	3.36	1.24
135.001	11.619	3.40e+03	0.008273	0.03378	3.37	1.24
150.000	12.247	3.40e+03	0.008273	0.03393	3.39	1.23
161.619	12.713	3.40e+03	0.008273	0.03406	3.40	1.23

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
Test Number: DSS 140	Preparation: wet	Elevation:
Description: Gray Silty Clay		
Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Shear Phase

Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
0.00000	0.00000	-39.979	0.00000	0.00000	3398.4	0.00000
0.00023333	0.00000	-39.979	0.00000	0.00000	3398.4	0.00000
0.017650	0.0033245	-37.628	-1.1318e+06	0.00053087	3391.3	0.0020747
0.034350	-0.0033245	-35.276	0.00000	0.0024423	3389.0	0.0027663
0.084333	0.00000	-35.276	0.00000	0.0055924	3370.2	0.0082988
0.10100	0.00000	-35.276	0.00000	0.0047427	3358.4	0.011757
0.16768	0.00000	-32.924	0.00000	0.012140	3283.2	0.033887
0.25002	0.00000	-28.221	0.00000	0.016068	3208.0	0.056017
0.50008	0.00000	-21.166	0.00000	0.0088478	3280.9	0.034578
1.0002	0.013298	-4.7035	-35370.	0.0046009	3337.3	0.017981
2.0004	0.033245	16.462	49517.	0.0092017	3276.2	0.035961
4.0006	0.10306	61.145	59330.	0.012953	3203.3	0.057400
8.0007	0.25266	117.59	46539.	0.013803	3215.0	0.053942
15.000	0.36237	211.66	58408.	0.024066	3078.7	0.094053
30.001	0.81451	385.68	47352.	0.035745	2923.6	0.13970
45.001	1.2733	496.22	38971.	0.052910	2695.7	0.20678
60.000	1.6656	573.82	34452.	0.069898	2470.0	0.27317
75.001	2.1709	618.51	28491.	0.078038	2361.9	0.30498
90.000	2.6164	642.02	24538.	0.091451	2206.8	0.35062
105.00	3.1250	651.43	20845.	0.099449	2077.6	0.38866
120.00	3.5805	658.49	18391.	0.10338	2002.4	0.41079
135.00	4.0559	674.95	16641.	0.11260	1908.3	0.43845
150.00	4.4748	684.35	15294.	0.11272	1877.8	0.44744
165.00	4.9602	674.95	13607.	0.11443	1849.6	0.45574
180.00	5.4057	670.24	12399.	0.11999	1757.9	0.48271
195.00	5.9476	660.84	11111.	0.12127	1736.8	0.48893
210.00	6.3698	651.43	10227.	0.12443	1713.3	0.49585
225.00	6.8485	656.13	9580.7	0.12641	1652.2	0.51383
240.00	7.3173	646.73	8838.4	0.12752	1605.2	0.52766
255.00	7.7262	644.38	8340.2	0.12940	1602.8	0.52835
270.00	8.2282	639.67	7774.2	0.13384	1558.2	0.54149
285.00	8.7169	632.62	7257.4	0.13268	1548.8	0.54426
300.00	9.2189	627.91	6811.2	0.13439	1520.6	0.55256
315.00	9.6278	620.86	6448.6	0.13493	1483.0	0.56362
330.00	10.073	613.80	6093.4	0.13980	1431.3	0.57884
345.00	10.509	613.80	5840.8	0.14209	1393.7	0.58990
360.00	10.974	611.45	5571.7	0.14066	1417.2	0.58299
375.00	11.443	602.04	5261.2	0.14308	1377.2	0.59474
390.00	11.878	602.04	5068.3	0.14180	1398.4	0.58852
405.00	12.374	597.34	4827.4	0.14408	1360.8	0.59959
420.00	12.916	594.99	4606.7	0.14451	1353.7	0.60166
435.00	13.258	585.58	4416.8	0.15052	1283.2	0.62241
450.00	13.754	583.23	4240.6	0.14919	1247.9	0.63278
465.00	14.199	578.53	4074.4	0.15221	1226.8	0.63900
480.00	14.708	580.88	3949.5	0.15480	1212.7	0.64315
495.00	15.147	576.17	3804.0	0.15563	1170.4	0.65560
510.00	15.682	569.12	3629.2	0.15819	1128.1	0.66805
525.00	16.127	569.12	3528.9	0.15819	1128.1	0.66805
540.00	16.593	566.77	3415.8	0.15964	1132.8	0.66667
555.00	17.005	564.42	3319.1	0.15762	1137.5	0.66528

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Shear Phase

Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
570.00	17.494	559.71	3199.5	0.15746	1111.6	0.67289
585.00	17.962	559.71	3116.0	0.15729	1085.8	0.68050
600.00	18.434	557.36	3023.5	0.16290	1050.5	0.69087
615.00	18.870	550.31	2916.3	0.16190	1067.0	0.68603
630.00	19.295	545.60	2827.6	0.16133	1076.4	0.68326
645.00	19.811	538.55	2718.5	0.16532	1010.6	0.70263
660.00	20.236	531.49	2626.4	0.16275	1052.9	0.69018
675.00	20.732	531.49	2563.7	0.16763	1001.2	0.70539
690.00	21.207	526.79	2484.0	0.16768	989.43	0.70885
705.00	21.669	522.08	2409.3	0.16561	1005.9	0.70401
720.00	22.181	529.14	2385.5	0.16589	1001.2	0.70539
735.00	22.630	522.08	2307.0	0.17086	970.62	0.71438
750.00	23.052	519.73	2254.6	0.17325	956.52	0.71853
765.00	23.508	515.03	2190.9	0.16609	998.83	0.70609
780.00	23.973	510.33	2128.7	0.17047	972.97	0.71369
795.00	24.502	505.62	2063.6	0.17550	933.02	0.72545
810.00	24.861	503.27	2024.4	0.17524	944.77	0.72199
825.00	25.383	505.62	1992.0	0.17843	925.97	0.72752
840.00	25.795	510.33	1978.4	0.17391	942.42	0.72268
855.00	26.230	507.97	1936.6	0.17365	954.17	0.71923
870.00	26.749	507.97	1899.0	0.17684	935.37	0.72476
885.00	27.188	500.92	1842.4	0.18122	909.52	0.73237
900.00	27.690	491.51	1775.1	0.17604	940.07	0.72337
915.00	28.172	482.11	1711.3	0.18122	909.52	0.73237
930.00	28.657	484.46	1690.5	0.17763	930.67	0.72614
945.00	29.119	479.75	1647.5	0.19197	846.06	0.75104
960.00	29.482	482.11	1635.3	0.18480	888.37	0.73859
975.00	30.027	479.75	1597.7	0.18480	888.37	0.73859
990.00	30.453	482.11	1583.1	0.17883	923.62	0.72822
1003.3	30.915	482.11	1559.5	0.18466	878.97	0.74136

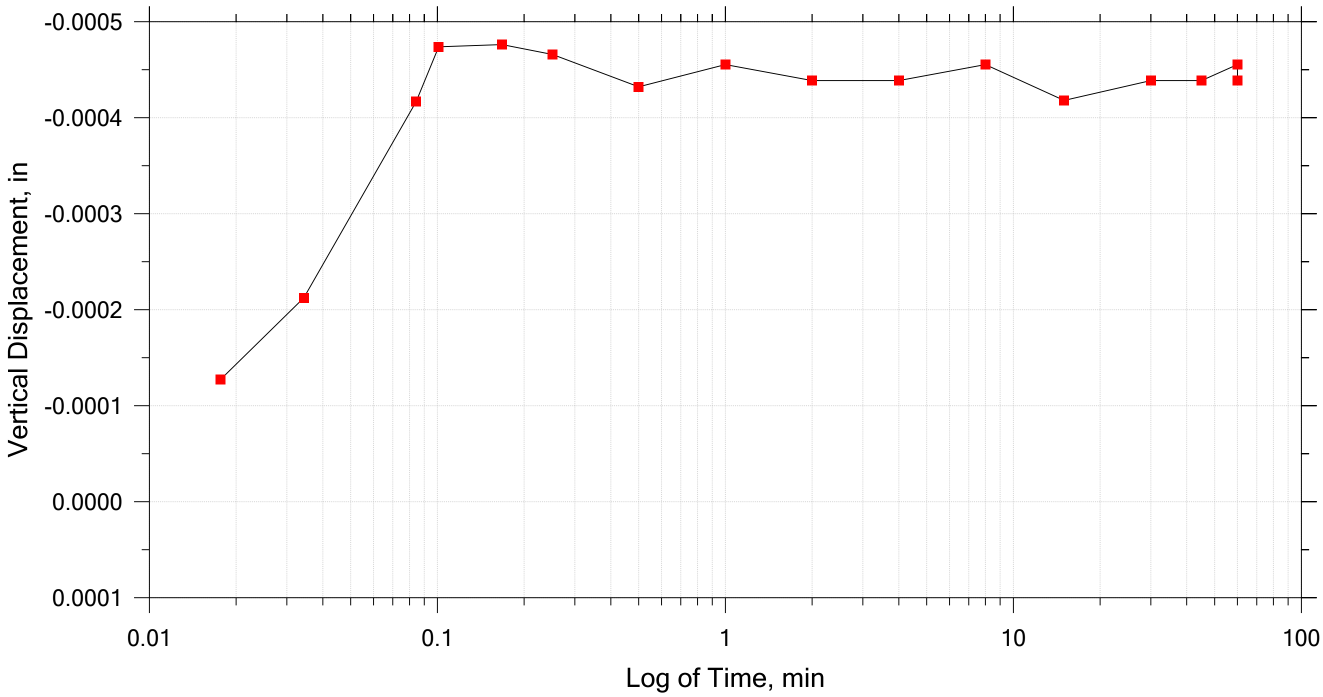
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U3	Test Date: 5/13/2021	Depth: 50.7
	Test Number: DSS 140	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3400 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

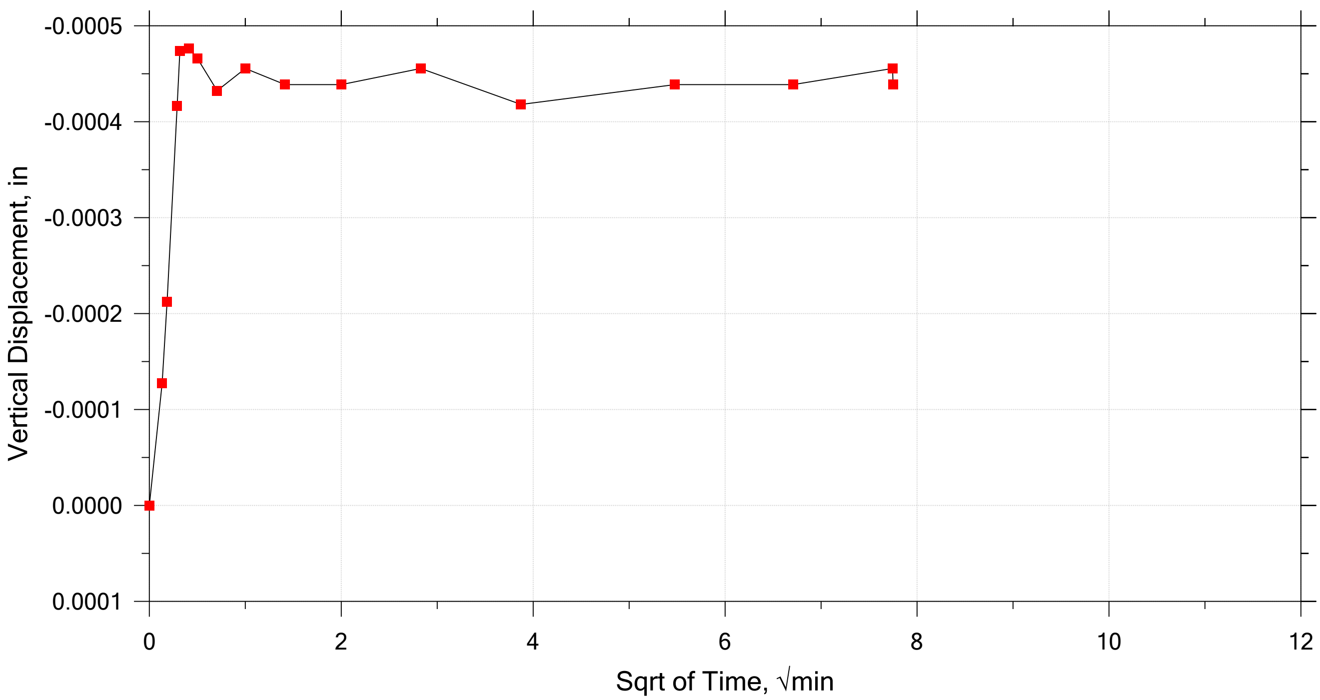
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 1 of 8

Constant Load Step

Stress: 220 psf





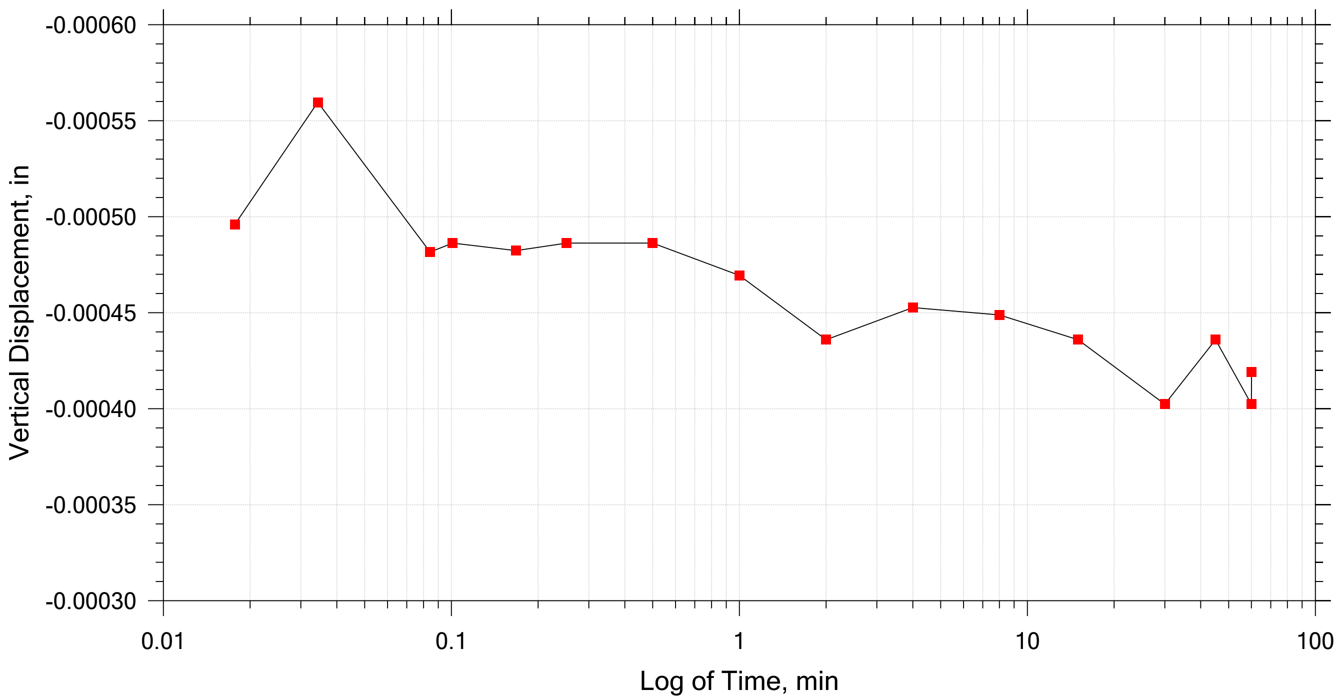
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

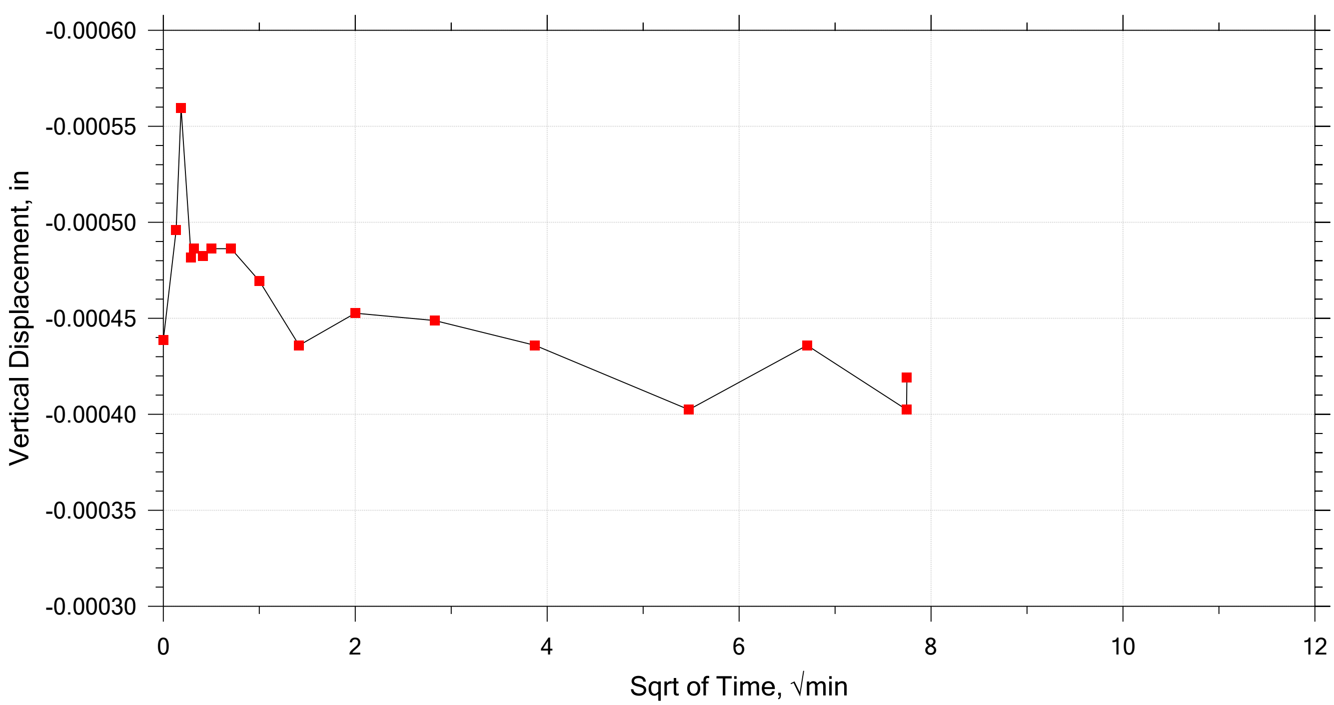
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 2 of 8

Constant Load Step

Stress: 330 psf





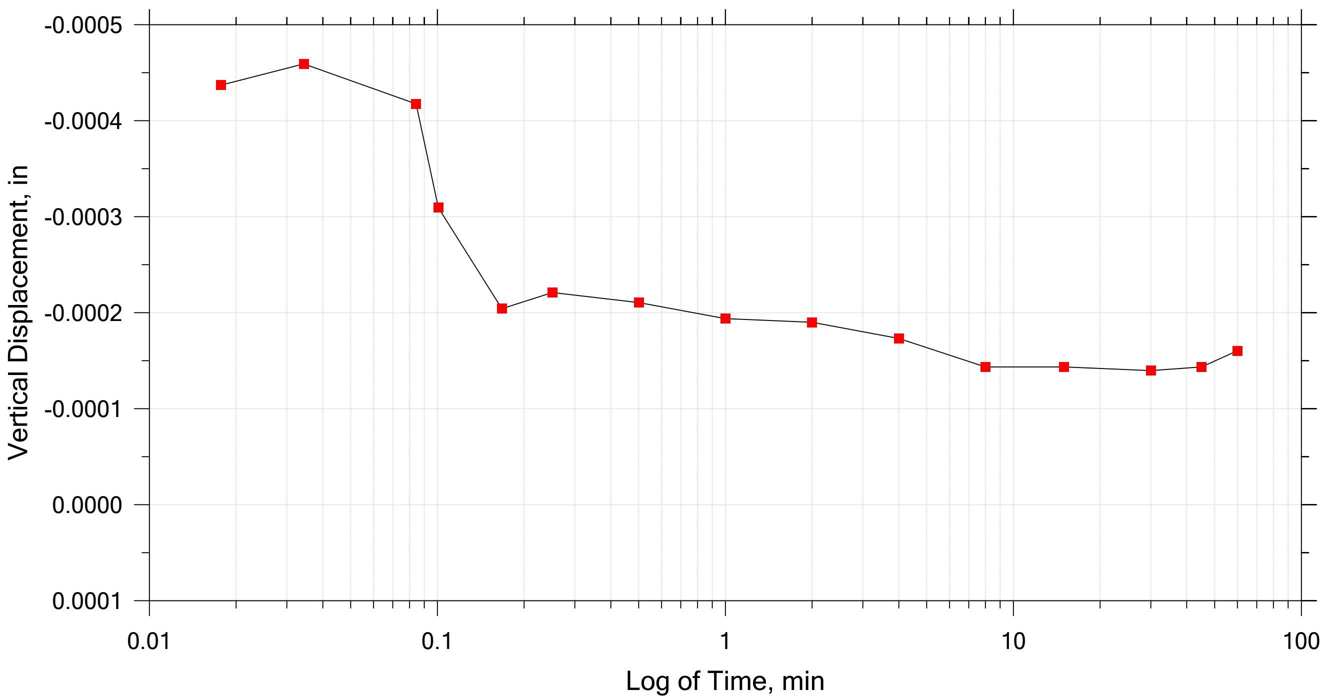
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

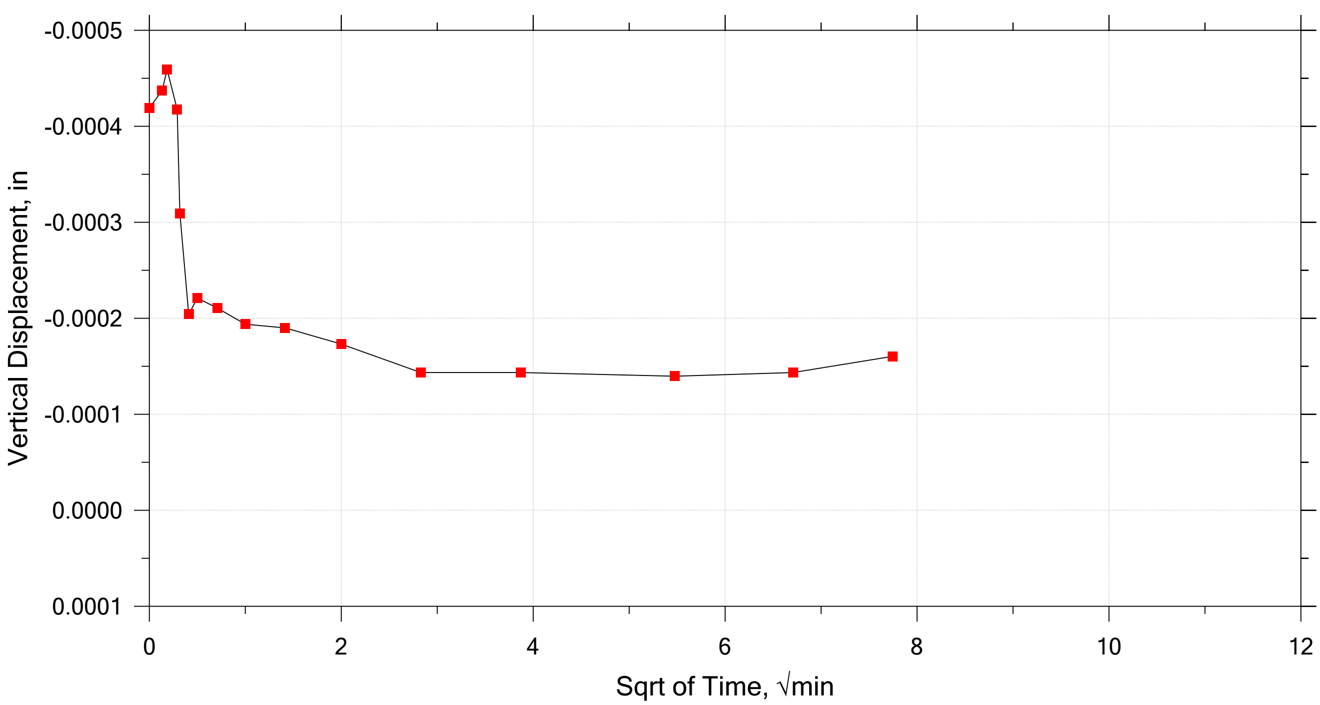
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 3 of 8

Constant Load Step

Stress: 495 psf





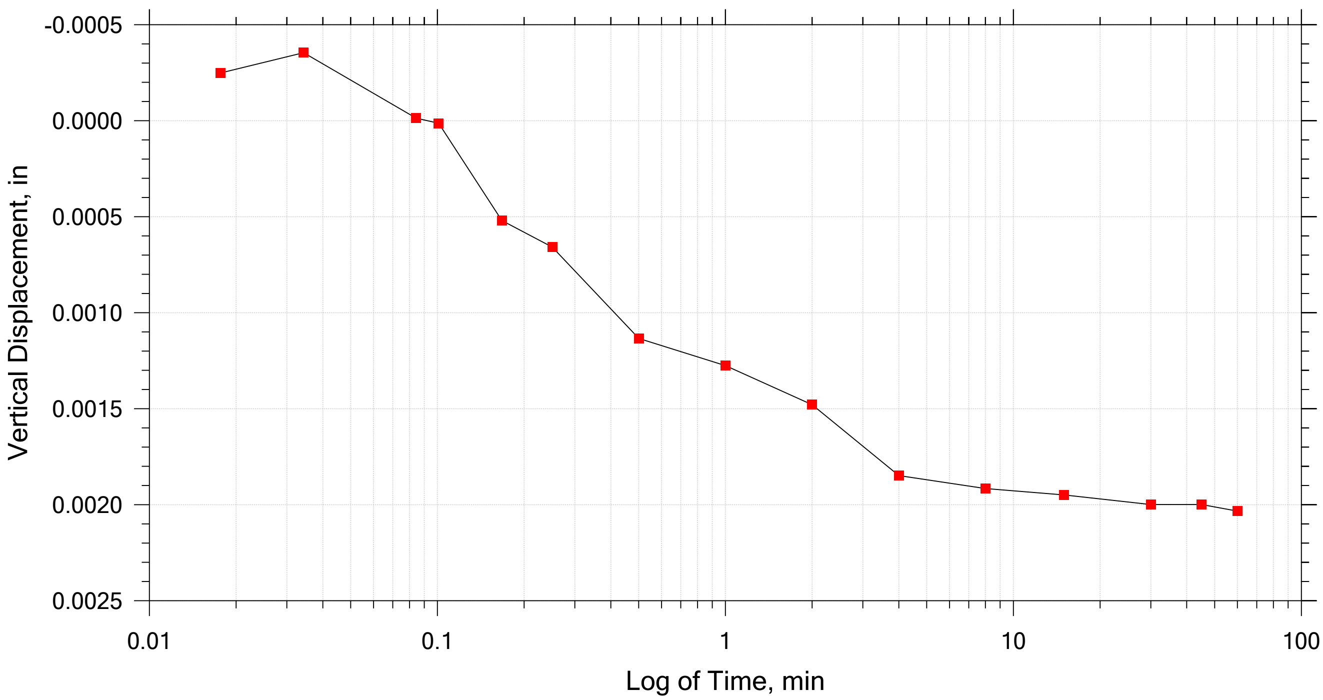
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

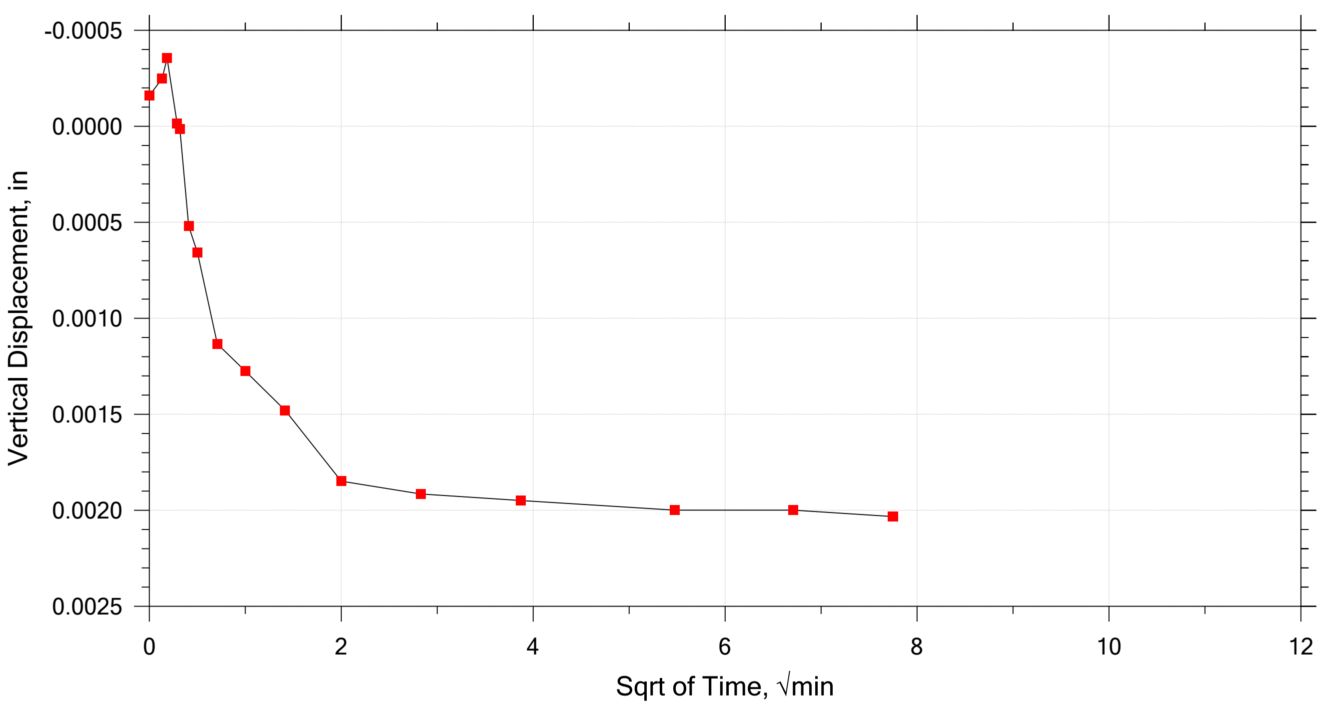
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 4 of 8

Constant Load Step

Stress: 743 psf





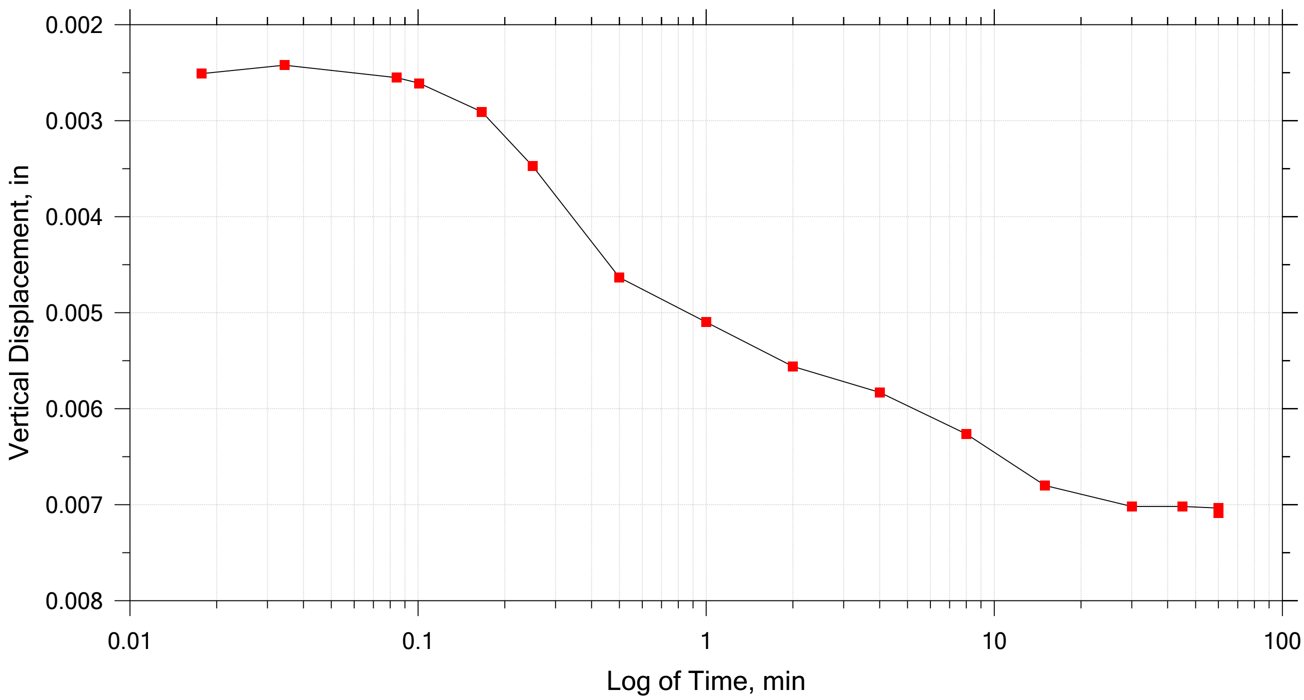
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

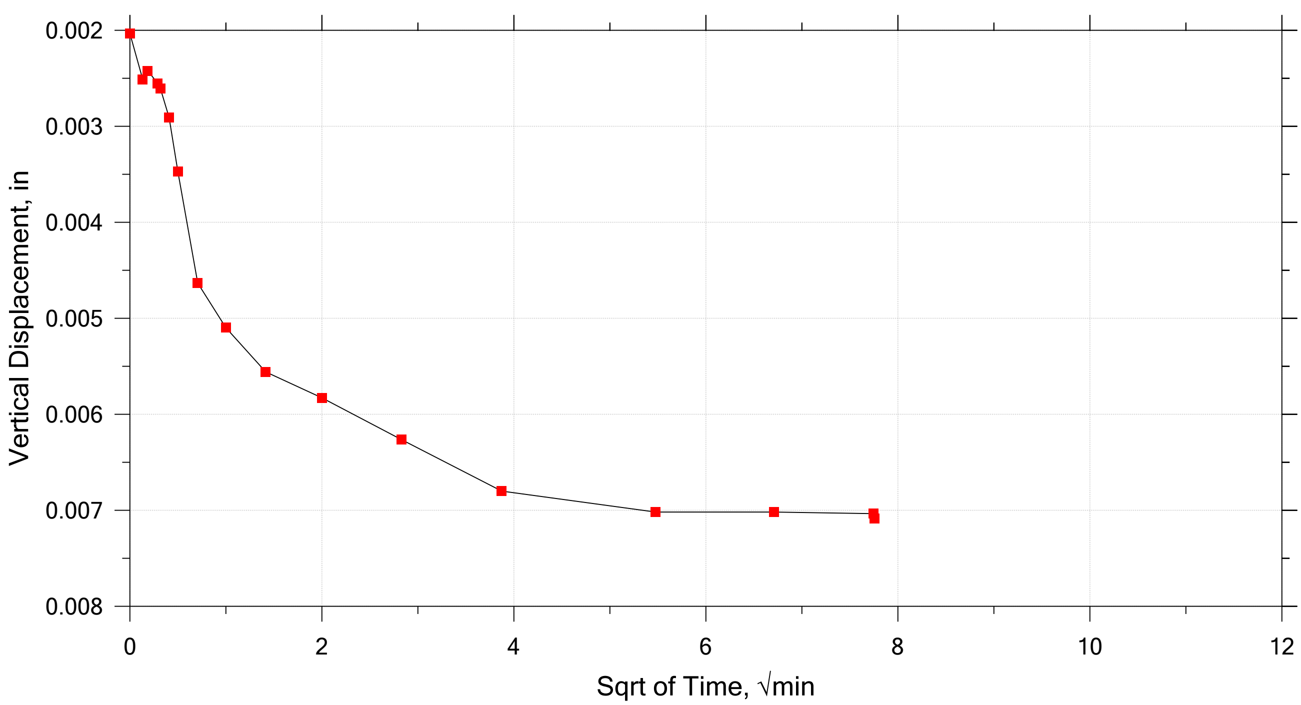
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 5 of 8

Constant Load Step

Stress: 1.11e+03 psf

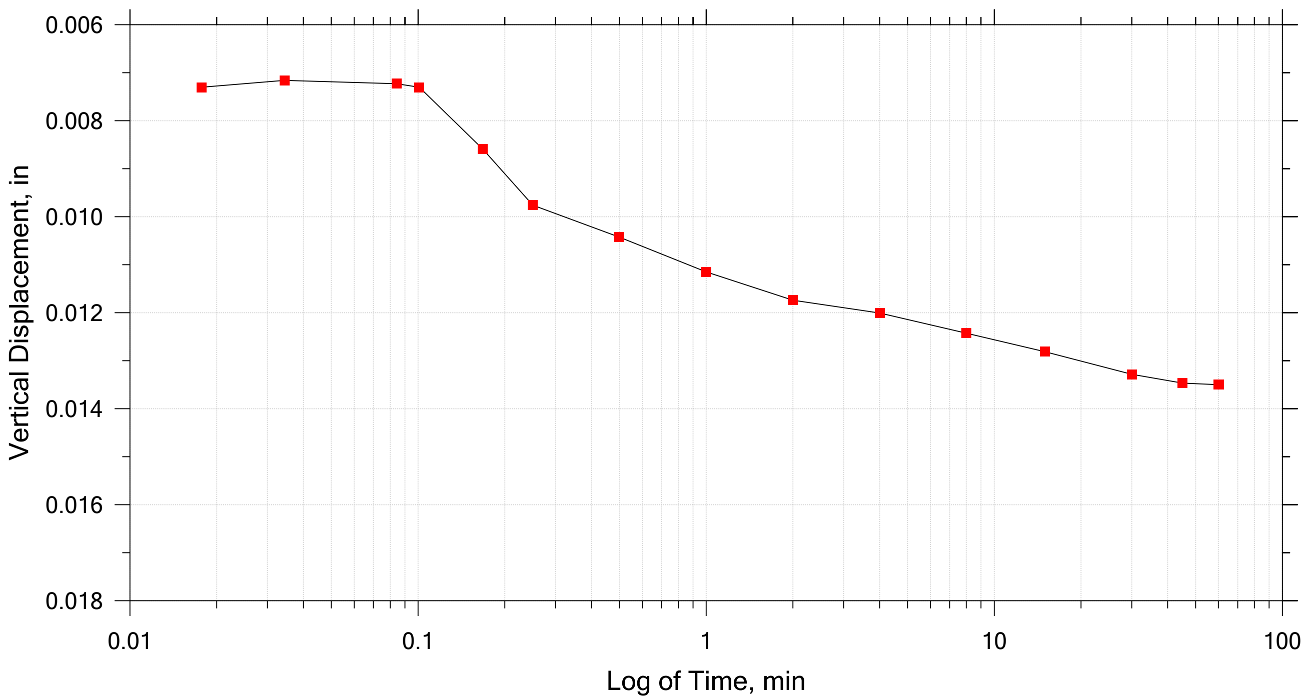


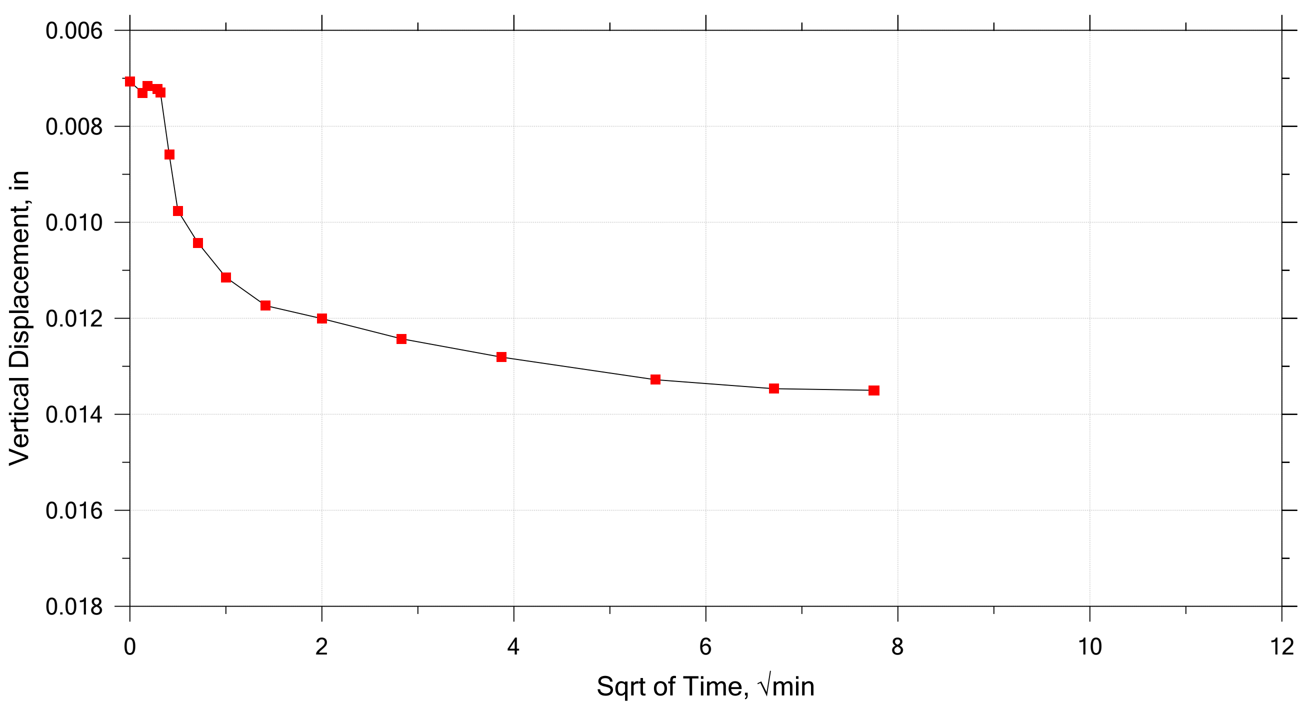


Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 6 of 8
Constant Load Step
Stress: 1.67e+03 psf





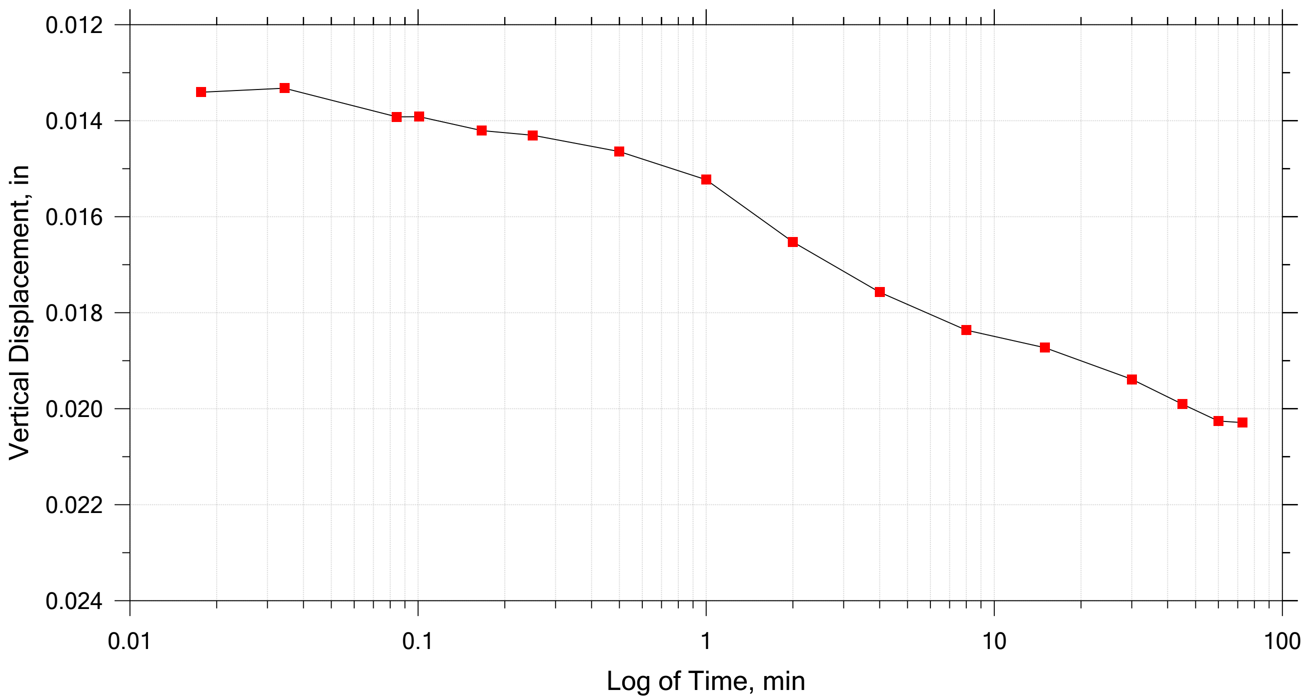
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

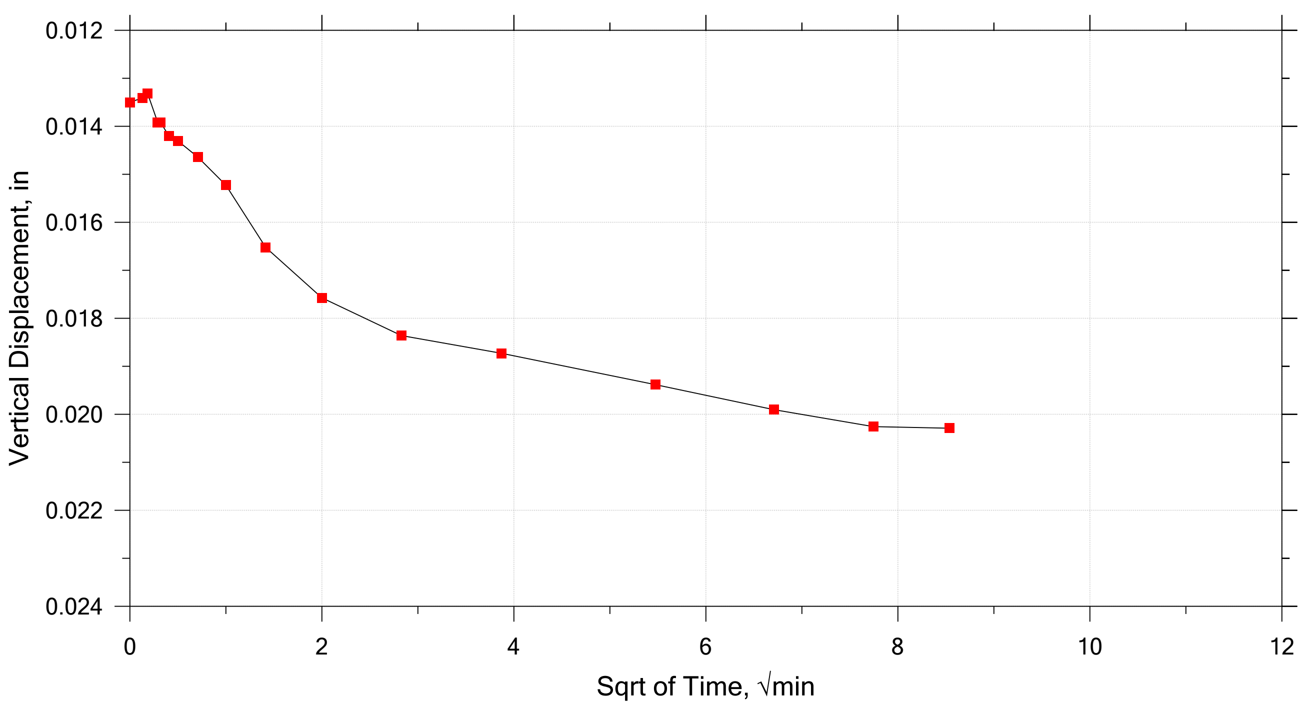
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 7 of 8

