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GEOTECHNICAL DESIGN REPORT

STATION 46 BRIDGE NO. 3039

MAINE DOT WIN 23929.00

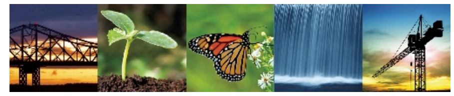
WOOLWICH, MAINE

September 2021
09.0026035.01

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



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GEOTECHNICAL
ENVIRONMENTAL
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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. 09.0026035.01

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

Re: Geotechnical Design Report
Replacement of Station 46 Bridge No. 3039
MaineDOT WIN 23929.00
U.S. Route 1, Woolwich, Maine

Dear Laura:

We are pleased to provide this Geotechnical Design Report, which includes geotechnical design recommendations for the replacement of Station 46 Bridge No. 3039 in Woolwich, Maine. Our work was completed under GZA GeoEnvironmental, Inc.'s (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.P000135.21, dated March 11, 2021, and the *Limitations* Included in **Appendix A** of this report.

It has been a pleasure serving MaineDOT on this phase 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.

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

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

Andrew R. Blaisdell, P.E.
Consultant Reviewer

Christopher L. Snow, P.E.
Principal

BMC/CLS/ARB:erc
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Attachment: Geotechnical Design Report

TABLE OF CONTENTS

TABLE OF CONTENTS (*continued*)

1.0 INTRODUCTION

This report presents the results of the geotechnical evaluation by GZA GeoEnvironmental, Inc. (GZA) for the replacement of Station 46 Bridge No. 3039 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.P000135.21, dated March 11, 2021, and the *Limitations* Included in **Appendix A** of this report. HNTB is serving as the bridge designer for MaineDOT.

1.1 BACKGROUND

The project includes replacement of the Station 46 Bridge No. 3039 carrying U.S. Route 1 over the tidal estuary of the Kennebec River and over Pan Am Railways' railbed in Woolwich, Maine. The project location is shown on **Figure 1**. The existing bridge has nine spans with a total length of approximately 675 feet and a width of 49 feet. The bridge was built in 1933 and consists of a steel girder, concrete deck superstructure supported on steel column piers and full-height, reinforced concrete abutments. The circa-1933 portion of existing abutments are supported on spread footings bearing on bedrock and the eight piers are supported on timber piles. Improvements since original construction include a widening in 1959, an additional widening and deck replacement in 1979, and replacement of the wearing surface and joints in 2012. Available plans indicate the widened portions of the abutments are supported on piles.

The preferred bridge replacement alternative consists of an approximately 619-foot-long, four-span bridge with an alignment shift 10 feet to the east. The location of the proposed baseline is shown on **Figures 2 and 3**. Abutments are anticipated to be supported by spread footings on bedrock. Abutment 1 left (north) wingwall is flared and terminates in a 1.75 horizontal to 1 vertical (1.75H:1V) riprap slope. Abutment 1 right (south) wingwall is perpendicular to the abutment and is abutted by a retaining wall that is proposed to be contractor design and extends between the existing and proposed Abutment 1, which is anticipated to be a mechanically stabilized earth embankment or a Prefabricated Concrete Modular Gravity (PCMG) wall. Abutment 2 is proposed to be located behind the existing abutment, and approach fills will consist of 2H:1V slopes. Piers are anticipated to be supported by driven pile foundations. The preferred alternative includes a temporary bridge to the southeast of the alignment. The proposed bridge configuration places Abutment 1 between the existing abutment and the first pier.

1.2 OBJECTIVES AND SCOPE OF SERVICES

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

- Conducted a site visit 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 five test borings;

- Coordinated and observed a supplemental subsurface exploration program, consisting of twelve additional bridge test borings, three cone penetration tests, and a geophysical program, to further evaluate subsurface conditions for the bridge;
- 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 footings on bedrock foundations; nominal resistance of pile foundations; pile drivability; settlement of approaches; retaining wall design parameters and site-specific seismic design considerations;
- Developed geotechnical engineering recommendations including foundation design recommendations for driven piles, footings on bedrock, retaining walls, lateral earth pressures, seismic design parameters; recommended construction considerations; and
- Prepared this report summarizing our findings and design recommendations.

2.0 SUBSURFACE EXPLORATIONS

Details of the previous and current subsurface explorations are provided in the following sections.

2.1 PREVIOUS (1978 AND 1979) BORINGS

In 1978, MaineDOT conducted two test borings, designated CB-15-78 and CB-16-78, to explore subsurface conditions for the bridge widening. Boring CB-15-78 was drilled through existing span 6 and encountered bedrock in which 5 feet of core was drilled. Boring CB-16-78 was drilled through existing span 4 and encountered bedrock at approximately 25 feet below grade in which a core was drilled.

In 1979, MaineDOT bedrock probes, designated 4 through 9, were drilled to bedrock refusal for the widening. The probes encountered refusal from 6.5 to 26.7 feet below ground surface on probable bedrock.

GZA used borings CB-15-78, CB-16-78, and bedrock probes 4 through 9 to provide data to characterize the subsurface stratification and bedrock elevation for design consideration. GZA also used the February 19, 1934 as-built drawings to interpolate bedrock elevations and develop the top-of-rock profile at Abutment 2. The locations of previous borings were estimated based on the locations shown on the 1979 drawing and presented on the Interpretive Subsurface Profile, **Figure 4**. The means of locating these borings when they were drilled is unknown. Therefore, their locations are considered approximate. The boring log sheets from the 1979 geotechnical report are included in **Appendix B**.

2.2 RECENT BORINGS

GZA completed a preliminary design exploration program in 2019 consisting of five test borings, and a final design bridge exploration program in 2021 consisting of twelve 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 or 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. The drill holes through the bridge deck were filled with concrete flush to the deck surface. GZA personnel monitored the drilling work and prepared logs of each boring that are included in **Appendix C.** Additional details of each program are described below.

2.3 PRELIMINARY DESIGN BORINGS

Borings BB-WS46-101 through BB-WS46-105 were drilled between October 7 and October 22, 2019. The borings were completed using a Mobile B-53 drill carried on a track rig and were drilled to depths ranging from approximately 32.5 to 136.5 feet below ground surface (bgs). Bedrock was cored approximately 10 to 10.5 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 seven thin-walled tube samples were taken from borings BB-WS46-102, -103, and -104 for laboratory testing for consolidation and shear strength.

2.4 FINAL DESIGN PHASE BORINGS

Borings BB-WS46-201 through BB-WS46-207/207A, and BB-WS46-301/301A through BB-WS46-305 were drilled between March 22 and May 19, 2021. The BB-WS46-200 series borings were drilled at substructure locations of the proposed replacement bridge, and the BB-WS46-300 series borings were drilled along or near the proposed temporary bridge alignment. At least one BB-WS46-200 series boring was drilled at each of the proposed replacement bridge abutment and pier locations. The borings were drilled using a track mounted Mobile B-53 drill rig. The borings were drilled to depths of approximately 21 to 136 feet and terminated approximately 8.2 to 12.4 feet into bedrock. SPTs were conducted using automatic hammers NEBC #1 and NEBC #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 four thin-walled tube samples were taken from borings BB-WS46-205 and -305 for laboratory testing for consolidation and shear strength.

2.5 CONE PENETRATION TESTING

GZA retained Summit Geoengineering Services (SGS) to complete one CPT, designated CPT-WS46-101, on October 14, 2019 as part of the preliminary design subsurface investigation program. CPT-WS46-101 was conducted adjacent to boring BB-WS46-103. Additionally, three Seismic Cone Penetration tests (sCPTs), designated sCPT-WS46-201 through -203 were conducted on March 24, 2021 during final design. The sCPTs were conducted with downhole shear wave velocity measurements for use in site-specific seismic design.

The as-drilled CPT locations were surveyed by MaineDOT and provided to GZA as shown on **Figure 3**.

The sCPTs were performed in accordance with ASTM D5778. CPT-WS46-101 was advanced using a truck-mounted PowerProbe 9630 Pro with a Vertek digital cone to a depth of approximately 107.9 feet; probe refusal was not observed. sCPT-WS46-201 through -203 were advanced using a track-mounted PowerProbe 9500 VTR with a Vertek digital cone to depths ranging from approximately 17 to 77 feet. Parameters obtained include cone resistance (qc), sleeve friction (fs), piezocone pore pressure (u2), and shear wave velocity (excluding CPT-WS46-101).

Data reports submitted to GZA by SGS containing the CPT results, dated November 17, 2019 and March 31, 2021 are included in **Appendix D**. SGS also provided GZA with Excel files containing the raw data collected from the CPTs for use in our engineering evaluations.

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 D**.

2.6 GEOPHYSICAL TESTING

Northeast Geophysical Services (NGS) completed a geophysical survey using a combination of Multichannel Analysis of Surface Waves (MASW) and Refraction Microtremor (ReMi) methods to evaluate shear (Vs) and compressive wave velocity (Vp) of the soil and bedrock at the site. MASW is an approach to collecting seismic velocity data that uses surface wave (Rayleigh wave) propagation to profile the subsurface. Two, approximately 230- and 345-foot-long seismic spreads, identified as Seismic Spread 1 and Seismic Spread 2, respectively, were completed perpendicular to each other with the center of both lines near BB-WS46-205 (Pier 2). The locations of each spread were estimated by NGS and are shown in the report which is presented in **Appendix E**. The geophysical data were acquired via a Geometrics Geode, 24-channel seismograph and 4 Hz vertical geophones spaced 15 feet apart for Seismic Spread 1 and 10 feet apart for Seismic Spread 2. The geophysical surveys measure the travel time of sound waves from a 16-lb hammer and a metal plate to refract waves at subsurface layers and differentiate material compressive wave velocities. Each survey line contained 24 geophones and included several impacts from the hammer at various locations. ReMi survey had irregular results which were not consistent with the sCPT results, and therefore were not considered in our evaluation.

The recorded field data was interpreted using the Hobson-Overton method. GZA utilized the shear wave velocities for the site-specific seismic analysis as described in **Section 5.8** of this report. The MASW results presented two shear wave velocity alignments that show two distinct strata, with average shear waves velocities of 200-500 feet per second (fps) and 500 to 1000 fps above bedrock. The results of the MASW survey are documented in a report prepared by NGS dated April 28, 2021, which is presented in **Appendix E**. The report provides additional details on the locations and interpretations.

The February 19, 1934 as-built drawings indicate that existing foundations bear directly on bedrock at approximately EL. -5.0 and bedrock elevation decreases drastically in the westerly direction. GZA proposed an additional seismic refraction survey to further evaluate bedrock elevations near the proposed Abutment 2. On August 1, 2021 NGS conducted the field survey that extended from the southwest to the northeast crossing between the existing pier and Abutment 2. Due to the highly sensitive soils, lack of access to the target area, and background vibrations from vehicular traffic, the seismic survey was not able to effectively delineate the bedrock surface in the vicinity of Abutment 2. The NGS results are included for reference in **Appendix E**.

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-five (25) gradation analysis / MaineDOT Frost Classification / Unified Soil Classification System (USCS) assessments;
- Fifty-seven (57) moisture content tests;
- Four (4) organic content tests;
- Twenty-four (24) Atterberg limits analyses;
- Four (4) incremental consolidation tests;
- Four (4) K_o consolidated direct simple shear tests on soil samples; and
- Four (4) unconfined compression/secant modulus tests on bedrock samples.

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

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.

[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.

Based on available bedrock geologic mapping[2], 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

Five soil units were encountered beneath 6 to 12 inches of asphalt pavement and above bedrock at the site: Fill, Wetland Deposit, Marine Clay (separated into Crust and underlying deposit), Marine Sand, and Glacial Till. The approximate thicknesses and generalized descriptions of the subsurface units are presented in the following table, in descending order from existing ground surface. Detailed descriptions of the materials encountered at specific locations are provided in the boring logs in **Appendix C**. An interpretive subsurface profile based on the test boring results is presented as **Figure 4**, Interpretive Subsurface Profile. The encountered thicknesses and elevations of each stratum are summarized on the attached **Table 1**.

[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	2 to 27	Varying from brown to grey, loose to medium dense, fine to coarse SAND and Sandy GRAVEL to occasional medium stiff, Silty CLAY, little silt, little sand. (USCS: SM, SW-SM, SP-SM) Typical MaineDOT Frost Classification Range= II to IV Encountered in borings *BB-WS46-101, BB-WS46-105, BB-WS46-201 through -205, BB-WS46-207, BB-WS46-301 through -304*
Wetland Deposits	4 to 32	Varying from dark grey to black, very soft to stiff Organic Silt, little to trace organic fibers, trace fine to medium sand to occasional Clayey Silt. (USCS: OH). Typical MaineDOT Frost Classification =III Encountered in borings *BB-WS46-102 through -105, CB-15-78, CB-16-78, BB-WS46-204 through -207, and BB-WS46-302 through -305*
Marine Clay Crust	4 to 12	Grey, very stiff to stiff, Silty CLAY, trace shells, trace fine sand. (USCS: CL, CH). Typical MaineDOT Frost Classification Range = III to IV Encountered in borings *BB-WS46-101 through -104, BB-WS46-204 through -206, BB-WS46-303, and BB-WS46-304*
Marine Clay	5 to 77	Grey, stiff to very soft, Silty CLAY, trace shells, trace fine sand. (USCS: CL, CH). Typical MaineDOT Frost Classification Range = III to IV Encountered in borings *BB-WS46-101 through -104, CB-15-78, BB-WS46-204 through -206, BB-WS46-303, and BB-WS46-304*
Marine Sand	0.2 to 22	Grey, loose to very dense, fine to coarse SAND, trace to some silt, trace gravel. (USCS: SP, SM, SP-SM, GW). Typical MaineDOT Frost Classification = 0 to II Encountered in borings *BB-WS46-101, BB-WS46-102, CB-15-78, CB-16-78, BB-WS46-202 through -206, BB-WS46-302 thought -304*
Glacial Till	0.5 to 12	Grey-brown, wet, dense to very dense, fine to coarse SAND, little to some silt, trace to some gravel (USCS: SM). MaineDOT Frost Classification = II Encountered in borings *BB-WS46-103, BB-WS46-104, and BB-WS46-204*
Estimated Top of Bedrock	Abutment 1: Approx. El. 0 (11 feet bgs) Piers: Approx. El. -26 to -126 (30 to 128 feet bgs) Abutment 2: Approx. El. -5 to -9 (18 to 23 feet bgs)	

4.2.1 Bedrock

Bedrock was cored in each test boring and was identified as a Schist and was described as hard to very hard, fresh to slightly weathered, aphanitic to coarse grained, and grey. The primary joints are extremely close to moderately spaced, moderately dipping to near vertical, planar to undulating, smooth to rough, fresh to discolored, very tight to wide, with occasional silt infilling. The secondary joints are very close to moderately spaced, horizontal to low angle, planar to undulating, smooth to rough, fresh to discolored, very tight to moderately wide, with occasional silt infilling. The Rock Quality Designation (RQD) in the schist ranged from 0 to 100 percent (average 67 percent), corresponding to a Rock Mass Quality of Very Poor to Excellent.

Unconfined compressive strength testing was conducted on four samples of fresh rock, the results of which are summarized in the following table.

SUMMARY OF BEDROCK STRENGTH TEST RESULTS							
Boring	**Depth below Existing Ground (ft bgs)**	**Depth below Top of Rock (ft bgs)**	**Elevation (ft NAVD 88)**	**Unconfined Compressive Strength (psi)**	**Secant Modulus @ 50% of Failure Stress (ksi)**	**Unit Weight (pcf)**	**Rock Type**
BB-WS46-101	33.0	2.7	13.0	3,083	836	169	SCHIST
BB-WS46-105	23.8	1.8	-10.0	4,336	1,310	172	SCHIST
BB-WS46-203	11.4	0.7	-0.6	8,745	2,360	161	GRANITE
BB-WS46-207	27.3	2.5	-12.8	4,521	1,550	171	SCHIST

4.2.2 Groundwater

Groundwater depth was measured in all borings. Groundwater depths ranged from approximately 1.0 to 24.4 feet, corresponding to approximately El. 2.9 to 21.6. Groundwater levels in the borings were measured during or immediately after drilling and may have been affected by drilling procedures, which included introduction of water for drilling purposes.

Groundwater monitoring wells were installed at the completion of drilling at boring locations BB-WS46-303 and -305 to evaluate the possible tidal impacts on the groundwater in the vicinity of the proposed substructures and to assess construction considerations. Water levels were measured in the observation wells between April 15 and April 19, 2021 at the completion of our drilling program; and again, on May 19, 2021, approximately one month after well installations. Readings were taken at both high and low tides in the wells and showed approximately 2 feet of variation with the tide level.

The groundwater observations were made at the times and under the conditions stated in the boring logs. Fluctuations in groundwater level occur due to variations in season, precipitation, tide levels and construction activities in the area. Consequently, water levels during construction are likely to vary from those encountered 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 H**.

5.2 APPROACH AND HIGHWAY EMBANKMENTS

The new bridge will follow the existing alignment except that Abutment 1 will be shifted approximately 12 feet right (south). The roadway profile will be raised approximately 1 foot above existing grades in the vicinity of the bridge, except for the new embankment being constructed between the existing and proposed Abutment 1, where maximum new fills of up to 38 feet are anticipated. The right (south) embankment near Abutment 2 will be widened slightly to accommodate the alignment shift, maximum new fill in this area is approximately 8 feet high.

Approach embankment side slopes will be constructed with an inclination of 2 horizontal to 1 vertical (2H:1V) or less, except around abutments, where a 1.75H:1V riprap-covered slope will wrap around the sides and front.

Temporary embankments are proposed to be contractor-designed. HNTB provided a feasible alignment and profile for a temporary two-lane temporary bridge located on the right (south) of the existing bridge). As envisioned, the alignment would require approximately 50 feet of embankment widening to carry the temporary roadway. The HNTB plans show approach fills for the temporary bridge up to approximately 11 to 13 feet above existing ground surface, at Abutment 1 and 2, respectively. We have assumed that the fill placed for the temporary detour will be removed at the end of construction. We also assumed the embankments would be constructed per MaineDOT standard specifications and details using engineered fill placed over the existing embankment/side slopes, including temporary embankment side slope inclinations of 2H:1V or flatter.

5.2.1 Soil Profile and Properties

GZA used the results of subsurface explorations and laboratory testing to develop soil profiles for use in foundation and embankment designs at the abutments. The results are summarized in the table below.

DESIGN SOIL PROFILES - ABUTMENTS				
Soil Unit	**Total Unit Weight (pcf)**	**Effective Friction Angle (deg) / Undrained Shear Strength (psf)**	**Estimated Thickness[1] (feet)** West Approach/ Abutment 1 (BB-WS46-101, 201, 202, 203)	**Estimated Thickness[1] (feet)** East Approach/ Abutment 2 (BB-WS46-105, 207)
Proposed Fill (Common Borrow, Sand, Gravel)	125	32	1 - 33	0 - 1
Existing Fill	125	31	8 - 24	18
Marine Clay (crust)	114	S_u = 1,500 psf	0 - 7	0
Marine Sand	120	30	0 - 5	0
Wetland Deposit	90	S_u = 300-650 psf	0	4-7
Depth to Bedrock	--	--	8 - 10	20 - 25

Note:
1. Estimated thicknesses of fill strata are measured from existing approach embankment pavement grades.

5.2.2 Retaining Walls

The HNTB plans show a contractor-designed, approximately 68-foot-long retaining wall is to extend from approximately Station 79+45 30 ft Right to Station 80+13 29 ft Right where it connects to the Abutment 1 right (south) wingwall. This retaining wall is anticipated to be either a Mechanically Stabilized Earth embankment or a PCMG (T-wall) wall. GZA used the plans, including retaining walls, as a basis for global stability and bearing resistance evaluations as described in the following sections.

5.2.3 Settlement

The Abutment 1 approach embankment profile is within approximately 1 foot of existing grade west of the existing abutment, and will require up to 38 feet of fill where the grade will be raised between the existing and proposed abutment. Considering the granular nature of the fill and marine sand there, embankment settlement is anticipated to occur as elastic settlement during fill placement. Therefore, post-construction settlement is anticipated to be negligible at the Abutment 1 approach.

Proposed fills in the vicinity of Abutment 2 are anticipated to range from 0 to 1.5 feet. Approximately 4 to 6 feet of moderately compressible wetland deposit is present in the immediate vicinity of the abutment. The compressible layer increases in thickness toward the east. Settlement mitigation in the immediate vicinity of the abutment and approach slab will include a 1- to 2-month period with fill in place prior to paving. Due to the limited thickness of compressible material here, it is anticipated to consolidate rapidly, and be subject to less than approximately 1 inch of post-construction settlement over the first 20 years of service. Refer to the Geotechnical Report for Pleasant Cove Bridge MaineDOT WIN 23929.01 for additional details of the settlement analyses at the east approach.

5.2.4 Embankment Slope Stability

GZA evaluated the stability of both approach embankments at critical cross-sections near the proposed abutments using the soil profiles tabulated above and shown in **Appendix H**. 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 abutment and retaining walls.

Evaluations were conducted using the computer analytical software *Slope/W*, developed by GeoSlope International, based on the Morgenstern-Price method. A grid and radius search technique and/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 G**. The plotted contours above the slope indicate relative factors of safety associated with center points of the analyzed circular surfaces. Additional details of the analyses and results are presented below.

Static Analysis

Three cross-sections were selected for analysis, consisting of the highest embankment and/or steepest side slope inclinations in proximity to each abutment and two retaining wall sections between the existing and proposed Abutment 1, summarized as follows:

- Sta. 79+50, Abutment 1 Approach: 30- to 33-foot-high embankment, embankment widening to the right (south) (no raise in grade). Left to right analysis only.
- Sta. 80+00, Abutment 1 Approach: 25- to 33-foot-high embankment, 5 to 40 foot high new fill between existing and proposed abutments, with new retaining wall with 15-foot exposed face height in the right (south) slope. The retaining wall is assumed to have an effective footing length or reinforcing depth of approximately 0.7 times the wall height. Proposed 1.75H:1V slope on left (north) side and 2.4H:1V slope on the right (south) (slope begins at toe of wall). Left to right and right to left analyses.
- Sta. 86+75, Abutment 2 Approach: 9- to 12-foot-high embankment, minimal raise in grade, 2.2H:1V to 3H:1V slopes. 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. 79+50, Left to Right	1.9	1.3
Sta. 80+00, Left to Right	1.5	1.5
Sta. 80+00, Right to Left	1.3	1.3
Sta. 86+75, Left to Right	1.9	1.3
Sta. 86+75, Right to Left	1.7	1.3

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

Seismic Analysis

Since the site is classified as Site Class E, a pseudostatic analysis was conducted at the highest section at station 80+00 using k_h defined as half of the maximum peak ground acceleration at the ground surface (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 1.0 for the critical slip surface, indicating that large slope deformations are not likely.

5.3 EVALUATION OF FOUNDATION TYPES

5.3.1 Abutment Foundations

Assessment of the foundation types was influenced by thickness and strength of soil, and depth to and strength of the bedrock. Subsurface conditions relevant to abutment foundation type considerations are summarized in the table below.

Boring/Hand Probe	Station	Offset (ft)	Approximate Top of Rock Depth (ft)	Approximate Top of Rock Elevation (ft)	Substructure
BB-WS46-202	80+23.5	26.5 Lt.	11.9	-0.2	Abutment 1
BB-WS46-203	80+39.6	7.8 Rt.	10.7	0.1	Abutment 1
BB-WS46-105	86+61.6	20.6 Rt.	22.0	-8.2	Abutment 2
BB-WS46-207	86+71.4	16.7 Lt.	24.8	-9.3	Abutment 2

Based on these data, spread footings bearing on bedrock were selected during preliminary design as the preferred foundation alternative for abutment foundations. Recommendations for spread footing design are provided in **Section 6.4.1.**

5.3.2 Pier Foundations

Based on the data from borings, we estimate the top of rock will range from approximately 30 to 125 feet bgs in the vicinity of the piers. A driven pile foundation was identified in preliminary design as the preferred alternative for support of the piers based on the encountered conditions.

5.3.3 Retaining Wall Foundations

Based on the data from borings, we estimate the top of rock is likely to be approximately 30 to 45 feet below the proposed roadway elevation between the existing and proposed Abutment 1. The subsurface strata present beneath the proposed retaining wall bearing level include existing fills materials. The project plans indicate a contractor designed retaining wall including either a Mechanically Stabilized Earth embankment or PCMG. Therefore, retaining wall foundations were evaluated to bear on either new or existing fills.

5.4 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**
SPREAD FOOTINGS			
Bearing	Footing on Rock	0.45	10.5.5.2.2-1
Sliding	Footing on Rock[1]	0.8	10.5.5.2.2-1
PREFABRICATED CONCRETE MODULAR GRAVITY WALLS			
Bearing	Footing on Soil	0.45	10.5.5.2.2-1
Sliding	Footing on Soil	0.9	10.5.5.2.2-1
MECHANICALLY STABILIZED EARTH WALLS			
Bearing	MSE Walls	0.65	11.5.7-1
Sliding	MSE Walls	1.0	11.5.7-1
DRIVEN PILES			
Nominal Bearing Resistance of Single Pile – Dynamic Analysis	Axial Resistance	0.65	10.5.5.2.3-1

Notes:

1. Resistance factor for footing on rock was taken as equal to footing on sand.

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

Structural resistance factor for driven piles at the strength limit state should be taken as ϕ_c=0.50, per AASHTO LRFD Article 10.7.3.2.3 for hard driving condition.

5.5 SPREAD FOOTING DESIGN CONSIDERATIONS

5.5.1 Spread Footing on Bedrock (Abutments 1 and 2)

Nominal and factored bearing resistances were calculated for bedrock-bearing footings using the Rock Mass Rating- (RMR-) based empirical correlation presented in "Foundations on Rock," by Duncan Wyllie. RMR was evaluated in accordance with Table 10.4.6.4-1 of the *2012 AASHTO LRFD Bridge Design Specifications, 6th Edition* (AASHTO). The current (9th) Edition of the *AASHTO Design Specifications* does not include the RMR formulation included in the previous version (6th Edition). However, Articles C10.4.6.4 and 10.6.3.2.1 of the 9th Edition refer to RMR-based design procedures for footings on rock, so the 6th Edition methodology was followed.

GZA used bedrock data obtained in test borings drilled at or near the proposed abutments to develop foundation design parameters at the abutment locations. Of the four unconfined compressive strength tests for the project, three ranged between about 3,100 and 4,500 psi strengths in Schist, and one Granite sample had a strength of 8,700 psi. For footing bearing design, the average of the three lower tests was selected for design, which is 4 ksi. The bedrock properties used in the bearing resistance evaluation are presented below:

DESIGN BEDROCK PROPERTIES FOR BEARING RESISTANCE EVALUATION					
Rock Type	**RQD (percent)**	**Unconfined Compressive Strength (ksi)**	**Rock Mass Rating (RMR)**	**m**	**s**
Schist	66	4.0	52	0.326	0.00033

Based on these parameters, the calculated nominal bearing resistance is 56 kips per square foot (ksf), resulting in a factored bearing resistance of 25 ksf for the strength limit state. Supporting calculations are provided in **Appendix H**.

LRFD Article 10.6.2.4.4 indicates that footings bearing on rock with an RMR-based rock quality of Fair or better and designed using LRFD methods are anticipated to experience ½ inch or less of settlement.

For proposed foundations bearing on bedrock, we recommend that sliding resistance be assessed using a nominal sliding resistance coefficient (C tan ϕf) equal to 0.7, a resistance factor ($\phi\tau$) of 0.8, and a factored sliding resistance coefficient of 0.56 for the Strength Limit State.

5.5.2 Retaining Walls Bearing on Soil

The plans indicate that the contractor designed retaining wall on the south side of Abutment 1 will be either a Mechanically Stabilized Earth (MSE) or Prefabricated Concrete Modular Gravity (PCMG) wall that extends from approximately Station 79+45 (39 ft Right) to Station 80+13 (29 ft Right). Current plans show that the proposed wall is stepped with bearing elevations ranging from approximately El. 18 to El. 33. Based on these bearing elevations, we estimate that the retaining walls will bear on new or existing fill soils.

Bearing resistance values were developed for foundations bearing on soil and MSE-reinforced fill bearing on soil. The analyses used the theoretical method (Munfakh et al., 2001) based on SPT data, as referenced in AASHTO LRFD Articles 10.6.3.1.1 and 10.6.3.1.2. To evaluate the service bearing resistance, a maximum footing settlement of 2 inches was used for the MSE and PCMG retaining wall bearing. We note that settlements will occur as the fills are placed, so post-construction settlements of supported roadways are anticipated to be approximately 1/2 inch or less.

Nominal, factored, and service bearing resistance values were developed for a range of effective footing widths. In accordance with FHWA GEC 06, C.4.1, the factored bearing resistances for a range of effective footing width, B'_f, values are presented in the plots in **Section 6.4.1.**

The resistance against sliding should be evaluated in accordance with AASHTO LRFD Article 10.6.3.4 using ϕ_s' equal to δ, equal to 32 degrees. Nominal sliding resistance for PCMG concrete footings bearing on soils at this site may be estimated using a sliding resistance coefficient (tan δ) equal to 0.62, and a resistance factor of 0.9 for the Strength condition. For MSE walls bearing on soil the sliding resistance factor of 1.0 is used for the strength condition. The recommended factored sliding resistance coefficient is 0.56 and 0.62 for PCMG and MSE walls, respectively. Passive resistance should be neglected for evaluation of sliding and overturning.

5.6 PILE DESIGN CONSIDERATIONS (PIERS)

GZA conducted lateral and axial pile analyses for each pier using several iterations of pile group configurations provided by HNTB. The analyses are described in the sections that follow.

5.6.1 Lateral Pile Analysis

GZA conducted lateral pile group analyses using GROUP 2015® (Group). We developed design subsurface profiles for use in Group that included organic Silt (wetland Deposit), marine clay, marine sand, and glacial till. The soil profiles and recommended design properties are summarized in the following tables, and pier cap geometry, pile sizes, and load combinations provided by HNTB are presented in **Appendix H**. Load combinations were provided for multiple strength, service, and extreme cases for each of the three pier locations. The Group Software analyses considered pile lateral resistance reduction factors (i.e., p-multipliers) in the direction of primary loading and are generated by the program based on the direction and magnitude of the resultant loads. These p-multipliers ranged from 1.0 to 0.785 and are summarized per pile in the results presented in **Appendix H**.

Pier 1						
Stratum	**Soil Model**	**Top of Layer Elevation (ft- NAVD 88)**	**Layer Thickness (ft)**	**k (pci) / E50**	**ϕ' (deg)/ Su (psf)**	**γ_e (pcf)**
Wetland Deposit	Soft Clay	2	18	E_{50} = 0.01	400	48
Marine Clay (Crust)	Stiff Clay w/o Free Water	-16	4	E_{50} = 0.007	900 psf	53
Marine Clay	Soft Clay	-20	5	E_{50} = 0.008	550 psf	53
Top of Rock	--	-25	--	--	--	--

Pier 2						
Stratum	**Soil Model**	**Top of Layer Elevation (ft- NAVD 88)**	**Layer Thickness (ft)**	**k (pci) / E50**	**ϕ' (deg)/ Su (psf)**	**γ_e (pcf)**
Wetland Deposit	Soft Clay	2	30	E_{50} = 0.01	400	48
Marine Clay (Crust)	Stiff Clay w/o Free Water	-28	8	E_{50} = 0.007	900 psf	53
Marine Clay	Soft Clay	-36	39	E_{50} = 0.008	550 psf	53
Marine Sand	Reese Sand	-75	10	45	31	63
Top of Rock	--	-85	--	--	--	--

Pier 3						
Stratum	**Soil Model**	**Top of Layer Elevation (ft- NAVD 88)**	**Layer Thickness (ft)**	**k (pci) / E50**	**ϕ' (deg)/ Su (psf)**	**γ_e (pcf)**
Wetland Deposit	Soft Clay	2	31	E_{50} = 0.01	400	48
Marine Clay (Crust)	Stiff Clay w/o Free Water	-29	7	E_{50} = 0.007	900 psf	53
Marine Clay	Soft Clay	-36	67	E_{50} = 0.008	550 psf	53
Glacial TIll	Reese Sand	-103	22	65	33	67
Top of Rock	--	-125	--	--	--	--

Notes:
1. Recommended modulus and unit weight values assume groundwater level at El. 2.
2. pci = pounds per cubic inch, deg = degrees, psf = pounds per square foot,
3. γ_e = effective unit weight (used below anticipated groundwater), pcf = pounds per square foot.

GZA conducted multiple analyses for each pier using pile group configurations developed by HNTB. The pier piles will consist of ASTM A572, Grade 50 (fy=50 ksi) HP14x117 steel H-piles. GZA's analyses were based on 4 rows of 7 piles (6 interior plumb piles and 22 battered piles - 28 total) at Piers 1 and 2; and on 3 rows of 7 plumb piles (21 total) at Pier 3. The pile batter varies from 2H:12V to 4H:12V. GZA provided the analysis results to the structural designer, HNTB, who evaluated the modelled foundation performance as part of the overall structural design and found it to be adequate.

The factored pile stresses and loads from the Group results are presented in the following table. The required nominal pile resistance is calculated by dividing the maximum factored pile demand by the relevant resistance factors for each load case (0.65 for Strength and 1.0 for Services and Extreme). The controlling nominal load case was selected based on the Group analysis results. The tables present the corresponding required nominal geotechnical resistance. The maximum stresses in the table are combined stresses including axial and bending components.

PIER 1 - 14x117					
LOAD CASE	**Maximum Factored Stress (ksi)**	**Maximum Factored Axial Pile Demand (kip)**	**Resistance Factor**	**Required Nominal Resistance (kip)**	**Controlling Required Nominal Resistance (kip)**
Strength I	11.7	286	0.65	440	440 (Strength I)
Strength III	5.8	159	0.65	245	
Strength IV	5.8	176	0.65	271	
Strength V	10.5	264	0.65	406	
Service I	8.1	203	1.0	203	
Service IV	4.4	121	1.0	121	
Extreme Event I	9.4	294	1.0	294	

PIER 2 - 14x117					
LOAD CASE	**Maximum Factored Stress (ksi)**	**Maximum Factored Axial Pile Demand (kip)**	**Resistance Factor**	**Required Nominal Resistance (kip)**	**Controlling Required Nominal Resistance (kip)**
Strength I	12.6	269	0.65	414	524 (Extreme Event I - A)
Strength III	10.9	189	0.65	291	
Strength IV	6.4	161	0.65	248	
Strength V	13.4	270	0.65	415	
Service I	10.3	206	1.0	206	
Service IV	7	139	1.0	139	
Extreme Event I - A	55.9	524	1.0	524	
Extreme Event I - B	56.2	524	1.0	524	
Extreme Event I - C	25	399	1.0	399	
Extreme Event I - D	25.4	398	1.0	398	

PIER 3 - 14x117					
LOAD CASE	**Maximum Factored Stress (ksi)**	**Maximum Factored Axial Pile Demand (kip)**	**Resistance Factor**	**Required Nominal Resistance (kip)**	**Controlling Required Nominal Resistance (kip)**
Strength I	12.4	362	0.65	557	557(Strength I)
Strength III	8.4	219	0.65	337	
Strength IV	6.7	216	0.65	332	
Strength V	12.7	343	0.65	528	
Service I	9.5	270	1.0	270	
Service IV	5.6	163	1.0	163	
Extreme Event I	8.2	179	1.0	179	

The results indicate that the piles are generally capable of achieving fixity and remaining elastic under the proposed loads, except for the extreme event at Pier 2. The Pier 2 Extreme Event 1A and Extreme Event 1B analyses showed maximum combined axial and bending stresses of approximately 50 to 56 ksi in 2 to 3 of the piles in each analysis. The structural designer, HNTB reviewed these results and determined that formation of a plastic hinge may occur in the upper portion of a few piles, but that load redistribution to adjacent piles would provide adequate resistance to support the design loads.

5.6.2 Design Phase Pile Drivability Analysis

GZA completed preliminary wave equation analyses to assess the drivability of an HP 14x117 pile with nominal geotechnical resistances of 440, 524, and 557 kips at Piers 1, 2, and 3, respectively. The skin friction resistance was evaluated for use as an input in drivability analyses using the computer analytical software APile by Ensoft. Considering the variability in length between the piers, GZA evaluated two possible conditions to characterize the range of anticipated pile behavior. The pile lengths used in the analyses were 28 and 127 feet. The preliminary analyses utilize a single pile hammer for all the piers, a Delmag D19-52 diesel hammer with a ram weight of 4,000 pounds and a maximum rated energy of 43,200 foot-pounds (ft-lbs). We anticipate 5 and 10 percent side friction for the short and long pier piles. We used a toe quakes of 0.04 for the short pile at Pier 1 and 0.07 for longer piles. 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)**
Pier 1 HP 14X117	28 feet	Delmag D 19-52 (Fuel setting 3, one above minimum)	440	25	9
Pier 3 HP 14x117	127 feet	Delmag D 19-52 (Fuel setting 1, maximum)	557	31	9

Since the driving stresses do not exceed the allowable driving stress of 45 ksi for ASTM A572 Grade 50 steel (0.9 x Fy), and the calculated penetration resistance for the pier piles is within the MaineDOT preferred range of 3 to 15 blows per inch, the analyzed hammer system is judged acceptable to install the pier piles to the required nominal resistance noted. Results of the preliminary wave equation analyses are provided in **Appendix H**.

5.7 LATERAL EARTH PRESSURE

The earth pressures will be controlled by the backfill material, which is proposed to consist of BDG Type 4 soil. In accordance with the requirements of the BDG Section 5.4.3, the abutments and wingwalls will be free to rotate and therefore should be designed for active earth pressure. For the planned abutments and wingwalls with footings bearing on rock and retaining walls, an active earth pressure coefficient, K_a=0.28, is recommended.

Design lateral earth pressure recommendations are provided in **Section 6.3** of this report.

5.8 SEISMIC DESIGN CONSIDERATIONS

The subsurface profile for seismic design includes the approach fills (including granular fill behind abutments), Wetland, Marine Clay, Marine Sand, and Glacial Till Deposits overlying bedrock. Seismic site class was determined in general accordance with LRFD Table C3.10.3.1, considering the average SPT N-values in granular soils and shear strength of cohesive soils that were present in most of the explorations. Given an average shear strength of approximately 600 psf from the borings, CPT and laboratory testing results, the bridge site falls in Site Class E. Considering the SD1 value in preliminary design was found to be greater than 0.15 g, requiring a Seismic Zone designation of 2, a site-specific seismic response analysis was performed to develop a design response spectrum for the bridge. GZA conducted the site-specific analysis and provided a memorandum presenting the results dated May 12, 2021 that is included in **Appendix I.**

The site-specific analyses utilized SHAKE2000 to generate response spectra at a depth below mudline equivalent to the lower 1 foot of the pile caps through a 127-foot-thick soil profile. A design acceleration response spectrum was selected as the mean plus one standard deviation spectrum from individual response spectra from three earthquake input motions applied to three shear wave velocity profiles (lower bound, best estimate and upper bound). The recommended acceleration response spectrum and spectral parameters can be found in **Section 6.2** of this report.

5.9 FROST PROTECTION

New and existing fills are anticipated to be present at the abutments, piers, and embankments. Based on the MaineDOT BDG, Section 5.2.1, the Freezing Index for the site is 1,300, and with low to moderate moisture content (20 percent) soils, the estimated depth of frost penetration is approximately 5.3 feet. Where abutment foundations bear directly on sound rock, there is no MaineDOT minimum requirement for footing embedment. However, in our opinion a minimum depth of 2 feet should be provided.

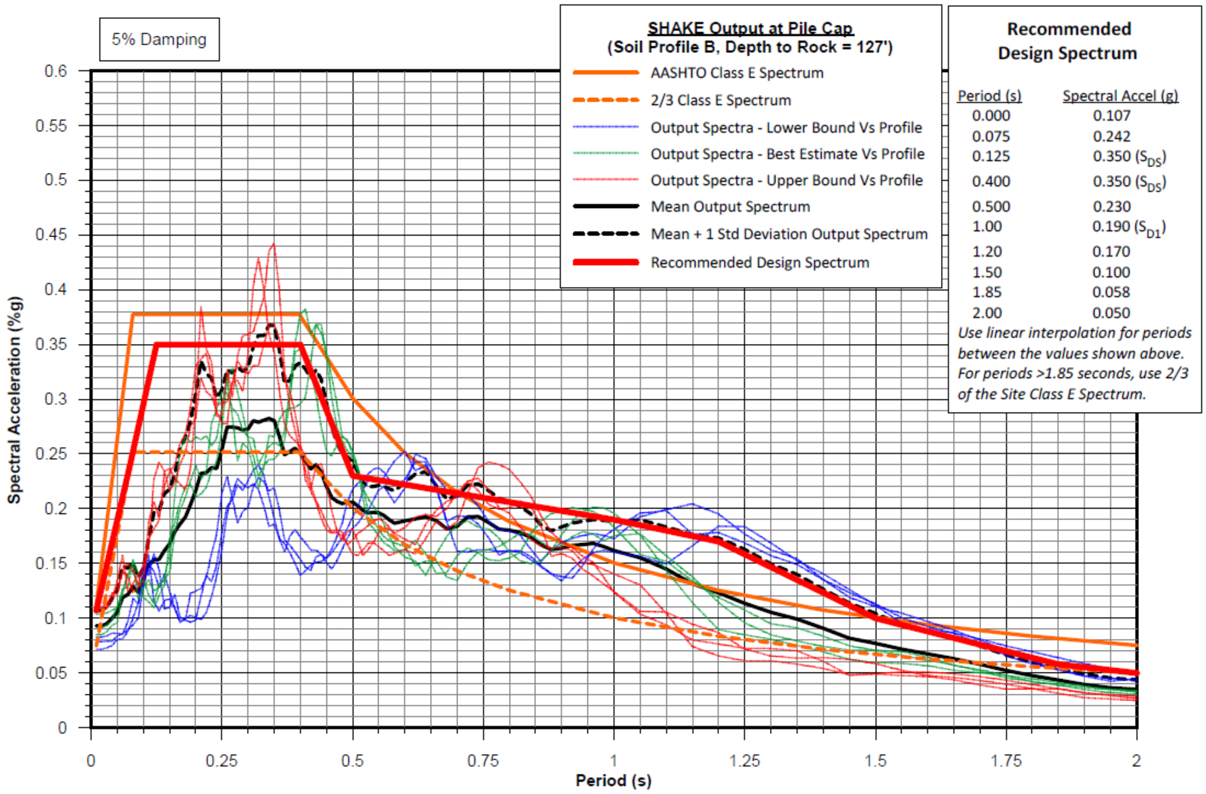
6.0 RECOMMENDATIONS

6.1 EMBANKMENT DESIGN CONSIDERATIONS

Embankment side slopes should be designed with MaineDOT-typical slope angles of 2H:1V or flatter, except in front of abutments where the 1.75H:1V slope angle may be used with an appropriate riprap surface treatment. Earth slopes should be provided with loam and seed for permanent erosion protection.

6.2 SEISMIC DESIGN

Based on design discussions with HNTB and MaineDOT regarding the proposed location of the piers, it was agreed that the results of the analysis for a 127-foot-thick soil profile are most appropriate for use in developing the recommended design response spectrum for the entire site. The recommended design response spectrum and the output response spectra for each input time history for this soil profile are shown below. Please note that each response spectrum was developed assuming a structural damping of 5 percent.



For the purpose of evaluating the appropriate Seismic Zone for the proposed bridge, we note that the recommended design spectrum is based on an S_{DS} of 0.35g and S_{D1} of 0.19g. As such, the bridge should be designated as Seismic Zone 2.

6.3 ABUTMENT AND WINGWALL DESIGN

- Backfill between new abutments, wingwalls, and retaining walls, 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
  - Coulomb Active Earth Pressure, K_a = 0.28 (use for design of abutment, wingwalls, and retaining walls)
- 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.

6.4 RECOMMENDATIONS FOR FOUNDATIONS

6.4.1 Spread Footing Design

Bedrock

- The proposed abutments should be supported on spread footing foundations bearing on sound, intact bedrock. Footings designed to bear on intact bedrock should be designed using a nominal bearing resistance, q_n, of 56 ksf. At the strength limit state, footings should be designed for a maximum factored bearing resistance of 25 ksf. A bearing resistance of 25 ksf should be used for service limit state design.
- Spread footings founded on bedrock should be checked for eccentricity with AASHTO Article 10.6.3.3. Eccentricity of the footing reaction at the strength limit state should be limited such that the resultant reaction on the base of the footing is no further than 0.45 B from the centerline of the footing, where B is the footing width perpendicular to the axis of rotation.
- The base resistance against sliding may be based on NAVFAC DM7.02-63, Table 1, which indicates the sliding resistance coefficient (tan δ) is equal to 0.7 for cast-in-place concrete on sound rock. Therefore, the nominal sliding resistance between footings and bedrock subgrades is equal to the vertical force multiplied by 0.7. The factored sliding resistance coefficient is 0.56 for Strength Limit State.
- The bedrock surface should be cleaned of loose soil or rock at the time of concrete placement for subfooting concrete or the footing. Bearing surface preparation should be in accordance with **Section 7.3**.
- The following table summarizes the top of bedrock elevations encountered in the borings. These data are provided to assist the designer in developing bottom-of-footing elevations for the abutments.

ESTIMATED BEDROCK LEVELS FOR FOOTING DESIGN	
Foundation Element	**Estimated Range in Bedrock Elevation (feet, NAVD 88)**
Abutment 1	El. 1 to -1
Abutment 2	El. -6 to -10

It is important to note that the top of intact rock cannot be known for the entire foundation area prior to construction. We expect that intact rock may be encountered above and below the estimated levels. Some construction-phase engineering should be anticipated to address the potential variability of the encountered conditions.

- If the bedrock level extends above the design bottom of footing elevation, the footing may be raised and vertical reinforcement shortened in the wall, subject to review and approval of the Designer to limit over-excavation of bedrock.

- If after cleaning the exposed bedrock surface is below the design footing bearing level, fill concrete may be placed up to the bottom of footing level.
- Anchoring, doweling, benching or other means of improving sliding resistance is recommended at locations where the prepared bedrock surface is steeper than 4H:1V in any direction.
- Rock dowels may be used to supplement the footing sliding resistance. If used, the dowels should be grouted a minimum of 2 feet into intact bedrock and embedded at least 1.5 feet into concrete. The unconfined compressive strength of the bedrock should be assumed to be 4.0 ksi for design of rock dowels.
- Dowels should be grouted with a cementitious grout on the MaineDOT Qualified Products List of Grout Materials for Keyways and Anchoring (pre-qualified for anchoring). Epoxy grout should not be used.
- Since the footings will be founded on bedrock, there is no minimum embedment required for frost protection per BDG Article 5.2.1, but we recommend a 2-foot minimum embedment below finish grade surrounding the footing.
- Existing substructures should be completely removed prior to new foundation construction where they interfere with new foundations.

Soil (Retaining Wall)

- Nominal, factored, and service bearing resistance values were developed for a range of effective footing widths for PCMG and MSE walls. In accordance with FHWA GEC 06, C.4.1,he factored bearing resistances for a range of effective footing width, B'_f, values are presented in the following plots.

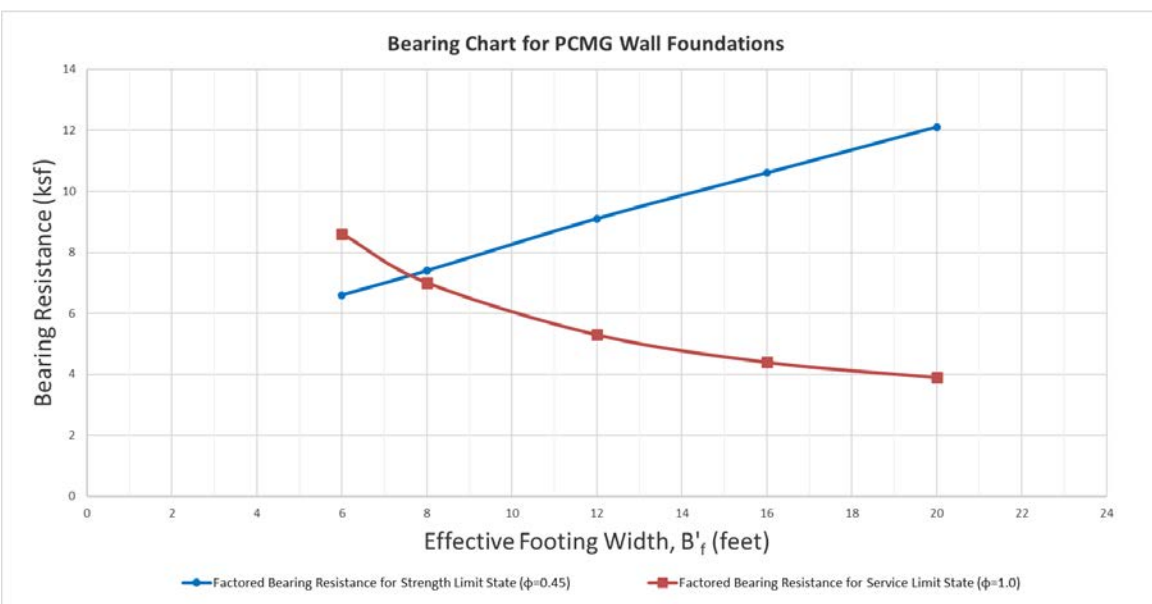


Figure A – Bearing Chart, PCMG Wall Foundations

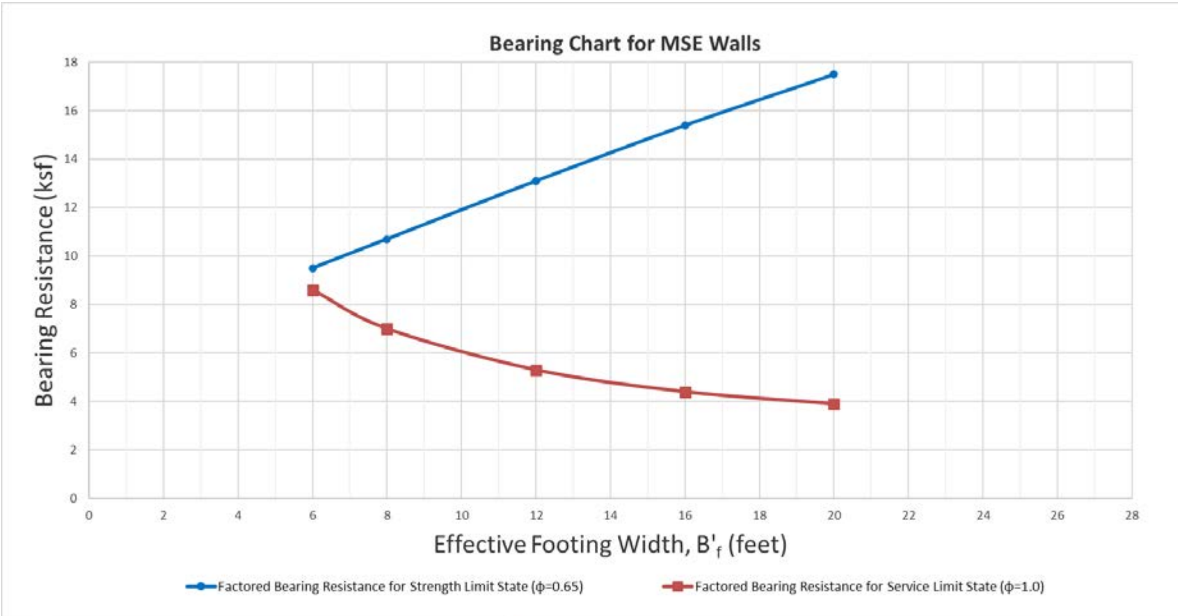


Figure B – Bearing Chart, MSE Wall

- PCMG wall design should be in accordance with the requirements of Standard Specification 674, Section 11.11 of LRFD and Section 5.6.5.2 of the BDG.
- MSE wall design should be in accordance with the requirements of Standard Specification 677 (Mechanically Stabilized Earth Retaining Wall), Section 11.10 of LRFD and Section 5.6.5.4 of the BDG.
- PCMG and MSE walls should be founded on compacted structural fill (Gravel Borrow, 703.20) or proof compacted existing fill soils. Factored strength limit bearing resistance and service limit bearing resistances are provided as a function of effective footing width, B'_f, on the bearing charts included in **Section 5.5.1**. The recommended bearing resistances are contingent upon proper subgrade preparation as described in this section and **Section 7.4**.
- The wall foundation designer should check the effective footing widths in their design against the bearing resistance plots in **Section 5.5.1** to determine the appropriate resistance values.
- The base resistance against sliding should be evaluated in accordance with AASHTO Article 10.6.3.4 using $\phi_s' = \delta = 32$ degrees. Nominal sliding resistance for footings on fill is equal to the vertical force multiplied by the sliding resistance coefficient (tan δ), which is equal to 0.62. The factored sliding resistance coefficient is 0.56 for PCMG walls and 0.62 for MSE walls for the strength condition.
- Passive resistance on the embedded portions of walls should be neglected when evaluating sliding and overturning.
- Minimum lengths of footings or reinforcement behind the face of the wall is 0.7 times the height of the wall to provide a factor of safety of at least 1.5 for global stability.
- Fill in the reinforcement zone should be specified as Gravel Borrow (MaineDOT Item 703.20), except where crushed stone is required beneath the abutment footing. The fill in the reinforcement zone should meet the electrochemical and plasticity requirements in Standard Specification Section 677.048.

- A minimum uniform vertical surcharge load of 250 pounds per square foot should be applied on the roadway surface above the wall. Lateral surcharge resulting from this load should be calculated and provided by the wall designer.

6.4.2 Pile Design

- The proposed piers may be supported on HP14x117 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 skin friction and end-bearing near or on bedrock.
- To promote penetration into rock and limit driving damage, the pier steel H-piles should be fitted with HP 776.07 hard bite pile tips or equivalent, which have a chisel-like point intended to limit the potential for the pile to slide on a sloping rock surface.
- 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 Pier 1 piles should be driven to a nominal resistance of 440 kips, calculated by dividing the maximum factored axial load of 286 kips, from the Strength I load case, by a resistance factor of 0.65.
- The Pier 2 piles should be driven to a nominal resistance of 524 kips, calculated by dividing the maximum factored axial load of 524 kips, from the Extreme I load case, by a resistance factor of 1.0.
- The Pier 3 piles should be driven to a nominal resistance of 557 kips, calculated by dividing the maximum factored axial load of 362 kips, from the Strength I load case, by a resistance factor of 0.65.
- Preliminary wave equation analyses indicate that the piles could be driven to the required nominal resistance using a diesel hammer with a maximum rated energy of about 43,200 ft-lbs for the anticipated range of pile lengths from 28 to 127 feet, ASTM A572 Grade 50 HP14x117 piles without exceeding the allowable driving stress of 45 ksi (0.9Fy for 50 ksi steel), and with a final penetration resistance of approximately 9 to 10 blows per inch.
- We recommend that the pile tip elevations shown on the drawings at the piers correspond to the bedrock elevations encountered in the borings (approximately El. -23 to -30 at Pier 1, approximately El. -80 to -100 at Pier 2, and approximately El. -98 to -125 at Pier 3). Corresponding pile lengths are anticipated to range from 20 to 125 feet. An additional 5 to 10 feet should also be included in estimated lengths to account for variability in the bedrock surface.
- We recommend that two piles at Pier 1 and Pier 2 and one pile at Pier 3 be dynamically tested at the end of initial drive to assess driving stress and establish the penetration resistance criteria to achieve the required nominal resistance for the production piles. A plumb and battered pile should be tested at Pier 1 and 2, the tested battered piles should have the toe in the easterly direction to assess the potential for pile tips walking (deflecting off) the sloping bedrock surface anticipated there. The plans should also require a restrike test on each test pile.
- Piles shall be spliced in accordance with MaineDOT Section 501.047.

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

7.0 CONSTRUCTION CONSIDERATIONS

This section provides guidance regarding quality control during pile installation, excavation, dewatering, and foundation subgrade preparation and protection.

7.1 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. As previously noted, the piles should be driven to a nominal resistance calculated by dividing the maximum factored pile load by a resistance factor of 0.65 for strength load case and 1.0 for the extreme load case, per AASHTO Table 10.5.5.2.3-1.

AASHTO Table 10.5.5.2.3-1 requires that at least one load test with signal matching be performed per substructure in conjunction with the resistance factor 0.65. We recommended that two PDA tests with Signal Matching be completed at each Piers 1 and 2 (one battered one plumb) and one plumb pile at Pier 3, including at least one restrike test for each tested pile, resulting in a total of ten PDA tests.

7.2 EXCAVATION, TEMPORARY LATERAL SUPPORT AND DEWATERING

Excavations for abutment foundations are anticipated to be within 12 and 25 feet of the existing ground surface at Abutments 1 and 2, respectively. It is our understanding that traffic will be carried on a temporary detour during construction of the new bridge. Due to the depth relative to water levels, proximity of existing structures and embankments, and potential for moderate strength cohesive soils, it is anticipated that the excavations for both Abutment 1 and Abutment 2 will require braced steel sheeting to support excavation slopes. In areas where sufficient space is available and water conditions permit, the excavation slopes may consist of sloped, open cuts. In all cases, temporary excavations should comply with OSHA excavation safety requirements.

We anticipate that the inflow of groundwater or surface water to abutment excavations can be handled by open pumping from sumps installed at the bottoms of excavations. The contractor should be responsible for controlling groundwater, surface runoff, infiltration, and water from all other sources by methods which preserve the undisturbed condition of the subgrade and permit foundation construction in-the-dry. Discharge of pumped groundwater and river water should comply with all local, State, and federal regulations.

We anticipate that a temporary sheet pile cofferdam with either a tremie seal or additional embedment to limit groundwater seepage will be necessary for the construction of Abutment 2 at the piers to control inflow of groundwater. Sheets are anticipated to be installed into the existing fills and the wetland deposit.

7.3 SUBGRADE PREPARATION

We anticipate it may be feasible to complete final bedrock subgrade preparation in-the-dry. The bedrock surface is known to be variable in terms of elevation, slope and localized weathering. Conventional excavation equipment is anticipated to be sufficient to complete excavations. All soil and loose, decomposed, highly-weathered and fractured bedrock should be removed from the footing bearing surface using pressurized air or water prior to placement of subfootings or footings.

The prepared bearing surfaces should be observed by the geotechnical engineer prior to placing concrete. The Geotechnical Engineer and Designer should also be provided cross-sections showing the prepared rock surface geometry prior to placement of concrete to evaluate whether benching, doweling, or subfooting concrete fill are needed for that foundation location. If the exposed bedrock surface is steeper than 4H:1V, then anchoring, doweling, benching or other means should be employed to improve sliding resistance.

7.4 EXCAVATION, PROOFROLLING AND COMPACTION

The foundations bearing on soil subgrades should be excavated to bearing level using a smooth-edged bucket. The exposed subgrade should then be proof-rolled using four to six passes of a dual-drum or larger, walk-behind roller (minimum centrifugal force of 10,000 pounds). Areas that exhibit weaving or rutting under the roller should be excavated, removing the suspect material and replacing with granular borrow, compacted to at least 95 percent of the maximum dry density as determined by AASHTO T 180, Modified Proctor Test. The actual extent of the removal and the acceptability of proof-rolling should be based on field observations by the Geotechnical Engineer.

7.5 REUSE OF ON-SITE MATERIALS

Based on the test boring results, two of the nine fill samples tested had less than 10 percent passing the No. 200 sieve, indicating the fill generally will not meet MaineDOT specifications for Granular Borrow and/or Granular Borrow for Underwater 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.

TABLES

TABLE 1
Summary of Subsurface Explorations
Station 46 Bridge 3039 Replacement
Woolwich, ME
WIN 23929.00

Exploration ID	Station	Offset (ft)	Ground Surface El. (ft)	Top of layer Elevation								Stratum Thickness							Depth to Bedrock (ft)	Bottom of Boring Depth (ft)	Bottom of Boring El. (ft)	Groundwater	
				Pavement	Fill	Wetland Deposit	Marine Clay Crust	Marine Clay	Marine Sand	Glacial Till	Bedrock	Pavement	Fill	Wetland Deposit	Marine Clay Crust	Marine Clay	Marine Sand	Glacial Till				Depth (ft)	Elevation (ft)
BB-WS46-101	79+35.8	12.7 R	46.0	46.0	45.0	NE	22.5	NE	16.2	NE	15.7	1.0	22.5	NE	6.3	NE	0.2	NE	30.3	40.3	5.7	24.4	21.6
BB-WS46-102	83+10.4	8.2 R	3.2	NE	NE	3.2	-20.8	-25.8	-52.3	NE	-68.0	NE	NE	24.0	5.0	26.5	15.7	NE	71.2	81.5	-78.3	1.0	2.2
BB-WS46-103	84+80.7	12.7 R	3.0	NE	NE	3.0	-28.8	-35.0	NE	-111.5	-123.5	NE	NE	31.8	6.2	76.5	NE	12.0	126.5	136.5	-133.5	1.0	2.0
BB-WS46-104	85+54.6	15.9 R	3.0	NE	NE	3.0	-23.0	-34.0	NE	-97.2	-97.7	NE	NE	26.0	11.0	63.2	NE	0.5	100.7	110.7	-107.7	1.0	2.0
BB-WS46-105	86+61.6	20.6 R	13.8	13.8	13.0	-4.0	NE	NE	NE	NE	-8.2	0.8	17.0	4.2	NE	NE	NE	NE	22.0	32.5	-18.7	12.4	1.4
BB-WS46-201	79+86.4	11.1 R	28.2	NE	28.2	NE	NE	NE	NE	NE	9.7	NE	18.5	NE	NE	NE	NE	NE	18.5	28.9	-0.7	NE	NE
BB-WS46-202	80+23.5	26.5 L	11.7	NE	11.7	NE	NE	NE	3.7	NE	-0.2	NE	8.0	NE	NE	NE	3.9	NE	11.9	23.4	-11.7	0.5	11.2
BB-WS46-203	80+39.6	7.8 R	10.8	NE	10.8	NE	NE	NE	1.8	NE	0.1	NE	9.0	NE	NE	NE	1.7	NE	10.7	21.0	-10.2	1.4	9.4
BB-WS46-204	81+84.2	6.9 R	4.1	NE	NE	4.1	-15.9	-19.9	NE	-24.5	-25.8	NE	NE	20.0	4.0	4.6	NE	1.3	29.9	40.0	-35.9	1.0	3.1
BB-WS46-205	83+70.0	9.7 R	2.0	NE	2.0	0.5	-26.0	-38.0	-73.4	NE	-81.0	NE	1.5	26.5	12.0	35.4	7.6	NE	82.5	93.0	-91.0	4.5	-2.5
BB-WS46-206	85+23.9	21.7 L	2.1	NE	NE	2.1	-28.8	-37.9	-103.4	NE	-125.6	NE	NE	30.9	9.1	65.5	22.2	NE	127.7	135.9	-133.8	NE	NE
BB-WS46-207/207A	86+71.4	16.7 L	14.5	14.5	14.0	-4.5	NE	NE	NE	NE	-9.3	0.5	18.5	4.8	NE	NE	NE	NE	24.8	35.0	-20.5	12.8	1.7
BB-WS46-301/301A	77+91.1	74.4 R	54.0	NE	54.0	NE	NE	NE	NE	NE	27.5	NE	26.5	NE	NE	NE	NE	NE	26.5	37.5	16.5	11.9	42.1
BB-WS46-302	80+87.2	64.3 R	9.1	NE	9.1	4.6	NE	NE	-6.7	NE	-8.3	NE	4.5	11.3	NE	NE	1.6	NE	17.2	29.6	-20.5	1.8	7.3
BB-WS46-303	82+92.3	74.3 R	4.4	NE	4.4	1.4	-24.1	-32.6	-67.1	NE	-78.1	NE	3.0	25.5	8.5	34.5	11.0	NE	82.5	93.0	-88.6	1.0	3.4
BB-WS46-304	84+57.1	133.1 R	5.6	NE	5.6	-1.4	-25.0	-35.4	-94.0	NE	-109.0	NE	7.0	23.6	10.4	58.6	15.0	NE	114.6	124.7	-119.1	7.0	-1.4
BB-WS46-305	85+72.8	54.3 R	2.9	NE	NE	2.9	-18.6	NE	NE	NE	-25.5	NE	NE	21.5	6.9	NE	NE	NE	28.4	40.0	-37.1	0.0	2.9
CPT-WS46-101	84+80.7	12.7 R	3.0	NE	NE	3.0	-21.0	-31.0	NE	NE	NE	NE	NE	24.0	10.0	>74	NE	NE	108.0	108.0	-105.0	0.0	3.0
sCPT-WS46-201	83+59.5	27.3 R	2.9	NE	NE	2.9	-26.1	-35.1	NE	NE	-74.1	NE	NE	29.0	9.0	39.0	NE	NE	77.0	77.0	-74.1	1.0	1.9
sCPT-WS46-202	85+52.8	144 R	5.9	NE	5.9	1.4	NE	NE	-12.6	NE	-13.1	NE	4.5	14.0	NE	NE	0.5	NE	19.0	19.0	-13.1	6.0	-0.1
sCPT-WS46-203	86+35.9	161.1 R	5.8	NE	5.8	3.3	NE	NE	-14.7	NE	-17.2	NE	2.5	18.0	NE	NE	2.5	NE	23.0	23.0	-17.2	3.0	2.8

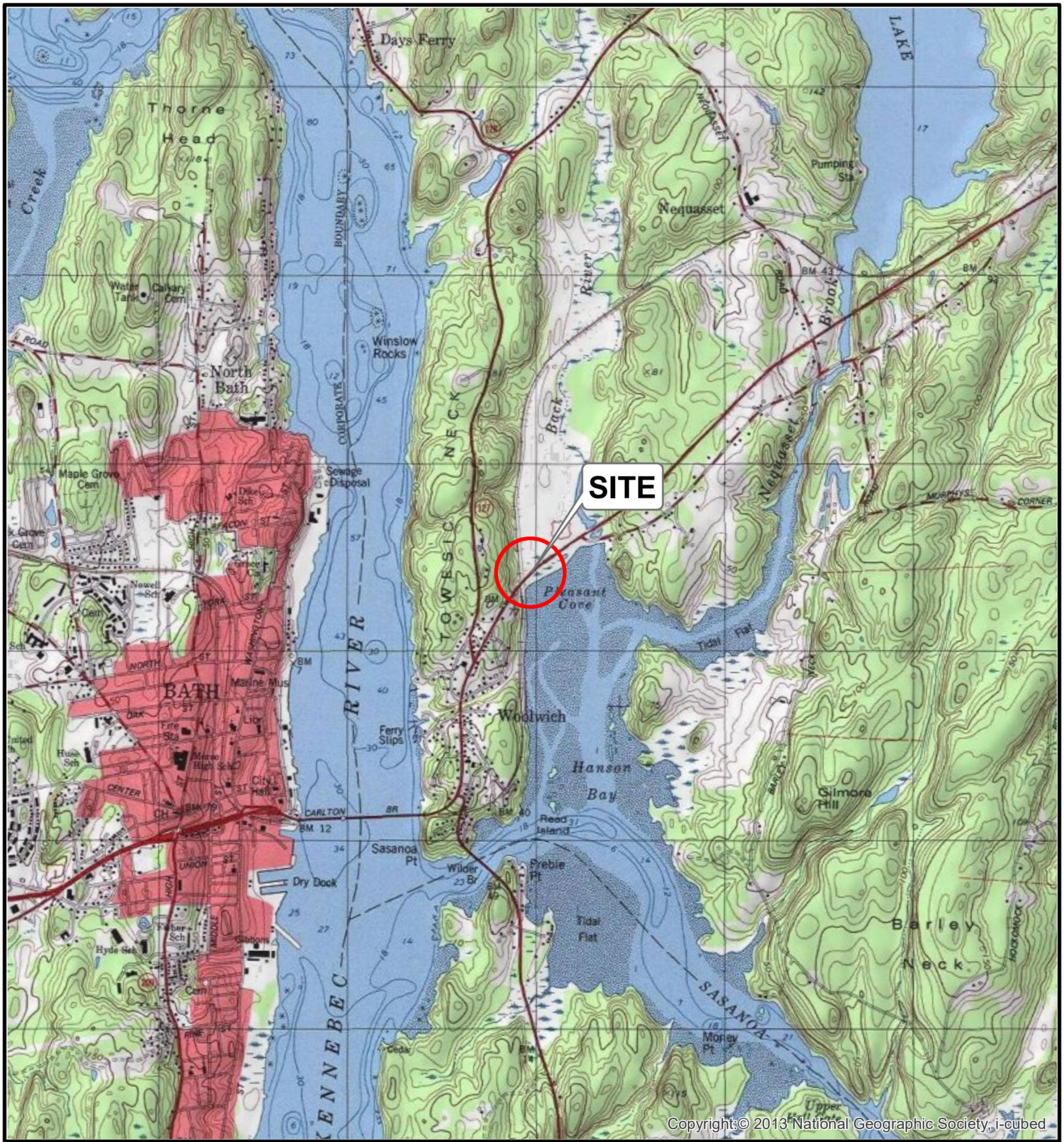
El. = Elevation, NE = Not Encountered, NM = Not Measured, NP = Not Penetrated, > = Boring Terminated in Stratum

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.
5. Cone pentration test Strautm Thickness interpreted from data.

TABLE 2
Summary of Bedrock Data
Station 46 Bridge Replacement
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)		LAB						Rock Type
			Top		Bottom		Top		Bottom								Top	Bottom	Depth of Sample (ft)	Depth of Sample into Rock (ft)	Elev Top of Sample (ft)	UCS (psi)	Modulus (ksi)	Unit Wt (pcf)	
BB-WS46-101	R1	46.0	30.3	-	35.3	30.3	0.0	-	5.0	60.0	60	100%	26	43%	2.5-8	0.01-0.1	15.7	10.7	33	2.7	13.0	3,083	836	169.2	SCHIST
BB-WS46-101	R2	46.0	35.3	-	40.3	30.3	5.0	-	10.0	60.0	60	100%	10	17%	2.5-8	0.01-0.1	10.7	5.7							SCHIST
BB-WS46-102	R1	3.2	71.5	-	73.5	71.2	0.3	-	2.3	24.0	24	100%	9	38%	2.5-8	0.004-0.02	-68.3	-70.3							SCHIST
BB-WS46-102	R2	3.2	73.5	-	78.0	71.2	2.3	-	6.8	54.0	50	93%	39	73%	0.75-8	0.004-0.02	-70.3	-74.8							SCHIST
BB-WS46-102	R3	3.2	78.0	-	81.5	71.2	6.8	-	10.3	42.0	42	100%	34	80%	2.5-8	0.004-0.1	-74.8	-78.3							SCHIST
BB-WS46-103	R1	3.0	126.5	-	131.3	126.5	0.0	-	4.8	57.6	58	101%	47	81%	0.75-8	0.004-0.1	-123.5	-128.3							SCHIST
BB-WS46-103	R2	3.0	131.3	-	136.6	126.5	4.8	-	10.1	63.6	63	99%	52	81%	0.75-8	0.004-0.1	-128.3	-133.6							SCHIST
BB-WS46-104	R1	3.0	100.7	-	105.7	100.7	0.0	-	5.0	60.0	54	90%	32	53%	0.75-8	0.004-0.02	-97.7	-102.7							SCHIST
BB-WS46-104	R2	3.0	105.7	-	110.7	100.7	5.0	-	10.0	60.0	60	100%	52	87%	2.5-8	0.004-0.02	-102.7	-107.7							SCHIST
BB-WS46-105	R1	13.8	22.5	-	27.5	22.0	0.5	-	5.5	60.0	60	100%	59	99%	2.5-8	0.004-0.02	-8.7	-13.7	23.8	1.8	-10.0	4,336	1,310	171.8	SCHIST
BB-WS46-105	R2	13.8	27.5	-	32.5	22.0	5.5	-	10.5	60.0	60	100%	58	97%	2.5-8	0.004-0.02	-13.7	-18.7							SCHIST
BB-WS46-201	R-1	28.2	19.0	-	24.0	18.5	0.5	-	5.5	60.0	55	92%	38	63%	<0.75-8	0.004-0.02	9.2	4.2							SCHIST
BB-WS46-201	R-2	28.2	24.0	-	28.9	18.5	5.5	-	10.4	58.8	59	100%	43	73%	2.5-8	<0.004-0.1	4.2	-0.7							SCHIST
BB-WS46-202	R-1	11.7	12.5	-	17.5	11.9	0.6	-	5.6	60.0	54	90%	33	55%	<0.75-2.5	0.02->0.4	-0.8	-5.8							GRANITE/SCHIST
BB-WS46-202	R-2	11.7	17.5	-	18.4	11.9	5.6	-	6.5	10.8	6	56%	0	0%	0.75	0.02-0.1	-5.8	-6.7							SCHIST
BB-WS46-202	R-3	11.7	18.4	-	23.4	11.9	6.5	-	11.5	60.0	60	100%	33	55%	2.5-8	0.02->0.4	-6.7	-11.7							GRANITE/SCHIST
BB-WS46-203	R-1	10.8	11.0	-	16.0	10.7	0.3	-	5.3	60.0	60	100%	50	83%	2.5-8	0.02-0.1	-0.2	-5.2	11.4	0.7	-0.6	8,745	2,360	161.4	SCHIST
BB-WS46-203	R-2	10.8	16.0	-	21.0	10.7	5.3	-	10.3	60.0	60	100%	50	83%	<0.75-8	0.02-0.1	-5.2	-10.2							SCHIST
BB-WS46-204	R-1	4.1	30.0	-	35.0	28.8	1.2	-	6.2	60.0	58	97%	35	58%	0.75-8	0.02-0.1	-25.9	-30.9							SCHIST
BB-WS46-204	R-2	4.1	35.0	-	40.0	28.8	6.2	-	11.2	60.0	59	98%	50	83%	2.5-8	0.02-0.1	-30.9	-35.9							SCHIST
BB-WS46-205	R-1	2	83.0	-	88.0	82.5	0.5	-	5.5	60.0	58	97%	44	73%	0.75-8	<0.004-0.02	-81.0	-86.0							SCHIST
BB-WS46-205	R-2	2	88.0	-	93.0	83.0	5.0	-	10.0	60.0	60	100%	50	83%	0.75-24	<0.004-0.01	-86.0	-91.0							SCHIST
BB-WS46-206	R-1	2.1	128.2	-	131.2	127.7	0.5	-	3.5	36.0	36	100%	5	14%	<0.75-8	0.004-0.4	-126.1	-129.1							SCHIST
BB-WS46-206	R-2	2.1	131.2	-	135.9	127.7	3.5	-	8.2	56.4	56	100%	33	58%	0.75-8	0.004-0.01	-129.1	-133.8							SCHIST
BB-WS46-207	R-1	14.5	25.0	-	30.0	24.8	0.2	-	5.2	60.0	57	95%	39	65%	0.75-8	0.02-0.1	-10.5	-15.5	27.3	2.5	-12.8	4,521	1,550	170.8	SCHIST
BB-WS46-207	R-2	14.5	30.0	-	35.0	24.8	5.2	-	10.2	60.0	60	100%	53	88%	0.75-8	0.02-0.1	-15.5	-20.5							SCHIST
BB-WS46-301A	R-1	54	27.0	-	32.0	26.5	0.5		5.5	60.0	57	95%	36	60%	<0.75-8	0.004-0.4	27.0	22.0							SCHIST
BB-WS46-301A	R-2	54	32.0	-	35.5	26.5	5.5		9.0	42.0	36	86%	15	36%	0.75-24	<0.004-0.4	22.0	18.5							SCHIST
BB-WS46-301A	R-3	54	35.5	-	37.5	26.5	9.0		11.0	24.0	23	96%	17	71%	0.75	0.004-0.02	18.5	16.5							SCHIST
BB-WS46-303	R-1	4.4	83.0		88.0	82.5	0.5		5.5	60.0	50	83%	35	58%	0.75-8	<0.004-0.01	-78.6	-83.6							SCHIST
BB-WS46-303	R-2	4.4	88.0		93.0	82.5	5.5		10.5	60.0	58	97%	52	87%	0.75-8	<0.004-0.01	-83.6	-88.6							SCHIST
BB-WS46-304	R-1	5.6	114.7		119.7	114.6	0.1		5.1	60.0	57	95%	37	61%	<0.75-8	<0.004-0.01	-109.1	-114.1							SCHIST
BB-WS46-304	R-2	5.6	119.7		124.7	114.6	5.1		10.1	60.0	60	100%	40	66%	<0.75	<0.004-0.01	-114.1	-119.1							SCHIST
BB-WS46-305	R-1	2.9	30.0		35.0	28.4	1.6		6.6	60.0	60	100%	41	69%	<0.75-8	<0.004-0.01	-27.1	-32.1							SCHIST
BB-WS46-305	R-2	2.9	35.0		38.8	28.4	6.6		10.4	45.6	43	95%	26	57%	0.75-2.5	0.004-0.4	-32.1	-35.9							SCHIST
BB-WS46-305	R-3	2.9	38.8		40.0	28.4	10.4		11.6	14.4	14	100%	14	100%	8	0.004-0.01	-35.9	-37.1							SCHIST

FIGURES



USGS QUADRANGLE LOCATION

N
W E
S

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

GZA

PROJ. MGR.: BMC
DESIGNED BY: ADM
REVIEWED BY: CLS
OPERATOR: LCN

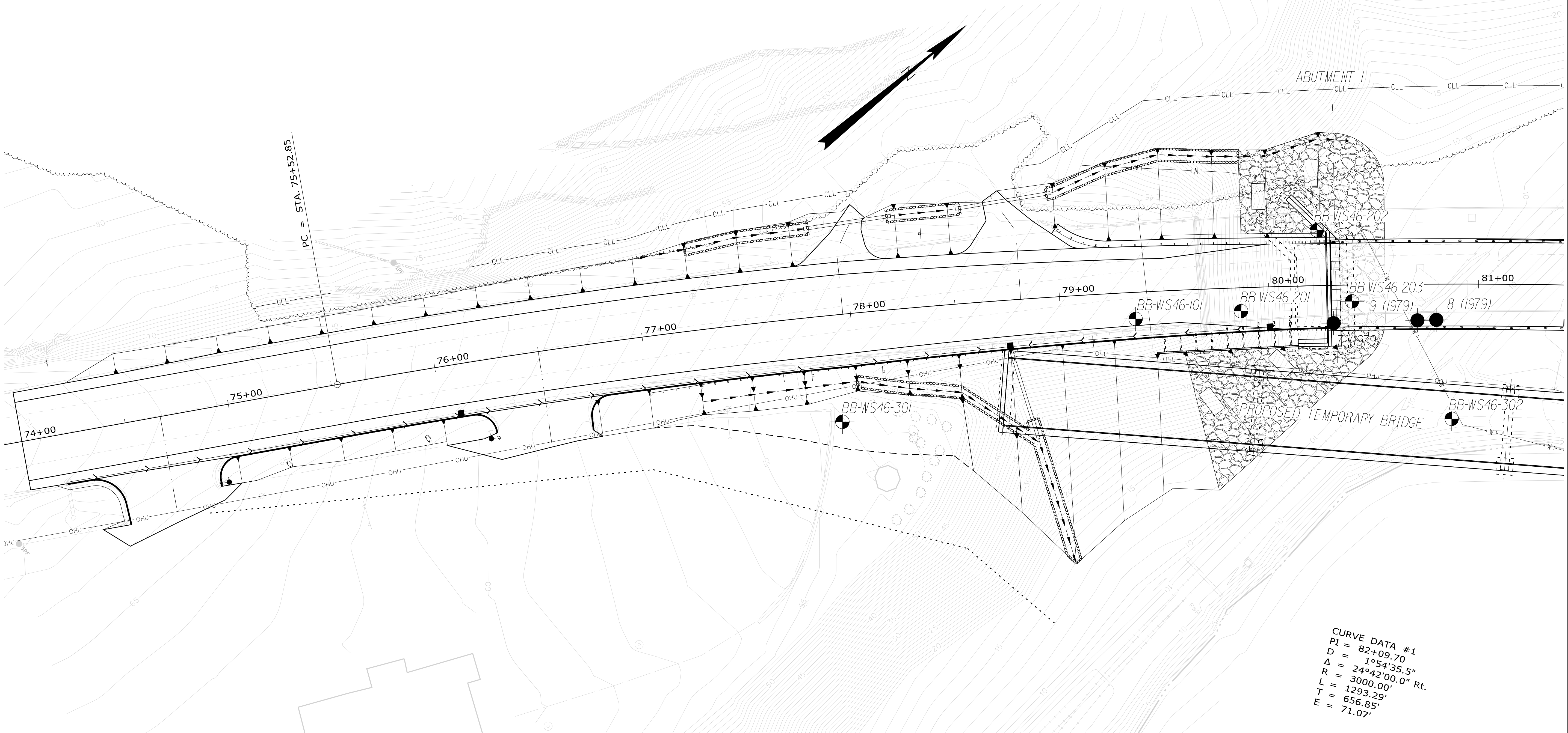
DATE: 07-22-2021

LOCUS PLAN

STATION 46 BRIDGE
WOOLWICH, ME

JOB NO.
09.0026035.01

FIGURE NO.
1



NOTES

1) Base map developed from electronic files (3DTopo_21dec09.dgn, Contours.dgn, Alignments.dgn, Topo-BathBridges.dgn, Topo_HNTB.dgn, and Bridge_Combined.dgn) provided by HNTB on April 27, 2021.

2) The as-drilled locations of the BB-WS46-100, -200, AND -300 series test borings and CPT-WS46-101 AND SCPT-WS46-200 series Cone Penetration Tests were surveyed and provided by MaineDOT in an electronic file (001_Borings_28 OCTOBER 19.dgn and 20 MAY BORINGS ONLY.dgn).

3) Borings CB-15-78 and CB-16-78 were drilled in 1978, and probe borings 4 through 9 were drilled in 1979 and were included in Geotechnical Report entitled "Soils Report 79-12, Woolwich-Sagadahoc County, Station 46 Bridge 26-1 (48)" dated March 1979.

BORING LOCATION PLAN LEGEND

BB-WS46-105	Locations and designations of 100 series borings performed by New England Boring Contractors of Hermon, Maine between October 7 and October 22, 2019.
BB-WS46-207	Locations and designations of 200 series borings performed by New England Boring Contractors of Hermon, Maine between March 22 and April 7, 2021.
BB-WS46-305	Locations and designations of 300 series borings performed by New England Boring Contractors of Hermon, Maine between March 22 and May 19, 2021.
CB-16-78, 9 (1979)	Locations and designation of historic explorations provided in 1979 Geotechnical Report.
CPT-WS46-101	Location and designation of 100 series Cone Penetrometer Test (CPT) performed by Summit Geoengineering Services, Inc. of Rockland, Maine on October 14, 2019.
SCPT-WS46-203	Location and designation of 200 series Cone Penetrometer Test (CPT) performed by Summit Geoengineering Services, Inc. of Rockland, Maine on March 24, 2021. (S indicates seismic testing was performed)

PLAN

25 0 25 50

Scale in Feet

PREPARED BY:

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2392900

WIN 23929.00

BRIDGE PLANS

Bridge No. 3039

SIGNATURE

P.E. NUMBER

DATE

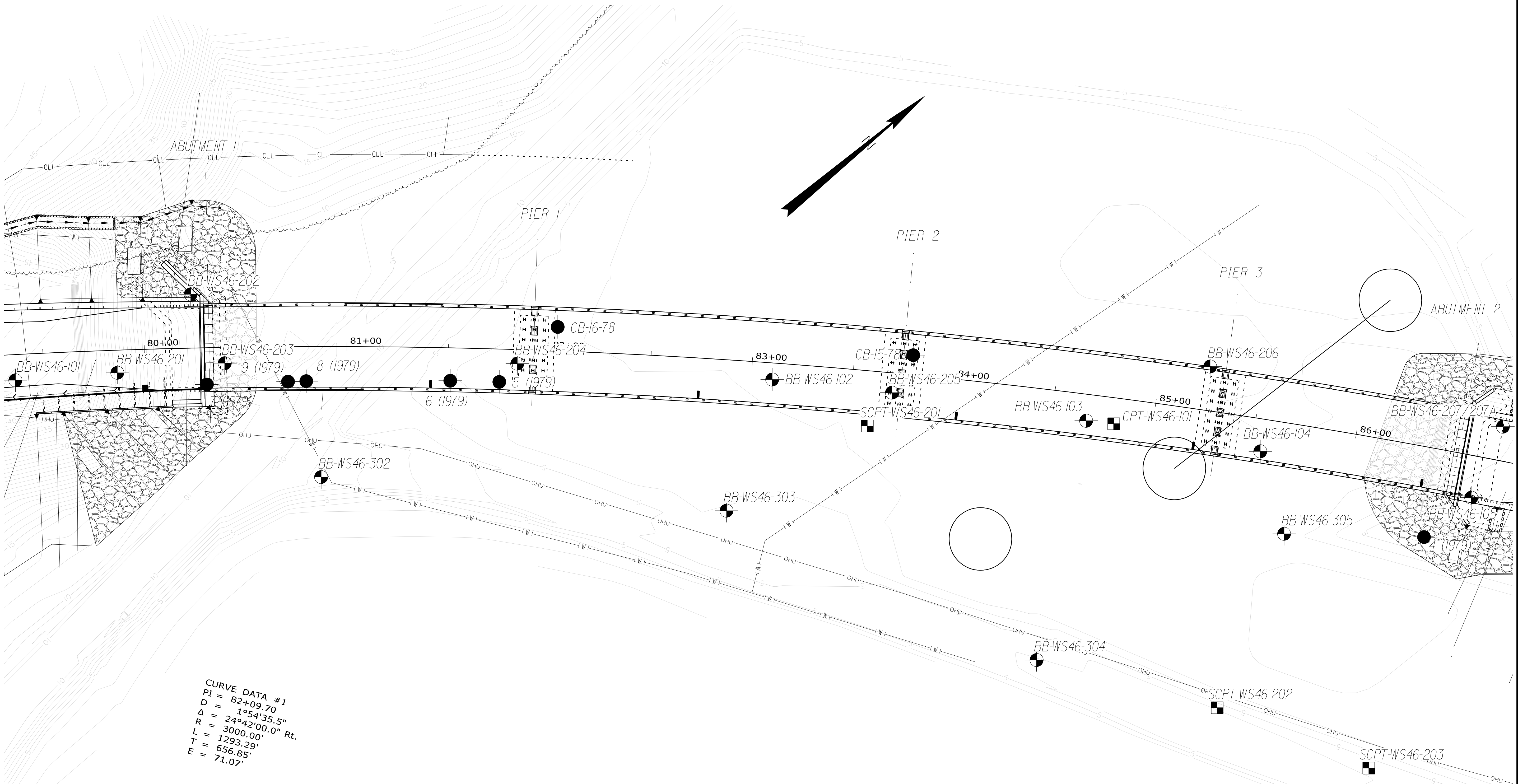
	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	E. TOME	
CHECKED-REVIEWED	B. CARDALI	05/2021
DESIGN2-DETAILED2	C. SNOW	
DESIGN3-DETAILED3	A. BLASDELL	05/2021
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

STATION 46 BRIDGE
KENNEBEC RIVER ESTUARY
WOOLWICH SAGADAHOC COUNTY

BORING LOCATION PLAN 1

SHEET NUMBER

2



NOTES

1) Base map developed from electronic files (3DTopo_21dec09.dgn, Contours.dgn, Alignments.dgn, Topo-BathBridges.dgn, Topo_HNTB.dgn, and Bridge_Combined.dgn) provided by HNTB on April 27, 2021.

2) The as-drilled locations of the BB-WS46-100, -200, AND -300 series test borings were surveyed and provided by MaineDOT in an electronic file (001_Borings_28 OCTOBER 19.dgn and 20 MAY BORINGS ONLY.dgn).

3) Borings CB-15-78 and CB-16-78 were drilled in 1978, and probe borings 4 through 9 were drilled in 1979 and were included in Geotechnical Report entitled "Soils Report 79-12, Woolwich-Sagadahoc County, Station 46 Bridge 26-1(48)" dated March 1979.

BORING LOCATION PLAN LEGEND

BB-WS46-105	Locations and designations of 100 series borings performed by New England Boring Contractors of Hermon, Maine between October 7 and October 22, 2019.
BB-WS46-207	Locations and designations of 200 series borings performed by New England Boring Contractors of Hermon, Maine between March 22 and April 7, 2021.
BB-WS46-305	Locations and designations of 300 series borings performed by New England Boring Contractors of Hermon, Maine between March 22 and May 19, 2021.
CB-16-78, 9 (1979)	Locations and designation of historic explorations provided in 1979 Geotechnical Report.
CPT-WS46-101	Location and designation of 100 series Cone Penetrometer Test (CPT) performed by Summit Geoengineering Services, Inc. of Rockland, Maine on October 14, 2019.
SCPT-WS46-203	Location and designation of 200 series Cone Penetrometer Test (CPT) performed by Summit Geoengineering Services, Inc. of Rockland, Maine on March 24, 2021. (S) indicates seismic testing was performed)

PLAN

25 0 25 50
Scale in Feet

PREPARED BY: GZA

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2392900

WIN 23929.00

BRIDGE PLANS

Bridge No. 3039

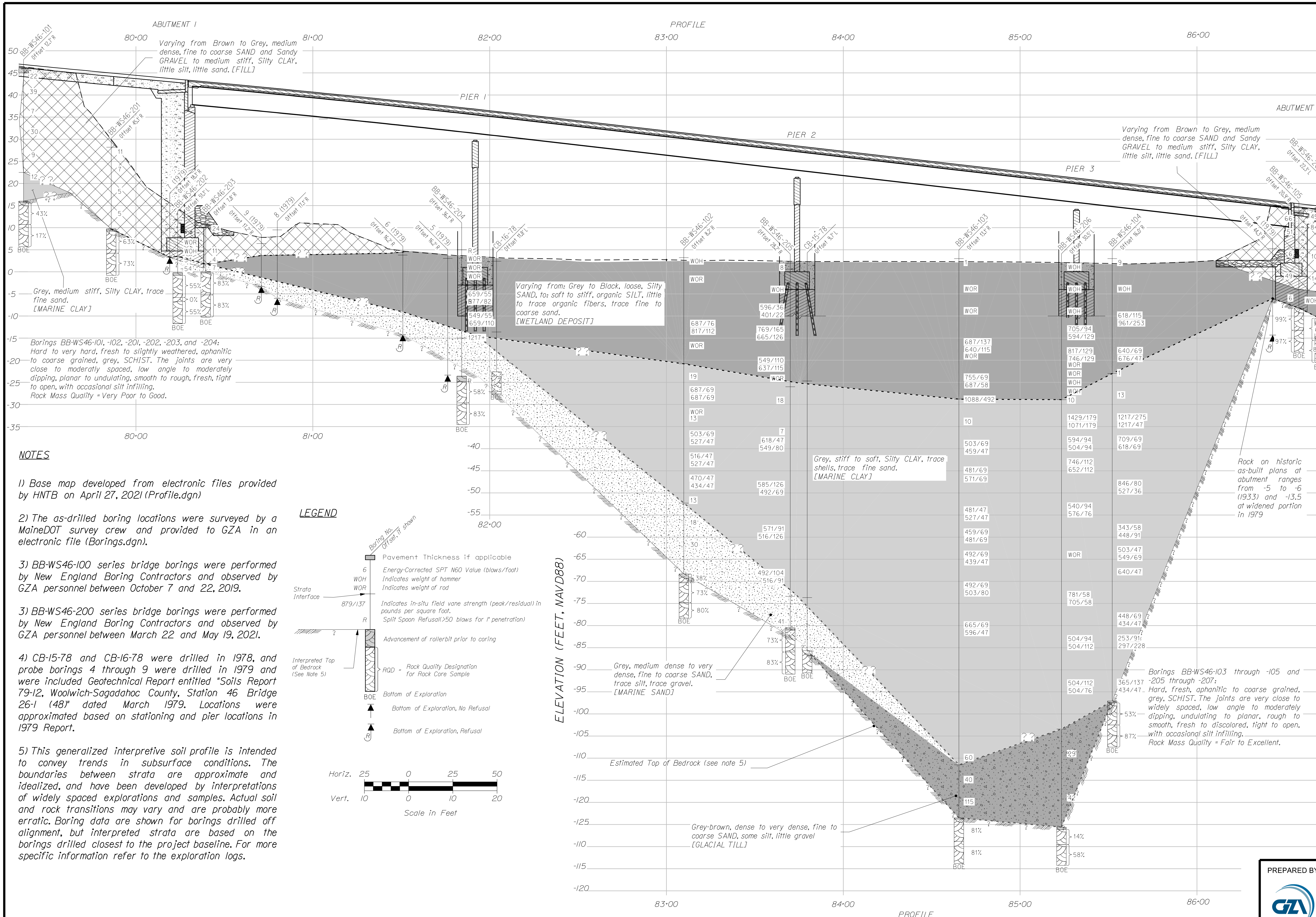
		BY	DATE
PROJ. MANAGER			
DESIGN-DETAILED	E. TOME	B. CARDALI	05/2021
CHECKED-REVIEWED	C. SNOW	A. BLASDELL	05/2021
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

STATION 46 BRIDGE
KENNEBEC RIVER ESTUARY
WOOLWICH SAGADAHOC COUNTY

BORING LOCATION PLAN 2

SHEET NUMBER
3

Filename: ...\BLP\Woolwich - 002_BLP.dgn Division: HIGHWAY Username: common Date:8/17/2021



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) BB-WS46-100 series bridge borings were performed by New England Boring Contractors and observed by GZA personnel between October 7 and 22, 2019.

3) BB-WS46-200 series bridge borings were performed by New England Boring Contractors and observed by GZA personnel between March 22 and May 19, 2021.

4) CB-15-78 and CB-16-78 were drilled in 1978, and probe borings 4 through 9 were drilled in 1979 and were included Geotechnical Report entitled "Soils Report 79-12, Woolwich-Sagadahoc County, Station 46 Bridge 26-I (48)" dated March 1979. Locations were approximated based on stationing and pier locations in 1979 Report.

5) 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.

LEGEND

Boring No., Offset, if shown

Pavement Thickness if applicable

6 — Energy-Corrected SPT N60 Value (blows/foot)

WOH — Indicates weight of hammer

WOR — Indicates weight of rod

Strata Interface

879/137 — Indicates in-situ field vane strength (peak/residual) in pounds per square foot.