Constant Load Step

Stress: 2.51e+03 psf





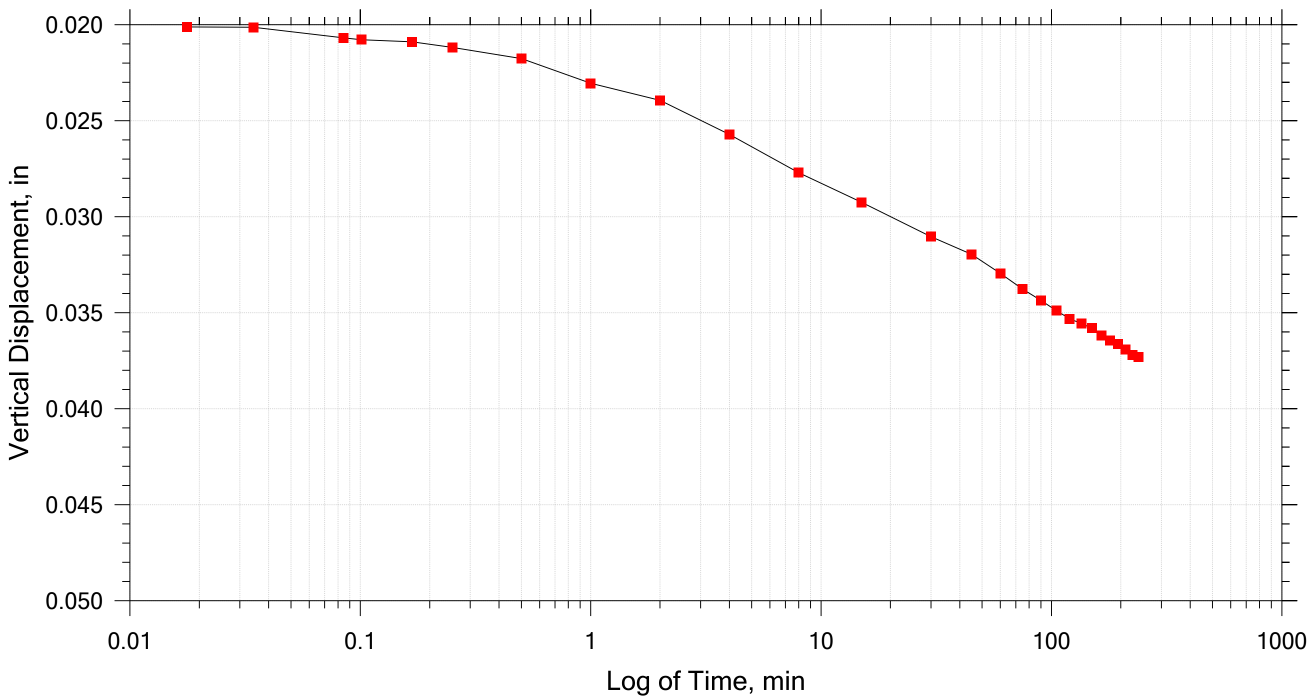
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

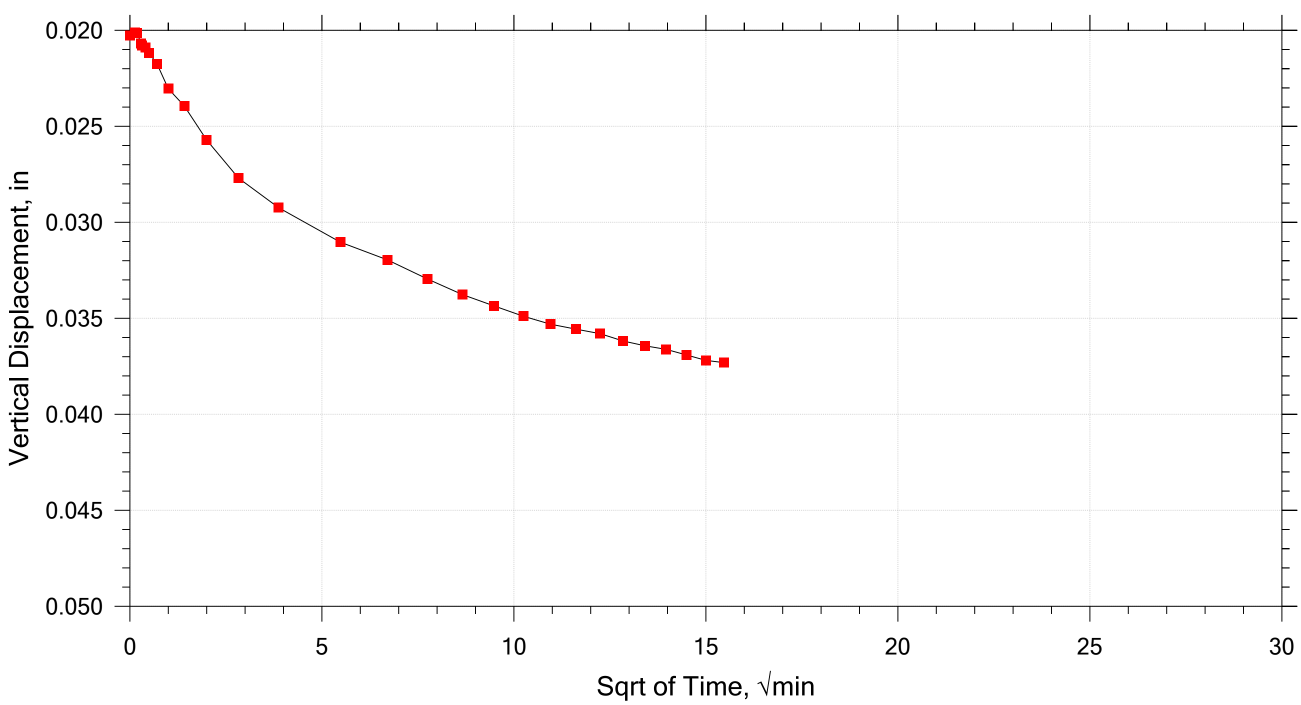
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 8 of 8

Constant Load Step

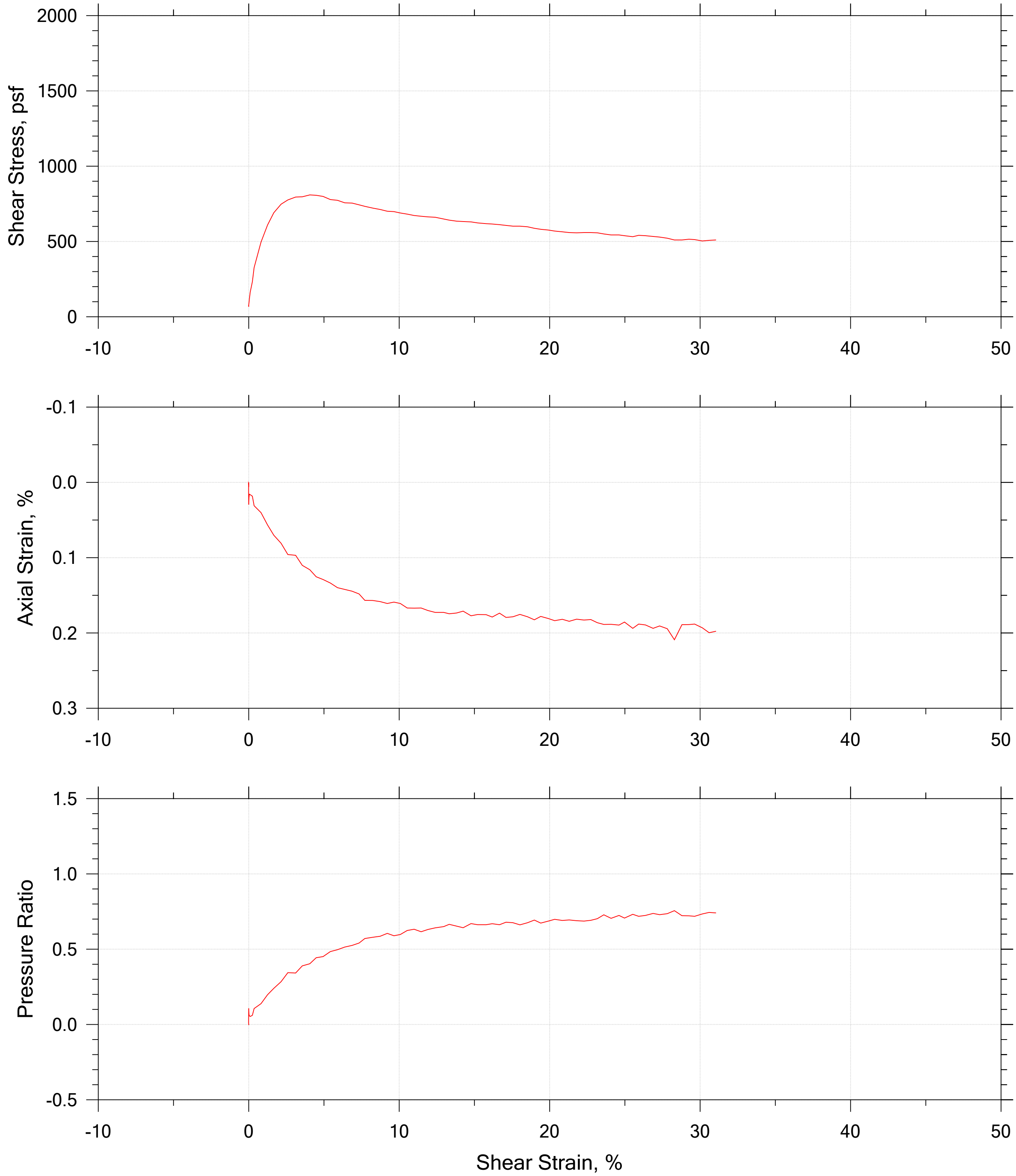
Stress: 3.7e+03 psf





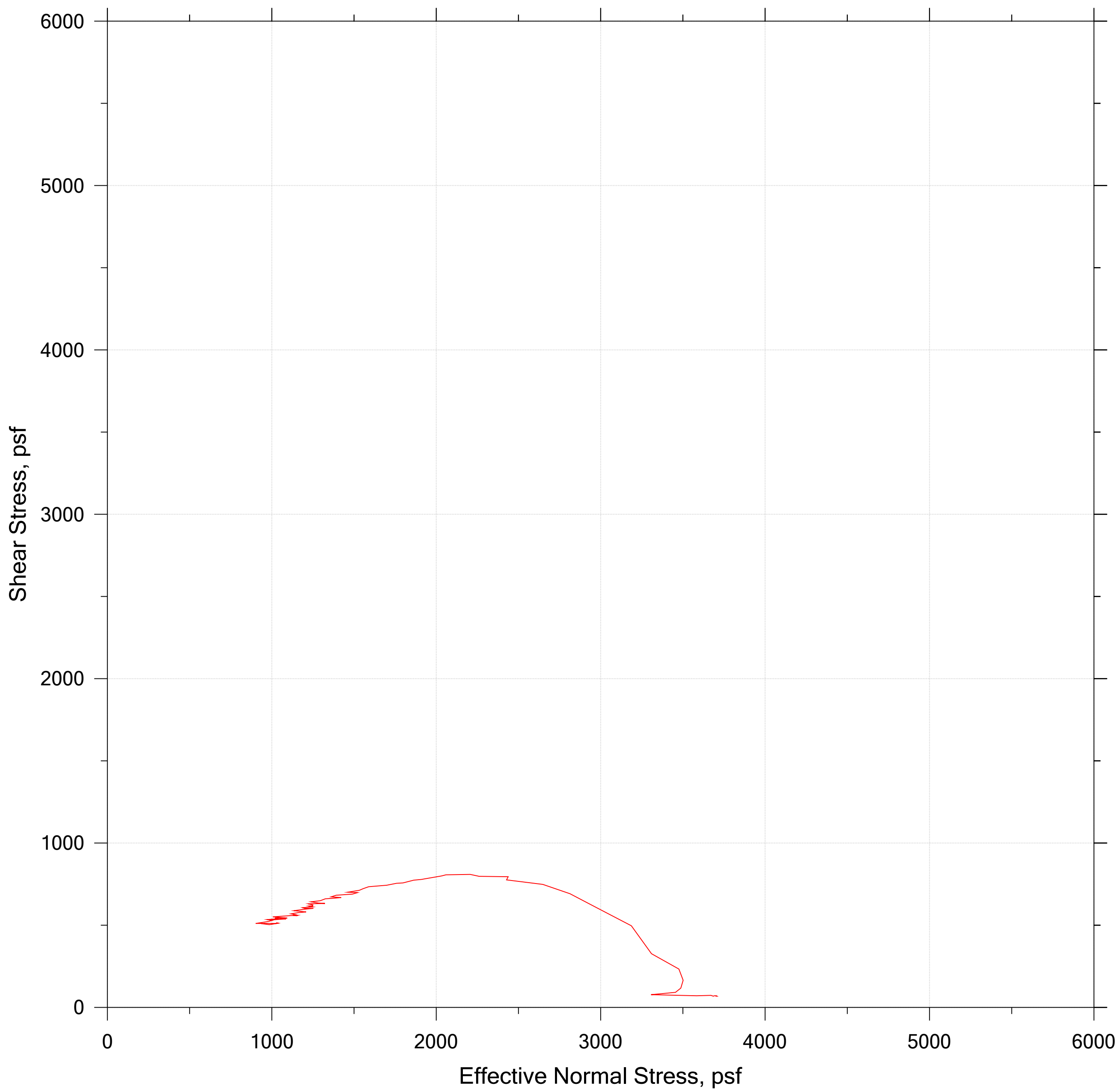
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



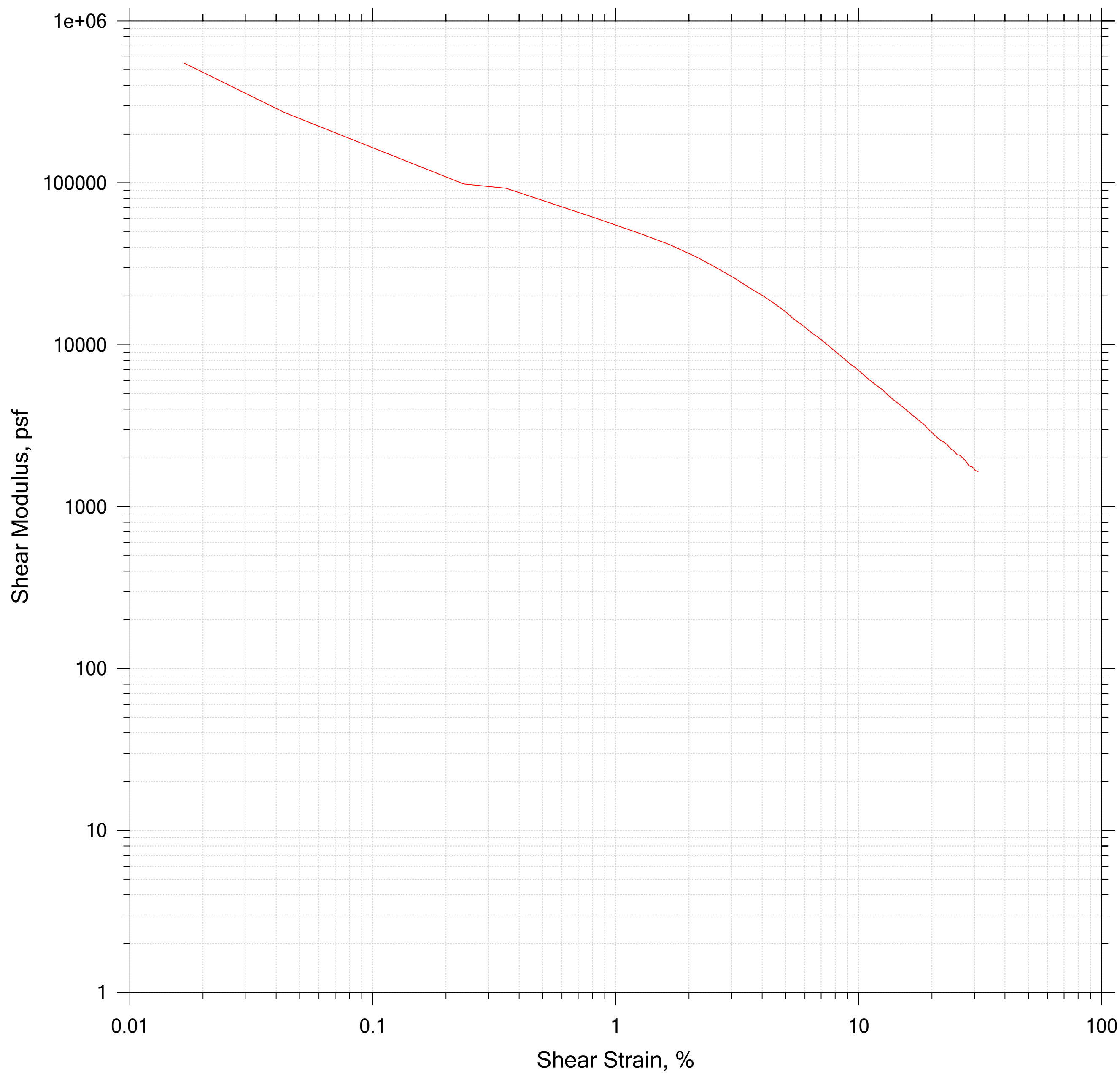
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Specimen Dimension, in: 2.50	Specific Gravity: 2.84 (Implied)	Liquid Limit: 43
Specimen Height, in: 1.00	Initial Void Ratio: 1.3	Plastic Limit: 23
Final Height, in: 0.96	Final Void Ratio: 1.21	Plasticity Index: 20

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	224	---		315
Mass Container, gm	36.63	0	0	60.22
Mass Container + Wet Soil, gm	158.13	144.21	141.89	202.11
Mass Container + Dry Soil, gm	123.1	99.52	99.52	159.74
Mass Dry Soil, gm	86.47	99.52	99.52	99.52
Water Content, %	40.51	44.91	42.57	42.57
Void Ratio	---	1.30	1.21	---
Degree of Saturation, %	---	98.17	100.00	---
Dry Unit Weight, pcf	---	77.159	80.304	---

Warning: The change in the sample wet weight during the test is not consistent with the change in the moisture content.

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 1 of 8

Constant Load Step

Stress: 220 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	7.05	0.002202	0.0000	0.000	1.30
0.018	0.133	54.1	0.002330	-0.0001273	-0.0127	1.30
0.034	0.185	91.7	0.002431	-0.0002124	-0.0212	1.30
0.084	0.290	186.	0.002686	-0.0004166	-0.0416	1.30
0.101	0.318	207.	0.002743	-0.0004739	-0.0473	1.30
0.168	0.409	214.	0.002762	-0.0004762	-0.0476	1.30
0.251	0.501	216.	0.002769	-0.0004658	-0.0465	1.30
0.500	0.707	216.	0.002769	-0.0004323	-0.0432	1.30
1.000	1.000	219.	0.002775	-0.0004554	-0.0455	1.30
2.000	1.414	219.	0.002775	-0.0004387	-0.0438	1.30
4.001	2.000	219.	0.002775	-0.0004387	-0.0438	1.30
8.001	2.829	219.	0.002775	-0.0004554	-0.0455	1.30
15.000	3.873	216.	0.002771	-0.0004180	-0.0418	1.30
30.000	5.477	219.	0.002775	-0.0004387	-0.0438	1.30
45.001	6.708	219.	0.002775	-0.0004387	-0.0438	1.30
60.001	7.746	219.	0.002775	-0.0004554	-0.0455	1.30
60.060	7.750	219.	0.002775	-0.0004387	-0.0438	1.30

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
Test Number: DSS 141	Preparation: wet	Elevation:
Description: Gray Silty Clay		
Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 2 of 8

Constant Load Step

Stress: 330 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	219.	0.002775	-0.0004387	-0.0438	1.30
0.018	0.133	240.	0.002832	-0.0004959	-0.0495	1.30
0.034	0.185	263.	0.002896	-0.0005596	-0.0559	1.30
0.084	0.290	315.	0.003036	-0.0004816	-0.0481	1.30
0.101	0.318	329.	0.003074	-0.0004862	-0.0486	1.30
0.168	0.409	327.	0.003070	-0.0004824	-0.0482	1.30
0.251	0.501	329.	0.003074	-0.0004862	-0.0486	1.30
0.500	0.707	329.	0.003074	-0.0004862	-0.0486	1.30
1.000	1.000	329.	0.003074	-0.0004695	-0.0469	1.30
2.000	1.414	329.	0.003074	-0.0004359	-0.0435	1.30
4.001	2.000	329.	0.003074	-0.0004527	-0.0452	1.30
8.001	2.829	327.	0.003070	-0.0004488	-0.0448	1.30
15.001	3.873	329.	0.003074	-0.0004359	-0.0435	1.30
30.000	5.477	329.	0.003074	-0.0004024	-0.0402	1.30
45.000	6.708	329.	0.003074	-0.0004359	-0.0435	1.30
60.001	7.746	329.	0.003074	-0.0004024	-0.0402	1.30
60.031	7.748	329.	0.003074	-0.0004191	-0.0419	1.30

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 3 of 8

Constant Load Step

Stress: 495 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	329.	0.003074	-0.0004191	-0.0419	1.30
0.018	0.133	367.	0.003176	-0.0004371	-0.0437	1.30
0.034	0.185	400.	0.003265	-0.0004592	-0.0459	1.30
0.084	0.290	477.	0.003475	-0.0004176	-0.0417	1.30
0.101	0.318	472.	0.003468	-0.0003093	-0.0309	1.30
0.167	0.409	491.	0.003513	-0.0002042	-0.0204	1.30
0.251	0.501	491.	0.003513	-0.0002210	-0.0221	1.30
0.501	0.708	494.	0.003520	-0.0002106	-0.0210	1.30
1.001	1.000	494.	0.003520	-0.0001938	-0.0194	1.30
2.001	1.414	491.	0.003516	-0.0001900	-0.0190	1.30
4.000	2.000	491.	0.003516	-0.0001732	-0.0173	1.30
8.001	2.829	494.	0.003520	-0.0001435	-0.0143	1.30
15.001	3.873	494.	0.003520	-0.0001435	-0.0143	1.30
30.001	5.477	491.	0.003516	-0.0001397	-0.0140	1.30
45.001	6.708	494.	0.003520	-0.0001435	-0.0143	1.30
60.001	7.746	494.	0.003520	-0.0001603	-0.0160	1.30
60.048	7.749	494.	0.003520	-0.0001603	-0.0160	1.30

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
Test Number: DSS 141	Preparation: wet	Elevation:
Description: Gray Silty Clay		
Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 4 of 8

Constant Load Step

Stress: 743 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	494.	0.003520	-0.0001603	-0.0160	1.30
0.018	0.133	557.	0.003692	-0.0002483	-0.0248	1.30
0.034	0.185	609.	0.003832	-0.0003548	-0.0354	1.30
0.084	0.290	625.	0.003876	-1.359e-05	-0.00136	1.30
0.101	0.318	646.	0.003934	1.298e-05	0.00130	1.30
0.167	0.409	719.	0.004131	0.0005201	0.0520	1.30
0.251	0.501	724.	0.004144	0.0006583	0.0658	1.30
0.501	0.708	740.	0.004188	0.001134	0.113	1.30
1.001	1.000	736.	0.004180	0.001275	0.127	1.30
2.001	1.415	743.	0.004194	0.001479	0.148	1.30
4.000	2.000	743.	0.004194	0.001848	0.185	1.30
8.000	2.828	743.	0.004194	0.001915	0.191	1.30
15.000	3.873	743.	0.004194	0.001949	0.195	1.30
30.001	5.477	743.	0.004194	0.001999	0.200	1.30
45.001	6.708	743.	0.004194	0.001999	0.200	1.30
60.001	7.746	743.	0.004194	0.002033	0.203	1.30
60.121	7.754	743.	0.004194	0.002033	0.203	1.30

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
Test Number: DSS 141	Preparation: wet	Elevation:
Description: Gray Silty Clay		
Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 5 of 8

Constant Load Step

Stress: 1114 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	743.	0.004194	0.002033	0.203	1.30
0.018	0.133	677.	0.004087	0.002510	0.251	1.30
0.034	0.185	785.	0.004309	0.002421	0.242	1.30
0.084	0.290	917.	0.004665	0.002551	0.255	1.29
0.101	0.318	945.	0.004742	0.002609	0.261	1.29
0.167	0.408	1.07e+03	0.005030	0.002908	0.290	1.29
0.250	0.500	1.07e+03	0.005035	0.003473	0.347	1.29
0.500	0.707	1.11e+03	0.005099	0.004634	0.463	1.29
1.000	1.000	1.11e+03	0.005103	0.005099	0.509	1.29
2.001	1.415	1.11e+03	0.005112	0.005559	0.555	1.29
4.001	2.000	1.11e+03	0.005111	0.005829	0.582	1.29
8.001	2.829	1.11e+03	0.005112	0.006264	0.626	1.29
15.001	3.873	1.11e+03	0.005112	0.006800	0.679	1.29
30.000	5.477	1.11e+03	0.005112	0.007018	0.701	1.28
45.001	6.708	1.11e+03	0.005112	0.007018	0.701	1.28
60.001	7.746	1.11e+03	0.005112	0.007035	0.703	1.28
60.151	7.756	1.11e+03	0.005112	0.007085	0.708	1.28

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
Test Number: DSS 141	Preparation: wet	Elevation:
Description: Gray Silty Clay		
Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 6 of 8

Constant Load Step

Stress: 1671 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	1.11e+03	0.005112	0.007069	0.706	1.28
0.018	0.133	1.18e+03	0.005231	0.007302	0.729	1.28
0.034	0.185	1.28e+03	0.005441	0.007159	0.715	1.28
0.084	0.290	1.48e+03	0.005825	0.007228	0.722	1.28
0.101	0.318	1.52e+03	0.005903	0.007301	0.729	1.28
0.168	0.410	1.54e+03	0.005939	0.008590	0.858	1.28
0.250	0.500	1.61e+03	0.006076	0.009761	0.975	1.28
0.500	0.707	1.65e+03	0.006149	0.01043	1.04	1.28
1.000	1.000	1.66e+03	0.006181	0.01115	1.11	1.28
2.000	1.414	1.67e+03	0.006195	0.01174	1.17	1.27
4.001	2.000	1.67e+03	0.006195	0.01201	1.20	1.27
8.001	2.829	1.67e+03	0.006195	0.01243	1.24	1.27
15.001	3.873	1.67e+03	0.006195	0.01281	1.28	1.27
30.000	5.477	1.67e+03	0.006195	0.01328	1.33	1.27
45.000	6.708	1.67e+03	0.006195	0.01347	1.35	1.27
60.000	7.746	1.67e+03	0.006195	0.01350	1.35	1.27
60.206	7.759	1.67e+03	0.006195	0.01350	1.35	1.27

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 7 of 8

Constant Load Step

Stress: 2506 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	1.67e+03	0.006195	0.01350	1.35	1.27
0.018	0.133	1.86e+03	0.006556	0.01341	1.34	1.27
0.034	0.185	2.03e+03	0.006860	0.01332	1.33	1.27
0.084	0.290	2.32e+03	0.007167	0.01392	1.39	1.27
0.101	0.318	2.39e+03	0.007237	0.01392	1.39	1.27
0.167	0.408	2.40e+03	0.007249	0.01421	1.42	1.27
0.250	0.500	2.46e+03	0.007303	0.01430	1.43	1.27
0.500	0.707	2.50e+03	0.007349	0.01464	1.46	1.27
1.000	1.000	2.50e+03	0.007351	0.01523	1.52	1.27
2.000	1.414	2.50e+03	0.007346	0.01652	1.65	1.26
4.001	2.000	2.51e+03	0.007353	0.01757	1.76	1.26
8.001	2.829	2.51e+03	0.007353	0.01836	1.83	1.26
15.001	3.873	2.51e+03	0.007353	0.01873	1.87	1.26
30.001	5.477	2.51e+03	0.007353	0.01938	1.94	1.26
45.001	6.708	2.51e+03	0.007353	0.01990	1.99	1.26
60.001	7.746	2.51e+03	0.007353	0.02026	2.02	1.25
72.888	8.537	2.51e+03	0.007353	0.02029	2.03	1.25

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
Test Number: DSS 141	Preparation: wet	Elevation:
Description: Gray Silty Clay		
Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 8 of 8

Constant Load Step

Stress: 3700 psf

Elapsed Time min	Sq.Rt. of Time min	Stress psf	Displacement Correction in	Corrected Displacement in	Strain %	Void Ratio
0.000	0.000	2.50e+03	0.007352	0.02028	2.03	1.25
0.018	0.133	2.92e+03	0.007782	0.02011	2.01	1.25
0.034	0.185	3.23e+03	0.008101	0.02013	2.01	1.25
0.084	0.290	3.68e+03	0.008558	0.02068	2.07	1.25
0.101	0.318	3.61e+03	0.008507	0.02078	2.08	1.25
0.168	0.409	3.64e+03	0.008531	0.02089	2.09	1.25
0.251	0.501	3.68e+03	0.008561	0.02118	2.12	1.25
0.501	0.708	3.66e+03	0.008550	0.02176	2.17	1.25
1.000	1.000	3.69e+03	0.008575	0.02304	2.30	1.25
2.001	1.414	3.68e+03	0.008568	0.02394	2.39	1.25
4.001	2.000	3.69e+03	0.008572	0.02571	2.57	1.24
8.000	2.829	3.69e+03	0.008578	0.02770	2.77	1.24
15.000	3.873	3.70e+03	0.008580	0.02924	2.92	1.23
30.001	5.477	3.70e+03	0.008582	0.03104	3.10	1.23
45.001	6.708	3.70e+03	0.008582	0.03196	3.19	1.23
60.001	7.746	3.70e+03	0.008582	0.03295	3.29	1.23
75.000	8.660	3.70e+03	0.008582	0.03377	3.37	1.22
90.001	9.487	3.70e+03	0.008582	0.03436	3.43	1.22
105.000	10.247	3.70e+03	0.008582	0.03489	3.49	1.22
120.000	10.954	3.70e+03	0.008582	0.03531	3.53	1.22
135.001	11.619	3.70e+03	0.008581	0.03557	3.55	1.22
150.001	12.247	3.70e+03	0.008581	0.03580	3.58	1.22
165.000	12.845	3.70e+03	0.008582	0.03618	3.61	1.22
180.001	13.416	3.70e+03	0.008582	0.03644	3.64	1.22
195.001	13.964	3.70e+03	0.008582	0.03662	3.66	1.22
210.000	14.491	3.70e+03	0.008582	0.03691	3.69	1.22
225.001	15.000	3.70e+03	0.008582	0.03719	3.72	1.22
239.162	15.465	3.70e+03	0.008582	0.03731	3.73	1.22

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Shear Phase

Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
0.00000	0.00000	68.200	0.00000	0.00000	3699.2	0.00000
0.00025000	0.00000	68.200	0.00000	0.00000	3699.2	0.00000
0.017683	0.00000	68.200	0.00000	0.00073620	3708.6	-0.0025413
0.034350	-0.0033357	70.552	0.00000	0.0010913	3703.9	-0.0012706
0.084333	-0.0033357	70.552	0.00000	0.0019791	3692.1	0.0019060
0.10100	-0.0033357	68.200	0.00000	0.0025117	3685.1	0.0038119
0.16770	-0.013343	72.904	0.00000	0.0018367	3671.0	0.0076239
0.25105	-0.010007	70.552	0.00000	0.013627	3584.0	0.031131
0.50007	-0.0033357	77.607	0.00000	0.029357	3306.7	0.10610
1.0010	0.016679	91.718	5.4991e+05	0.019912	3454.8	0.066074
2.0002	0.043364	117.59	2.7116e+05	0.015686	3487.7	0.057179
4.0009	0.10007	164.62	1.6450e+05	0.016361	3501.8	0.053367
8.0007	0.23684	232.82	98305.	0.018314	3475.9	0.060356
15.001	0.35359	326.89	92450.	0.030920	3309.1	0.10546
30.000	0.81391	496.22	60967.	0.040153	3186.8	0.13850
45.001	1.2509	609.10	48693.	0.056487	2970.6	0.19695
60.001	1.6645	691.41	41538.	0.070124	2813.2	0.23952
75.001	2.1515	747.85	34759.	0.080812	2648.7	0.28399
90.001	2.6019	776.07	29828.	0.095762	2427.7	0.34371
105.00	3.1156	794.89	25513.	0.096792	2437.1	0.34117
120.00	3.5592	797.24	22399.	0.11011	2260.9	0.38882
135.00	4.0562	809.00	19945.	0.11593	2206.8	0.40343
150.00	4.4832	806.64	17993.	0.12538	2058.8	0.44346
165.00	4.9402	799.59	16185.	0.12907	2032.9	0.45044
180.00	5.4205	778.42	14361.	0.13367	1908.3	0.48412
195.00	5.8975	773.72	13119.	0.13987	1863.7	0.49619
210.00	6.3812	757.26	11867.	0.14214	1797.9	0.51398
225.00	6.8682	754.91	10991.	0.14457	1757.9	0.52478
240.00	7.3352	743.15	10131.	0.14814	1699.2	0.54066
255.00	7.7155	733.74	9510.0	0.15661	1588.7	0.57052
270.00	8.2426	721.98	8759.2	0.15687	1555.8	0.57942
285.00	8.7296	712.58	8162.8	0.15830	1532.3	0.58577
300.00	9.2099	700.82	7609.4	0.16085	1461.8	0.60483
315.00	9.6469	698.47	7240.3	0.15901	1520.6	0.58895
330.00	10.074	689.06	6840.1	0.16087	1490.0	0.59720
345.00	10.531	682.00	6476.2	0.16688	1391.3	0.62389
360.00	10.988	672.60	6121.3	0.16700	1360.8	0.63215
375.00	11.462	667.89	5827.3	0.16676	1421.9	0.61563
390.00	11.909	663.19	5569.0	0.17019	1365.5	0.63088
405.00	12.396	660.84	5331.3	0.17263	1325.5	0.64168
420.00	12.959	649.08	5008.6	0.17274	1294.9	0.64994
435.00	13.326	642.02	4817.8	0.17444	1238.5	0.66518
450.00	13.810	634.97	4597.9	0.17346	1283.2	0.65311
465.00	14.247	632.62	4440.4	0.17103	1323.2	0.64231
480.00	14.777	630.26	4265.1	0.17718	1222.1	0.66963
495.00	15.211	623.21	4097.1	0.17546	1250.3	0.66201
510.00	15.775	618.51	3920.9	0.17560	1247.9	0.66264
525.00	16.182	616.15	3807.8	0.17878	1224.4	0.66900
540.00	16.669	611.45	3668.3	0.17372	1250.3	0.66201
555.00	17.102	606.75	3547.8	0.17932	1186.8	0.67916

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Shear Phase

Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
570.00	17.563	602.04	3428.0	0.17847	1200.9	0.67535
585.00	18.026	602.04	3339.8	0.17532	1252.6	0.66137
600.00	18.530	597.34	3223.7	0.17847	1200.9	0.67535
615.00	18.987	587.93	3096.5	0.18247	1135.1	0.69314
630.00	19.407	580.88	2993.1	0.17804	1208.0	0.67344
645.00	19.914	576.17	2893.3	0.18090	1161.0	0.68615
660.00	20.331	569.12	2799.2	0.18361	1116.3	0.69822
675.00	20.838	564.42	2708.6	0.18190	1144.5	0.69060
690.00	21.302	559.71	2627.5	0.18450	1130.4	0.69441
705.00	21.789	557.36	2558.0	0.18161	1149.2	0.68933
720.00	22.286	559.71	2511.5	0.18278	1158.6	0.68679
735.00	22.736	559.71	2461.8	0.18218	1139.8	0.69187
750.00	23.167	557.36	2405.9	0.18636	1099.9	0.70267
765.00	23.600	550.31	2331.8	0.18860	1005.9	0.72808
780.00	24.084	543.25	2255.7	0.18853	1092.8	0.70457
795.00	24.611	543.25	2207.4	0.18948	1020.0	0.72427
810.00	24.978	538.55	2156.1	0.18547	1085.8	0.70648
825.00	25.525	531.49	2082.2	0.19376	991.78	0.73189
840.00	25.919	540.90	2086.9	0.18819	1041.1	0.71855
855.00	26.365	538.55	2042.6	0.18934	1022.3	0.72363
870.00	26.879	533.84	1986.1	0.19387	970.62	0.73761
885.00	27.313	529.14	1937.3	0.19062	1001.2	0.72935
900.00	27.820	522.08	1876.7	0.19441	977.67	0.73571
915.00	28.297	510.33	1803.5	0.20894	902.47	0.75604
930.00	28.794	510.33	1772.3	0.18905	1027.0	0.72236
945.00	29.258	515.03	1760.3	0.18891	1029.4	0.72173
960.00	29.634	512.68	1730.0	0.18819	1041.1	0.71855
975.00	30.155	503.27	1669.0	0.19322	984.73	0.73380
990.00	30.599	507.97	1660.1	0.19961	947.12	0.74396
1002.7	31.059	510.33	1643.1	0.19761	958.87	0.74079

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: HB-WPC-203	Tester: SJR	Checker: sjr
	Sample Number: U4	Test Date: 5/17/2021	Depth: 80.5
	Test Number: DSS 141	Preparation: wet	Elevation:
	Description: Gray Silty Clay		
	Remarks: Sample consolidated to 3700 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

APPENDIX E – ENGINEERING CALCULATIONS

GZA GeoEnvironmental, Inc *Engineers and Scientists*
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106
207-879-9190
Fax 207-879-0099
http://www.gza.com

JOB: 09.0026037.01 Pleasant Cove Bridge
SUBJECT: Settlement
SHEET: 1 OF 60
CALCULATED BY B. Cardali, 8/16/21
REVIEWED BY CLS, 8/18/21

Objective

Evaluate the Settlement under the proposed preload and Vertical Drainage Wick (VDW) configuration. Preload height includes final grade elevation plus a 6-foot surcharge (min. 125 pcf). Proposed VDW spacing of 5-feet in a triangular pattern

Methodology

1. Develop Settlement Properties and Settle3 Inputs.
2. Complete Settlement analysis using Settle3 for both no mitigation at 75 years Post Construction and after preload period of 12 months. (Primary Consolidation Settlement Only)
3. Generate effective Stress profiles at the end of preload and final.
4. Calculate Stress ratio with depth and estimated Cα
5. Calculate anticipated Secondary Settlement
6. Determine average percent consolidation after preload condition

1. Soil Properties

GZA developed consolidation properties for the Wetland and Marine Clay deposits based on laboratory and measured field data which is presented on Page 6 and summarized below and in Table A on page 7 of this package.

Layers For Settlement Model	Soil Properties							
Original Ground Surface El. (1920)	**CR**	**RR**	**Max past pressure Top (ksf)**	**Max past pressure change with depth (ksf)**	**Cv (ft^2/day)**	**Cvr (ft^2/day)**	**Unit Weight (pcf)**	**Max Cα**
Wetland 1 (Above El -4)	0.25	0.03	0.49	0.03	0.07	0.7	90	0.014
Wetland 2 (EL.-4 to -15)	0.25	0.03	0.67	0.03	0.07	0.7	90	0.014
Wetland 3 (El -15 and below)	0.25	0.03	1	0.03	0.07	0.7	90	0.014
Marine Clay 1 (Above El -39)	0.19	0.019	4.6	--	0.1	0.7	112	0.007
Marine Clay 2 (EL.-39 to -55)	0.19	0.019	4.6	-0.125	0.1	0.7	112	0.007
Marine Clay 3 (El -55 and below)	0.21	0.021	2.6	0.05	0.1	0.7	112	0.007
Glacial Till	--	--	--	--	--	--	130	--

2. Settle3 Settlement Model Results

The Settle3 model Staging for the project is:

Year 0: Original Embankment Construction 1936 approximately (Station 46 Bridge to Station 92+00)
Year 14: Remainder of Existing Embankment Construction in approximately 1950
Year 86: Begin Construction (preload Fall 2022 to Fall 2023)
Year 162: 75 years Post construction

GZA identified inconsistencies with Settle3's calculation of secondary compression with a staged filling scenario. We have therefore utilized a separate calculation to estimate secondary compression.

No Mitigation

Settlement evaluations were conducted on the proposed embankment without PVDs or surcharging to determine the anticipated primary consolidation settlement under the proposed fills within the design life of 75 years. Secondary compression from the Preload and VWD calculation was combined with this primary consolidation. The estimated maximum consolidation settlement plus secondary compression of approximately 32 inches was calculated at Station 93+00. The results are tabulated in Table B on page 7 of this design package and on the Settle3 plots on pages 8 and 9.

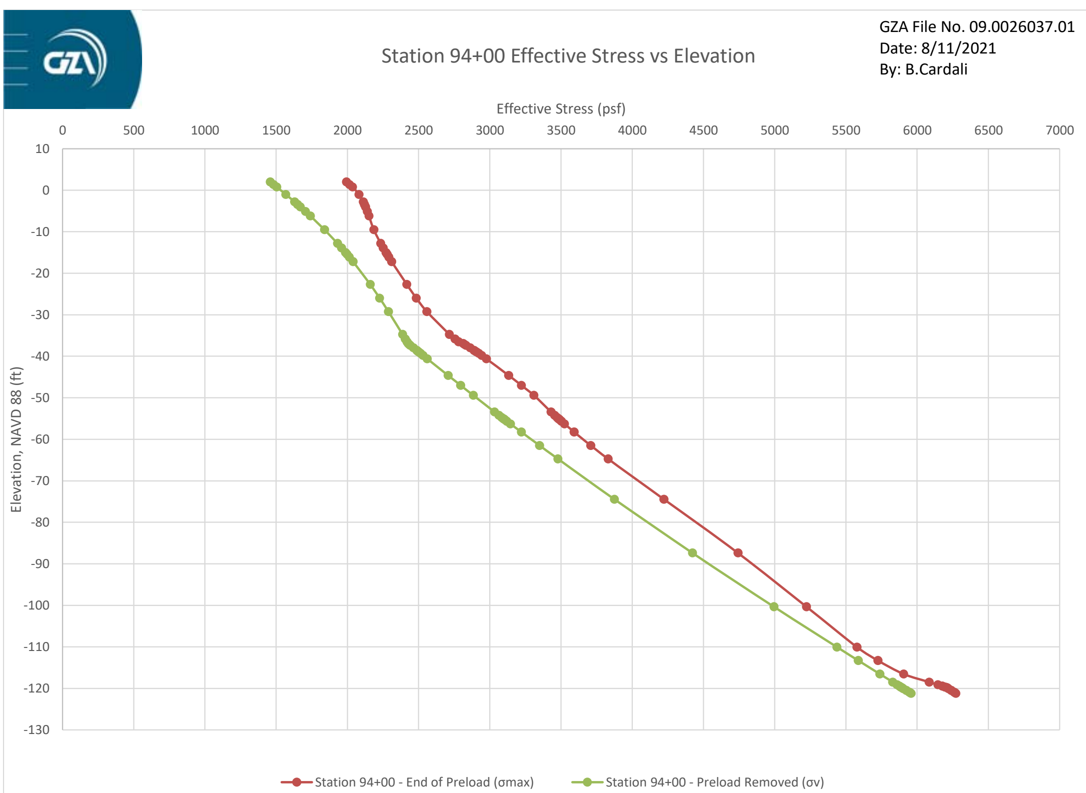
Preload & PVD

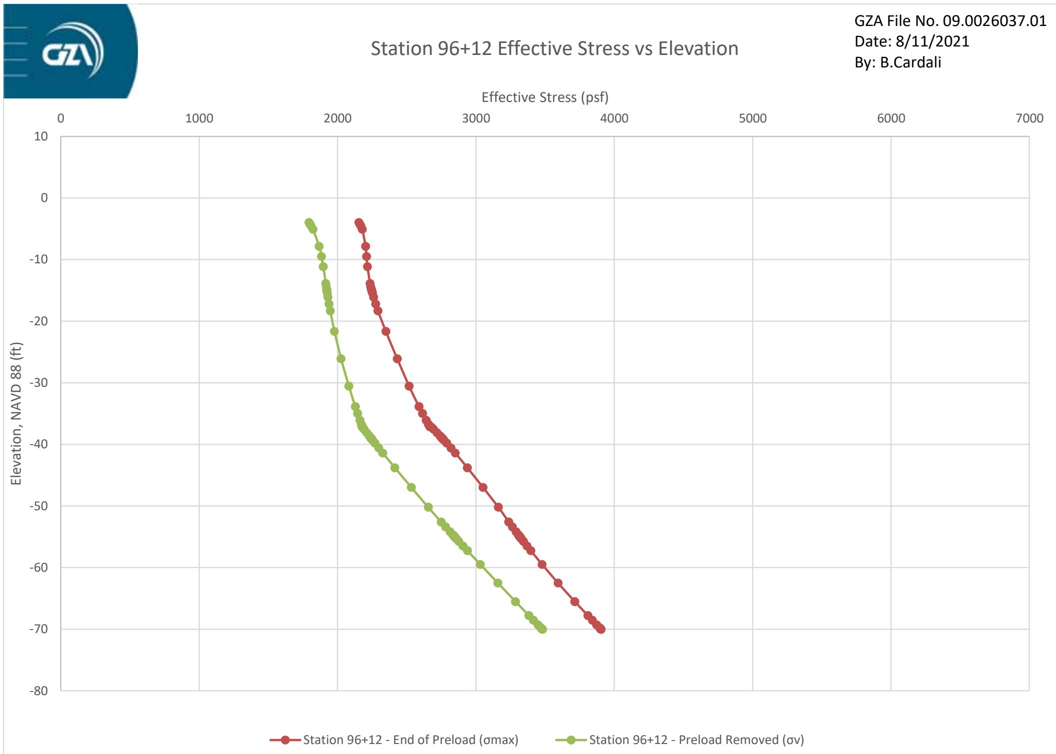
Settlement evaluations were conducted for the preferred preload mitigation alternative of VWDs with a 5-foot triangular spacing with a 6-foot surcharge for 12 months, through the entire wetland and marine clay profiles and a ratio of horizontal to vertical consolidation (Cv_v/Cv_h) of 1.3. Maximum settlement under the preload was estimated to be 37 inches at station 94+00. The results indicate that the average degree of consolidation of the deepest sections was approximately 80 percent in 10 months and 90 percent in 14 months. The results are tabulated in Table B on page 7 of this design package and on the Settle3 plots on pages 10 and 11.

Settle3 inputs are provided on pages 15 through 62.

3. Effective Stress Profiles

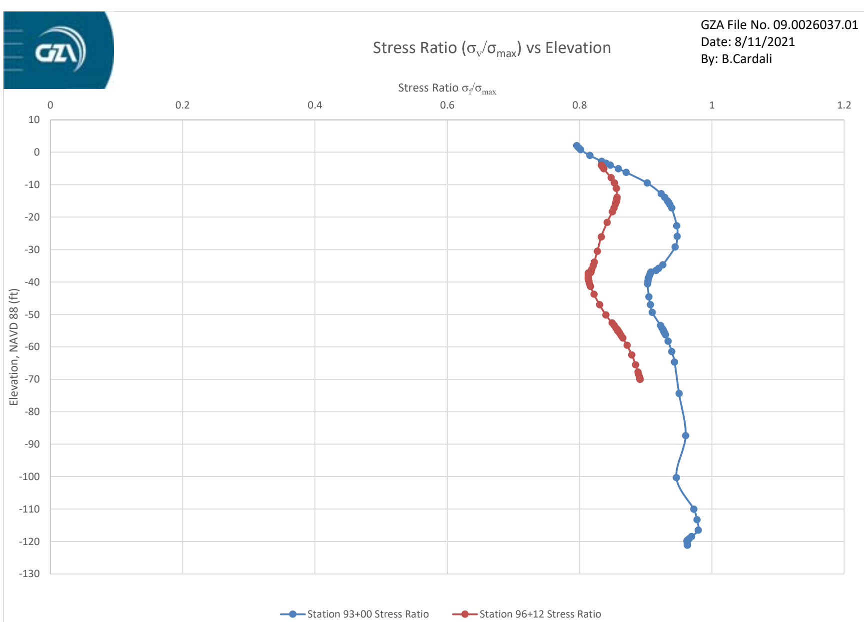
Effective stress profiles were extracted from the Settle3 software at two critical locations to confirm that the effective stress at the end of the preload is greater than the final stress under the embankment and to evaluate effective stress ratios (σv/σmax) at Station 94+00 (the thickest soil profile consisting of 37 feet of Wetland deposit underlain by 100 feet of marine clay) and Station 96+12 (Abutment 1). The two plots are shown below.