R — Split Spoon Refusal (>50 blows for 1" penetration)

Advancement of rollerbit prior to coring

Interpreted Top of Bedrock (See Note 5)

RQD = Rock Quality Designation for Rock Core Sample

BOE — Bottom of Exploration

Bottom of Exploration, No Refusal

Bottom of Exploration, Refusal

Horiz. 25 0 25 50

Vert. 10 0 10 20

Scale in Feet

Division: Bridge
Filename: ...\SP\Woolwich_ISP 5 25 2021.dgn
Date: 8/6/2021
Username: BMC

PREPARED BY: GZA

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2392900

WIN 23929.00

BRIDGE PLANS

Bridge No. 3039

	BY	DATE
PROJ. MANAGER	E. TOME	
DESIGN-DETAILED	B. CARDALI	5/2021
CHECKED-REVIEWED	A. BLAISDELL	5/2021
DESIGN2-DETAILED2	C. SNOW	
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

STATION 46 BRIDGE
KENNEBEC RIVER ESTUARY
WOOLWICH SAGADAHOC COUNTY

INTERPRETIVE SUBSURFACE PROFILE

SHEET NUMBER

4

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 – PREVIOUS TEST BORING LOGS

LEGEND

PLAN SYMBOLS

○ -------- ROD SOUNDING

⊗ -------- AUGER BORING

-------- BORING & SOUNDING

⬡ -------- POWER AUGER

◉ -------- WASH BORING

◇ -------- SEISMIC: SHOT LOCATION

◆ -------- RESISTIVITY: TEST LOCATION

⊠ -------- TEST PIT

-------- LEDGE ON SURFACE

EXPLORATION NOTES

-------- WATER LEVEL

10 18 -------- BLOWS PER FOOT - ROD SOUNDINGS

CLAY B-160 ------ MATERIAL & SAMPLE NO. - AUGER BORING

2' 5' -------- DEPTH OF MATERIAL CHANGE (IN FEET)

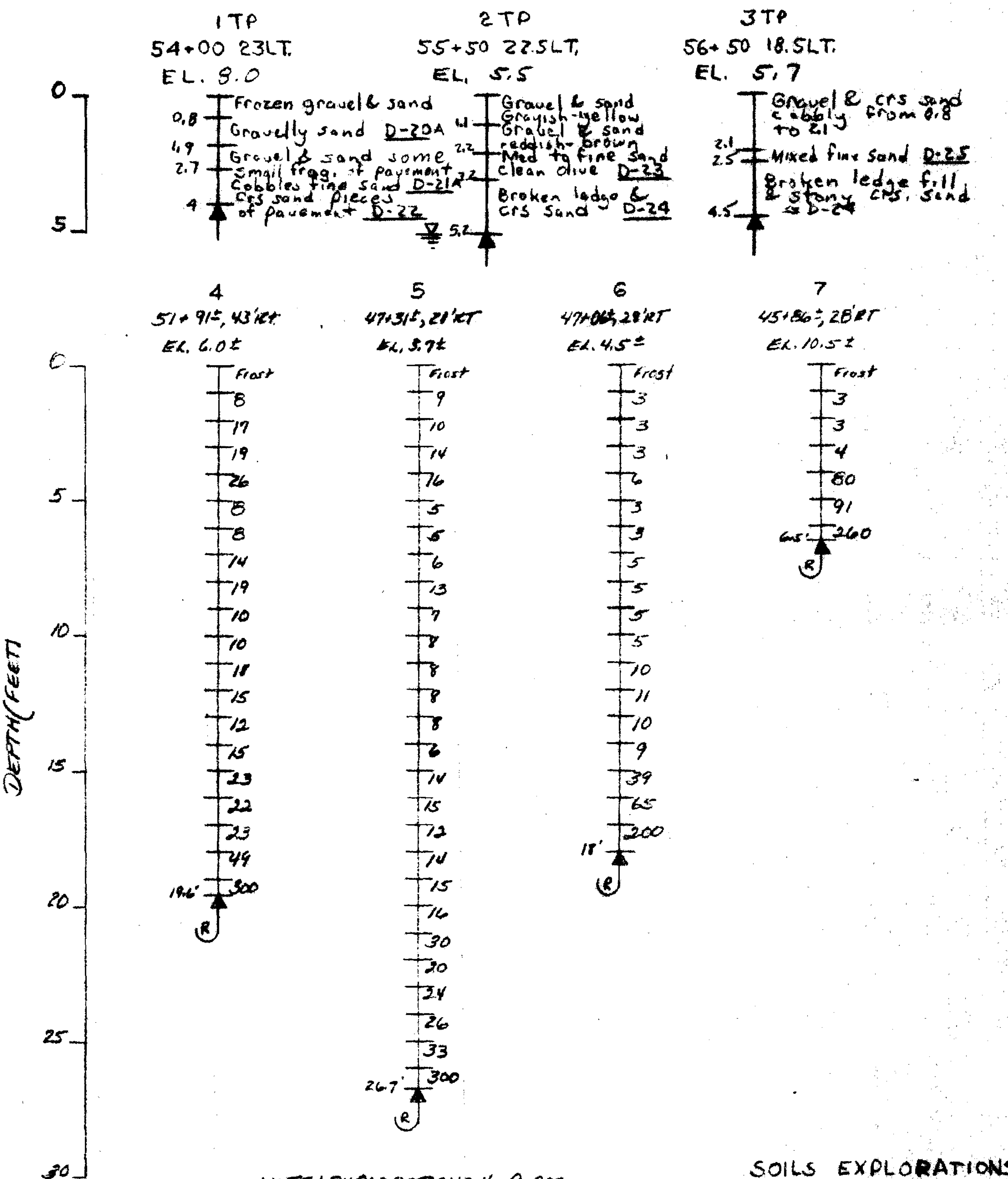
-------- BOTTOM OF EXPLORATION

R -------- REFUSAL

-------- LEDGE

SML-233(4/74)

SHEET NO. 3
EXPLORATIONS 1-7
TEST PITS

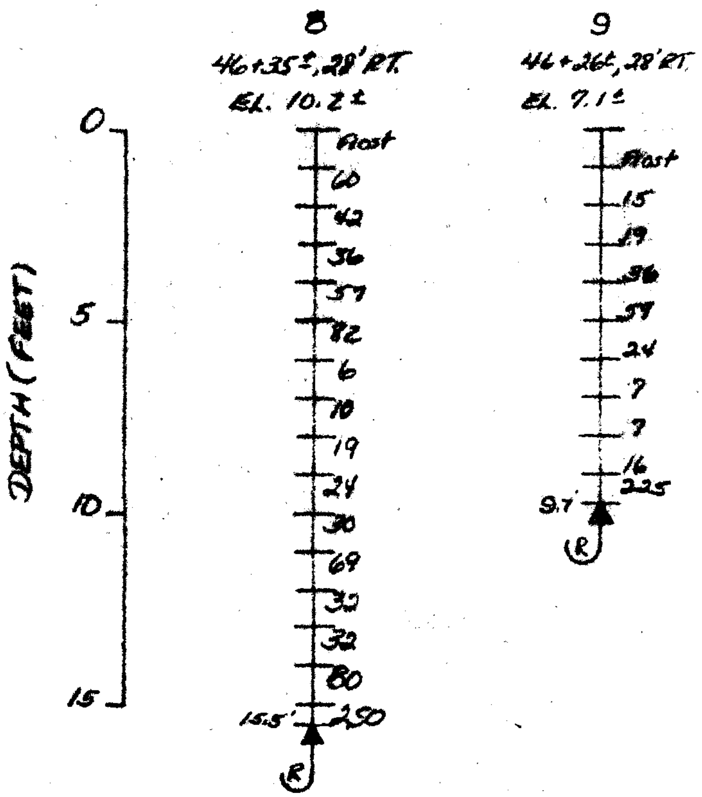


NOTE: EXPLORATIONS 4-9 ARE
Taken from existing ℄

SOILS EXPLORATIONS
WOOLWICH
26-1(48)

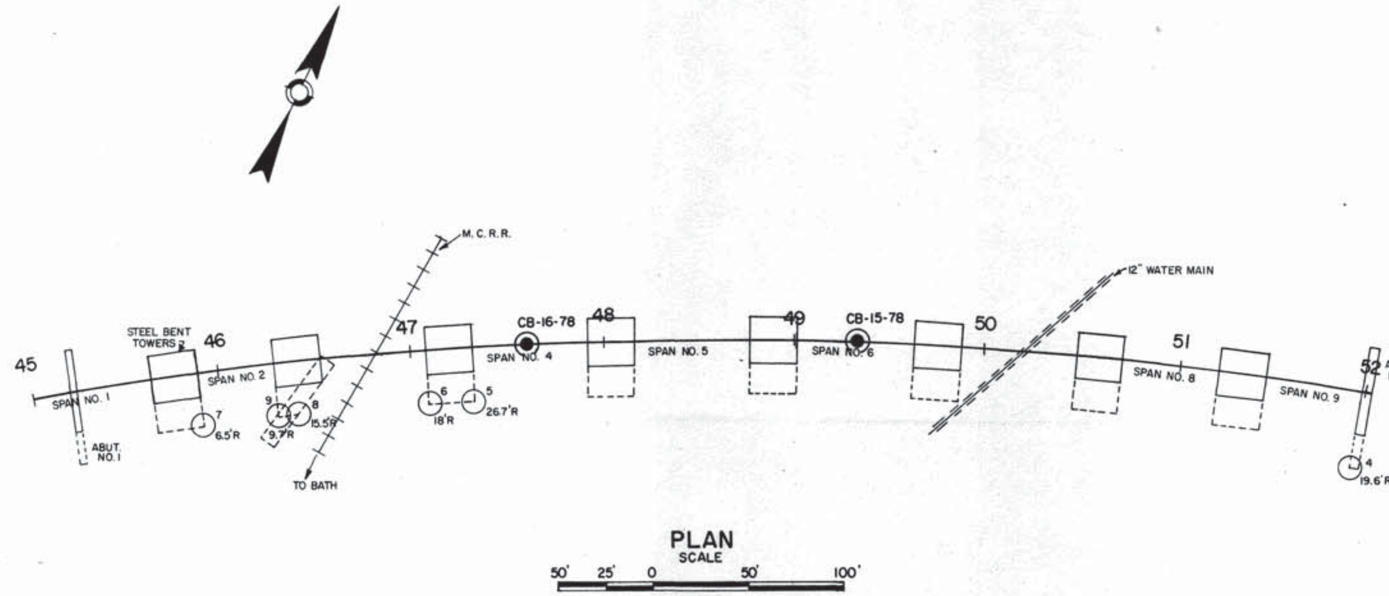
MARCH 1979

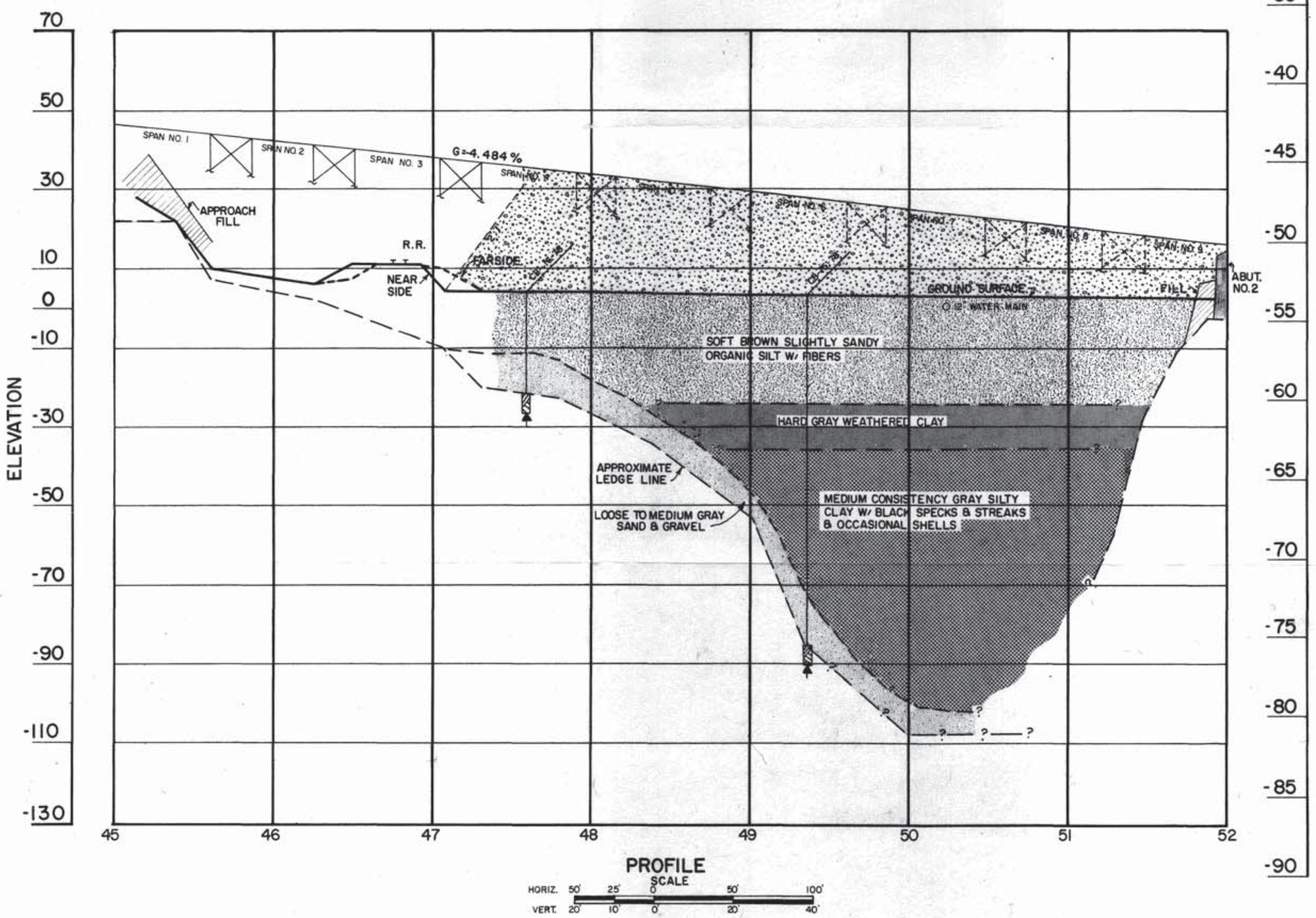
SHEET NO. 4
EXPLORATIONS 8-9

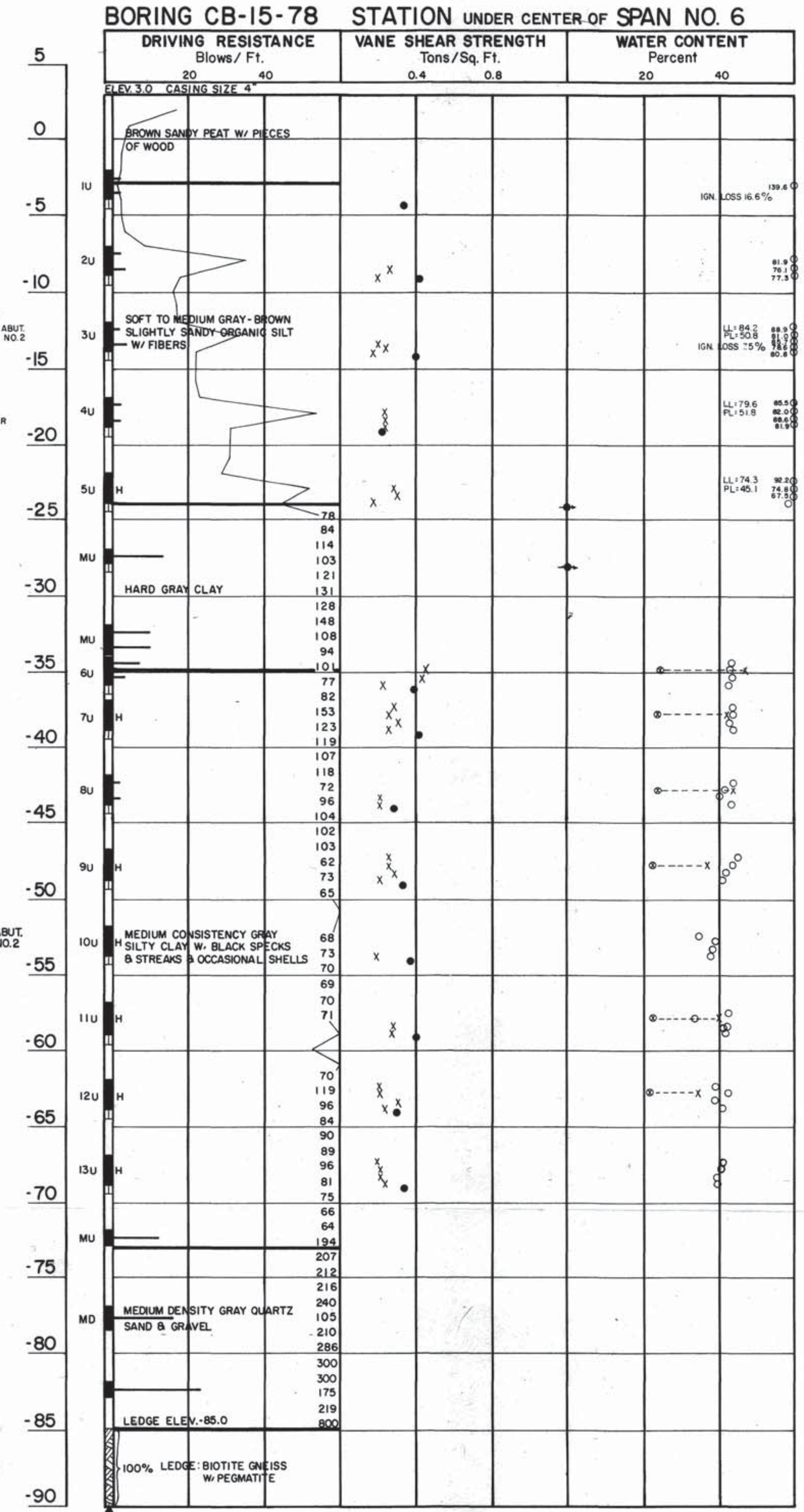


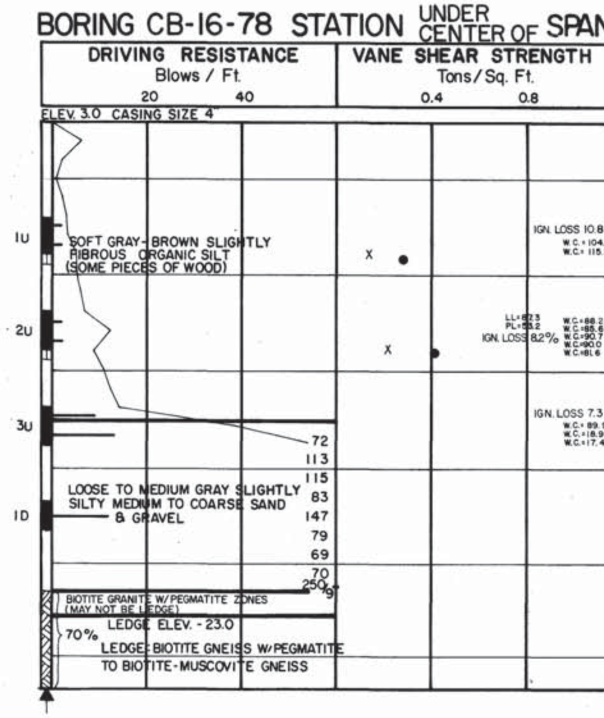
NOTE: EXPLORATIONS 8-9 are taken from existing ℄

SOILS EXPLORATIONS
WOOLWICH
26-1 (48)









BORING NOTES

All samples and vanes are made ahead of casing

Number of blows required to drive extra heavy casing one foot with 400 ft. lbs. of energy per blow

Location of sample or sample attempt

Number and type of dry sample

- ID — S & H Sampler # 1290's
- IU — 3 1/2" O.D. 16 ga. seamless tubing
- MD — Unsuccessful sample attempt and type of sampler

Number of blows required to drive spoon or tubing one foot with 350 ft. lbs. of energy per blow

H — Sampling spoon or seamless tubing driven by static weight of drill rods and hammer

Field vane test

Bottom of boring (may not be bottom of soil strata)

Locations cored by diamond bit and per cent recovery of rock

SHEAR NOTES

- ● Field vane shear strengths
- X Laboratory vane shear strengths
- → Shear strengths in excess of capacity of equipment
- ○ One half unconfined compressive strengths

WATER CONTENT NOTES

- ○ Natural water contents, given as per cent of dry weight
- ⊙--X Plastic and liquid limits

Ignition losses are given as per cent of dry weight

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

ROUTE 1 BRIDGE

OVER

M. C. R. R. TRACKS

IN THE TOWN OF

WOOLWICH
SAGADAHOC COUNTY

FOUNDATION SURVEY

SHEET 7 OF 7 AUGUSTA, MAINE JAN. 1979

APPENDIX C – RECENT TEST BORING LOGS

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

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

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))

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: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-101
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	46.0	**Auger ID/OD:**	4.25" SSA
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/7/19-10/7/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 79+35.8, 12.7 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	24.4
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							SSA			ASPHALT	
								45.0		1.0	
	1D	24/12	1.0 - 3.0	10-10-5-11	15	22				Brown, medium dense, fine to coarse SAND, little gravel, trace organic silt, (Fill).	
5	2D	24/10	5.0 - 7.0	2-14-12-12	26	39				Brown, dry, dense, Gravelly, fine to coarse SAND, little organic silt, (Fill).	G# 19-S-2627 A-1-9, SP-SM WC=10.6
10	3D	24/14	10.0 - 12.0	1-2-3-11	5	7				Grey, moist, medium stiff, Silty CLAY, little fine to coarse sand, (Fill).	PI=9 LL=31 PL=22 A-4, CL WC=23.3
							15				
							26				
							44				
							104				
15	4D	24/10	15.0 - 17.0	8-11-9-4	20	30	63			Brown, wet, medium dense, sandy GRAVEL, little organic silt, (Fill).	G# 19-S-2629 A-1-a, GP-GM WC=10.6
							38				
							39				
							34				
							13				
20	5D	24/0	20.0 - 22.0	3-3-3-4	6	9	RC			No recovery.	
								22.5		23.5	
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 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.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-101
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	46.0	**Auger ID/OD:**	4.25" SSA
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/7/19-10/7/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 79+35.8, 12.7 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	24.4
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	6D	24/14	25.0 - 27.0	1-2-2-3	4	6				Grey, moist, medium stiff, Silty CLAY, (Marine Clay).	WC=26.1
	7D	6/6	29.8 - 30.3	41-36	R			16.2		29.8	
30	R1	60/60	30.3 - 35.3	RQD = 43%			NX	15.7		Moist, very dense, fine to coarse SAND, (Marine Sand). 30.3	q_p=444 ksf
										Splitspoon refusal at 30.3', probable rock, advanced roller bit to 30.3 and set up to core at 30.3'. R1: Very hard to hard, fresh to slightly weathered, medium grained, grey, SCHIST. Primary joints are very close to moderately spaced, low angle, undulating, rough, fresh, open, with silt infilling. Secondary joints are extremely close to moderately spaced, high angle to vertical, undulating, rough, fresh to discolored, partially open to open. Rock Mass Quality = Poor Recovery = 100 Rock Core Times (min:sec): 30.3-31.3' (2:09), 31.3-32.3' (1:51), 32.3-33.3' (2:37), 33.3-34.3' (1:12), 34.3-35.3' (1:20)	
35	R2	60/60	35.3 - 40.3	RQD = 17%						R2: Very hard to hard, fresh to slightly weathered, medium grained, SCHIST. Primary joints are close to moderately spaced, low angle, undulating, rough, fresh, partially open to open. Secondary joints are close to moderately spaced, moderately dipping, planar, rough to smooth, fresh to discolored, partially open to open. Rock Mass Quality = Very Poor Recovery = 100% Rock Core Times (min:sec): 35.3-36.3' (1:32), 36.3-37.3' (1:03), 37.3-38.3' (1:17), 38.3-39.3' (1:58), 39.3-40.3' (1:32)	
40								5.7		40.3	
										Bottom of Exploration at 40.3 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 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.

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: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-102
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	3.2	**Auger ID/OD:**	
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/7/19-10/9/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 83+10.4, 8.2 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
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	24/1	0.0 - 2.0	WOH-WOH-WOH-WOH			RC			Grey/black, wet, very loose, fine to coarse SAND, some organic silt, (Wetland Deposit).	
5	2D	24/0	5.0 - 7.0	WOR-WOR-WOR-WOR						No recovery.	
10	1U	24/18	10.0 - 12.0	PUSH						Grey, moist to wet, Organic SILT, trace organic fibers, (Wetland Deposit).	
							PUSH				
15	3D	24/14	15.0 - 17.0	Push thru vane						Grey, moist to wet, medium stiff, Organic SILT, trace organic fibers, (Wetland Deposit). 65x130mm vane raw torque readings: V1: 185/20 in-lbs V2: 220/30 in-lbs	
	V1		15.6 - 16.0	S_u=687/76 psf							
	V2		16.6 - 17.0	S_u=817/112 psf							
20	4D	24/13	20.0 - 22.0	WOR-WOR-WOR-WOR						Grey, moist to wet, Organic SILT, trace organic fibers, (Wetland Deposit).	WC=83.7
								-20.8		24.0	
25											

Remarks:

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2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Cored into pavement with 6" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 10" thick. Ground level 26.2' below top of bridge deck.
4. Water level measured immediately after removal of casing.

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: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-102
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	3.2	**Auger ID/OD:**	
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/7/19-10/9/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 83+10.4, 8.2 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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	2U	24/15	25.0 - 27.0	PUSH							
	5D	24/24	27.0 - 29.0	4-5-8-9	13	19				Grey, wet, very stiff, Silty CLAY, (Marine Clay).	
								-24.8		28.0	
30	6D	24/24	30.0 - 32.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V3: 300/30 in-lbs V4: 300/30 in-lbs	A-7, CH LL=53 PL=24 PI=29 WC=37.8
	V3		30.6 - 31.0	S_u=687/69 psf							
	V4		31.6 - 32.0	S_u=687/69 psf							
35	7D	24/20	35.0 - 37.0	WOR-WOR-WOR-WOR						Grey, wet, Silty CLAY, (Marine Clay).	
40	8D	24/19	40.0 - 42.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V5: 220/30 in-lbs V6: 230/20 in-lbs	A-7, CL LL=44 PL=22 PI=22 WC=40.9
	V5		40.6 - 41.0	S_u=503/69 psf							
	V6		41.6 - 42.0	S_u=527/47 psf							
45	9D	24/22	45.0 - 47.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V7: 225/20 in-lbs V8: 230/28 in-lbs	
	V7		45.6 - 46.0	S_u=516/47 psf							
	V8		46.6 - 47.0	S_u=527/47 psf							
50											

Remarks:

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2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Cored into pavement with 6" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 10" thick. Ground level 26.2' below top of bridge deck.
4. Water level measured immediately after removal of casing.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Station 46 Bridge 3039 Replacement Location: Woolwich, Maine	Boring No.: BB-WS46-102 WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	3.2	**Auger ID/OD:**	
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/7/19-10/9/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 83+10.4, 8.2 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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
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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 V9	24/22	50.0 - 52.0 50.6 - 51.0	Push thru vane S_u=470/47 psf						Grey, wet, soft, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V9: 205/20 in-lbs V10: 190/20 in-lbs	
	V10		51.6 - 52.0	S_u=434/47 psf							
55	11D	24/12	55.0 - 57.0	6-4-5-4	9	13		-52.3		Top 6": Grey, wet, Silty CLAY, (Marine Clay). 55.5 Bottom 6": Grey, wet, medium dense, fine to coarse SAND, trace gravel, (Marine Sand).	
							22				
							27				
							28				
60	12D	24/4	60.0 - 62.0	5-6-6-6	12	18	28			Grey, wet, medium dense, fine to coarse SAND, trace organic silt, (Marine Sand).	
							8				
							25				
							45				
							58				
65	13D	24/8	65.0 - 67.0	9-9-11-12	20	30	79			Grey, wet, medium dense, fine to medium SAND, trace gravel, trace organic silt, (Marine Sand).	G#19-S-2634 A-1-b, SP WC=18.7
							17				
							32				
							84				
							112				
70	14D	14/9	70.0 - 71.2	11-17-110/2"	R		103			Top 12": Grey, wet, fine to coarse SAND, trace organic silt, (Marine Sand).	
	R1	24/24	71.5 - 73.5	RQD = 38%				-68.0		Bottom 2": Grey, wet, fine to coarse SAND, little gravel, trace organic silt. 71.2 Splitspoon refusal at 71.2', probable top of rock. Roller cone to 71.5'. Consistent dark grey rock fragments in wash return. Set up to core at 71.5'. R1: Very hard, fresh, aphanitic to coarse grained, grey, SCHIST. Joints are close to moderately spaced, moderately dipping, planar, rough to smooth, fresh, tight to partially open.	
	R2	54/50	73.5 - 78.0	RQD = 73%							
75											

Remarks:

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2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Cored into pavement with 6" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 10" thick. Ground level 26.2' below top of bridge deck.
4. Water level measured immediately after removal of casing.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-102
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	3.2	**Auger ID/OD:**	
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/7/19-10/9/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 83+10.4, 8.2 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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
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N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
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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										Rock Mass Quality = Poor Recovery = 93% Rock Core Times (min:sec): 71.5-72.5' (1:48), 72.5-73.5' (1:45) R2: Very hard, fresh, aphanitic to coarse grained, grey, SCHIST. Joints are very close to moderately spaced, moderately dipping, planar, rough to smooth, fresh, tight to partially open. Rock Mass Quality = Fair Recovery = 100% Rock Core Times (min:sec): 73.5-74.5' (1:38), 74.5-75.5' (1:18), 75.5-76.5' (1:15), 76.5-77.5' (1:23), 77.5-78.0' (2:02)	
	R3	42/42	78.0 - 81.5	RQD = 80%						R3: Very hard, fresh, aphanitic to coarse grained, grey, SCHIST. Joints are close to moderately spaced, moderately dipping, planar, smooth, fresh, tight to open.	
80								-78.3		Rock Mass Quality = Good Recovery = 100% Rock Core Times (min:sec): 78.0-79.0' (1:53), 79.0-80.0' (1:26), 80.0-81.0' (1:45), 81.0-81.5' (0:45)	
										81.5 **Bottom of Exploration at 81.5 feet below ground surface.**	
85											
90											
95											
100											

Remarks:

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2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-103
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	3.0	**Auger ID/OD:**	4.25"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/16/19-10/22/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 84+80.7, 12.7 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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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
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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	24/10	0.0 - 2.0	1-1-WOH	1	1	RC			Black, wet, soft, Organic SILT, some fine to coarse sand, little organic fibers and wood fragments, (Wetland Deposit).	
5											
	2D	24/13	6.0 - 8.0	WOR-WOR-WOR-WOR						Black, wet, very soft, Organic SILT, trace organic fibers, (Wetland Deposit).	WC=104.1
10											
	3D	24/12	11.0 - 13.0	WOR-WOR-WOR-WOR			65			Black, wet, very soft, Organic SILT, trace organic fibers, (Wetland Deposit).	
							69				
							33				
							RC				
15											
	1U	24/24	16.0 - 18.0	PUSH			63			Black, wet, Organic SILT, trace organic fibers.	
							50				
	V1		18.6 - 19.0	S_u=687/137 psf			44			65x130mm vane raw torque readings: V1: 300/60 in-lbs V2: 280/50 in-lbs	
	V2		19.6 - 20.0	S_u=640/115 psf			46				
20							45				
	4D	24/20	21.0 - 23.0	WOR-WOR-WOR-WOR			61			Black, wet, medium stiff, Organic SILT, trace organic fibers, (Wetland Deposit).	A-7, OH LL=88 PL=57 PI=31 WC=79.9
							37				
							32				
25							36				

Remarks:

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3. Cored into pavement with 6" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 8" thick. Ground level 18.5' below top of bridge deck.
4. Water level measured immediately after removal of casing.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project:	Station 46 Bridge 3039 Replacement	**Location:**	Woolwich, Maine	**Boring No.:**	BB-WS46-103
				WIN:	23929.00
Driller:	New England Boring Contractors	**Elevation (ft.)**	3.0	**Auger ID/OD:**	4.25"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/16/19-10/22/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 84+80.7, 12.7 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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SSA = Solid Stem Auger
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WOR/C = Weight of Rods or Casing
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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							27				
	5D	24/22	26.0 - 28.0	Push thru vane			64			Black, wet, medium stiff, Organic SILT, trace organic fibers, (Wetland Deposit). 65x130mm vane raw torque readings: V3: 330/30 in-lbs V4: 300/25 in-lbs	
	V3		26.6 - 27.0	S_u=755/69 psf							
	V4		27.6 - 28.0	S_u=687/58 psf			44				
							46				
							70				
30							63				
	6D	24/22	31.0 - 33.0	Push thru vane			106			Top 10": Black, wet, stiff, Organic SILT, trace organic fibers, (Wetland Deposit). 65x130mm vane raw torque readings: V5: 425/215 in-lbs	
	V5		31.6 - 32.0	S_u=1088/492 psf				-28.8			
	MV		32.6 - 32.8				195			31.8	
							210			Bottom 12": Grey, stiff, Silty CLAY, trace shells, (Marine Clay).	
							175				
35							140				
	7D	24/24	36.0 - 38.0	WOH-2-5-6	7	10	RC			Grey, wet, stiff, Silty CLAY, trace shells, (Marine Clay).	
	MV		36.0 - 36.2					-34.0		37.0	
40											
	8D	24/24	41.0 - 43.0	Push thru vane						Grey, wet, soft to medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V6: 220/30 in-lbs V7: 200/20 in-lbs	WC=43.4
	V6		41.6 - 42.0	S_u=503/69 psf							
	V7		42.6 - 43.0	S_u=459/47 psf							
45	2U	24/24	45.0 - 47.0	PUSH						Grey, wet, soft to medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V8: 210/30 in-lbs V9: 250/30 in-lbs	
	V8		47.6 - 48.0	S_u=481/69 psf							
	V9		49.6 - 50.0	S_u=571/69 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. Cored into pavement with 6" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 8" thick. Ground level 18.5' below top of bridge deck.
4. Water level measured immediately after removal of casing.

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: Station 46 Bridge 3039 Replacement Location: Woolwich, Maine	Boring No.: BB-WS46-103 WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	3.0	**Auger ID/OD:**	4.25"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/16/19-10/22/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 84+80.7, 12.7 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
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											
	9D	24/24	51.0 - 53.0	WOR-WOR-WOR-WOR						Grey, wet, soft, Silty CLAY, trace shells, (Marine Clay).	A-7, CL LL=41 PL=21 PI=20 WC=40.7
55											
	10D V10	24/24	56.0 - 58.0 56.6 - 57.0	Push thru vane S_u=481/47 psf						Grey, wet, soft to medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V10: 210/20 in-lbs V11: 230/20 in-lbs	WC=40.0
	V11		57.6 - 58.0	S_u=527/47 psf							
60											
	11D V12	24/24	61.0 - 63.0 61.6 - 62.0	Push thru vane S_u=459/69 psf						Grey, wet, soft, Silty CLAY, trace shells, (Marine Clay). 65x130mm vane raw torque readings: V12: 200/30 in-lbs V13: 210/30 in-lbs	A-6, CL LL=32 PL=19 PI=13 WC=33.0
	V13		62.6 - 63.0	S_u=481/69 psf							
65											
	12D V14	24/24	66.0 - 68.0 66.6 - 67.0	Push thru vane S_u=492/69 psf						Grey, wet, soft, Silty CLAY, trace shells, (Marine Clay). 65x130mm vane raw torque readings: V14: 215/30 in-lbs V15: 190/20 in-lbs	
	V15		67.6 - 68.0	S_u=439/47 psf							
70	3U		70.0 - 72.0	PUSH						Grey, wet, soft to medium stiff, Silty CLAY, trace fine sand, trace shells, (Marine Clay). 65x130mm vane raw torque readings: V16: 215/30 in-lbs V17: 220/35 in-lbs	
	V16		72.6 - 73.0	S_u=492/69 psf							
	V17		73.6 - 74.0	S_u=503/80 psf							
75											

Remarks:

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2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Cored into pavement with 6" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 8" thick. Ground level 18.5' below top of bridge deck.
4. Water level measured immediately after removal of casing.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine
Boring No.: BB-WS46-103
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	3.0	**Auger ID/OD:**	4.25"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/16/19-10/22/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 84+80.7, 12.7 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
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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											
	13D	24/24	76.0 - 78.0	WOR-WOR-WOR-WOR						Grey, wet, soft to medium stiff, Silty CLAY, (Marine Clay).	A-6, CL LL=34 PL=19 PI=15 WC=43.6
80											
	14D V18	24/24	81.0 - 83.0 81.6 - 82.0	Push thru vane S_u=665/69 psf						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V18: 290/30 in-lbs V19: 260/20 in-lbs	WC=39.8
			82.6 - 83.0	S_u=596/47 psf							
85											
90											
95											
100											

Remarks:

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4. Water level measured immediately after removal of casing.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project:	Station 46 Bridge 3039 Replacement	**Boring No.:**	BB-WS46-103		
Location:	Woolwich, Maine	**WIN:**	23929.00		
Driller:	New England Boring Contractors	**Elevation (ft.)**	3.0	**Auger ID/OD:**	4.25"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/16/19-10/22/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 84+80.7, 12.7 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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MV = Unsuccessful Field Vane Shear Test Attempt
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SSA = Solid Stem Auger
HSA = Hollow Stem Auger
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WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
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N-uncorrected = Raw Field SPT N-value
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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											
105											
	15D	24/24	107.5 - 109.5	WOR-WOR-WOR-WOR						Grey, wet, soft, Silty CLAY, trace fine sand, (Marine Clay).	WC=23.4
							46				
							48				
110							42				
	16D	24/4	111.0 - 113.0	WOR/21"-5	40	60	40			Grey, wet, soft, Silty CLAY, trace fine sand, (Marine Clay).	
							19				
							30				
							50	-111.5		114.5	
115							68				
	17D	24/11	116.0 - 118.0	7-14-13-20	27	40	86			Grey-brown, wet, dense, fine to coarse SAND, some silt, little gravel, (Glacial Till).	
							64				
							70				
							164				
120							297				
	18D	24/11	121.0 - 123.0	43-45-32-49	77	115	283			Grey-brown, wet, very dense, fine to coarse SAND, some gravel, some silt, (Glacial Till).	G#19-S-2644 A-1-b, SM WC=9.2
							RC				
125											

Remarks:

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4. Water level measured immediately after removal of casing.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-103
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	3.0	**Auger ID/OD:**	4.25"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/16/19-10/22/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 84+80.7, 12.7 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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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
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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											
	19D	6/6	126.0 - 126.5	20-74/0"			NX	-123.5		Grey, wet, very dense, fine to coarse SAND, little silt, little gravel. Consistent dark grey rock fragments in wash return. Advance roller bit to 126.5'. Set up to core at 126.5'. 126.5	
	R1	58/58	126.5 - 131.3	RQD = 81%						R1: Hard, fresh, aphanitic to coarse grained, grey, SCHIST. Joints are very close to moderately spaced, moderately dipping, planar, rough, fresh, tight to open. Rock Mass Quality = Good Recovery = 100% Rock Core Times (min:sec): 126.5-127.5' (3:41), 127.5-128.5' (2:59), 128.5-129.5' (2:57), 129.5-130.5' (2:50), 130.5-131.3' (3:32)	
130											
	R2	63/63	131.3 - 136.6	RQD = 81%						R2: Hard, fresh, medium to coarse grained, grey, SCHIST. Joints are very close to moderately spaced, moderately dipping, planar, rough, fresh, tight to open. Rock Mass Quality = Good Recovery = 100% Rock Core Times (min:sec): 131.3-132.3' (2:06), 132.3-133.3' (2:30), 133.3-134.3' (1:49), 134.3-135.3' (1:45), 135.3-136.3' (1:51), 136.3-136.5' (0:20)	
135											
								-133.5		136.5 **Bottom of Exploration at 136.5 feet below ground surface.**	
140											
145											
150											

Remarks:

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2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Cored into pavement with 6" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 8" thick. Ground level 18.5' below top of bridge deck.
4. Water level measured immediately after removal of casing.

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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Station 46 Bridge 3039 Replacement Location: Woolwich, Maine	Boring No.: BB-WS46-104 WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	3.0	**Auger ID/OD:**	4.25"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/9/19-10/15/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 85+54.6, 15.9 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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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	0.0 - 2.0	3-4-2-1	6	9	7			Black, moist, loose, fine to coarse SAND, some organic silt, little organic fibers, (Wetland Deposit). Note: sample increased in silt content with depth.	
							3				
							4				
							6				
							8				
5	2D	24/8	5.0 - 7.0	WOH-WOH-WOH-WOH			7			Black, moist, Organic SILT, trace fine to coarse sand, little organic fibers, (Wetland Deposit).	
							8				
							11				
							17				
							17				
10	1U	24/24	10.0 - 12.0	Push thru vane			38			Black, moist, medium stiff, Organic SILT, trace fine to coarse sand, little organic fibers, (Wetland Deposit). 65x130mm vane raw torque readings: V1: 270/50 in-lbs V2: 420/110 in-lbs	
	V1		12.6 - 13.0	S_u=618/115 psf			26				
	V2		13.6 - 14.0	S_u=961/253 psf			29				
							31				
15	3D	24/22	15.0 - 17.0	WOR-WOR-WOR-WOR			36			Black, moist, Organic SILT, little organic fibers, (Wetland Deposit).	
							38				
							32				
							25				
							27				
20	4D V3	24/21	20.0 - 22.0 20.6 - 21.0	Push thru vane S_u=640/69 psf			37			Black, wet, medium stiff, Organic SILT, little organic fibers, (Wetland Deposit). 65x130mm vane raw torque readings: V3: 280/30 in-lbs V4: 295/20 in-lbs	A-7, OH LL=101 PL=59 PI=42 WC=83.4
	V4		21.6 - 22.0	S_u=676/47 psf			55				
							37				
							53				
25							45				

Remarks:

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2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Cored into pavement with 6" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 10" thick. Ground level 15.2' below top of bridge deck.
4. Water level measured immediately after removal of casing.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project:	Station 46 Bridge 3039 Replacement	**Location:**	Woolwich, Maine	**Boring No.:**	BB-WS46-104
				WIN:	23929.00
Driller:	New England Boring Contractors	**Elevation (ft.)**	3.0	**Auger ID/OD:**	4.25"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/9/19-10/15/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 85+54.6, 15.9 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MU = Unsuccessful Thin Wall Tube Sample Attempt
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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	1/12"-2-4	1	1	60			Top 12": Black, wet, soft, Organic SILT, little fine to coarse sand, trace organic fibers, (Wetland Deposit).	
							79	-23.0		26.0 Bottom 12": Grey, wet, medium stiff, Silty CLAY, (Marine Clay).	
							44				
							75				
							122				
30	MV 6D	24/24	30.0 - 30.2 30.0 - 32.0	3-4-5-6	9	13	RC			Grey, wet, stiff, Silty CLAY, (Marine Clay).	WC=32.0
35	7D V5 V6	24/24	35.0 - 37.0 35.6 - 36.0 36.6 - 37.0	Push thru vane S_u=1217/275 psf S_u=1217/47 psf						Grey, wet, stiff, Silty CLAY, trace shells, (Marine Clay). 65x130mm vane raw torque readings: V5: 550/120 in-lbs V6: 540/20 in-lbs	
								-34.0		37.0	
40	8D V7 V8	24/24	40.0 - 42.0 40.6 - 41.0 41.6 - 42.0	Push thru vane S_u=709/69 psf S_u=618/69 psf						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V7: 310/30 in-lbs V8: 270/30 in-lbs	
45	2U	24/24	45.0 - 47.0	PUSH						Grey, wet, Silty CLAY, (Marine Clay).	
50											

Remarks:

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2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Cored into pavement with 6" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 10" thick. Ground level 15.2' below top of bridge deck.
4. Water level measured immediately after removal of casing.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement	**Boring No.:** BB-WS46-104	
Location: Woolwich, Maine	**WIN:** 23929.00	

Driller:	New England Boring Contractors	**Elevation (ft.)**	3.0	**Auger ID/OD:**	4.25"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/9/19-10/15/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 85+54.6, 15.9 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
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SSA = Solid Stem Auger
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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	9D	24/24	50.0 - 52.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V9: 370/35 in-lbs V10: 230/15 in-lbs	A-7, CL LL=41 PL=23 PI=18 WC=40.6
	V9		50.6 - 51.0	S_u=846/80 psf							
	V10		51.6 - 52.0	S_u=527/36 psf							
55	10D	24/24	55.0 - 57.0	WOR-WOR-WOR-WOR						Grey, wet, soft, Silty CLAY, trace fine sand, trace shells, (Marine Clay). 0.5"-1.0" seam of sand at bottom of sample.	
60	11D	24/24	60.0 - 62.0	Push thru vane						Grey, wet, soft, Silty CLAY, trace shells, (Marine Clay). 65x130mm vane raw torque readings: V11: 150/25 in lbs V12: 195/40 in-lbs	
	V11		60.6 - 61.0	S_u=343/58 psf							
	V12		61.6 - 62.0	S_u=448/91 psf							
65	12D	24/24	65.0 - 67.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, trace shells, (Marine Clay). 65x130mm vane raw torque readings: V13: 220/20 in-lbs V14: 240/30 in-lbs	WC=7.4
	V13		65.6 - 66.0	S_u=503/47 psf							
	V14		66.6 - 67.0	S_u=549/69 psf							
70	13D	24/24	70.0 - 72.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, trace shells, (Marine Clay). 65x130mm vane raw torque readings: V15: 280/20 in-lbs	
	V15		70.6 - 71.0	S_u=640/47 psf							
	MV		71.0 - 71.1								
75											

Remarks:

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2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Cored into pavement with 6" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 10" thick. Ground level 15.2' below top of bridge deck.
4. Water level measured immediately after removal of casing.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project:	Station 46 Bridge 3039 Replacement	**Boring No.:**	BB-WS46-104
Location:	Woolwich, Maine	**WIN:**	23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	3.0	**Auger ID/OD:**	4.25"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/9/19-10/15/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 85+54.6, 15.9 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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	14D	24/24	75.0 - 77.0	WOR-WOR-WOR-WOR						Grey, wet, soft, Silty CLAY, (Marine Clay).	
80	15D	24/24	80.0 - 82.0	Push thru vane						Grey, wet, soft, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V16: 195/30 in-lbs V17: 190/20 in-lbs	A-6, CL LL=34 PL=19 PI=15 WC=39.6
	V16		80.6 - 81.0	S_u=448/69 psf							
	V17		81.6 - 82.0	S_u=434/47 psf							
85	16D	24/17	85.0 - 87.0	Push thru vane						Grey, wet, soft, Silty CLAY, (Marine Clay). 65x130mm vane raw torque readings: V18: 110/40 in-lbs V19: 130/100 in-lbs	
	V18		85.6 - 86.0	S_u=253/91 psf							
	V19		86.6 - 87.0	S_u=297/228 psf							
90	17D	24/24	90.0 - 92.0	WOR-WOR-WOR-WOR						Grey, wet, soft, Silty CLAY, (Marine Clay).	
95	18D	24/24	95.0 - 97.0	Push thru vane						Grey, wet, soft, Silty CLAY, trace shells, (Marine Clay). V20: 160/60 in-lbs V21: 190/20 in-lbs	
	V20		95.6 - 96.0	S_u=365/137 psf							
	V21		96.6 - 97.0	S_u=434/47 psf							
100											

Remarks:

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2. Automatic hammer NEBC #D19 Energy Transfer Ratio = 0.895
3. Cored into pavement with 6" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 10" thick. Ground level 15.2' below top of bridge deck.
4. Water level measured immediately after removal of casing.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-104
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	3.0	**Auger ID/OD:**	4.25"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/9/19-10/15/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 85+54.6, 15.9 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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SSA = Solid Stem Auger
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WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
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S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
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N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
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WC = Water Content, percent
LL = Liquid Limit
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G = Grain Size Analysis
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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	19D	8/8	100.0 - 100.7	23-100/2"				-97.2		Top 2": Grey, wet, Silty CLAY, (Marine Clay). 100.2	
	R1	60/54	100.7 - 105.7	RQD = 53%				-97.7		Bottom 6": Brown, dry, very dense, fine to coarse SAND, trace gravel, (Glacial Till). Consistent dark grey rock fragments in wash return. Set up to core at 100.7'. 100.7	
										R1: Hard, fresh, aphanitic to coarse grained, grey, SCHIST. Primary joints are very close to moderately spaced, moderately dipping, planar to undulating, rough, fresh, tight to partially open. Secondary joints are moderately spaced, low angle, fresh, moderately wide, with silt infilling. Rock Mass Quality = Fair Recovery = 90% Rock Core Times (min:sec): 100.7-101.7' (2:20), 101.7-102.7' (2:00), 102.7-103.7' (1:41), 103.7-104.7' (2:03), 104.7-105.7' (2:37)	
105	R2	60/60	105.7 - 110.7	RQD = 87%						R2: Hard, fresh, aphanitic to coarse grained, grey, SCHIST. Joints are close to moderately spaced, moderately dipping, planar to undulating, rough, fresh, tight to partially open. Rock Mass Quality = Good Recovery = 100% Rock Core Times (min:sec): 105.7-106.7' (3:24), 106.7-107.7' (1:03), 107.7-108.7' (1:14), 108.7-109.7' (1:42), 109.7-110.7' (1:35)	
110								-107.7		110.7 **Bottom of Exploration at 110.7 feet below ground surface.**	
115											
120											
125											

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-105
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	13.8	**Auger ID/OD:**	4.25"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/15/19-10/15/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 86+61.6, 20.6 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	12.4
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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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 & CONCRETE	
								13.0		0.8	
	1D	24/15	1.0 - 3.0	23-20-24-16	44	66				Brown, dry, dense, sandy fine to coarse GRAVEL, little organic silt, (Fill).	G#19-S-2650 A-1-a, GM WC=3.7
	2D	24/14	4.0 - 6.0	10-21-13-14	34	51				Brown, dry, dense, fine to coarse SAND, little gravel, little organic silt, little asphalt, (Fill).	
5											
										Auger advancement indicates probable transition to silty material.	
	3D	24/17	9.0 - 11.0	WOH-2-2-2	4	6	18			Top 12": Black, moist, Organic SILT, trace fine sand, (Fill).	
10							19			Bottom 5": Brown, fine to coarse SAND, trace organic silt, (Fill).	
							40				
							50				
							92				
	4D	24/2	14.0 - 16.0	5-16-17-8	33	49	108			Grey, wet, dense, fine to coarse GRAVEL, little fine to coarse sand, little organic silt, (Fill).	
15							48				
							110				
							78				
								-4.0		17.8	
							57			Roller bit advancement and wash return indicate probable transition at 17.8'.	
	5D	24/21	19.0 - 21.0	2-2-2-3	4	6	60			Black, wet, medium stiff, Organic SILT, trace fine sand, (Wetland Deposit).	WC=62.2
20							66				
							60				
								-8.2		22.0	
	R1	60/60	22.5 - 27.5	RQD = 99%			NX			Increased roller bit resistance at 22.0', probable top of rock. Advanced roller bit to 22.5' and set up to core. R1: Hard, fresh, medium to coarse grained, grey, SCHIST. Joints are close to moderately spaced, low angle, dipping, planar to undulating, rough to smooth, fresh to discolored, tight to partially open.	q_p=624 ksf
25											

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-105
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	13.8	**Auger ID/OD:**	4.25"
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/15/19-10/15/19	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 86+61.6, 20.6 RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	12.4
Hammer Efficiency Factor:	0.895	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
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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										Rock Mass Quality = Excellent Recovery = 100% Rock Core Times (min:sec): 22.5-23.5' (1:33), 23.5-24.5' (2:12), 24.5-25.5' (2:06), 25.5-26.5' (1:40), 26.5-27.5' (2:20)	
	R2	60/60	27.5 - 32.5	RQD = 97%						R2: Hard, fresh, medium to coarse grained, grey, SCHIST. Primary joints are close to moderately spaced, horizontal, planar, smooth, fresh, tight to partially open. Secondary joints are close to moderately spaced, moderately dipping, planar, smooth, fresh, tight to partially open. Rock Mass Quality = Excellent Recovery = 100% Rock Core Times (min:sec): 27.5-28.5' (3:02), 28.5-29.5' (1:34), 29.5-30.5' (1:27), 30.5-31.5' (1:42), 31.5-32.5' (4:13)	
30											
								-18.7		32.5 **Bottom of Exploration at 32.5 feet below ground surface.**	
35											
40											
45											
50											

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-201
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	28.2	**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:	3/22/21-3/22/21	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 79+86.4, 11.1' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	Not Encountered
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	24/2	0.0 - 2.0	1-5-3-7	8	11	41			Brown, moist, medium dense, GRAVEL, some fine to coarse sand, some silt, (Fill).	
							28				
							17				
							24				
	2D	24/9	4.0 - 6.0	6-4-1-1	5	7	42			Brown, moist, loose, silty fine to medium SAND, trace gravel, (Fill).	G#21-S-1479 A-4(0). SM WC=23.3
5							38				
							RC				
	3D	24/10	9.0 - 11.0	5-2-2-3	4	5				Brown, moist, loose, silty fine to coarse SAND, (Fill).	
10											
							26				
	4D	24/10	14.0 - 16.0	1-2-2-1	4	5	35			Brown, wet, medium stiff, SILT, little fine to coarse sand, trace gravel, (Fill).	
15							46				
							47				
							51				
							NQ	9.7		18.5 Casing refusal at 18.5', probable top of rock. Advanced roller bit to 19.0', consistent dark gray rock fragments in wash return, setup to core at 19.0'.	
	R1	60/55	19.0 - 24.0	RQD=63%						R1: Very hard, fresh to slightly weathered, Aphanitic to coarse grained, grey, SCHIST. Joints are extremely close to moderately spaced, horizontal to low angle, stepped to planar,rough to smooth, fresh to discolored, tight to open. Rock Quality = Fair Recovery = 92% Rock Core Time (min:sec): 19-20' (02:17), 20-21'(03:17), 21-22' (02:06), 23-24' (02:11).	
20											
	R2	59/59	24.0 - 28.9	RQD=73%						R2: Very Hard to medium hard, fresh to slightly weathered, aphanitic to coarse-grained, grey/black, SCHIST. Joints are extremely close to	
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. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick concrete deck 9" thick. Ground level 15.8' below top of bridge deck.
4. Water level measured immediately after removal of casing.

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.

Boring No.: BB-WS46-201

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement				**Boring No.:**	BB-WS46-201
Location: Woolwich, Maine				**WIN:**	23929.00
Driller:	New England Boring Contractors	**Elevation (ft.)**	28.2	**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:	3/22/21-3/22/21	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 79+86.4, 11.1' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	Not Encountered
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										moderately spaced, low angle to moderately dipping planar to undulating, fresh to discolored, very tight to open. Rock Quality = Fair Recovery = 100% Rock Core time (min:sec): 24-25' (01:32), 25-26' (02:19), 26-27' (01:09), 27-28' (1:00), 28-28.9' (01:15).	
								-0.7		28.9	
										Bottom of Exploration at 28.9 feet below ground surface.	
30											
35											
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 #D23 Energy Transfer Ratio = 0.818.
3. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick concrete deck 9" thick. Ground level 15.8' below top of bridge deck.
4. Water level measured immediately after removal of casing.