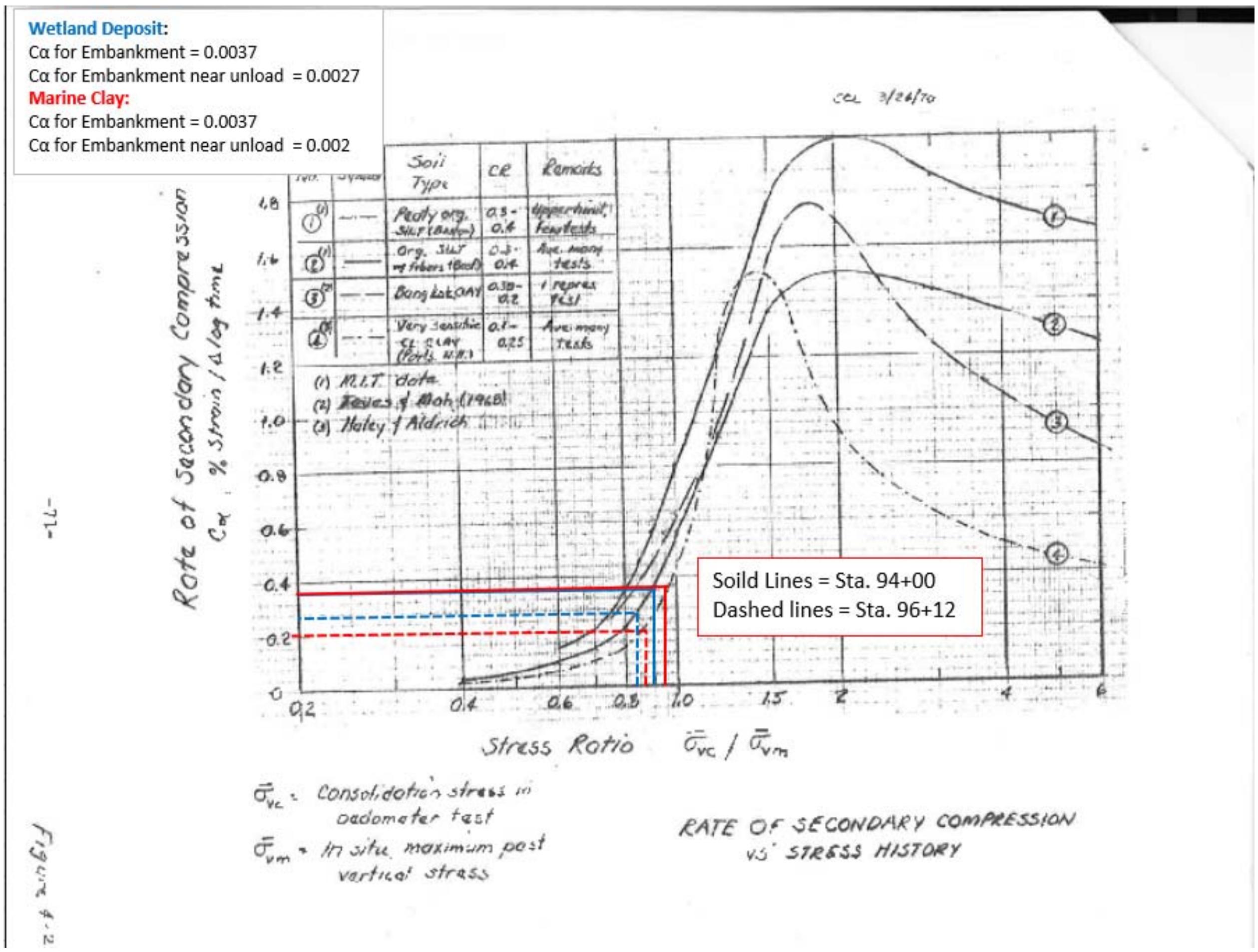


4. Calculation of Stress Ratios

The Stress ratio is calculated by dividing the final effective stress by the maximum previous effective stress. The profiles previously discussed were considered and plotted in the following graph.



From these plots the average stress ratios were determined for each strata per profile. The stress ratios at Station 94+00 were estimated to be 0.9 for the Wetland Deposit and 0.94 for the Marine Clay. The stress ratios at Station 96+12 were estimated to be 0.83 for the Wetland Deposit and 0.87 for the Marine Clay. Utilizing the stress ratio vs Cα from the plot below, Cα was estimated for Station 94+00 to be 0.0037 for both the wetland deposit and the Marine Clay. Cα was estimated for Station 96+12 to be 0.0027 for the wetland deposit and 0.002 for the Marine Clay.



5. Secondary Compression

Time to end of primary consolidation was calculated for the deepest soil profile considering the VDWs installed to the bottom of the clay. Under the preload, the time to achieve an average degree of consolidation of 90% is 12 months. Secondary compression was then evaluated for the 75 years design life. The time from t_{90} equals 1 year to the design life of 75 years corresponds to 1.75 log cycles of secondary compression. The estimate secondary compression along the alignment is presented below:

Wetland Deposit			
Layer	Layer Thickness (H_o) (ft)	Number of Log cycles at 75 yr $\# \text{Cycles} = \log \frac{t}{t_{90}}$	S_s at 75 yr $S_s = H_o * c_\alpha * \log \frac{t}{t_{90}}$
87+00	6	1.75	0.5
88+00	11.5	1.75	0.9
89+00	16	1.75	1.2
90+00	21	1.75	1.6
91+00	27	1.75	2.10
92+00	32.5	1.75	2.5
93+00	35	1.75	2.7
94+00	37	1.75	2.9
95+00	33	1.75	2.6
96+00	28.5	1.75	2.2
97+00	23.5	1.75	1.8
98+00	17	1.75	1.3
99+00	6.5	1.75	0.5
100+00	4	1.75	0.3

Marine Clay			
Layer	Layer Thickness (H_o) (ft)	Number of Log cycles at 75 yr $\# \text{Cycles} = \log \frac{t}{t_{90}}$	S_s at 75 yr $S_s = H_o * c_\alpha * \log \frac{t}{t_{90}}$
87+00	0	1.75	0.0
88+00	0	1.75	0.0
89+00	28	1.75	2.2
90+00	52.5	1.75	4.1
91+00	55	1.75	4.3
92+00	60	1.75	4.7
93+00	84	1.75	6.5
94+00	100	1.75	7.8
95+00	69	1.75	5.4
96+00	36	1.75	2.8
97+00	33	1.75	2.6
98+00	9.5	1.75	0.7
99+00	0	1.75	0.0
100+00	0	1.75	0.0

6. Results

Settlement Under Preload vs. No Mitigation - Table B shows the estimated primary consolidation and secondary compression in 75 years with no mitigation; the estimated primary consolidation and secondary compression after 1 year of preload with a 6-foot surcharge and VWDs at 5' O.C.; the estimated consolidation settlement at 100 percent consolidation under the preload; the required average percent consolidation required under preload to mitigate post-construction settlement; and the estimated percent consolidation expected after 12 month preload.

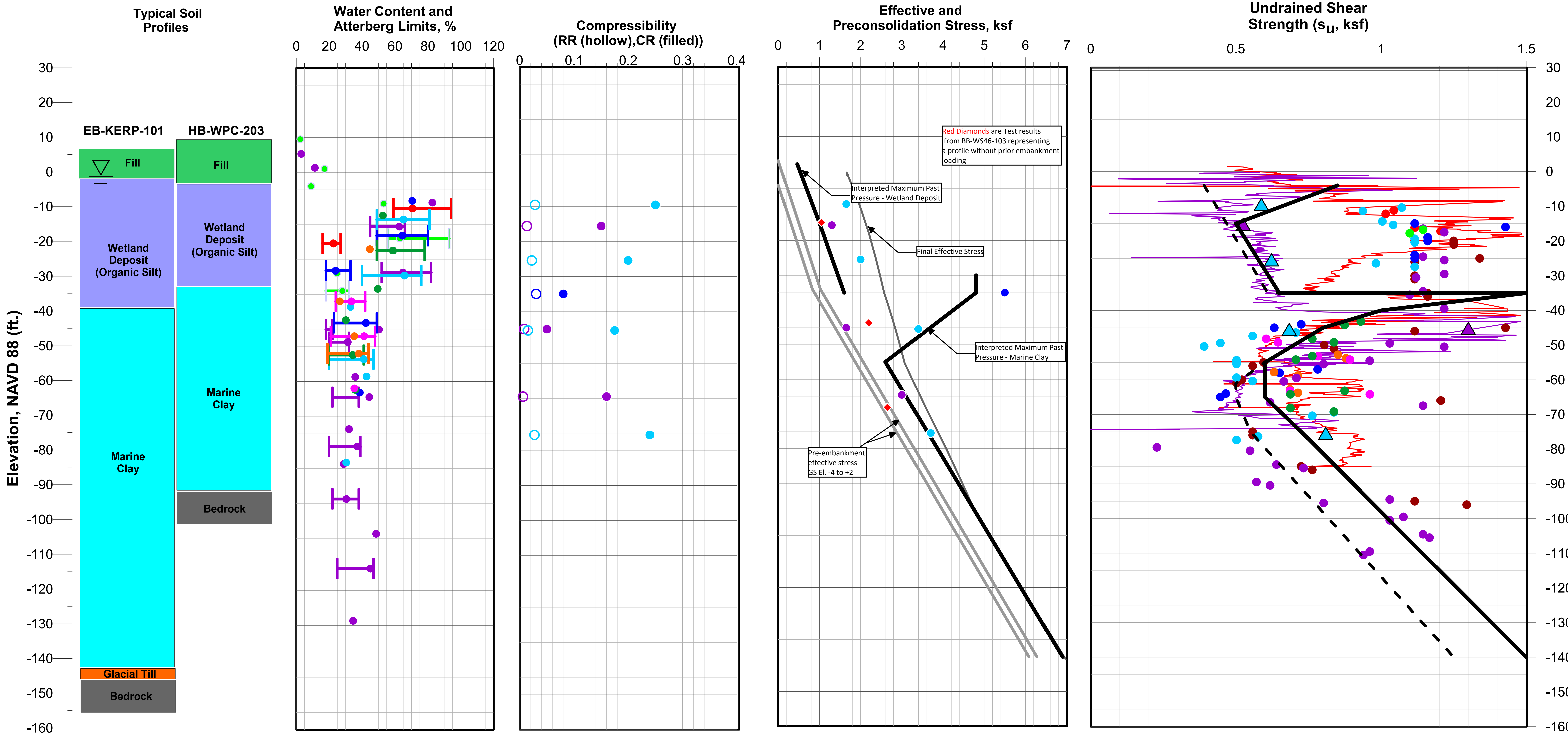
7. Conclusions

The results show that approximately 40 to 77 % consolidation is needed under preload and that approximately 80 to 90+ % is anticipated. Therefore, the required percent consolidation can be met within the preload period. Additionally, considering the unload near the proposed bridge, we anticipated less than 0.5 inches of consolidation at the bridge abutments, therefore downdrag is not considered in pile design.

8. Attachments

The attachments are described as follows:

- **GZA PLOT Water Content, Compressibility, Stress History and Strength of Cohesive Soils (page 6)**
- **Table A - Settle3 model inputs (page 7)**
- **Table B - Settlement Results (page 8)**
- **Settle3 Plots (page 9-12)**
  - **Consolidation Settlement No Mitigation at 75 Yr. Post-Construction (Sta. 87+00 - 95+00 & 98+00 to 100+00)**
  - **Consolidation Settlement No Mitigation at 75 Yr. Post-Construction (Station 95+00 - 98+00)**
  - **Consolidation Settlement After 12 Mo. Preload, 6' Surcharge & VDW (Station 87+00 to 95+00 & 98+00 - 100+00)**
  - **Consolidation Settlement After 12 Mo. Preload, 6' Surcharge & VDW (Station 95+00 to 98+00)**
- **Settle3 Input Report (page 13 -60)**



NOTES:

1. DATA BASED ON TEST BORINGS (EB-KERP-101 AND -102, HB-WPC-201 THROUGH -205, BB-WPC-201 THROUGH -203, AND BB-WPC-301) PERFORMED BY NEW ENGLAND BORING CONTRACTORS OF HERMON, MAINE BETWEEN OCTOBER 22 AND 26, 2019 AND MARCH 25 AND APRIL 7, 2021 . BORINGS PERFORMED BY NEW ENGLAND BORING CONTRACTPRS WERE OBSERVED AND LOGGED BY GZA PERSONNEL.
2. CPT EXPLORATIONS (CPT-KERP-101 & CPT-WPC-201) PERFORMED BY SUMMIT GEOENGINEERING OF ROCKLAND, MAINE ON OCTOBER 14, 2019 AND MARCH 30, 2021.
3. TYPICAL SOIL PROFILE BASED ON BORING EB-KERP-101 AND HB-WPC-203.
4. WATER CONTENTS BASED ON LABORATORY TESTS PERFORMED ON SAMPLES TAKEN FROM RECENT BORINGS.
5. EFFECTIVE STRESS BASED ON CALCULATED INITIAL AND FINAL EFFECTIVE STRESS FROM SETTLE3D AT EB-KERP-101 LOCATION.
6. PRECONSOLIDATION PRESSURE BASED ON LABORATORY CONSOLIDATION TESTS AND GZA INTERPRETATIONS . CONSOLIDATION TEST SAMPLE AT EL.-45 WAS LOW QUALITY DUE TO SAND SEAMS.
7. CORRELATED UNDRAINED SHEAR STRENGTHS FROM CPT-KERP-101 AND CPT-WPC-201 DATA ARE BASED ON N_{kt}=14 AND 18, RESPECTIVELY. Nkt VALUES ARE BASED ON LABORATORY TESTING AND FIELD VANE SHEAR STRENGTHS.
8. FIELD VANE SHEAR TESTS IN ORGANIC SILT AT EL. -15 TO -35 FEET MAY BE HIGHER THAN ACTUAL UNDRAINED SHEAR STRENGTHS DUE TO THE PRESENCE OF ORGANIC FIBERS. CPT AND LABORATORY DATA WERE USED AS THE BASIS FOR THE DESIGN PROFILE.
9. IN LEGEND, FV=UNDRAINED SHEAR STRENGTH FROM IN-SITU FIELD VANE, CONSOL=LAB DATA FROM CONSOLIDATION TEST. DSS TEST PERFORMED ON SAMPLE WITH APPLIED VERTICAL STRESS CALCULATED AS THE INSITU EFFECTIVE STRESS.

LEGEND

Plastic Limit, PL — Water Content, Wn — Liquid Limit, LL

- EB-KERP-101 (FV,Consol)
- EB-KERP-102 (FV)
- HB-WPC-201 (FV)
- HB-WPC-202 (FV,Consol)
- HB-WPC-203 (FV,Consol)
- BB-WPC-201 (FV)
- BB-WPC-202 (FV)
- BB-WPC-203 (FV)
- BB-WPC-301 (FV)
- DESIGN PROFILE under Emb.
- DSS (HB-WPC-203)
- DESIGN PROFILE outside Emb.
- CPT-KERP-101 (when drilled)
- DSS (EB-KERP-101)
- CPT-WPC-201 (Nkt 18)

PLEASANT COVE BRIDGE
WOOLWICH, ME

IN-SITU SOIL CONDITIONS VS. ELEVATION

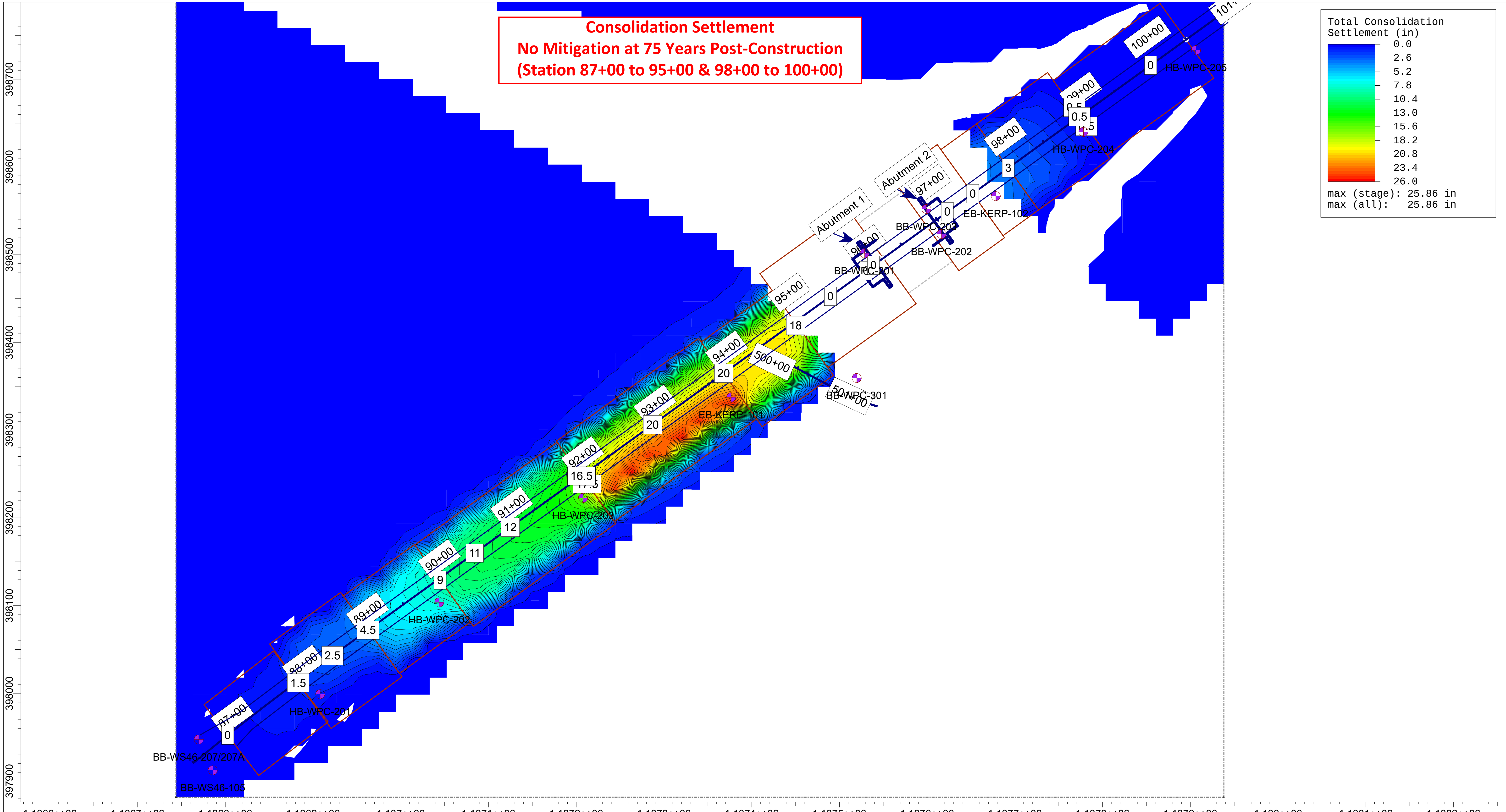
PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers & Scientists www.gza.com		MAINE DEPARTMENT OF TRANSPORTATION	
PROJ MGR: BMC	REVIEWED BY: CLS	CHECKED BY: --	FIGURE 4
DESIGNED BY: BMC	DRAWN BY: BMC	SCALE: N/A	
DATE: 8/13/2021	PROJECT NUMBER: 09.0026037.01	REVISION NUMBER: 0	

Table A - Pleasant Cove Settle3 Inputs																					
Layers For Settlement Model	Boring Strata Thickness for model to Match Stress History plots													Soil Properties							
	BB-WS46-105	BB-WS46-207	HB-WPC-201	HB-WPC-202	HB-WPC-203	EB-KERP-101	BB-WPC-301	BB-WPC-201	BB-WPC-202	BB-WPC-203	EB-KERP-102	HB-WPC-204	HB-WPC-205	CR	RR	Max past pressure Top (ksf)	Max past pressure change with depth (ksf)	Cv (ft^2/day)	Cvr (ft^2/day)	Unit Weight (pcf)	Cα
Original Ground Surface El. (1920)	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**-4**	**-4**	**-4**	**2**	**3**	**4**								
Wetland 1 (Above El -4)	6	6	6	6	6	6	6	0	0	0	6	7	5.2	0.25	0.03	0.49	0.03	0.07	0.7	90	0.014
Wetland 2 (EL.-4 to -15)	4.2	6.3	11	11	11	11	11	11	11	11	11	4.8	0	0.25	0.03	0.67	0.03	0.07	0.7	90	0.014
Wetland 3 (El -15 and below)	0	0	4.4	11.7	19.6	23.7	22.7	22.4	14.7	18.7	12.5	0	0	0.25	0.03	1	0.03	0.07	0.7	90	0.014
Marine Clay 1 (Above El -39)	0	0	0	12.3	4.4	0.3	1.3	1.6	9.3	5.3	11.5	0	0	0.19	0.019	4.6	--	0.1	0.7	112	0.007
Marine Clay 2 (EL.-39 to -55)	0	0	0	16	16	16	16	16	16	16	0.5	0	0	0.19	0.019	4.6	-0.125	0.1	0.7	112	0.007
Marine Clay 3 (El -55 and below)	0	0	0	17.7	36.3	86.7	46.4	14.9	20.2	12.5	0	0	0	0.21	0.021	2.6	0.05	0.1	0.7	112	0.007
Glacial Till	0	0	2.4	5.9	0	2.5	0.6	0	0	3.8	0	1.6	3.7	--	--	--	--	--	--	130	--

Table B -Settlement Result Summary
Pleasant Cove Bridge - Woolwich, Maine

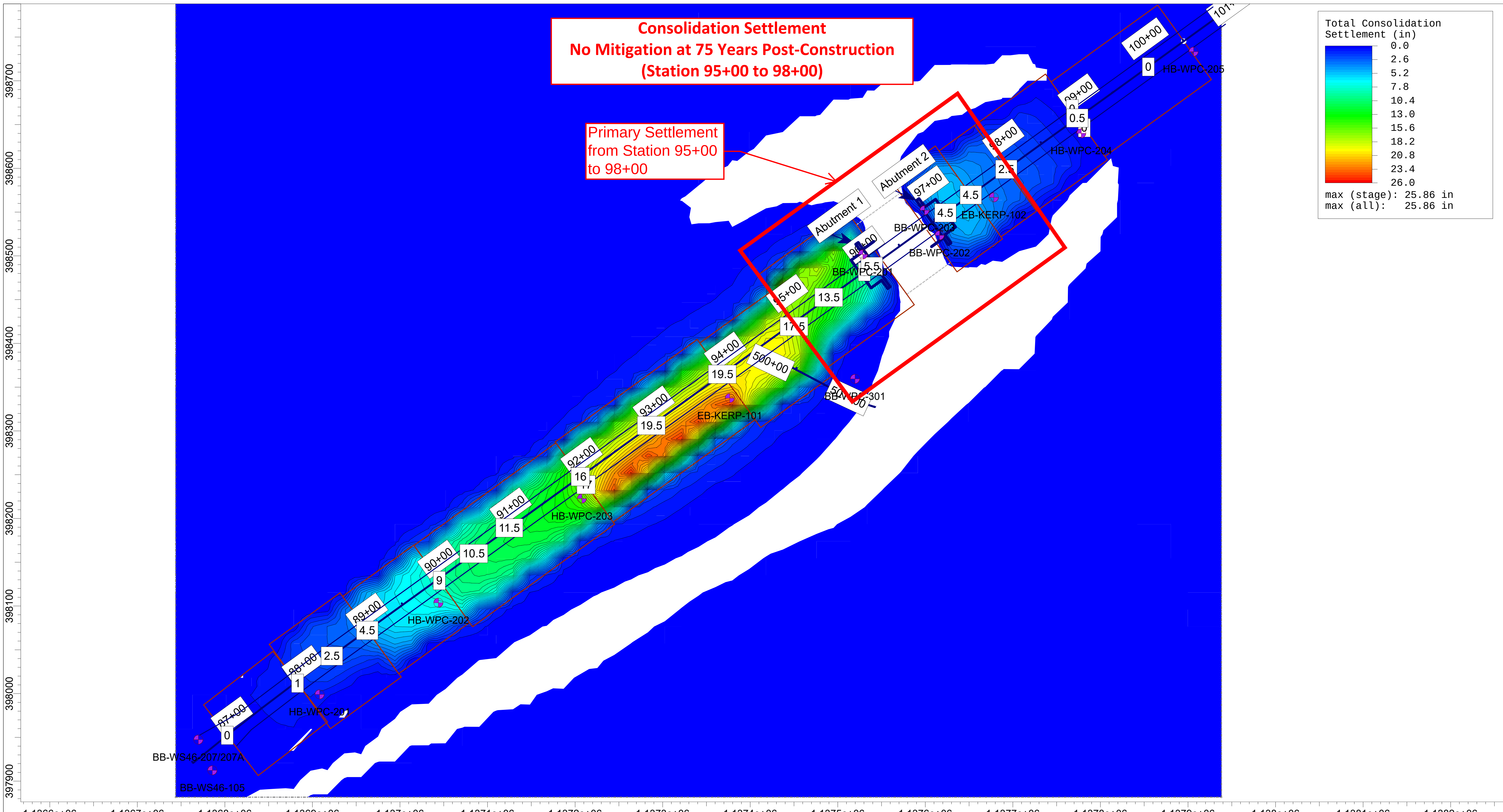
Table B - Settlement Results															
Settlement Mitigation Alternative		**Maximum Settlement at Station within Roadway Limits (inches)**													
		87+00	**88+00**	**89+00**	**90+00**	**91+00**	**92+00**	**93+00**	**94+00**	**95+00**	**96+00 (Abutment 1)**	**97+00 (Abutment 2)**	**98+00**	**99+00**	**100+00**
No Mitigation 75 years after Final Pavement	**Primary**	**0.5**	**1.5**	**4.5**	**9**	**12**	**17.5**	**22**	**21**	**17.5**	**8.5**	**4.5**	**2.5**	**0.5**	**0**
	Secondary (1.75 cycles)	**0.9**	**0.9**	**3.5**	**6.1**	**6.1**	**7.0**	**9.6**	**10.5**	**7.9**	**3.5**	**2.6**	**1.8**	**0.9**	**0.0**
	Total	**1.4**	**2.4**	**8.0**	**15.1**	**18.1**	**24.5**	**31.6**	**31.5**	**25.4**	**12.0**	**7.1**	**4.3**	**1.4**	**0.0**
Preload with VDWs - Proposed fills plus 6 ft. Surcharge for 12 months (Fall 2022 to Fall 2023)	**Total**	**0.0**	**5.0**	**12.5**	**19.0**	**24.0**	**32.5**	**37.0**	**37.0**	**32.0**	**19.0**	**12.0**	**7.5**	**1.5**	**0.0**
Difference		-1.4	2.6	4.5	3.9	5.9	8.0	5.4	5.5	6.6	7.0	4.9	3.3	0.1	0.0
Estimated Settlement at 100% Consolidation under Surcharge (S_{c100})	**Total**	**0.0**	**6.0**	**13.5**	**20.0**	**25.5**	**34.5**	**41.0**	**41.0**	**34.5**	**20.0**	**12.0**	**8.0**	**1.5**	**0.0**
Required Pecent Consolidation Under Preload (Settlement under Permanent Embankment w/o Preload/ S_{c100})		**--**	**40%**	**59%**	**76%**	**71%**	**71%**	**77%**	**77%**	**74%**	**60%**	**59%**	**53%**	**92%**	**--**
Average Percent Consolidation under preload		--	83%	93%	95%	94%	94%	90%	90%	93%	95%	100%	94%	100%	--

Notes:
1. Settlement rounded to the nearest 0.5 inches.
2. T90 for surcharge load is approximately 1 year, therefore assumed 1.75 logs cycles would occur in design life of 75 years which considers the effect of VWDs.
3. Negative value indicates settlement post construction, a value less than -3 inches would exceed proposed settlement criteria of 3 inches in 20 years for the project.



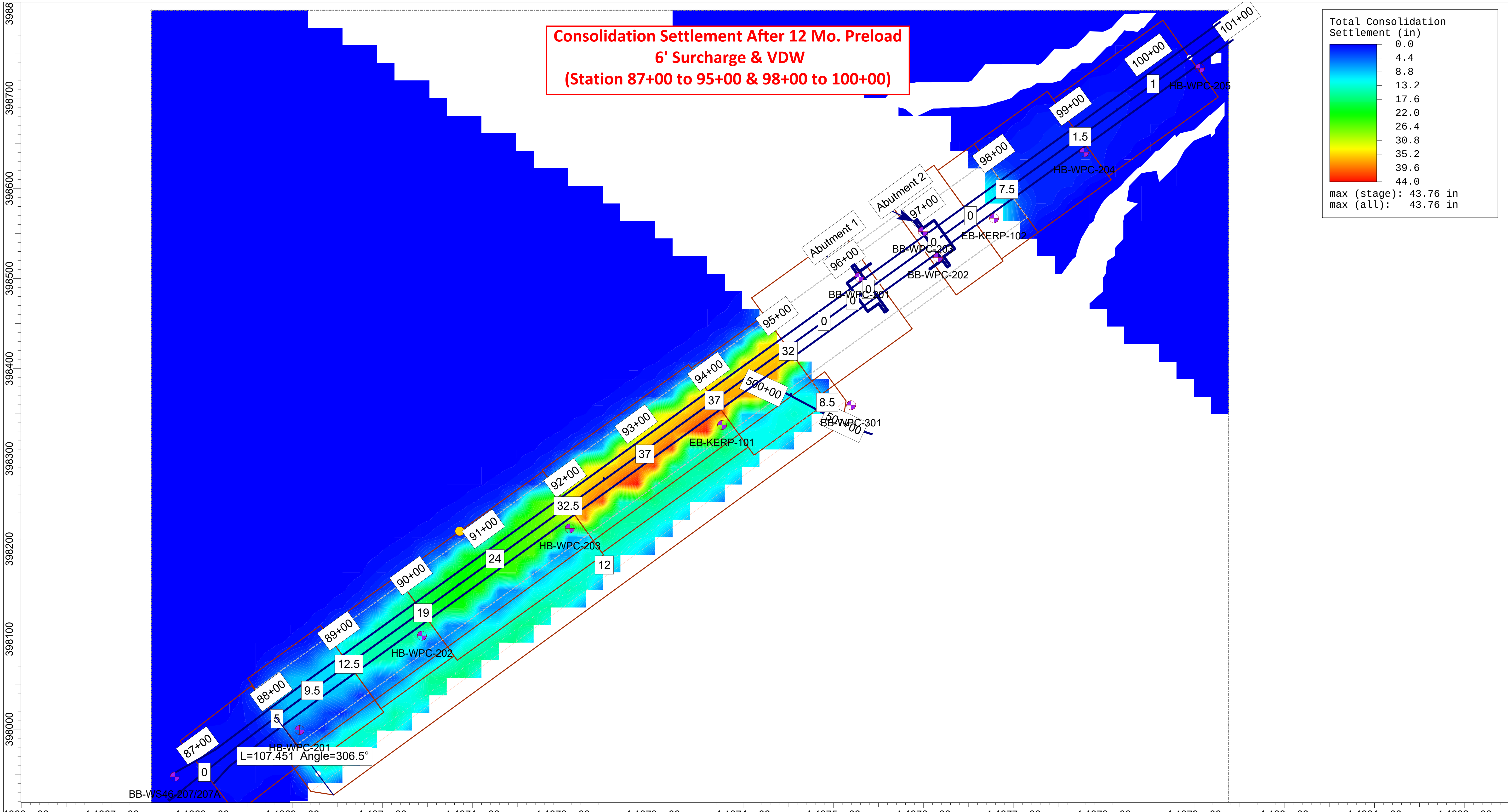
SETTLE3 5.011

Project	Pleasant Cove Bridge
Analysis Description	No Mitigation
Drawn By	B.Cardali
Company	GZA GeoEnvironmental, Inc.
Date	6/29/2020, 3:31:54 PM
File Name	Pleasant Cove Settle3 model Base no mitigation (no reset) 6.30.2021.s3z



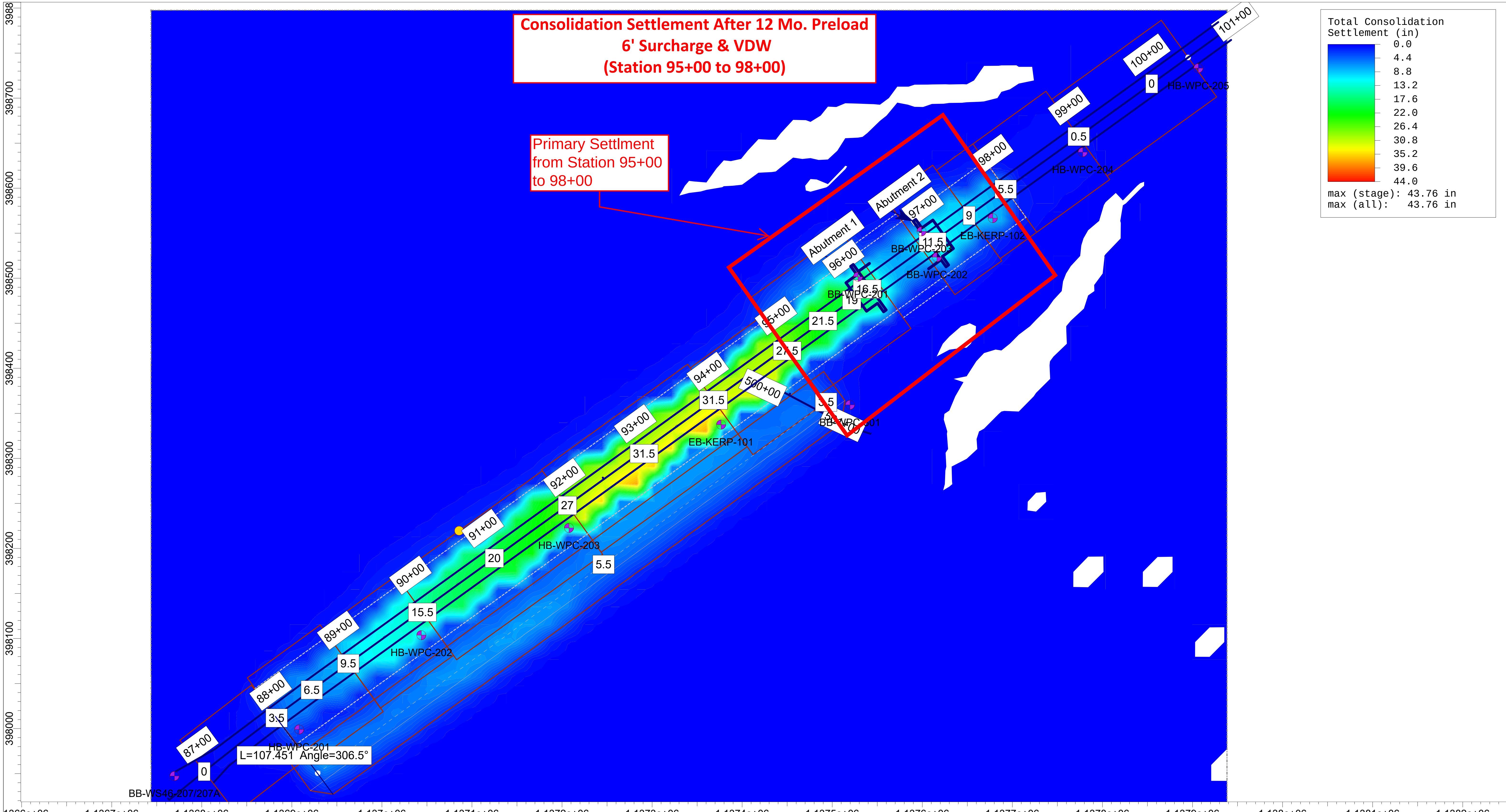
SETTLE3 5.011

Project	Pleasant Cove Bridge
Analysis Description	No Mitigation
Drawn By B.Cardali	*Company* GZA GeoEnvironmental, Inc.
Date 6/29/2020, 3:31:54 PM	*File Name* Pleasant Cove Settle3 model Base no mitigation (no reset) 6.30.2021.s3z



Project	Pleasant Cove Bridge
Analysis Description	Preload with PVDs (12 months)
Drawn By	B.Cardali
Company	GZA GeoEnvironmental, Inc.
Date	6/29/2020, 3:31:54 PM
File Name	Pleasant Cove Settle3 model 6 ft preload 1 yr with wicks (reset) 8.10.2021.s3z

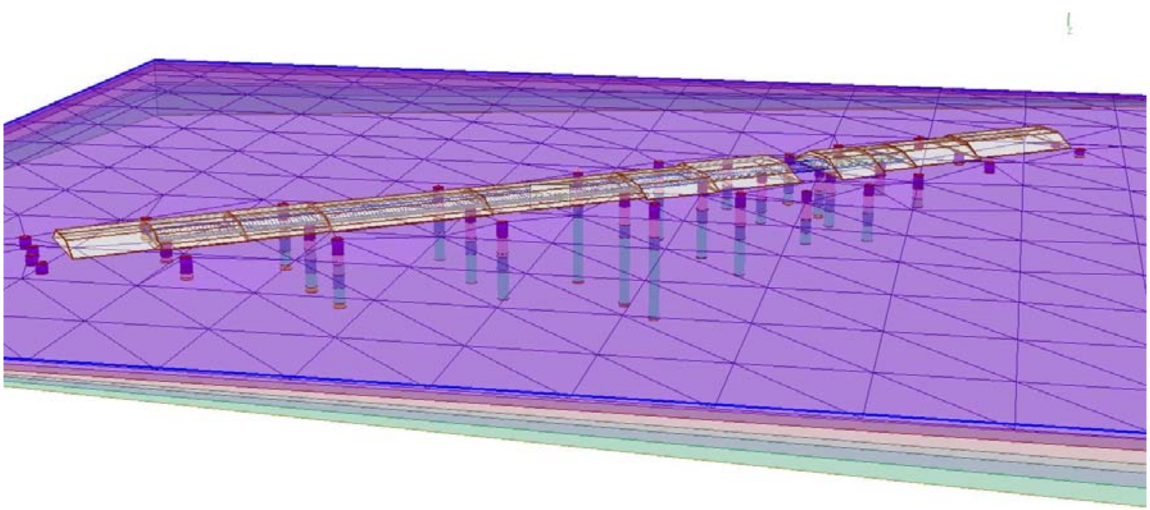
SETTLE3 5.011



GZA

Project	Pleasant Cove Bridge		
Analysis Description	Preload with PVDs (12 months)		
Drawn By	B.Cardali	*Company*	GZA GeoEnvironmental, Inc.
Date	6/29/2020, 3:31:54 PM	*File Name*	Pleasant Cove Settle3 model 6 ft preload 1 yr with wicks (reset) 8.10.2021.s3z

SETTLE3 5.011



GZA GeoEnvironmental, Inc.
Report Creation Date: 2021/08/13, 10:16:34

Table of Contents

Settle3 Analysis Information

Kennebec Estuary Rehabilitation Project

Project Settings

Document Name	Pleasant Cove Settle3 model 6 ft preload 1 yr with wicks (reset) 8.10.2021.s3z
Project Title	Kennebec Estuary Rehabilitation Project
Analysis	Alternative I - 5- foot maximum grade raise
Author	B.Cardali
Company	GZA GeoEnvironmental, Inc.
Date Created	6/29/2020, 3:31:54 PM
Stress Computation Method	Boussinesq
Time-dependent Consolidation Analysis	
Time Units	years
Permeability Units	feet/day
Minimum settlement ratio for subgrade modulus	0.9
Poisson ratio for Boussinesq stress computation	0.3
Include buoyancy effect when material settles below water table	
Use average properties to calculate layered stresses	
Improve consolidation accuracy	
Ignore negative effective stresses in settlement calculations	

Stage Settings

Stage #	Name	Time [years]
1	Stage 1	0
2	Stage 2 - Orig. Emb placed	0.1
3	Stage 3 - rest of orig. em	14
4	Stage 4	26
5	Stage 5	38
6	Stage 6	50
7	Stage 7	62
8	Stage 8	74
9	Stage 9 -Current em	86.8
10	Stage 10 - Preload Start	86.81
11	Stage 11 - preload off	87.8
12	Stage 12 - Pave	88.2
13	Stage 12 - 10 yr pc	98.2
14	Stage 13 - 20 yr pc	108.2
15	Stage 14 - 40 yr pc	128.2
16	Stage 15 - 60	148.2

Embankments

1. Embankment: "Embankment Load 11"

Label				Embankment Load 11			
Center Line				(1.13755e+06, 398496) to (1.1376e+06, 398532)			
Near End Angle				90 degrees			
Far End Angle				90 degrees			
Number of Layers				1			
Base Width				98			
Layer	**Stage**	**Left Bench Width (ft)**	**Left Angle (deg)**	**Height (ft)**	**Unit Weight (kips/ft3)**	**Right Angle (deg)**	**Right Bench Width (ft)**
1	Stage 3 - rest of orig. em = 14 y	0	31.6075	16	0.125	27.3902	0

2. Embankment: "Embankment Load 1"

Label	Embankment Load 1	
Center Line	(1.1368e+06, 397952) to (1.13688e+06, 398013)	
Near End Angle	90 degrees	
Far End Angle	90 degrees	
Number of Zones	2	
Number of Sections	2	
Zone	**Name**	**Unit Weight (kips/ft3)**
1	New Zone	0.125
2	New Zone 2	0.125

3. Embankment: "88+00 to 89+00"

Label	88+00 to 89+00	
Center Line	(1.13688e+06, 398013) to (1.13696e+06, 398072)	
Near End Angle	90 degrees	
Far End Angle	90 degrees	
Number of Zones	2	
Number of Sections	2	
Zone	**Name**	**Unit Weight (kips/ft3)**
1	New Zone	0.125
2	New Zone 2	0.125

4. Embankment: "89+00 to 90+00"

Label	89+00 to 90+00	
Center Line	(1.13696e+06, 398072) to (1.13704e+06, 398131)	
Near End Angle	90 degrees	
Far End Angle	90 degrees	
Number of Zones	2	
Number of Sections	2	
Zone	**Name**	**Unit Weight (kips/ft3)**
1	New Zone	0.125
2	New Zone 2	0.125

5. Embankment: "90+00 TO 92+00"

Label		90+00 TO 92+00
Center Line		(1.13704e+06, 398131) to (1.13721e+06, 398248)
Near End Angle		90 degrees
Far End Angle		90 degrees
Number of Zones		2
Number of Sections		2
Zone	**Name**	**Unit Weight (kips/ft3)**
1	New Zone	0.125
2	New Zone 2	0.125

6. Embankment: "Embankment Load 5"

Label		Embankment Load 5
Center Line		(1.13721e+06, 398248) to (1.13737e+06, 398365)
Near End Angle		90 degrees
Far End Angle		90 degrees
Number of Zones		2
Number of Sections		2
Zone	**Name**	**Unit Weight (kips/ft3)**
1	New Zone	0.125
2	New Zone 2	0.125

7. Embankment: "94+00 to 95+00"

Label		94+00 to 95+00
Center Line		(1.13737e+06, 398365) to (1.13745e+06, 398423)
Near End Angle		90 degrees
Far End Angle		90 degrees
Number of Zones		2
Number of Sections		2
Zone	**Name**	**Unit Weight (kips/ft3)**
1	New Zone	0.125
2	New Zone 2	0.125

8. Embankment: "95+00 to 96"

Label		95+00 to 96
Center Line		(1.13745e+06, 398423) to (1.13755e+06, 398496)
Near End Angle		90 degrees
Far End Angle		90 degrees
Number of Zones		2
Number of Sections		2
Zone	**Name**	**Unit Weight (kips/ft3)**
1	New Zone	0.125
2	New Zone 2	0.125

9. Embankment: "Embankment Load 8"

Label	Embankment Load 8	
Center Line	(1.1376e+06, 398532) to (1.13765e+06, 398570)	
Near End Angle	90 degrees	
Far End Angle	90 degrees	
Number of Zones	2	
Number of Sections	2	
Zone	**Name**	**Unit Weight (kips/ft3)**
1	New Zone	0.125
2	New Zone 2	0.125

10. Embankment: "97+00 to 98+00"

Label	97+00 to 98+00	
Center Line	(1.13765e+06, 398570) to (1.13769e+06, 398599)	
Near End Angle	90 degrees	
Far End Angle	90 degrees	
Number of Zones	5	
Number of Sections	2	
Zone	**Name**	**Unit Weight (kips/ft3)**
1	New Zone	0.125
2	New Zone 2	0.125
3	New Zone 3	0.125
4	New Zone 4	0.125
5	New Zone 5	0.125

11. Embankment: "98+00 to 99+00"

Label	98+00 to 99+00	
Center Line	(1.13769e+06, 398599) to (1.13777e+06, 398657)	
Near End Angle	90 degrees	
Far End Angle	90 degrees	
Number of Zones	2	
Number of Sections	2	
Zone	**Name**	**Unit Weight (kips/ft3)**
1	New Zone	0.125
2	New Zone 2	0.125

12. Embankment: "99 to 100+50"

Label	99 to 100+50	
Center Line	(1.13777e+06, 398657) to (1.1379e+06, 398745)	
Near End Angle	90 degrees	
Far End Angle	90 degrees	
Number of Zones	2	
Number of Sections	2	
Zone	**Name**	**Unit Weight (kips/ft3)**
1	New Zone	0.125
2	New Zone 2	0.125

13. Embankment: "Embankment Load 13"

Label				Embankment Load 13			
Center Line				(1.13688e+06, 398013) to (1.13769e+06, 398599)			
Near End Angle				26.57 degrees			
Far End Angle				26.57 degrees			
Number of Layers				1			
Base Width				77			
Layer	**Stage**	**Left Bench Width (ft)**	**Left Angle (deg)**	**Height (ft)**	**Unit Weight (kips/ft3)**	**Right Angle (deg)**	**Right Bench Width (ft)**
1	Stage 10 - Preload Start = 86.81 y	0	26.57	6	0.125	26.57	0

14. Embankment: "Embankment Load 14"

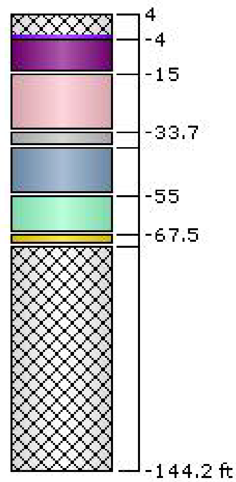
Label				Embankment Load 14			
Center Line				(1.13691e+06, 397972) to (1.1374e+06, 398323)			
Near End Angle				26.57 degrees			
Far End Angle				26.57 degrees			
Number of Layers				1			
Base Width				40			
Layer	**Stage**	**Left Bench Width (ft)**	**Left Angle (deg)**	**Height (ft)**	**Unit Weight (kips/ft3)**	**Right Angle (deg)**	**Right Bench Width (ft)**
1	Stage 10 - Preload Start = 86.81 y	0	90	4	0.125	26.57	0

Soil Layers

Ground Surface Drained: Yes

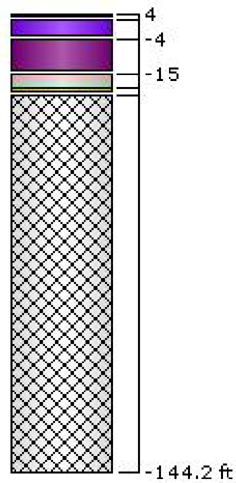
BB-WPC-203

XY Location:		BB-WPC-203: (1.1376e+06, 398552)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	0	-4	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	18.7	-15	No
4	Marine Clay 1	5.3	-33.7	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	12.5	-55	Yes
7	Glacial Till	3.8	-67.5	Yes



HB-WPC-201

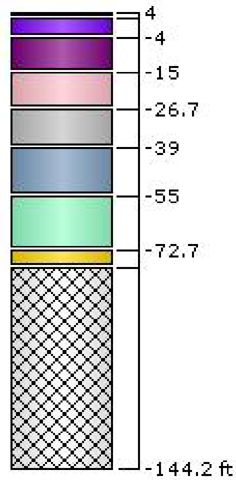
XY Location:		HB-WPC-201: (1.13691e+06, 397999)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	4.4	-15	No
4	Marine Clay 1	0	-19.4	No
5	Marine Clay 2	0	-19.4	No
6	Marine Clay 3	0	-19.4	Yes
7	Glacial Till	2.4	-19.4	Yes



HB-WPC-202

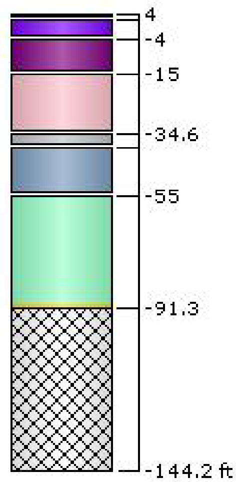
XY Location: HB-WPC-202: (1.13704e+06, 398104)

Layer #	Type	Thickness [ft]	Elevation [ft]	Drained at Bottom
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	11.7	-15	No
4	Marine Clay 1	12.3	-26.7	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	17.7	-55	Yes
7	Glacial Till	5.9	-72.7	Yes



HB-WPC-203

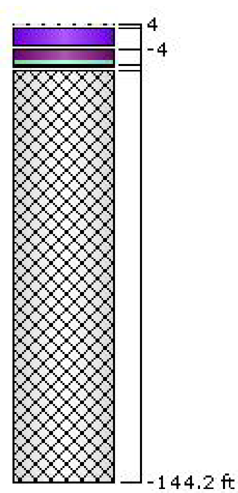
XY Location:		HB-WPC-203: (1.13721e+06, 398223)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	19.6	-15	No
4	Marine Clay 1	4.4	-34.6	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	36.3	-55	Yes
7	Glacial Till	0	-91.3	Yes