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: Station 46 Bridge 3039 Replacement Location: Woolwich, Maine	Boring No.: BB-WS46-202 WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	11.7	**Auger ID/OD:**	4.25" OD
Operator:	Tom Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/09/2021-04/09/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 80+23.6, 26.5' LT	**Casing ID/OD:**	3/3.5"/4/4.5"	**Water Level*:**	0.5
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
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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	24/3	0.0 - 2.0	Push	-		SSA			Brown, wet, coarse Sandy GRAVEL with wood fragments, (Fill).	
	2D	24/6	2.0 - 4.0	Push	-					Brown, wet, fine to coarse SAND, little gravel, trace silt, (Fill).	G#21-S-1480 A-1-b, SW-SM WC=15.1
	3D	24/5	4.0 - 6.0	WOR-WOH-WOR-WOR	-					Top 2": Brown, wet, fine to coarse SAND, little gravel, trace silt, (Fill). Bottom 3": Olive brown, sandy SILT, (Fill).	
5							RC				
	4D	24/0	6.0 - 8.0	WOH-WOH-WOH-WOH						No recovery.	
								3.7		8.0	
	5D	24/7	8.0 - 10.0	14-14-24-23	38	54				Olive brown, wet, very dense, fine to medium SAND, litle silt, trace gravel, (Marine Sand).	
10	6D	23/15	10.0 - 11.9	8-20-18-35/5"	38	54				Brown wet, very dense, fine to coarse SAND, some gravel, trace silt, (Marine SAND).	G#21-S-1481 A-2-4(0), SP-SM WC=23.3
								-0.2		11.9	
	R1	60/54	12.5 - 17.5	RQD = 55%			NQ			Split spoon refusal at 11.9'. Roller cone to 12.5'. Consistent dark grey rock fragments in wash return. Set up to core at 12.5'. R1: 12.5'-14': Hard slightly weathered to decomposed, medium to coarse grained, grey and white, GRANITE. Joints are extremely close to close moderately dipping to high angle, undulating, rough, discolored, open. 14'-17.5': Very hard, fresh to slightly weathered, grey, SCHIST with quartz. Joints are very close to close, low angle to moderately dipping, undulating, rough, discolored, open to wide, with silt infilling: Rock Quality = Fair Recovery = 90% Rock Core Times (min:sec): 12.5'-13.5' (0:23), 13.5'-14.5' (1:38), 15.5'-16.5' (1:20), 16.5'-17.5' (1:41).	
15											
	R2	11/6	17.5 - 18.4	RQD = 0%						R2: Very hard, fresh to slightly weathered, grey, SCHIST. Joints are very close, low angle to moderately dipping, undulating, rough, open. Rock Quality = Very Poor Recovery = 54% Rock Core Times (min:sec): 17.5'-18.4' (1:30)	
	R3	60/00	18.4 - 23.4	RQD = 55%						R3: 18.4'-19.4': Very hard, fresh, aphanitic to fine grained, grey, SCHIST. Joints are close, low angle, undulating, rough, fresh, open. 19.4'-23.4': Very hard, decomposed to discolored, fine to coarse-grained, grey, GRANITE. Primary joints are extremely close to moderately spaced, moderately dipping to vertical, undulating, rough, discolored to decomposed, open to wide. Secondary joints are close, horizontal, undulating, rough, fresh, wide. Rock Quality = Fair Recovery = 54%	
20											
								-11.7			
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. Samples 1D and 2D pushed with drill head, no N valves recorded.
5. Sample 4D no recovery in 2" SS, 3" spoon used to collect sample for description.

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:	Station 46 Bridge 3039 Replacement			**Boring No.:**	BB-WS46-202
Location:	Woolwich, Maine			**WIN:**	23929.00
Driller:	New England Boring Contractors	**Elevation (ft.)**	11.7	**Auger ID/OD:**	4.25" OD
Operator:	Tom Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/09/2021-04/09/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 80+23.6, 26.5' LT	**Casing ID/OD:**	3/3.5"/4/4.5"	**Water Level*:**	0.5
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										Rock Core Times (min:sec): 18.4'-19.4' (3:09), 19.4'-20.4' (2:13), 20.4'-21.4' (2:37), 21.4'-22.4' (2:49), 22.4'-23.4'(2:56)	
										23.4	
										Bottom of Exploration at 23.4 feet below ground surface.	
30											
35											
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 measured immediately after removal of casing.
4. Samples 1D and 2D pushed with drill head, no N valves recorded.
5. Sample 4D no recovery in 2" SS, 3" spoon used to collect sample for description.

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: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-203
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	10.8	**Auger ID/OD:**	-
Operator:	Tom Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Truck B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/24/2021 - 03/29/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 80+39.6, 7.8' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.4 ft.
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	24/6	0.0 - 2.0	WOH-WOH-17-75	17	24	RC			Brown, wet, medium dense, fine to coarse SAND, little silt, trace gravel, trace organic material, (Fill).	G#21-S-1482 A-1-b, SP-SM WC=21.6
5	2D	24/3	5.0 - 7.0	10-5-3-2	8	11				Brown, wet, medium dense, fine to coarse SAND, little silt, little gravel, (Fill).	
	3D	24/4	7.0 - 9.0	2-2-1-1	3	4				Olive-brown, wet, very loose, fine to coarse SAND, little silt, little gravel, (Fill).	
9.0								1.8			
	4D	20/5	9.0 - 10.7	3-2-3-16/2"	5	7				Olive-brown/grey, moist, loose, fine to coarse SAND, some silt, trace gravel, (Marine Sand).	
10.7								0.1			
	R1	60/60	11.0 - 16.0	RQD = 83%			NQ			Split spoon refusal at 10.7' roller cone to 11.0'. Set up to core at 11.0'. R1: Hard, slightly weathered to weathered, fine to coarse grained, grey, SCHIST. Primary joints are close to moderately spaced, low angle, undulating, rough, open, weathered with Silt in filling. Rock Quality = Good Recovery = 100% Rock Core Times (min/sec): 11-12' (1:40), 12-13' (1:59), 13-14' (01:55), 14-15' (2:00), 15-16' (02:13)	q_p=1259 ksf
15											
	R2	60/60	16.0 - 21.0	RQD = 83%						R2: Very hard to hard, fresh to slightly weathered, fine to coarse grained, grey, SCHIST. Joints are extremely close to moderately dipping, undulating, rough, open, with little silt infilling. Rock Quality = Good Recovery = 100% Rock Core Times (min:sec): 16-17' (01:38), 17-18' (01:30),18-19' (01:34), 19-20' (01:45), 20-21' (01:07)	
20											
21.0								-10.2		**Bottom of Exploration at 21.0 feet below ground surface.**	
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 = 0.852.
3. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 9" thick. Ground level 30.9' below top of bridge deck.
4. Water level measured immediately after removal of casing.

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.

Boring No.: BB-WS46-203

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	**Project:** Station 46 Bridge 3039 Replacement **Location:** Woolwich, Maine	**Boring No.:** BB-WS46-204 **WIN:** 23929.00

Driller:	New England Boring	**Elevation (ft.)**	4.1	**Auger ID/OD:**	-
Operator:	Tom Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Truck B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/22/2021 - 03/24/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 81+84.2, 6.9' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0 ft.
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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	6/5	0.0 - 0.5	69/6"	-		PUSH			Dark brown, wet, fine to coarse SAND, little Organic Silt, with wood fragments, (Wetland Deposit). Probable cobble 0.5'-0.7'.	
	2D	24/6	1.0 - 3.0	WOR-WOR-WOH-WOH	-					Dark brown, wet, very soft, Organic SILT, some fine to coarse sand, trace organics, (Wetland Deposit).	
	3D	24/0	3.0 - 5.0	WOR-WOR-WOR-WOR	-					No Recovery	
5	4D	24/6	5.0 - 7.0	WOR-WOR-WOR-WOR	-					Brown, moist, Organic SILT, little fine gravel, trace organic fibers, (Wetland Deposit).	G#21-S-1483 WC=50.6
10	5D	24/24	10.0 - 12.0	Push thru vane	-		RC			Brown, wet, medium stiff, Organic SILT, trace fine sand, trace organics, (Wetland Deposit). 65x130 mm vane raw torque reading: V1: 24/2 ft-lbs. V2: 21/3 ft-lbs.	#21-S-1484 OH PI=48 LL=108 PL=60 WC=95.1
	V1		10.6 - 11.0	S_u=659/55 psf	-						
	V2		11.6 - 12.0	S_u=577/82 psf	-						
15	6D	24/17	15.0 - 17.0	Push thru vane	-					Dark brown, wet, medium stiff, Organic SILT, little organics, trace fine sand, (Wetland Deposit). 65x130 mm vane raw torque reading: V3: 20/2 ft-lbs. V4: 24/4 ft-lbs.	
	V3		15.6 - 16.0	S_u=549/55 psf	-						
	V4		16.6 - 17.0	S_u=659/110 psf	-						
20	7D	24/24	20.0 - 22.0	Push thru vane				-15.9		20.0 Grey, wet, very stiff, Silty CLAY, trace fine to medium sand, (Marine Clay). 65x130 mm vane raw torque reading: V5: >50 ft-lbs. MV1: Could not advance vane.	G#21-S-1485 WC=35.7
	V5		20.6 - 21.0	S_u>1373 psf							
	MV1		21.6 - 22.0	-							
								-19.9		24.0	
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 = 0.852.
3. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 9" thick. Ground level 31.0' below top of bridge deck.

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: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-204
WIN: 23929.00

Driller:	New England Boring	**Elevation (ft.)**	4.1	**Auger ID/OD:**	-
Operator:	Tom Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Truck B53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/22/2021 - 03/24/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 81+84.2, 6.9' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.0 ft.
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	8D	24/24	25.0 - 27.0	WOR-WOR-WOR-WOR						Grey, wet, very soft, Silty CLAY, (Marine Clay).	#21-S-1486 CL PI=18 LL=37 PL=19 WC=37.9
								-24.5		28.6 Roller cone resistance increased at 28.6'. Grey, wet, gravelly, fine to coarse SAND, little silt, (Glacial Till). Split spoon refusal at 27.9'. Advanced roller cone to 30.0'. Set up to core.	
	9D	2/2	29.7 - 29.9	50/2"	R			-25.8		29.9	
30	R1	60/58	30.0 - 35.0	RQD = 58%			NQ			R1: Very hard to hard, fresh to slightly weathered, fine to medium grained, grey, SCHIST with quartz. Joints are very close to moderately spaced, low angle, undulating, rough, fresh to slightly weathered, open, with some silt in filling. Rock Quality = Fair Recovery = 97% Rock Core Times (min:sec): 30-31' (1:40), 31-32' (1:59), 32-33' (1:55), 33-34' (2:00), 34-35'(2:13)	
35	R2	60/59	35.0 - 40.0	RQD = 83%						R2: Very hard to hard, fresh to slightly weathered, fine grained, grey, SCHIST. Joints are close to moderately spaced, low angle to moderately dipping, undulating, rough fresh to slightly weathered, open. Rock Quality = Good Recovery = 98% Rock Core Times (min:sec): 35-36' (01:38), 36-37' (01:30), 37-38' (01:34), 38-39' (01:45), 39-40' (01:07)	
40								-35.9		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#D23 Energy transfer ratio = 0.852.
3. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 9" thick. Ground level 31.0' below top of bridge deck.

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: Station 46 Bridge 3039 Replacement Location: Woolwich, Maine	Boring No.: BB-WS46-205 WIN: 23929.00

Driller:	New England Boring	**Elevation (ft.)**	2.0	**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:	3/23/2021-3/24/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 83+70.0, 9.7' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	4.5 ft.
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
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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	4-4-2-1	6	8	18			Top 17": Dark brown/grey, wet, loose, fine to coarse SAND, some organic silt, trace gravel, little organic fibers and wood fragments, trace glass, (Fill).	
							14	0.5		1.5 Bottom 2": Dark brown/grey, wet, organic SILT, (Wetland Deposit).	
							7				
							10				
							8				
5	2D	24/17	5.0 - 7.0	WOH-WOH-WOH-WOH	-		RC			Dark brown/black, wet, very soft, Organic SILT, little organic fibers and wood fragments, (Wetland Deposit).	
10	3D V1	24/14	10.0 - 12.0 10.6 - 11.0	Push thru vane S_u=596/36 psf						Dark grey, wet, soft to medium stiff, Organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit). 65x130 mm vane raw torque reading: V1: 260/15 in-lbs. V2: 175/10 in-lbs. Black, wet, organic SILT (Wetland Deposit).	#21-S-1487 OH PI=45 LL=103 PL=58 WC=92.7
	V2		11.6 - 12.0	S_u=393/22 psf							
	1U		13.0 - 15.0	PUSH							
15	4D V3	24/19	15.0 - 17.0 15.6 - 16.0	Push thru vane S_u=769/165 psf						Dark grey, wet, medium stiff, Organic SILT, trace fine sand, (Wetland Deposit). 65x130 mm vane raw torque reading: V3: 28/6 ft-lbs. V4: 290/55 in-lbs.	
	V4		16.6 - 17.0	S_u=665/126 psf							
							30				
20	2U	24/23	20.0 - 22.0	PUSH			RC			Dark grey, wet, medium stiff, Organic SILT, (Wetland Deposit).	
	V5		22.6 - 23.0	S_u=549/110 psf						65x130 mm vane raw torque reading: V5: 20/4 ft-lbs. V6: 275/50 in-lbs.	
	V6		23.6 - 24.0	S_u=637/115 psf							
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 NEB#D23 Energy transfer ratio = 0.818.
3. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 9" thick. Ground level 24.5' below top of bridge deck.
4. Water level measured immediately after removal of casing.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project:	Station 46 Bridge 3039 Replacement			**Boring No.:**	BB-WS46-205
Location:	Woolwich, Maine			**WIN:**	23929.00
Driller:	New England Boring	**Elevation (ft.)**	2.0	**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:	3/23/2021-3/24/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 83+70.0, 9.7' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	4.5 ft.
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
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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	WOR-WOR-WOR-WOR						Dark grey, wet, organic Clayey SILT, trace organic fibers, (Wetland Deposit).	
							40				
							39				
							29	-26.0		28.0 Color change in wash return indicating probable strata change at 28'.	
							RC				
30	MV1 6D	24/24	30.0 - 30.1 30.0 - 32.0	WOH-6-7-9	13	18				Grey, wet, very stiff, Silty CLAY, (Marine Clay).	#21-S-1488 WC=30.4
35	3U	24/24	35.0 - 37.0	PUSH						Grey, wet, medium stiff, Silty CLAY, (Marine Clay).	
	MV2 7D	24/24	37.0 - 37.0 37.0 - 39.0	- 11-2-3-4	5	7					
40	8D V7	24/24	40.0 - 42.0 40.6 - 41.0	push thru vane S_u=618/47 psf				-38.0		40.0 Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130 mm vane raw torque reading: V7: 270/20 in-lbs. V8: 240/35 in-lbs.	#21-S-1489 WC=41.3
	V8		41.6 - 42.0	S_u=549/80 psf							
45											
50											

Remarks:

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2. Automatic hammer NEB#D23 Energy transfer ratio = 0.818.
3. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 9" thick. Ground level 24.5' below top of bridge deck.
4. Water level measured immediately after removal of casing.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-205
WIN: 23929.00

Driller:	New England Boring	**Elevation (ft.)**	2.0	**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:	3/23/2021-3/24/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 83+70.0, 9.7' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	4.5 ft.
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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	9D	24/24	50.0 - 52.0	push thru vane						Grey, wet, soft to medium stiff, Silty CLAY, (Marine Clay). 65x130 mm vane raw torque reading:	#21-S-1490 CL PI=23 LL=42 PL=19 WC=38.7
	V9		50.6 - 51.0	S_u=585/126 psf						V9: 255/55 in-lbs.	
	V10		51.6 - 52.0	S_u=492/69 psf						V10: 215/30 in-lbs.	
55											
60	10D	24/24	60.0 - 62.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 65x130 mm vane raw torque reading:	#21-S-1491 WC=37.2
	V11		60.6 - 61.0	S_u=571/91 psf						V11: 250/40 in-lbs.	
	V12		61.6 - 62.0	S_u=516/126 psf						V12: 225/55 in-lbs.	
65											
70	11D	24/24	70.0 - 72.0	Push thru vane						Grey, wet, soft to medium stiff, Silty CLAY, (Marine Clay). 65x130 mm vane raw torque reading:	#21-S-1492 WC=36.8
	V13		70.6 - 71.0	S_u=492/104 psf						V13: 215/45 in-lbs.	
	V14		71.6 - 72.0	S_u=516/91 psf						V14: 225/40 in-lbs.	
75											

Remarks:

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2. Automatic hammer NEB#D23 Energy transfer ratio = 0.818.
3. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 9" thick. Ground level 24.5' below top of bridge deck.
4. Water level measured immediately after removal of casing.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-205
WIN: 23929.00

Driller:	New England Boring	**Elevation (ft.)**	2.0	**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:	3/23/2021-3/24/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	Sta. 83+70.0, 9.7' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	4.5 ft.
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MD = Unsuccessful Split Spoon Sample Attempt
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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								-73.4		75.4 Roller bit resistance and wash return indicate probable strata change at 75.4'.	
							27				
80	12D	24/12	80.0 - 82.0	19-15-15-22	30	41	32			Grey, wet, medium dense, GRAVEL, some fine to coarse sand, little silt, (Marine Sand).	#21-S-1493 A-1-a, GW
							60				
							74	-80.5		82.5	
	R1	60/58	83.0 - 88.0	RQD = 73%			NX			Casing refusal at 82.5', probable top of rock. Roller coned to 83.0'. Consistent dark grey rocks in wash return. Set up to core at 83.0'. R1: Very hard to hard, fresh, aphanitic to coarse grained, grey, SCHIST. Primary joints are very close to moderately spaced, horizontal to low angle, planar, rough, fresh, tight to partially open. Secondary joints are very close to moderately spaced, moderately dipping to high angle, planar, fresh, very tight to tight. One vertical joint. Rock Quality = Fair Recovery = 97% Rock Core Times (min:sec): 83-84' (01:13), 84-85' (02:47), 85-86' (04:27), 86-87' (04:27), 87-88' (02:07)	
85											
	R2	60/60	88.0 - 93.0	RQD = 83%						R2: Very hard to hard, fresh, aphanitic to medium grained, grey, SCHIST. Primary joints are very close to widely spaced, moderately dipping to high angle, planar, smooth to rough, fresh, very tight to tight, with silt in filling. Secondary joints are moderately spaced, horizontal to low angle, planar, smooth, fresh, tight. Rock Quality = Good Recovery = 100% Rock core times (min:sec): 88-89' (01:48), 89-90' (01:34), 90-91' (02:16), 91-92' (02:20), 92-93' (02:45)	
90											
								-91.0		93.0 **Bottom of Exploration at 93.0 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 NEB#D23 Energy transfer ratio = 0.818.
3. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 9" thick. Ground level 24.5' below top of bridge deck.
4. Water level measured immediately after removal of casing.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.
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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-206
WIN: 23929.00

Driller:	New England Boring	**Elevation (ft.)**	2.1	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Tractor B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4/08/2021 - 04/09/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 85+23.9, 21.7' LT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.8
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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MU = Unsuccessful Thin Wall Tube Sample Attempt
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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	24/0	0.0 - 2.0	WOH-WOH-WOH-WOH	-		PUSH			No Recovery	
5	2D	24/8	5.0 - 7.0	WOH-WOH-WOH-WOH	-					Dark grey, wet, very soft, Organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit).	G#21-S-1494 WC=106.6
10	3D	24/12	10.0 - 12.0	WOR-WOH-WOH-WOH	-		54			Dark grey, wet, very soft, Organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit).	
							30				
							42				
							28				
							35				
15	4D	24/13	15.0 - 17.0	Push thru vane	-		RC			Black, wet, medium stiff, Organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit). 55x110 mm vane raw torque reading: V1: 190/25 in-lbs. V2: 160/35 in-lbs.	#21-S-1495 OH PI=43 LL=93 PL=50 WC=85.4
	V1		15.6 - 16.0	S_u=705/94 psf	-						
	V2		16.6 - 17.0	S_u=594/129 psf	- -						
20	5D	24/20	20.0 - 22.0	Push thru vane	-					Black, wet, medium stiff, Organic SILT, trace fine sand, some organic fibers, little wood fragments, (Wetland Deposit). 55x110 mm vane raw torque reading: V3: 220/35 in-lbs. V4: 200/35 in-lbs.	#21-S-1496 WC=82.9
	V3		20.6 - 21.0	S_u=817/129 psf							
	V4		21.6 - 22.0	S_u=746/129 psf							
	6D	24/24	22.0 - 24.0	WOR-WOR-WOR-WOH	-		78			Black, wet, Organic SILT, trace fine sand, little organic fibers, little wood fragments.	
							78				
25	7D	24/24	24.0 - 26.0	WOR-WOR-WOR-WOR			70			Dark grey, wet, Organic SILT, some to little fine sand, trace organic fibers, trace wood fragments.	

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. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 9" thick. Ground level 19.0' below top of bridge deck.

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: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-206
WIN: 23929.00

Driller:	New England Boring	**Elevation (ft.)**	2.1	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Tractor B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4/08/2021 - 04/09/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 85+23.9, 21.7' LT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.8
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							66			Note: Sand content increased to some in bottom 12 inches of sample.	#21-S-1497 OH PI=44 LL=94 PL=50 WC=85.8
	8D	24/24	26.0 - 28.0	WOR-WOH-WOH-WOH	-		72			Dark grey, wet, Organic SILT, trace fine sand, trace organic fibers, trace wood fragments.	
							71				
	9D	24/3	28.0 - 30.0	WOR-WOH-WOH-WOH	-		70			Dark grey to grey, wet, organic Clayey SILT, trace fine sand.	
							60				
30	10D	24/21	30.0 - 32.0	WOH-1-6-11	-		RC			Top 10": Dark grey, wet, organic Clayey SILT, (Wetland Deposit).	
	MV1		30.6 - 31.0	-				-28.8		Could not shear vane. 30.9	
										Bottom 11": Grey, wet, stiff, Silty CLAY, (Marine Clay).	
35	11D	24/20	35.0 - 37.0	Push thru vane	-					Grey, wet, stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	#21-S-1498 CL PI=22 LL=46 PL=24 WC=41.3
	V5		35.6 - 36.0	S_u=1429/179 psf						V5: 32/4 ft-lbs	
	V6		36.6 - 37.0	S_u=1071/179 psf						V6: 24/4 ft-lbs	
40	12D	24/24	40.0 - 42.0	Push thru vane				-37.9		40.0 Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	
	V7		40.6 - 41.0	S_u=594/94 psf						V7: 160/25 in-lbs	
	V8		41.6 - 42.0	S_u=504/94 psf						V8: 135/25 in-lbs	
45	13D	24/24	45.0 - 47.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	
	V9		45.6 - 46.0	S_u=746/112 psf						V9: 200/30 in-lbs	
	V10		46.6 - 47.0	S_u=652/112 psf						V10: 175/30 in-lbs	
50											

Remarks:

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2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 9" thick. Ground level 19.0' below top of bridge deck.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-206
WIN: 23929.00

Driller:	New England Boring	**Elevation (ft.)**	2.1	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Tractor B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4/08/2021 - 04/09/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 85+23.9, 21.7' LT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.8
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
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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											
55	14D	24/24	55.0 - 57.0	Push thru vane						Dark, grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	#21-S-1499 WC=41.3
	V11		55.6 - 56.0	S_u=540/94 psf						V11: 145/25 in-lbs	
	V12		56.6 - 57.0	S_u=576/76 psf						V12: 155/20 in-lbs	
60											
65	15D	24/24	65.0 - 67.0	WOR-WOR-WOR-WOR	-					Dark grey, wet, medium stiff, Silty CLAY, (Marine Clay).	#21-S-1500 CL PI=16 LL=37 PL=21 WC=37.4
70											
75											

Remarks:

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3. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 9" thick. Ground level 19.0' below top of bridge deck.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-206
WIN: 23929.00

Driller:	New England Boring	**Elevation (ft.)**	2.1	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Tractor B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4/08/2021 - 04/09/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 85+23.9, 21.7' LT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.8
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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WOH = Weight of 140 lb. Hammer
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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
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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	75.0 - 77.0	Push thru vane						Dark grey, wet, medium stiff, Silty CLAY, trace fine sand, (Marine Clay). 55x110 mm vane raw torque reading: V13: 210/15 in-lbs V14: 190/15 in-lbs	
	V13		75.6 - 76.0	S_u=781/58 psf							
	V14		76.6 - 77.0	S_u=705/58 psf							
80											
85	17D	24/24	85.0 - 87.0	Push thru vane						Dark grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V15: 135/25 in-lbs	#21-S-1501 WC=36.8
	V15		85.6 - 86.0	S_u=504/94 psf							
	V16		86.6 - 87.0	S_u=504/112 psf						V16: 135/30 in-lbs	
90											
95	18D	24/24	95.0 - 97.0	Push thru vane						Dark grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V17: 135/30 in-lbs	
	V17		95.6 - 96.0	S_u=504/112 psf							
	V18		96.6 - 97.0	S_u=504/76 psf						V18: 135/20 in-lbs	
100											

Remarks:

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3. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 9" thick. Ground level 19.0' below top of bridge deck.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-206
WIN: 23929.00

Driller:	New England Boring	**Elevation (ft.)**	2.1	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Tractor B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4/08/2021 - 04/09/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 85+23.9, 21.7' LT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.8
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
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SSA = Solid Stem Auger
HSA = Hollow Stem Auger
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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											
105								-103.4		105.5 Increased roller bit resistance at 105.5', probable strata change.	
110	19D	24/14	110.0 - 112.0	6-12-9-12	21	29				Grey, wet, medium dense, fine to coarse SAND, some silt, little gravel, (Glacial Till).	#21-S-1502 A-2-4(0), SM
							5				
							19				
							46				
							20				
115							300			Casing refusal at 115.0'. Set up to core. Core barrel action indicates probable sand, gravel, and cobble layer.	
							23				
							83				
							93				
							62				
120	20D	24/9	120.0 - 122.0	7-10-21-25	31	42	54			Grey, wet, dense, Silty fine to coarse SAND, (Glacial Till).	
							80				
							155				
							190				
							224				
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.
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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-206
WIN: 23929.00

Driller:	New England Boring	**Elevation (ft.)**	2.1	**Auger ID/OD:**	-
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Tractor B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4/08/2021 - 04/09/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 85+23.9, 21.7' LT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.8
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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$S_{u(lab)}$ = 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
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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							311				
							220				
							306	-125.6		127.7	
	R1	36/36	128.2 - 131.2	RQD = 14%			NQ				
130											
	R2	56/56	131.2 - 135.9	RQD = 58%							
135								-133.8		135.9	
140											
145											
150											

Casing refusal at 127.7'. Roller coned ahead to 128.2'. Consistent dark grey rock fragments in wash, set up to core at 128.2'.
R1: From 128.2 to 130.8': Hard to very soft, fresh to moderately weathered, aphanitic to fine grained, grey, SCHIST. Primary joints are extremely close to close, moderately dipping to high angle, planar, smooth, fresh to decomposed, tight to open with fine sand in filling. Secondary joints are close to moderately spaced, low angle, undulating, rough, fresh to discolored, moderately wide.
130.8-131.2': Rock is decomposed to fine to coarse sand and gravel size pieces.
Recovery = 100%
Rock Quality = Very Poor
Rock Core Times (min:sec): 128.2-129.2' (03:09), 129.2-130.2' (03:17), 130.2-131.2' (03:33)
R2: Hard, fresh to slightly weathered, aphanitic to fine grained, grey, SCHIST. Joints are very close to moderately spaced, moderately dipping, planar to stepped, smooth, fresh to discolored, tight.
Recovery: 100%
Rock Quality = Fair
Rock Core Times (min:sec): 131.2-132.2'(02:52), 132.2-133.2' (03:12), 133.2-134.2'(03:10), 134.2-135.2' (03:00), 135.2-135.9' (03:04)

Bottom of Exploration at 135.9 feet below ground surface.

Remarks:

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3. Cored into pavement with 5" thin wall bit. Pavement on bridge deck 3" thick, concrete deck 9" thick. Ground level 19.0' below top of bridge deck.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-207
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	14.5	**Auger ID/OD:**	-
Operator:	Tom Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	B. Woodman	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/08/2021-04/08/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 86+71.4, 16.7' LT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	12.8'
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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							RC	14.0	Asphalt — 0.5	
	1D	24/10	1.0 - 3.0	14-12-20-32	32	45	SPIN		Dark brown, dry, dense, fine to coarse SAND, some gravel, (Fill). Roller cone advancement indicates cobbles and gravel from 3.0'-4.0'.	
5	2D	21/3	4.0 - 5.8	44-40-19-36/3"	59	84			Brown, dry, very dense, fine to coarse SAND, some gravel, little silt, (Fill).	G#21-S-1503 A-1-b, SM WC=3.1
10	3D	24/10	10.0 - 12.0	4-3-4-37	7	10			Brown, moist, stiff, Clayey SILT, some fine to coarse sand, little gravel, (Fill).	#21-S-1504 A-4(0) WC=33.3
15	4D	24/0	15.0 - 17.0	4-5-5-7	10	14			Brown, wet, medium dense, fine to coarse SAND, some gravel, some silt, (Fill).	
								-4.5	— 19.0 Roller cone resistance decreased and wash return changed color. Probable strata change at 19'. Brown, moist, Organic SILT, some organic fibers, (Wetland Deposit).	
20	5D	24/0	20.0 - 22.0	WOH-WOH-WOH-WOH						
25								-10.3	— 24.8	

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. No Recovery in Samples 4D and 5D, descriptions based on recovery from a 3" spoon.

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: Station 46 Bridge 3039 Replacement Location: Woolwich, Maine	Boring No.: BB-WS46-207 WIN: 23929.00

Driller:	New England Boring Contractors	Elevation (ft.)	14.5	Auger ID/OD:	-
Operator:	Tom Schaefer	Datum:	NAVD 88	Sampler:	Standard Splitspoon
Logged By:	B. Woodman	Rig Type:	Track B-53 Mobile	Hammer Wt./Fall:	140#/30"
Date Start/Finish:	04/08/2021-04/08/2021	Drilling Method:	Drive & Wash	Core Barrel:	NQ
Boring Location:	Sta. 86+71.4, 16.7' LT	Casing ID/OD:	3"/3.5"/4"/4.5"	Water Level*:	12.8'
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	R1	60/57	25.0 - 30.0	RQD = 65%			NQ			Roller cone resistance increases at 24.8', probable top of rock. Roller coned to 25.0' and set up to core. R1: Hard to soft, fresh to slightly weathered, fine to coarse grained, grey, SCHIST. Joints are very close to moderately spaced, moderately dipping undulating rough fresh to discolored, with silt infilling, open. Rock Quality = Fair Recovery = 95% Rock Core Times (min:sec): 25'-26' (1:17), 26'-27' (1:04), 27'-28' (1:10), 28'-29' (1:10), 29'-30' (1:16)	q_p=651 ksf
30	R2	60/60	30.0 - 35.0	RQD = 88%						R2: Hard fresh, aphanitic to medium grained, grey, SCHIST. Joints are very close to moderately spaced, moderately dipping, undulating, rough, fresh to weathered, open, with silt infilling. Rock Quality = Good Recovery = 100% Rock Core Times (min:sec): 30'-31 (1:38), 31'-32' (1:03), 32'-33' (1:10), 33'-34' (1:24), 34'-35' (1:09)	
35								-20.5		35.0 **Bottom of Exploration at 35.0 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 measured immediately after removal of casing.
4. No Recovery in Samples 4D and 5D, descriptions based on recovery from a 3" spoon.

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:** Station 46 Bridge 3039 Replacement **Location:** Woolwich, Maine	**Boring No.:** BB-WS46-301 **WIN:** 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	54.0	**Auger ID/OD:**	4"
Operator:	Tom Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/12/2021-04/13/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 77+91.1, 74.4' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	11.9
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.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/18	0.0 - 2.0	1-5-16-12	21	30	SSA			Top 8": Brown, moist, fine to medium SAND, trace coarse sand, some silt, (Fill). Bottom 10": Black to brown, moist, GRAVEL, some fine to coarse sand, little silt, (Fill).	
	2D	24/18	2.5 - 4.5	10-4-5-7	9	13				Brown, moist, very stiff, sandy SILT, little gravel, with asphalt fragments, (Fill).	G#21-S-1505 A-4(0), SM WC=21.1
5	3D	24/17	5.0 - 7.0	3-2-7-6	9	13				Brown, moist, Sandy SILT, trace gravel, with asphalt fragments, (Fill). Bottom 5": Black, moist, GRAVEL, some fine to coarse sand, (Fill).	
							RC				
	4D	24/14	7.0 - 9.0	7-5-4-3	9	13				Top 6": Black, moist, loose to medium loose, GRAVEL, some fine to coarse sand, (Fill). Bottom 8": Dark brown, moist, loose to medium loose, fine to coarse SAND, some silt, trace gravel, with asphalt fragments, (Fill).	
	5D	24/5	9.0 - 11.0	5-2-5-17	7	10				Dark brown, moist, medium dense, fine to coarse SAND, some silt, little gravel, (Fill).	
10											
	6D	24/9	11.0 - 13.0	6-2-3-8	5	7	5			Top 5": Dark brown, wet, fine to coarse SAND, some gravel, some silt, (Fill). Bottom 4": Brown, wet, fine to coarse SAND, some silt, little gravel, (Fill).	#21-S-1506 A-2-4(0), SM
							13				
	7D	24/4	13.0 - 15.0	2-2-1-1	3	4	11			Brown, wet, loose, Silty SAND, (Fill).	
							8				
15	8D	23/3	15.0 - 16.9	WOH-WOH-25/5"			9			Top 2.5": Wood pieces & fragments. Bottom 0.5": Grey, moist, fine to coarse SAND, some gravel, (Fill). Roller cone refusal at 16.9', metal shaving in wash offset 4-feet to the east. See BB-WS46-301A for details.	
							6 22	37.1		16.9 **Bottom of Exploration at 16.9 feet below ground surface.**	
20											
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.

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: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-301A
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	54.0	**Auger ID/OD:**	-
Operator:	Tom Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/12/2021-04/13/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 77+91.1, 74.4' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	11.9
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MD = Unsuccessful Split Spoon Sample Attempt
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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			Offset 4 feet from BB-WS46-301. See BB-WS46-301 for soil descriptions from 0-18' bgs.	
5							RC				
10											
							26				
							58				
							31				
							24				
15							23				
							RC				
	1D	24/0	18.0 - 20.0	1-1-WOH-1	1	1		36.0		18.0 Black, wet, very soft, organic Silty GRAVEL, trace coarse sand, (Fill).	
							20				
20	2D	24/2	20.0 - 22.0	WOH-4-4-5	8	11	22			Grey, wet, medium stiff, Silty CLAY, little gravel, some wood fragments, (Fill).	
							RC				
	3D	24/3	22.0 - 24.0	1-7-11-12	18	26				Grey, wet, very stiff, Silty CLAY, some coarse sand, some wood fragments.	
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. Sample 1D did not have recovery in 2" SS. 3" spoon used to collect sample for description.
5. Sample 2D had poor recovery in 2" SS. 3" spoon used to collect sample for description.

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: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-301A
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	54.0	**Auger ID/OD:**	-
Operator:	Tom Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/12/2021-04/13/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 77+91.1, 74.4' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	11.9
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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	4D	18/17	25.0 - 26.5	5-28-12-25/0"	40	57				Grey/brown, wet, dense, silty fine to medium SAND, trace coarse sand, little gravel.	
							NQ	27.5		26.5	
	R1	60/57	27.0 - 32.0	RQD = 60%						Split spoon refusal of 26.5'. Roller cone to 27'. Dark grey rocks in wash return. Set up to core at 27.0'. R1: Hard, fresh to slightly weathered aphanitic to medium grained, grey, SCHIST. Primary joints are very close to close, moderately dipping, planar, rough to smooth, fresh to discolored. Tight to moderately wide. Secondary joints are extremely close to moderately spaced, low angle, planar, rough to smooth, fresh to discolored, tight to partially open. Tertiary joints are widely spaced, vertical to high angle, planar to undulating, fresh to decomposed, very tight to open. Rock Quality = Fair Recovery = 95% Rock Core Times (min:sec): 27'-28'(02:05), 28'-29'(01:28), 29'-30'(01:27), 30'-31'(01:36), 31'-32'(0:59)	
30											
	R2	42/36	32.0 - 35.5	RQD = 36%						R2: Hard, fresh to slightly weathered, aphanitic to medium grained, grey, SCHIST. Primary joints are very close to moderately spaced moderately dipping, planar, smooth, fresh to decomposed, tight. Secondary joints are widely spaced, low angle, planar to undulating, smooth, fresh, tight to moderately wide. Tertiary joints are close to moderately spaced, vertical to high angle, planar, smooth, fresh to discolored, very tight to tight. Rock Quality = Poor Recovery = 86% Rock Core Times (min:sec): 32'-33' (01:11), 33'-34' (01:28), 34'-35.5' (0:57)	
35	R3	24/23	35.5 - 37.5	RQD = 71%							
								16.5		R3: Hard, fresh to slightly weathered, aphanitic to medium grained, grey, SCHIST. Primary joints are very close, moderately dipping, planar, smooth, discolored to decomposed, tight. One low angle joint. Joint is planar to undulating, smooth, fresh, partially open. One vertical joint. Joint is planar, smooth, discolored, tight. Rock Quality = Fair Recovery = 96% Rock Core Times (min:sec): 35.5'-36.5' (02:16), 36.5'-37.5' (01:23) 37.5	
										Bottom of Exploration at 37.5 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 measured immediately after removal of casing.
4. Sample 1D did not have recovery in 2" SS. 3" spoon used to collect sample for description.
5. Sample 2D had poor recovery in 2" SS. 3" spoon used to collect sample for description.

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: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-302
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	9.1	**Auger ID/OD:**	4.25" OD
Operator:	Brad Enos	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	E. Tome	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	05/19/21-05/19/21	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ2
Boring Location:	Sta. 80+87.2, 64.3' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	1.75'
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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

Sample Information

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.)
0	1D	18/12	0.0 - 1.5	3-5-5-50/0"	10	14	SSA	8.9
	2D	24/12	2.0 - 4.0	3-4-3-3	7	10		
	3D	24/9	4.0 - 6.0	1-2-4-2	6	8		4.8
5								
	4D	24/24	6.0 - 8.0	3-4-4-3	8	11	RC	
	5D	24/14	9.0 - 11.0	WOH-WOH-1-2	1	1		
10								
	6D	24/19	14.0 - 16.0	Push thru vane				
15	V1		14.6 - 15.0	S_u>1116/281 psf				
	MV1							-6.5
							NQ	-8.1
	R1	60/60	18.6 - 23.6	RQD = 83%				
20								
	R2	60/48	23.6 - 28.6	RQD = 70%				
25								

Visual Description and Remarks

Top 2": Brown, dry, fine to coarse SAND, with roots, (Topsoil). — 0.2

Bottom 10": Grey/brown, dry, medium dense, fine to coarse SAND, some gravel, (Fill).
Splitspoon refusal on probable boulder.

Brown, moist, loose, fine to coarse SAND, some silt, gravel in tip, (Fill).
Intermittent resistance of solid stem auger from 1.0'-6.0' indicates probable cobbles and boulders throughout.

Top 3": Brown, moist, loose, fine to coarse SAND, trace silt, trace gravel, (Fill). — 4.3

Bottom 6": Grey, wet, loose, silty fine to medium SAND, with organic fibers, (Wetland Deposit).

Dark grey, wet, medium stiff, Clayey SILT, some fine sand, with organic fibers, (Wetland Deposit).

Casing refusal at 8.0', increased roller bit resistance from 8.0'-8.5', probable cobble/boulder.

Top 2": Grey, wet, Silty CLAY, (Wetland Deposit).
Bottom 12": Dark brown, wet, very soft, organic SILT, with organic material, (Wetland Deposit).

Dark brown, wet, very soft, organic SILT, with organic material, (Wetland Deposit).
50x110 mm vane raw torque reading:
V1: >300/75 in-lbs — 15.6

MV1: Could not advance vane.
Increased roller bit resistance from 15.6'-17.2', wash return indicates probable sand and gravel. — 17.2

Increased resistance at 17.2', probable top of rock. Advanced roller bit to 18.6' and set up to core.
R1: Hard, slightly weathered, fine to coarse grained, grey, SCHIST. Joints are very close to close, horizontal to moderately dipping, undulating, rough, discolored, partially open to moderately wide.
Rock Quality = Good
Recovery = 100%
Rock Core Times (min:sec): 18.6-19.6' (3:21), 19.6-20.6' (2:33), 20.6-21.6' (2:05), 21.6-22.6' (2:13), 22.6-23.6' (2:20)

R2: Hard, fresh to slightly weathered, fine to coarse grained, grey, SCHIST. Joints are very close to moderately spaced, low angle to moderately dipping, undulating rough, tight to partially open.

Laboratory Testing Results/ AASHTO and Unified Class.

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 = 0.818.
3. Water level measured immediately after removal of casing.

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: Station 46 Bridge 3039 Replacement Location: Woolwich, Maine	Boring No.: BB-WS46-302 WIN: 23929.00

Driller:	New England Boring Contractors	Elevation (ft.)	9.1	Auger ID/OD:	4.25" OD
Operator:	Brad Enos	Datum:	NAVD 88	Sampler:	Standard Splitspoon
Logged By:	E. Tome	Rig Type:	Track B-53 Mobile	Hammer Wt./Fall:	140#/30"
Date Start/Finish:	05/19/21-05/19/21	Drilling Method:	Drive & Wash	Core Barrel:	NQ2
Boring Location:	Sta. 80+87.2, 64.3' RT	Casing ID/OD:	3"/3.5"/4"/4.5"	Water Level*:	1.75'
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										Rock Quality = Fair Recovery = 80% Rock Core Times (min:sec): 23.6-24.6' (2:03), 24.6-25.6' (1:54), 25.6-26.6' (1:47), 26.6-27.6' (1:55), 27.6-28.6' (1:42)	
	R3	12/12	28.6 - 29.6	RQD = 0%				-20.5		R3: Hard, moderately weathered, fine to coarse grained, grey, SCHIST. Joints are extremely close to very close, low angle, undulating, rough, open. Rock Quality = Very Poor Recovery = 100% Rock Core Times (min:sec): 28.6-29.6' (1:10)	
30										29.6 **Bottom of Exploration at 29.6 feet below ground surface.**	
35											
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 = 0.818.
3. Water level measured immediately after removal of casing.

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: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-303
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	4.4	**Auger ID/OD:**	4"
Operator:	Tom Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/14/2021-04/15/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 82+92.3, 74.3' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	2.4
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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	0.0 - 2.0	5-12-7-9	19	27	SSA			Dark brown, moist, medium dense, fine to coarse SAND, some gravel, some silt, (Fill)	
	2D	24/9	2.0 - 4.0	2-3-5-3	8	11				Top 4":Dark brown, moist, fine to coarse SAND, some gravel, some silt, some wood fragments, (Fill).	
								1.4		3.0	
										Bottom 5": Grey/brown, moist, silty, fine to medium SAND, trace roots, (Wetland Deposit).	
5	3D	24/9	5.0 - 7.0	WOH-WOH-WOH-WOH						Grey, wet, Clayey SILT, trace fine sand, trace roots, (Wetland Deposit).	
							SSA				
10	4D	24/15	10.0 - 12.0	Push thru vane			RC			55x110 mm vane raw torque reading:	
	V1		12.6 - 13.0	S_u=889/112 psf						V1: 225/30 in-lbs	
	V2		13.6 - 14.0	S_u=746/112 psf						V2: 200/30 in-lbs	
15	5D	24/24	15.0 - 17.0	Push thru vane						Dark brown, wet, medium stiff, Organic SILT, trace fine sand, trace organic fibers, (Wetland Deposit). 55x110 mm vane raw torque reading:	
	V3		17.6 - 18.0	S_u=875/147 psf						V3: 235/40 in-lbs	
	V4		18.6 - 19.0	S_u=893/170 psf						V4: 240/45 in-lbs	
20	6D	24/22	20.0 - 22.0	WOH-WOH-WOH-WOH						Dark brown, wet, medium stiff, Organic SILT, (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#1 Energy transfer ratio = 0.852.
3. Water level measured immediately after removal of casing.
4. Well installed to 20' bgs., 10' of 2" ID PVC screen, 12.8' of 2" ID PVC riser, sand backfill to 8' bgs., bentonite chips from 8'bgs. to 5' bgs., sand backfill from 5' bgs. to ground surface. 3" stand pipe with cap at ground surface.

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: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-303
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	4.4	**Auger ID/OD:**	4"
Operator:	Tom Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/14/2021-04/15/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 82+92.3, 74.3' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	2.4
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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	7D	24/2	25.0 - 27.0	Push thru vane						Dark brown, wet, medium stiff, Organic SILT, trace fine sand, (Wetland Deposit). 55x110 mm vane raw torque reading: V5: 205/30 in-lbs V6: 275/45/ in-lbs	
	V5		25.6 - 26.0	S_u=762/112 psf							
	V6		26.6 - 27.0	S_u=1022/170 psf							
							108	-24.1		28.5 Wash return color change at 28.5', possible strata change.	
							90				
30	8D		30.0 - 32.0	2-5-5-6	10	14	55			Grey, wet, stiff, Silty CLAY, trace fine sand, (Marine Clay)	
	MV1		31.0 - 31.0	-	-		84			MV1: Could not advance vane.	
							100				
							58				
							76				
35	9D	24/24	35.0 - 37.0	WOH-WOH-WOH-WOH	-		65			Dark grey, wet, Silty CLAY, (Marine Clay). MV2: Could not advance vane.	
	MV2						RC				
								-32.6		37.0	
40	10D	24/24	40.0 - 42.0	Push thru vane						Dark grey, wet, medium stiff, Silty CLAY, trace shells, (Marine Clay). 55x110 mm vane raw torque reading: V7: 195/40 in-lbs V8: 200/35 in-lbs	
	V7		40.6 - 41.0	S_u=728/147 psf							
	V8		41.6 - 42.0	S_u=746/129 psf							
45											
50											

Remarks:

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2. Automatic Hammer NEBC#1 Energy transfer ratio = 0.852.
3. Water level measured immediately after removal of casing.
4. Well installed to 20' bgs., 10' of 2" ID PVC screen, 12.8' of 2" ID PVC riser, sand backfill to 8' bgs., bentonite chips from 8'bgs. to 5' bgs., sand backfill from 5' bgs. to ground surface. 3" stand pipe with cap at ground surface.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-303
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	4.4	**Auger ID/OD:**	4"
Operator:	Tom Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	04/14/2021-04/15/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 82+92.3, 74.3' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	2.4
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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	11D	24/24	50.0 - 52.0	Push thru vane	-					Dark grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V9: 145/20 in-lbs	
	V9		50.6 - 51.0	S_u=540/76 psf							
	V10		51.6 - 52.0	S_u=504/80 psf						V10: 135/15 in-lbs	
55											
60	12D	24/24	60.0 - 62.0	Push thru vane						Dark grey, wet, soft, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V11: 125/20 in-lbs	
	V11		60.6 - 61.0	S_u=404/76 psf							
	V12		61.6 - 62.0	S_u=464/58 psf						V12: 125/15 in-lbs	
65											
70	13D	24/24	70.0 - 72.0	Push thru vane						Top 18": Dark grey, wet, medium stiff, Silty CLAY, role 1/8"sand seam at 71.0'. 55x110 mm vane raw torque reading:	
	V13		71.6 - 72.0	S_u=634/76 psf				-67.1		71.5 Bottom 6": Grey, wet, Silty fine SAND, some gravel, (Marine Sand). V13: 170/20 in-lbs MV3: Could not advance vane.	
	MV3			-							
75											

Remarks:

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2. Automatic Hammer NEBC#1 Energy transfer ratio = 0.852.
3. Water level measured immediately after removal of casing.
4. Well installed to 20' bgs., 10' of 2" ID PVC screen, 12.8' of 2" ID PVC riser, sand backfill to 8' bgs., bentonite chips from 8'bgs. to 5' bgs., sand backfill from 5' bgs. to ground surface. 3" stand pipe with cap at ground surface.

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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Station 46 Bridge 3039 Replacement Location: Woolwich, Maine	Boring No.: BB-WS46-303 WIN: 23929.00

Driller:	New England Boring Contractors	Elevation (ft.)	4.4	Auger ID/OD:	4"
Operator:	Tom Schaefer	Datum:	NAVD 88	Sampler:	Standard Splitspoon
Logged By:	L. Navarrete	Rig Type:	Track B-53 Mobile	Hammer Wt./Fall:	140#/30"
Date Start/Finish:	04/14/2021-04/15/2021	Drilling Method:	Drive & Wash	Core Barrel:	NQ
Boring Location:	Sta. 82+92.3, 74.3' RT	Casing ID/OD:	3"/3.5"/4"/4.5"	Water Level*:	2.4
Hammer Efficiency Factor:	0.852	Hammer Type:	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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
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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	14D	24/13	75.0 - 77.0	3-3-5-8	8	11				Grey, wet, medium dense, fine to coarse SAND, trace gravel, (Marine Sand).	
	15D	24/6	79.0 - 81.0	3-4-1-5	5	7	RC			Grey, wet, loose, fine to coarse SAND, trace gravel, (Marine Sand).	
80											
								-78.1		82.5	
	R1	60/50	83.0 - 88.0	RQD = 58%			NQ			Increased roller cone resistance at 82.5', probable top of rock. Roller cone to 83.0' and set up to core. R1: Hard, fresh aphanitic to medium grained, grey, SCHIST. Joints are very close to moderately spaced, moderately dipping, planar, smooth, fresh, very tight to, tight, with some silt infilling. Rock Quality = Fair Recovery = 83% Rock Core Times (min:sec): 83'-84' (03:40), 84'-85' (01:46), 85'-86' (01:50), 86'-87' (01:35), 87'-88' (01:52)	
85											
	R2	60/58	88.0 - 93.0	RQD = 87%						R2: Hard, fresh, aphanitic to medium grained, grey, SCHIST. Joints are very close to moderately spaced, moderately dipping, planar, smooth fresh, very tight to tight. Rock Quality = Good Recovery = 97% Rock Core Times (min:sec): 88'-89' (02:45), 89'-90' (01:06), 90'-91' (01:46), 91'-92' (01:41), 92'-93' (01:51)	
90											
								-88.6		93.0 **Bottom of Exploration at 93.0 feet below ground surface.**	
95											
100											

Remarks:

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2. Automatic Hammer NEBC#1 Energy transfer ratio = 0.852.
3. Water level measured immediately after removal of casing.
4. Well installed to 20' bgs., 10' of 2" ID PVC screen, 12.8' of 2" ID PVC riser, sand backfill to 8' bgs., bentonite chips from 8'bgs. to 5' bgs., sand backfill from 5' bgs. to ground surface. 3" stand pipe with cap at ground surface.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-304
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.6	**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:	04/01/2021 - 04/05/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 84+57.1, 133.1' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	3.5
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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SSA = Solid Stem Auger
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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	24/3	0.0 - 2.0	2-10-10-10	20	27	SSA			Black, moist, medium dense, fine to coarse SAND, some silt, little gravel, little organic fibers, little roots, (Fill).	
	2D	24/1	4.0 - 6.0	1-2-1-2	3	4				Brown, moist, loose fine to coarse SAND, some gravel, some silt, (Fill).	
5											
							PUSH				
								-1.4		-7.0-	
	3D	24/22	9.0 - 11.0	Push thru vane	-					Grey/brown, wet, stiff to medium stiff, Organic SILT, little to trace fine sand, little organic fibers, (Wetland Deposit). 55x110 mm vane raw torque reading. V1: 290/55 in-lbs V2: 255/45 in-lbs	
10	V1		9.6 - 10.0	S_u=1080/205 psf							
	V2		10.6 - 11.0	S_u=951/170 psf							
							RC				
	4D	24/22	14.0 - 16.0	Push thru vane	-					Dark grey, wet, medium stiff, Organic SILT, trace fine sand, little organic fibers, (Wetland Deposit). 55x110 mm vane raw torque reading: V3: 250/40 in-lbs V4: 230/40 in-lbs	
15	V3		14.6 - 15.0	S_u=929/147 psf							
	V4		15.6 - 16.0	S_u=817/147 psf							
	5D	24/12	19.0 - 21.0	Push thru vane	-					Black wet, stiff to medium stiff, Organic SILT, trace fine sand, little organic fibers, (Wetland Deposit). 55x110 mm vane raw torque reading: V5: 285/40 in-lbs V6: 240/40 in-lbs	
20	V5		19.6 - 20.0	S_u=1062/147 psf							
	V6		20.6 - 21.0	S_u=893/147 psf							
	6D	24/23	24.0 - 26.0	Push thru vane	-					Dark gray, wet, medium stiff, Organic SILT, 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.

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: Station 46 Bridge 3039 Replacement Location: Woolwich, Maine	Boring No.: BB-WS46-304 WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.6	**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:	04/01/2021 - 04/05/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 84+57.1, 133.1' RT	**Casing ID/OD:**	3"/3.5"/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
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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	V7 V8		24.6 - 25.0 25.6 - 26.0	S_u=969/129 psf S_u=857/147 psf						55x110 mm vane raw torque reading: V7: 260/35 in-lbs V8: 230/40 in-lbs	
	7D ~~V9~~ V10	24/24	29.0 - 31.0 ~~29.6 - 30.0~~ 30.2 - 30.6	Push thru vane ~~S_u=987/129 psf~~ S_u=1429/223 psf	-			-25.0		Dark grey, wet, medium stiff, Organic SILT, trace fine sand, little organic fibers, little wood, (Wetland Deposit). 55x110 mm vane raw torque reading: V9: 265/35 in-lbs V10: 32/5 ft-lbs 30.6 Bottom 2-inches of 7D contained silty clay.	
30											
	8D ~~V11~~	24/24	34.0 - 36.0 ~~34.6 - 35.0~~	Push thru vane ~~S_u=>2000 psf~~	-					Grey, wet, very stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V11: 50+ ft-lbs Could not shear vane.	
35											
	9D ~~V12~~ V13	24/24	39.0 - 41.0 ~~39.6 - 40.0~~ 40.6 - 41.0	Push thru vane ~~S_u=1250/179 psf~~ S_u=982/179 psf	-			-35.4		Grey, wet, stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V12: 28/4 ft-lbs V13: 22/4 ft-lbs 41.0	
40											
	10D ~~V14~~ V15	24/24	44.0 - 46.0 ~~44.6 - 45.0~~ 45.6 - 46.0	Push thru vane ~~S_u=763/94 psf~~ S_u=652/94 psf	-					Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading: V14: 205/25 in-lbs V15: 175/25 in-lbs	
45											
	11D	24/24	49.0 - 51.0	Push thru vane						Grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	
50											

Remarks:

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2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-304
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.6	**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:	04/01/2021 - 04/05/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 84+57.1, 133.1' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	3.5
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MU = Unsuccessful Thin Wall Tube Sample Attempt
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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	V16		49.6 - 50.0	S_u=634/94 psf						V16: 170/25 in-lbs	
	V17		50.6 - 51.0	S_u=705/129						V17: 190/35 in-lbs	
	12D	24/24	54.0 - 56.0	Push thru vane						Dark grey, wet, medium stiff, Silty CLAY, trace shell fragments, (Marine Clay). 55x110 mm vane raw torque reading:	
55	V18		54.6 - 55.0	S_u=670/76 psf						V18: 180/20 in-lbs	
	V19		55.6 - 56.0	S_u=558/94 psf						V19: 150/25 in-lbs	
	13D	24/24	59.0 - 61.0	Push thru vane						Dark grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	
60	V20		59.6 - 60.0	S_u=652/58 psf						V20: 175/15 in-lbs	
	V21		60.6 - 61.0	S_u=558/58 psf						V21: 150/15 in-lbs	
65											
	14D	24/24	69.0 - 71.0	Push thru vane						Dark grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	
70	V22		69.6 - 70.0	S_u=522/76 psf						V22: 140/20 in-lbs	
	V23		70.6 - 71.0	S_u=540/76 psf						V23: 145/20 in-lbs	
75											

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-304
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.6	**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:	04/01/2021 - 04/05/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 84+57.1, 133.1' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	3.5
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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SSA = Solid Stem Auger
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WOR/C = Weight of Rods or Casing
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$S_{u(lab)}$ = 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
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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	Push thru vane						Dark grey, wet, stiff to medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	
80	V24		79.6 - 80.0	S_u=1062/36 psf						V24: 285/10 in-lbs	
	V25		80.6 - 81.0	S_u=728/36 psf						V25: 195/10 in-lbs	
85											
	16D	24/24	89.0 - 91.0	Push thru vane						Dark grey, wet, medium stiff, Silty CLAY, (Marine Clay). 55x110 mm vane raw torque reading:	
90	V26		89.6 - 90.0	S_u=616/94 psf						V26: 165/25 in-lbs	
	V27		90.6 - 91.0	S_u=504/76 psf						V27: 135/20 in-lbs	
95											
	17D	24/22	99.0 - 101.0	2-3-WOH-WOH	-			-94.0		Top 11": grey, wet, Silty CLAY, (Marine Clay). 99.6	
100											

Remarks:

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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	**Project:** Station 46 Bridge 3039 Replacement **Location:** Woolwich, Maine	**Boring No.:** BB-WS46-304 **WIN:** 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.6	**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:	04/01/2021 - 04/05/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 84+57.1, 133.1' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	3.5
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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N-uncorrected = Raw Field SPT N-value
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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	MV1			-						Bottom 11": grey, brown, wet, Silty, fine to coarse SAND, (Marine Sand). MV1: Could not advance vane.	
	18D	24/12	104.0 - 106.0	3-19-44-18	63	86				Brown, wet, very dense, fine to coarse SAND, some silt, little gravel, (Marine Sand).	
105											
	19D	24/14	109.0 - 111.0	15-11-12-16	23	31	27			Grey, wet, medium dense, fine to coarse SAND, trace silt, (Marine Sand).	
110							46				
							80				
							69				
							75				
	20D	7/5	114.0 - 114.6	50-50/1"	-		NQ	-109.0		Grey, wet, fine to medium SAND, little gravel, trace silt, (Marine Sand). 114.6	
115	R1	60/57	114.7 - 119.7	RQD = 61%						Splitspoon refusal at 114.6', roller cone to 114.7' and set up to core. R1: Hard, fresh to slightly weathered aphanitic to medium grained, grey, SCHIST. Joints are extremely close to moderately spaced, to moderately dipping, stepped to planar, smooth to rough, fresh to discolored, very tight to tight. Recovery = 95% Rock Quality = Fair Rock Core Times (min/sec): 114.7'-115.7' (02:43), 115.7'-116.7' (02:01), 116.7'-117.7' (02:14), 117.7'-118.7' (02:11), 118.7'-119.7' (02:13)	
	R2	60/60	119.7 - 124.7	RQD = 66%						R2: Hard, fresh to slightly weathered aphanitic to medium grained, grey, SCHIST. Joints are extremely close, to moderately dipping, planar, smooth, fresh, very tight to tight. Recovery = 100% Rock Quality = Fair Rock Core Times (min/sec): 119.7'-120.7' (01:30), 120.7' 121.7' (01:50), 121.7'-122.7' (02:06), 122.7'-123.7' (01:16), 123.7'-124.7' (01:51)	
120											
125								-119.1		124.7	

Remarks:

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2. Automatic hammer NEBC#D23 Energy transfer ratio = 0.818.
3. Water level measured immediately after removal of casing.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Station 46 Bridge 3039 Replacement
Location: Woolwich, Maine

Boring No.: BB-WS46-304
WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	5.6	**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:	04/01/2021 - 04/05/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 84+57.1, 133.1' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	3.5
Hammer Efficiency Factor:	0.818	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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SSA = Solid Stem Auger
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WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
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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
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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										**Bottom of Exploration at 124.7 feet below ground surface.**	
130											
135											
140											
145											
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 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.

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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Station 46 Bridge 3039 Replacement Location: Woolwich, Maine	Boring No.: BB-WS46-305 WIN: 23929.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	2.9	**Auger ID/OD:**	-
Operator:	Tom Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	L. Navarrete	**Rig Type:**	Track B-53 Mobile	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4/15/2021-4/19/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NQ
Boring Location:	Sta. 85+72.8, 54.3' RT	**Casing ID/OD:**	3"/3.5"/4"/4.5"	**Water Level*:**	0.1"/0.0"
Hammer Efficiency Factor:	0.852	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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MD = Unsuccessful Split Spoon Sample Attempt
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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	WOH-WOH-WOH-WOH	-		SSA			Black, wet, very soft, Organic SILT, trace fine sand, little roots, some wood, (Wetland Deposit).	
5	2D	24/23	5.0 - 7.0	WOH-WOH-WOH-WOH	-		RC			Dark brown, wet, very soft, Organic SILT, little to trace organic fibers, (Wetland Deposit).	G#21-S-1507 WC=106.7
	1U	24/20	8.0 - 10.0	PUSH	-					1U: Dark brown, wet, medium stiff, Organic SILT, (Wetland Deposit).	
10	V1		10.6 - 11.0	Push thru vane S_u=839/147 psf						55x110 mm vane raw torque reading: V1: 225/40 in-lbs	
	V2		11.6 - 12.0	S_u=705/147 psf						V2: 190/40 in-lbs	
15	3D V3		15.0 - 17.0 15.6 - 16.0	Push thru vane S_u=929/170 psf						Dark brown, wet, medium stiff, Organic SILT, (Wetland Deposit). 55x110 mm vane raw torque reading: V3: 250/45 in-lbs	#21-S-1508 OH PL=45 LL=94 PL=49 WC=83.8
	V4		16.6 - 17.0	S_u=875/170 psf						V4: 235/45 in-lbs	
20	4D V5	24/23	20.0 - 22.0	Push thru vane S_u=1295/179 psf						Top 18": Dark/brown, wet, stiff Organic SILT, trace fine sand, trace organic fibers. 55x110 mm vane raw torque reading: V5: 29/4 ft-lbs	#21-S-1509 WC=31.0
								-18.6		21.5	
	MV1			-						Bottom 5": Grey, wet, Silty CLAY, (Marine Clay). MV1: Could not advance vane.	
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.

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: Station 46 Bridge 3039 Replacement Location: Woolwich, Maine	Boring No.: BB-WS46-305 WIN: 23929.00

Driller:	New England Boring Contractors	Elevation (ft.)	2.9	Auger ID/OD:	-
Operator:	Tom Schaefer	Datum:	NAVD 88	Sampler:	Standard Splitspoon
Logged By:	L. Navarrete	Rig Type:	Track B-53 Mobile	Hammer Wt./Fall:	140#/30"
Date Start/Finish:	4/15/2021-4/19/2021	Drilling Method:	Drive & Wash	Core Barrel:	NQ
Boring Location:	Sta. 85+72.8, 54.3' RT	Casing ID/OD:	3"/3.5"/4"/4.5"	Water Level*:	0.1"/0.0"
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	MU1	24/6	25.0 - 27.0	PUSH						Grey, wet, Silty CLAY, (Marine Clay).	
	5D MU2	17/17 17/3	27.0 - 28.4 27.0 - 28.4	WOH-WOH-WOH/5"- PUSH						Grey, wet, very stiff, Silty CLAY, (Marine Clay).	#21-S-1510 CL PL=12 LL=28 PL=16 WC=22.3
								-25.5		28.4	
30	6D R1	0/0 60/60	30.0 - 30.0 30.0 - 35.0	50/0' RQD = 69%						Roller cone from 28.4' to 30.0', dark grey, rock in wash return, split spoon refusal at 30.0'. Set up to core at 30.0'. R1: Hard, fresh, aphanitic to medium grained, grey, SCHIST. Primary joints are extremely close to moderately spaced, moderately dipping, planar, smooth, fresh to discolored, very tight to tight. One vertical joint. Joint is planar, fresh, tight. Recovery: 100% Rock Quality = Fair Rock Core Times (min:sec): 30-31' (02:10), 31-32' (01:07), 32-33' (01:23), 33-34' (01:31), 34-35' (01:40)	
35	R2	46/43	35.0 - 38.8	RQD = 57%						R2: Very hard to hard, fresh, aphanitic to medium grained, grey, SCHIST. Primary joints are very close to close moderately dipping, undulating to planar, smooth, fresh, tight to moderately wide. One horizontal joint. Joint is planar, smooth, discolored, partially open. One high angle joint, Joint is planar, smooth, fresh, tight to open. Recovery: 95% Rock Quality = Fair Rock Core Times (min:sec): 35-36' (01:34), 36-37' (01:47), 37-38' (01:22), 38-38.8' (01:09)	
	R3	14/14	38.8 - 40.0	RQD = 100%						R3: Hard, fresh, aphanitic to medium grained, grey, SCHIST. Joints are moderately, spaced moderately dipping planar, smooth, fresh, tight. Recovery: 100 % Rock Quality = Excellent Rock Core Times (min:sec): 38.8-39' (0:56), 39-40' (01:33)	
40								-37.1		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.

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 D – CONE PENETRATION REPORTS

November 17, 2019
Summit #19234.1

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

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

Dear Mr. Cardali;

We have completed exploration services for 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 referred to as 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 107.9 feet below ground surface. Anchoring was provided using ballast weight from a Ford F550 truck and Ram 5500 truck connected by structural beams. CPT was performed for a soil surface located approximately 20 feet below the top of bridge deck. Parameters obtained include cone resistance (q_c), sleeve friction (f_s), and piezocone pore pressure (u_2). An exploration log for CPT-SW46-101 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

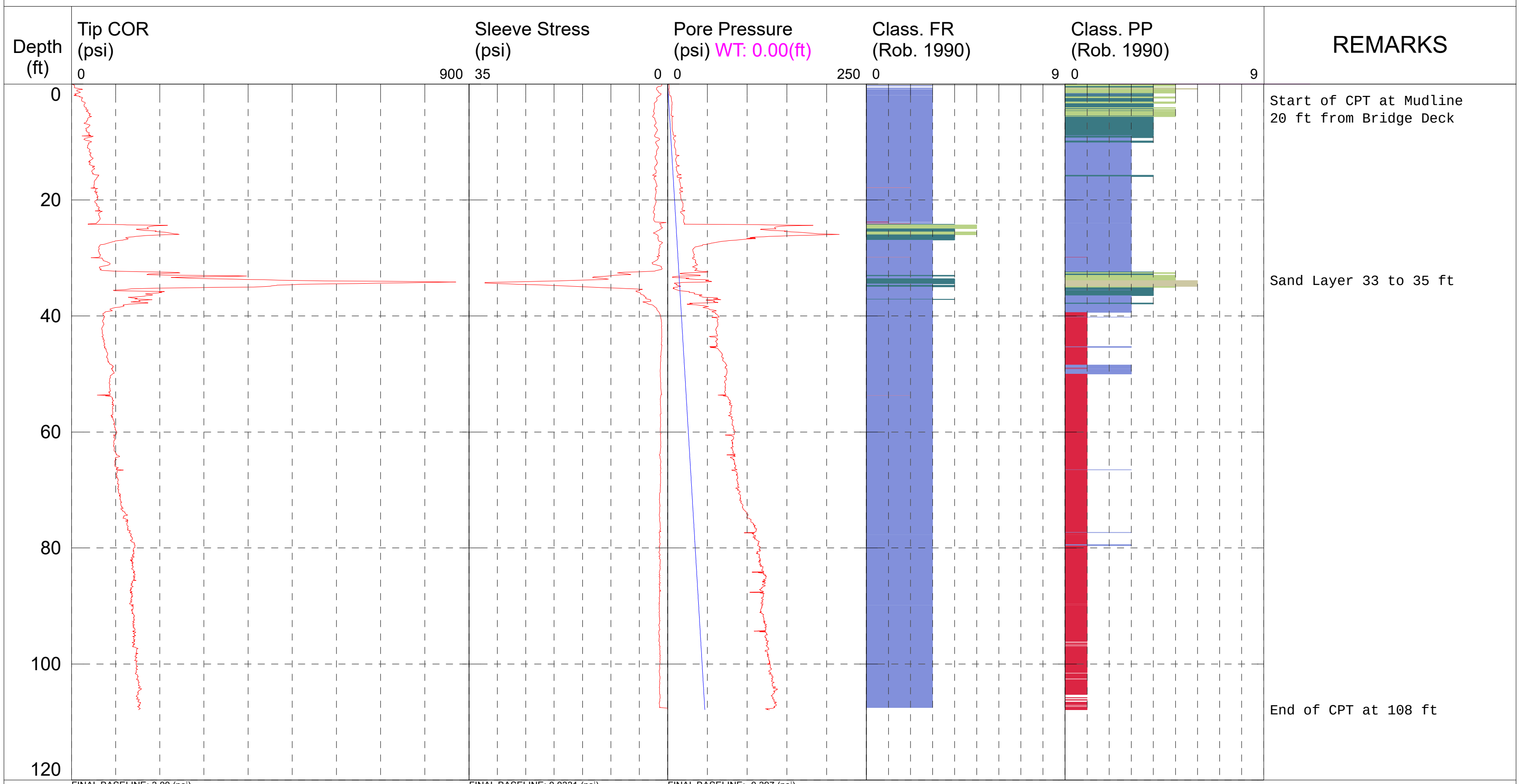
Craig W. Coolidge, P.E.
Vice President, Principal Engineer

Attachments: EXPLORATION LOG (CPT-SW46-103)

CPT-SW46-101

COMPANY: Summit Geoengineering Services
OPERATOR: C.Coolidge, P.E.
CREW: S. Floyd
CLIENT: GZA GeoEnvironmental
CLIENT REP: Blaine Cardale, P.E.

TEST DATE: Mon 14/Oct/2019
TEST ID: CPT-SW46-101
PROJECT: 19234.1
SITE: Bridge 46 Route 1
LOCATION: Woolwich, Maine



TOTAL DEPTH: 107.888 ft

PROBE ID: 4544.104.A

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

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

March 31, 2021
Summit #19234.12

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

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

Dear Mr. Cardale;

We have completed exploration services for bridge 46 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 bridge 46 in Woolwich, Maine. SGS performed 4 seismic piezocone penetration tests ($SCPT_u$) on March 24, 2021. $SCPT_u$ was advanced using a track mounted Power Probe 9500 VTR with a Vertek digital cone having a cross sectional area of 10 cm^2. $SCPT_u$ was performed to a depth of push refusal ranging from 17 to 77 feet below ground surface. Anchoring was provided using a dual point 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 LOGS

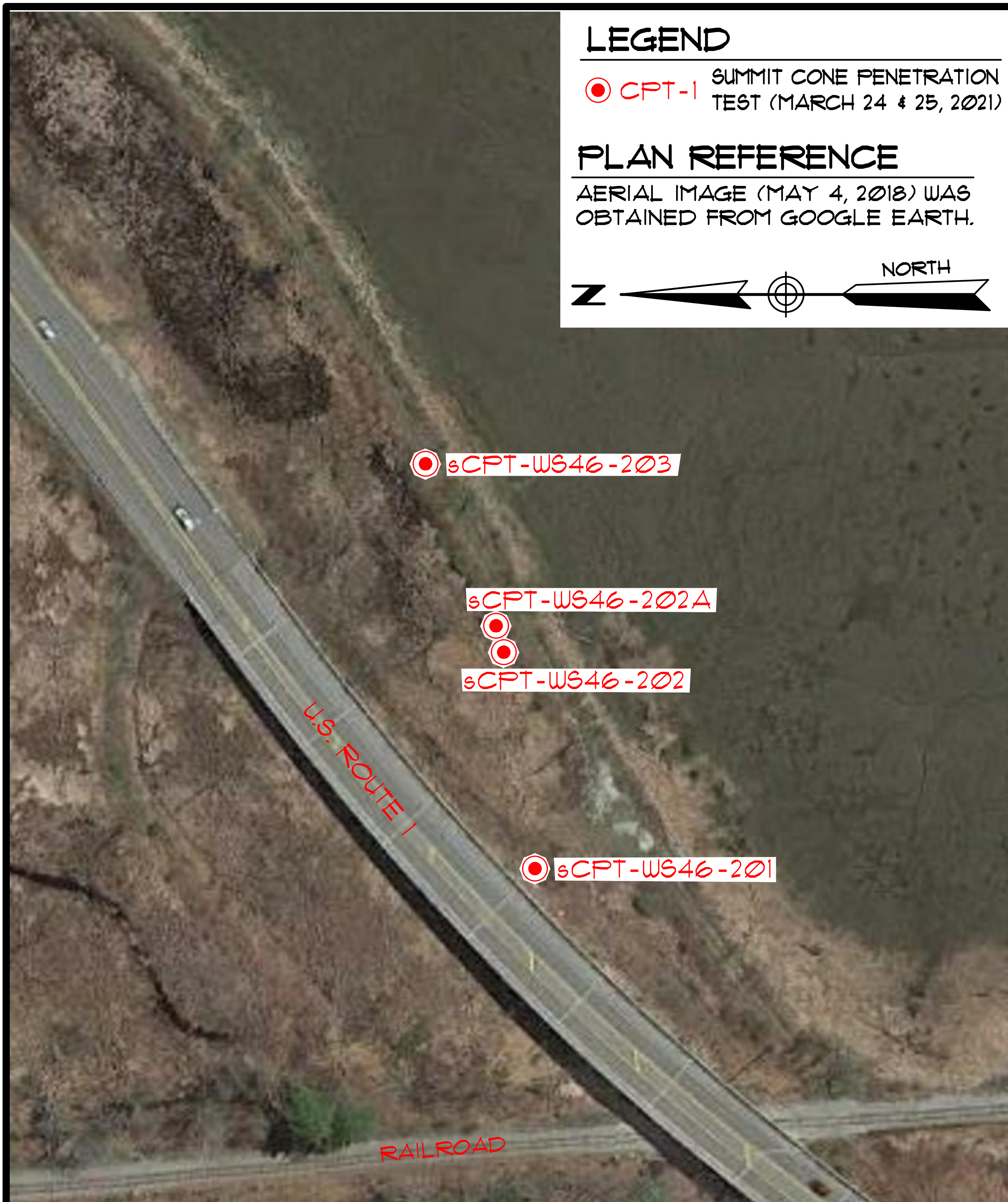
145 Lisbon Street (PO Box 7216) Lewiston, Maine 04243 | (207) 576-3313
173 Pleasant Street Rockland, Maine 04841 | (207) 318-7761
www.summitgeoeng.com

LEGEND

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

PLAN REFERENCE

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



EXPLORATION LOCATION PLAN
BRIDGE 46

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

DATE: 3-31-2021	DRAWN BY: KRF	CHECKED BY: CWC
JOB: 19234.12	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

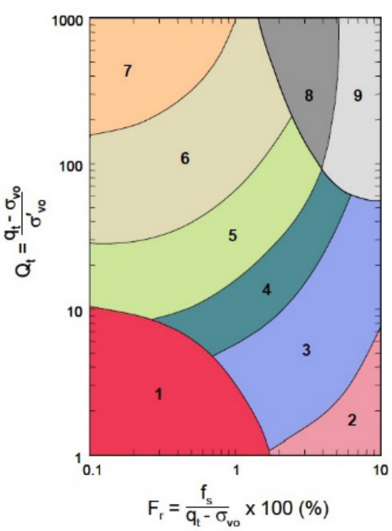
Piezocone penetration test (CPT) is performed by a cone on the end of a series of rods pushed into the ground at a constant rate (2 cm/s) to obtain near continuous measurements of soil parameters. Parameters obtained during the CPT test include cone tip resistance, sleeve friction, and piezocone pore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

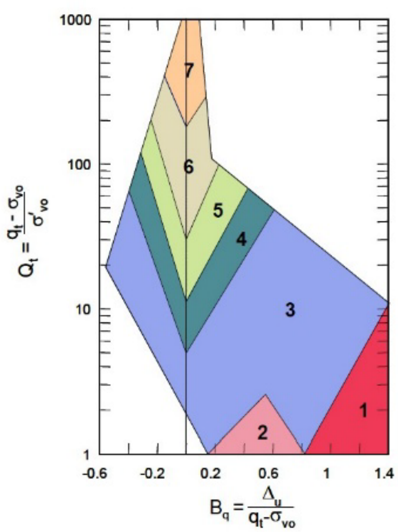
CPT Data Symbols:

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.





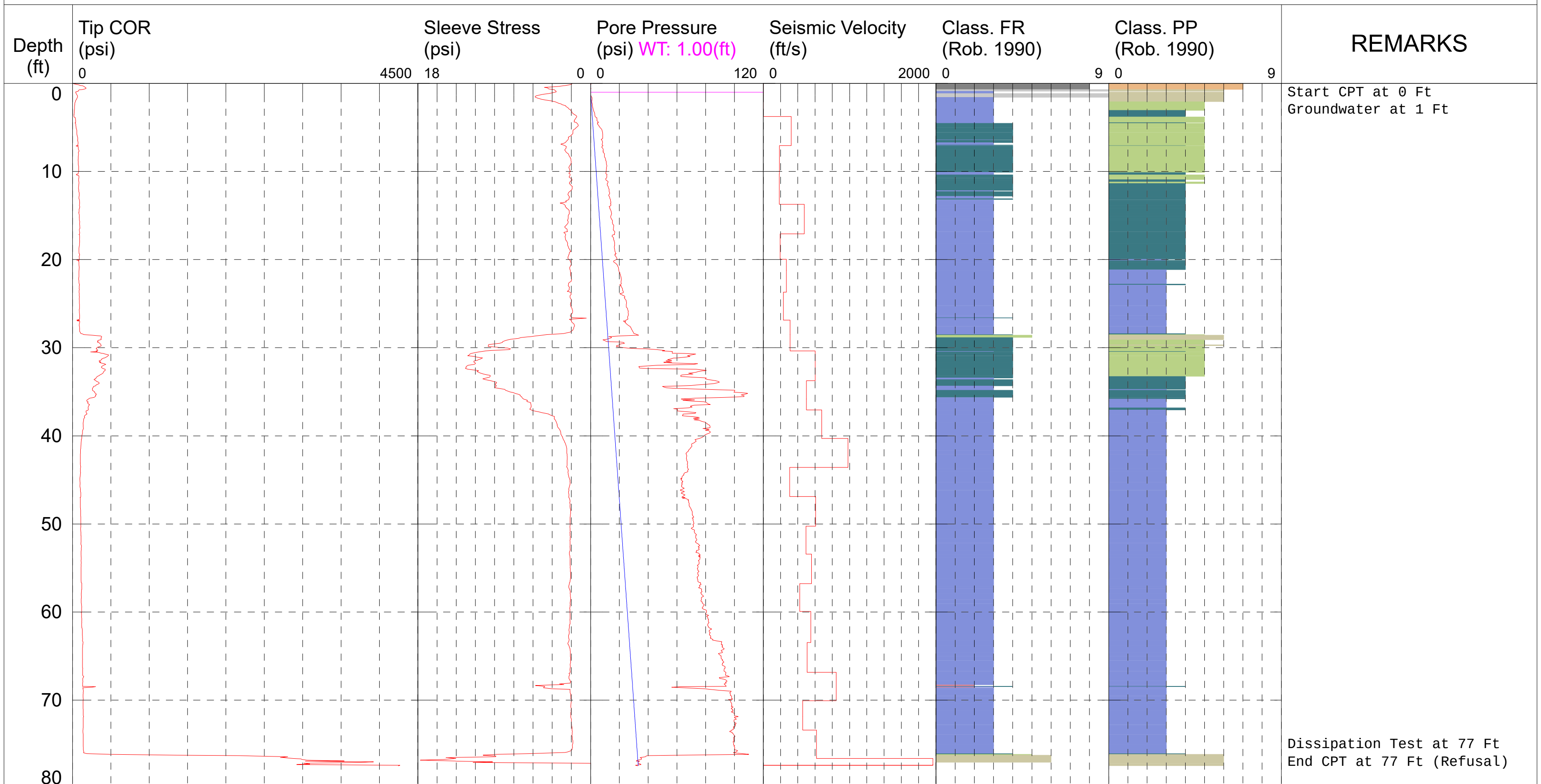
Zone	Soil Behavior Type
1	Sensitive, Fine Grained
2	Organic Soils-Peats
3	Clays; Clay to Silty Clay
4	Silt Mixtures; Clayey Silt to Silty Clay
5	Sand Mixtures; Silty Sand to Sandy Silt
6	Sands; Clean Sands to Silty Sands
7	Gravelly Sand to Sand
8	Very Stiff Sand to Clayey Sand*
9	Very Stiff Fine Grained*

*Overconsolidated or Cemented

CPT-WS46-201

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

TEST DATE: Wed 24/Mar/2021
TEST ID: CPT-WS46-201
PROJECT: 19234.21
SITE: Bridge 46
LOCATION: Woolwich, ME



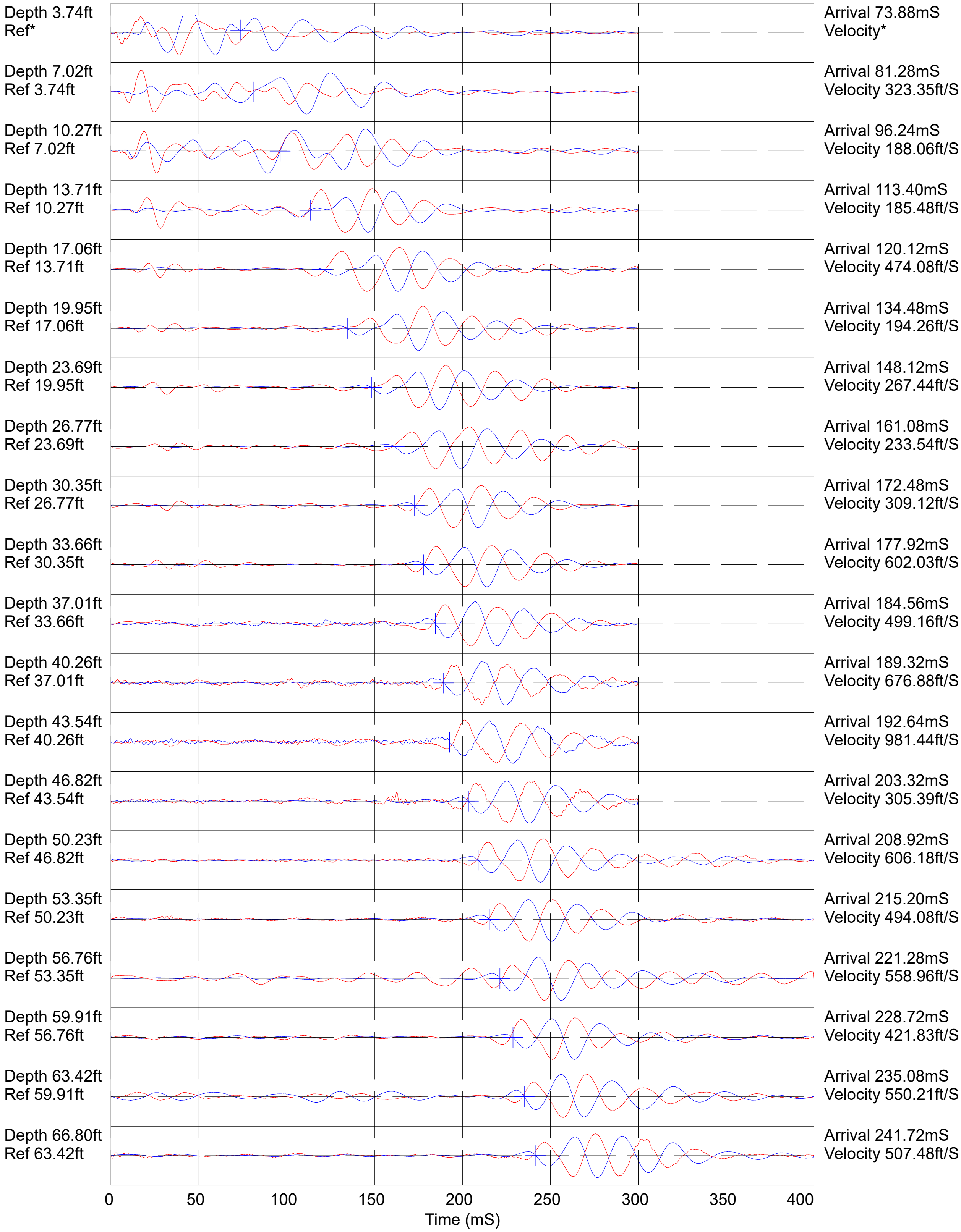
TOTAL DEPTH: 77.436 ft

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

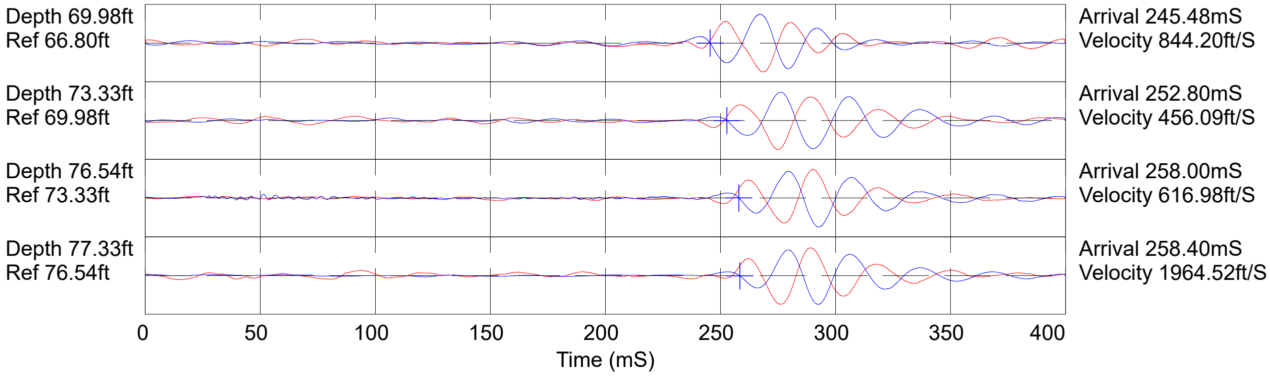
TEST ID: CPT-WS46-201



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

PROBE ID: 4644.108XX

TEST ID: CPT-WS46-201



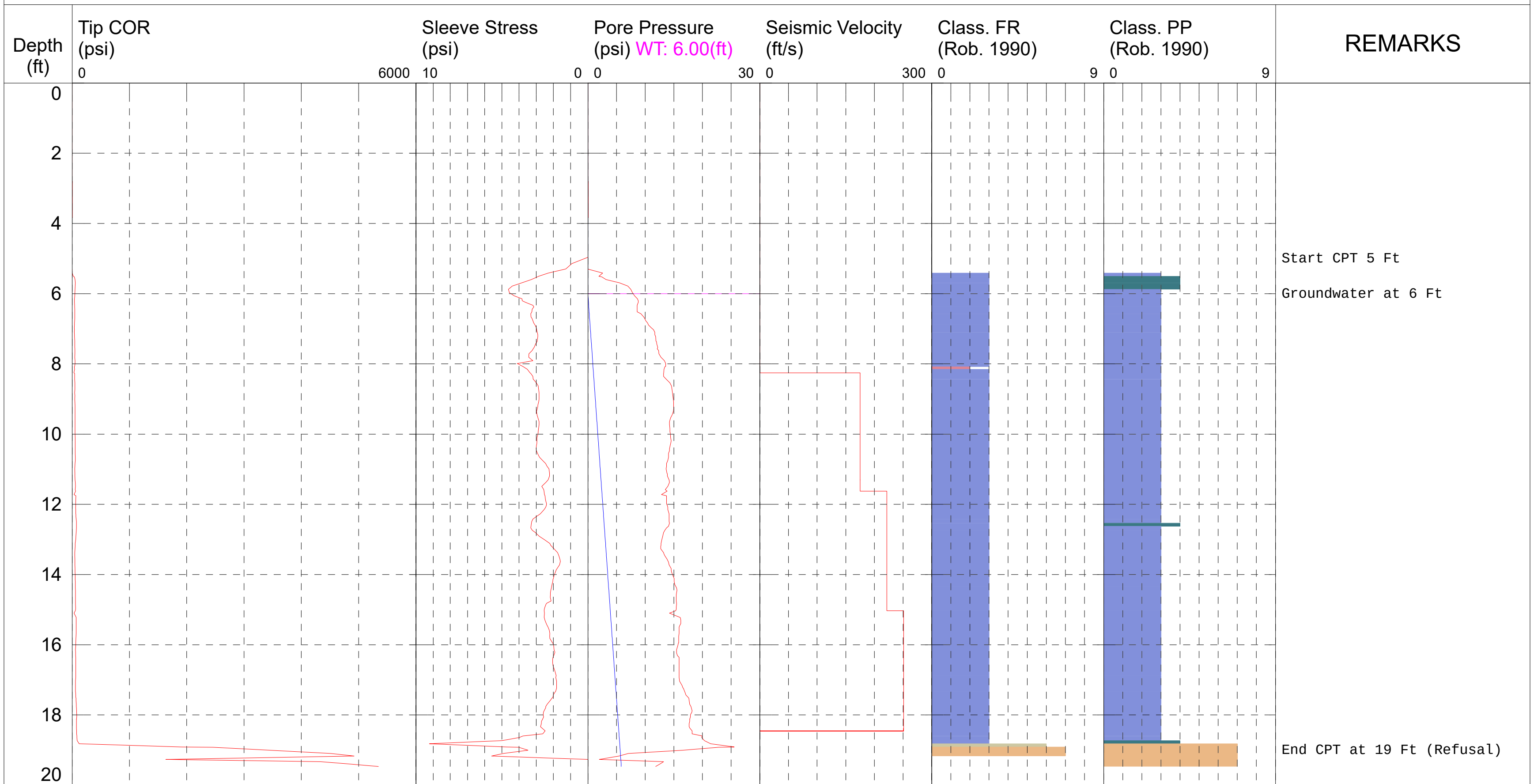
Hammer to Rod String Distance (ft): 4.92
* = Not Determined

PROBE ID: 4644.108XX

CPT-WS46-202

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

TEST DATE: Wed 24/Mar/2021
TEST ID: CPT-WS46-202
PROJECT: 19234.21
SITE: Bridge 46
LOCATION: Woolwich, ME



TOTAL DEPTH: 19.464 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-WS46-202

Depth 8.17ft
Ref*

Arrival 29.80mS
Velocity*

Depth 11.58ft
Ref 8.17ft

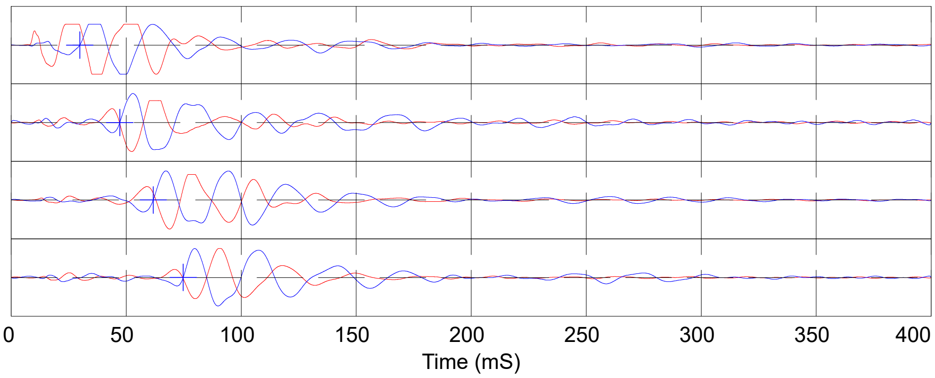
Arrival 47.20mS
Velocity 175.09ft/S

Depth 15.03ft
Ref 11.58ft

Arrival 61.76mS
Velocity 221.70ft/S

Depth 18.44ft
Ref 15.03ft

Arrival 74.80mS
Velocity 250.93ft/S



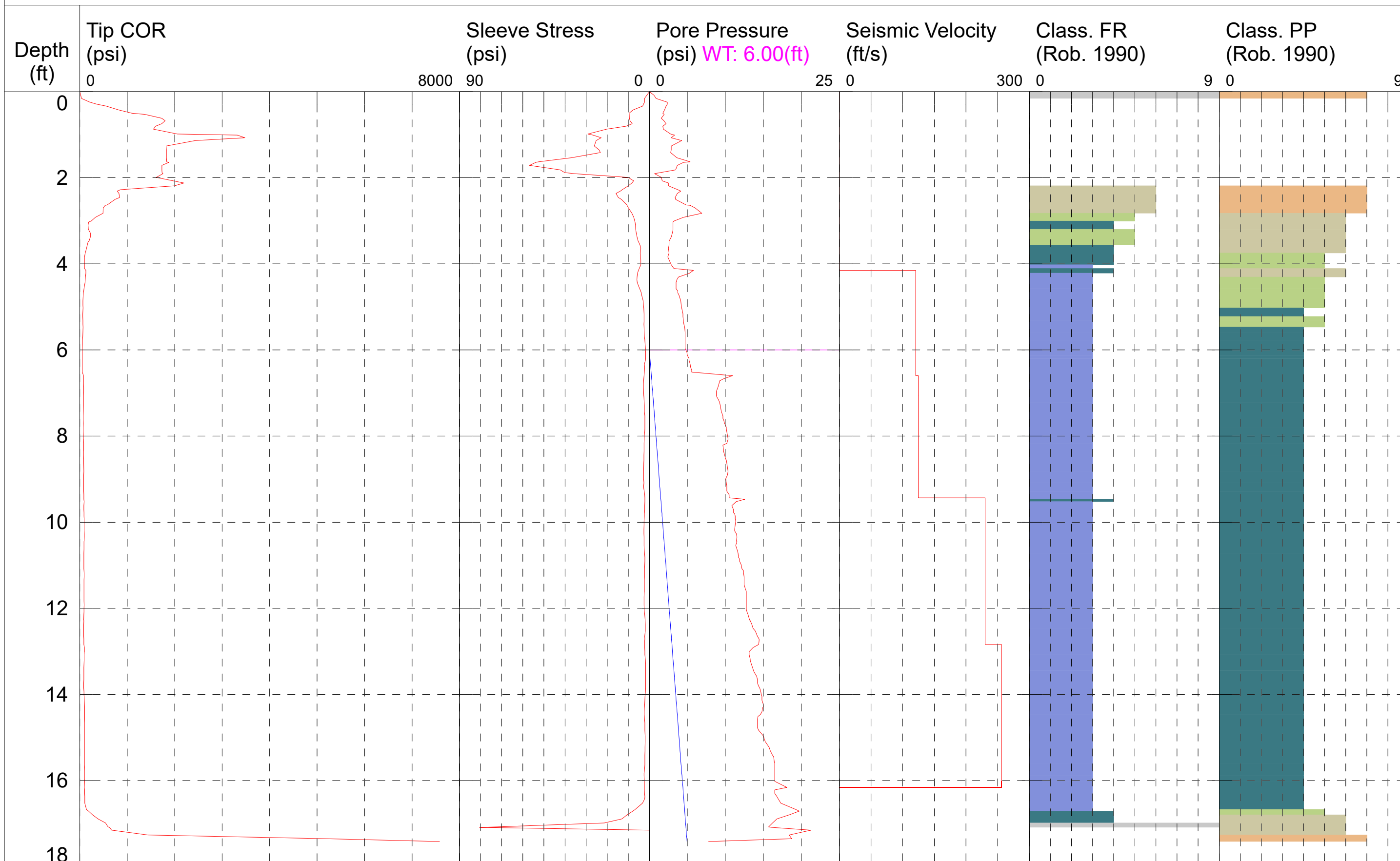
Hammer to Rod String Distance (ft): 4.92
* = Not Determined

PROBE ID: 4644.108XX

CPT-WS46-202a

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

TEST DATE: Wed 24/Mar/2021
TEST ID: CPT-WS46-202a
PROJECT: 19234.21
SITE: Bridge 46
LOCATION: Woolwich, ME



REMARKS

Start CPT at 0 Ft

Rocky Fill 0 to 2 Ft

Groundwater at 6 Ft

End CPT at 17 Ft (Refusal)

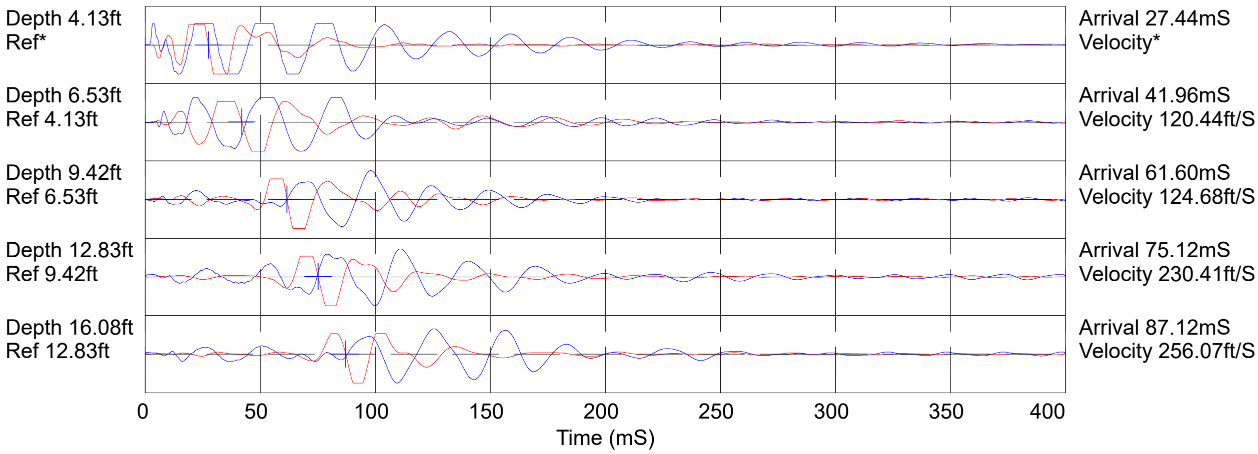
TOTAL DEPTH: 17.414 ft

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-WS46-202a



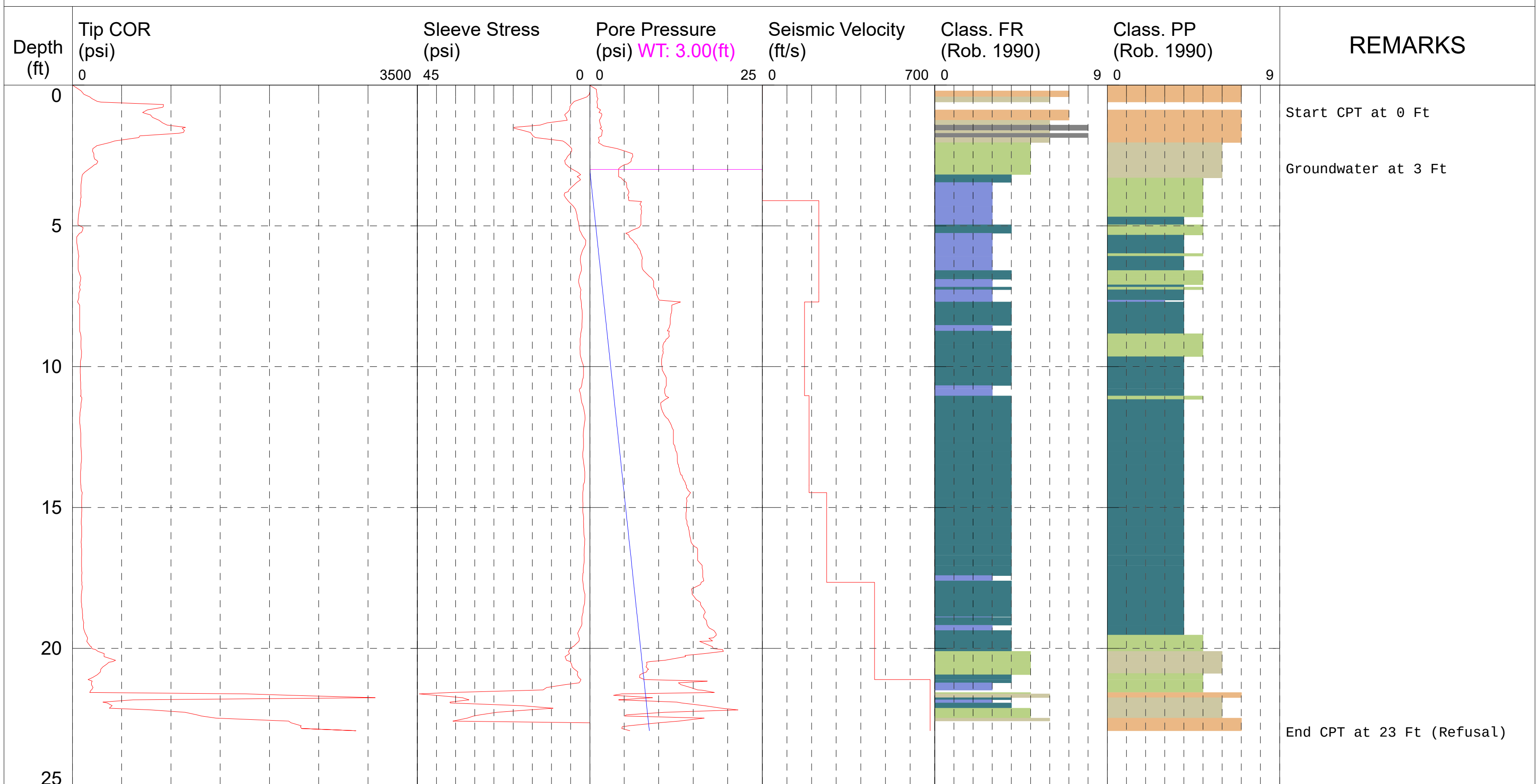
Hammer to Rod String Distance (ft): 4.92
* = Not Determined

PROBE ID: 4644.108XX

CPT-WS46-203

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

TEST DATE: Wed 24/Mar/2021
TEST ID: CPT-WS46-203
PROJECT: 19234.21
SITE: Bridge 46
LOCATION: Woolwich, ME