HB-WPC-204

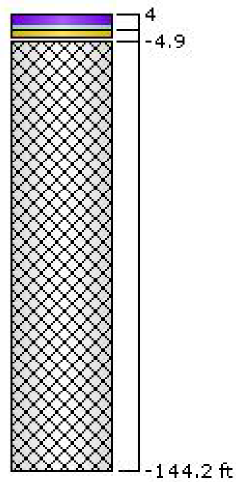
XY Location: HB-WPC-204: (1.13778e+06, 398640)

Layer #	Type	Thickness [ft]	Elevation [ft]	Drained at Bottom
1	Wetland Deposit 1 (Organic Silt)	7	3	No
2	Wetland Deposit 2 (Organic Silt)	4.8	-4	No
3	Wetland Deposit 3 (Organic Silt)	0	-8.8	No
4	Marine Clay 1	0	-8.8	No
5	Marine Clay 2	0	-8.8	No
6	Marine Clay 3	0	-8.8	Yes
7	Glacial Till	1.6	-8.8	Yes



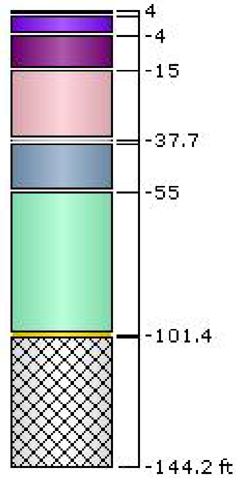
HB-WPC-205

XY Location:	HB-WPC-205: (1.13791e+06, 398733)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	5.2	4	No
2	Wetland Deposit 2 (Organic Silt)	0	-1.2	No
3	Wetland Deposit 3 (Organic Silt)	0	-1.2	No
4	Marine Clay 1	0	-1.2	No
5	Marine Clay 2	0	-1.2	No
6	Marine Clay 3	0	-1.2	Yes
7	Glacial Till	3.7	-1.2	Yes



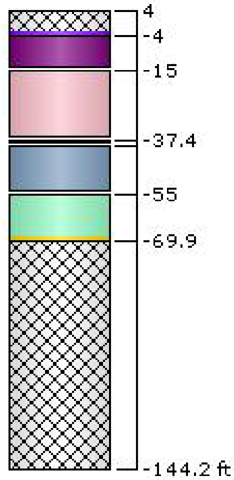
BB-WPC-301

XY Location:		BB-WPC-301: (1.13752e+06, 398359)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	22.7	-15	No
4	Marine Clay 1	1.3	-37.7	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	46.4	-55	Yes
7	Glacial Till	0.6	-101.4	Yes



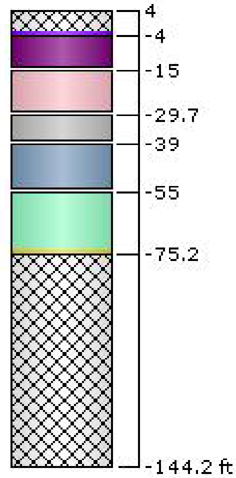
BB-WPC-201

XY Location:		BB-WPC-201: (1.13753e+06, 398502)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	0	-4	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	22.4	-15	No
4	Marine Clay 1	1.6	-37.4	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	14.9	-55	Yes
7	Glacial Till	0	-69.9	Yes



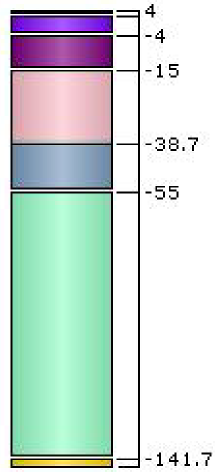
BB-WPC-202

XY Location:		BB-WPC-202: (1.13762e+06, 398523)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	0	-4	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	14.7	-15	No
4	Marine Clay 1	9.3	-29.7	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	20.2	-55	Yes
7	Glacial Till	0	-75.2	Yes



EB-KERP-101

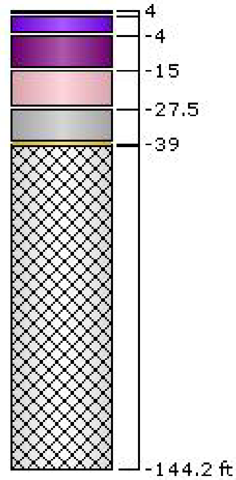
XY Location:		EB-KERP-101: (1.13738e+06, 398337)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	23.7	-15	No
4	Marine Clay 1	0.3	-38.7	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	86.7	-55	Yes
7	Glacial Till	2.5	-141.7	Yes



EB-KERP-102

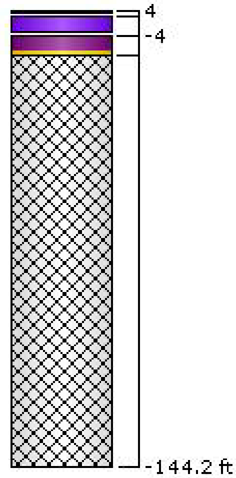
XY Location: EB-KERP-102: (1.13768e+06, 398567)

Layer #	Type	Thickness [ft]	Elevation [ft]	Drained at Bottom
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	12.5	-15	No
4	Marine Clay 1	11.5	-27.5	No
5	Marine Clay 2	0.5	-39	No
6	Marine Clay 3	0	-39.5	Yes
7	Glacial Till	0	-39.5	Yes



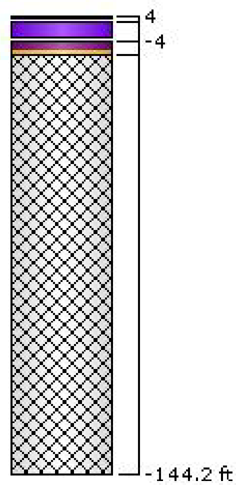
BB-WS46-207/207A

XY Location:		BB-WS46-207/207A: (1.13677e+06, 397947)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	6.3	-4	No
3	Wetland Deposit 3 (Organic Silt)	0	-10.3	No
4	Marine Clay 1	0	-10.3	No
5	Marine Clay 2	0	-10.3	No
6	Marine Clay 3	0	-10.3	Yes
7	Glacial Till	0	-10.3	Yes



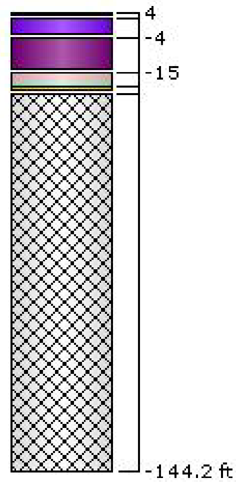
BB-WS46-105

XY Location:	BB-WS46-105: (1.13679e+06, 397912)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	4.2	-4	No
3	Wetland Deposit 3 (Organic Silt)	0	-8.2	No
4	Marine Clay 1	0	-8.2	No
5	Marine Clay 2	0	-8.2	No
6	Marine Clay 3	0	-8.2	Yes
7	Glacial Till	0	-8.2	Yes



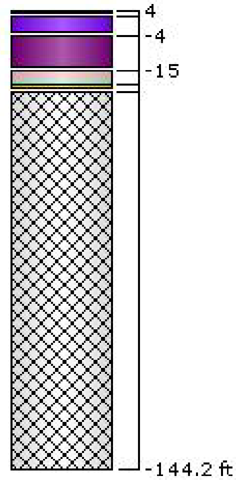
X-1

XY Location:		X-1: (1.13684e+06, 398095)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	4.4	-15	No
4	Marine Clay 1	0	-19.4	No
5	Marine Clay 2	0	-19.4	No
6	Marine Clay 3	0	-19.4	Yes
7	Glacial Till	2.4	-19.4	Yes



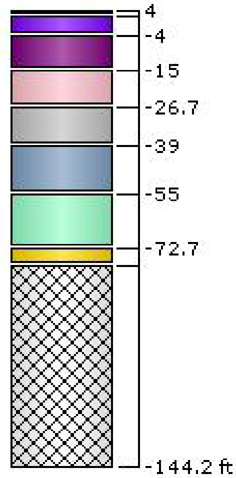
X-2

XY Location:	X-2: (1.13696e+06, 397938)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	4.4	-15	No
4	Marine Clay 1	0	-19.4	No
5	Marine Clay 2	0	-19.4	No
6	Marine Clay 3	0	-19.4	Yes
7	Glacial Till	2.4	-19.4	Yes



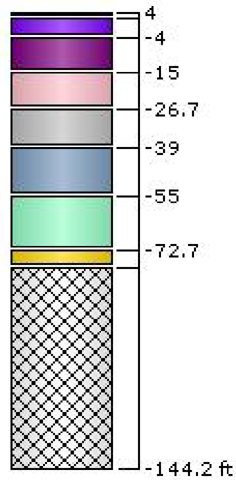
X-3

XY Location:	X-3: (1.13698e+06, 398191)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	11.7	-15	No
4	Marine Clay 1	12.3	-26.7	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	17.7	-55	Yes
7	Glacial Till	5.9	-72.7	Yes



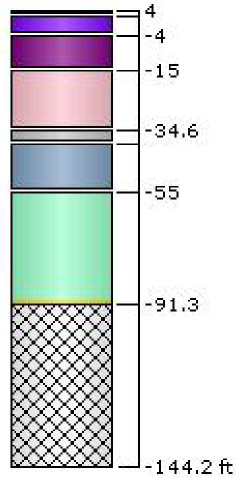
X-4

XY Location:	X-4: (1.1371e+06, 398046)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	11.7	-15	No
4	Marine Clay 1	12.3	-26.7	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	17.7	-55	Yes
7	Glacial Till	5.9	-72.7	Yes



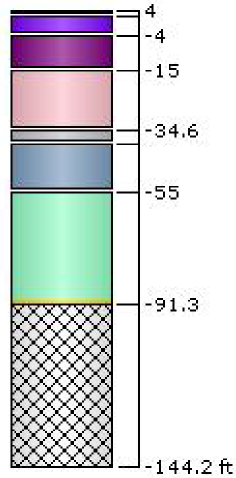
X-5

XY Location:		X-5: (1.13714e+06, 398316)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	19.6	-15	No
4	Marine Clay 1	4.4	-34.6	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	36.3	-55	Yes
7	Glacial Till	0	-91.3	Yes



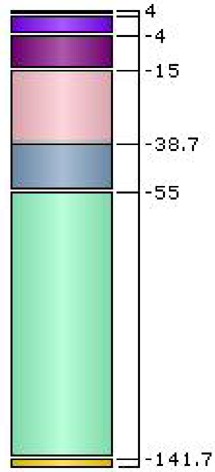
X-6

XY Location:		X-6: (1.13726e+06, 398160)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	19.6	-15	No
4	Marine Clay 1	4.4	-34.6	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	36.3	-55	Yes
7	Glacial Till	0	-91.3	Yes



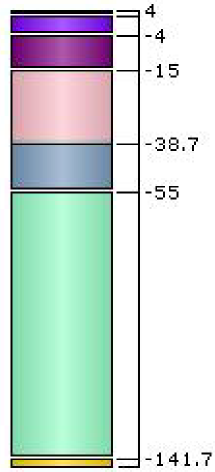
X-7

XY Location:	X-7: (1.1373e+06, 398429)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	23.7	-15	No
4	Marine Clay 1	0.3	-38.7	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	86.7	-55	Yes
7	Glacial Till	2.5	-141.7	Yes



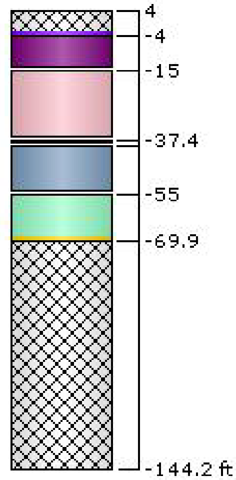
X-8

XY Location:		X-8: (1.13742e+06, 398285)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	23.7	-15	No
4	Marine Clay 1	0.3	-38.7	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	86.7	-55	Yes
7	Glacial Till	2.5	-141.7	Yes



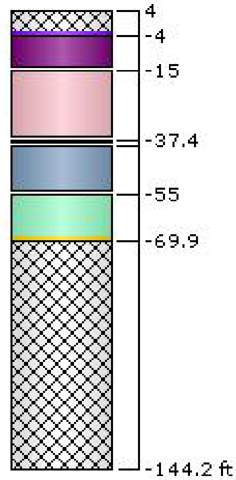
X-9

XY Location:	X-9: (1.13747e+06, 398571)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	0	-4	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	22.4	-15	No
4	Marine Clay 1	1.6	-37.4	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	14.9	-55	Yes
7	Glacial Till	0	-69.9	Yes



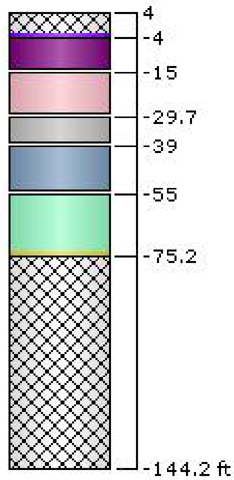
X-10

XY Location:	X-10: (1.1376e+06, 398408)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	0	-4	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	22.4	-15	No
4	Marine Clay 1	1.6	-37.4	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	14.9	-55	Yes
7	Glacial Till	0	-69.9	Yes



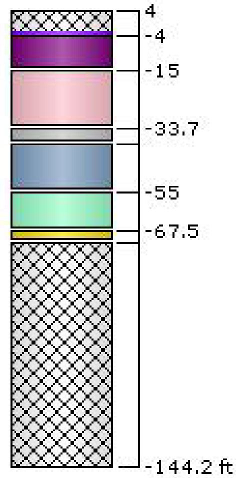
X-11

XY Location:	X-11: (1.13767e+06, 398459)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	0	-4	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	14.7	-15	No
4	Marine Clay 1	9.3	-29.7	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	20.2	-55	Yes
7	Glacial Till	0	-75.2	Yes



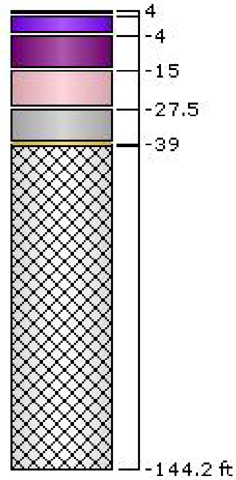
X-12

XY Location:		X-12: (1.13755e+06, 398619)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	0	-4	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	18.7	-15	No
4	Marine Clay 1	5.3	-33.7	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	12.5	-55	Yes
7	Glacial Till	3.8	-67.5	Yes



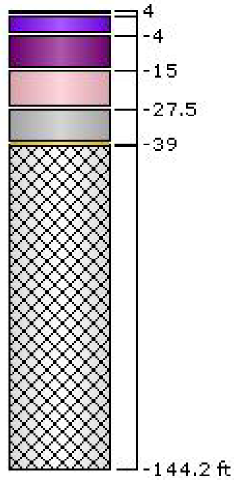
X-13

XY Location:		X-13: (1.13761e+06, 398664)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	12.5	-15	No
4	Marine Clay 1	11.5	-27.5	No
5	Marine Clay 2	0.5	-39	No
6	Marine Clay 3	0	-39.5	Yes
7	Glacial Till	0	-39.5	Yes



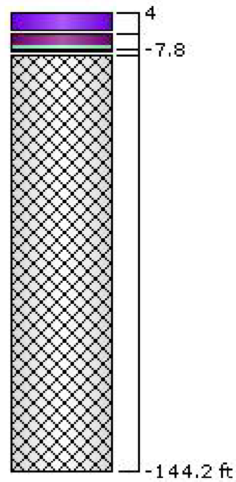
X-14

XY Location:		X-14: (1.13773e+06, 398505)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	12.5	-15	No
4	Marine Clay 1	11.5	-27.5	No
5	Marine Clay 2	0.5	-39	No
6	Marine Clay 3	0	-39.5	Yes
7	Glacial Till	0	-39.5	Yes



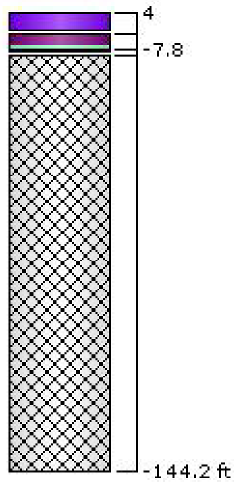
X-15

XY Location:	X-15: (1.13772e+06, 398723)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	7	4	No
2	Wetland Deposit 2 (Organic Silt)	4.8	-3	No
3	Wetland Deposit 3 (Organic Silt)	0	-7.8	No
4	Marine Clay 1	0	-7.8	No
5	Marine Clay 2	0	-7.8	No
6	Marine Clay 3	0	-7.8	Yes
7	Glacial Till	1.6	-7.8	Yes



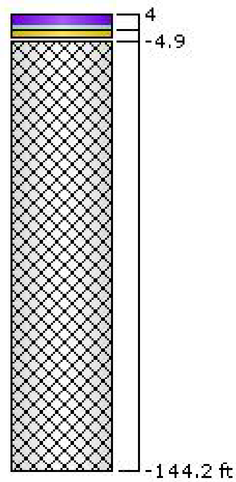
X-16

XY Location:	X-16: (1.13782e+06, 398589)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	7	4	No
2	Wetland Deposit 2 (Organic Silt)	4.8	-3	No
3	Wetland Deposit 3 (Organic Silt)	0	-7.8	No
4	Marine Clay 1	0	-7.8	No
5	Marine Clay 2	0	-7.8	No
6	Marine Clay 3	0	-7.8	Yes
7	Glacial Till	1.6	-7.8	Yes



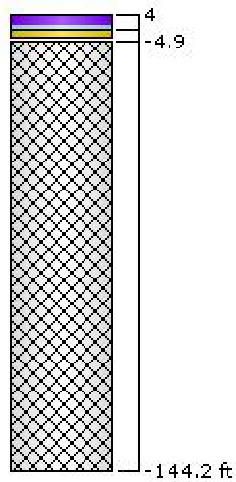
X-17

XY Location:	X-17: (1.13785e+06, 398798)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	5.2	4	No
2	Wetland Deposit 2 (Organic Silt)	0	-1.2	No
3	Wetland Deposit 3 (Organic Silt)	0	-1.2	No
4	Marine Clay 1	0	-1.2	No
5	Marine Clay 2	0	-1.2	No
6	Marine Clay 3	0	-1.2	Yes
7	Glacial Till	3.7	-1.2	Yes



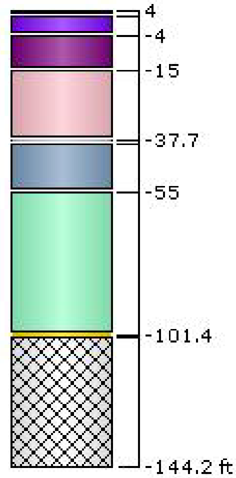
X-18

XY Location:		X-18: (1.13794e+06, 398694)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	5.2	4	No
2	Wetland Deposit 2 (Organic Silt)	0	-1.2	No
3	Wetland Deposit 3 (Organic Silt)	0	-1.2	No
4	Marine Clay 1	0	-1.2	No
5	Marine Clay 2	0	-1.2	No
6	Marine Clay 3	0	-1.2	Yes
7	Glacial Till	3.7	-1.2	Yes



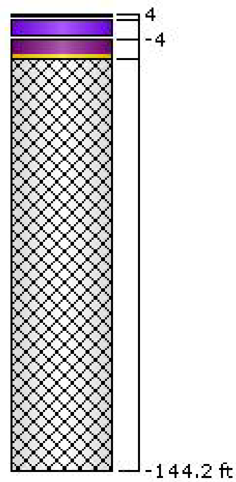
X-19

XY Location:		X-19: (1.13739e+06, 398512)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	22.7	-15	No
4	Marine Clay 1	1.3	-37.7	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	46.4	-55	Yes
7	Glacial Till	0.6	-101.4	Yes



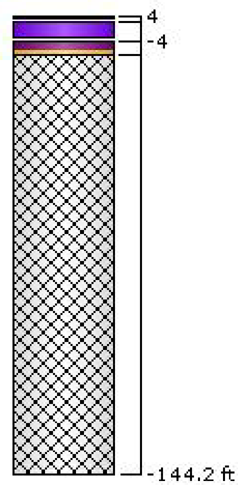
X-20

XY Location:	X-20: (1.13674e+06, 397983)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	6.3	-4	No
3	Wetland Deposit 3 (Organic Silt)	0	-10.3	No
4	Marine Clay 1	0	-10.3	No
5	Marine Clay 2	0	-10.3	No
6	Marine Clay 3	0	-10.3	Yes
7	Glacial Till	0	-10.3	Yes



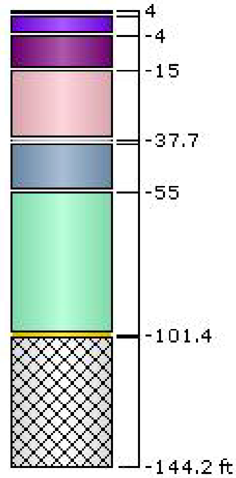
X-21

XY Location:	X-21: (1.13681e+06, 397882)			
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	4.2	-4	No
3	Wetland Deposit 3 (Organic Silt)	0	-8.2	No
4	Marine Clay 1	0	-8.2	No
5	Marine Clay 2	0	-8.2	No
6	Marine Clay 3	0	-8.2	Yes
7	Glacial Till	0	-8.2	Yes



X-22

XY Location:		X-22: (1.13746e+06, 398432)		
Layer #	**Type**	**Thickness [ft]**	**Elevation [ft]**	**Drained at Bottom**
1	Wetland Deposit 1 (Organic Silt)	6	2	No
2	Wetland Deposit 2 (Organic Silt)	11	-4	No
3	Wetland Deposit 3 (Organic Silt)	22.7	-15	No
4	Marine Clay 1	1.3	-37.7	No
5	Marine Clay 2	16	-39	No
6	Marine Clay 3	46.4	-55	Yes
7	Glacial Till	0.6	-101.4	Yes



Soil Properties

Property		Wetland Deposit 1 (Organic Silt)	Wetland Deposit 2 (Organic Silt)	Wetland Deposit 3 (Organic Silt)	Marine Clay 1
Color					
Unit Weight [kips/ft3]		0.09	0.09	0.09	0.112
Saturated Unit Weight [kips/ft3]		0.09	0.09	0.09	0.112
K0		0.5	0.5	0.5	0.5
Primary Consolidation		Enabled	Enabled	Enabled	Enabled
Material Type		Non-Linear	Non-Linear	Non-Linear	Non-Linear
Cce		0.25	0.25	0.25	0.19
Cre		0.03	0.03	0.03	0.019
e0		1.1	1.1	1.1	1.1
Pc [ksf]	top	0.49	0.67	1	4.6
	rate of change	0.03	0.03	0.03	-
Cv [ft2/d]		0.07	0.07	0.07	0.1
Cvr [ft2/d]		0.7	0.7	0.7	0.7
Ch [ft2/d]		0.091	0.091	0.091	0.13
B-bar		1	1	1	1
Secondary Consolidation		Standard	Standard	Standard	Standard
Cae		0.014	0.014	0.014	0.007
Care		0.0035	0.0035	0.0035	0.007
Undrained Su A [kips/ft2]		0	0	0	0
Undrained Su S		0.2	0.2	0.2	0.2
Undrained Su m		0.8	0.8	0.8	0.8
Piezo Line ID		1	1	1	1

Property		Marine Clay 2	Marine Clay 3	Glacial Till
Color				
Unit Weight [kips/ft3]		0.112	0.112	0.115
Saturated Unit Weight [kips/ft3]		0.112	0.112	0.115
K0		0.5	0.5	1
Primary Consolidation		Enabled	Enabled	Disabled
Material Type		Non-Linear	Non-Linear	
Cce		0.19	0.21	-
Cre		0.019	0.021	-
e0		1.1	1.1	-
Pc [ksf]	top	4.6	2.6	-
	rate of change	-0.125	0.05	-
Cv [ft2/d]		0.1	0.1	-
Cvr [ft2/d]		0.7	0.7	-
Ch [ft2/d]		0.13	0.13	-

B-bar	1	1	-
Secondary Consolidation	Standard	Standard	Disabled
Cae	0.007	0.007	-
Care	0.007	0.007	-
Undrained Su A [kips/ft2]	0	0	0
Undrained Su S	0.2	0.2	0.2
Undrained Su m	0.8	0.8	0.8
Piezo Line ID	1	1	1
Rate of change is measured per feet depth.			

Groundwater

Groundwater method	Piezometric Lines
Water Unit Weight	0.0624 kips/ft3

Piezometric Line Entities

ID	Elevation (ft)
1	2 ft

Wick Drains

Wick Drain Region 1

Installation Stage	Stage 10 - Preload Start = 86.81 y
Cross-Section Shape	Strip
Width	0.3
Thickness	0.013
Drain Spacing	5
Drain Length	100
Drain Pattern	Triangular
Ratio of diameter of smear zone to diameter of drain	5
Ratio of undisturbed to smear zone permeability	3

Coordinates

X [ft]	Y [ft]
1.1369e+06	397992
1.13763e+06	398518
1.1376e+06	398561
1.13687e+06	398035

Wick Drain Region 2

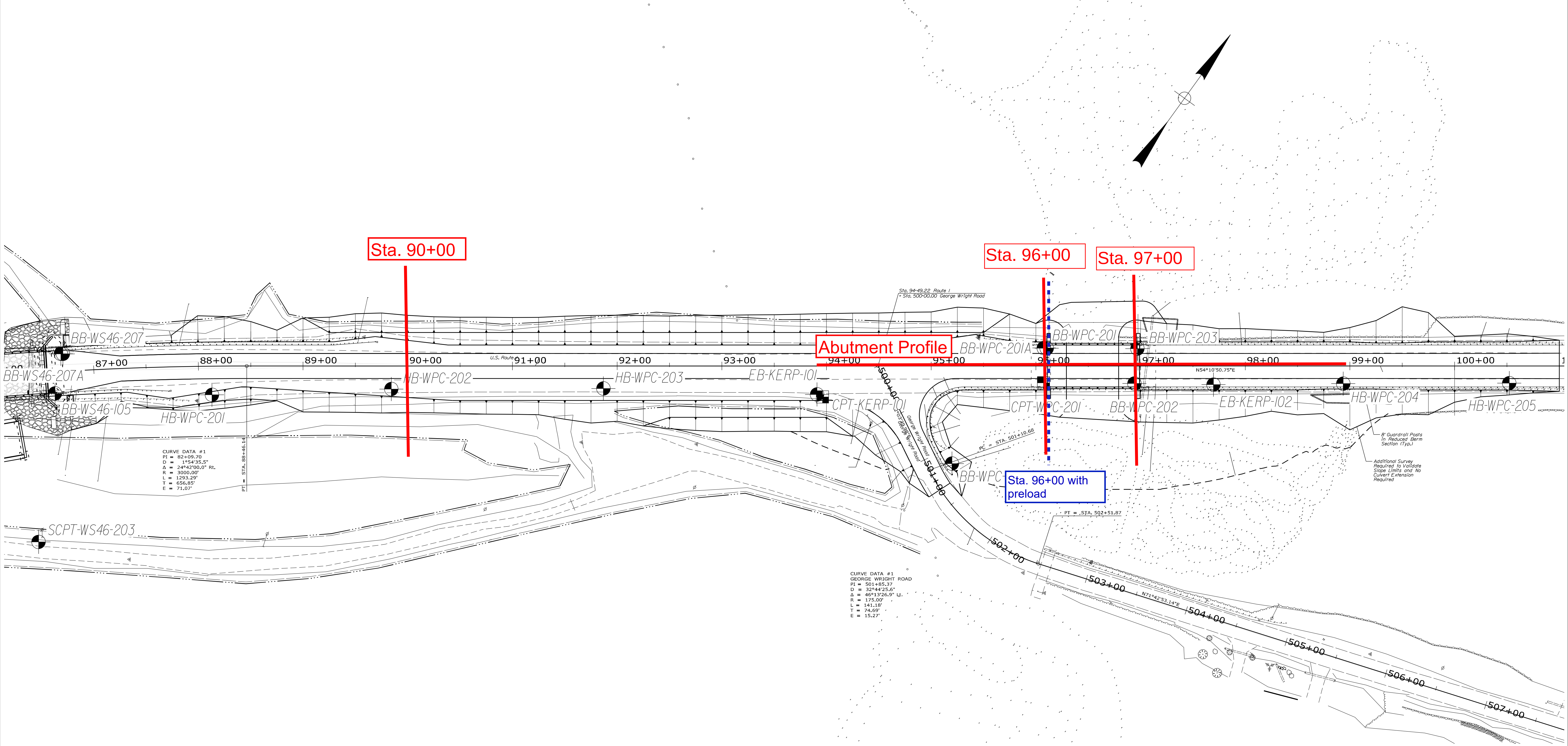
Installation Stage	Stage 10 - Preload Start = 86.81 y
Cross-Section Shape	Strip
Width	0.3
Thickness	0.013
Drain Spacing	5
Drain Length	100
Drain Pattern	Triangular
Ratio of diameter of smear zone to diameter of drain	5
Ratio of undisturbed to smear zone permeability	3

Coordinates

X [ft]	Y [ft]
1.13763e+06	398518
1.13771e+06	398577
1.13768e+06	398620
1.1376e+06	398561

Global Stability Calculations

Calc: E.Tome / B.Cardali
Ck: C.Snow



NOTES

1) Base map developed from electronic files (3DTopo_2Idec09.dgn, Contours.dgn, and Alignments.dgn) provided by HNTB on April 27, 2021 and from electronic file (Bridge.dgn) provided by HNTB on May 27, 2021.

2) The as-drilled locations of the EB-KERP-100 series and BB-WS46-105 test borings were surveyed and provided by MaineDOT in an electronic file (001_Borings_28 OCTOBER 19.dgn).

3) The as-drilled locations of the BB-WPC-200 and HB-WPC-200 series test borings and the CPT-WPC-201 cone penetration test were surveyed and provided by MaineDOT in an electronic file (WOOLWICH 23929.00 BORINGS 19 MAY 21.DGN).

BORING LOCATION PLAN LEGEND

EB-KERP-102	Locations and designations of 100 series borings performed by New England Boring Contractors of Hermon, Maine between October 22 and October 26, 2019.
BB-WPC-205	Locations and designations of 200 series borings performed by New England Boring Contractors of Hermon, Maine between March 22 and April 7, 2021.
BB-WPC-301	Locations and designations of 300 series borings performed by New England Boring Contractors of Hermon, Maine between March 22 and May 19, 2021.
CPT-KERP-101	Location and designation of 100 series Cone Penetrometer Test (CPT) performed by Summit Geoengineering Services, Inc. of Rockland, Maine on October 14, 2019.
CPT-WPC-201	Location and designation of 200 series Cone Penetrometer Test (CPT) performed by Summit Geoengineering Services, Inc. of Rockland, Maine on October XX, XXXX.

PLAN

Scale in Feet

PREPARED BY:

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2392900

WIN
23929.01

BRIDGE PLANS

PLEASANT COVE BRIDGE
KENNEBEC RIVER ESTUARY
WOOLWICH SAGADAHOC COUNTY

BORING LOCATION PLAN

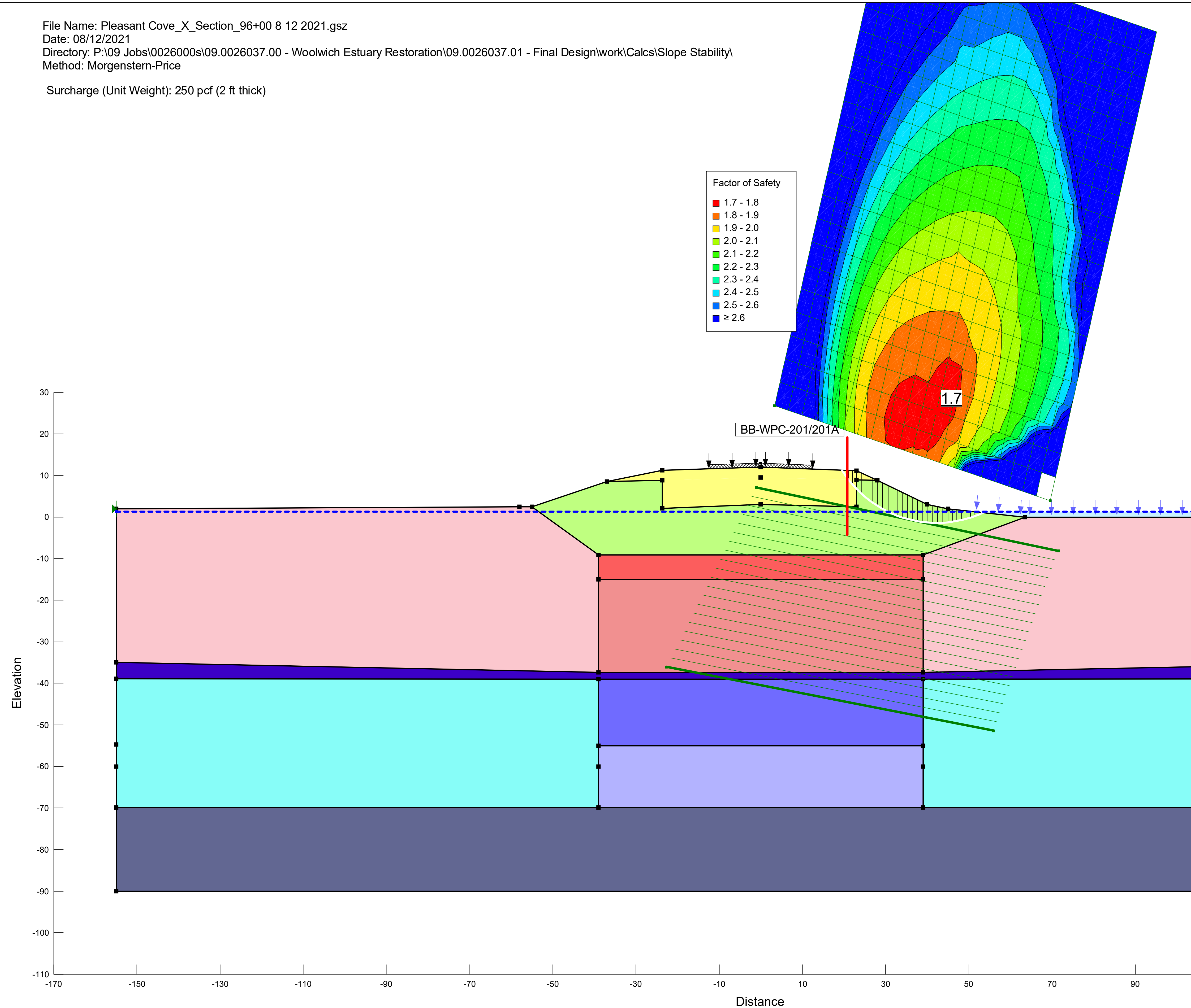
SHEET NUMBER
1

Filename: ...\BLP\Woolwich - BLP Scaled.dgn Division: HIGHWAY Username: common Date:5/28/2021

Station 96+00

File Name: Pleasant Cove_X_Section_96+00 8 12 2021.gsz
Date: 08/12/2021
Directory: P:\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary Restoration\09.0026037.01 - Final Design\work\Calcs\Slope Stability\
Method: Morgenstern-Price

Surcharge (Unit Weight): 250 pcf (2 ft thick)



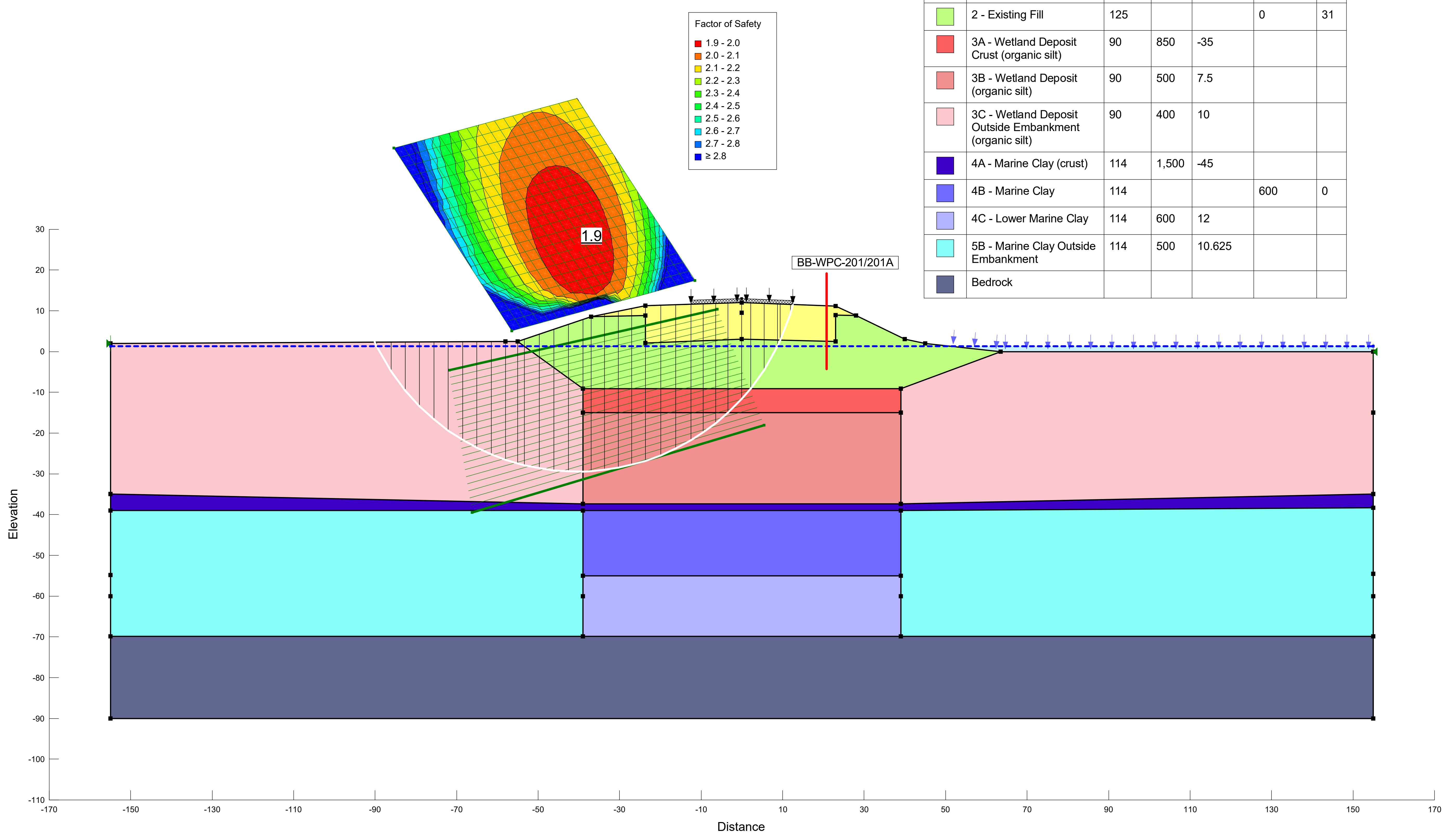
Color	Name	Unit Weight (pcf)	C-Top of Layer (psf)	C-Rate of Change ((lbf/ft²)/ft)	Cohesion (psf)
	1 - New Fill	125			0
	2 - Existing Fill	125			0
	3A - Wetland Deposit Crust (organic silt)	90	850	-35	
	3B - Wetland Deposit (organic silt)	90	500	7.5	
	3C - Wetland Deposit Outside Embankment (organic silt)	90	400	10	
	4A - Marine Clay (crust)	114	1,500	-45	
	4B - Marine Clay	114			600
	4C - Lower Marine Clay	114	600	12	
	5B - Marine Clay Outside Embankment	114	500	10.625	
	Bedrock				

Station 96+00

File Name: Pleasant Cove_X_Section_96+00 8 12 2021.gsz
Date: 08/12/2021
Directory: P:\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary Restoration\09.0026037.01 - Final Design\work\Calcs\Slope Stability\
Method: Morgenstern-Price

Surcharge (Unit Weight): 250 pcf (2 ft thick)

Color	Name	Unit Weight (pcf)	C-Top of Layer (psf)	C-Rate of Change ((lbf/ft²)/ft)	Cohesion' (psf)	Phi' (°)
	1 - New Fill	125			0	32
	2 - Existing Fill	125			0	31
	3A - Wetland Deposit Crust (organic silt)	90	850	-35		
	3B - Wetland Deposit (organic silt)	90	500	7.5		
	3C - Wetland Deposit Outside Embankment (organic silt)	90	400	10		
	4A - Marine Clay (crust)	114	1,500	-45		
	4B - Marine Clay	114			600	0
	4C - Lower Marine Clay	114	600	12		
	5B - Marine Clay Outside Embankment	114	500	10.625		
	Bedrock					

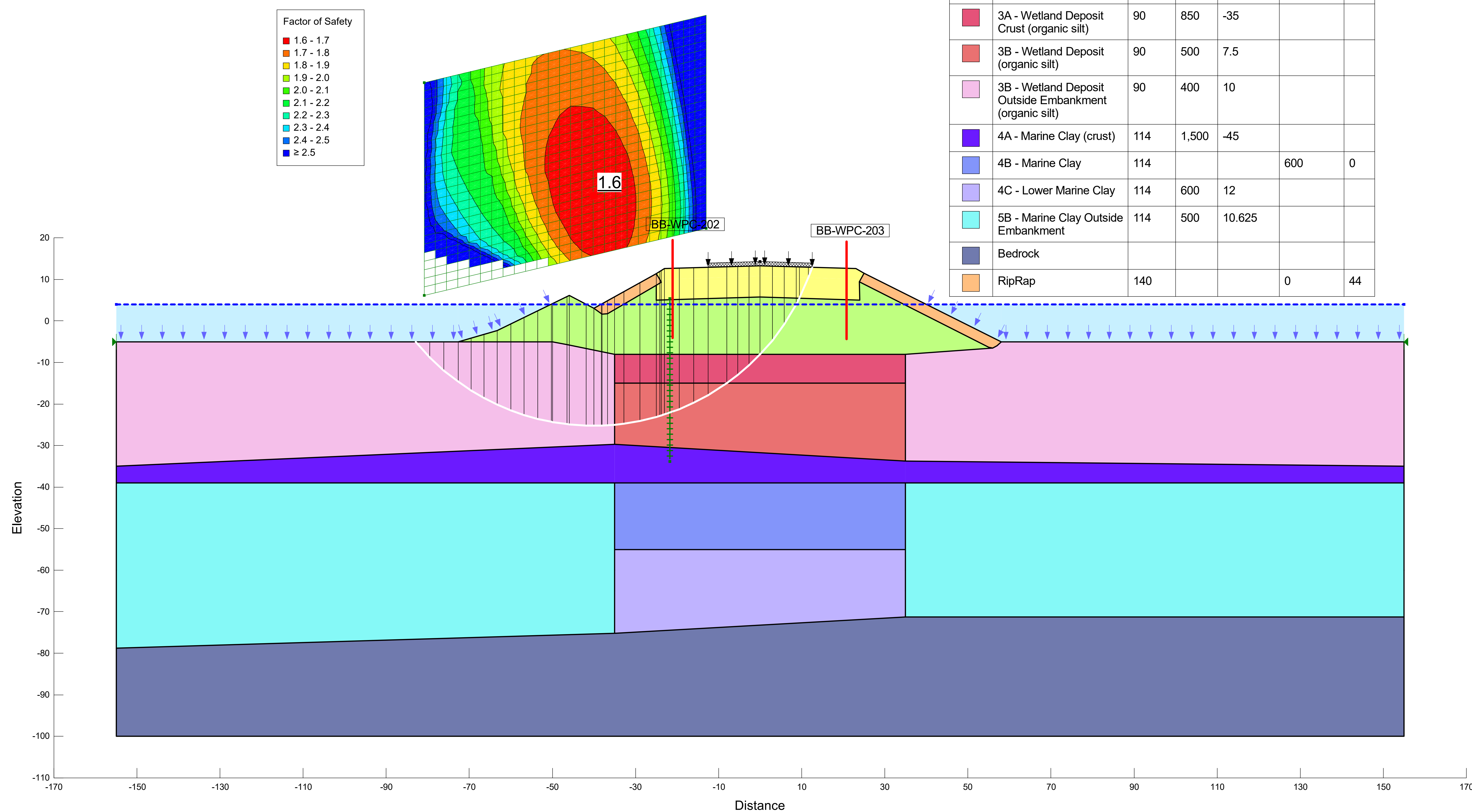


Station 97+00

File Name: Back River_X_Section_97+00 ENT.gsz
Date: 08/12/2021
Directory: P:\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary Restoration\09.0026037.01 - Final Design\work\Calcs\Slope Stability\
Method: Morgenstern-Price

Surcharge (Unit Weight): 250 pcf (2 ft thick)

Color	Name	Unit Weight (pcf)	C-Top of Layer (psf)	C-Rate of Change ((lbf/ft²)/ft)	Cohesion' (psf)	Phi' (°)
	1 - New Fill	125			0	32
	2 - Existing Fill	125			0	32
	3A - Wetland Deposit Crust (organic silt)	90	850	-35		
	3B - Wetland Deposit (organic silt)	90	500	7.5		
	3B - Wetland Deposit Outside Embankment (organic silt)	90	400	10		
	4A - Marine Clay (crust)	114	1,500	-45		
	4B - Marine Clay	114			600	0
	4C - Lower Marine Clay	114	600	12		
	5B - Marine Clay Outside Embankment	114	500	10.625		
	Bedrock					
	RipRap	140			0	44

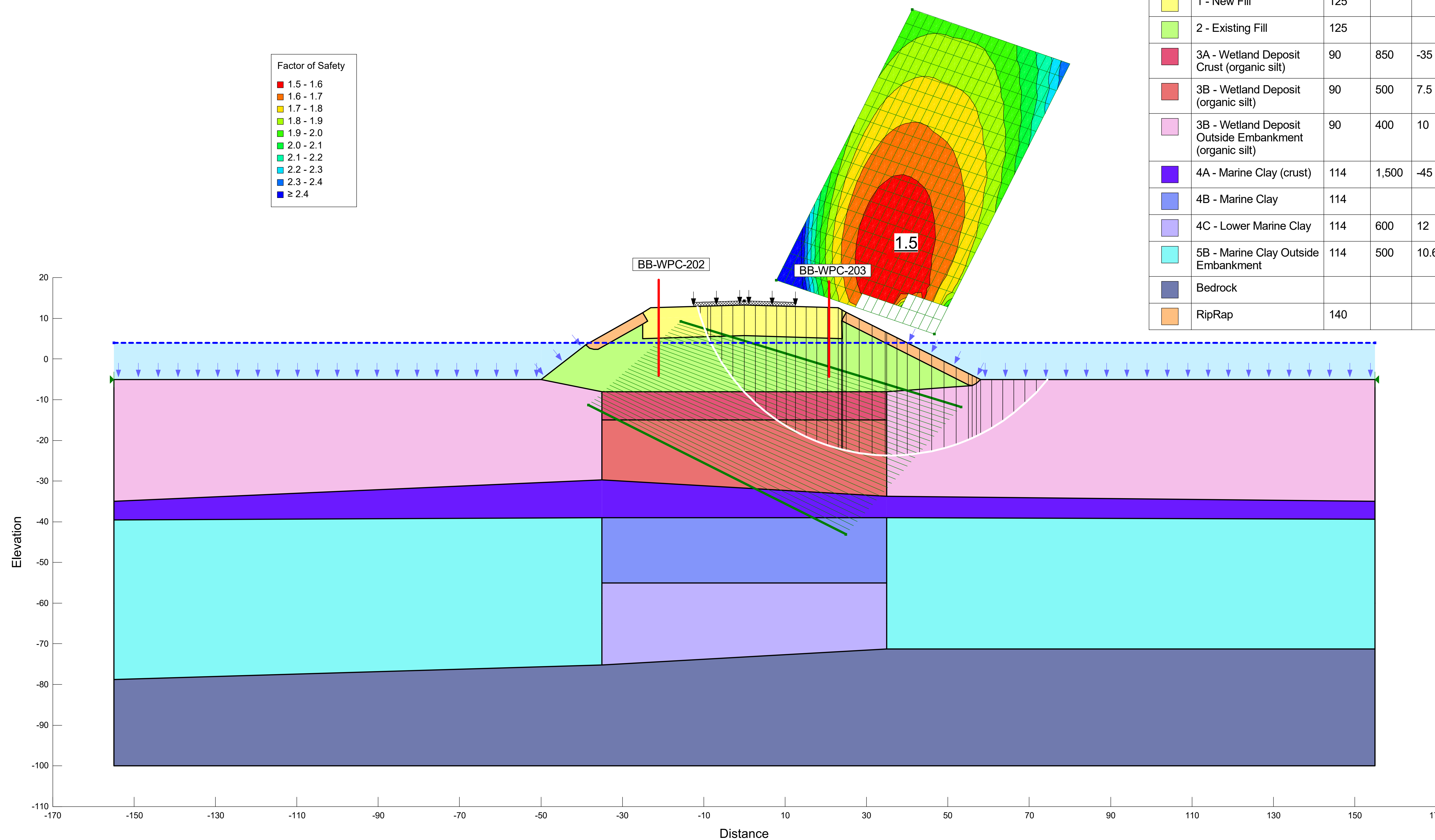


Station 97+00

Date: 08/12/2021
Directory: P:\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary Restoration\09.0026037.01 - Final Design\work\Calcs\Slope Stability\
Method: Morgenstern-Price