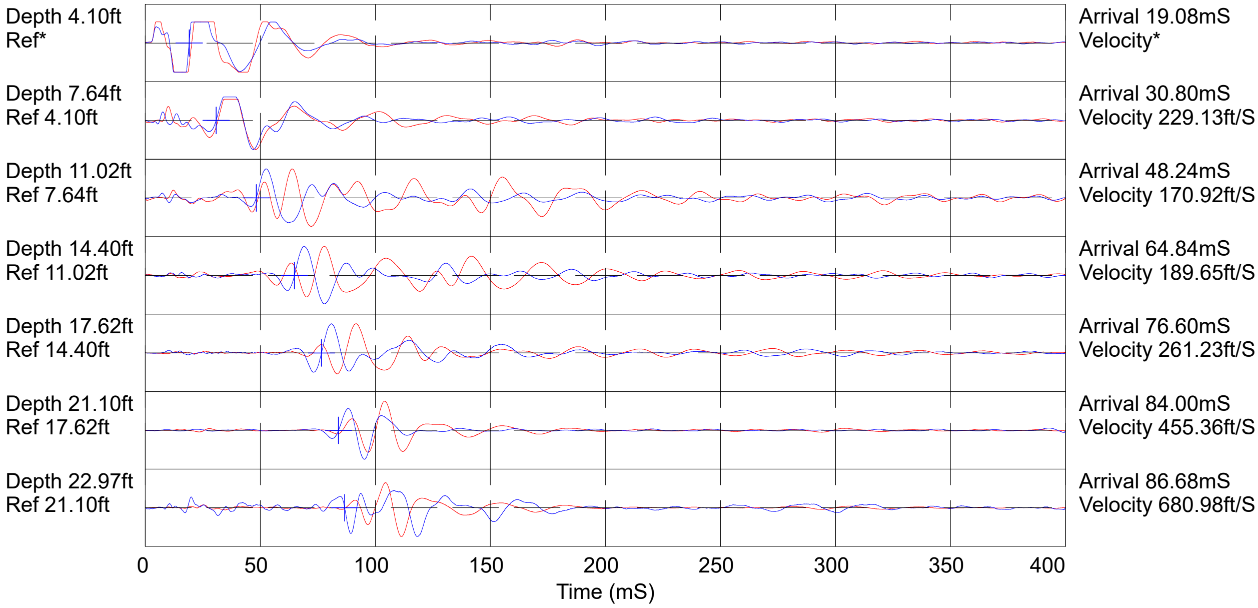
TOTAL DEPTH: 22.925 ft

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-WS46-203



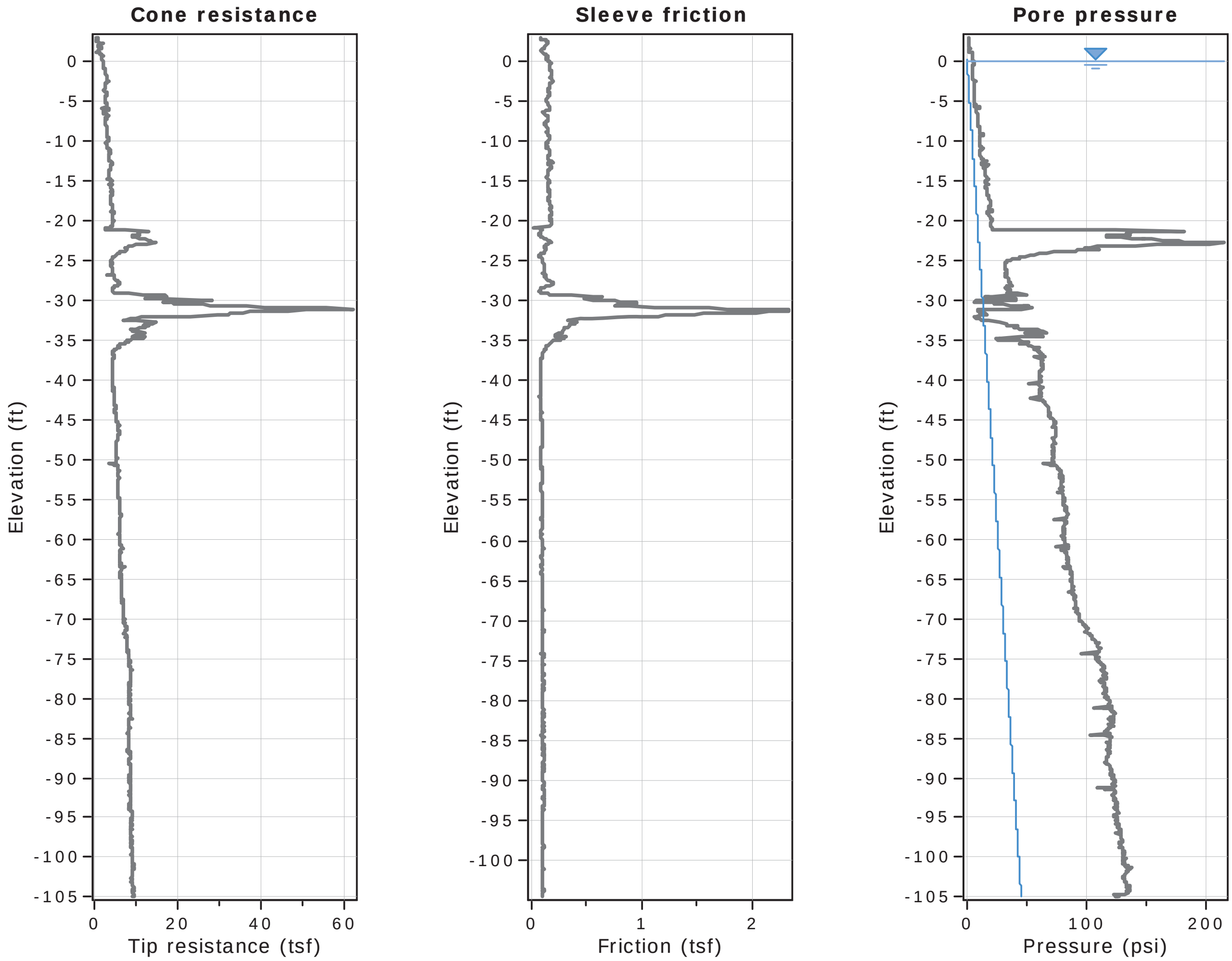
Hammer to Rod String Distance (ft): 4.92
* = Not Determined

PROBE ID: 4644.108XX

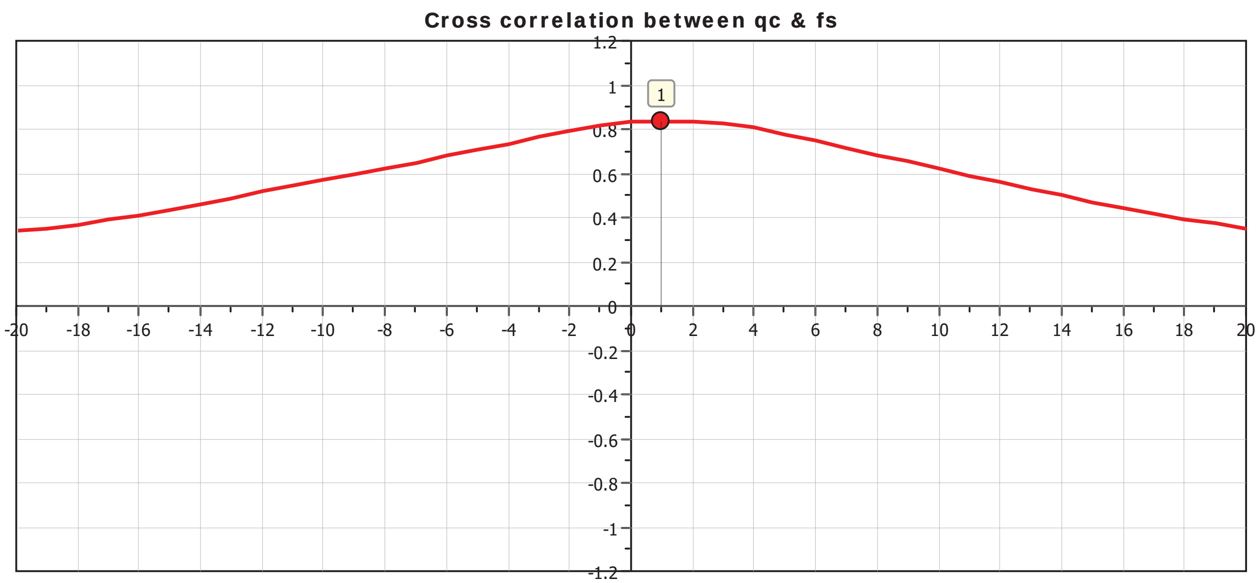
GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

CPT: CPT-SW46-101
Total depth: 107.89 ft, Date: 10/14/2019
Surface Elevation: 3.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator: Summit Geoengineering / C. Coolidge

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**



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).

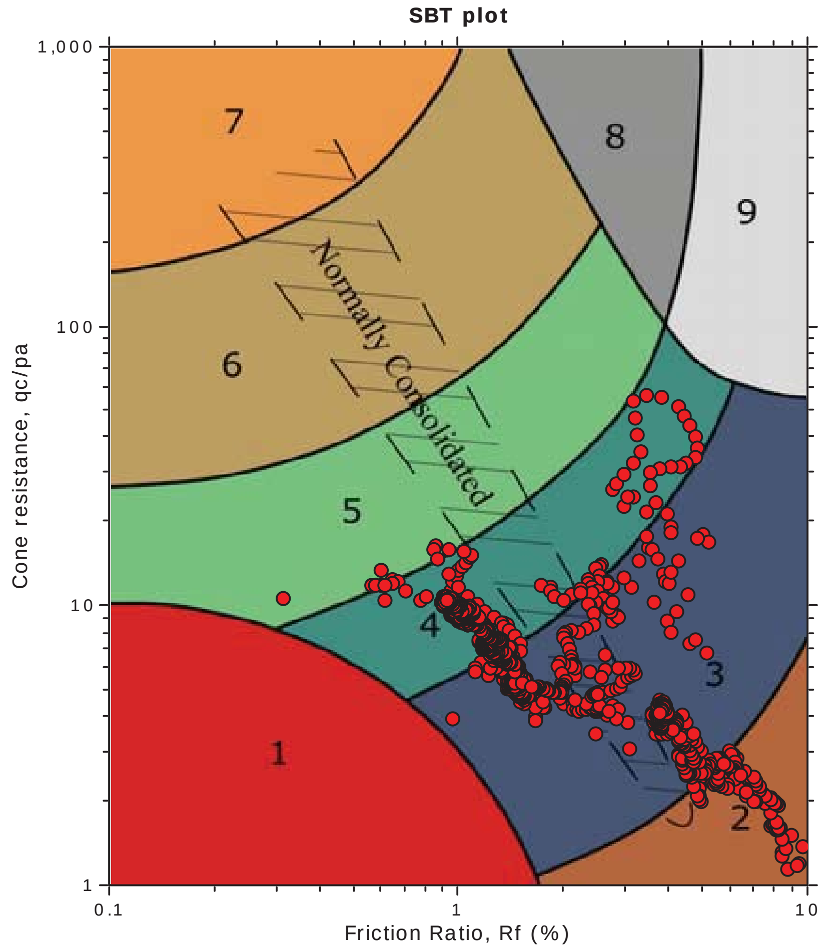


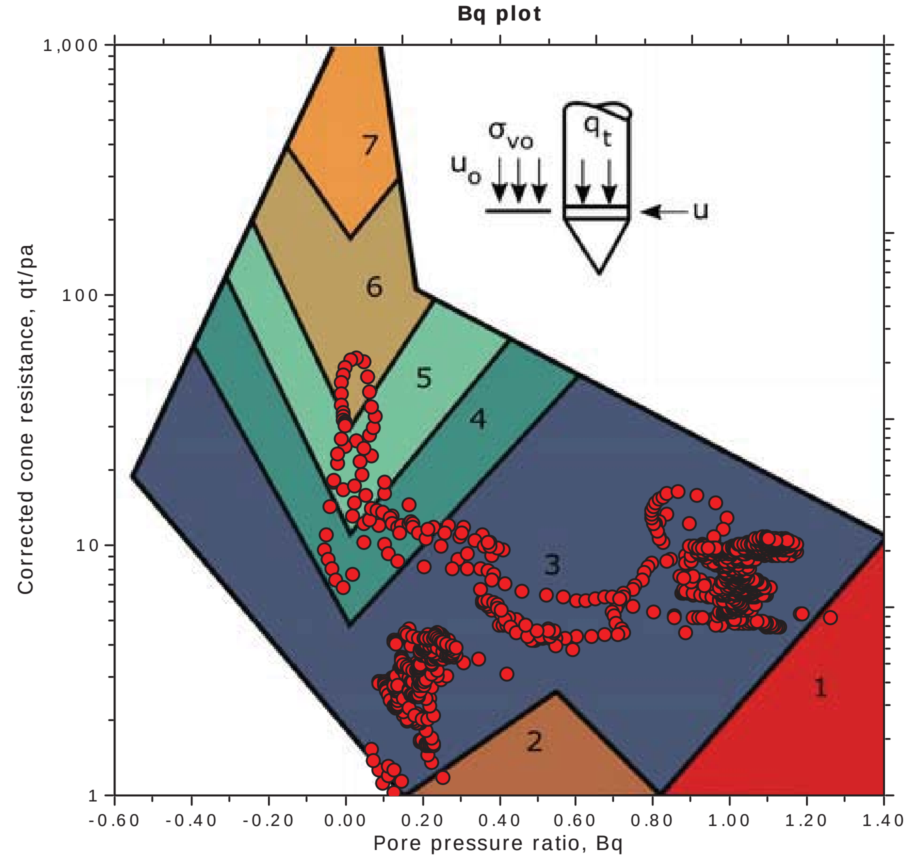
GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

CPT: CPT-SW46-101
Total depth: 107.89 ft, Date: 10/14/2019
Surface Elevation: 3.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator: Summit Geoengineering / C. Coolidge

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**

SBT - Bq plots





SBT legend

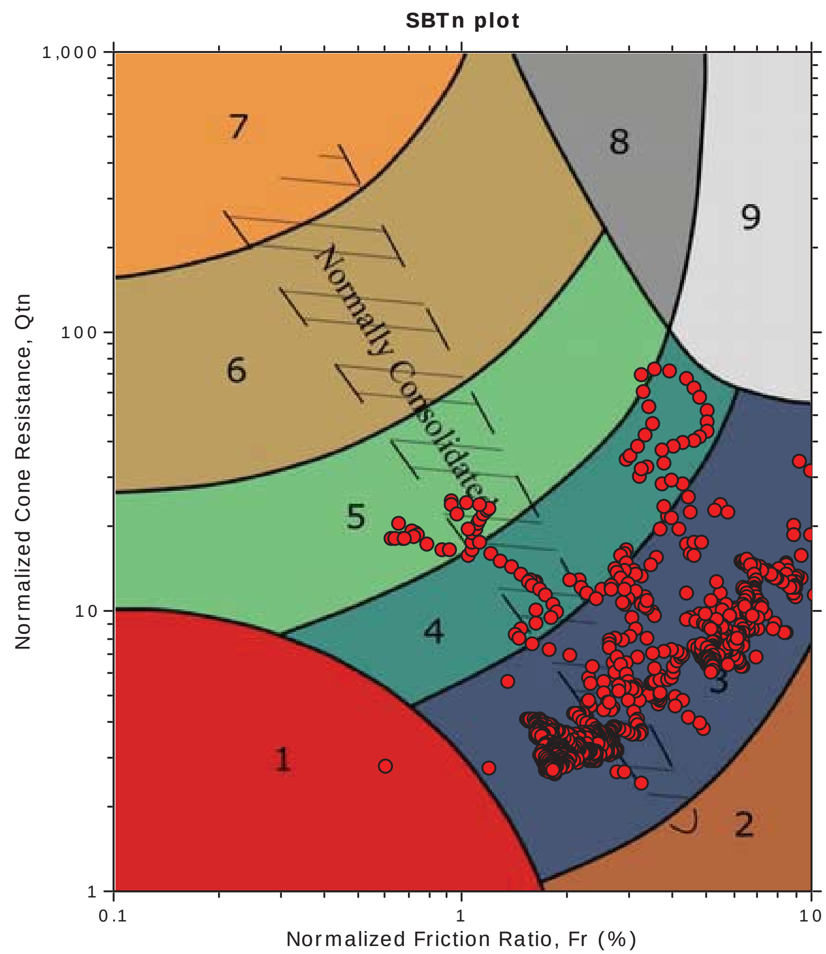
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

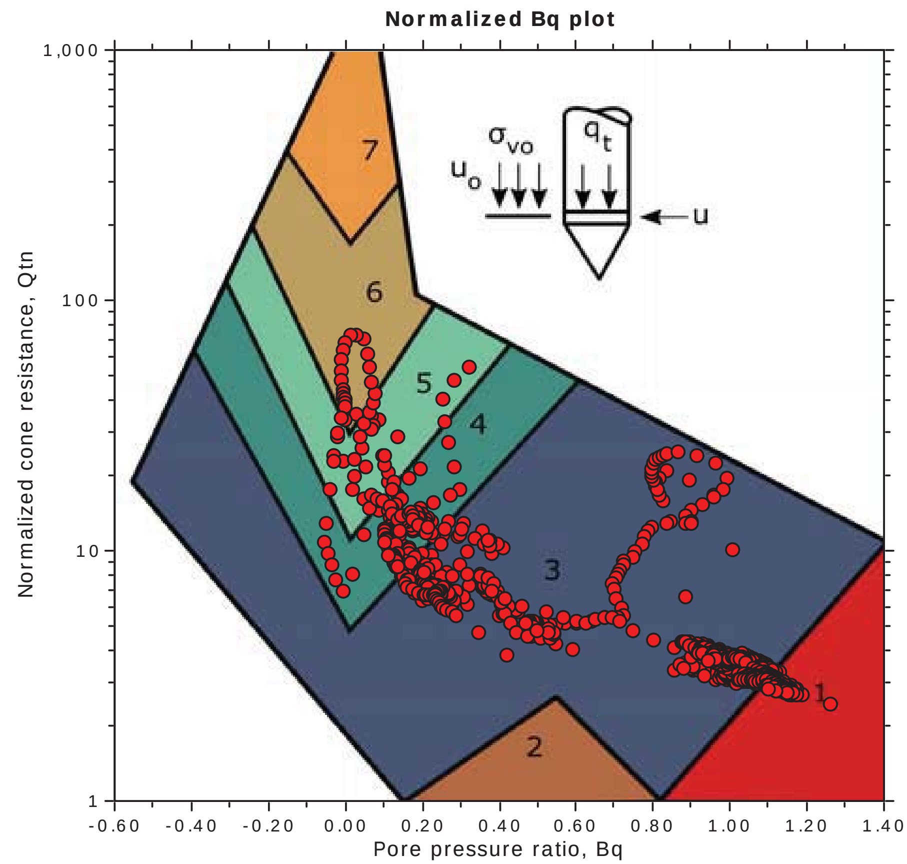
GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

Project: Station 46 Bridge Replacement
Location: Woolwich, Maine

CPT: CPT-SW46-101
Total depth: 107.89 ft, Date: 10/14/2019
Surface Elevation: 3.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator: Summit Geoengineering / C. Coolidge

SBT - Bq plots (normalized)





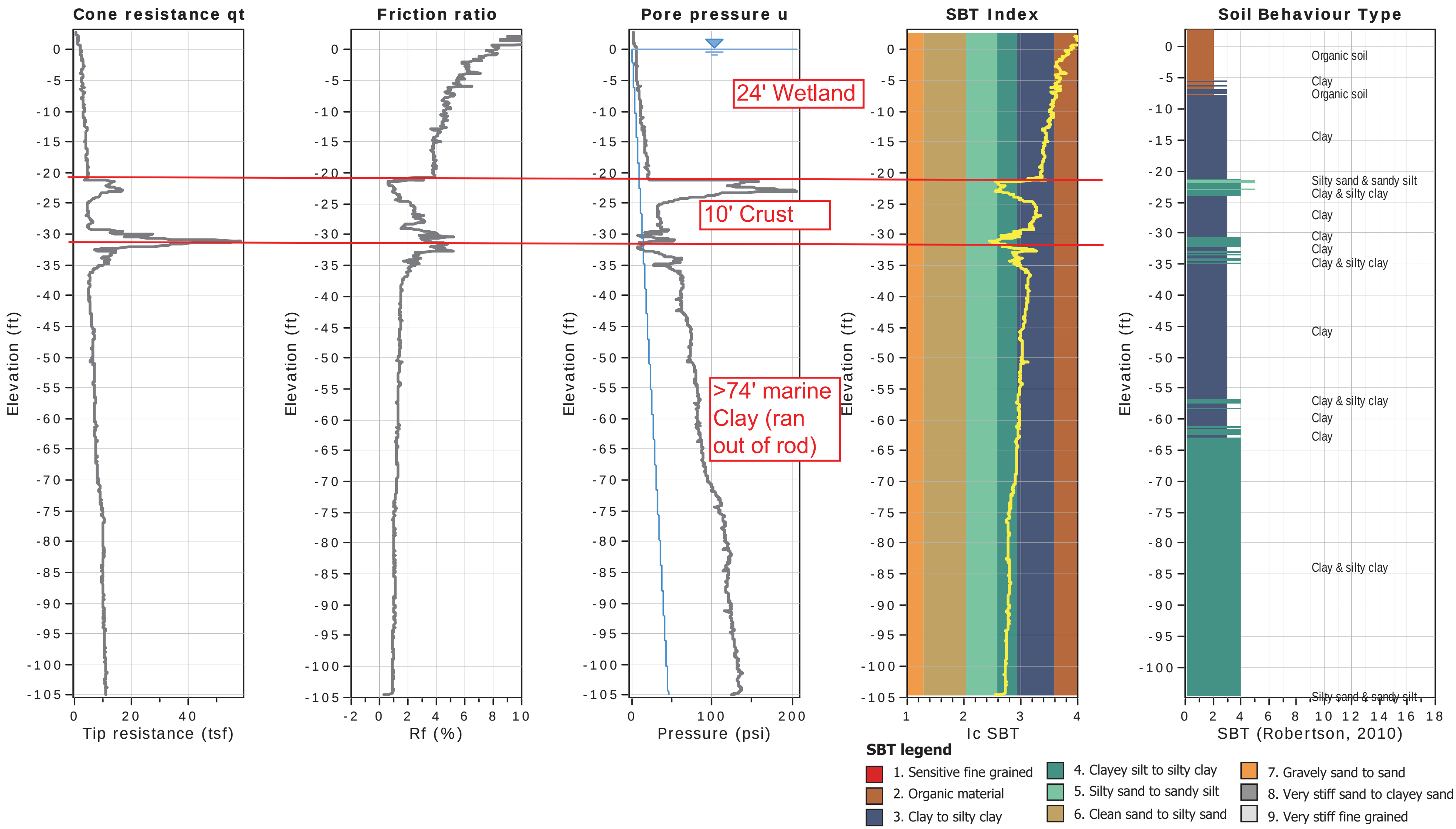
SBTn legend

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.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

Project: Station 46 Bridge Replacement
Location: Woolwich, Maine

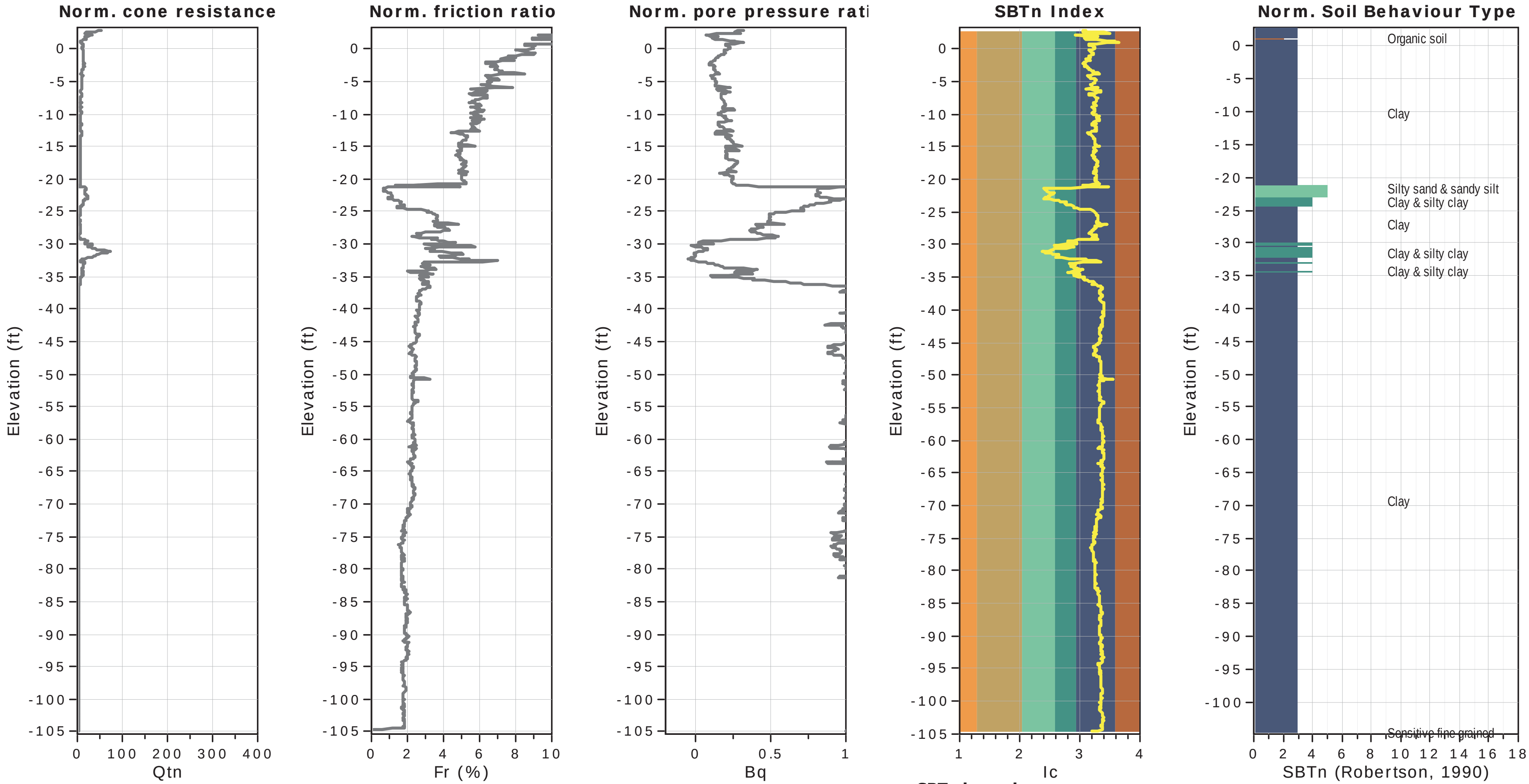
CPT: CPT-SW46-101
Total depth: 107.89 ft, Date: 10/14/2019
Surface Elevation: 3.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator: Summit Geoengineering / C. Coolidge



GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

CPT: CPT-SW46-101
Total depth: 107.89 ft, Date: 10/14/2019
Surface Elevation: 3.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator: Summit Geoengineering / C. Coolidge

Project: Station 46 Bridge Replacement
Location: Woolwich, Maine



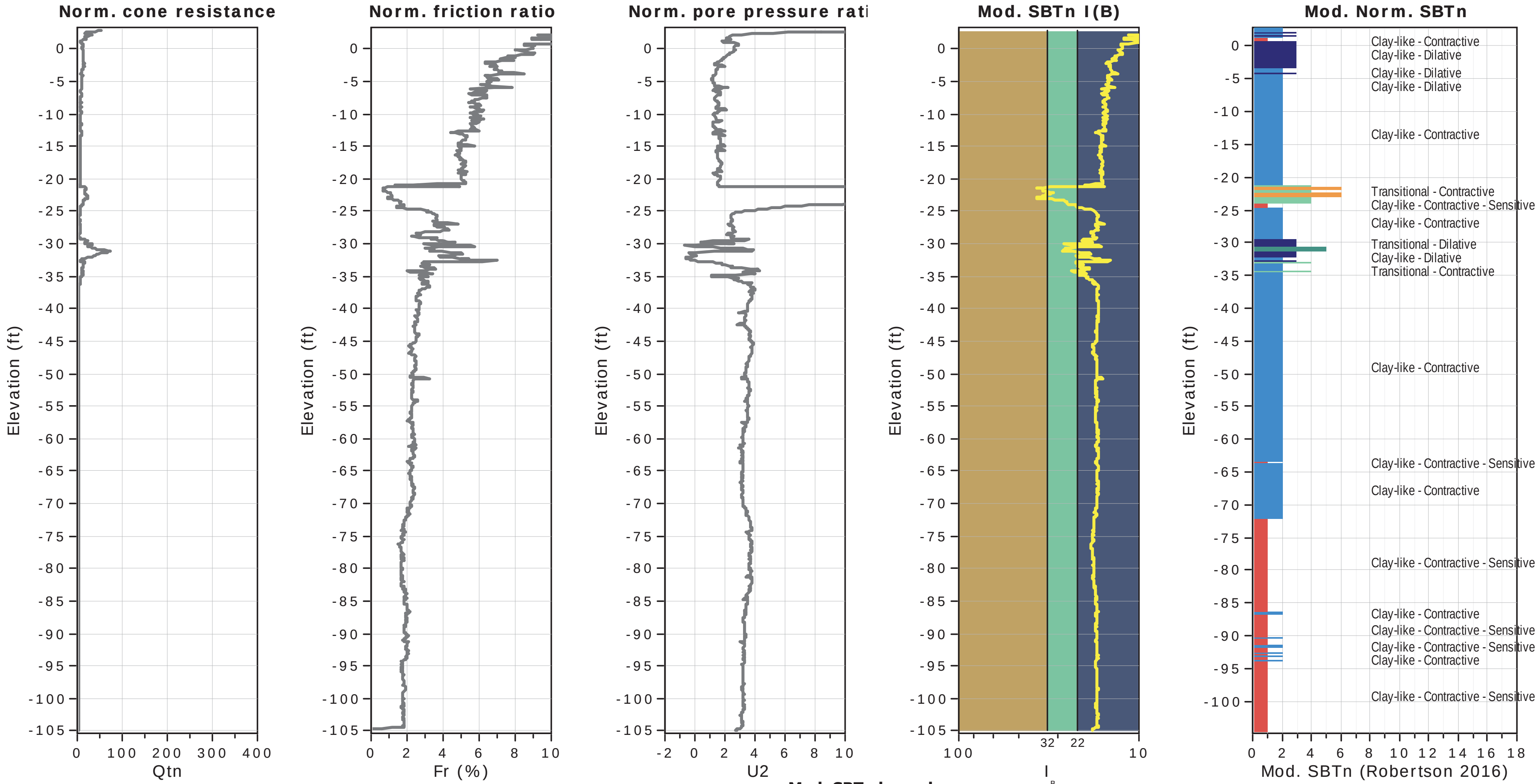
SBTn legend

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.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

CPT: CPT-SW46-101
Total depth: 107.89 ft, Date: 10/14/2019
Surface Elevation: 3.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator: Summit Geoengineering / C. Coolidge

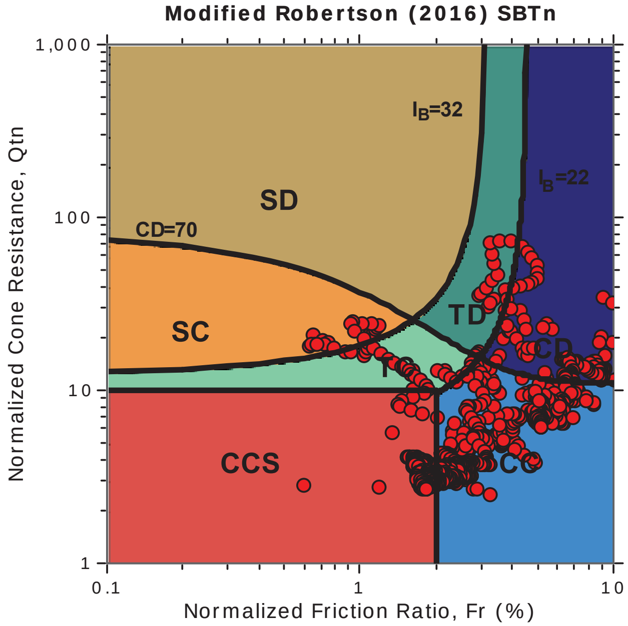
Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**

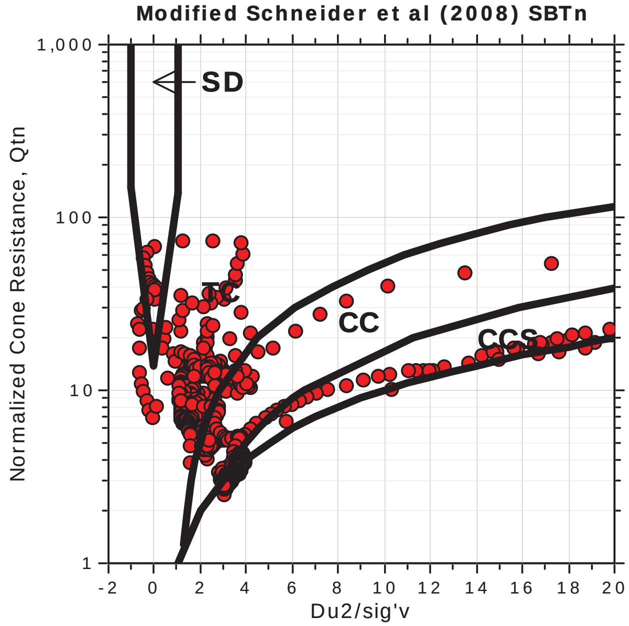


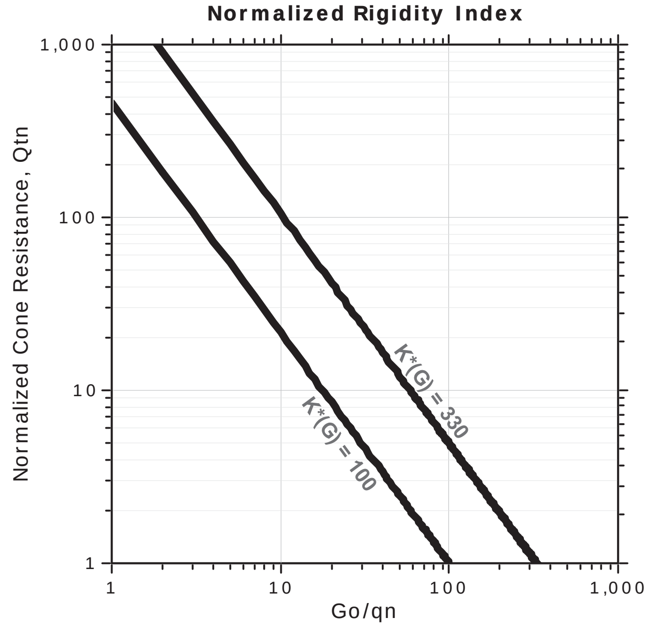
Mod. SBTn legend

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

Updated SBTn plots







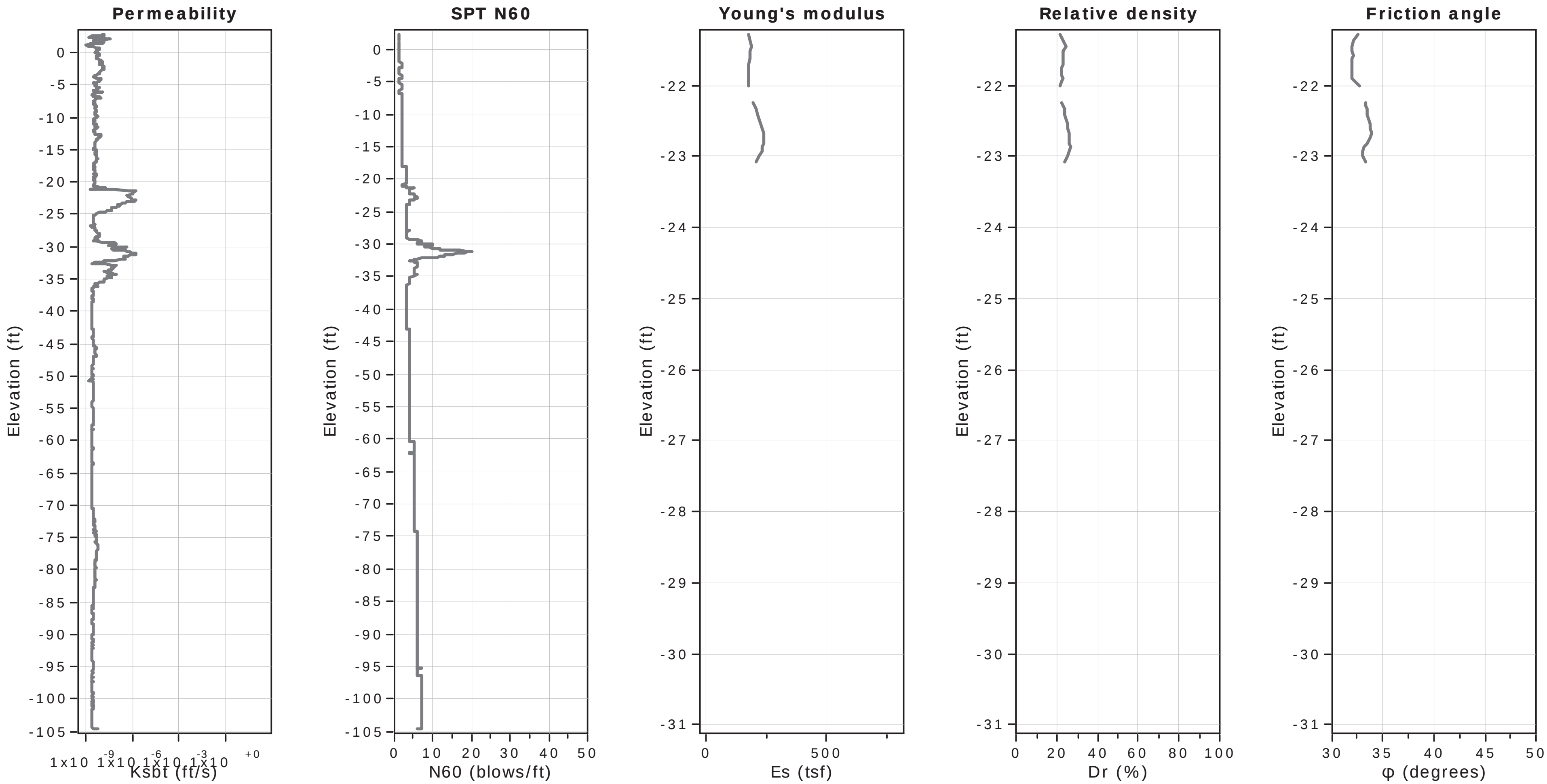
CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
TD: Transitional - Dilative
SC: Sand-like - Contractive
SD: Sand-like - Dilative

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

GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

CPT: CPT-SW46-101
Total depth: 107.89 ft, Date: 10/14/2019
Surface Elevation: 3.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator: Summit Geoengineering / C. Coolidge

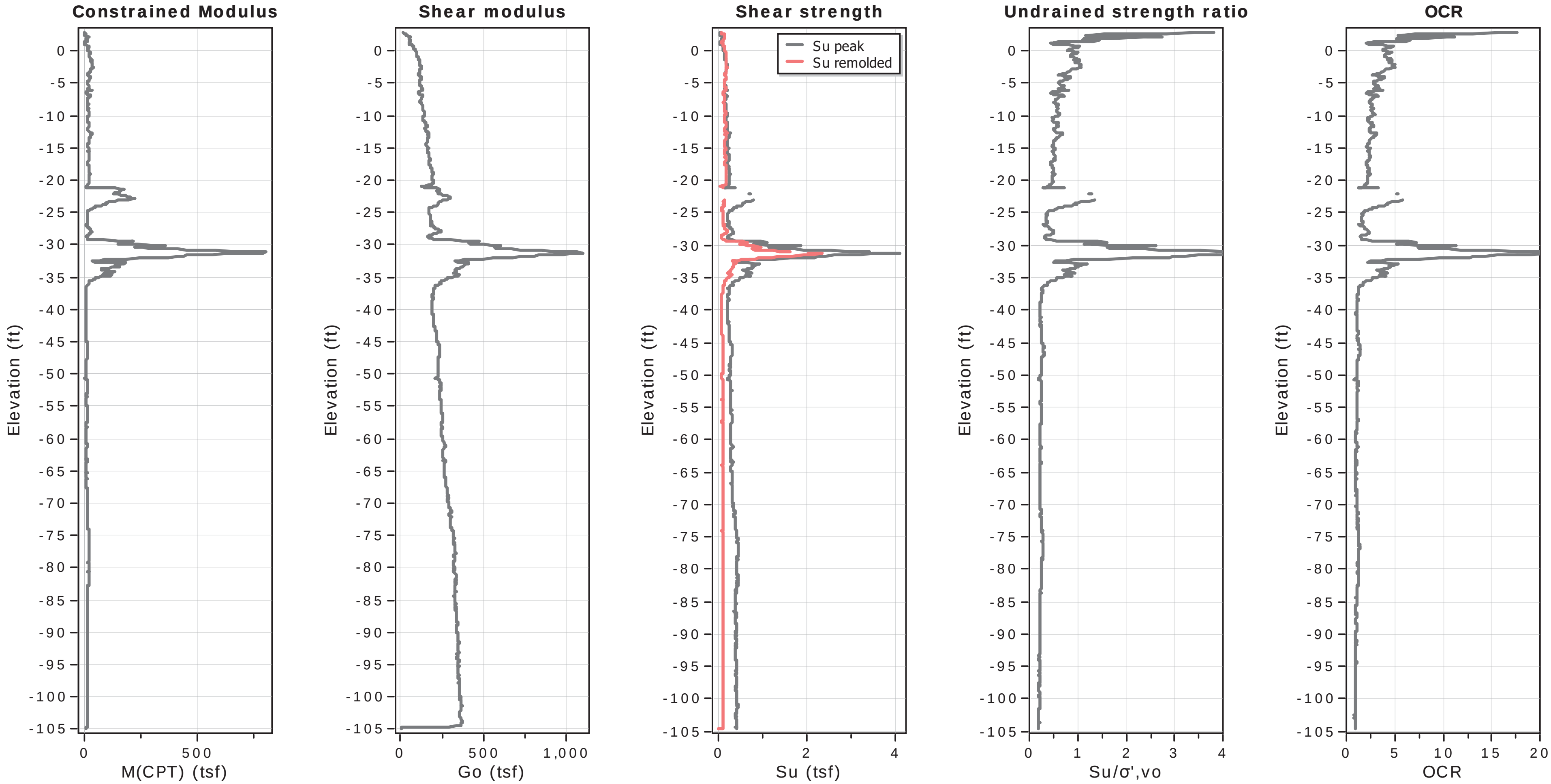
Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**



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



Calculation parameters

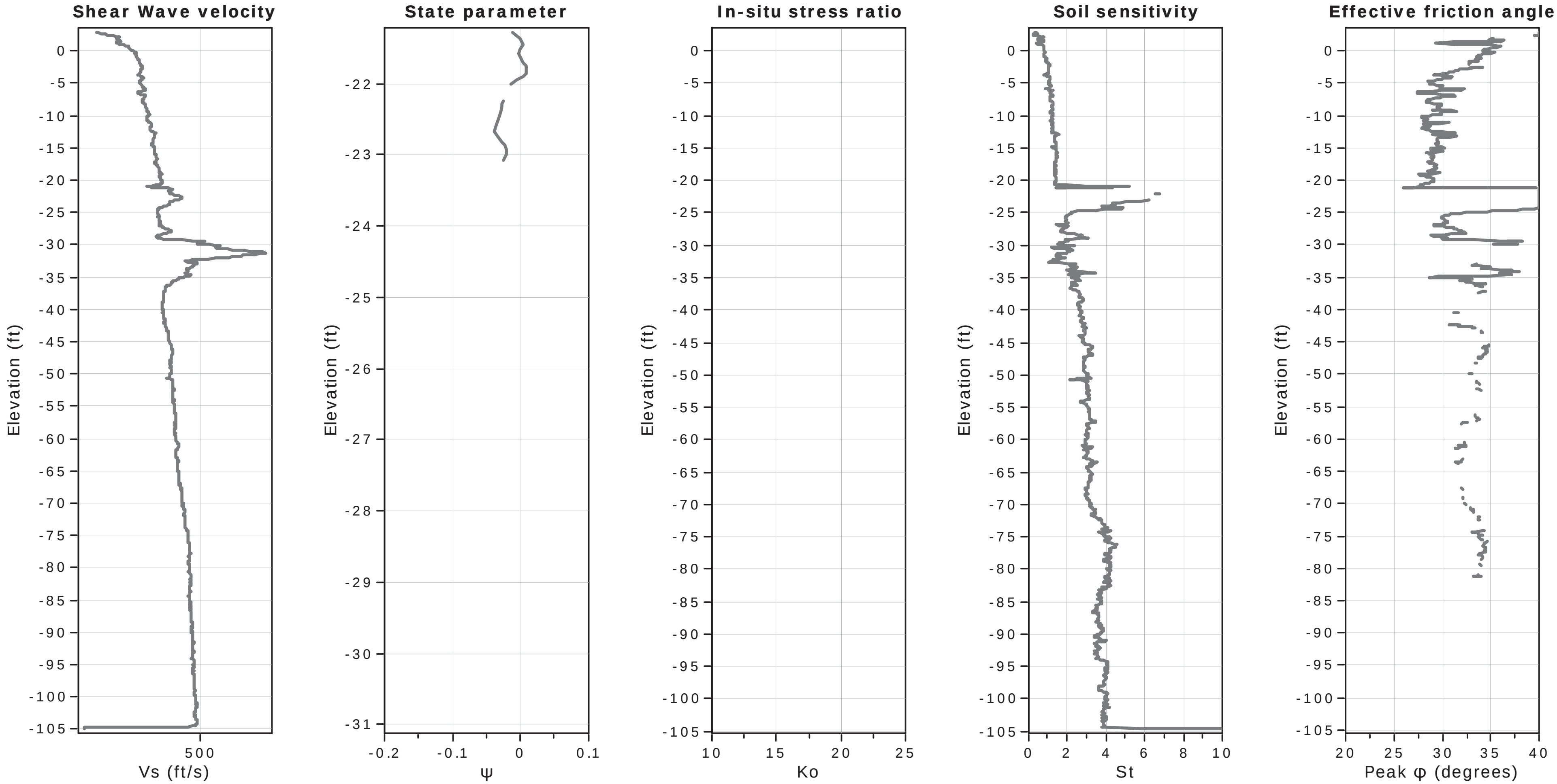
Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14

OCR factor for clays, N_{kt}: 0.33
User defined estimation data
Flat Dilatometer Test data

GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

CPT: CPT-SW46-101
Total depth: 107.89 ft, Date: 10/14/2019
Surface Elevation: 3.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator: Summit Geoengineering / C. Coolidge

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**



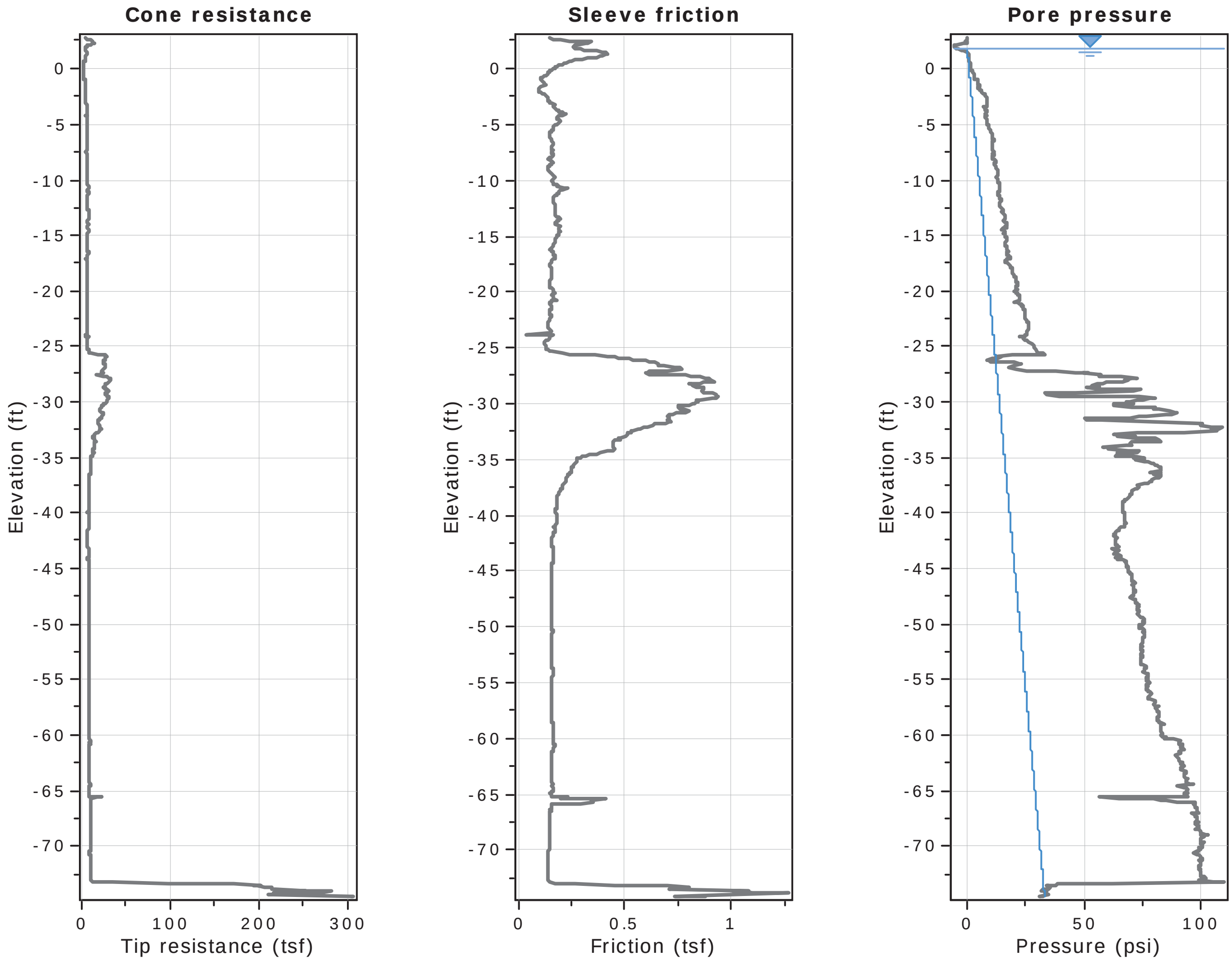
Calculation parameters

Soil Sensitivity factor, N_S: 7.00
User defined estimation data

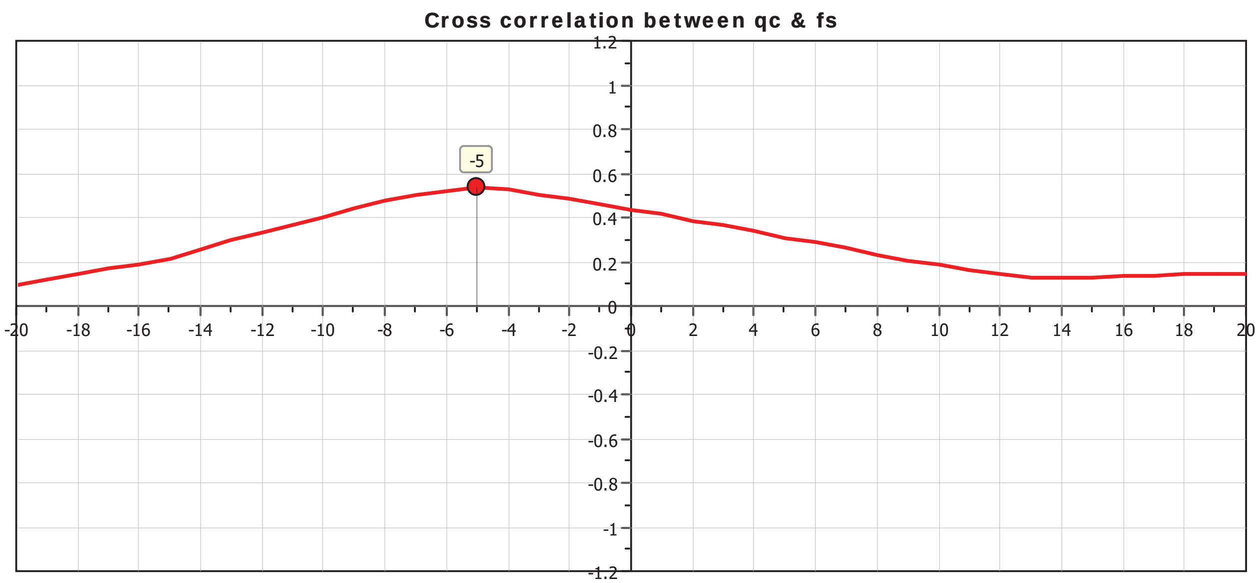
GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