Surcharge (Unit Weight): 250 pcf (2 ft thick)

Color	Name	Unit Weight (pcf)	C-Top of Layer (psf)	C-Rate of Change ((lbf/ft²)/ft)	Coh (psf)
	1 - New Fill	125			0
	2 - Existing Fill	125			0
	3A - Wetland Deposit Crust (organic silt)	90	850	-35	
	3B - Wetland Deposit (organic silt)	90	500	7.5	
	3B - Wetland Deposit Outside Embankment (organic silt)	90	400	10	
	4A - Marine Clay (crust)	114	1,500	-45	
	4B - Marine Clay	114			600
	4C - Lower Marine Clay	114	600	12	
	5B - Marine Clay Outside Embankment	114	500	10.625	
	Bedrock				
	RipRap	140			0

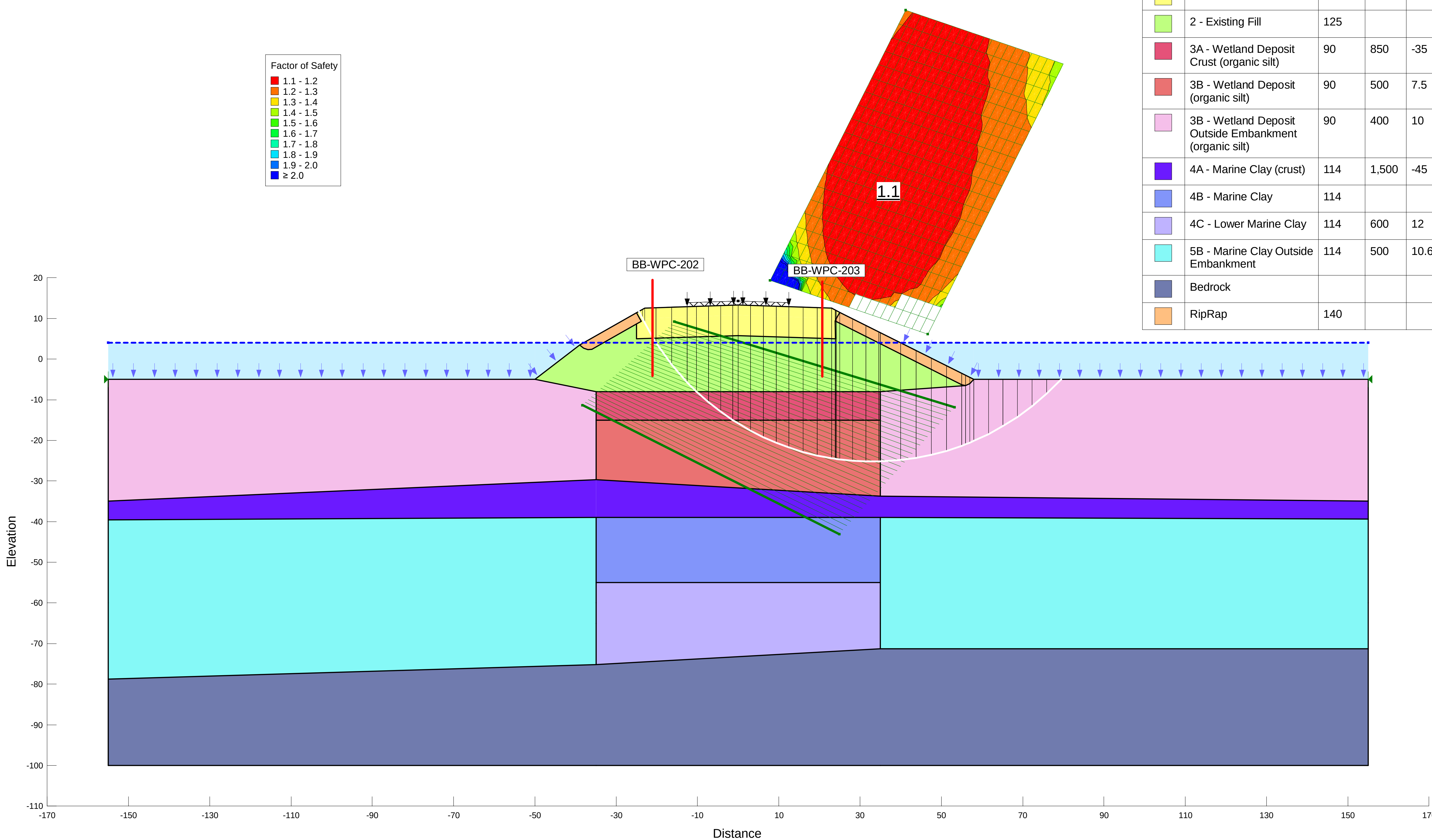


Station 97+00 - Seismic

File Name: Back River_X_Section_97+00 ENT.gsz
Date: 08/19/2021
Directory: P:\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary Restoration\09.0026037.01 - Final Design\work\Calcs\Slope Stability\
Method: Morgenstern-Price

Surcharge (Unit Weight): 250 pcf (2 ft thick)

Color	Name	Unit Weight (pcf)	C-Top of Layer (psf)	C-Rate of Change ((lbf/ft²)/ft)	Cohesion' (psf)	Phi' (°)
	1 - New Fill	125			0	32
	2 - Existing Fill	125			0	32
	3A - Wetland Deposit Crust (organic silt)	90	850	-35		
	3B - Wetland Deposit (organic silt)	90	500	7.5		
	3B - Wetland Deposit Outside Embankment (organic silt)	90	400	10		
	4A - Marine Clay (crust)	114	1,500	-45		
	4B - Marine Clay	114			600	0
	4C - Lower Marine Clay	114	600	12		
	5B - Marine Clay Outside Embankment	114	500	10.625		
	Bedrock					
	RipRap	140			0	44



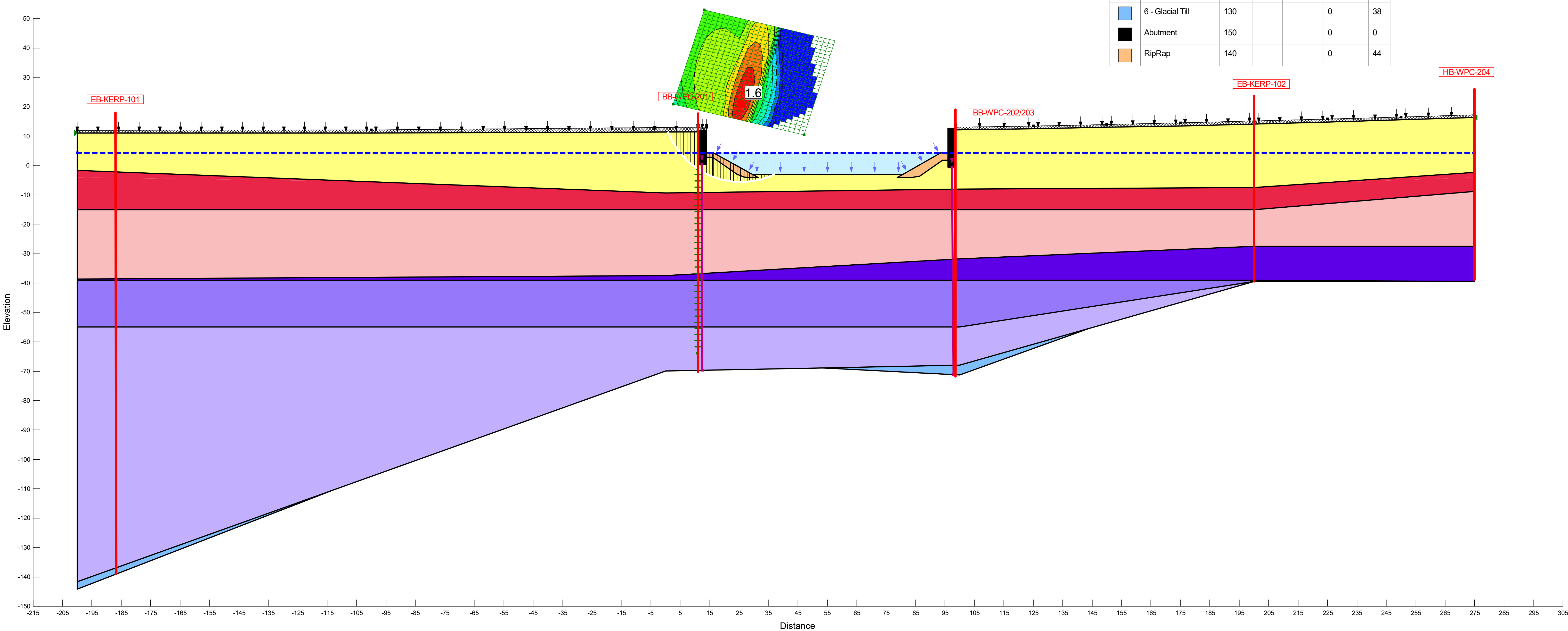
Abutment 1 Profile

File Name: Pleasant Cove_Profile_abutments 8 11 2021.gsz
Date: 08/12/2021
Directory: P:\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary Restoration\09.0026037.01 - Final Design\work\Calcs\Slope Stability\
Method: Morgenstern-Price

Surcharge (Unit Weight): 250 pcf (2 ft thick)

Pile Lateral resistance calculated using Brohms method in cohesive materials (see pages 8-9 for calculation)

Color	Name	Unit Weight (pcf)	C-Top of Layer (psf)	C-Rate of Change ((lbf/ft²)/ft)	Cohesion' (psf)	Phi' (°)
	1 - New Fill	125			0	32
	3A - Wetland Deposit Crust (organic silt)	90	850	-35		
	3C - Lower Wetland Deposit (organic silt)	90	500	7.5		
	4A - Marine Clay (crust)	114	1,500	-45		
	5A - Marine Clay	114			600	0
	5B - Lower Marine Clay	114	600	12		
	6 - Glacial Till	130			0	38
	Abutment	150			0	0
	RipRap	140			0	44



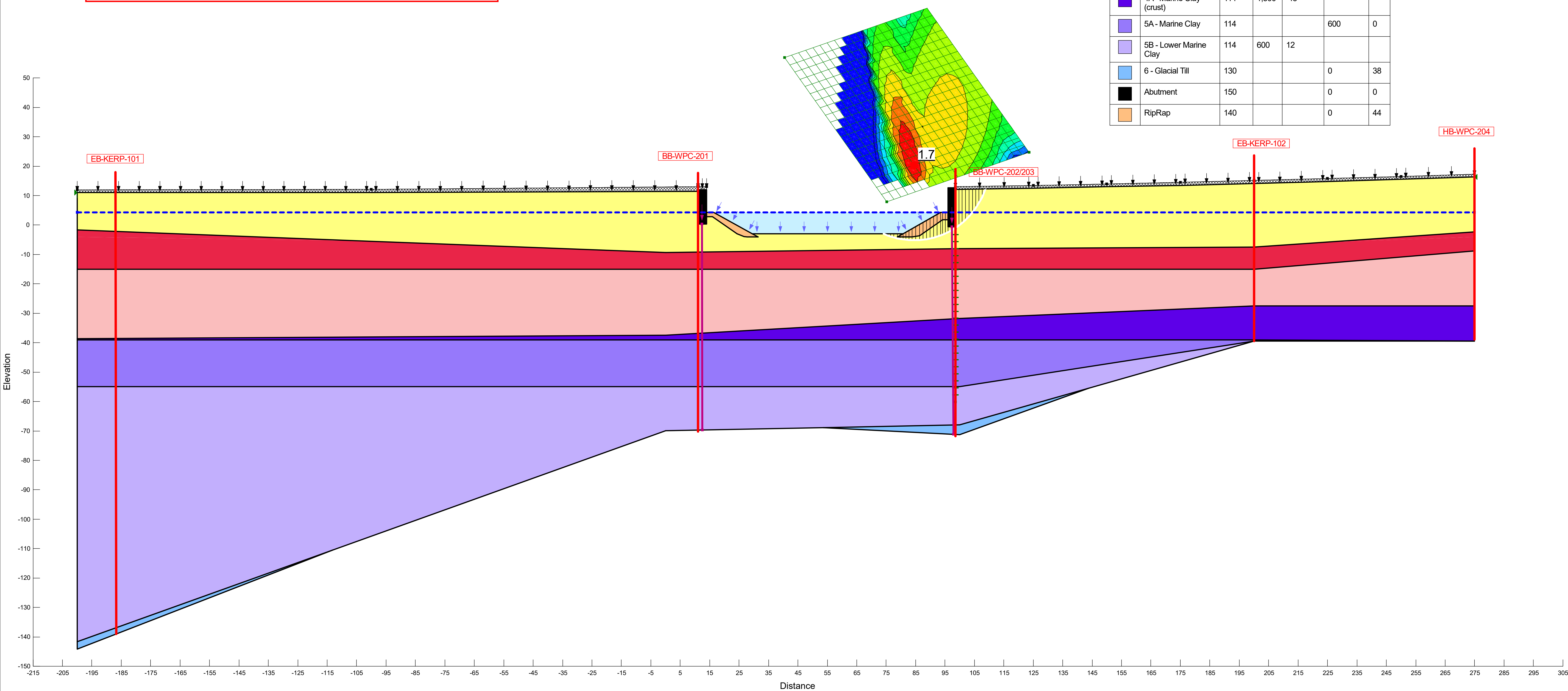
Abutment 2 Profile

File Name: Pleasant Cove_Profile_abutments 8 11 2021.gsz
Date: 08/11/2021
Directory: P:\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary Restoration\09.0026037.01 - Final Design\work\Calcs\Slope Stability\
Method: Morgenstern-Price

Surcharge (Unit Weight): 250 pcf (2 ft thick)

Pile Lateral resistance calculated using Brohms method in cohesive materials (see pages 10-11 for calculation)

Color	Name	Unit Weight (pcf)	C-Top of Layer (psf)	C-Rate of Change ((lbf/ft²)/ft)	Cohesion' (psf)	Phi' (°)
	1 - New Fill	125			0	32
	3A - Wetland Deposit Crust (organic silt)	90	850	-35		
	3C - Lower Wetland Deposit (organic silt)	90	500	7.5		
	4A - Marine Clay (crust)	114	1,500	-45		
	5A - Marine Clay	114			600	0
	5B - Lower Marine Clay	114	600	12		
	6 - Glacial Till	130			0	38
	Abutment	150			0	0
	RipRap	140			0	44



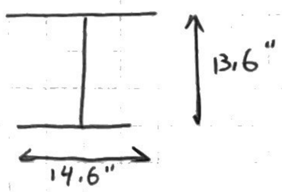
GZA
GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, ME 04106
(207) 879-9190
http://www.gza.com

Engineers and Scientists

JOB	09.0026037.01 PLEASANT COVE
SHEET NO	1 OF 2
Calculated By	B.CARDALI Date 8/11/21
Checked By	C Snow Date 8-16-21
Scale	

EVALUATE LATERAL CAPACITY FOR NEW DRIVEN H-PILES

HP 14x73



$\sigma_y = 50$ ksi

$I_{(weak)} = 261 \text{ in}^4$

$C = 14.6/2 = 7.3$ in

FIND YIELD MOMENT

$$M_y = \frac{\sigma I}{c} = \frac{(50 \text{ ksi})(261 \text{ in}^4)}{7.3 \text{ in}} = 1787.7 \text{ kip-in}$$

$$148.97 \text{ kip-Ft}$$

FROM Brohms Method Fig 16.8 long piles in cohesive soil

$$\text{Ultimate Resistance Moment} = \frac{M_y}{S_u d^3} = \frac{148.97 \text{ k-FT}}{(.5\text{ksf})\left(\frac{13.6}{12}\right)^3} = 204.8$$

FROM FIGURE 16.8

$$\frac{P_u}{S_u d^2} = 45 \implies P_u = (45)(.5)\left(\frac{13.6}{12}\right)^2 = \underline{28.9 \text{ kip}}$$

$\boxed{\text{LATERAL PILE CAPACITY FOR NEW DRIVEN HP 14X73 IS 28.9 kips}}$

For 8-foot spacing, the resisting force is approximately 3.6 kips per foot applied horizontally at the point of intersection with the failure surface. (CLS)

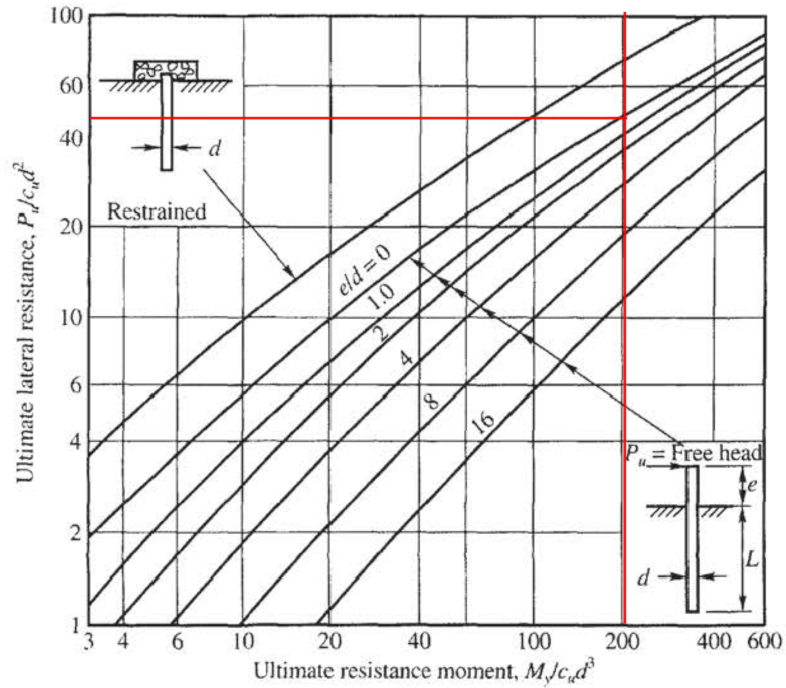


Figure 16.8 Ultimate lateral resistance of a long pile in cohesive soil related to embedded length (after Broms (1964a))

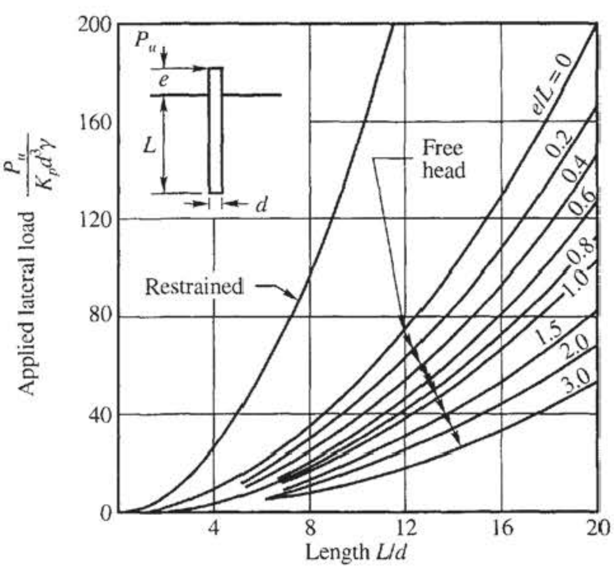


Figure 16.9 Ultimate lateral resistance of a short pile in cohesionless soil related to embedded length (after Broms (1964b))

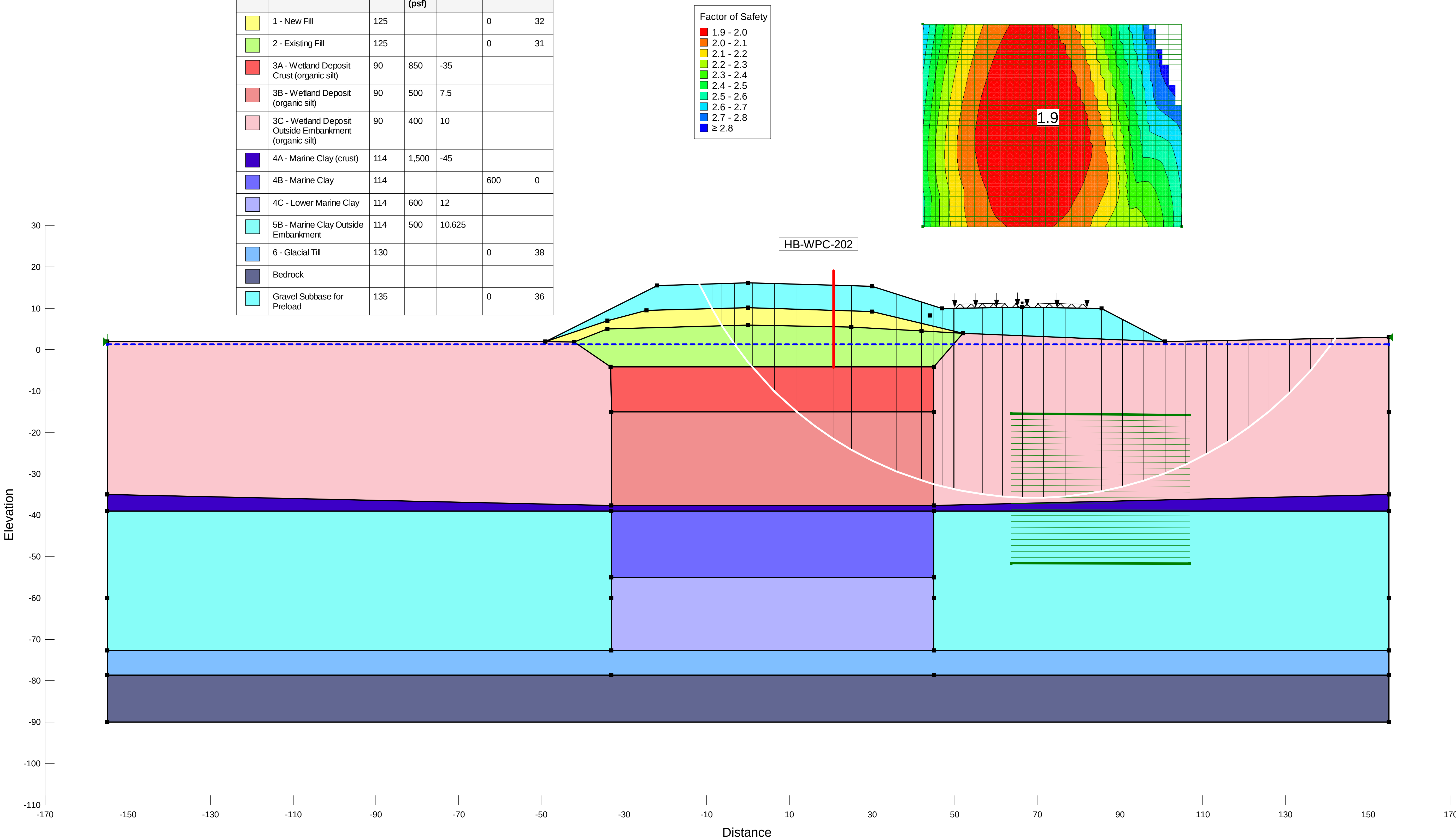
involves the yield moment M_y for the pile section. The equations suggested by Broms for computing M_y are as follows:

Station 90+00 - Temporary Detour and Preload

File Name: Pleasant Cove_X_Section_90+00 ENT.gsz
Date: 08/19/2021
Directory: P:\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary Restoration\09.0026037.01 - Final Design\work\Calcs\Slope Stability\
Method: Morgenstern-Price

Surcharge (Unit Weight): 250 pcf (2 ft thick)

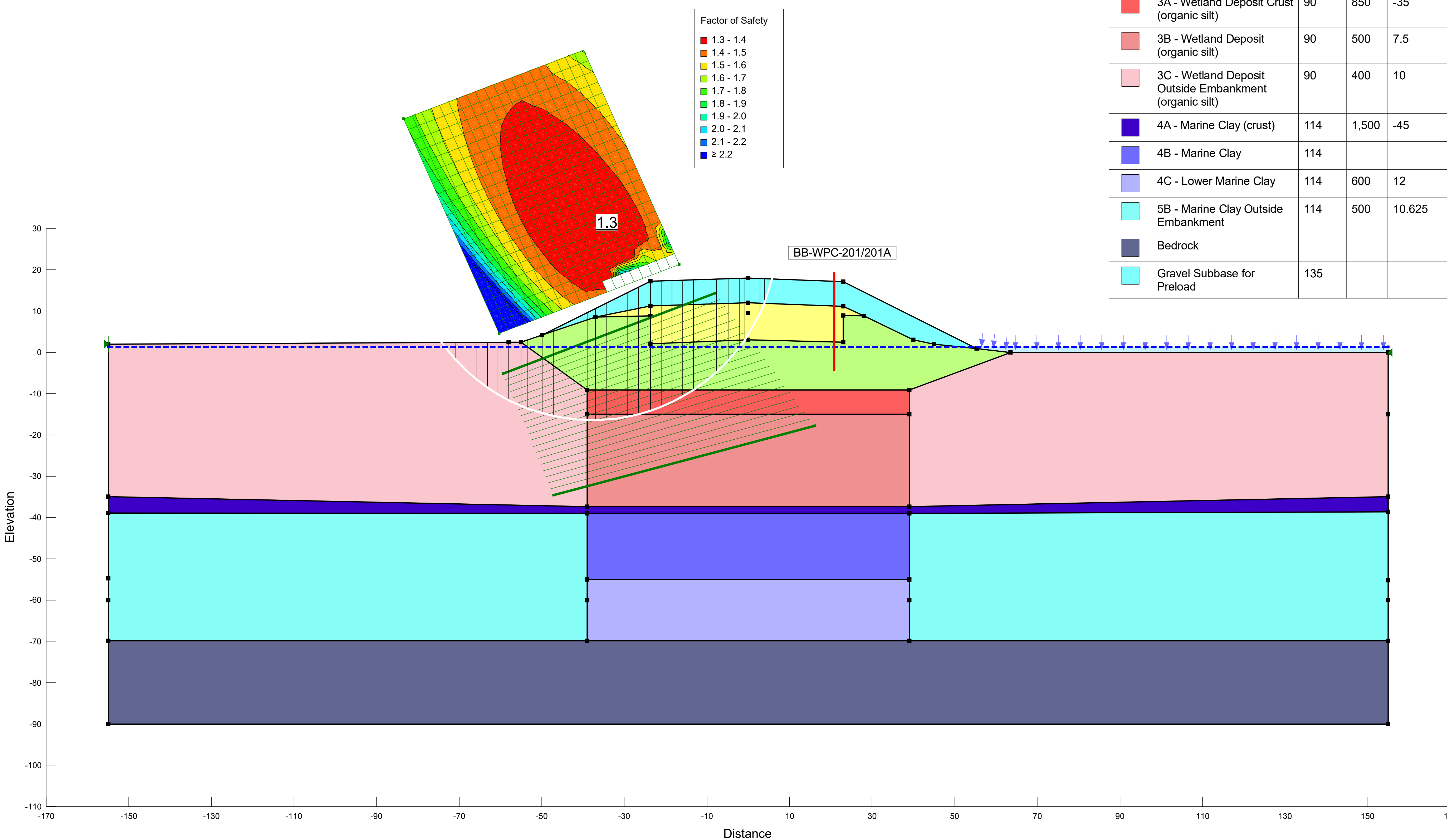
Color	Name	Unit Weight (pcf)	C-Top of Layer (psf)	C-Rate of Change ((lbf/ft²)/ft)	Cohesion' (psf)	Phi' (°)
	1 - New Fill	125			0	32
	2 - Existing Fill	125			0	31
	3A - Wetland Deposit Crust (organic silt)	90	850	-35		
	3B - Wetland Deposit (organic silt)	90	500	7.5		
	3C - Wetland Deposit Outside Embankment (organic silt)	90	400	10		
	4A - Marine Clay (crust)	114	1,500	-45		
	4B - Marine Clay	114			600	0
	4C - Lower Marine Clay	114	600	12		
	5B - Marine Clay Outside Embankment	114	500	10.625		
	6 - Glacial Till	130			0	38
	Bedrock					
	Gravel Subbase for Preload	135			0	36



Station 96+00 - 6 foot surcharge

File Name: Pleasant Cove_X_Section_96+00 8 12 2021.gsz
Date: 08/12/2021
Directory: P:\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary Restoration\09.0026037.01 - Final Design\work\Calcs\Slope Stability\
Method: Morgenstern-Price

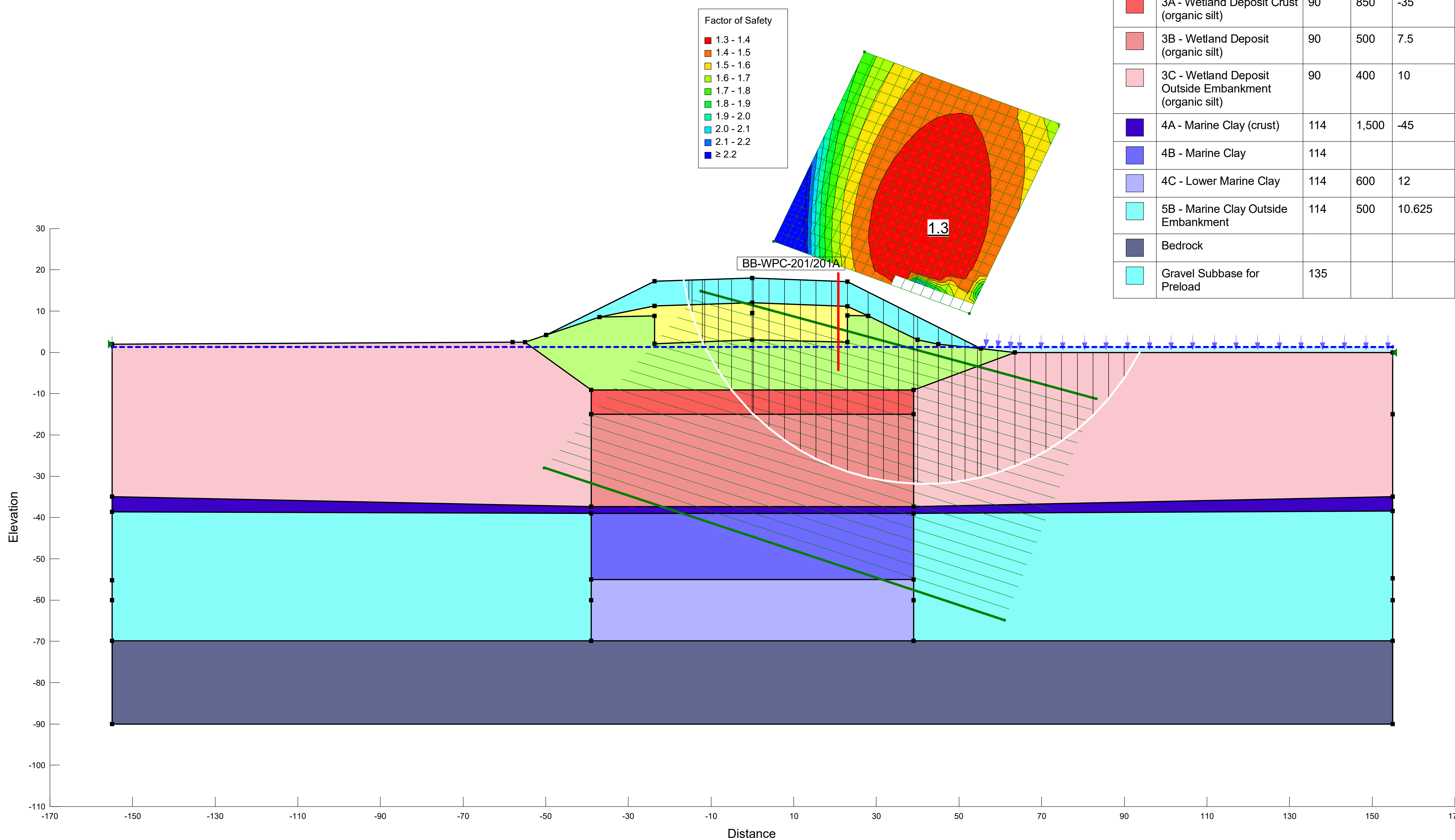
Color	Name	Unit Weight (pcf)	C-Top of Layer (psf)	C-Rate of Change ((lbf/ft²)/ft)	Cohesion' (psf)	Phi' (°)
	1 - New Fill	125			0	32
	2 - Existing Fill	125			0	31
	3A - Wetland Deposit Crust (organic silt)	90	850	-35		
	3B - Wetland Deposit (organic silt)	90	500	7.5		
	3C - Wetland Deposit Outside Embankment (organic silt)	90	400	10		
	4A - Marine Clay (crust)	114	1,500	-45		
	4B - Marine Clay	114			600	0
	4C - Lower Marine Clay	114	600	12		
	5B - Marine Clay Outside Embankment	114	500	10.625		
	Bedrock					
	Gravel Subbase for Preload	135			0	36



Station 96+00 - 6 foot surcharge

File Name: Pleasant Cove_X_Section_96+00 8 12 2021.gsz
Date: 08/12/2021
Directory: P:\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary Restoration\09.0026037.01 - Final Design\work\Calcs\Slope Stability\
Method: Morgenstern-Price

Color	Name	Unit Weight (pcf)	C-Top of Layer (psf)	C-Rate of Change ((lbf/ft²)/ft)	Cohesion' (psf)	Phi' (°)
	1 - New Fill	125			0	32
	2 - Existing Fill	125			0	31
	3A - Wetland Deposit Crust (organic silt)	90	850	-35		
	3B - Wetland Deposit (organic silt)	90	500	7.5		
	3C - Wetland Deposit Outside Embankment (organic silt)	90	400	10		
	4A - Marine Clay (crust)	114	1,500	-45		
	4B - Marine Clay	114			600	0
	4C - Lower Marine Clay	114	600	12		
	5B - Marine Clay Outside Embankment	114	500	10.625		
	Bedrock					
	Gravel Subbase for Preload	135			0	36



GZA GeoEnvironmental, Inc
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106
207-879-9190
Fax 207-879-0099
http://www.gza.com

Engineers and Scientists

Objective

Evaluate the axial geotechnical resistance of the abutment for the Plesant Cove Bridge in Woolwich, ME. Evaluations were conducted to assess a suitable driving system to install piles to the required geotechnical nominal resistance of 464 kips for Abutment piles.

Methodology

Evaluate proposed pile section for governing factored axial compression resistance as follows.

1. Nominal Compressive Resistance
2. Factored Structural Compressive Resistance - Strength Limit State
3. Factored Structural Compressive Resistance - Extreme/Service Limit State
4. Geotechnical Resistance (Static Analysis)
5. Geotechnical Resistance (Drivability Analysis)
6. Factored Geotechnical Resistance - Strength Limit State
7. Factored Geotechnical Resistance - Extreme/Service Limit State

References

1. American Association of State Highway and Transportation Officials, AASHTO LRFD Bridge Design Specifications: Customary U.S. Units, 8th edition. (AASHTO LRFD)

Soil Properties

Consider Pleasant Cove Bridge Interpretive Subsurface Profile (see Figure 3), subsurface layering and properties relative to pile design are presented in the Apile outputs attached.

Structural Properties

HP14x73, ASTM A572, Gr. 50

Yield Strength of Steel $F_y := 50ksi$

Area of section $A_s := 21.4in^2$

Young's Modulus of Steel $E_s := 30000 \cdot ksi$

Radius of gyration (weak axis) $r_x := 3.49in$

1. Nominal Structural Compressive Resistance P_n

Nominal Compressive Resistance: $P_n := 0.66^{\lambda} \cdot F_y \cdot A_s$ AASHTO Eq. 6.9.5.1-1

Determine normalized column slenderness factor λ

$$\lambda := \left(\frac{K \cdot l}{r_s \cdot \pi}\right)^2 \cdot \frac{F_y}{E}$$ AASHTO Eq. 6.9.4.1-3 pg. 6-74

$\lambda := 0$ Where the pile is fully embedded, AASHTO 10.7.3.13.1.

Giving: $P_n := 0.66^{\lambda} \cdot F_y \cdot A_s$ $P_n = 1070 \cdot kip$

2. Factored Structural Compressive Resistance - Strength Limit State:

Factor for piles in compression under hard driving conditions:

From Article 6.5.4.2 $\phi_c := 0.5$

Factored Compressive Resistance for Strength Limit State:

$P_r := \phi_c \cdot P_n$ AASHTO Eq. 6.9.2.1-1 pg. 6-71

$P_r = 535 \cdot kip$

Note: This is the maximum structural resistance assuming no unbraced length, actual structural resistance should be checked by the structural engineer.

3. Factored Structural Compressive Resistance - Service/Extreme Limit State:

Resistance Factors for Extreme Limit States:

From Article 10.5.5.1 and 10.5.5.3 $\phi := 1$

Factored Compressive Resistance for Service/Extreme Limit State:

$P_r := \phi \cdot P_n$ AASHTO Eq. 6.9.2.1-1 pg. 6-71

$P_r = 1070 \cdot kip$

4. Geotechnical Axial Resistance - Static Analysis

AASHTO Article 10.7.3.2.3 states that the nominal resistance of piles driven to point bearing on hard rock is controlled by the structural limit state or potential for driving damage to occur during hard driving.

Required nominal resistance of 464 kips for the pile configuration based on a maximum factored pile loads of 301.6 kips and a 0.65 resistance factor.

The estimated % skin friction resistance is 10% for the piles at the required nominal pile resistance, based on the estimated friction resistance. A-pile is higher, but we anticipate driving resistance in the wetland and Marine deposits may be lower than the calculated static resistance.

5. Geotechnical Axial Resistance - Drivability Analysis

$\sigma_{dr} := 0.9 \cdot \phi_{da} \cdot f_y$ AASHTO Eq. 10.7.8.1

$f_y := 50\text{ksi}$ yield Strength of steel

$\phi_{da} := 1.0$ AASHTO Table 10.5.5.2.3-1 Refers to Article 6.5.4.2, Pg. 6-28

$\sigma_{dr} := 0.9 \cdot \phi_{da} \cdot f_y$ $\sigma_{dr} = 45 \cdot \text{ksi}$ Driving Stress in pile cannot exceed 45 ksi

Abutment Piles - Drive pile plumb through 71 feet of soil to rock with toe quake representative of tip resistance in soil (0.14 in) and no plug and representative of tip resistance on rock (0.04 in), to evaluate range of driving conditions. Model pile length as 76 feet (5 foot stickup at end of drive).
Drive piles with a Delmag D19-52 open-ended diesel hammer with a rated energy of 47,132 ft-lbs (fuel setting 1, maximum and fuel setting 2, 1 below maximum). **The proposed hammer is sized to achieve the required nominal pile resistance for each of the potential driving scenarios; not the maximum driveability resistance for the pile section and profile.**

GRLWEAP Output is attached for the Abutment piles.

$R_{ndr1} := 465\text{kip}$

Required nominal geotechnical resistance:
Toe quake 0.14 inch (fuel setting 1) - pile driving stress=37 ksi, final penetration resistance=9 bpi.
Toe quake 0.04 inch (fuel setting 2) - pile driving stress=37 ksi, final penetration resistance=8 bpi.

6. Factored Drivability Resistance - Strength Limit State:

Strength Limit State Factored Drivability Resistance:

PDA, WEAP and CAPWAP used to establishing driving criteria

$\phi_{dyn} := 0.65$ AASHTO Table 10.5.5.2.3-1

$$R_{ndr1\_factored} := R_{ndr1} \cdot \phi_{dyn}$$

$$R_{ndr1\_factored} = 302 \cdot \text{kip}$$

7. Factored Drivability Resistance - Service/Extreme Limit States:

Service and Extreme Limit State Factored Drivability Resistance:

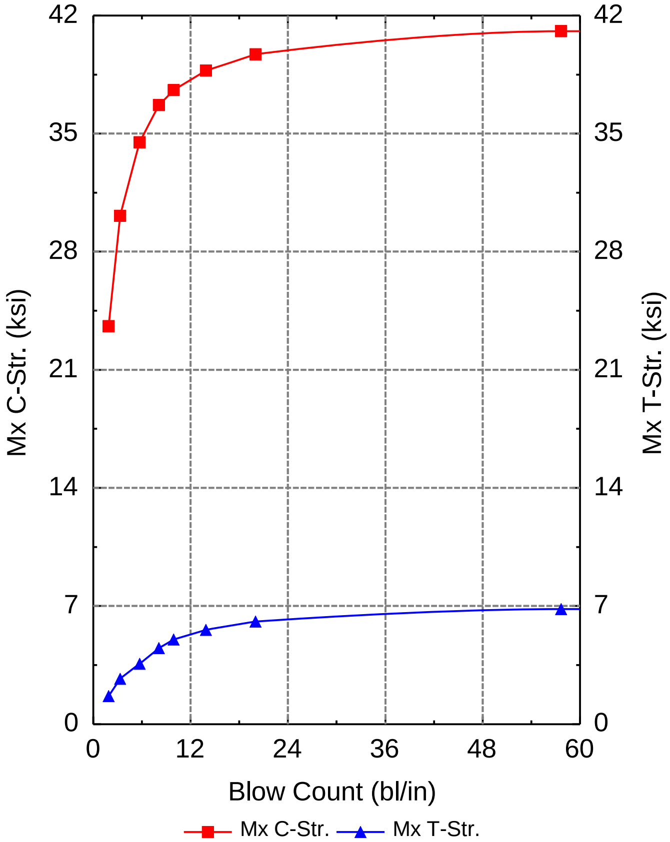
Resistance Factors for Extreme Limit States: $\phi_{serv\_ext} := 1$

From Article 10.5.5.1 and 10.5.5.3

Pier 1: $R_{ndr1\_serv\_ext} := R_{ndr1} \cdot \phi_{serv\_ext}$

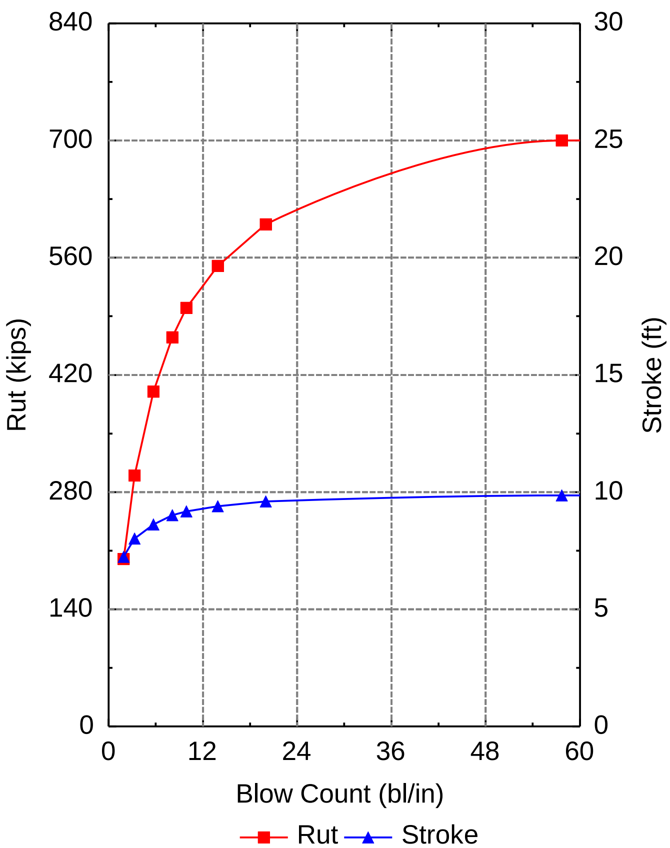
$R_{ndr1\_serv\_ext} = 465 \cdot kip$

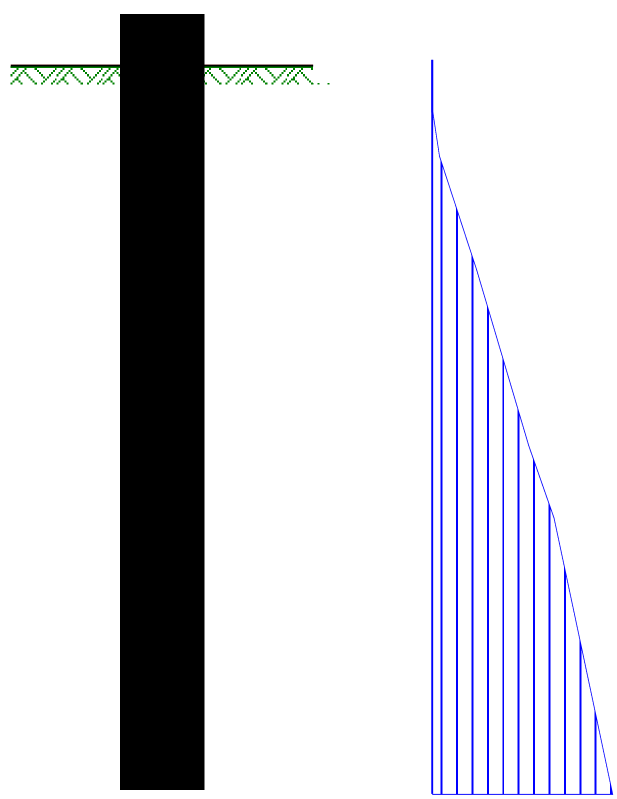
Since the driving stresses do not exceed the limiting driving stress of 45 ksi for ASTM A572 steel (50 ksi yield stress), and the calculated penetration resistance for the piers is within the MaineDOT preferred range of 6 to 15 blows per inch, the analyzed hammer system is judged acceptable to install the piles to the required nominal resistances. The selected hammer system is large enough for the all pier piles.



DELMAG D 19-52

Ram Weight	4.00	kips
Efficiency	0.800	
Pressure	1600.0 (100%)	psi
Helmet Weight	3.100	kips
Hammer Cushion	109976.0	kips/in
COR of H.C.	0.800	
Skin Quake	0.100	in
Toe Quake	0.140	in
Skin Damping	0.050	s/ft
Toe Damping	0.150	s/ft
Pile Length	76.000	ft
Pile Penetration	71.000	ft
Pile Top Area	21.400	in²
RSA	No	



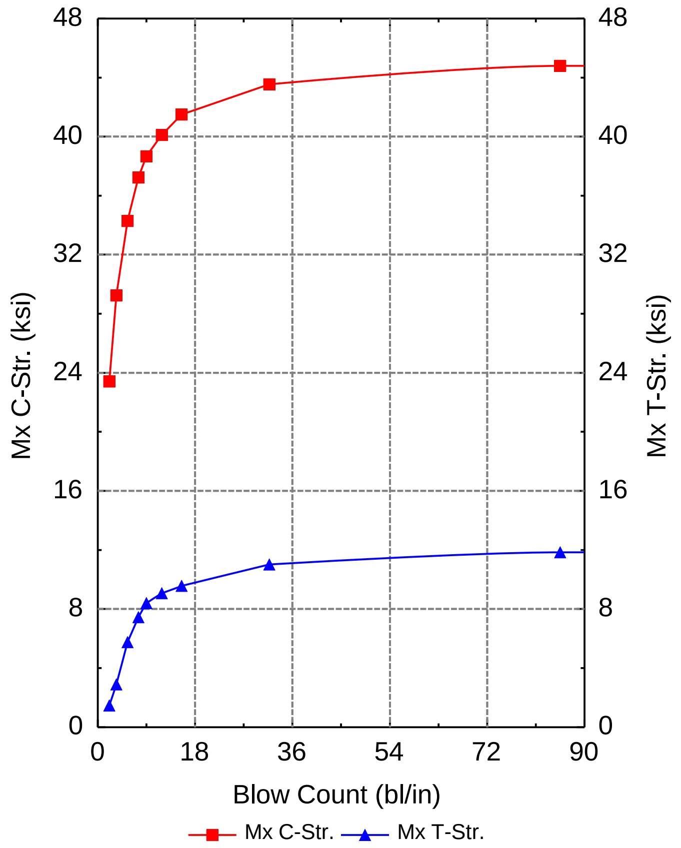


Pile Model

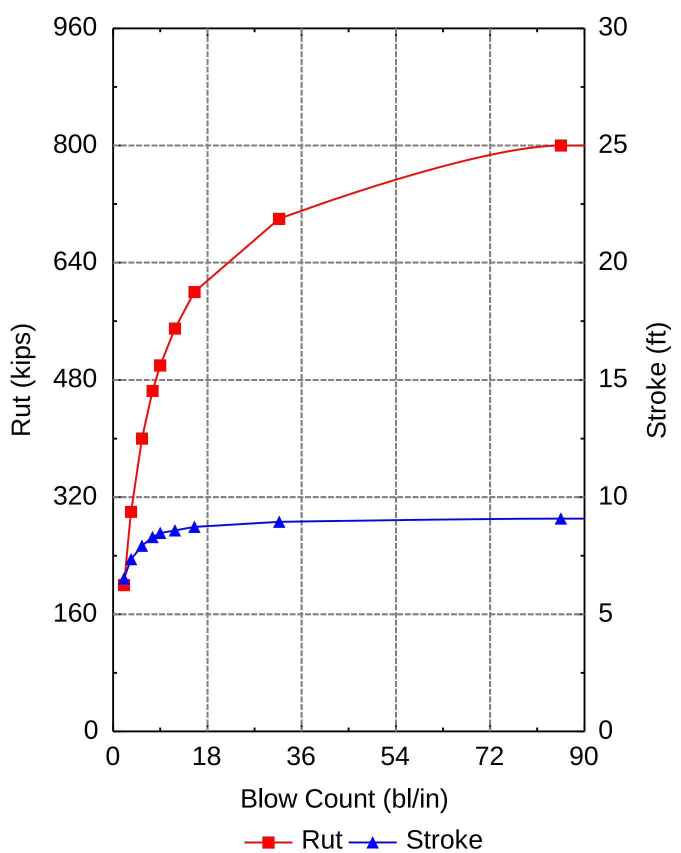
Shaft=10%
(Prop.)