CPT: CPT-WS46-201
Total depth: 77.44 ft, Date: 4/26/2021
Surface Elevation: 2.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

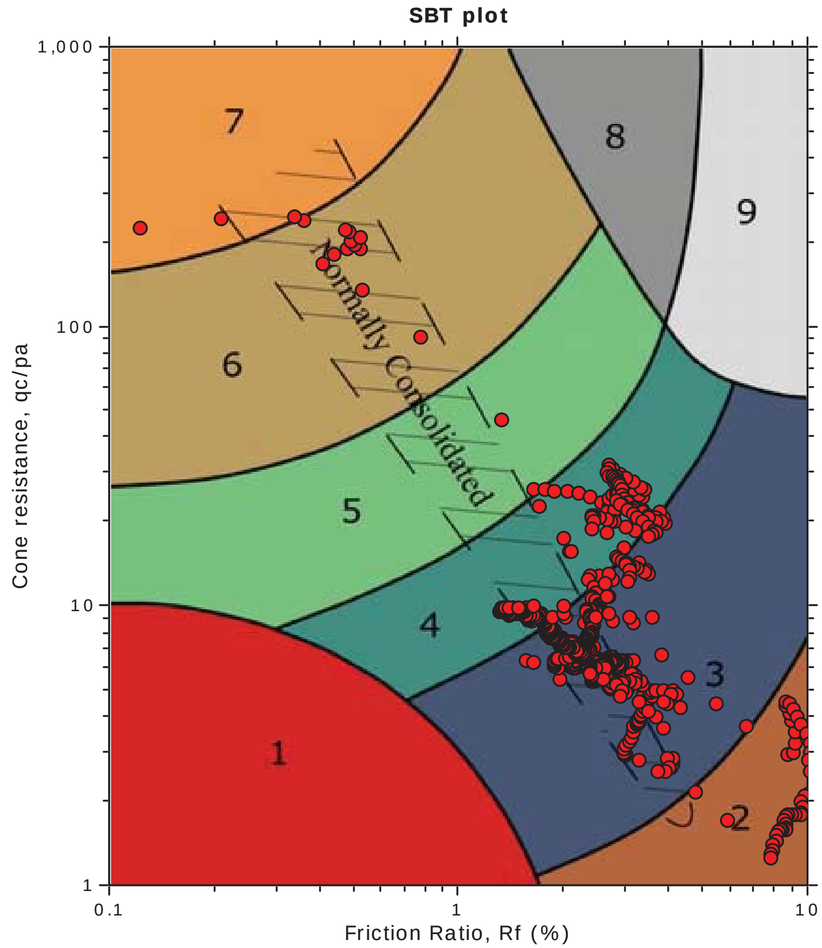
Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**

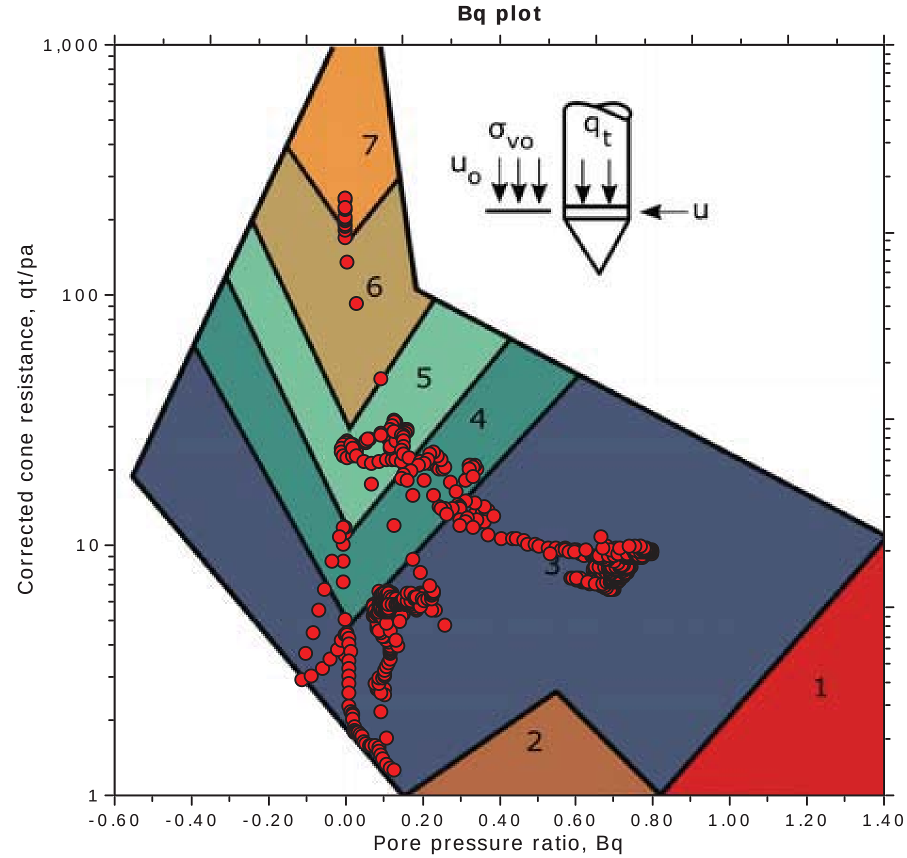


The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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

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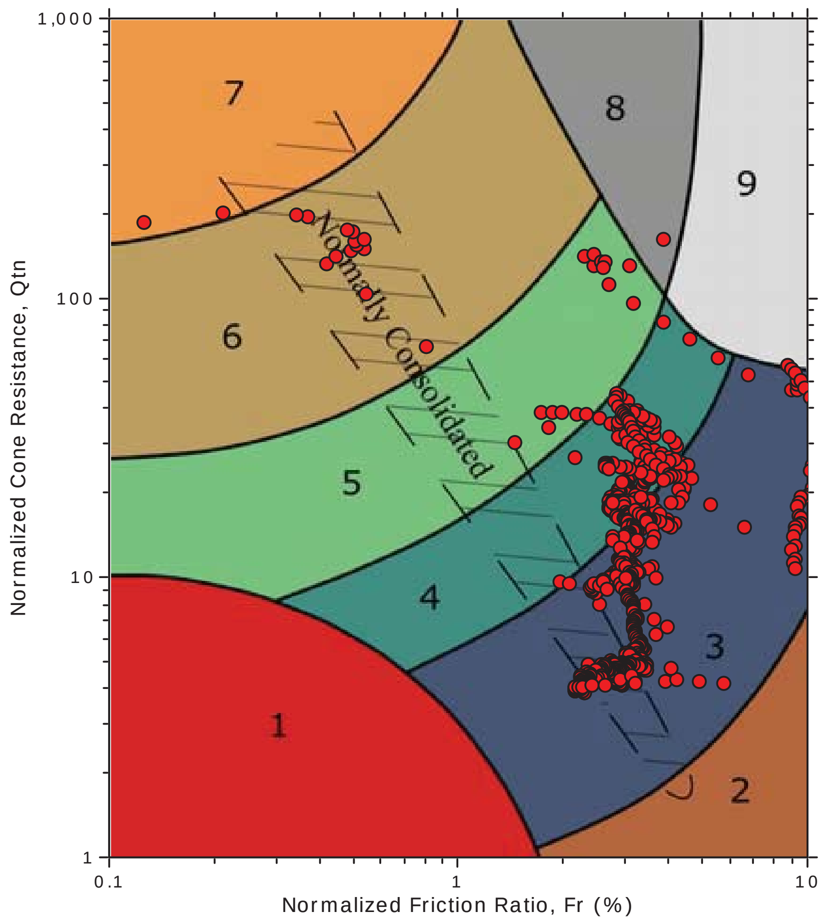
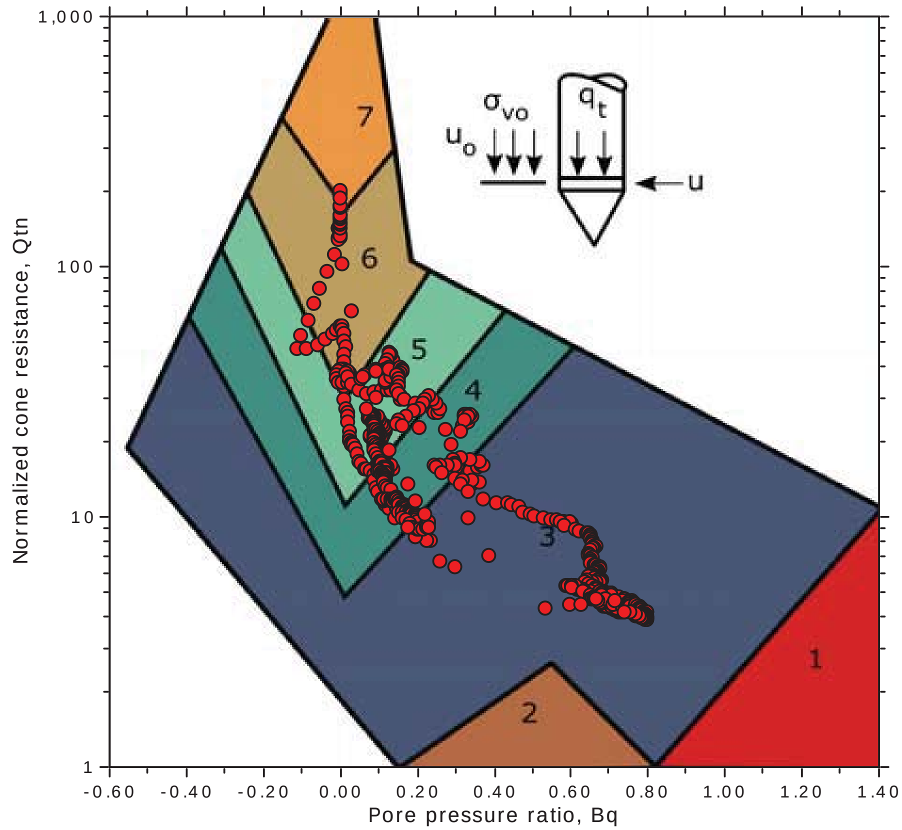
CPT: CPT-WS46-201
Total depth: 77.44 ft, Date: 4/26/2021
Surface Elevation: 2.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: Station 46 Bridge Replacement
Location: Woolwich, Maine

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

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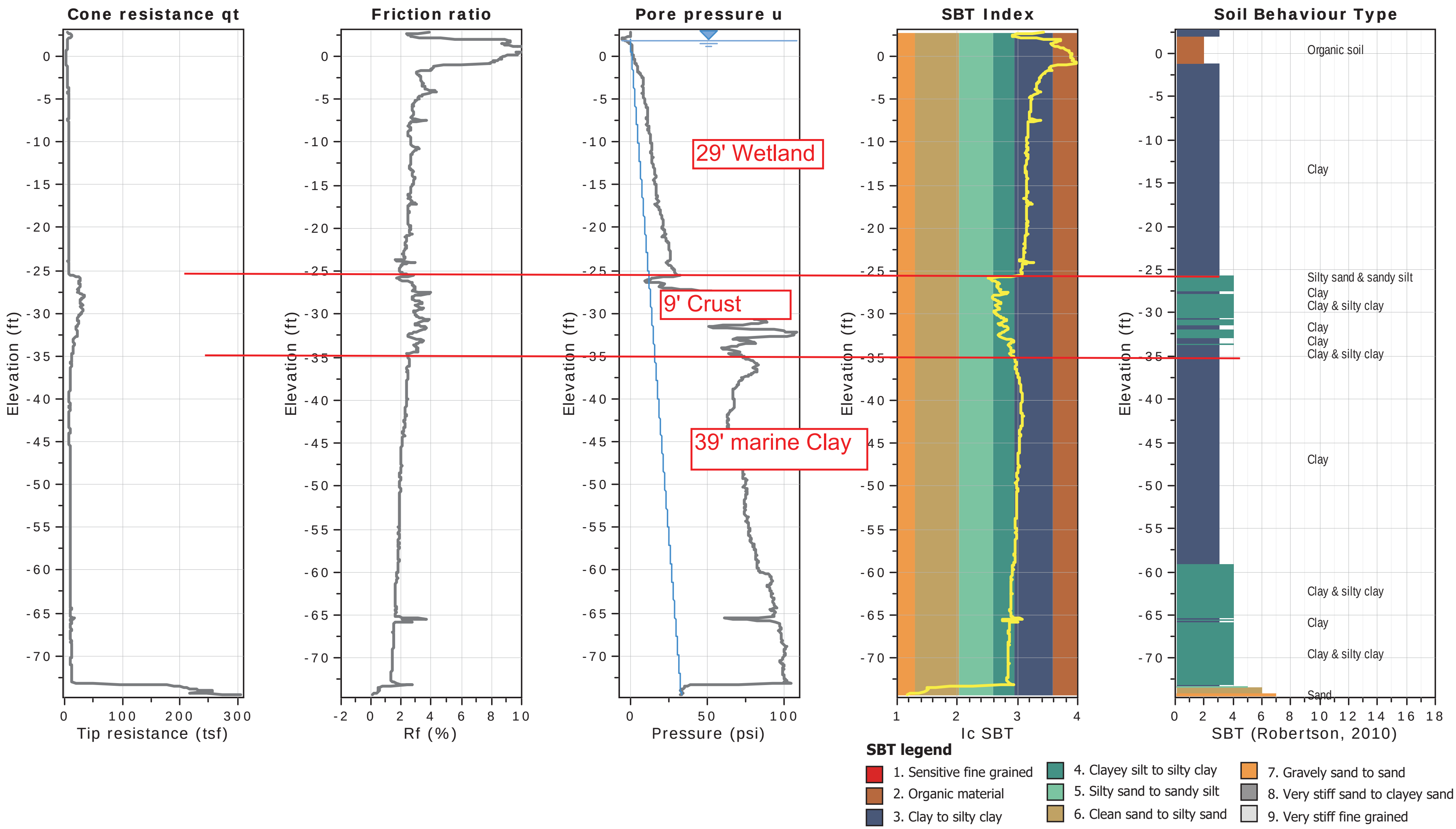
CPT: CPT-WS46-201
Total depth: 77.44 ft, Date: 4/26/2021
Surface Elevation: 2.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

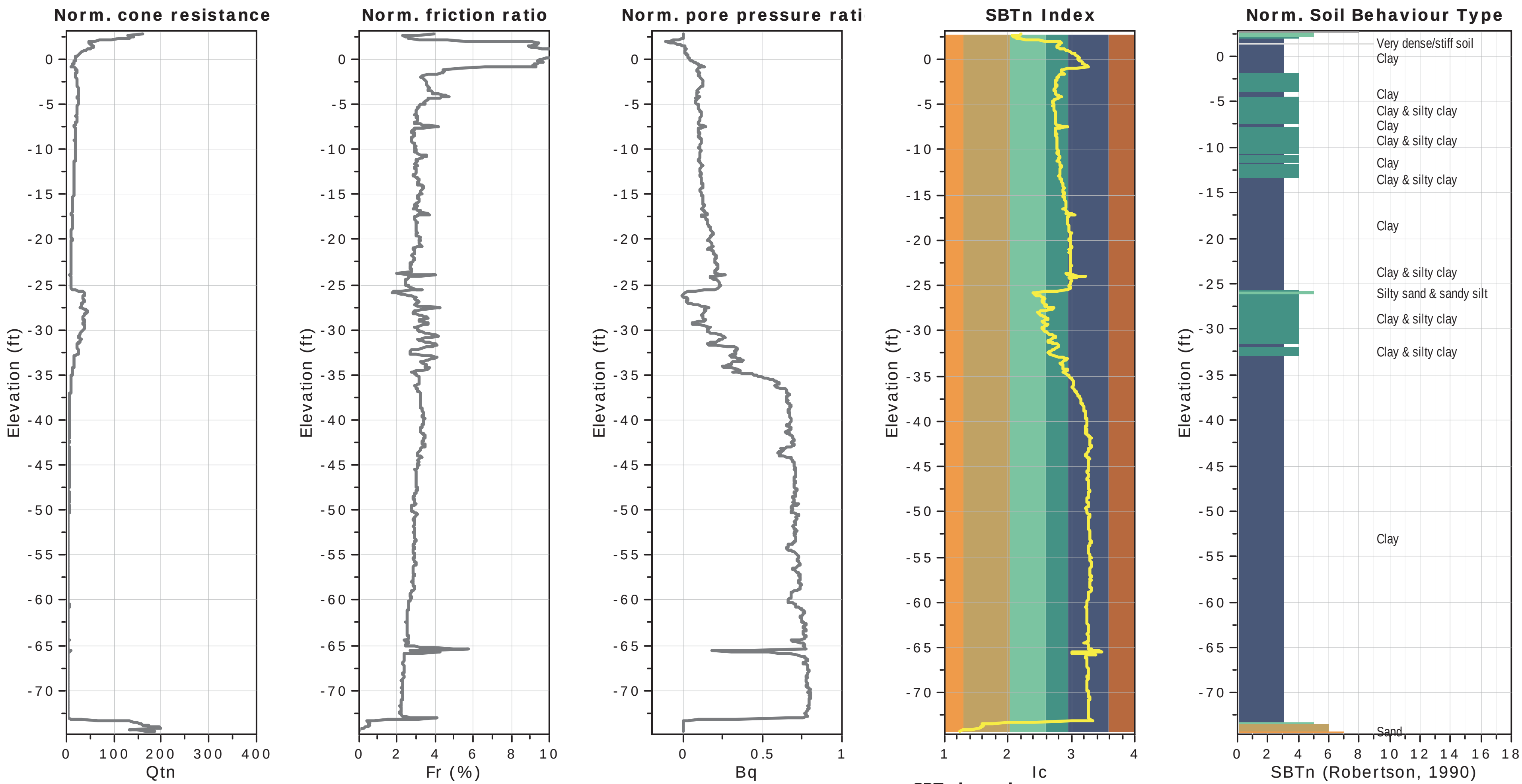
Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**



GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

Project: Station 46 Bridge Replacement
Location: Woolwich, Maine

CPT: CPT-WS46-201
Total depth: 77.44 ft, Date: 4/26/2021
Surface Elevation: 2.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:



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

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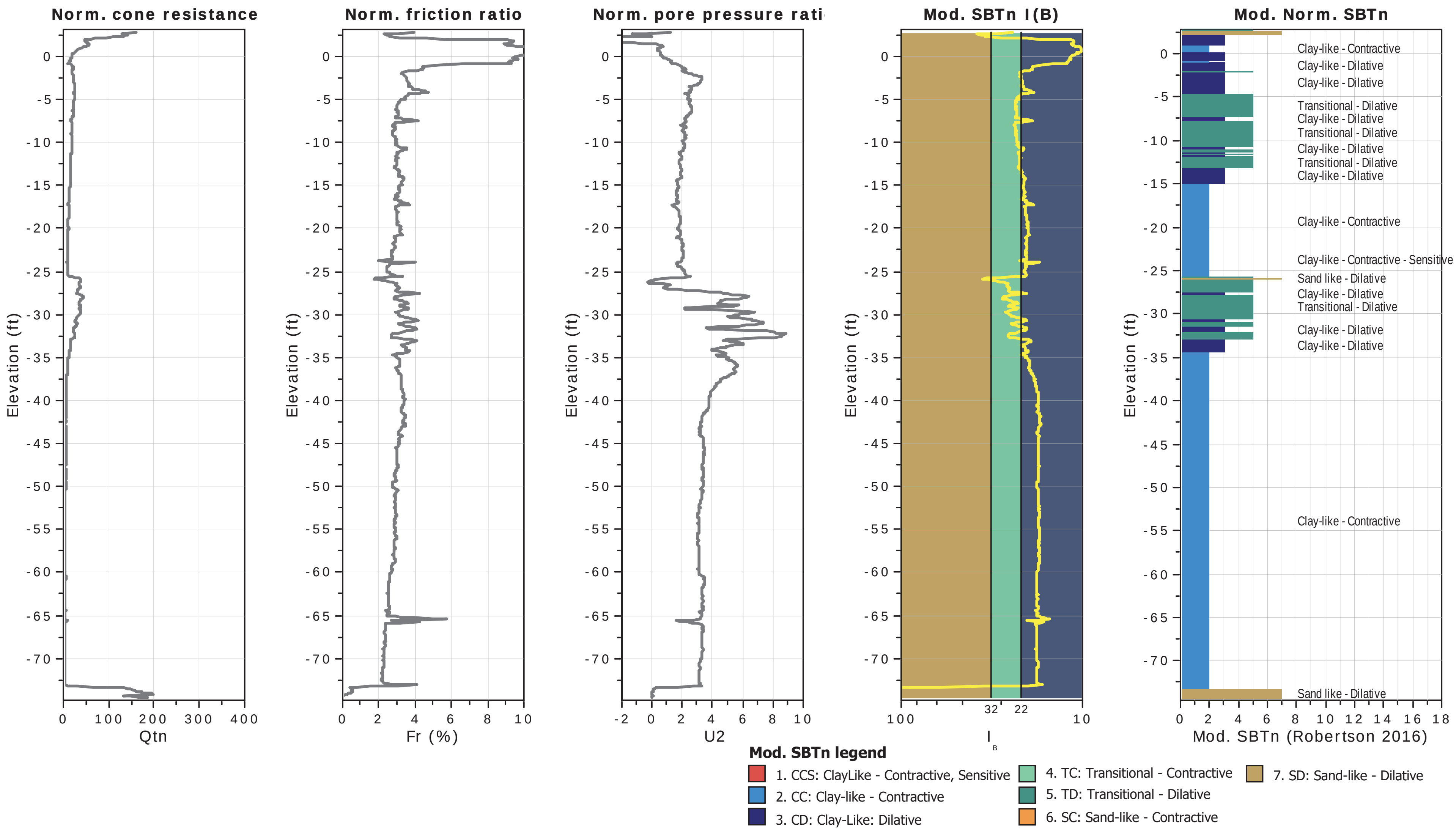
Project: Station 46 Bridge Replacement
Location: Woolwich, Maine

CPT: CPT-WS46-201
Total depth: 77.44 ft, Date: 4/26/2021
Surface Elevation: 2.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:



GZA GeoEnvironmental, Inc.
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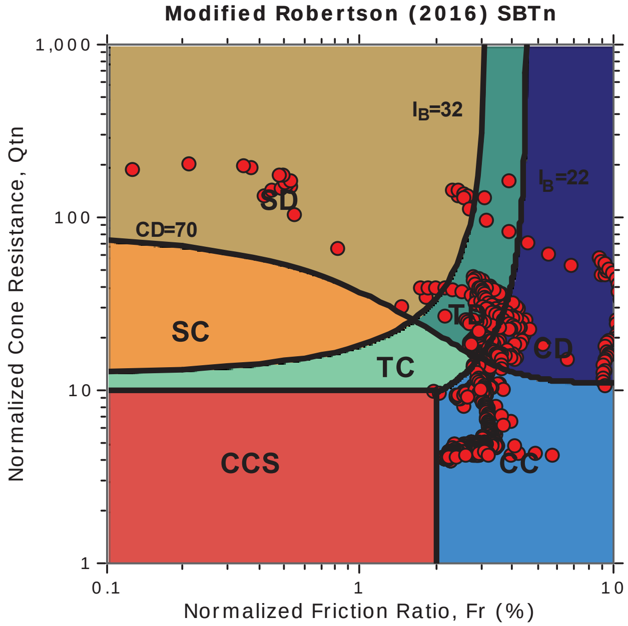
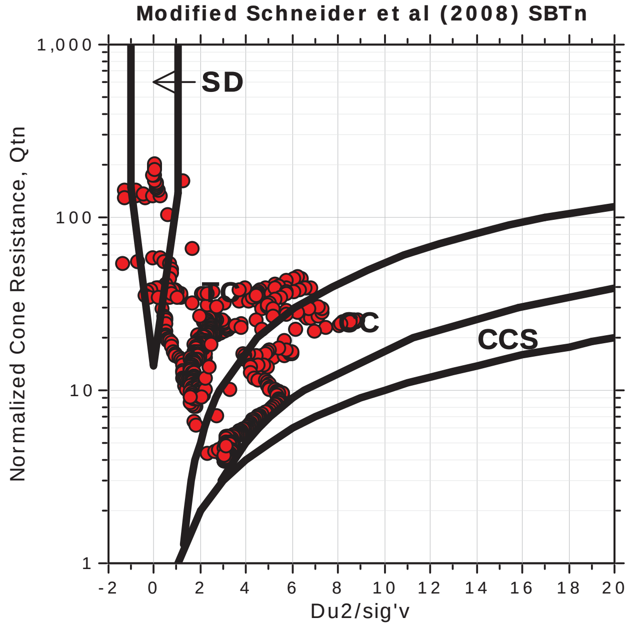
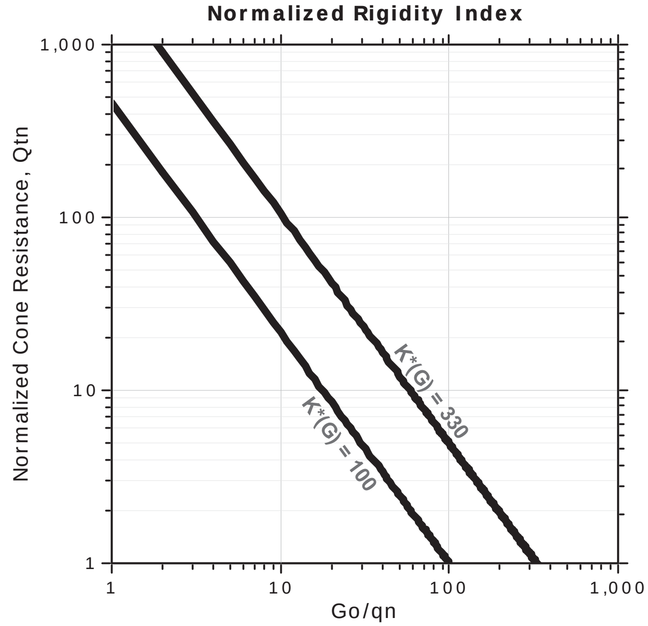
CPT: CPT-WS46-201
Total depth: 77.44 ft, Date: 4/26/2021
Surface Elevation: 2.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**

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)

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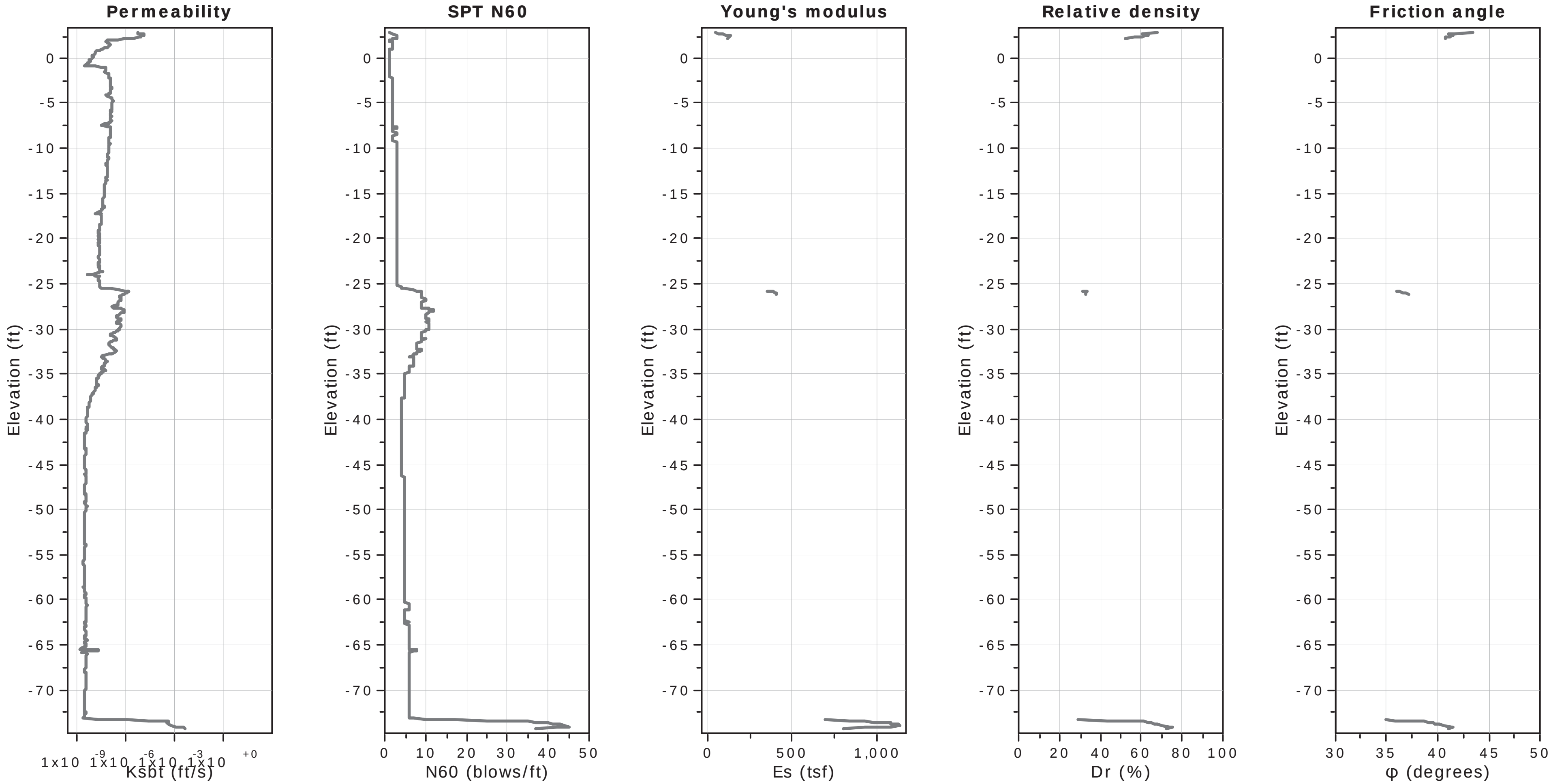
CPT: CPT-WS46-201
Total depth: 77.44 ft, Date: 4/26/2021
Surface Elevation: 2.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**



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

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CPT: CPT-WS46-201
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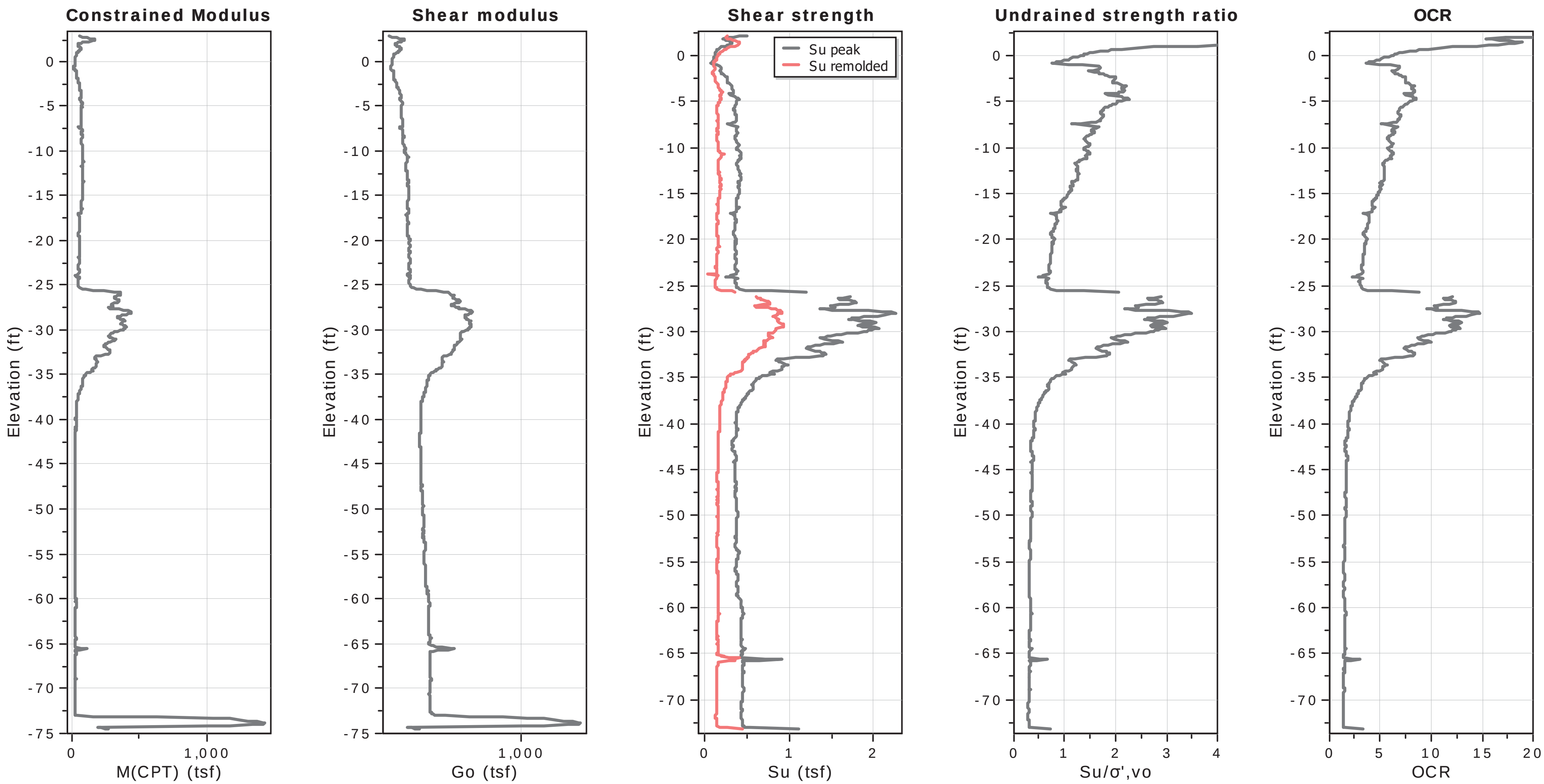
Surface Elevation: 2.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**



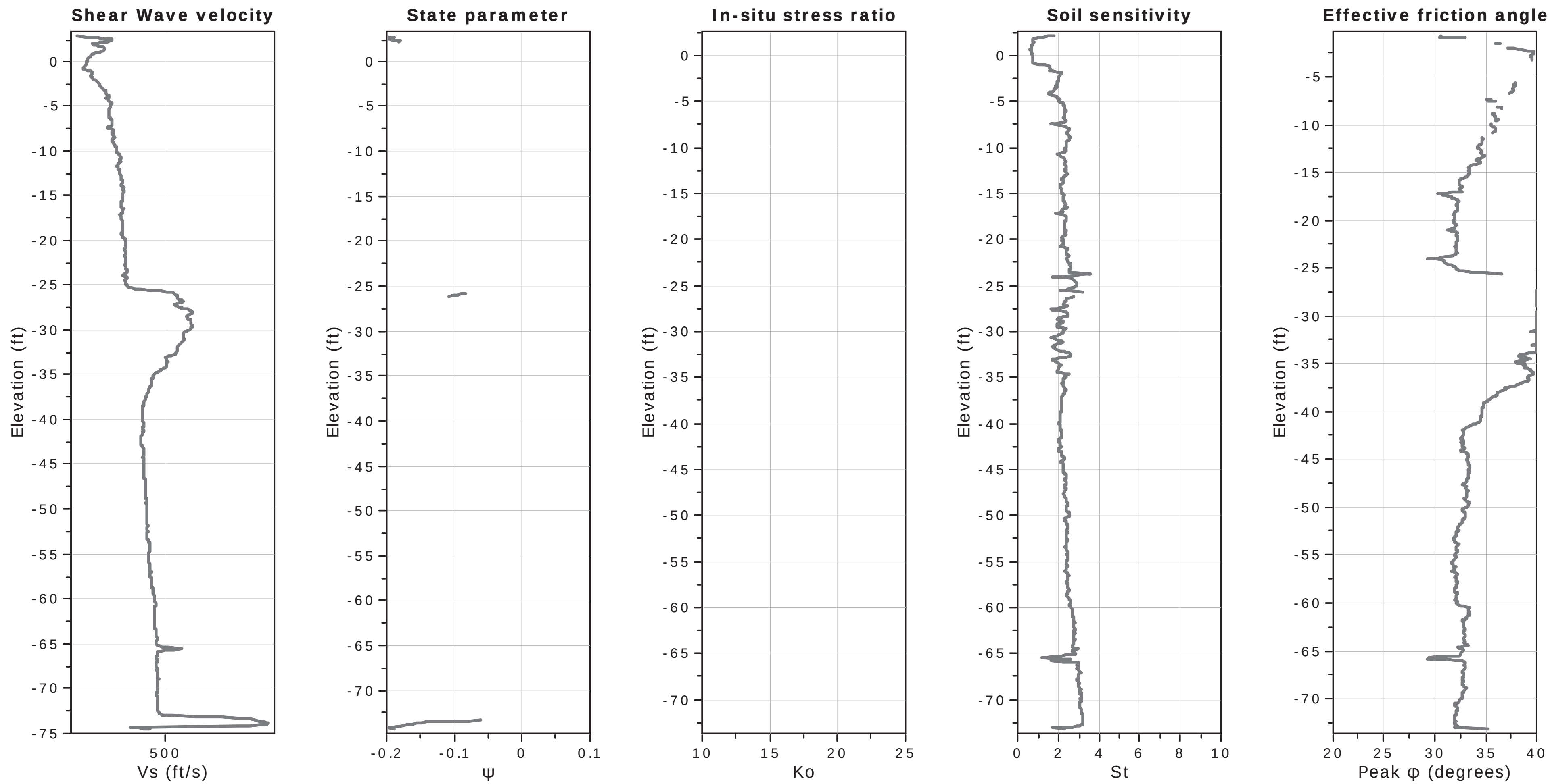
Calculation parameters
Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14

OCR factor for clays, N_{kt}: 0.33
User defined estimation data
Flat Dilatometer Test data

GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

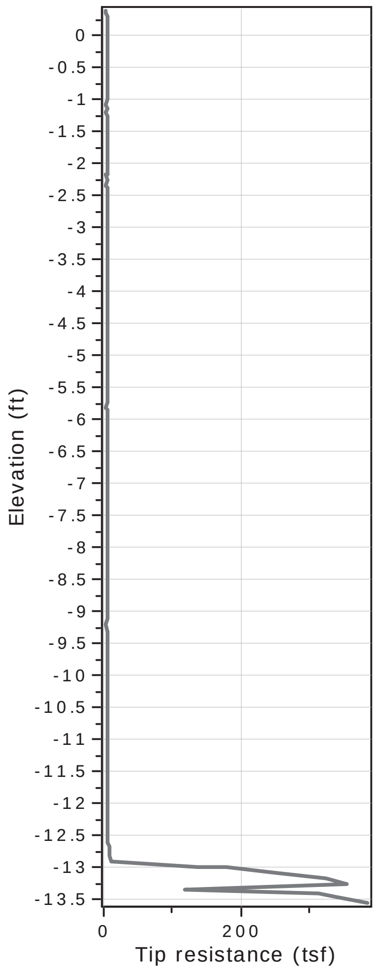
CPT: CPT-WS46-201
Total depth: 77.44 ft, Date: 4/26/2021
Surface Elevation: 2.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

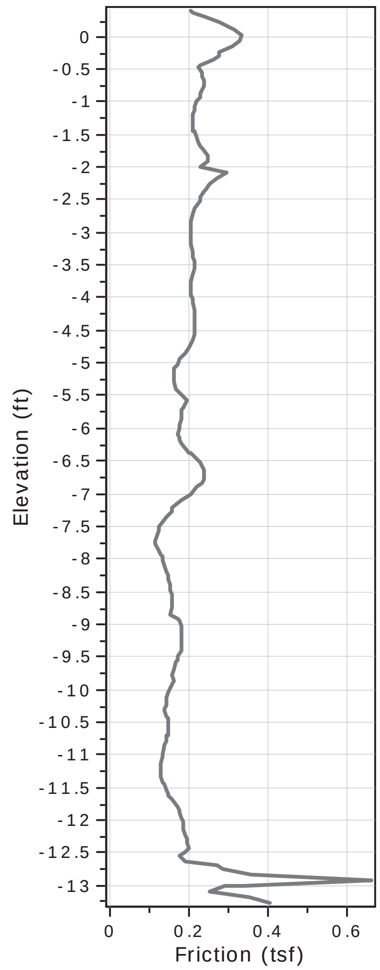
Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**

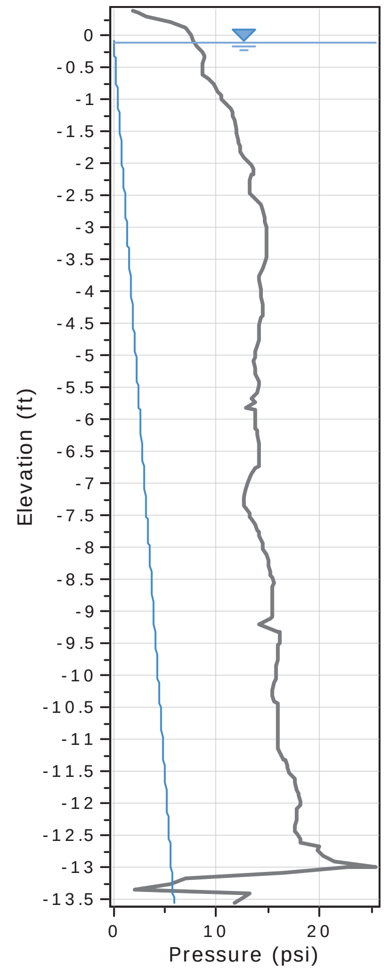


Calculation parameters

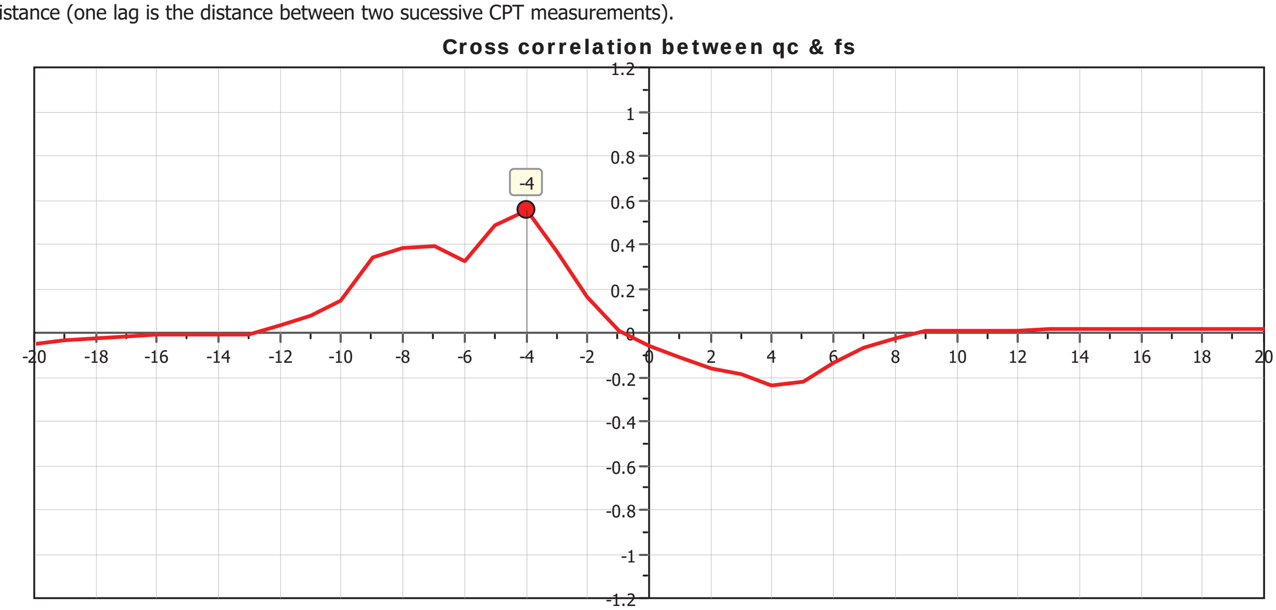
Soil Sensitivity factor, N_S: 7.00
User defined estimation data







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).