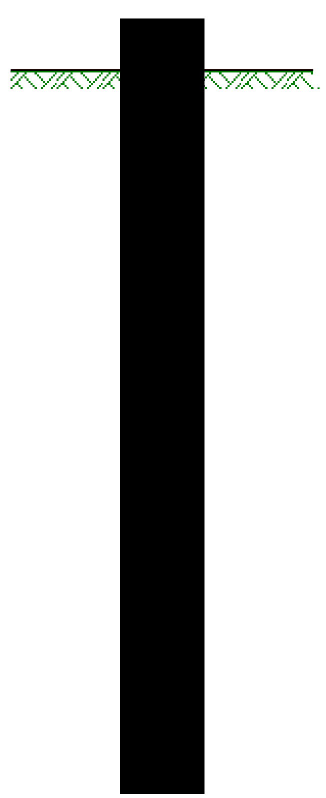
Bearing Graph Summary — DELMAG D 19-52

Rut kips	Mx C-Str. ksi	Mx T-Str. ksi	Blow Ct bl/in	Stroke ft	ENTHRU kip-ft	Hammer -
200.0	23.60	1.65	1.9	7.25	20.43	D 19-52
300.0	30.13	2.69	3.3	8.02	21.75	D 19-52
400.0	34.50	3.57	5.7	8.62	23.29	D 19-52
465.0	36.69	4.50	8.1	9.01	24.38	D 19-52
500.0	37.58	5.01	9.9	9.18	24.81	D 19-52
550.0	38.74	5.59	13.9	9.40	25.42	D 19-52
600.0	39.70	6.09	20.0	9.60	25.90	D 19-52
700.0	41.06	6.81	57.6	9.86	26.58	D 19-52
800.0	41.49	7.22	9999.0	9.88	26.61	D 19-52

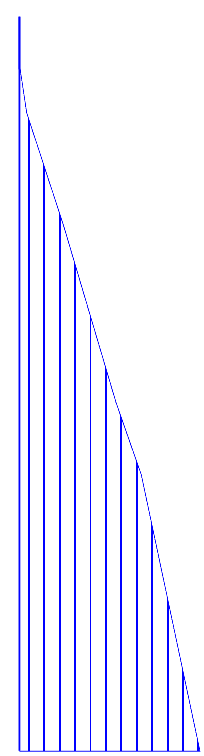


DELMAG D 19-52		
Ram Weight	4.00	kips
Efficiency	0.800	
Pressure	1440.0 (90%)	psi
Helmet Weight	3.100	kips
Hammer Cushion	109976.0	kips/in
COR of H.C.	0.800	
Skin Quake	0.100	in
Toe Quake	0.040	in
Skin Damping	0.050	s/ft
Toe Damping	0.150	s/ft
Pile Length	76.000	ft
Pile Penetration	71.000	ft
Pile Top Area	21.400	in^2
RSA	No	





Pile Model



Shaft=10%
(Prop.)

Bearing Graph Summary — DELMAG D 19-52

Rut	Mx C-Str.	Mx T-Str.	Blow Ct	Stroke	ENTHRU	Hammer
kips	ksi	ksi	bl/in	ft	kip-ft	-
200.0	23.41	1.45	2.1	6.53	16.83	D 19-52
300.0	29.23	2.89	3.4	7.35	18.55	D 19-52
400.0	34.29	5.75	5.5	7.92	20.12	D 19-52
465.0	37.24	7.45	7.5	8.29	21.15	D 19-52
500.0	38.66	8.40	9.0	8.47	21.65	D 19-52
550.0	40.11	9.07	11.8	8.58	21.93	D 19-52
600.0	41.50	9.56	15.5	8.73	22.35	D 19-52
700.0	43.54	11.01	31.7	8.95	22.93	D 19-52
800.0	44.79	11.84	85.5	9.08	23.28	D 19-52
900.0	45.16	12.14	9999.0	9.16	23.46	D 19-52

```
=========================================================================
                 APILE for Windows, Version 2018.8.5

                  Serial Number :  653550831

                  A Program for Analyzing the Axial Capacity
                  and Short-term Settlement of Driven Piles
                            under Axial Loading.
                 (c) Copyright ENSOFT, Inc., 1987-2015
                      All Rights Reserved

=========================================================================


This program is licensed to :

GZA GeoEnvironmental, Inc.
Portland, OR

Path to file locations      : P:\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary
Restoration\09.0026037.01 - Final Design\work\Calcs\Drivability\Apile\
Name of input data file     : Pleasant Cove.ap8d
Name of output file         : Pleasant Cove.ap8o
Name of plot output file    : Pleasant Cove.ap8p

-------------------------------------------------------------------------
                     Time and Date of Analysis
-------------------------------------------------------------------------

          Date:  June 24, 2021     Time:  13:36:13


1
     *********************
     * INPUT INFORMATION *
     *********************




     Pleasant Cove Abutment Piles

     DESIGNER   : B.Cardali

     JOB NUMBER : 09.0026037.01


     METHOD FOR UNIT LOAD TRANSFERS :

     - USACE (U.S. Army Corps of Engineers)
       Unfactored Unit Side Friction and Unit Side Resistance are used.



     COMPUTATION METHOD(S) FOR PILE CAPACITY :

     - USACE (U.S. Army Corps of Engineers)
       # Critical Depth Method for Sand:
         10 to 20 Pile Diameter based on the Density
       Use Long Pile Option


     TYPE OF LOADING :
     - COMPRESSION


     PILE TYPE :

     H-Pile/Steel Pile


     DATA FOR AXIAL STIFFNESS :

     - MODULUS OF ELASTICITY     = 0.290E+08 PSI
     - CROSS SECTION AREA        =     21.40 IN2
```

NONCIRCULAR PILE PROPERTIES :

- TOTAL PILE LENGTH, TL = 76.00 FT.
- BATTER ANGLE = 0.00 DEG
- PILE STICKUP LENGTH, PSL = 5.00 FT.
- ZERO FRICTION LENGTH, ZFL = 5.00 FT.
- PERIMETER OF PILE = 56.40 IN.
- TIP AREA OF PILE = 21.40 IN2
- INCREMENT OF PILE LENGTH USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	SAND	1.25	63.00	32.00	0.00
9.30	SAND	1.25	63.00	32.00	0.00
9.30	CLAY	0.00	48.00	0.00	0.00
20.30	CLAY	0.00	48.00	0.00	0.00
20.30	CLAY	0.00	48.00	0.00	0.00
37.30	CLAY	0.00	48.00	0.00	0.00
37.30	CLAY	0.00	53.00	0.00	0.00
44.30	CLAY	0.00	53.00	0.00	0.00
44.30	CLAY	0.00	53.00	0.00	0.00
75.00	CLAY	0.00	53.00	0.00	0.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	1.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	1.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.70	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.70	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	1.30	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	1.30	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.55	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.55	0.00	0.00	0.00	0.00

* MAXIMUM UNIT FRICTION AND/OR MAXIMUM UNIT BEARING WERE SET TO BE 0.10E+08 BECAUSE THE USER DOES NOT PLAN TO LIMIT THE COMPUTED DATA.

DEPTH FT.	LRFD FACTOR ON UNIT FRICTION	LRFD FACTOR ON UNIT BEARING
0.00	1.000	1.000
9.30	1.000	1.000
9.30	1.000	1.000
20.30	1.000	1.000
20.30	1.000	1.000
37.30	1.000	1.000
37.30	1.000	1.000
44.30	1.000	1.000
44.30	1.000	1.000
75.00	1.000	1.000

1

****
* COMPUTATION RESULT *
****

****
* ARMY CORPS METHOD *
****

PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.2	0.2
1.00	0.0	0.3	0.3
2.00	0.0	0.5	0.5
3.00	0.0	0.8	0.8
4.00	0.0	1.1	1.1
5.00	0.5	1.4	1.9
6.00	1.6	1.7	3.3
7.00	2.9	2.0	4.8
8.00	4.3	2.2	6.5
9.00	6.0	2.1	8.1
10.00	7.9	1.9	9.8
11.00	10.6	1.7	12.3
12.00	14.1	1.4	15.6
13.00	17.7	1.3	19.0
14.00	21.2	1.3	22.5
15.00	24.7	1.3	26.1
16.00	28.2	1.3	29.6
17.00	31.8	1.3	33.1
18.00	35.3	1.3	36.6
19.00	38.8	1.3	40.1
20.00	42.3	1.2	43.6
21.00	45.9	1.1	47.0
22.00	49.1	1.0	50.2
23.00	52.1	1.0	53.0
24.00	55.0	0.9	56.0
25.00	58.0	0.9	58.9
26.00	61.0	0.9	61.9
27.00	63.9	0.9	64.9
28.00	66.9	0.9	67.8
29.00	69.8	0.9	70.8
30.00	72.8	0.9	73.7
31.00	75.8	0.9	76.7
32.00	78.7	0.9	79.7
33.00	81.7	0.9	82.6
34.00	84.6	0.9	85.6
35.00	87.6	0.9	88.5
36.00	90.6	1.0	91.5
37.00	93.5	1.2	94.7
38.00	96.5	1.3	97.8
39.00	99.8	1.5	101.3
40.00	103.5	1.7	105.2
41.00	107.1	1.7	108.9
42.00	110.8	1.7	112.5
43.00	114.5	1.7	116.1
44.00	118.1	1.5	119.6
45.00	121.8	1.2	123.0
46.00	124.9	1.0	125.9
47.00	127.4	0.8	128.2
48.00	129.9	0.7	130.7
49.00	132.5	0.7	133.2
50.00	135.0	0.7	135.7
51.00	137.5	0.7	138.2
52.00	140.0	0.7	140.7
53.00	142.5	0.7	143.3
54.00	145.1	0.7	145.8
55.00	147.6	0.7	148.3
56.00	150.1	0.7	150.8
57.00	152.6	0.7	153.3
58.00	155.1	0.7	155.9
59.00	157.7	0.7	158.4
60.00	160.2	0.7	160.9
61.00	162.7	0.7	163.4
62.00	165.2	0.7	166.0
63.00	167.7	0.7	168.5
64.00	170.3	0.7	171.0
65.00	172.8	0.7	173.5
66.00	175.3	0.7	176.0
67.00	177.8	0.7	178.6
68.00	180.3	0.7	181.1
69.00	182.9	0.7	183.6

```
 70.00        185.4          0.7       186.1
 71.00        187.9          0.7       188.6


NOTES:
- AN ASTERISK IS PLACED IN THE END-BEARING COLUMN
  IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION
  OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.


    ************************************************
    * COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
    * CURVES FOR AXIAL LOADING                      *
    ************************************************

T-Z CURVE   NO. OF   DEPTH TO CURVE   LOAD TRANSFER   PILE MOVEMENT
   NO.      POINTS        FT.              PSI             IN.

    1         10      0.0000E+00
                                     0.0000E+00      0.0000E+00
                                     0.0000E+00      0.1000E-01
                                     0.0000E+00      0.2000E-01
                                     0.0000E+00      0.4000E-01
                                     0.0000E+00      0.6000E-01
                                     0.0000E+00      0.8000E-01
                                     0.0000E+00      0.1200E+00
                                     0.0000E+00      0.1600E+00
                                     0.0000E+00      0.5000E+00
                                     0.0000E+00      0.1000E+02
    2         10      0.4675E+01
                                     0.0000E+00      0.0000E+00
                                     0.4067E+00      0.1000E-01
                                     0.5751E+00      0.2000E-01
                                     0.7252E+00      0.4000E-01
                                     0.7943E+00      0.6000E-01
                                     0.8340E+00      0.8000E-01
                                     0.8780E+00      0.1200E+00
```

```
                                     0.9017E+00      0.1600E+00
                                     0.9544E+00      0.5000E+00
                                     0.9800E+00      0.1000E+02
    3         10      0.9258E+01
                                     0.0000E+00      0.0000E+00
                                     0.5520E+00      0.1000E-01
                                     0.9162E+00      0.2000E-01
                                     0.1367E+01      0.4000E-01
                                     0.1635E+01      0.6000E-01
                                     0.1813E+01      0.8000E-01
                                     0.2035E+01      0.1200E+00
                                     0.2167E+01      0.1600E+00
                                     0.2498E+01      0.5000E+00
                                     0.2682E+01      0.1000E+02
    4         10      0.9300E+01
                                     0.0000E+00      0.0000E+00
                                     0.4868E+00      0.1000E-01
                                     0.1028E+01      0.2000E-01
                                     0.2136E+01      0.4000E-01
                                     0.2623E+01      0.6000E-01
                                     0.2704E+01      0.8000E-01
                                     0.2623E+01      0.1200E+00
                                     0.2515E+01      0.1600E+00
                                     0.2515E+01      0.5000E+00
                                     0.2515E+01      0.1000E+02
    5         10      0.1483E+02
                                     0.0000E+00      0.0000E+00
                                     0.9375E+00      0.1000E-01
                                     0.1979E+01      0.2000E-01
                                     0.4115E+01      0.4000E-01
                                     0.5052E+01      0.6000E-01
                                     0.5208E+01      0.8000E-01
                                     0.5052E+01      0.1200E+00
                                     0.4844E+01      0.1600E+00
                                     0.4844E+01      0.5000E+00
                                     0.4844E+01      0.1000E+02
    6         10      0.2026E+02
                                     0.0000E+00      0.0000E+00
                                     0.9375E+00      0.1000E-01
```

			0.1979E+01	0.2000E-01
			0.4115E+01	0.4000E-01
			0.5052E+01	0.6000E-01
			0.5208E+01	0.8000E-01
			0.5052E+01	0.1200E+00
			0.4844E+01	0.1600E+00
			0.4844E+01	0.5000E+00
			0.4844E+01	0.1000E+02
7	10	0.2030E+02		
			0.0000E+00	0.0000E+00
			0.9375E+00	0.1000E-01
			0.1979E+01	0.2000E-01
			0.4115E+01	0.4000E-01
			0.5052E+01	0.6000E-01
			0.5208E+01	0.8000E-01
			0.5052E+01	0.1200E+00
			0.4844E+01	0.1600E+00
			0.4844E+01	0.5000E+00
			0.4844E+01	0.1000E+02
8	10	0.2883E+02		
			0.0000E+00	0.0000E+00
			0.7875E+00	0.1000E-01
			0.1662E+01	0.2000E-01
			0.3456E+01	0.4000E-01
			0.4244E+01	0.6000E-01
			0.4375E+01	0.8000E-01
			0.4244E+01	0.1200E+00
			0.4069E+01	0.1600E+00
			0.4069E+01	0.5000E+00
			0.4069E+01	0.1000E+02
9	10	0.3726E+02		
			0.0000E+00	0.0000E+00
			0.7875E+00	0.1000E-01
			0.1662E+01	0.2000E-01
			0.3456E+01	0.4000E-01
			0.4244E+01	0.6000E-01
			0.4375E+01	0.8000E-01
			0.4244E+01	0.1200E+00
			0.4069E+01	0.1600E+00

			0.4069E+01	0.5000E+00
			0.4069E+01	0.1000E+02
10	10	0.3730E+02		
			0.0000E+00	0.0000E+00
			0.7875E+00	0.1000E-01
			0.1662E+01	0.2000E-01
			0.3456E+01	0.4000E-01
			0.4244E+01	0.6000E-01
			0.4375E+01	0.8000E-01
			0.4244E+01	0.1200E+00
			0.4069E+01	0.1600E+00
			0.4069E+01	0.5000E+00
			0.4069E+01	0.1000E+02
11	10	0.4083E+02		
			0.0000E+00	0.0000E+00
			0.9750E+00	0.1000E-01
			0.2058E+01	0.2000E-01
			0.4279E+01	0.4000E-01
			0.5254E+01	0.6000E-01
			0.5417E+01	0.8000E-01
			0.5254E+01	0.1200E+00
			0.5038E+01	0.1600E+00
			0.5038E+01	0.5000E+00
			0.5038E+01	0.1000E+02
12	10	0.4426E+02		
			0.0000E+00	0.0000E+00
			0.9750E+00	0.1000E-01
			0.2058E+01	0.2000E-01
			0.4279E+01	0.4000E-01
			0.5254E+01	0.6000E-01
			0.5417E+01	0.8000E-01
			0.5254E+01	0.1200E+00
			0.5038E+01	0.1600E+00
			0.5038E+01	0.5000E+00
			0.5038E+01	0.1000E+02
13	10	0.4430E+02		
			0.0000E+00	0.0000E+00
			0.9750E+00	0.1000E-01
			0.2058E+01	0.2000E-01

			0.4279E+01	0.4000E-01
			0.5254E+01	0.6000E-01
			0.5417E+01	0.8000E-01
			0.5254E+01	0.1200E+00
			0.5038E+01	0.1600E+00
			0.5038E+01	0.5000E+00
			0.5038E+01	0.1000E+02
14	10	0.5968E+02		
			0.0000E+00	0.0000E+00
			0.6703E+00	0.1000E-01
			0.1415E+01	0.2000E-01
			0.2942E+01	0.4000E-01
			0.3612E+01	0.6000E-01
			0.3724E+01	0.8000E-01
			0.3612E+01	0.1200E+00
			0.3463E+01	0.1600E+00
			0.3463E+01	0.5000E+00
			0.3463E+01	0.1000E+02
15	10	0.7496E+02		
			0.0000E+00	0.0000E+00
			0.6703E+00	0.1000E-01
			0.1415E+01	0.2000E-01
			0.2942E+01	0.4000E-01
			0.3612E+01	0.6000E-01
			0.3724E+01	0.8000E-01
			0.3612E+01	0.1200E+00
			0.3463E+01	0.1600E+00
			0.3463E+01	0.5000E+00
			0.3463E+01	0.1000E+02

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.8681E-02	0.1000E-03
0.6138E-01	0.5000E-02
0.8681E-01	0.1000E-01
0.1941E+00	0.5000E-01
0.2745E+00	0.1000E+00
0.3882E+00	0.2000E+00
0.6138E+00	0.5000E+00
0.7356E+00	0.1000E+01
0.7356E+00	0.2000E+01

LOAD VERSUS SETTLEMENT CURVE
****

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.3072E+00	0.3100E-03	0.8681E-02	0.1000E-03
0.2892E+01	0.2940E-02	0.1836E-01	0.1000E-02
0.1442E+02	0.1464E-01	0.6138E-01	0.5000E-02
0.2852E+02	0.2896E-01	0.8681E-01	0.1000E-01
0.8656E+02	0.1115E+00	0.1941E+00	0.5000E-01
0.1101E+03	0.1842E+00	0.2745E+00	0.1000E+00
0.1591E+03	0.6299E+00	0.6138E+00	0.5000E+00
0.1605E+03	0.1131E+01	0.7356E+00	0.1000E+01
0.1633E+03	0.2134E+01	0.7356E+00	0.2000E+01

Preliminary LPile Input Parameters
Maine Department of Transportation. - Pleasant Cove Bridge
Woolwich, Maine

GZA FILE NO. 09.0026037.01
CALCULATED BY BMC 5/13/2021
CHECKED BY C. Snow 8-16-21

Objective: To estimate the horizontal modulus of subgrade reaction (k) or E50 of subsurface strata for use in lateral analyses. K values are estimated using strata internal friction angles (ϕ') or shear strength.

Methods Correlations between the horizontal modulus of subgrade reaction and the soil internal friction angle of a given stratum are based on Figure 3-34 presented in the 2019 LPile Technical Manual.

Given Information: SPT measurements, In-situ vanes, and subsurface conditions in borings BB-WPC-201, -202 and -203 performed by New England Borings Contractors between March 25, 2021 and April 16, 2021.

Abutment 1, Pile length = 71.3' (min. anticipated)					
Stratum	**Soil Model**	**Top of Layer Elevation (NAVD88 ft)**	**k (pci) / E50**	**ϕ' (deg)/ Su (psf)**	**γ_e (pcf)**
Existing Fill**	Reese Sand	0.3	85	32	63
Wetland Deposit	Soft Clay	-9	E_{50}=0.01	1000	48
Wetland Deposit	Soft Clay	-20	E_{50}=0.01	700	48
Marine Clay Crust	Stiff Clay w/o free water	-37	E_{50}=0.007	1300	53
Marine Clay	Soft Clay	-44	E_{50}=0.008	550	53
Top of Rock	--	-71	--	--	--

Abutment 2, Pile length = 73.3					
Stratum	**Soil Model**	**Top of Layer Elevation (NAVD88 ft)**	**k (pci) / E50**	**ϕ' (deg)/ Su (psf)**	**γ_e (pcf)**
Existing Fill**	Reese Sand	0.3	85	32	63
Wetland Deposit	Soft Clay	-8.5	E_{50}=0.01	1000	48
Wetland Deposit	Soft Clay	-20	E_{50}=0.01	700	48
Marine Clay Crust	Stiff Clay w/o free water	-34	E_{50}=0.007	1300	53
Marine Clay	Soft Clay	-44	E_{50}=0.008	600	53
Top of Rock	--	-73	--	--	--

Notes: 1. Pile tip elevation should be assumed to be top of Rock.

2. ** indicates the top of layer is the approximate ground water elevation based on the boring logs.

3. pci = pounds per cubic inch, deg = degrees, psi =pounds per square inch, γe = effective unit weight pcf = pounds per square foot.

4. These parameters do not include reductions for group interaction. Reduction factors should be applied in accordance with AASHTO 10.7.2.4 for spacing of 3 to 5 pile diameters or less.

GZA
GeoEnvironmental, Inc
477 Congress Street, Suite 700
Portland, Maine 04101
207-879-9190
Fax 207-879-0099
http://www.gza.com

Engineers and Scientists

Integral Abutment LRFD Pile Design

Subject: Pile Design for the Pleasant Cove Bridge Replacement in Woolwich, Maine.

Reference:

- AASHTO LRFD Bridge Design Specifications, 8th Edition, 2017
- Maine BDG Chapter 5 - Substructures 2014
- VTRANS Integral Abutment Bridge Design Guidelines 2008

Design Steps - Maine BDG

Step 1 - Determine the foundation displacements and the load effects (P_u and M_u) from the superstructure and substructure designs.

$P_u := 301.6 \cdot kip$ Maximum Factored Axial Load

0.719" thermal movement given by HNTB at each abutment.

Step 2 - If applicable, determine the magnitude of scour. N / A

Step 3 - Select preliminary pile size.

HP14 x 73, Weak Axis Properties

Steel yield strength $F_{y50} := 50ksi$

Modulus of elasticity for steel $E := 29000ksi$

Cross sectoinal area of pile $A_g := 21.4in^2$

Radius of gyration $r_y := 3.49in$

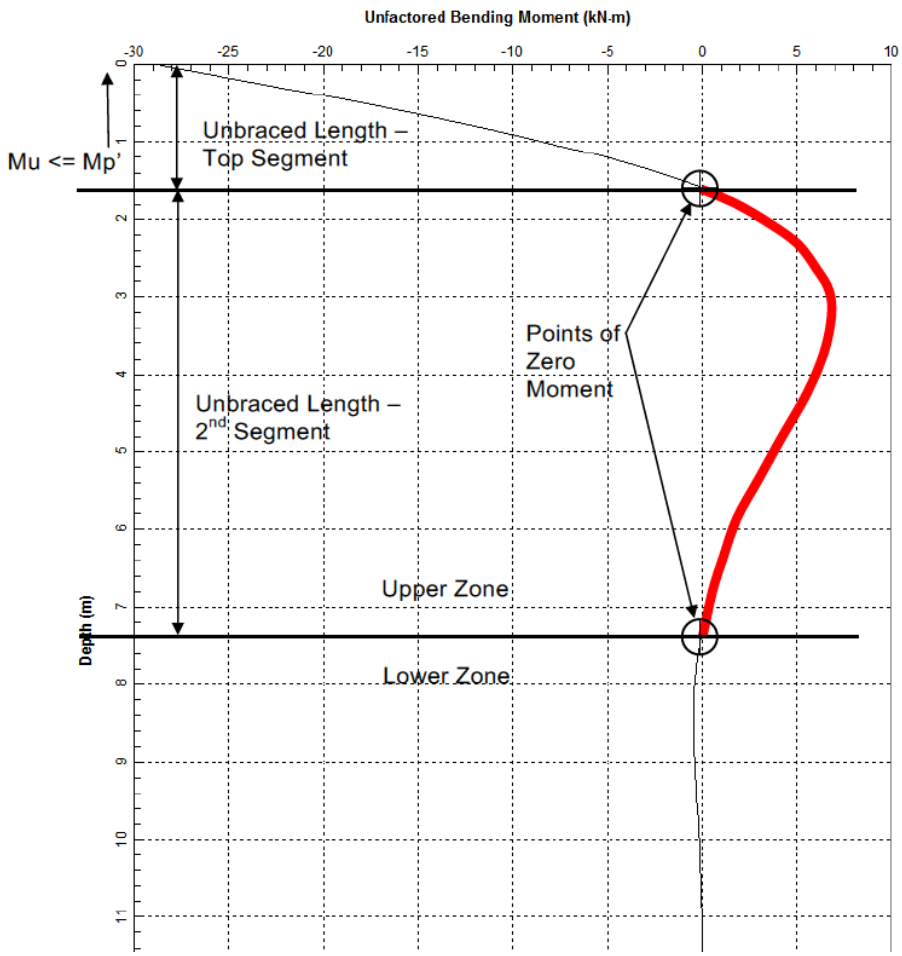
Width of Flange $b_f := 14.6 \cdot in$

Thickness of Flange $t_f := .505 \cdot in$

Elastic Section Modulus $S_y := 35.8 \cdot in^3$

Plastic Section Modulus $Z_y := 54.6 \cdot in^3$

Step 4 - Determine the pile unbraced length and maximum moment at the top of the pile by running LPile software for top translation = 0.719 inches, P_u = 301.6 kip, and Live Load Rotation = 0 (Fixed against rotation)



Maximum moment from LPile output $M_u := 1682 \text{kip} \cdot \text{in} = 140.17 \cdot \text{kip} \cdot \text{ft}$

Unbraced lengths from LPile output

Upper segment $L_1 := 5.3 \cdot \text{ft}$

Lower segment $L_2 := 13 \cdot \text{ft}$

Step 5 - Determine if the applied moment on the pile will cause pile head plastic deformation considering the interaction of combined axial and flexural load effects on a single pile (LRFD 6.9.2.2)

a. Obtain the unbraced lengths of the top and lower segments of the pile and calculate the column slenderness factor (λ) for each segment.

See above for unbraced lengths (critical lengths L_1 and L_2).

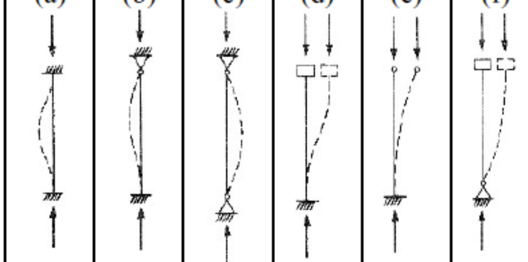
Upper segment slenderness factor

$$\lambda_1 := \frac{(L_1)}{r_y} = 18.223$$

Lower segment slenderness factor

$$\lambda_2 := \frac{(L_2)}{r_y} = 44.699$$

b. Determine K values for top and bottom of the pile per LRFD Table C4.6.2.5-1

	(a)	(b)	(c)	(d)	(e)	(f)
Buckled shape of column is shown by dashed line						
Theoretical *K* value	0.5	0.7	1.0	1.0	2.0	2.0
Design value of *K* when ideal conditions are approximated	0.65	0.80	1.0	1.2	2.1	2.0
End condition code		Rotation fixed Translation fixed Rotation free Translation fixed Rotation fixed Translation free Rotation free Translation free				

Upper segment K value (Type d) $K_1 := 1.2$

Lower segment K value (Type c) $K_2 := 1$

c. Calculate the nominal and factored structural pile resistance P_n, per LRFD 6.9.4.1 using the λ values

GZA
GeoEnvironmental, Inc
477 Congress Street, Suite 700
Portland, Maine 04101
207-879-9190
Fax 207-879-0099
http://www.gza.com

Engineers and Scientists

Elastic critical buckling resistance, P_e, based on flexural buckling

Upper P_e

$$P_{e1} := \frac{(\pi^2 \cdot E) \cdot A_g}{(K_1 \cdot \lambda_1)^2} = 12808.1 \cdot kip$$

Lower P_e

$$P_{e2} := \frac{(\pi^2 \cdot E) \cdot A_g}{(K_2 \cdot \lambda_2)^2} = 3065.6 \cdot kip$$

Nominal yield resistance, P_o $\qquad P_o := F_{y50} \cdot A_g = 1070 \cdot kip$

Check that the ratio of Pe to Po is > 0.44

If $P_e/P_o > 0.44$ then use equation 6.9.4.1.1-1
If $P_e/P_o < 0.44$ then use equation 6.9.4.1.1-2

$$P_n = \left[0.658^{\left(\frac{P_o}{P_e}\right)} \right] P_o \qquad (6.9.4.1.1\text{-}1)$$

$$P_n = 0.877 P_e \qquad (6.9.4.1.1\text{-}2)$$

$$\frac{P_{e1}}{P_o} = 11.97 \qquad \frac{P_{e2}}{P_o} = 2.865$$

Use eq. 6.9.4.1.1-1: Nominal structural Pile resistance, P_n for both segments

$$P_{n1} := \left[0.658^{\left(\frac{P_o}{P_{e1}}\right)} \right] \cdot P_o = 1033.23 \cdot kip$$

$$P_{n2} := \left[0.658^{\left(\frac{P_o}{P_{e2}}\right)} \right] \cdot P_o = 924.6 \cdot kip$$

Factored structural Pile Resistance, $P_r = \varphi_c (P_n)$

$$\phi_c := .7$$

GZA
GeoEnvironmental, Inc
477 Congress Street, Suite 700
Portland, Maine 04101
207-879-9190
Fax 207-879-0099
http://www.gza.com

Engineers and Scientists

$$P_{r1} := \phi_c \cdot P_{n1} = 723.26 \cdot kip$$

$$P_{r2} := \phi_c \cdot P_{n2} = 647.196 \cdot kip$$

d. Compare the ratio of P_u, the maximum factored axial load, to P_r, the structural resistance in the specified portion of the pile - the pile size should be such that the ratio is not less than 0.20.

Check for both segments

$$\frac{P_u}{P_{r1}} = 0.417 \qquad \frac{P_u}{P_{r2}} = 0.466$$

e. Determine the nominal and factored flexural resistance about H-Pile weak axis, (LRFD 6.12.2.2)

Check slenderness ratio for flange, limiting slenderness ratio for compact flange, and limiting slenderness ratio for a noncompact flange.

$$\lambda_f := \frac{b_f}{2 \cdot t_f} = 14.455$$

slenderness ratio for flange eq. 6.12.2.2.1-3

$$\lambda_{pf} := 0.38 \cdot \left(\frac{E}{F_{y50}}\right)^{.5} = 9.152$$

$$\lambda_{rf} := 0.83 \cdot \left(\frac{E}{F_{y50}}\right)^{.5} = 19.989$$

If $\lambda_{pf} < \lambda_f < \lambda_{rf}$ Use equation 6.12.2.2.1-2 to find the nominal flexural resistance

$$M_n := \left[1 - \left(1 - \frac{S_y}{Z_y}\right) \cdot \left[\frac{\lambda_f - \lambda_{pf}}{0.45 \cdot \left(\frac{E}{F_{y50}}\right)^{.5}}\right]\right] \cdot F_{y50} \cdot Z_y = 189.16 \cdot ft \cdot kip$$

$$\phi_f := 1.0$$

for flexural resistance according to Maine BDG

$$M_r := M_n \cdot \phi_f = 189.2 \cdot ft \cdot kip$$

$$M_u = 140.2 \cdot ft \cdot kip$$

$$\frac{P_u}{P_{r1}} + \frac{8}{9} \cdot \frac{M_u}{M_r} = 1.1$$

If less than 1, remains in elastic zone. Since it exceeds 1, pile is expected to yield at the base of the pile cap.

j. Calculate the moment that will cause a plastic hinge at the top of the pile, M_p',
Note: M_p' will be lower than M_n due to the inclusion of the axial load in the interaction equation for pile overstresses

$$\frac{P_u}{P_r} + \frac{8.0}{9.0}\left(\frac{M_{ux}}{M_{rx}} + \frac{M_{uy}}{M_{ry}}\right) \le 1.0$$

LRFD 6.9.2.2 Interaction equation

Use the interaction equation to find the moment that will cause a plastic hinge at the top of the pile. Assume M_{ux} and M_{rx} = 0 (out-of-plane), $M_{ry} = M_r$ and $M_u = M_p$', solve for Mp'

$$M_p := \left(\frac{9}{8}\right) \cdot \left[1 - \left(\frac{P_u}{P_{r1}}\right)\right] \cdot M_r = 124.1 \cdot ft \cdot kip \qquad M_p = 1488815.49 \cdot in \cdot lbf$$

k. If the calculated moment from LPile Run 1 exceeds the moment that would cause a plastic hinge, a plastic hinge forms, and the moment (M_p') represents the limiting moment reaction at the pile top for subsequent analysis. 124.1 ft-kip

Step 6 - For fixed head piles, run a second LPILE analysis with end conditions 1) Top moment = M_p', top translation = 0.719 in; and axial load equal to P_u. Recalculate unbraced lengths from the moment vs. depth curve.

New unbraced lengths were determined from the second LPile analysis

Upper segment $L_{1p} := 4.8 \cdot ft$

Lower segment $L_{2p} := 13.1 \cdot ft$

6a. Repeat steps 5a through 5d above.

6b - If the pile size is such that the ratio of Pu to structural resistance exceeds 0.2, check the upper segment of the pile with the interaction equation of LRFD 6.9.2.2. If a plastic hinge forms at the top of the pile, the K value of the upper segment changes from 1.2, for a rotation fixed head condition, to 2.1, for a rotation free head condition. With the new K value and lengths repeat step 5.

5a

Upper segment slenderness factor $\lambda_{1p} := \frac{(L_{1p})}{r_y} = 16.504$

Lower segment slenderness factor $\lambda_{2p} := \frac{(L_{2p})}{r_y} = 45.043$

5b

Upper segment K value (Type e) $K_{1p} := 2.1$

Lower segment K value (Type c) $K_{2p} := 1$

5c

Elastic critical buckling resistance, P_e, based on flexural buckling

Upper P_e $$P_{ep1} := \frac{(\pi^2 \cdot E) \cdot A_g}{(K_{1p} \cdot \lambda_{1p})^2} = 5098.9 \cdot kip$$

Lower P_e $$P_{ep2} := \frac{(\pi^2 \cdot E) \cdot A_g}{(K_{2p} \cdot \lambda_{2p})^2} = 3019 \cdot kip$$

Nominal yield resistance, P_o $P_o := F_{y50} \cdot A_g = 1070 \cdot kip$

Check that the ratio of Pe to Po is > 0.44

If $P_e/P_o > 0.44$ then use equation 6.9.4.1.1-1
If $P_e/P_o < 0.44$ then use equation 6.9.4.1.1-2

$$\frac{P_{ep1}}{P_o} = 4.765 \qquad \frac{P_{ep2}}{P_o} = 2.821$$

Use eq. 6.9.4.1.1-1: Nominal structural Pile resistance, P_n for both segments

$$P_{np1} := \left[0.658^{\left(\frac{P_o}{P_{ep1}}\right)}\right] \cdot P_o = 980.03 \cdot kip$$

$$P_{np2} := \left[0.658^{\left(\frac{P_o}{P_{ep2}}\right)}\right] \cdot P_o = 922.48 \cdot kip$$

Factored structural Pile Resistance, $P_r = \varphi_c (P_n)$

$$P_{rp1} := \phi_c \cdot P_{np1} = 686 \cdot kip$$

$$P_{rp2} := \phi_c \cdot P_{np2} = 645.7 \cdot kip$$

d. Compare the ratio of P_u to the structural resistance in the upper portion of the pile - the pile size should be such that the ratio is not less than 0.20.

Check for both segments

$$\frac{P_u}{P_{rp1}} = 0.4396 \qquad \frac{P_u}{P_{rp2}} = 0.467$$

From VTrans Integral Abutment Design Section 4.5.2 - Check the axial capacity of the upper segment and the interaction equation for the second segment to assess suitability of pile section.

Upper Segment

Check that P_u/P_{rp1} is < 1

$$\frac{P_u}{P_{rp1}} = 0.44$$

< 1, OK

Lower Segment

Ultimate moment along the lower segment from LPile output

$$M_{maxp2} := 49.7 \cdot ft \cdot kip$$

$$\frac{P_u}{P_{rp2}} + \frac{8}{9} \cdot \frac{M_{maxp2}}{M_r} = 0.701$$

< 1, OK

Initial Lpile Run: Pu= 301.6 kip, 0.719 inch deflection, no rotation

```
===============================================================================

                     LPile for Windows, Version 2019-11.002

                 Analysis of Individual Piles and Drilled Shafts
                Subjected to Lateral Loading Using the p-y Method
                          © 1985-2019 by Ensoft, Inc.
                              All Rights Reserved

===============================================================================

This copy of LPile is being used by:

E. Tome
Portland

Serial Number of Security Device: 161635470

This copy of LPile is licensed for exclusive use by:

GZA GeoEnvironmental, Inc., Port

Use of this program by any entity other than GZA GeoEnvironmental, Inc., Port
is a violation of the software license agreement.

-------------------------------------------------------------------------------
                             Files Used for Analysis
-------------------------------------------------------------------------------

Path to file locations:
\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary Restoration\09.0026037.01 - Final Design\work\Calcs\Lpile\

Name of input data file:
Pleasant Cove Bridge 12x53.lp11

Name of output report file:
Pleasant Cove Bridge 12x53.lp11

Name of plot output file:
Pleasant Cove Bridge 12x53.lp11

Name of runtime message file:
Pleasant Cove Bridge 12x53.lp11


-------------------------------------------------------------------------------
                            Date and Time of Analysis
-------------------------------------------------------------------------------

               Date:  July 16, 2021              Time:  10:43:34


-------------------------------------------------------------------------------
                                  Problem Title
-------------------------------------------------------------------------------

Project Name: Pleasant Cove Bridge - Woolwich

Job Number: 09.0026037.01

Client: MaineDOT

Engineer: B.Cardali

Description: 14 X 73



-------------------------------------------------------------------------------
                          Program Options and Settings
-------------------------------------------------------------------------------

Computational Options:
 - Conventional Analysis
Engineering Units Used for Data Input and Computations:
 - US Customary System Units (pounds, feet, inches)

Analysis Control Options:
 - Maximum number of iterations allowed                =          500
 - Deflection tolerance for convergence                =   1.0000E-05 in
 - Maximum allowable deflection                        =     100.0000 in
 - Number of pile increments                           =          100

Loading Type and Number of Cycles of Loading:
 - Static loading specified

 - Use of p-y modification factors for p-y curves not selected
 - Analysis uses layering correction (Method of Georgiadis)
 - No distributed lateral loads are entered
 - Loading by lateral soil movements acting on pile not selected
 - Input of shear resistance at the pile tip not selected
 - Input of moment resistance at the pile tip not selected
 - Computation of pile-head foundation stiffness matrix not selected
```

```
 - Push-over analysis of pile not selected
 - Buckling analysis of pile not selected

Output Options:
 - Output files use decimal points to denote decimal symbols.
 - Values of pile-head deflection, bending moment, shear force, and
   soil reaction are printed for full length of pile.
 - Printing Increment (nodal spacing of output points) = 1
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats



--------------------------------------------------------------------------------
                     Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Number of pile sections defined                       =           1
Total length of pile                                  =      71.000 ft
Depth of ground surface below top of pile             =      0.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over
the length of the pile. A summary of values of pile diameter vs. depth follows.

            Depth Below          Pile
Point        Pile Head         Diameter
 No.           feet             inches
-----      -------------     -------------
  1             0.000           14.6000
  2            71.000           14.6000


Input Structural Properties for Pile Sections:
----------------------------------------------

Pile Section No. 1:

   Section 1 is a H weak axis steel pile
   Length of section                                  =    71.000000 ft
   Pile width                                         =    13.600000 in
   Shear capacity of section                          =       0.0000 lbs
```

```
--------------------------------------------------------------------------------
                       Ground Slope and Pile Batter Angles
--------------------------------------------------------------------------------

Ground Slope Angle                                    =       0.000 degrees
                                                      =       0.000 radians

Pile Batter Angle                                     =       0.000 degrees
                                                      =       0.000 radians


--------------------------------------------------------------------------------
                       Soil and Rock Layering Information
--------------------------------------------------------------------------------

The soil profile is modelled using 5 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

   Distance from top of pile to top of layer          =       0.0000 ft
   Distance from top of pile to bottom of layer       =     9.300000 ft
   Effective unit weight at top of layer              =    63.000000 pcf
   Effective unit weight at bottom of layer           =    63.000000 pcf
   Friction angle at top of layer                     =    32.000000 deg.
   Friction angle at bottom of layer                  =    32.000000 deg.
   Subgrade k at top of layer                         =    85.000000 pci
   Subgrade k at bottom of layer                      =    85.000000 pci


Layer 2 is soft clay, p-y criteria by Matlock, 1970

   Distance from top of pile to top of layer          =     9.300000 ft
   Distance from top of pile to bottom of layer       =    20.300000 ft
   Effective unit weight at top of layer              =    48.000000 pcf
   Effective unit weight at bottom of layer           =    48.000000 pcf
   Undrained cohesion at top of layer                 =  1000.000000 psf
   Undrained cohesion at bottom of layer              =  1000.000000 psf
   Epsilon-50 at top of layer                         =     0.010000
   Epsilon-50 at bottom of layer                      =     0.010000


Layer 3 is soft clay, p-y criteria by Matlock, 1970

   Distance from top of pile to top of layer          =    20.300000 ft
   Distance from top of pile to bottom of layer       =    37.300000 ft
   Effective unit weight at top of layer              =    48.000000 pcf
   Effective unit weight at bottom of layer           =    48.000000 pcf
   Undrained cohesion at top of layer                 =   700.000000 psf
```

Undrained cohesion at bottom of layer = 700.000000 psf
Epsilon-50 at top of layer = 0.010000
Epsilon-50 at bottom of layer = 0.010000

Layer 4 is stiff clay without free water

Distance from top of pile to top of layer = 37.300000 ft
Distance from top of pile to bottom of layer = 44.300000 ft
Effective unit weight at top of layer = 53.000000 pcf
Effective unit weight at bottom of layer = 53.000000 pcf
Undrained cohesion at top of layer = 1300. psf
Undrained cohesion at bottom of layer = 1300. psf
Epsilon-50 at top of layer = 0.007000
Epsilon-50 at bottom of layer = 0.007000

Layer 5 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 44.300000 ft
Distance from top of pile to bottom of layer = 72.000000 ft
Effective unit weight at top of layer = 53.000000 pcf
Effective unit weight at bottom of layer = 53.000000 pcf
Undrained cohesion at top of layer = 550.000000 psf
Undrained cohesion at bottom of layer = 550.000000 psf
Epsilon-50 at top of layer = 0.008000
Epsilon-50 at bottom of layer = 0.008000

(Depth of the lowest soil layer extends 1.000 ft below the pile tip)

Summary of Input Soil Properties

Layer Layer Num.	Soil Type Name (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	E50 or krm	kpy pci
1	Sand	0.00	63.0000	--	32.0000	--	85.0000
	(Reese, et al.)	9.3000	63.0000	--	32.0000	--	85.0000
2	Soft	9.3000	48.0000	1000.0000	--	0.01000	--
	Clay	20.3000	48.0000	1000.0000	--	0.01000	--
3	Soft	20.3000	48.0000	700.0000	--	0.01000	--
	Clay	37.3000	48.0000	700.0000	--	0.01000	--
4	Stiff Clay	37.3000	53.0000	1300.	--	0.00700	--
	w/o Free Water	44.3000	53.0000	1300.	--	0.00700	--
5	Soft	44.3000	53.0000	550.0000	--	0.00800	--
	Clay	72.0000	53.0000	550.0000	--	0.00800	--

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length	Run Analysis
1	5	y = 0.719000 in	S = 0.0000 in/in	301600.	N.A.	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Steel H Weak Axis:

Length of Section = 71.000000 ft
Flange Width = 14.600000 in
Section Depth = 13.600000 in
Flange Thickness = 0.505000 in
Web Thickness = 0.505000 in
Yield Stress of Pipe = 45.000000 ksi
Elastic Modulus = 29000. ksi
Cross-sectional Area = 21.103950 sq. in.
Moment of Inertia = 262.073233 in^4
Elastic Bending Stiffness = 7600124. kip-in^2
Plastic Modulus, Z = 54.625591in^3
Plastic Moment Capacity = Fy Z = 2458.in-kip

Axial Structural Capacities:

Nom. Axial Structural Capacity = Fy As = 949.678 kips
Nominal Axial Tensile Capacity = -949.678 kips

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	301.600

Definition of Run Messages:

Y = part of pipe section has yielded.

Axial Thrust Force = 301.600 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Total Stress ksi	Run Msg
0.00000394	29.9677491	7599744.	132.2724860	15.1176033	
0.00000789	59.9354983	7599744.	69.7862430	15.9440432	
0.00001183	89.9032474	7599744.	48.9574953	16.7704829	
0.00001577	119.8709965	7599744.	38.5431215	17.5969229	
0.00001972	149.8387457	7599744.	32.2944972	18.4233628	
0.00002366	179.8064948	7599744.	28.1287477	19.2498024	
0.00002760	209.7742440	7599744.	25.1532123	20.0762423	
0.00003155	239.7419931	7599744.	22.9215607	20.9026820	
0.00003549	269.7097422	7599744.	21.1858318	21.7291219	
0.00003943	299.6774914	7599744.	19.7972486	22.5555616	
0.00004338	329.6452405	7599744.	18.6611351	23.3820015	
0.00004732	359.6129896	7599744.	17.7143738	24.2084414	
0.00005126	389.5807388	7599744.	16.9132682	25.0348813	
0.00005521	419.5484879	7599744.	16.2266061	25.8613212	
0.00005915	449.5162371	7599744.	15.6314991	26.6877609	
0.00006309	479.4839862	7599744.	15.1107804	27.5142008	
0.00006704	509.4517353	7599744.	14.6513227	28.3406405	
0.00007098	539.4194845	7599744.	14.2429159	29.1670804	
0.00007492	569.3872336	7599744.	13.8774993	29.9935203	
0.00007887	599.3549827	7599744.	13.5486243	30.8199601	
0.00008281	629.3227319	7599744.	13.2510708	31.6463999	
0.00008675	659.2904810	7599744.	12.9805675	32.4728397	
0.00009069	689.2582301	7599744.	12.7335863	33.2992795	
0.00009464	719.2259793	7599744.	12.5071869	34.1257194	
0.00009858	749.1937284	7599744.	12.2988994	34.9521592	
0.0001025	779.1614776	7599744.	12.1066341	35.7785990	
0.0001065	809.1292267	7599744.	11.9286106	36.6050389	
0.0001104	839.0969758	7599744.	11.7633031	37.4314787	
0.0001144	869.0647250	7599744.	11.6093961	38.2579186	
0.0001183	899.0324741	7599744.	11.4657495	39.0843584	
0.0001222	929.0002232	7599744.	11.3313705	39.9107982	
0.0001262	958.9679724	7599744.	11.2053902	40.7372380	
0.0001301	988.9357215	7599744.	11.0870450	41.5636779	
0.0001341	1019.	7599744.	10.9756614	42.3901176	
0.0001380	1049.	7599744.	10.8706425	43.2165575	
0.0001420	1079.	7599744.	10.7714579	44.0429973	
0.0001459	1109.	7599744.	10.6776348	44.8694372	
0.0001498	1138.	7594291.	10.5899846	45.0000000	Y
0.0001538	1166.	7581436.	10.5086051	45.0000000	Y
0.0001617	1219.	7539642.	10.3620551	45.0000000	Y
0.0001696	1268.	7480980.	10.2343061	45.0000000	Y
0.0001774	1315.	7410000.	10.1224915	45.0000000	Y
0.0001853	1359.	7330373.	10.0242121	45.0000000	Y
0.0001932	1400.	7245071.	9.9374387	45.0000000	Y
0.0002011	1439.	7156501.	9.8604379	45.0000000	Y
0.0002090	1477.	7065586.	9.7920461	45.0000000	Y
0.0002169	1513.	6974004.	9.7309747	45.0000000	Y
0.0002248	1547.	6882035.	9.6764675	45.0000000	Y
0.0002327	1580.	6791025.	9.6274856	45.0000000	Y
0.0002405	1612.	6701247.	9.5834114	45.0000000	Y
0.0002484	1643.	6612658.	9.5438072	45.0000000	Y
0.0002563	1673.	6525777.	9.5080760	45.0000000	Y
0.0002642	1702.	6440880.	9.4757447	45.0000000	Y
0.0002721	1730.	6358075.	9.4464407	45.0000000	Y
0.0002800	1758.	6277444.	9.4198310	45.0000000	Y

0.0002879	1784.	6198860.	9.3957021	45.0000000	Y
0.0002957	1811.	6122300.	9.3738245	45.0000000	Y
0.0003036	1836.	6046384.	9.3533269	45.0000000	Y
0.0003115	1859.	5968960.	9.3331751	45.0000000	Y
0.0003194	1882.	5890706.	9.3133064	45.0000000	Y
0.0003273	1902.	5811427.	9.2940912	45.0000000	Y
0.0003352	1921.	5732327.	9.2751295	45.0000000	Y
0.0003431	1940.	5653681.	9.2564604	45.0000000	Y
0.0003509	1957.	5575076.	9.2383353	45.0000000	Y
0.0003588	1973.	5497308.	9.2201372	45.0000000	Y
0.0003667	1988.	5420081.	9.2026383	45.0000000	Y
0.0003746	2002.	5344522.	9.1852503	45.0000000	Y
0.0003825	2016.	5269649.	9.1684896	45.0000000	Y
0.0003904	2028.	5196008.	9.1515325	45.0000000	Y
0.0003983	2041.	5123562.	9.1353370	45.0000000	Y
0.0004062	2052.	5052686.	9.1192398	45.0000000	Y
0.0004140	2063.	4982791.	9.1033044	45.0000000	Y
0.0004219	2074.	4914603.	9.0879835	45.0000000	Y
0.0004298	2084.	4847498.	9.0724380	45.0000000	Y
0.0004377	2093.	4781875.	9.0575725	45.0000000	Y
0.0004456	2102.	4717455.	9.0428004	45.0000000	Y
0.0004535	2111.	4654675.	9.0281804	45.0000000	Y
0.0004614	2119.	4592968.	9.0139359	45.0000000	Y
0.0004692	2127.	4532645.	8.9999907	45.0000000	Y
0.0005008	2156.	4304344.	8.9461683	45.0000000	Y
0.0005323	2180.	4094691.	8.8953279	45.0000000	Y
0.0005639	2201.	3903000.	8.8478295	45.0000000	Y
0.0005954	2219.	3726647.	8.8026819	45.0000000	Y
0.0006270	2235.	3564429.	8.7605140	45.0000000	Y
0.0006585	2249.	3415113.	8.7203572	45.0000000	Y
0.0006901	2261.	3276996.	8.6826384	45.0000000	Y
0.0007216	2273.	3149267.	8.6464741	45.0000000	Y
0.0007532	2283.	3030557.	8.6126214	45.0000000	Y
0.0007847	2292.	2920309.	8.5802670	45.0000000	Y
0.0008163	2300.	2817584.	8.5493324	45.0000000	Y
0.0008478	2307.	2721316.	8.5199539	45.0000000	Y
0.0008793	2314.	2631440.	8.4919945	45.0000000	Y

Summary of Results for Nominal Moment Capacity for Section 1

Load No.	Axial Thrust kips	Nominal Moment Capacity in-kips
1	301.6000000000	2314.

Note that the values in the above table are not factored by a strength reduction factor for LRFD.

The value of the strength reduction factor depends on the provisions of the LRFD code being followed.

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to the LRFD structural design standard being followed.

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	0.00	0.00	N.A.	No	0.00	44830.
2	9.3000	7.6542	No	No	44830.	112963.
3	20.3000	24.6732	Yes	No	157793.	130584.
4	37.3000	24.6953	No	No	288377.	99473.
5	44.3000	68.3574	No	No	387850.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Displacement and Pile-head Rotation (Loading Type 5)
Displacement of pile head = 0.719000 inches

Max moment for Calculation

Stress Greater than yield Stress, conduct Plastic Hinge Analysis

Rotation of pile head = 0.000E+00 radians
Axial load on pile head = 301600.0 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.7190	-1682475.	29773.	0.00	61156.	6.50E+09	0.00	0.00	0.00
0.7100	0.7096	-1428102.	29323.	-0.00204	54071.	6.50E+09	-46.9224	563.3860	0.00
1.4200	0.6842	-1172322.	28691.	-0.00364	46946.	7.58E+09	-101.4115	1263.	0.00
2.1300	0.6477	-920515.	27608.	-0.00481	39932.	7.60E+09	-152.9535	2012.	0.00
2.8400	0.6023	-677160.	26117.	-0.00571	33153.	7.60E+09	-197.0207	2787.	0.00
3.5500	0.5504	-446156.	24268.	-0.00634	26719.	7.60E+09	-236.9249	3667.	0.00
4.2600	0.4943	-231065.	22097.	-0.00672	20727.	7.60E+09	-272.8032	4702.	0.00
4.9700	0.4360	-35112.	19670.	-0.00686	15269.	7.60E+09	-296.8639	5801.	0.00
5.6800	0.3773	139393.	16985.	-0.00681	18174.	7.60E+09	-333.4461	7529.	0.00
6.3900	0.3200	289292.	14018.	-0.00657	22349.	7.60E+09	-363.0458	9666.	0.00
7.1000	0.2655	412004.	10814.	-0.00617	25767.	7.60E+09	-389.0910	12488.	0.00
7.8100	0.2148	505284.	7423.	-0.00566	28366.	7.60E+09	-406.7787	16133.	0.00
8.5200	0.1690	567581.	3933.	-0.00506	30101.	7.60E+09	-412.5903	20797.	0.00
9.2300	0.1287	598292.	448.9371	-0.00440	30956.	7.60E+09	-405.2595	26838.	0.00
9.9400	0.09399	597862.	-2229.	-0.00373	30945.	7.60E+09	-223.2778	20239.	0.00
10.6500	0.06504	579502.	-4061.	-0.00307	30433.	7.60E+09	-206.8245	27093.	0.00
11.3600	0.04163	544459.	-5735.	-0.00244	29457.	7.60E+09	-186.2702	38126.	0.00
12.0700	0.02341	494326.	-7212.	-0.00186	28061.	7.60E+09	-160.3741	58368.	0.00
12.7800	0.00992	431128.	-8429.	-0.00134	26300.	7.60E+09	-125.3871	107734.	0.00
13.4900	5.40E-04	357585.	-9172.	-9.00E-04	24252.	7.60E+09	-48.9843	772620.	0.00
14.2000	-0.00542	279457.	-8909.	-5.43E-04	22075.	7.60E+09	110.8208	174200.	0.00
14.9100	-0.00871	208568.	-7877.	-2.69E-04	20101.	7.60E+09	131.4413	128556.	0.00
15.6200	-0.01001	146619.	-6730.	-7.03E-05	18375.	7.60E+09	137.6632	117171.	0.00
16.3300	-0.00991	94242.	-5560.	6.47E-05	16916.	7.60E+09	137.1956	117970.	0.00
17.0400	-0.00891	51551.	-4411.	1.46E-04	15727.	7.60E+09	132.4122	126662.	0.00
17.7500	-0.00741	18325.	-3316.	1.86E-04	14802.	7.60E+09	124.5601	143168.	0.00
18.4600	-0.00574	-5913.	-2298.	1.93E-04	14456.	7.60E+09	114.4191	169733.	0.00
19.1700	-0.00413	-21828.	-1374.	1.77E-04	14899.	7.60E+09	102.5333	211484.	0.00
19.8800	-0.00273	-30237.	-556.8670	1.48E-04	15133.	7.60E+09	89.3002	279050.	0.00
20.5900	-0.00161	-32077.	47.1214	1.13E-04	15185.	7.60E+09	52.4812	277529.	0.00
21.3000	-8.02E-04	-30015.	448.0591	7.81E-05	15127.	7.60E+09	41.6357	442231.	0.00
22.0100	-2.80E-04	-24844.	750.6537	4.74E-05	14983.	7.60E+09	29.3959	894955.	0.00
22.7200	5.15E-06	-17467.	848.3626	2.37E-05	14778.	7.60E+09	-6.4595	1.07E+07	0.00
23.4300	1.23E-04	-10509.	726.6230	7.98E-06	14584.	7.60E+09	-22.1178	1528198.	0.00
24.1400	1.41E-04	-5127.	533.6217	-7.87E-07	14434.	7.60E+09	-23.1876	1400231.	0.00
24.8500	1.10E-04	-1412.	343.9088	-4.45E-06	14331.	7.60E+09	-21.3459	1654820.	0.00
25.5600	6.52E-05	756.5311	176.5273	-4.82E-06	14312.	7.60E+09	-17.9455	2344182.	0.00
26.2700	2.78E-05	1621.	42.2701	-3.49E-06	14336.	7.60E+09	-13.5703	4163256.	0.00
26.9800	5.80E-06	1495.	-53.1738	-1.74E-06	14333.	7.60E+09	-8.8344	1.30E+07	0.00
27.6900	-1.90E-06	723.3714	-75.9529	-4.98E-07	14311.	7.60E+09	3.4871	1.56E+07	0.00
28.4000	-2.69E-06	203.0563	-43.8934	2.15E-08	14297.	7.60E+09	4.0386	1.28E+07	0.00

L1, 5.3'

L2, 13' (depth of 18')

29.1100	-1.53E-06	-24.6828	-14.3908	1.21E-07	14292.	7.60E+09	2.8869	1.60E+07	0.00
29.8200	-6.16E-07	-42.7879	-0.4446	8.36E-08	14292.	7.60E+09	0.3868	5353770.	0.00
30.5300	-1.07E-07	-32.6883	1.4909	4.13E-08	14292.	7.60E+09	0.06748	5353770.	0.00
31.2400	8.86E-08	-17.5960	1.5411	1.31E-08	14292.	7.60E+09	-0.05569	5353770.	0.00
31.9500	1.17E-07	-6.4957	0.9918	-3.62E-10	14291.	7.60E+09	-0.07325	5353770.	0.00
32.6600	8.25E-08	-0.6937	0.4590	-4.39E-09	14291.	7.60E+09	-0.05182	5353770.	0.00
33.3700	4.17E-08	1.3487	0.1266	-4.02E-09	14291.	7.60E+09	-0.02623	5353770.	0.00
34.0800	1.39E-08	1.4834	-0.02235	-2.44E-09	14291.	7.60E+09	-0.00873	5353770.	0.00
34.7900	2.12E-10	0.9804	-0.06009	-1.06E-09	14291.	7.60E+09	-1.33E-04	5353770.	0.00
35.5000	-4.10E-09	0.4649	-0.04968	-2.46E-10	14291.	7.60E+09	0.00258	5353770.	0.00
36.2100	-3.97E-09	0.1351	-0.02806	9.06E-11	14291.	7.60E+09	0.00250	5353770.	0.00
36.9200	-2.56E-09	-0.01376	-0.01057	1.59E-10	14291.	7.60E+09	0.00161	5353770.	0.00
37.6300	-1.27E-09	-0.04590	-0.00170	1.25E-10	14291.	7.60E+09	4.75E-04	3182006.	0.00
38.3400	-4.25E-10	-0.04343	9.95E-04	7.51E-11	14291.	7.60E+09	1.59E-04	3182006.	0.00
39.0500	7.89E-12	-0.02933	0.00166	3.43E-11	14291.	7.60E+09	-2.95E-06	3182006.	0.00
39.7600	1.60E-10	-0.01535	0.00139	9.28E-12	14291.	7.60E+09	-5.98E-05	3182006.	0.00
40.4700	1.66E-10	-0.00567	8.72E-04	-2.51E-12	14291.	7.60E+09	-6.20E-05	3182006.	0.00
41.1800	1.17E-10	-4.80E-04	4.21E-04	-5.96E-12	14291.	7.60E+09	-4.39E-05	3182006.	0.00
41.8900	6.44E-11	0.00153	1.32E-04	-5.37E-12	14291.	7.60E+09	-2.41E-05	3182006.	0.00
42.6000	2.60E-11	0.00179	-1.22E-05	-3.51E-12	14291.	7.60E+09	-9.71E-06	3182006.	0.00
43.3100	4.67E-12	0.00134	-6.10E-05	-1.75E-12	14291.	7.60E+09	-1.74E-06	3182006.	0.00
44.0200	-3.84E-12	7.61E-04	-6.23E-05	0.00	14291.	7.60E+09	1.44E-06	3182006.	0.00
44.7300	-5.08E-12	2.83E-04	-4.28E-05	0.00	14291.	7.60E+09	3.14E-06	5258167.	0.00
45.4400	-3.61E-12	3.18E-05	-1.99E-05	0.00	14291.	7.60E+09	2.23E-06	5258167.	0.00
46.1500	-1.84E-12	-5.77E-05	-5.59E-06	0.00	14291.	7.60E+09	1.14E-06	5258167.	0.00
46.8600	0.00	-6.44E-05	8.90E-07	0.00	14291.	7.60E+09	3.85E-07	5258167.	0.00
47.5700	0.00	-4.30E-05	2.58E-06	0.00	14291.	7.60E+09	1.11E-08	5258167.	0.00
48.2800	0.00	-2.07E-05	2.16E-06	0.00	14291.	7.60E+09	-1.09E-07	5258167.	0.00
48.9900	0.00	-6.28E-06	1.24E-06	0.00	14291.	7.60E+09	-1.06E-07	5258167.	0.00
49.7000	0.00	4.92E-07	5.08E-07	0.00	14291.	7.60E+09	-6.68E-08	5258167.	0.00
50.4100	0.00	2.41E-06	9.43E-08	0.00	14291.	7.60E+09	-3.02E-08	5258167.	0.00
51.1200	0.00	2.13E-06	-6.82E-08	0.00	14291.	7.60E+09	-7.90E-09	5258167.	0.00
51.8300	0.00	1.26E-06	-9.37E-08	0.00	14291.	7.60E+09	1.90E-09	5258167.	0.00
52.5400	0.00	5.37E-07	-6.75E-08	0.00	14291.	7.60E+09	4.25E-09	5258167.	0.00
53.2500	0.00	1.16E-07	-3.48E-08	0.00	14291.	7.60E+09	3.43E-09	5258167.	0.00
53.9600	0.00	-5.70E-08	-1.20E-08	0.00	14291.	7.60E+09	1.92E-09	5258167.	0.00
54.6700	0.00	-8.97E-08	-5.50E-10	0.00	14291.	7.60E+09	7.58E-10	5258167.	0.00
55.3800	0.00	-6.72E-08	3.19E-09	0.00	14291.	7.60E+09	1.20E-10	5258167.	0.00
56.0900	0.00	-3.58E-08	3.19E-09	0.00	14291.	7.60E+09	-1.21E-10	5258167.	0.00
56.8000	0.00	-1.30E-08	2.03E-09	0.00	14291.	7.60E+09	-1.52E-10	5258167.	0.00
57.5100	0.00	-1.20E-09	9.29E-10	0.00	14291.	7.60E+09	-1.06E-10	5258167.	0.00
58.2200	0.00	2.89E-09	2.50E-10	0.00	14291.	7.60E+09	-5.33E-11	5258167.	0.00
58.9300	0.00	3.11E-09	-5.15E-11	0.00	14291.	7.60E+09	-1.75E-11	5258167.	0.00
59.6400	0.00	2.04E-09	-1.26E-10	0.00	14291.	7.60E+09	0.00	5258167.	0.00
60.3500	0.00	9.68E-10	-1.03E-10	0.00	14291.	7.60E+09	5.39E-12	5258167.	0.00
61.0600	0.00	2.83E-10	-5.87E-11	0.00	14291.	7.60E+09	5.11E-12	5258167.	0.00
61.7700	0.00	-3.27E-11	-2.34E-11	0.00	14291.	7.60E+09	3.16E-12	5258167.	0.00
62.4800	0.00	-1.19E-10	-3.99E-12	0.00	14291.	7.60E+09	1.41E-12	5258167.	0.00

63.1900	0.00	-1.02E-10	3.50E-12	0.00	14291.	7.60E+09	0.00	5258167.	0.00
63.9000	0.00	-5.97E-11	4.54E-12	0.00	14291.	7.60E+09	0.00	5258167.	0.00
64.6100	0.00	-2.49E-11	3.21E-12	0.00	14291.	7.60E+09	0.00	5258167.	0.00
65.3200	0.00	-5.01E-12	1.63E-12	0.00	14291.	7.60E+09	0.00	5258167.	0.00
66.0300	0.00	2.97E-12	0.00	0.00	14291.	7.60E+09	0.00	5258167.	0.00
66.7400	0.00	4.36E-12	0.00	0.00	14291.	7.60E+09	0.00	5258167.	0.00
67.4500	0.00	3.20E-12	0.00	0.00	14291.	7.60E+09	0.00	5258167.	0.00
68.1600	0.00	1.68E-12	0.00	0.00	14291.	7.60E+09	0.00	5258167.	0.00
68.8700	0.00	0.00	0.00	0.00	14291.	7.60E+09	0.00	5258167.	0.00
69.5800	0.00	0.00	0.00	0.00	14291.	7.60E+09	0.00	5258167.	0.00
70.2900	0.00	0.00	0.00	0.00	14291.	7.60E+09	0.00	5258167.	0.00
71.0000	0.00	0.00	0.00	0.00	14291.	7.60E+09	0.00	2629084.	0.00

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 1:

```
Pile-head deflection            =     0.71900000 inches
Computed slope at pile head     =       0.000000 radians
Maximum bending moment          =      -1682475. inch-lbs
Maximum shear force             =         29773. lbs
Depth of maximum bending moment =       0.000000 feet below pile head
Depth of maximum shear force    =       0.000000 feet below pile head
Number of iterations            =             17
Number of zero deflection points =            14
```

Summary of Pile-head Responses for Conventional Analyses

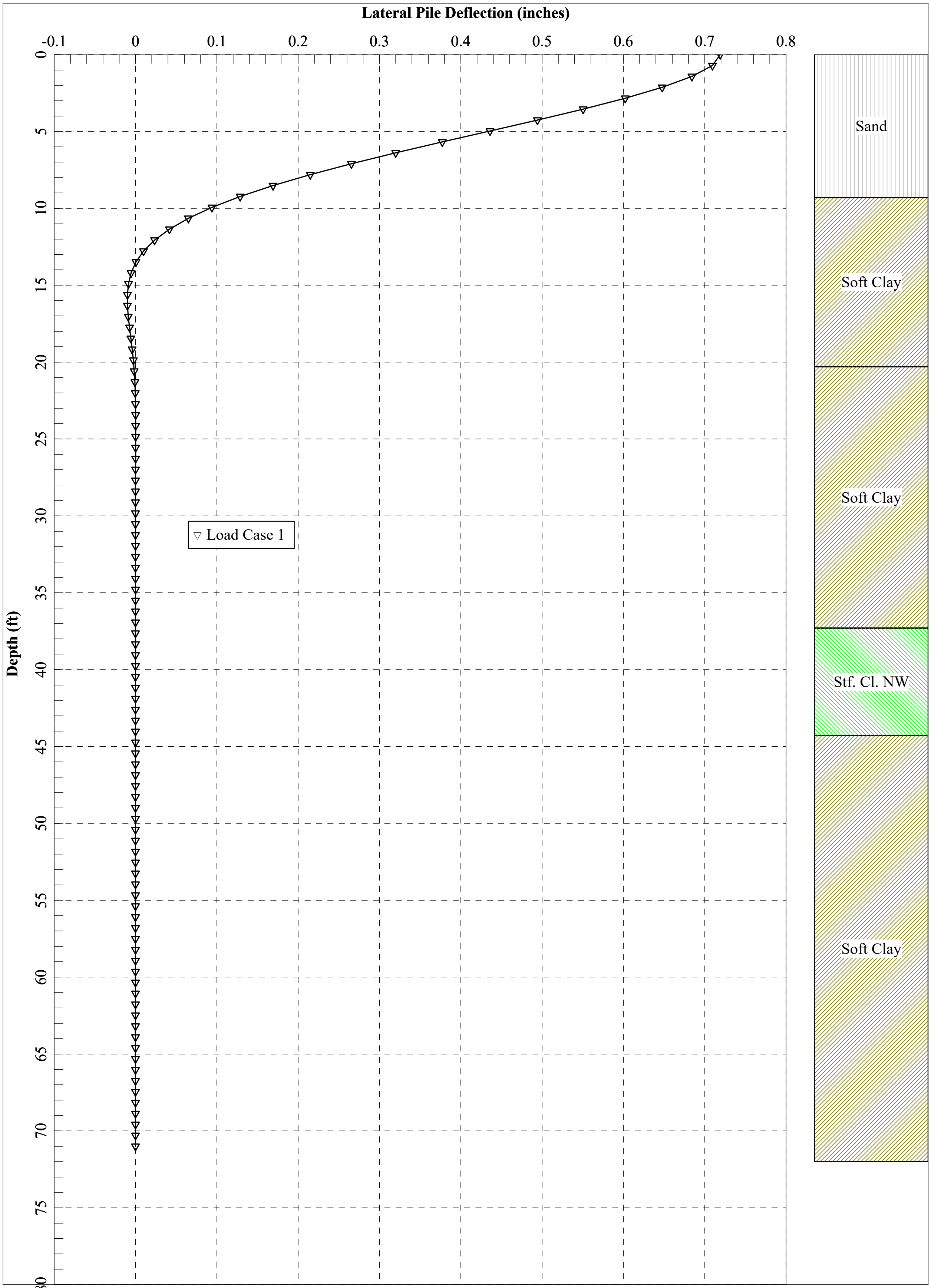
Definitions of Pile-head Loading Conditions:

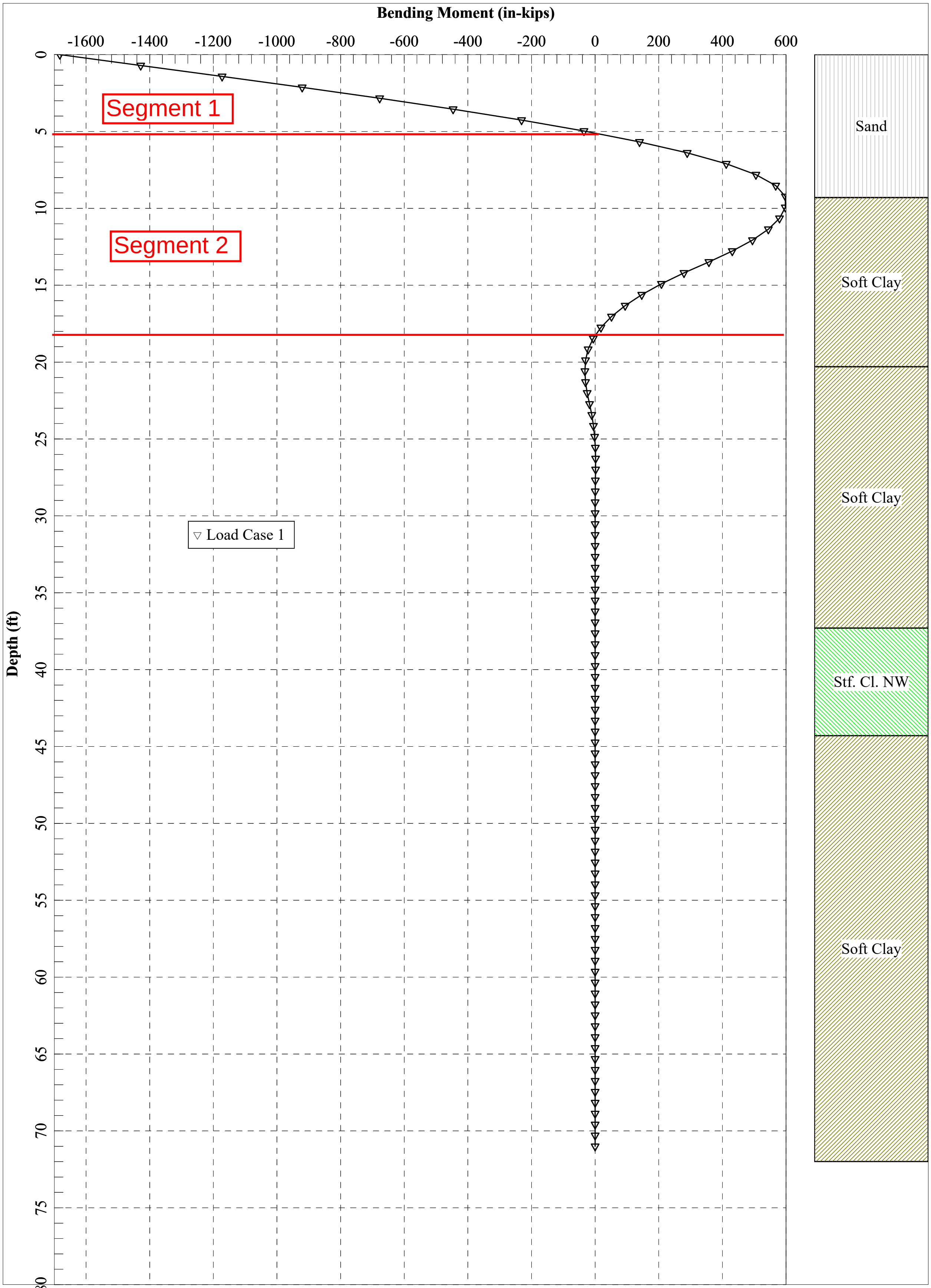
Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

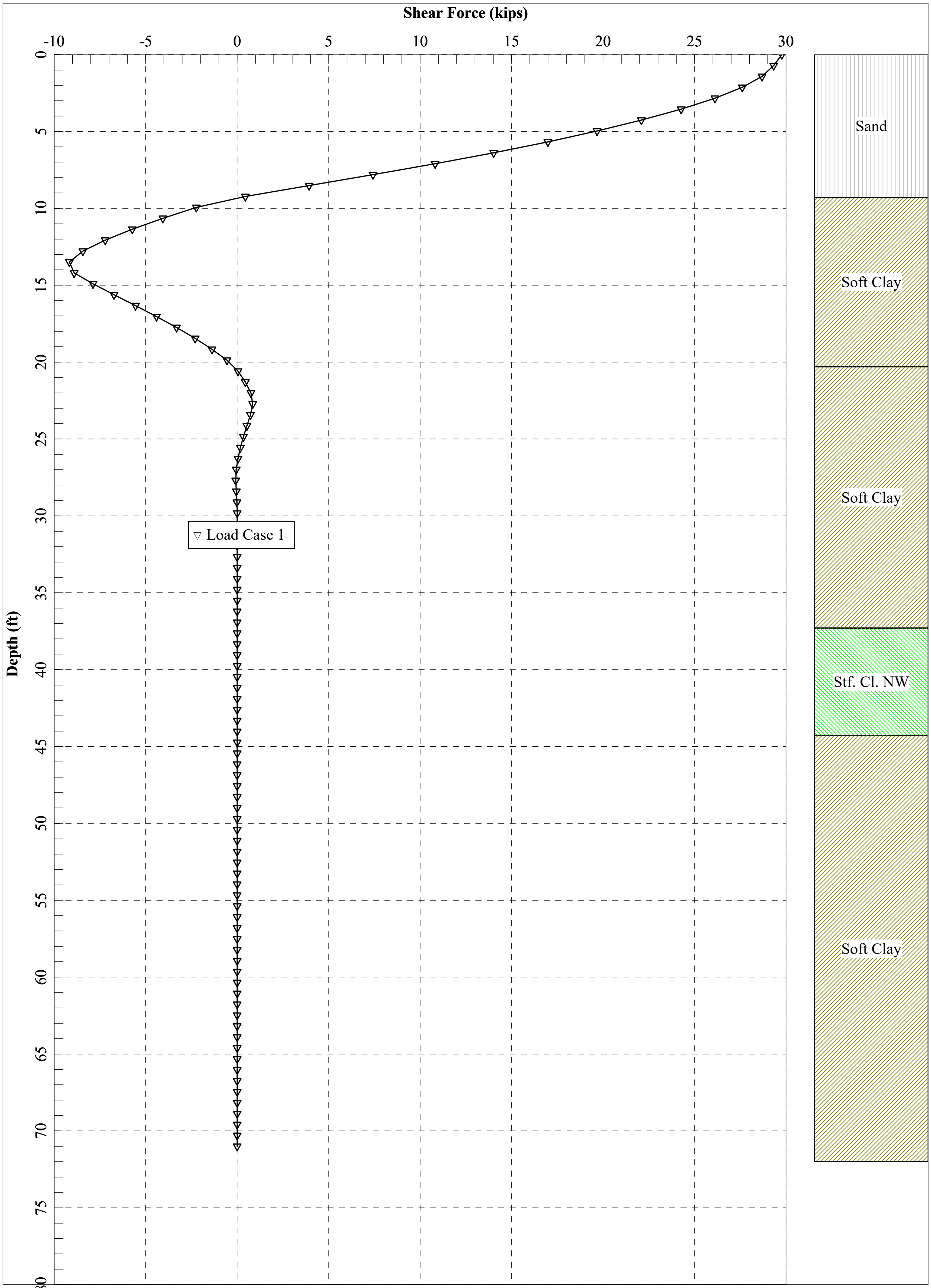
Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	y, in	0.7190	S, rad	0.00	301600.	0.7190	0.00	29773.	-1682475.

Maximum pile-head deflection = 0.7190000000 inches
Maximum pile-head rotation   = 0.0000000000 radians = 0.000000 deg.

The analysis ended normally.


Lateral Pile Deflection (inches)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
Load Case 1
Sand
Soft Clay
Soft Clay
Stf. Cl. NW
Soft Clay


Bending Moment (in-kips)
-1600
-1400
-1200
-1000
-800
-600
-400
-200
0
200
400
600
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
Segment 1
Segment 2
Load Case 1
Sand
Soft Clay
Soft Clay
Stf. Cl. NW
Soft Clay



Shear Force (kips)
-10
-5
0
5
10
15
20
25
30
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
Load Case 1
Sand
Soft Clay
Soft Clay
Stf. Cl. NW
Soft Clay

Second Lpile Run: Pu= 301.6 kip, 0.719 inch deflection, Mp =124.1 kip-ft (1,488,815.5 in-lbs)

```
===============================================================================

                     LPile for Windows, Version 2019-11.002

                 Analysis of Individual Piles and Drilled Shafts
                Subjected to Lateral Loading Using the p-y Method
                          © 1985-2019 by Ensoft, Inc.
                              All Rights Reserved

===============================================================================

This copy of LPile is being used by:

GZA
GZA - Portland, ME

Serial Number of Security Device: 161635470

This copy of LPile is licensed for exclusive use by:

GZA GeoEnvironmental, Inc., Port

Use of this program by any entity other than GZA GeoEnvironmental, Inc., Port
is a violation of the software license agreement.

-------------------------------------------------------------------------------
                             Files Used for Analysis
-------------------------------------------------------------------------------

Path to file locations:
\09 Jobs\0026000s\09.0026037.00 - Woolwich Estuary Restoration\09.0026037.01 - Final Design\work\Calcs\Lpile\

Name of input data file:
Pleasant Cove Bridge 14x73 Run 2.lp11

Name of output report file:
Pleasant Cove Bridge 14x73 Run 2.lp11

Name of plot output file:
Pleasant Cove Bridge 14x73 Run 2.lp11

Name of runtime message file:
Pleasant Cove Bridge 14x73 Run 2.lp11


-------------------------------------------------------------------------------
                            Date and Time of Analysis
-------------------------------------------------------------------------------

               Date:  August 12, 2021           Time:  16:34:29


-------------------------------------------------------------------------------
                                 Problem Title
-------------------------------------------------------------------------------

Project Name: Pleasant Cove Bridge - Woolwich

Job Number: 09.0026037.01

Client: MaineDOT

Engineer: B.Cardali

Description: 14 X 73



-------------------------------------------------------------------------------
                           Program Options and Settings
-------------------------------------------------------------------------------

Computational Options:
 - Conventional Analysis
Engineering Units Used for Data Input and Computations:
 - US Customary System Units (pounds, feet, inches)

Analysis Control Options:
 - Maximum number of iterations allowed               =          500
 - Deflection tolerance for convergence               =   1.0000E-05 in
 - Maximum allowable deflection                       =     100.0000 in
 - Number of pile increments                          =          100

Loading Type and Number of Cycles of Loading:
 - Static loading specified

 - Use of p-y modification factors for p-y curves not selected
 - Analysis uses layering correction (Method of Georgiadis)
 - No distributed lateral loads are entered
 - Loading by lateral soil movements acting on pile not selected
 - Input of shear resistance at the pile tip not selected
 - Input of moment resistance at the pile tip not selected
 - Computation of pile-head foundation stiffness matrix not selected
```

```
 - Push-over analysis of pile not selected
 - Buckling analysis of pile not selected

Output Options:
 - Output files use decimal points to denote decimal symbols.
 - Values of pile-head deflection, bending moment, shear force, and
   soil reaction are printed for full length of pile.
 - Printing Increment (nodal spacing of output points) = 1
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats



--------------------------------------------------------------------------------
                      Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Number of pile sections defined                        =           1
Total length of pile                                   =      71.000 ft
Depth of ground surface below top of pile              =      0.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over
the length of the pile. A summary of values of pile diameter vs. depth follows.

            Depth Below          Pile
Point        Pile Head         Diameter
 No.           feet             inches
-----      -------------     -------------
  1            0.000           14.6000
  2           71.000           14.6000


Input Structural Properties for Pile Sections:
----------------------------------------------

Pile Section No. 1:

   Section 1 is a H weak axis steel pile
   Length of section                                   =    71.000000 ft
   Pile width                                          =    13.600000 in
   Shear capacity of section                           =       0.0000 lbs
```

```
--------------------------------------------------------------------------------
                        Ground Slope and Pile Batter Angles
--------------------------------------------------------------------------------

Ground Slope Angle                                     =       0.000 degrees
                                                       =       0.000 radians

Pile Batter Angle                                      =       0.000 degrees
                                                       =       0.000 radians


--------------------------------------------------------------------------------
                        Soil and Rock Layering Information
--------------------------------------------------------------------------------

The soil profile is modelled using 5 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

   Distance from top of pile to top of layer           =       0.0000 ft
   Distance from top of pile to bottom of layer        =     9.300000 ft
   Effective unit weight at top of layer               =    63.000000 pcf
   Effective unit weight at bottom of layer            =    63.000000 pcf
   Friction angle at top of layer                      =    32.000000 deg.
   Friction angle at bottom of layer                   =    32.000000 deg.
   Subgrade k at top of layer                          =    85.000000 pci
   Subgrade k at bottom of layer                       =    85.000000 pci


Layer 2 is soft clay, p-y criteria by Matlock, 1970

   Distance from top of pile to top of layer           =     9.300000 ft
   Distance from top of pile to bottom of layer        =    20.300000 ft
   Effective unit weight at top of layer               =    48.000000 pcf
   Effective unit weight at bottom of layer            =    48.000000 pcf
   Undrained cohesion at top of layer                  =  1000.000000 psf
   Undrained cohesion at bottom of layer               =  1000.000000 psf
   Epsilon-50 at top of layer                          =     0.010000
   Epsilon-50 at bottom of layer                       =     0.010000


Layer 3 is soft clay, p-y criteria by Matlock, 1970

   Distance from top of pile to top of layer           =    20.300000 ft
   Distance from top of pile to bottom of layer        =    37.300000 ft
   Effective unit weight at top of layer               =    48.000000 pcf
   Effective unit weight at bottom of layer            =    48.000000 pcf
   Undrained cohesion at top of layer                  =   700.000000 psf
```

```
   Undrained cohesion at bottom of layer              =   700.000000 psf
   Epsilon-50 at top of layer                         =     0.010000
   Epsilon-50 at bottom of layer                      =     0.010000
```

Layer 4 is stiff clay without free water

```
   Distance from top of pile to top of layer          =    37.300000 ft
   Distance from top of pile to bottom of layer       =    44.300000 ft
   Effective unit weight at top of layer              =    53.000000 pcf
   Effective unit weight at bottom of layer           =    53.000000 pcf
   Undrained cohesion at top of layer                 =        1300. psf
   Undrained cohesion at bottom of layer              =        1300. psf
   Epsilon-50 at top of layer                         =     0.007000
   Epsilon-50 at bottom of layer                      =     0.007000
```

Layer 5 is soft clay, p-y criteria by Matlock, 1970

```
   Distance from top of pile to top of layer          =    44.300000 ft
   Distance from top of pile to bottom of layer       =    72.000000 ft
   Effective unit weight at top of layer              =    53.000000 pcf
   Effective unit weight at bottom of layer           =    53.000000 pcf
   Undrained cohesion at top of layer                 =   550.000000 psf
   Undrained cohesion at bottom of layer              =   550.000000 psf
   Epsilon-50 at top of layer                         =     0.008000
   Epsilon-50 at bottom of layer                      =     0.008000
```

(Depth of the lowest soil layer extends 1.000 ft below the pile tip)

Summary of Input Soil Properties

Layer Layer Num.	Soil Type Name (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	E50 or krm	kpy pci
1	Sand	0.00	63.0000	--	32.0000	--	85.0000
	(Reese, et al.)	9.3000	63.0000	--	32.0000	--	85.0000
2	Soft	9.3000	48.0000	1000.0000	--	0.01000	--
	Clay	20.3000	48.0000	1000.0000	--	0.01000	--
3	Soft	20.3000	48.0000	700.0000	--	0.01000	--
	Clay	37.3000	48.0000	700.0000	--	0.01000	--
4	Stiff Clay	37.3000	53.0000	1300.	--	0.00700	--
	w/o Free Water	44.3000	53.0000	1300.	--	0.00700	--
5	Soft	44.3000	53.0000	550.0000	--	0.00800	--
	Clay	72.0000	53.0000	550.0000	--	0.00800	--

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length	Run Analysis
1	4	y = 0.719000 in	M = -1488816. in-lbs	301600.	N.A.	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Steel H Weak Axis:

```
Length of Section                                   =    71.000000 ft
Flange Width                                        =    14.600000 in
Section Depth                                       =    13.600000 in
Flange Thickness                                    =     0.505000 in
Web Thickness                                       =     0.505000 in
Yield Stress of Pipe                                =    45.000000 ksi
Elastic Modulus                                     =       29000. ksi
Cross-sectional Area                                =    21.103950 sq. in.
Moment of Inertia                                   =   262.073233 in^4
Elastic Bending Stiffness                           =      7600124. kip-in^2
Plastic Modulus, Z                                  =    54.625591in^3
Plastic Moment Capacity = Fy Z                      =        2458.in-kip
```

Axial Structural Capacities:

```
Nom. Axial Structural Capacity = Fy As              =      949.678 kips
Nominal Axial Tensile Capacity                      =     -949.678 kips
```

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	301.600

Definition of Run Messages:

Y = part of pipe section has yielded.

Axial Thrust Force =   301.600 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Total Stress ksi	Run Msg
0.00000394	29.9677491	7599744.	132.2724860	15.1176033	
0.00000789	59.9354983	7599744.	69.7862430	15.9440432	
0.00001183	89.9032474	7599744.	48.9574953	16.7704829	
0.00001577	119.8709965	7599744.	38.5431215	17.5969229	
0.00001972	149.8387457	7599744.	32.2944972	18.4233628	
0.00002366	179.8064948	7599744.	28.1287477	19.2498024	
0.00002760	209.7742440	7599744.	25.1532123	20.0762423	
0.00003155	239.7419931	7599744.	22.9215607	20.9026820	
0.00003549	269.7097422	7599744.	21.1858318	21.7291219	
0.00003943	299.6774914	7599744.	19.7972486	22.5555616	
0.00004338	329.6452405	7599744.	18.6611351	23.3820015	
0.00004732	359.6129896	7599744.	17.7143738	24.2084414	
0.00005126	389.5807388	7599744.	16.9132682	25.0348813	
0.00005521	419.5484879	7599744.	16.2266061	25.8613212	
0.00005915	449.5162371	7599744.	15.6314991	26.6877609	
0.00006309	479.4839862	7599744.	15.1107804	27.5142008	
0.00006704	509.4517353	7599744.	14.6513227	28.3406405	
0.00007098	539.4194845	7599744.	14.2429159	29.1670804	
0.00007492	569.3872336	7599744.	13.8774993	29.9935203	
0.00007887	599.3549827	7599744.	13.5486243	30.8199601	
0.00008281	629.3227319	7599744.	13.2510708	31.6463999	
0.00008675	659.2904810	7599744.	12.9805675	32.4728397	
0.00009069	689.2582301	7599744.	12.7335863	33.2992795	
0.00009464	719.2259793	7599744.	12.5071869	34.1257194	
0.00009858	749.1937284	7599744.	12.2988994	34.9521592	
0.0001025	779.1614776	7599744.	12.1066341	35.7785990	
0.0001065	809.1292267	7599744.	11.9286106	36.6050389	
0.0001104	839.0969758	7599744.	11.7633031	37.4314787	
0.0001144	869.0647250	7599744.	11.6093961	38.2579186	
0.0001183	899.0324741	7599744.	11.4657495	39.0843584	
0.0001222	929.0002232	7599744.	11.3313705	39.9107982	
0.0001262	958.9679724	7599744.	11.2053902	40.7372380	
0.0001301	988.9357215	7599744.	11.0870450	41.5636779	
0.0001341	1019.	7599744.	10.9756614	42.3901176	
0.0001380	1049.	7599744.	10.8706425	43.2165575	
0.0001420	1079.	7599744.	10.7714579	44.0429973	
0.0001459	1109.	7599744.	10.6776348	44.8694372	
0.0001498	1138.	7594291.	10.5899846	45.0000000	Y
0.0001538	1166.	7581436.	10.5086051	45.0000000	Y
0.0001617	1219.	7539642.	10.3620551	45.0000000	Y
0.0001696	1268.	7480980.	10.2343061	45.0000000	Y
0.0001774	1315.	7410000.	10.1224915	45.0000000	Y
0.0001853	1359.	7330373.	10.0242121	45.0000000	Y
0.0001932	1400.	7245071.	9.9374387	45.0000000	Y
0.0002011	1439.	7156501.	9.8604379	45.0000000	Y
0.0002090	1477.	7065586.	9.7920461	45.0000000	Y
0.0002169	1513.	6974004.	9.7309747	45.0000000	Y
0.0002248	1547.	6882035.	9.6764675	45.0000000	Y
0.0002327	1580.	6791025.	9.6274856	45.0000000	Y
0.0002405	1612.	6701247.	9.5834114	45.0000000	Y
0.0002484	1643.	6612658.	9.5438072	45.0000000	Y
0.0002563	1673.	6525777.	9.5080760	45.0000000	Y
0.0002642	1702.	6440880.	9.4757447	45.0000000	Y
0.0002721	1730.	6358075.	9.4464407	45.0000000	Y
0.0002800	1758.	6277444.	9.4198310	45.0000000	Y

0.0002879	1784.	6198860.	9.3957021	45.0000000	Y
0.0002957	1811.	6122300.	9.3738245	45.0000000	Y
0.0003036	1836.	6046384.	9.3533269	45.0000000	Y
0.0003115	1859.	5968960.	9.3331751	45.0000000	Y
0.0003194	1882.	5890706.	9.3133064	45.0000000	Y
0.0003273	1902.	5811427.	9.2940912	45.0000000	Y
0.0003352	1921.	5732327.	9.2751295	45.0000000	Y
0.0003431	1940.	5653681.	9.2564604	45.0000000	Y
0.0003509	1957.	5575076.	9.2383353	45.0000000	Y
0.0003588	1973.	5497308.	9.2201372	45.0000000	Y
0.0003667	1988.	5420081.	9.2026383	45.0000000	Y
0.0003746	2002.	5344522.	9.1852503	45.0000000	Y
0.0003825	2016.	5269649.	9.1684896	45.0000000	Y
0.0003904	2028.	5196008.	9.1515325	45.0000000	Y
0.0003983	2041.	5123562.	9.1353370	45.0000000	Y
0.0004062	2052.	5052686.	9.1192398	45.0000000	Y
0.0004140	2063.	4982791.	9.1033044	45.0000000	Y
0.0004219	2074.	4914603.	9.0879835	45.0000000	Y
0.0004298	2084.	4847498.	9.0724380	45.0000000	Y
0.0004377	2093.	4781875.	9.0575725	45.0000000	Y
0.0004456	2102.	4717455.	9.0428004	45.0000000	Y
0.0004535	2111.	4654675.	9.0281804	45.0000000	Y
0.0004614	2119.	4592968.	9.0139359	45.0000000	Y
0.0004692	2127.	4532645.	8.9999907	45.0000000	Y
0.0005008	2156.	4304344.	8.9461683	45.0000000	Y
0.0005323	2180.	4094691.	8.8953279	45.0000000	Y
0.0005639	2201.	3903000.	8.8478295	45.0000000	Y
0.0005954	2219.	3726647.	8.8026819	45.0000000	Y
0.0006270	2235.	3564429.	8.7605140	45.0000000	Y
0.0006585	2249.	3415113.	8.7203572	45.0000000	Y
0.0006901	2261.	3276996.	8.6826384	45.0000000	Y
0.0007216	2273.	3149267.	8.6464741	45.0000000	Y
0.0007532	2283.	3030557.	8.6126214	45.0000000	Y
0.0007847	2292.	2920309.	8.5802670	45.0000000	Y
0.0008163	2300.	2817584.	8.5493324	45.0000000	Y
0.0008478	2307.	2721316.	8.5199539	45.0000000	Y
0.0008793	2314.	2631440.	8.4919945	45.0000000	Y

Summary of Results for Nominal Moment Capacity for Section 1

Load No.	Axial Thrust kips	Nominal Moment Capacity in-kips
1	301.6000000000	2314.

Note that the values in the above table are not factored by a strength reduction factor for LRFD.

The value of the strength reduction factor depends on the provisions of the LRFD code being followed.

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to the LRFD structural design standard being followed.

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	0.00	0.00	N.A.	No	0.00	44830.
2	9.3000	7.6542	No	No	44830.	112963.
3	20.3000	24.6732	Yes	No	157793.	130584.
4	37.3000	24.6953	No	No	288377.	99473.
5	44.3000	68.3574	No	No	387850.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Displacement and Moment (Loading Type 4)
Displacement of pile head = 0.719000 inches

max moment

```
Moment at pile head                                  =    -1488815.5 in-lbs
Axial load at pile head                              =      301600.0 lbs
```

L1 = 4.8'

max moment in segment 2 (49.7 kp-ft)

L2 = 13.1'

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.7190	-1488815.	27427.	-0.00127	55762.	7.03E+09	0.00	0.00	0.00
0.7100	0.7005	-1249557.	27227.	-0.00293	49097.	7.03E+09	-46.9224	570.6987	0.00
1.4200	0.6691	-1009816.	26596.	-0.00425	42419.	7.60E+09	-101.4115	1291.	0.00
2.1300	0.6281	-774527.	25512.	-0.00525	35865.	7.60E+09	-152.9534	2075.	0.00
2.8400	0.5797	-548110.	24021.	-0.00599	29559.	7.60E+09	-197.0205	2896.	0.00
3.5500	0.5260	-334415.	22196.	-0.00649	23606.	7.60E+09	-231.4832	3750.	0.00
4.2600	0.4691	-136561.	20085.	-0.00675	18095.	7.60E+09	-263.9330	4793.	0.00
4.9700	0.4110	42528.	17747.	-0.00680	15476.	7.60E+09	-284.9792	5908.	0.00
5.6800	0.3532	200807.	15175.	-0.00667	19885.	7.60E+09	-318.6991	7688.	0.00
6.3900	0.2974	335374.	12344.	-0.00637	23633.	7.60E+09	-345.7984	9908.	0.00
7.1000	0.2447	443873.	9295.	-0.00593	26655.	7.60E+09	-369.9883	12881.	0.00
7.8100	0.1963	524235.	6078.	-0.00539	28894.	7.60E+09	-385.0949	16713.	0.00
8.5200	0.1529	575133.	2784.	-0.00477	30311.	7.60E+09	-388.2258	21629.	0.00
9.2300	0.1150	$\boxed{596193.}$	-482.5693	-0.00411	30898.	7.60E+09	-378.5977	28042.	0.00
9.9400	0.08283	588053.	-3007.	-0.00345	30671.	7.60E+09	-214.0615	22019.	0.00
10.6500	0.05624	562679.	-4759.	-0.00281	29964.	7.60E+09	-197.0408	29849.	0.00
11.3600	0.03503	521382.	-6347.	-0.00220	28814.	7.60E+09	-175.8600	42772.	0.00
12.0700	0.01880	465817.	-7731.	-0.00164	27266.	7.60E+09	-149.0615	67557.	0.00
12.7800	0.00702	398089.	-8842.	-0.00116	25380.	7.60E+09	-111.7181	135652.	0.00
13.4900	-9.63E-04	321105.	-9062.	-7.57E-04	23235.	7.60E+09	60.2387	532941.	0.00
14.2000	-0.00588	247569.	-8320.	-4.38E-04	21187.	7.60E+09	113.8228	165048.	0.00
14.9100	-0.00842	181582.	-7281.	-1.97E-04	19349.	7.60E+09	129.9720	131458.	0.00
15.6200	-0.00924	124507.	-6157.	-2.57E-05	17759.	7.60E+09	134.0215	123615.	0.00
16.3300	-0.00886	76801.	-5023.	8.71E-05	16430.	7.60E+09	132.1811	127087.	0.00
17.0400	-0.00775	38470.	-3921.	1.52E-04	15363.	7.60E+09	126.4252	138945.	0.00
17.7500	-0.00628	9204.	-2881.	1.78E-04	14548.	7.60E+09	117.8382	159983.	0.00
18.4600	-0.00471	-11533.	-1922.	1.77E-04	14612.	7.60E+09	107.1133	193721.	0.00
19.1700	-0.00326	-24462.	-1062.	1.57E-04	14973.	7.60E+09	94.7346	247859.	0.00
19.8800	-0.00204	-30444.	-313.6445	1.26E-04	15139.	7.60E+09	81.0402	339191.	0.00
20.5900	-0.00111	-30456.	228.9432	9.21E-05	15139.	7.60E+09	46.3278	357014.	0.00
21.3000	-4.66E-04	-27016.	574.6845	5.99E-05	15044.	7.60E+09	34.8322	636206.	0.00
22.0100	-8.54E-05	-20971.	808.7288	3.30E-05	14875.	7.60E+09	20.1078	2006165.	0.00
22.7200	9.54E-05	-13405.	808.5663	1.37E-05	14665.	7.60E+09	-20.1460	1799736.	0.00
23.4300	1.48E-04	-7263.	622.5681	2.12E-06	14493.	7.60E+09	-23.5156	1352827.	0.00
24.1400	1.31E-04	-2807.	425.8933	-3.53E-06	14369.	7.60E+09	-22.6522	1468193.	0.00
24.8500	8.80E-05	12.2617	244.8541	-5.09E-06	14292.	7.60E+09	-19.8453	1921592.	0.00
25.5600	4.46E-05	1391.	92.8753	-4.31E-06	14330.	7.60E+09	-15.8305	3021011.	0.00
26.2700	1.46E-05	1617.	-20.2864	-2.62E-06	14336.	7.60E+09	-10.7333	6267891.	0.00
26.9800	-2.13E-08	1059.	-65.9533	-1.12E-06	14321.	7.60E+09	0.01336	5353770.	0.00
27.6900	-4.52E-06	498.9138	-53.8045	-2.48E-07	14305.	7.60E+09	2.8385	5353770.	0.00
28.4000	-4.25E-06	143.4413	-30.3423	1.12E-07	14295.	7.60E+09	2.6691	5353770.	0.00
29.1100	-2.61E-06	-18.6948	-11.9910	1.82E-07	14292.	7.60E+09	1.6387	5353770.	0.00
29.8200	-1.15E-06	-61.8202	-1.9401	1.37E-07	14293.	7.60E+09	0.7206	5353770.	0.00
30.5300	-2.76E-07	-52.4581	1.8689	7.28E-08	14293.	7.60E+09	0.1735	5353770.	0.00
31.2400	9.34E-08	-30.3482	2.3581	2.64E-08	14292.	7.60E+09	-0.05869	5353770.	0.00
31.9500	1.73E-07	-12.4115	1.6447	2.40E-09	14292.	7.60E+09	-0.1088	5353770.	0.00
32.6600	1.34E-07	-2.3344	0.8221	-5.87E-09	14291.	7.60E+09	-0.08434	5353770.	0.00
33.3700	7.31E-08	1.6268	0.2672	-6.27E-09	14291.	7.60E+09	-0.04591	5353770.	0.00
34.0800	2.74E-08	2.2506	-0.00185	-4.09E-09	14291.	7.60E+09	-0.01724	5353770.	0.00
34.7900	3.31E-09	1.6163	-0.08418	-1.93E-09	14291.	7.60E+09	-0.00208	5353770.	0.00
35.5000	-5.37E-09	0.8261	-0.07867	-5.57E-10	14291.	7.60E+09	0.00338	5353770.	0.00
36.2100	-6.17E-09	0.2787	-0.04777	6.27E-11	14291.	7.60E+09	0.00388	5353770.	0.00
36.9200	-4.30E-09	0.01177	-0.01974	2.26E-10	14291.	7.60E+09	0.00270	5353770.	0.00
37.6300	-2.33E-09	-0.05882	-0.00451	1.99E-10	14291.	7.60E+09	8.69E-04	3182006.	0.00
38.3400	-9.10E-10	-0.06618	6.35E-04	1.29E-10	14291.	7.60E+09	3.40E-04	3182006.	0.00
39.0500	-1.27E-10	-0.04866	0.00228	6.47E-11	14291.	7.60E+09	4.73E-05	3182006.	0.00
39.7600	1.92E-10	-0.02758	0.00218	2.20E-11	14291.	7.60E+09	-7.19E-05	3182006.	0.00
40.4700	2.48E-10	-0.01164	0.00148	0.00	14291.	7.60E+09	-9.26E-05	3182006.	0.00
41.1800	1.92E-10	-0.00238	7.78E-04	-7.87E-12	14291.	7.60E+09	-7.18E-05	3182006.	0.00
41.8900	1.14E-10	0.00166	2.91E-04	-8.27E-12	14291.	7.60E+09	-4.26E-05	3182006.	0.00
42.6000	5.15E-11	0.00262	2.76E-05	-5.87E-12	14291.	7.60E+09	-1.92E-05	3182006.	0.00
43.3100	1.39E-11	0.00216	-7.64E-05	-3.19E-12	14291.	7.60E+09	-5.20E-06	3182006.	0.00
44.0200	-2.93E-12	0.00133	-9.39E-05	-1.23E-12	14291.	7.60E+09	1.09E-06	3182006.	0.00
44.7300	-7.09E-12	5.71E-04	-7.06E-05	0.00	14291.	7.60E+09	4.37E-06	5258167.	0.00
45.4400	-5.80E-12	1.28E-04	-3.67E-05	0.00	14291.	7.60E+09	3.58E-06	5258167.	0.00
46.1500	-3.28E-12	-5.62E-05	-1.28E-05	0.00	14291.	7.60E+09	2.03E-06	5258167.	0.00
46.8600	-1.31E-12	-9.27E-05	-7.70E-07	0.00	14291.	7.60E+09	8.08E-07	5258167.	0.00
47.5700	0.00	-7.03E-05	3.25E-06	0.00	14291.	7.60E+09	1.36E-07	5258167.	0.00
48.2800	0.00	-3.77E-05	3.32E-06	0.00	14291.	7.60E+09	-1.22E-07	5258167.	0.00
48.9900	0.00	-1.39E-05	2.13E-06	0.00	14291.	7.60E+09	-1.57E-07	5258167.	0.00
49.7000	0.00	-1.45E-06	9.85E-07	0.00	14291.	7.60E+09	-1.11E-07	5258167.	0.00
50.4100	0.00	2.94E-06	2.72E-07	0.00	14291.	7.60E+09	-5.63E-08	5258167.	0.00
51.1200	0.00	3.23E-06	-4.83E-08	0.00	14291.	7.60E+09	-1.88E-08	5258167.	0.00
51.8300	0.00	2.14E-06	-1.30E-07	0.00	14291.	7.60E+09	-3.42E-10	5258167.	0.00
52.5400	0.00	1.02E-06	-1.08E-07	0.00	14291.	7.60E+09	5.51E-09	5258167.	0.00
53.2500	0.00	3.06E-07	-6.17E-08	0.00	14291.	7.60E+09	5.31E-09	5258167.	0.00
53.9600	0.00	-2.85E-08	-2.50E-08	0.00	14291.	7.60E+09	3.32E-09	5258167.	0.00
54.6700	0.00	-1.22E-07	-4.48E-09	0.00	14291.	7.60E+09	1.49E-09	5258167.	0.00
55.3800	0.00	-1.06E-07	3.50E-09	0.00	14291.	7.60E+09	3.82E-10	5258167.	0.00
56.0900	0.00	-6.28E-08	4.70E-09	0.00	14291.	7.60E+09	-1.01E-10	5258167.	0.00
56.8000	0.00	-2.64E-08	3.36E-09	0.00	14291.	7.60E+09	-2.14E-10	5258167.	0.00
57.5100	0.00	-5.55E-09	1.72E-09	0.00	14291.	7.60E+09	-1.71E-10	5258167.	0.00
58.2200	0.00	2.95E-09	5.86E-10	0.00	14291.	7.60E+09	-9.54E-11	5258167.	0.00
58.9300	0.00	4.51E-09	2.09E-11	0.00	14291.	7.60E+09	-3.73E-11	5258167.	0.00
59.6400	0.00	3.35E-09	-1.62E-10	0.00	14291.	7.60E+09	-5.66E-12	5258167.	0.00
60.3500	0.00	1.77E-09	-1.60E-10	0.00	14291.	7.60E+09	6.20E-12	5258167.	0.00
61.0600	0.00	6.36E-10	-1.01E-10	0.00	14291.	7.60E+09	7.61E-12	5258167.	0.00
61.7700	0.00	5.31E-11	-4.58E-11	0.00	14291.	7.60E+09	5.28E-12	5258167.	0.00
62.4800	0.00	-1.47E-10	-1.21E-11	0.00	14291.	7.60E+09	2.63E-12	5258167.	0.00

63.1900	0.00	-1.56E-10	2.75E-12	0.00	14291.	7.60E+09	0.00	5258167.	0.00
63.9000	0.00	-1.02E-10	6.35E-12	0.00	14291.	7.60E+09	0.00	5258167.	0.00
64.6100	0.00	-4.78E-11	5.16E-12	0.00	14291.	7.60E+09	0.00	5258167.	0.00
65.3200	0.00	-1.37E-11	2.91E-12	0.00	14291.	7.60E+09	0.00	5258167.	0.00
66.0300	0.00	1.81E-12	1.15E-12	0.00	14291.	7.60E+09	0.00	5258167.	0.00
66.7400	0.00	5.97E-12	0.00	0.00	14291.	7.60E+09	0.00	5258167.	0.00
67.4500	0.00	5.08E-12	0.00	0.00	14291.	7.60E+09	0.00	5258167.	0.00
68.1600	0.00	2.96E-12	0.00	0.00	14291.	7.60E+09	0.00	5258167.	0.00
68.8700	0.00	1.25E-12	0.00	0.00	14291.	7.60E+09	0.00	5258167.	0.00
69.5800	0.00	0.00	0.00	0.00	14291.	7.60E+09	0.00	5258167.	0.00
70.2900	0.00	0.00	0.00	0.00	14291.	7.60E+09	0.00	5258167.	0.00
71.0000	0.00	0.00	0.00	0.00	14291.	7.60E+09	0.00	2629084.	0.00

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 1:

```
Pile-head deflection            =     0.71900000 inches
Computed slope at pile head     =    -0.00126880 radians
Maximum bending moment          =      -1488815. inch-lbs
Maximum shear force             =         27427. lbs
Depth of maximum bending moment =       0.000000 feet below pile head
Depth of maximum shear force    =       0.000000 feet below pile head
Number of iterations            =             17
Number of zero deflection points =            14
```

Summary of Pile-head Responses for Conventional Analyses

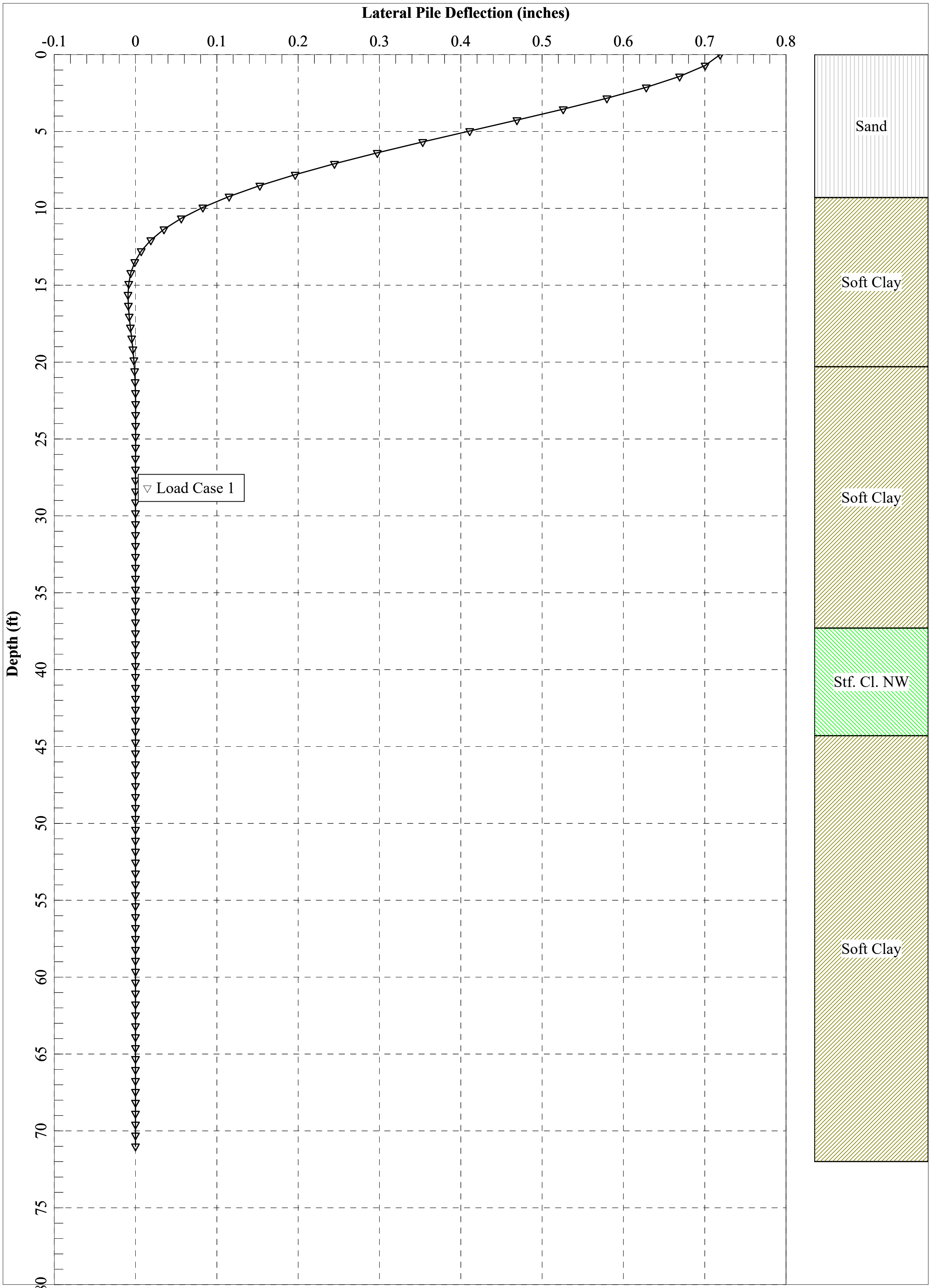
Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

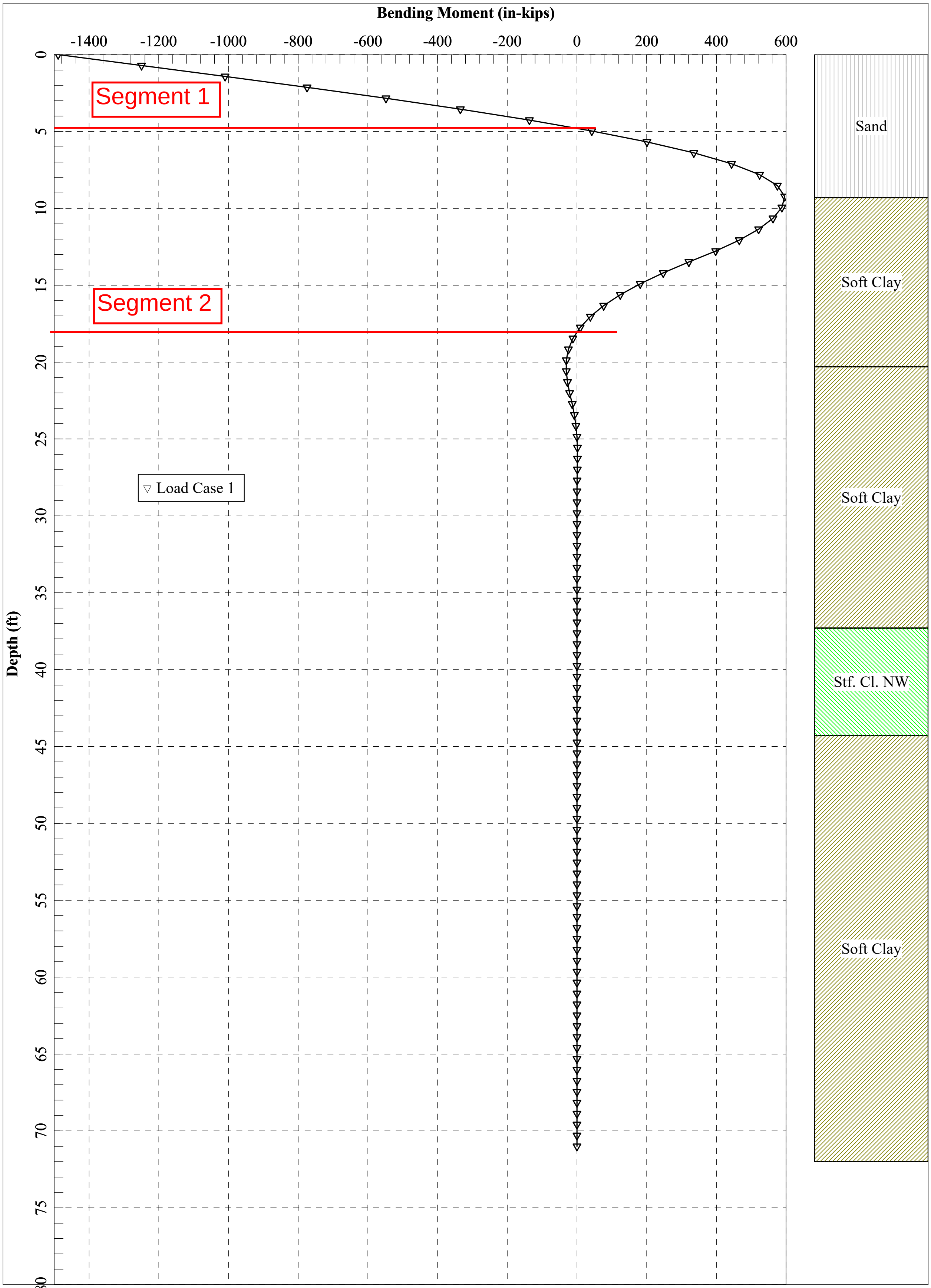
Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	y, in	0.7190	M, in-lb	-1488816.	301600.	0.7190	-0.00127	27427.	-1488815.

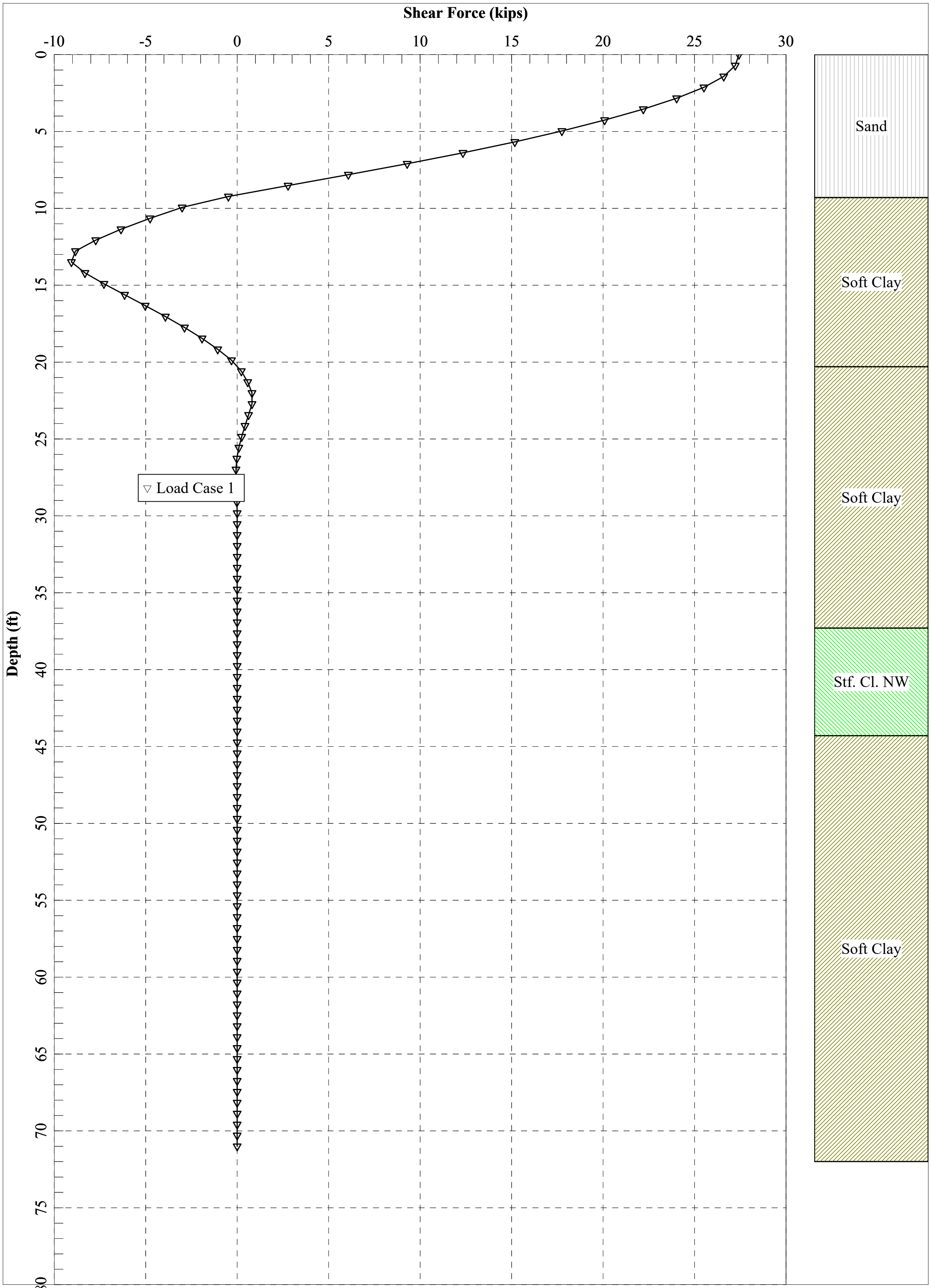
Maximum pile-head deflection = 0.7190000000 inches
Maximum pile-head rotation = -0.0012687988 radians = -0.072697 deg.

The analysis ended normally.



Lateral Pile Deflection (inches)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
Load Case 1
Sand
Soft Clay
Soft Clay
Stf. Cl. NW
Soft Clay


Bending Moment (in-kips)
-1400
-1200
-1000
-800
-600
-400
-200
0
200
400
600
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
Segment 1
Segment 2
Load Case 1
Sand
Soft Clay
Soft Clay
Stf. Cl. NW
Soft Clay



Shear Force (kips)
-10
-5
0
5
10
15
20
25
30
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
Load Case 1
Sand
Soft Clay
Soft Clay
Stf. Cl. NW
Soft Clay

GZA
GeoEnvironmental, Inc
707 Sable Oaks Drive
Suite 150
South Portland, Maine 04106
207-879-9190
Fax 207-879-0099

Engineers and Scientists

Subject: Evaluate lateral earth pressure coefficients

References:

1. MaineDOT Bridge Design Guide, Chapter 3
2. AASHTO LRFD Bridge Design Specifications, 9th Edition (2020)

Input Parameters:

$\beta := 0\text{deg}$ Angle of backfill to the horizontal

$\theta := 90\text{deg}$ Angle of backface of wall to the horizontal

$\phi := 32\text{deg}$ Effective angle of internal friction *(Granular borrow, Soil Type 4, BDG Table 3-3)*

$\delta_f := 19.5\text{deg}$ Average value of friction angle between, precast concrete and clean sand/silty sand-gravel mixture *(AASHTO LRFD Table 3.11.5.3-1)*

Passive Earth Pressure on Integral Backwall:

Per BDG Section 5.4.2.11, developing full passive pressure requires that ratio of lateral abutment movement (y) to abutment height (Hb) exceeds 0.005. If the calculated rotation is significantly less, Rankine earth pressure may be considered.

$y := 0.414\text{in}$ From structural engineer (Contraction only no shrinkage or creep) Total deflection 0.719" less shrinkage .187" and creep .118".

$H_b := 12.3\text{ft}$

$\frac{y}{H_b} = 0.0028$ Ratio of lateral movement to abutment height is greater than 0.005, use coulomb passive earth Pressure

Earth Pressure Coefficients:

Since the ratio of lateral movement is much less than .005 GZA evaluated the typical Rankine passive earth pressure

$$K_{pr} := \frac{1 + \sin(\phi)}{1 - \sin(\phi)} \qquad \boxed{K_{pr} = 3.25}$$

March 2014

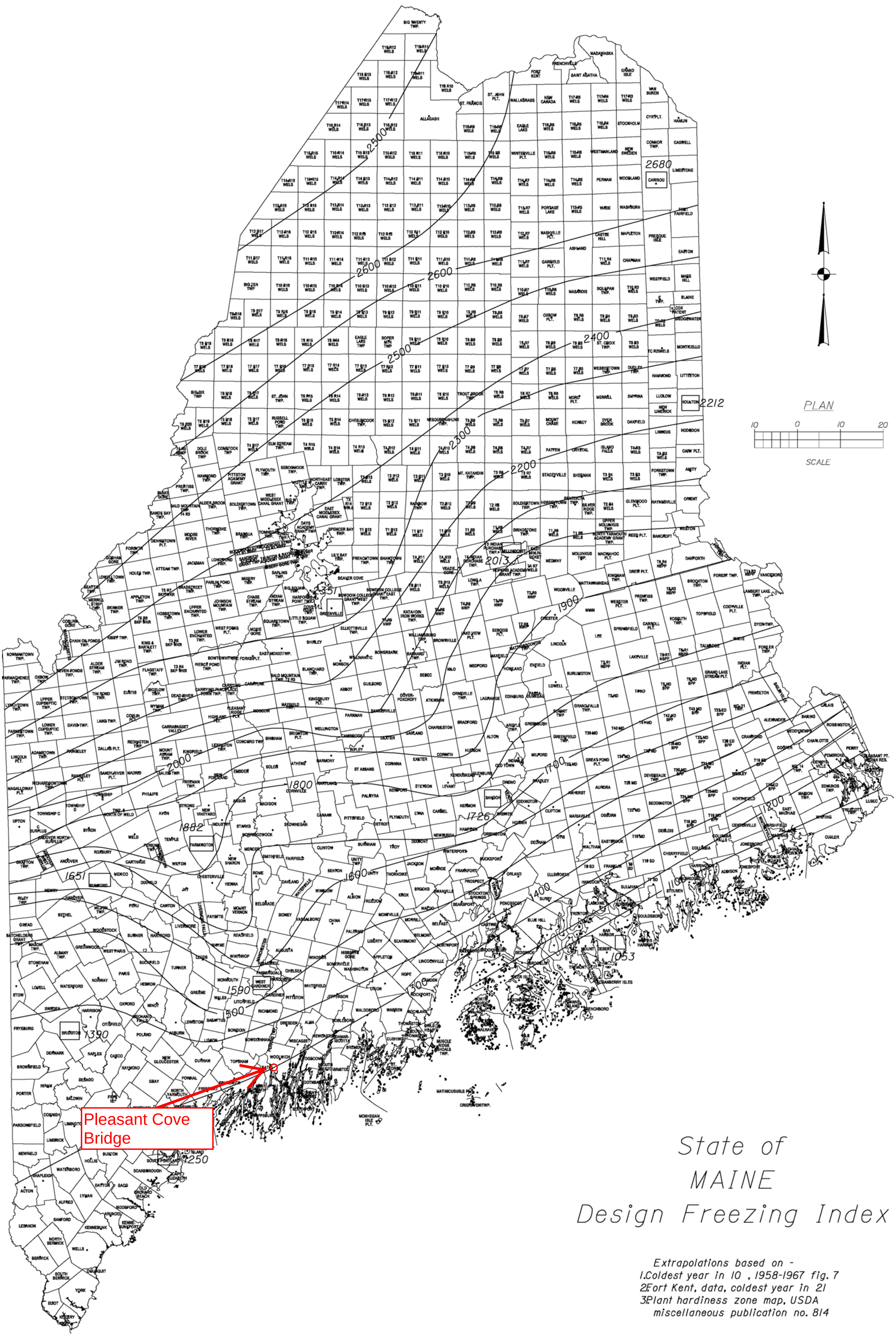


Figure 5-1 Maine Design Freezing Index Map

Table 5-1 Depth of Frost Penetration

Design Freezing Index	Frost Penetration (in)					
	Coarse Grained			Fine Grained		
	w=10%	w=20%	w=30%	w=10%	w=20%	w=30%
1000	66.3	55.0	47.5	47.1	40.7	36.9
1100	69.8	57.8	[illegible]	[illegible]	42.7	38.7
1200	73.1	60.4	[illegible]	[illegible]	44.7	40.5
1300	76.3	63.0	54.3	54.2	46.6	42.2
1400	79.2	65.5	56.4	56.3	48.5	43.9
1500	82.1	67.9	58.4	58.3	50.2	45.4
1600	84.8	70.2	60.3	60.2	51.9	46.9
1700	87.5	72.4	62.2	62.2	53.5	48.4
1800	90.1	74.5	64.0	64.0	55.1	49.8
1900	92.6	76.6	65.7	65.8	56.7	51.1
2000	95.1	78.7	67.5	67.6	58.2	52.5
2100	97.6	80.7	69.2	69.3	59.7	53.8
2200	100.0	82.6	70.8	71.0	61.1	55.1
2300	102.3	84.5	72.4	72.7	62.5	56.4
2400	104.6	86.4	74.0	74.3	63.9	57.6
2500	106.9	88.2	75.6	75.9	65.2	58.8
2600	109.1	89.9	77.1	77.5	66.5	60.0

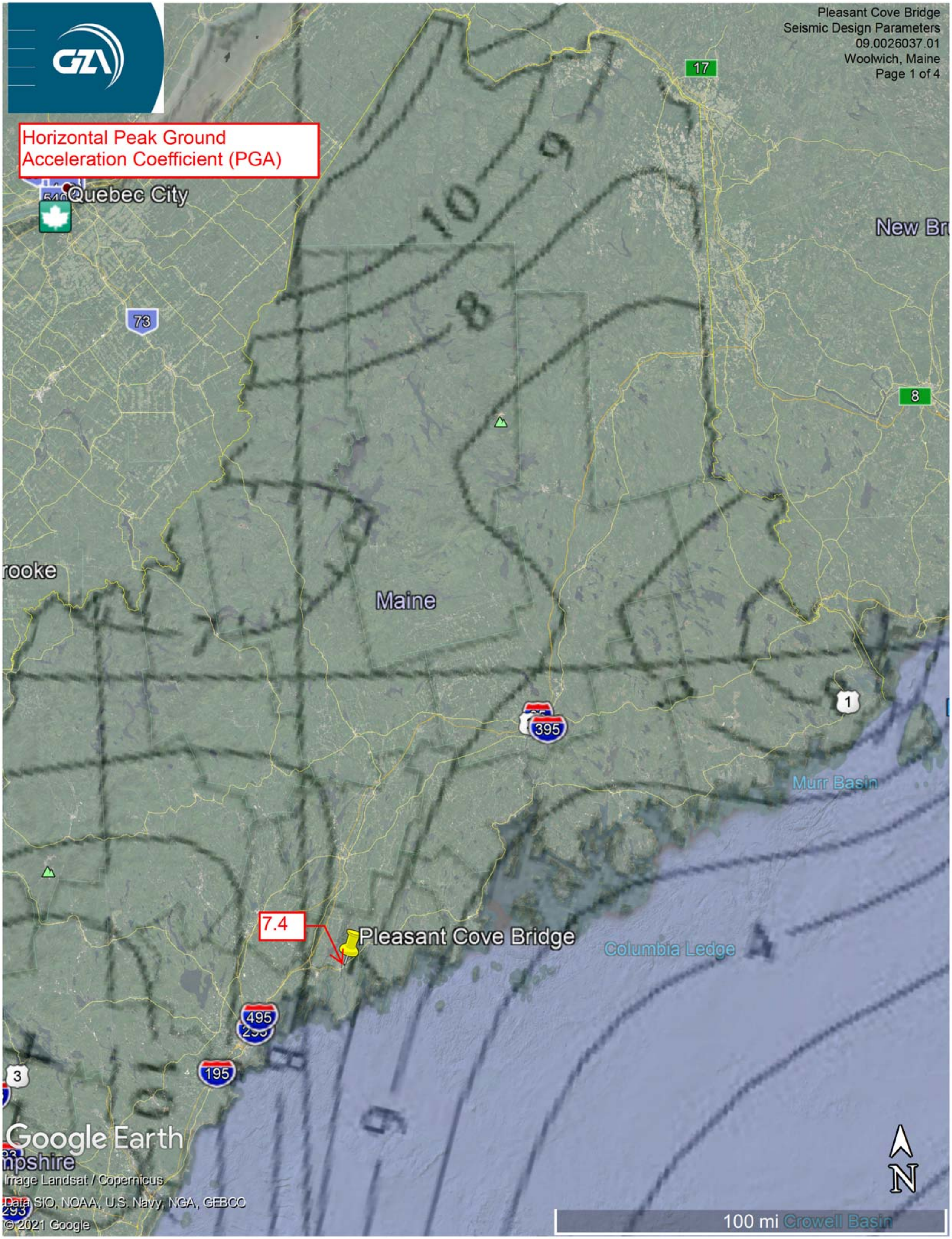
Granular Fill proposed near pier footings

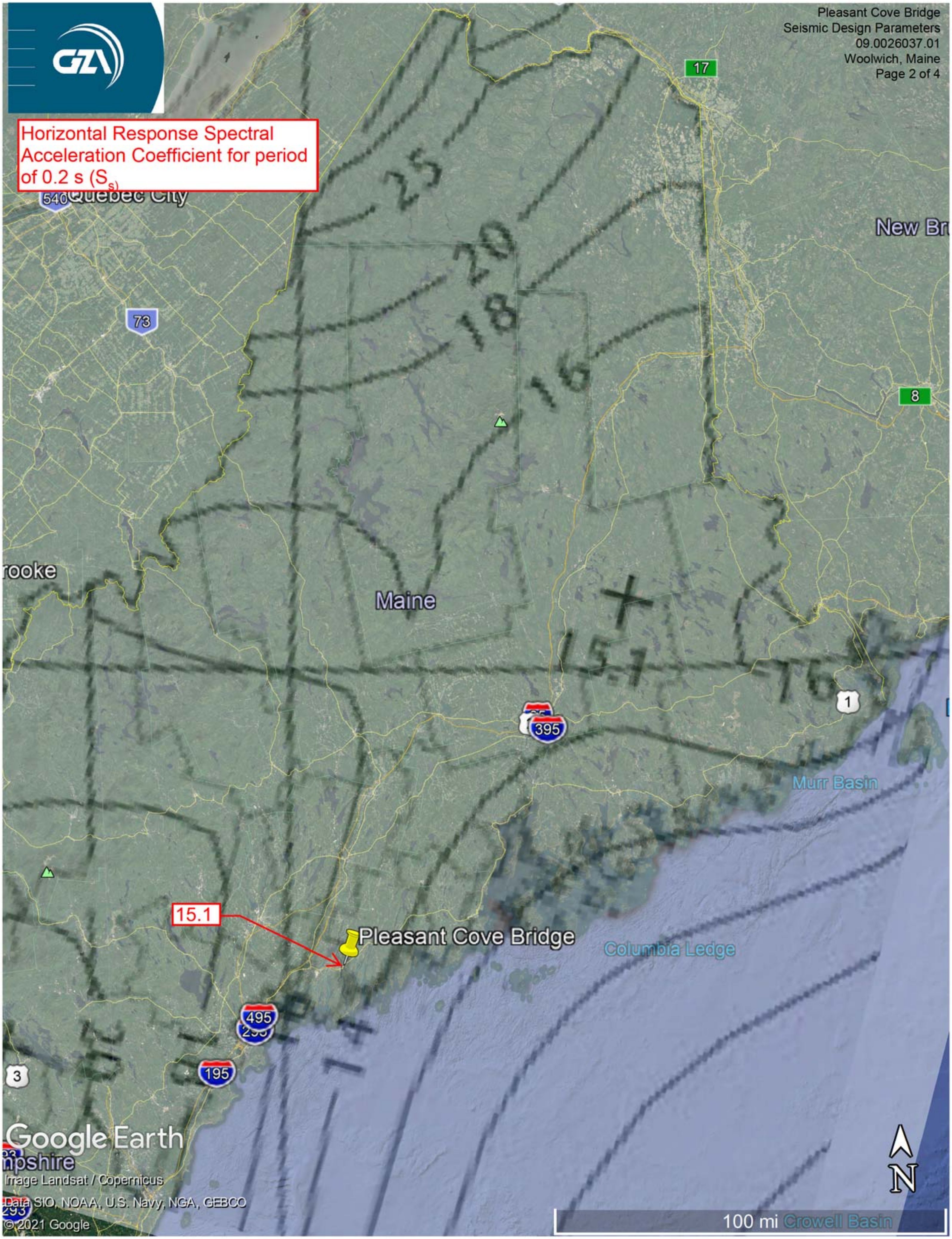
63" = 5.3'

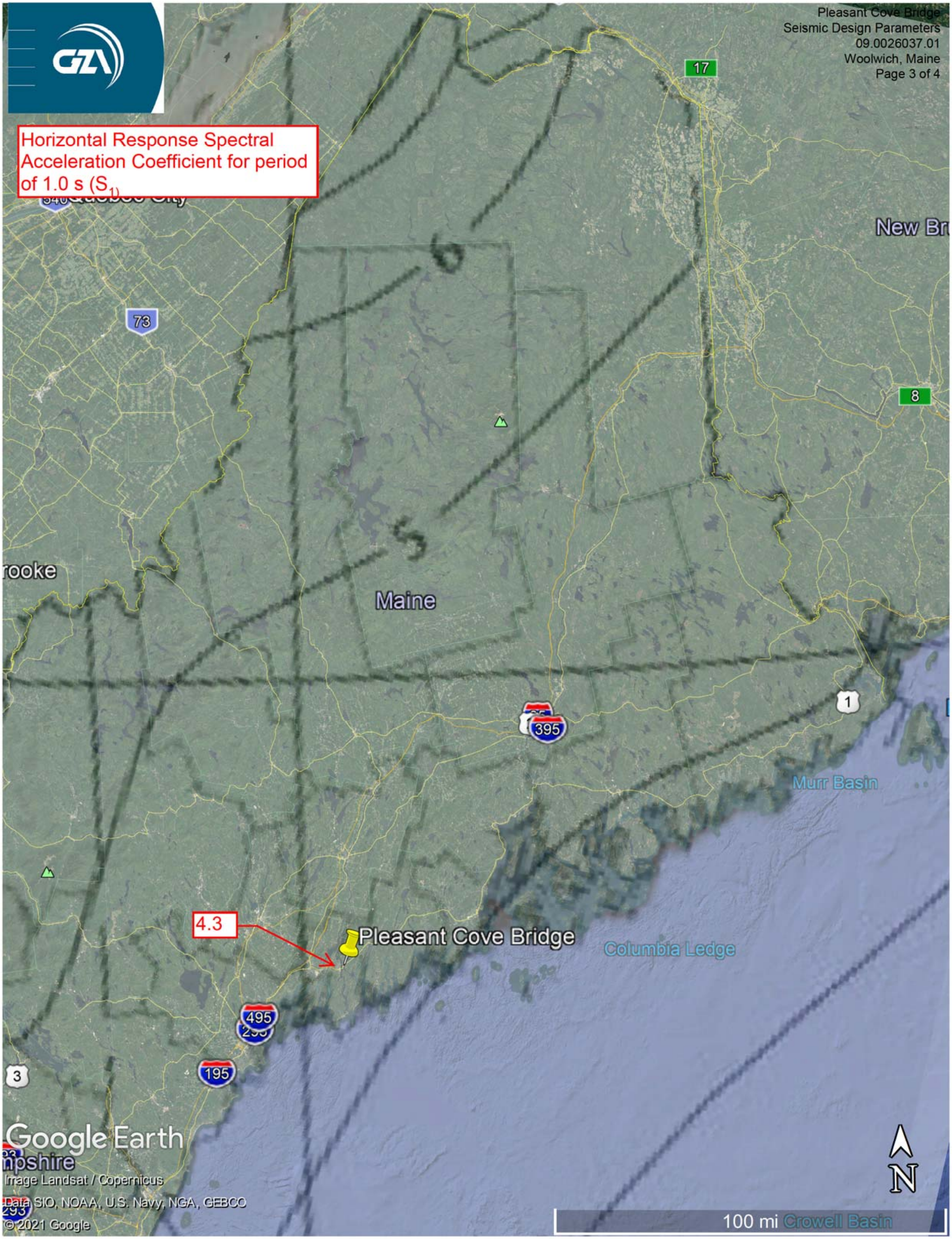
Notes: 1. w = water content
2. Where the Freezing Index and/or water content is between the presented values, linear interpretation may be used to determine the frost penetration.

Wetland deposit soils are anticipated to be present near the elevation of the pier pile caps but the plans indicate granular fill adjacent to the pile caps. The granular material controls therefore material is corase-grained with water contents of approximately 20%. Based on the MaineDOT BDG, Section 5.2.1 and a Freezing Index of 1300 the estimated depth of frost penetration is 63 inches.

Horizontal Peak Ground Acceleration Coefficient (PGA)




Horizontal Response Spectral Acceleration Coefficient for period of 0.2 s (S_s)
Quebec City
New Br
Maine
rooke
25
20
18
16
15.1
16
15.1
Pleasant Cove Bridge
Murr Basin
Columbia Ledge
Google Earth
npshire
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2021 Google
100 mi
Crowell Basin
N


Horizontal Response Spectral Acceleration Coefficient for period of 1.0 s (S_1)
6
5
Maine
New Br
4.3
Pleasant Cove Bridge
Columbia Ledge
Murr Basin
Google Earth
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2021 Google
100 mi
Crowell Basin
N

Pleasant Cove Seismic Interpolation for Coefficients		
Seismic Parameter	**Interpolated Value from Maps[1]**	**Design Parameter**
Horizontal Peak ground Acceleration Coefficient	7.4	$PGA = .074$
Horizontal Response Spectral Acceleration Coefficient for Period of 0.2s	15.1	$S_s = 0.151$
Horizontal Response Spectral Acceleration Coefficient for Period of 1.0s	4.3	$S_1 = .043$

Notes: 1. AASHTO Figures 3.10.2.1-1,-2, and -3 were overlaid within the Google Earth software. Coefficients were interpolated between lines on these figures as presented in pages 1 through 3 of this calculation.

For Class E, values of F_{PGA} and F_a = 2.5, and F_v = 3.5

Therefore:

$$A_s = F_{PGA} \times PGA = 2.5 \times 0.074 = 0.19\ g$$

$$S_{DS} = F_a \times S_s = 2.5 \times 0.151 = 0.38\ g$$

$$S_{D1} = F_v \times S_1 = 3.5 \times 0.043 = 0.15\ g$$

Summary:

SITE CLASS E SEISMIC DESIGN PARAMETERS	
Parameter	**Design Value**
Fpga	2.5
Fa	2.5
Fv	3.5
As (Period = 0.0 sec)	0.19 g
SDs (Period = 0.2 sec)	0.38 g
SD1 (Period = 1.0 sec)	0.15 g

APPENDIX F – ROCK CORE PHOTOGRAPHS

Pleasant Cove Bridge
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)			Penetration (in.)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
EB-KERP-101	R-1	149.5	-	154.5	60.0	60	100%	55	92%	SCHIST	1
EB-KERP-101	R-2	154.5	-	159.5	60.0	60	100%	56	93%	SCHIST	2
EB-KERP-102	R-1	49.5	-	54.5	60.0	60	100%	47	78%	SCHIST	3
EB-KERP-102	R-2	54.5	-	59.5	60.0	60	100%	47	78%	SCHIST	4

Notes: 1. Box row corresponds to the core box section in which the rock core sample is contained; Row 1=Top, Row 4=Bottom.
2. Top photo is dry, bottom photo is wet.

Pleasant Cove Bridge
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)			Penetration (in.)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
BB-WPC-201A	R-1	76.6	-	79.6	33.6	33.6	100%	4	12%	SCHIST	1
BB-WPC-201A	R-2	79.5	-	84	54	50.4	93%	42	78%	SCHIST	1, 2
BB-WPC-201A	R-3	84	-	87.5	42	41	98%	37	88%	SCHIST	2, 3

Notes:
1. Box row corresponds to the core box section in which the rock core sample is contained; Row 1=Top, Row 4=Bottom.
2. Top photo is dry, bottom photo is wet.
3. Transition between core runs within a row are marked by wood or paper separators.

Pleasant Cove Bridge
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)			Penetration (in.)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
BB-WPC-202	R-1	84	-	88.4	53	48	90%	5	9%	SCHIST	1
BB-WPC-202	R-2	88.4	-	93.5	61	61	100%	38	62%	SCHIST	1, 2
BB-WPC-203	R-1	79.8	-	84.5	56	56	100%	6	11%	SCHIST	3
BB-WPC-203	R-2	84.5	-	87.5	36	36	100%	19	53%	SCHIST	3, 4
BB-WPC-203	R-3	87.5	-	90.5	36	36	100%	16	44%	SCHIST	4

Notes:
1. Box row corresponds to the core box section in which the rock core sample is contained; Row 1=Top, Row 4=Bottom.
2. Top photo is dry, bottom photo is wet.
3. Transition between core runs within a row are marked by wood or paper separators.

Pleasant Cove Bridge
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)			Penetration (in.)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
HB-WPC-205	R-1	30	-	35	60	60	100%	37	62%	SCHIST	1
HB-WPC-205	R-2	35	-	40	60	48	80%	35	58%	SCHIST	2
HB-WPC-204	R-1	27	-	32	60	59	98%	59	98%	SCHIST	3
HB-WPC-204	R-2	32	-	37	60	60	100%	44	73%	SCHIST	4

Notes: 1. Box row corresponds to the core box section in which the rock core sample is contained; Row 1=Top, Row 4=Bottom.
2. Top photo is dry, bottom photo is wet.

Pleasant Cove Bridge
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)			Penetration (in.)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
HB-WPC-203	R-1	98	-	101.6	43	43	100%	15	35%	SCHIST	1
HB-WPC-203	R-2	101.6	-	105.5	47	46	98%	18	38%	SCHIST	2
HB-WPC-203	R-3	105.5	-	108.4	35	33.6	96%	15.5	44%	SCHIST	3
BB-WPC-301	R-1	106.8	-	111.8	60	60	100%	20.5	34%	SCHIST	3, 4

Notes: 1. Box row corresponds to the core box section in which the rock core sample is contained; Row 1=Top, Row 4=Bottom.
2. Top photo is dry, bottom photo is wet.
3. Transition between core runs within a row are marked by wood or paper separators.

Pleasant Cove Bridge
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)			Penetration (in.)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
HB-WPC-201	R-1	10	-	36	60	60	100%	53	88%	SCHIST	1
HB-WPC-201	R-2	36	-	41	60	60	100%	57	95%	SCHIST	2
HB-WPC-202	R-1	84.5	-	89.5	60	60	100%	28	47%	SCHIST	3
HB-WPC-202	R-2	89.5	-	94	54	50	93%	19.5	36%	SCHIST	4

Notes: 1. Box row corresponds to the core box section in which the rock core sample is contained; Row 1=Top, Row 4=Bottom.
2. Top photo is dry, bottom photo is wet.