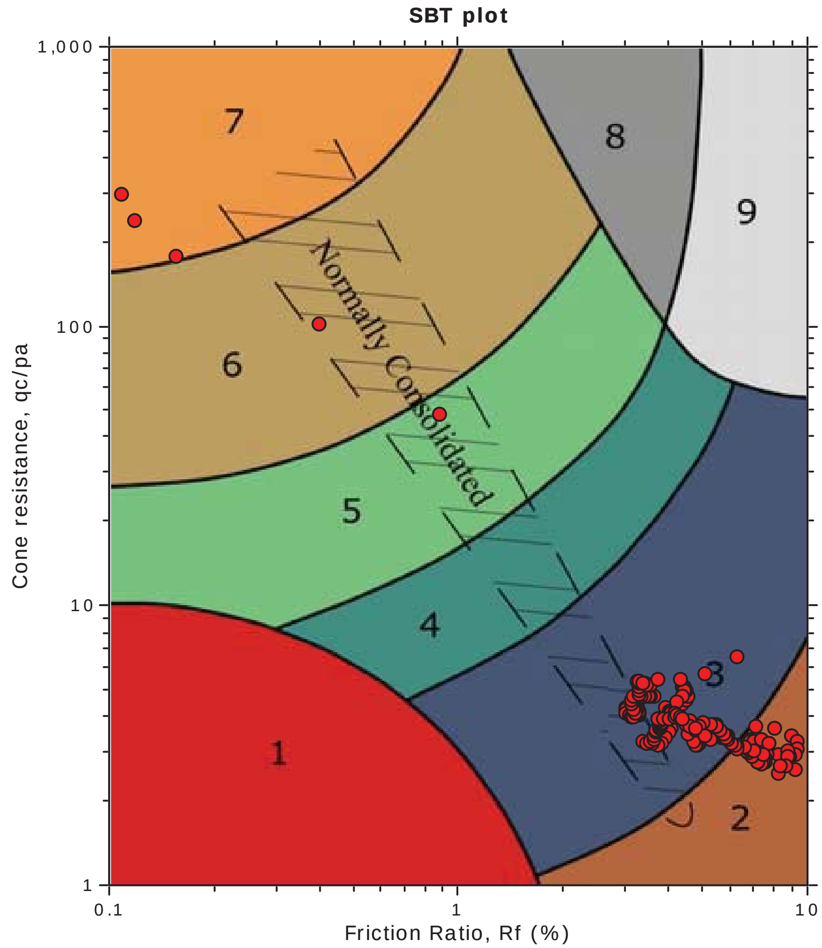


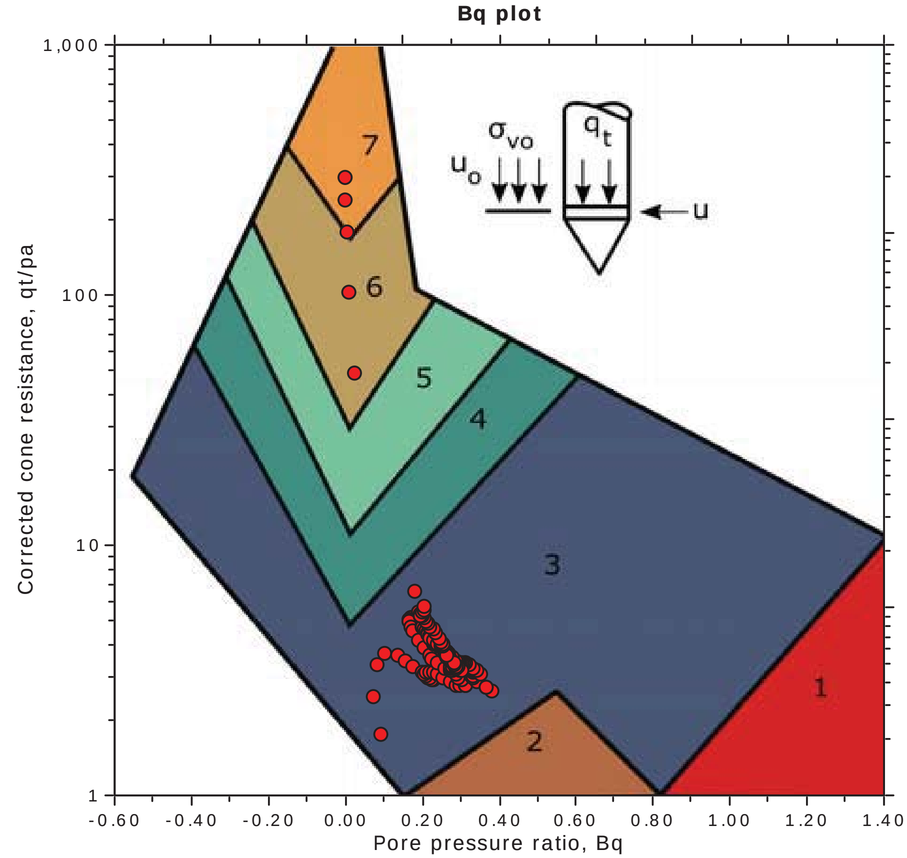
GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

Project: Station 46 Bridge Replacement
Location: Woolwich, Maine

CPT: CPT-WS46-202
Total depth: 19.46 ft, Date: 4/26/2021
Surface Elevation: 5.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

SBT - Bq plots





SBT legend

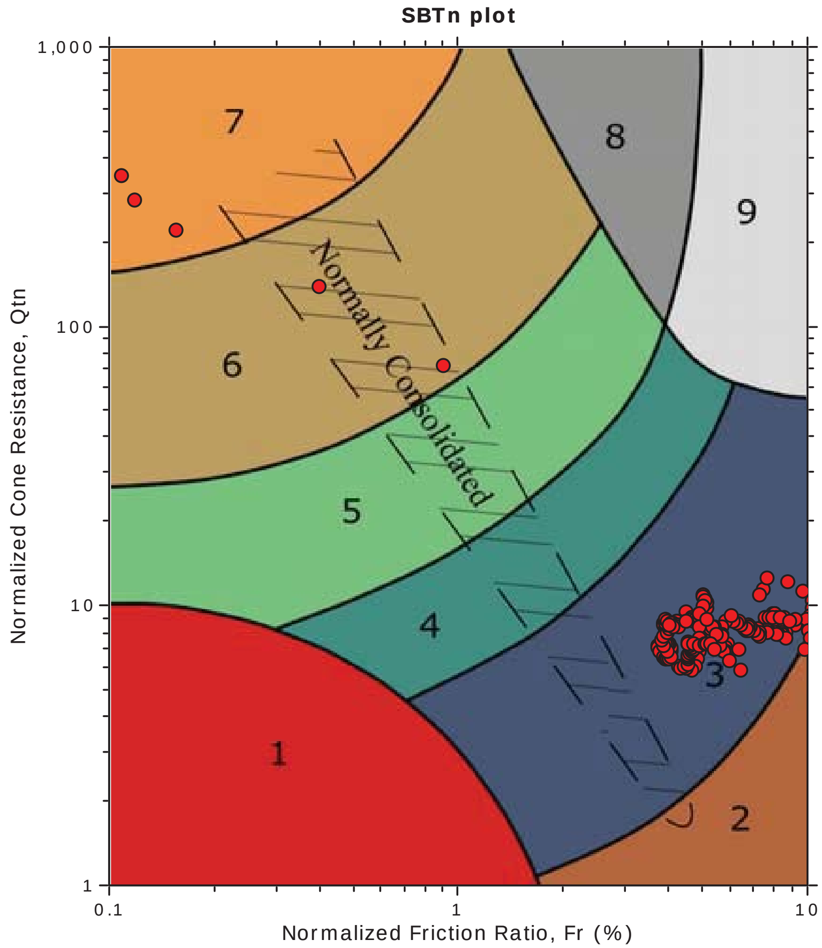
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

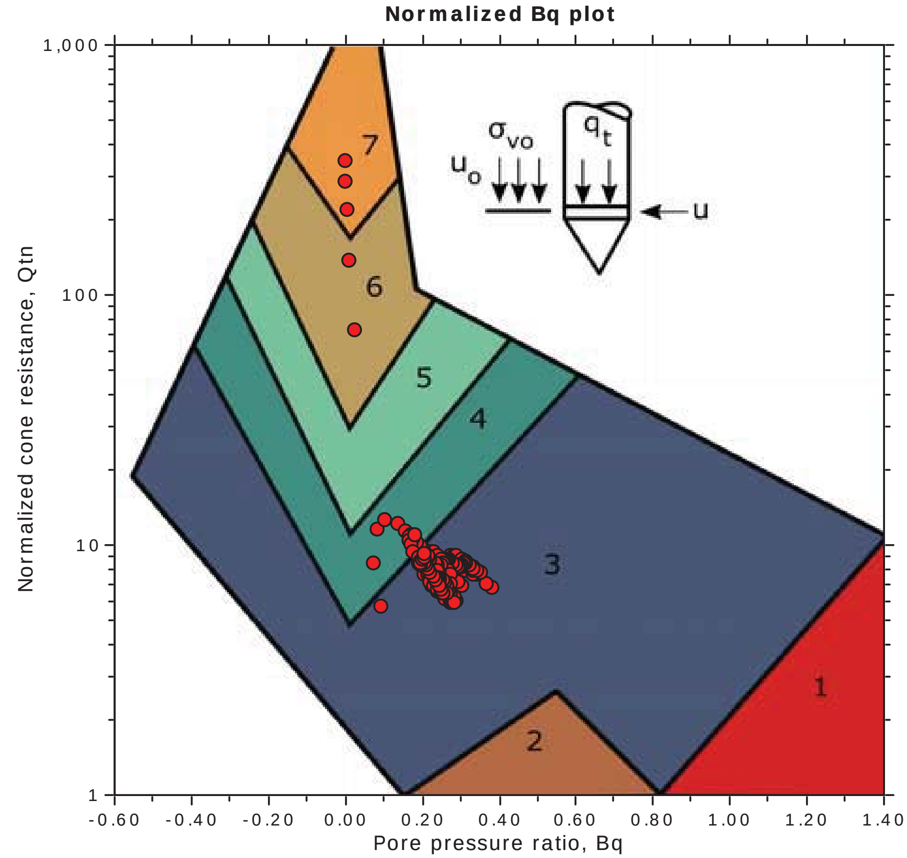
GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

Project: Station 46 Bridge Replacement
Location: Woolwich, Maine

CPT: CPT-WS46-202
Total depth: 19.46 ft, Date: 4/26/2021
Surface Elevation: 5.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

SBT - Bq plots (normalized)





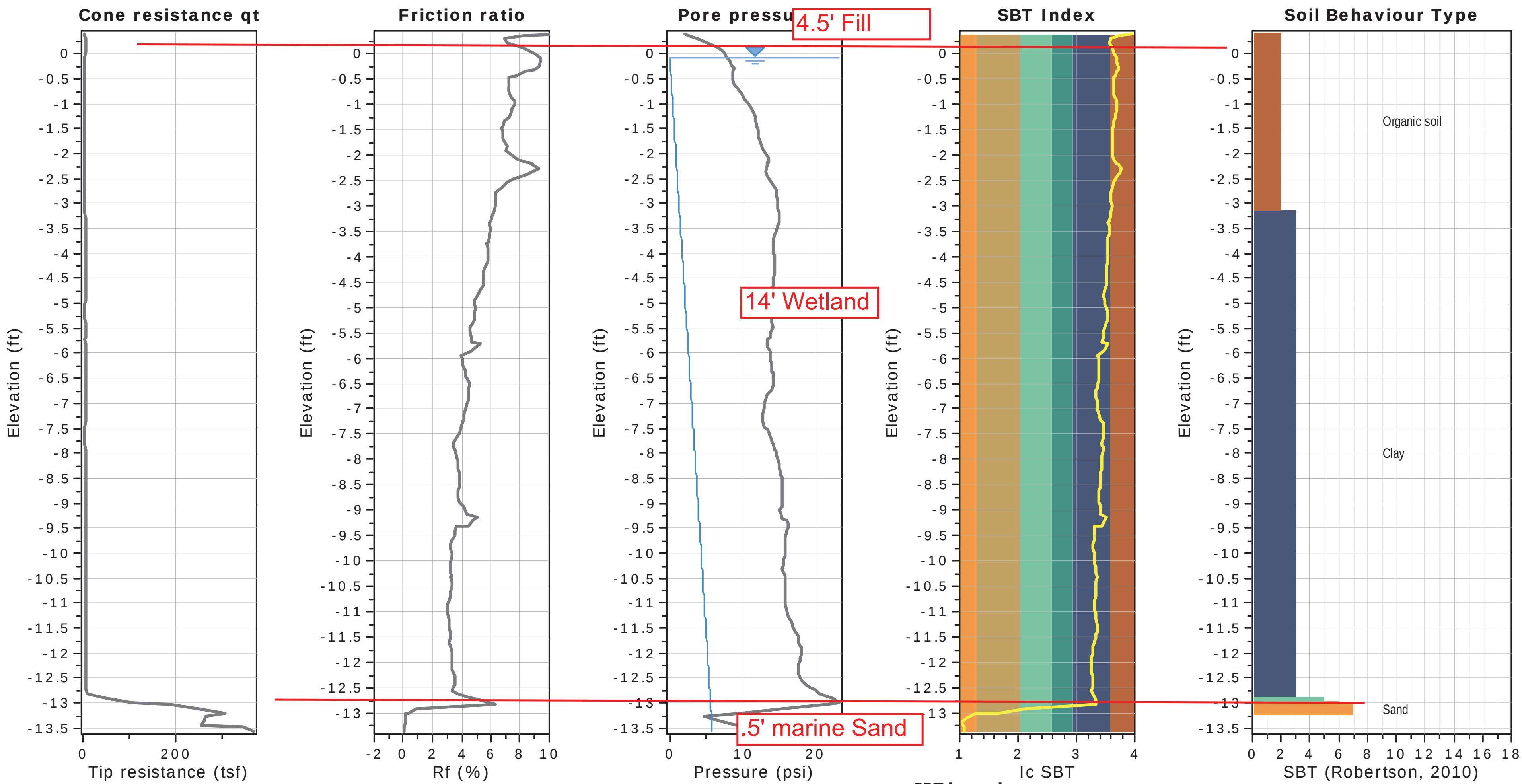
SBTn legend

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.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

CPT: CPT-WS46-202
Total depth: 19.46 ft, Date: 4/26/2021
Surface Elevation: 5.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**



SBT legend

- 1. Sensitive fine grained
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- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
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- 9. Very stiff fine grained

GZA GeoEnvironmental, Inc.
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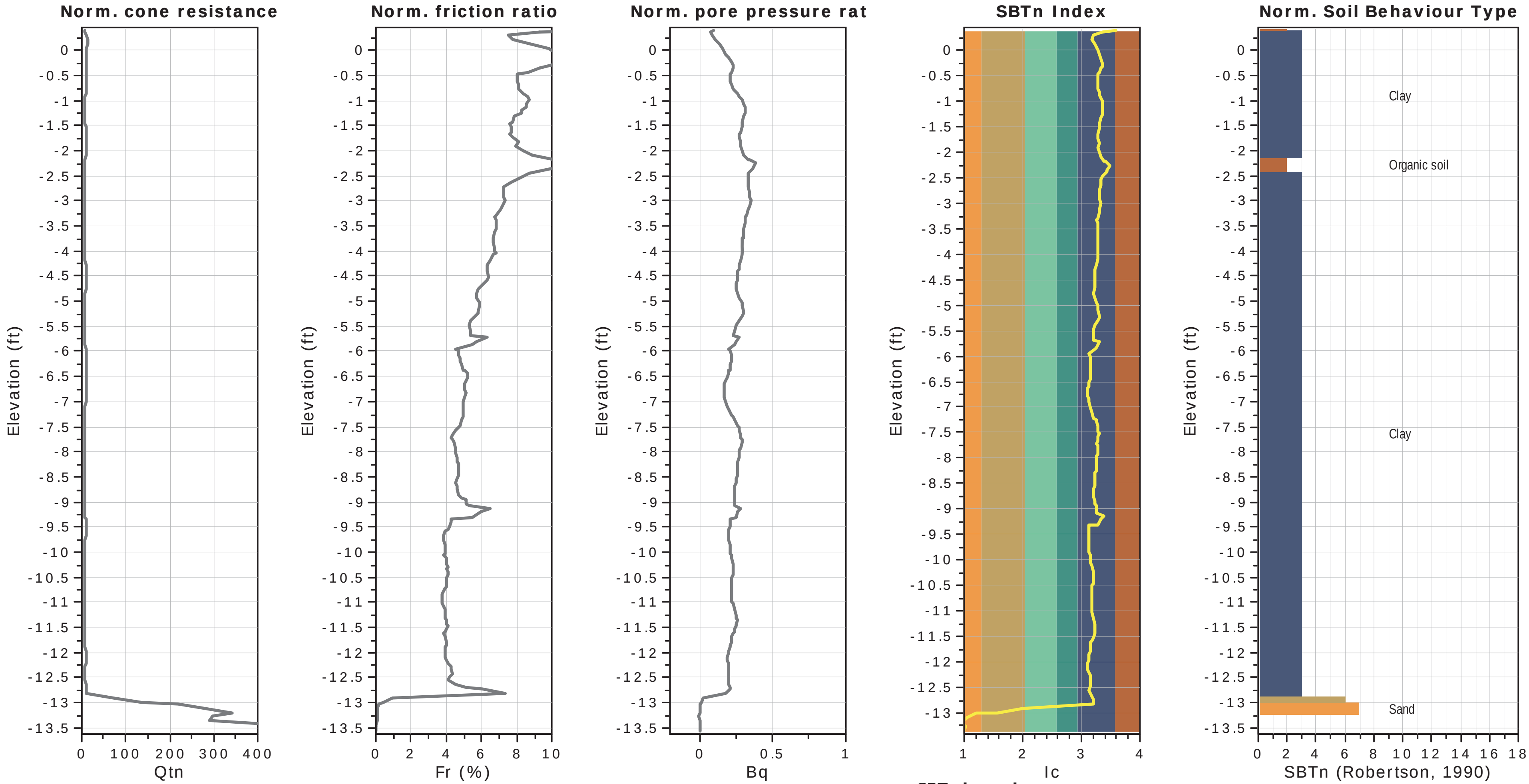
South Portland, Maine 04106

CPT: CPT-WS46-202
Total depth: 19.46 ft, Date: 4/26/2021
Surface Elevation: 5.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
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5. Silty sand to sandy silt
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GZA GeoEnvironmental, Inc.
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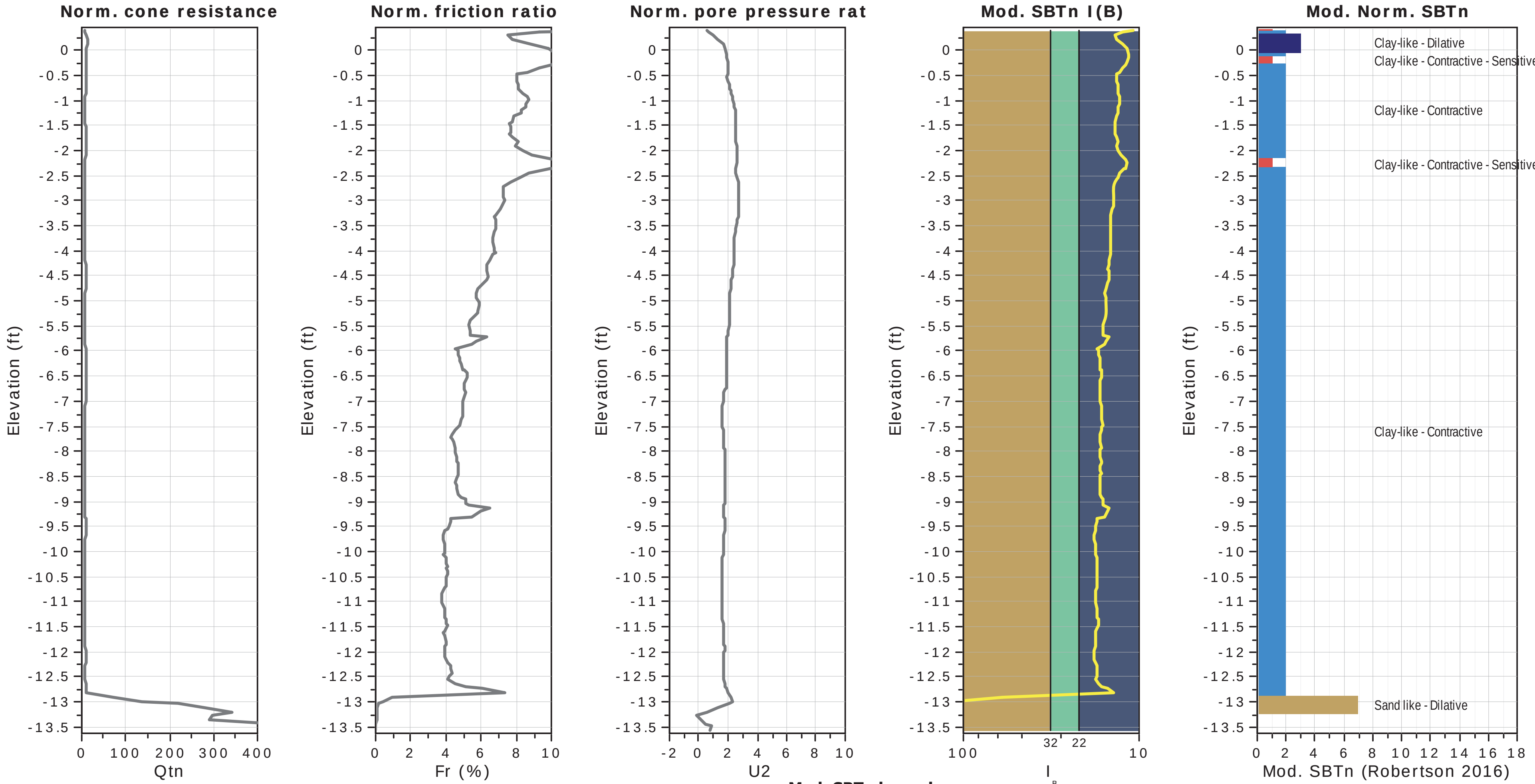
CPT: CPT-WS46-202
Total depth: 19.46 ft, Date: 4/26/2021
Surface Elevation: 5.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**



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.
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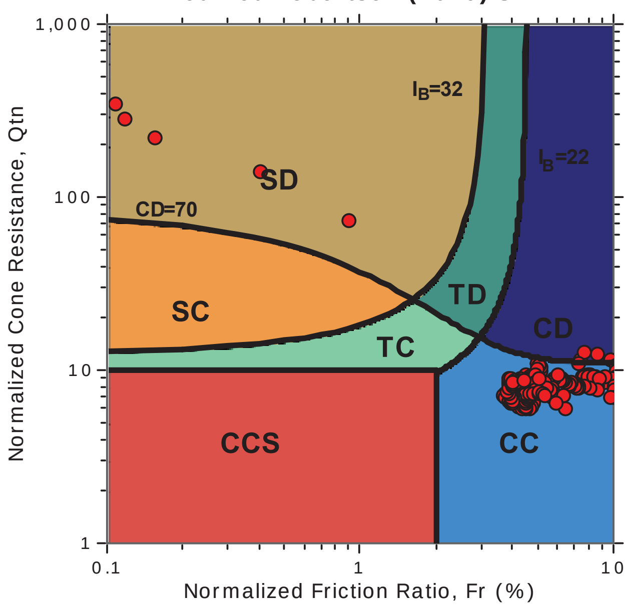
South Portland, Maine 04106

Project: Station 46 Bridge Replacement
Location: Woolwich, Maine

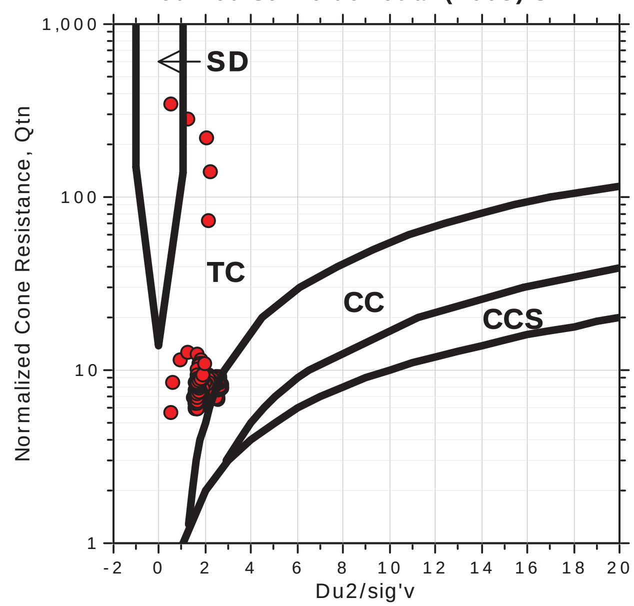
CPT: CPT-WS46-202
Total depth: 19.46 ft, Date: 4/26/2021
Surface Elevation: 5.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Updated SBTn plots

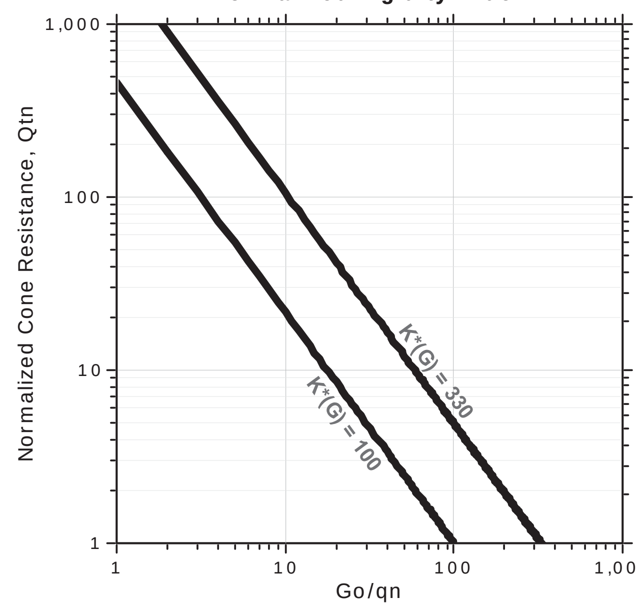
Modified Robertson (2016) SBTn



Modified Schneider et al (2008) SBTn



Normalized Rigidity Index



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)

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CPT: CPT-WS46-202
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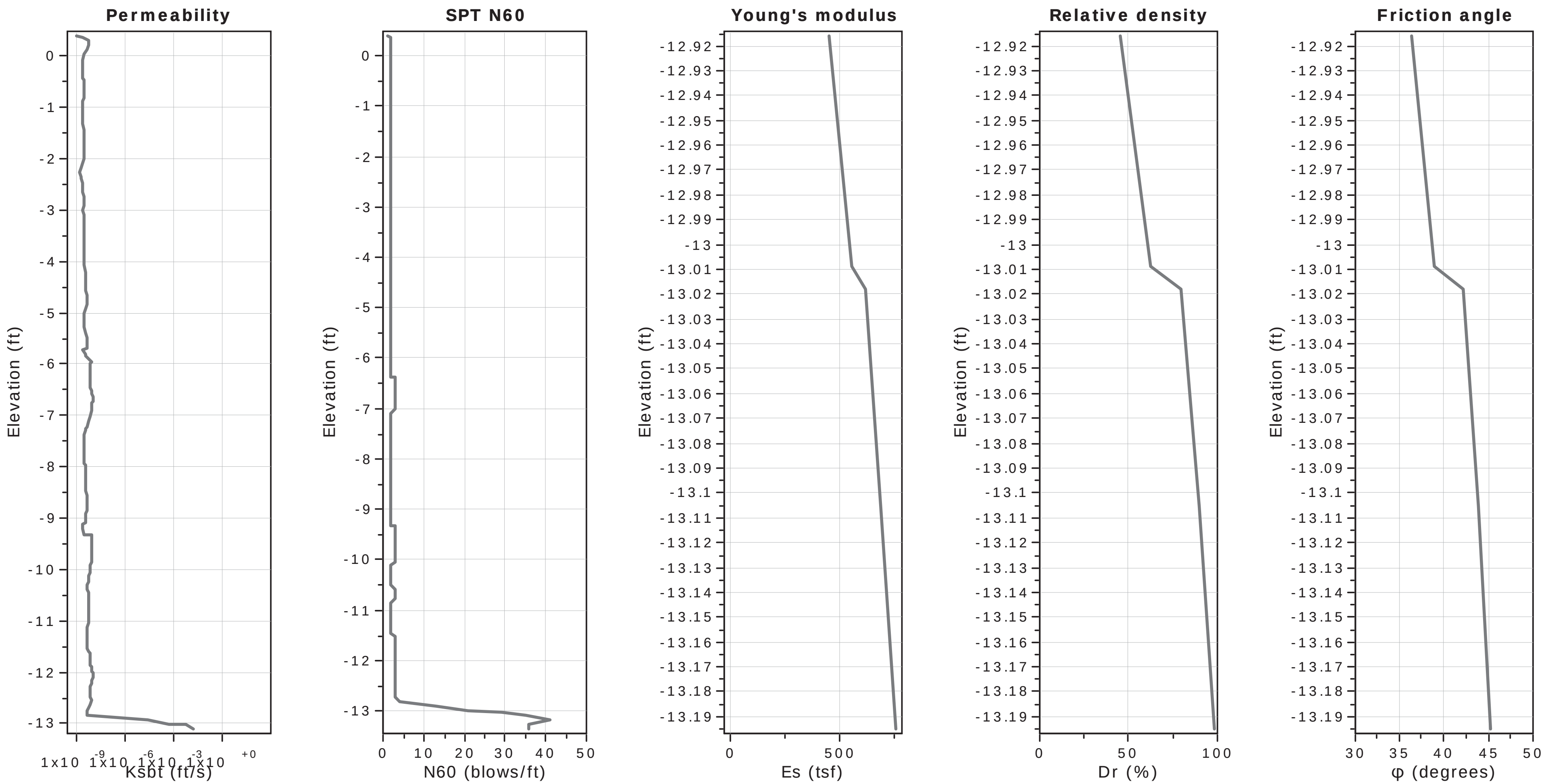
Surface Elevation: 5.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**



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

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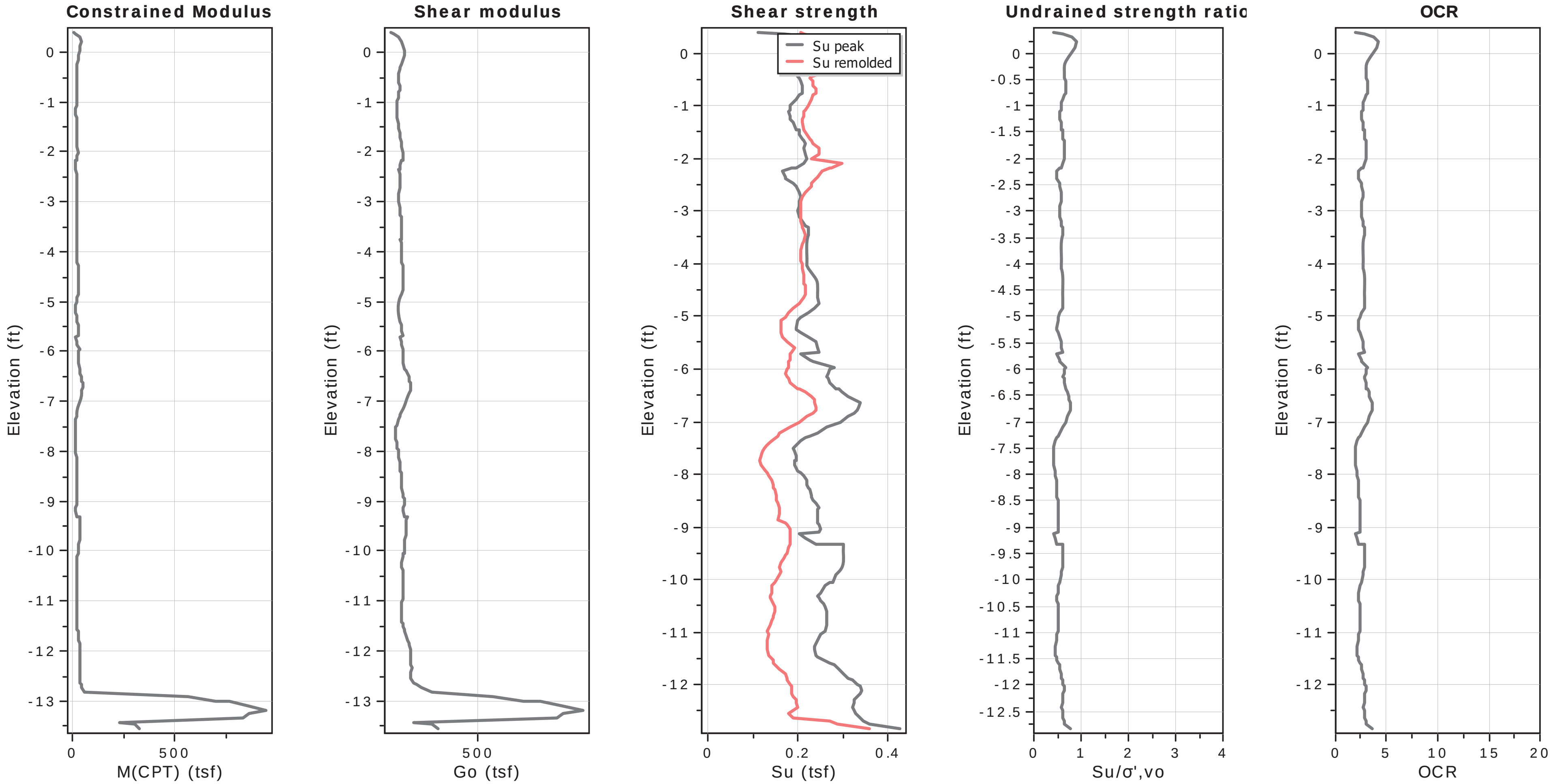
CPT: CPT-WS46-202
Total depth: 19.46 ft, Date: 4/26/2021
Surface Elevation: 5.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**

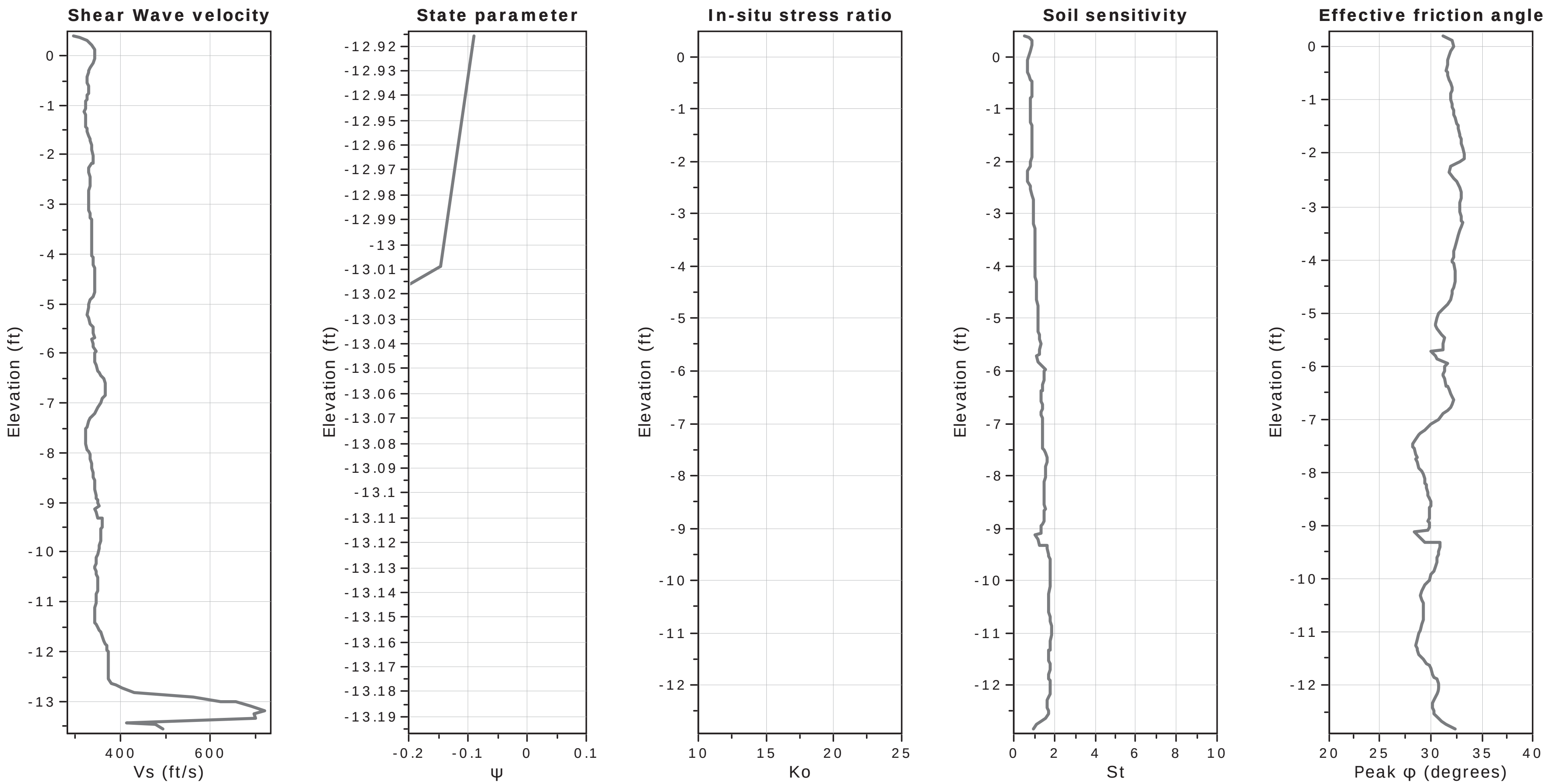


Calculation parameters
Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data
Flat Dilatometer Test data

GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**

CPT: CPT-WS46-202
Total depth: 19.46 ft, Date: 4/26/2021
Surface Elevation: 5.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:



Calculation parameters

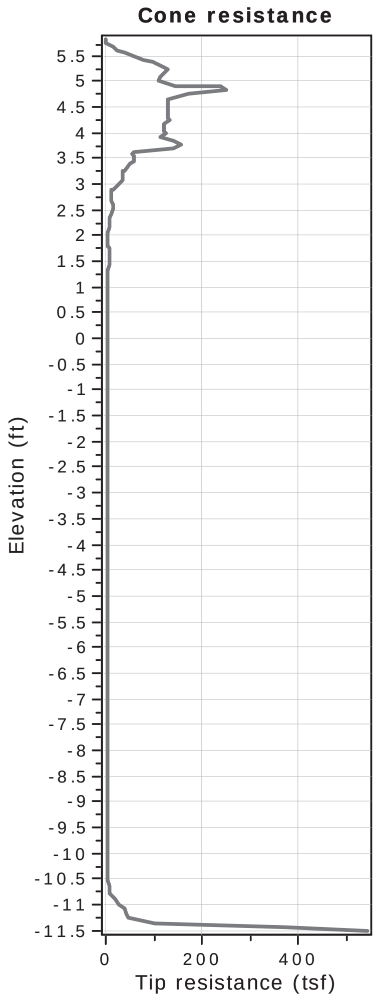
Soil Sensitivity factor, N_S: 7.00

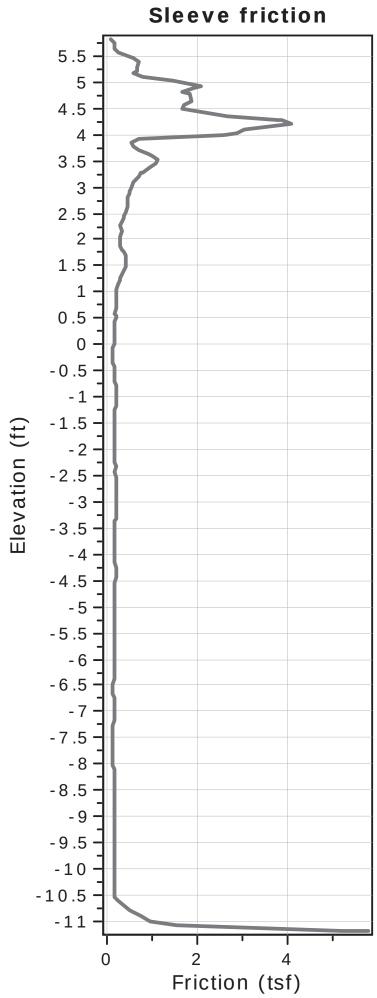
User defined estimation data

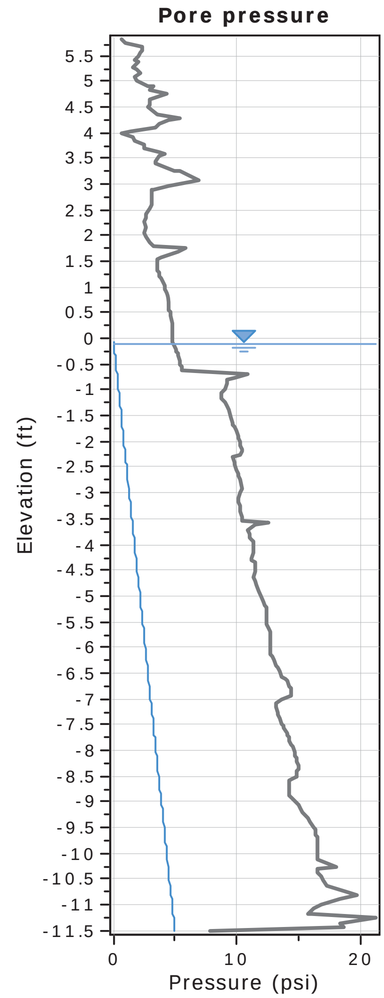
GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
South Portland, Maine 04106

CPT: CPT-WS46-202a
Total depth: 17.41 ft, Date: 4/26/2021
Surface Elevation: 5.90 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

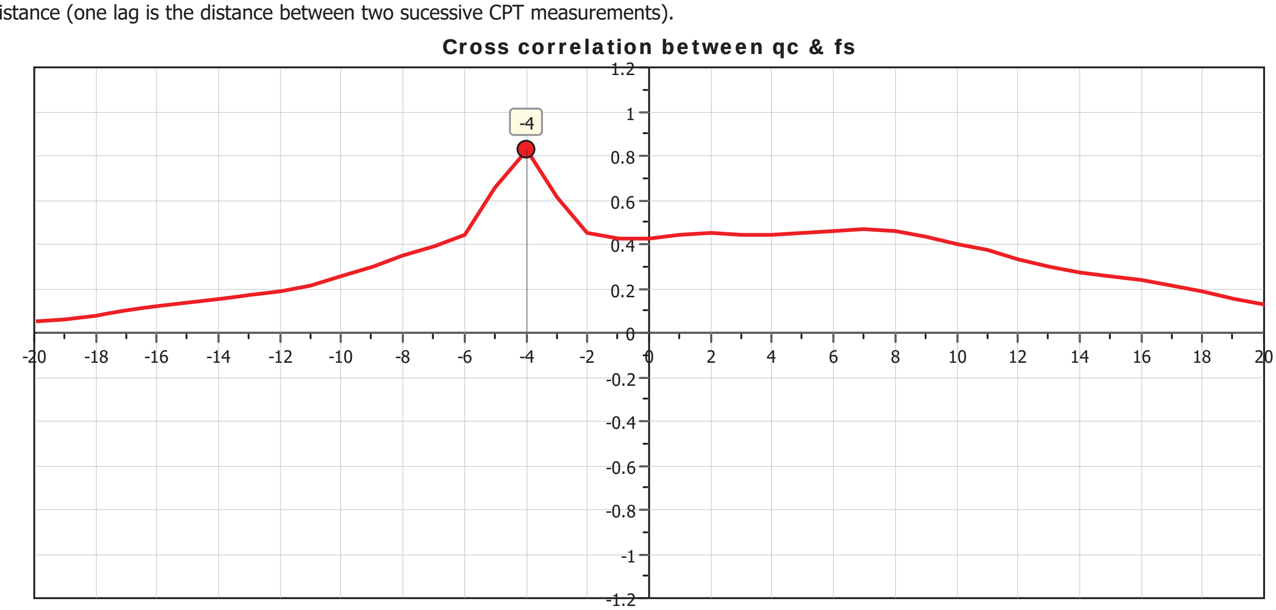
Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**







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).



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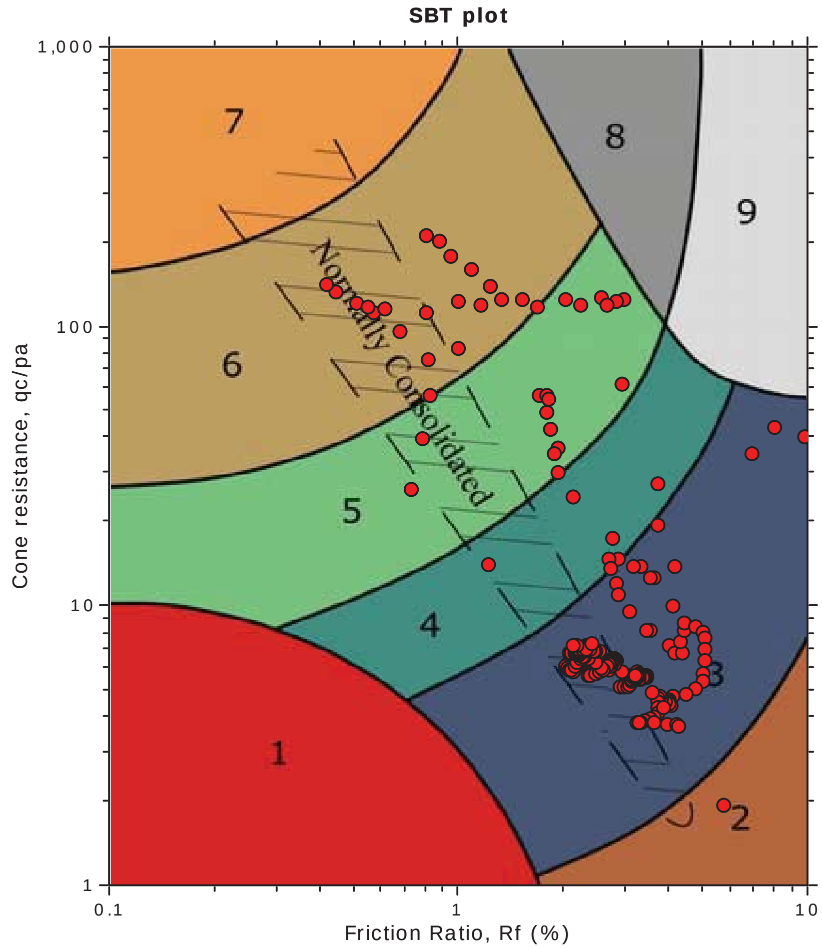
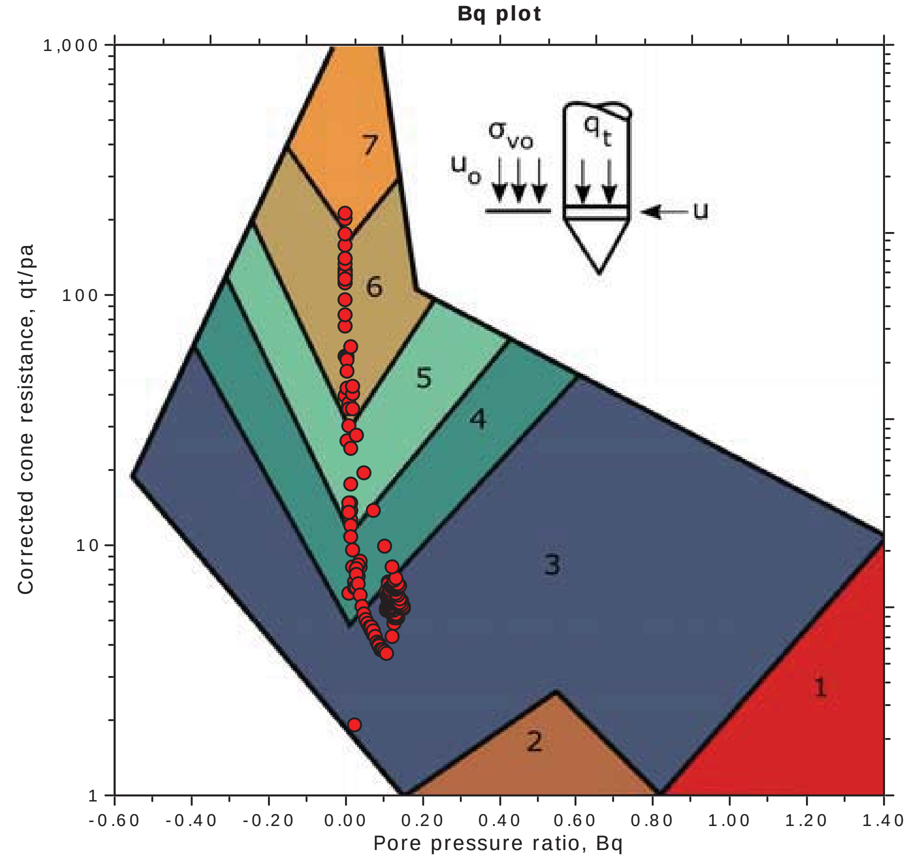
Cone Operator:

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**

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

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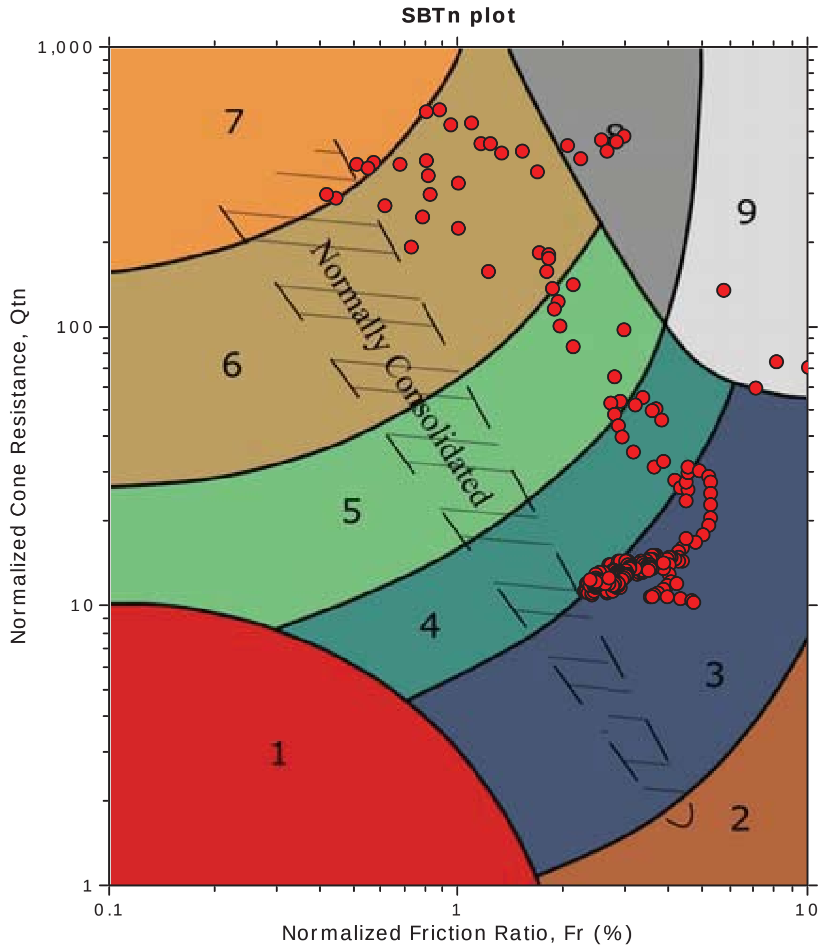
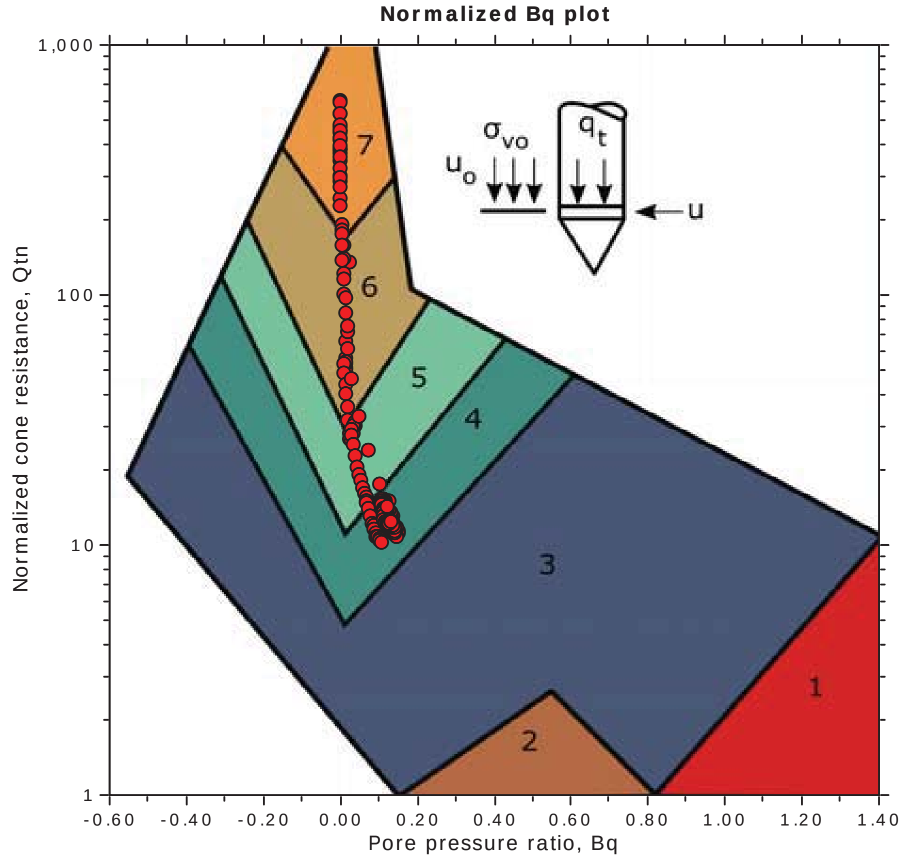
Project: Station 46 Bridge Replacement
Location: Woolwich, Maine

SBT - Bq plots (normalized)





SBTn legend

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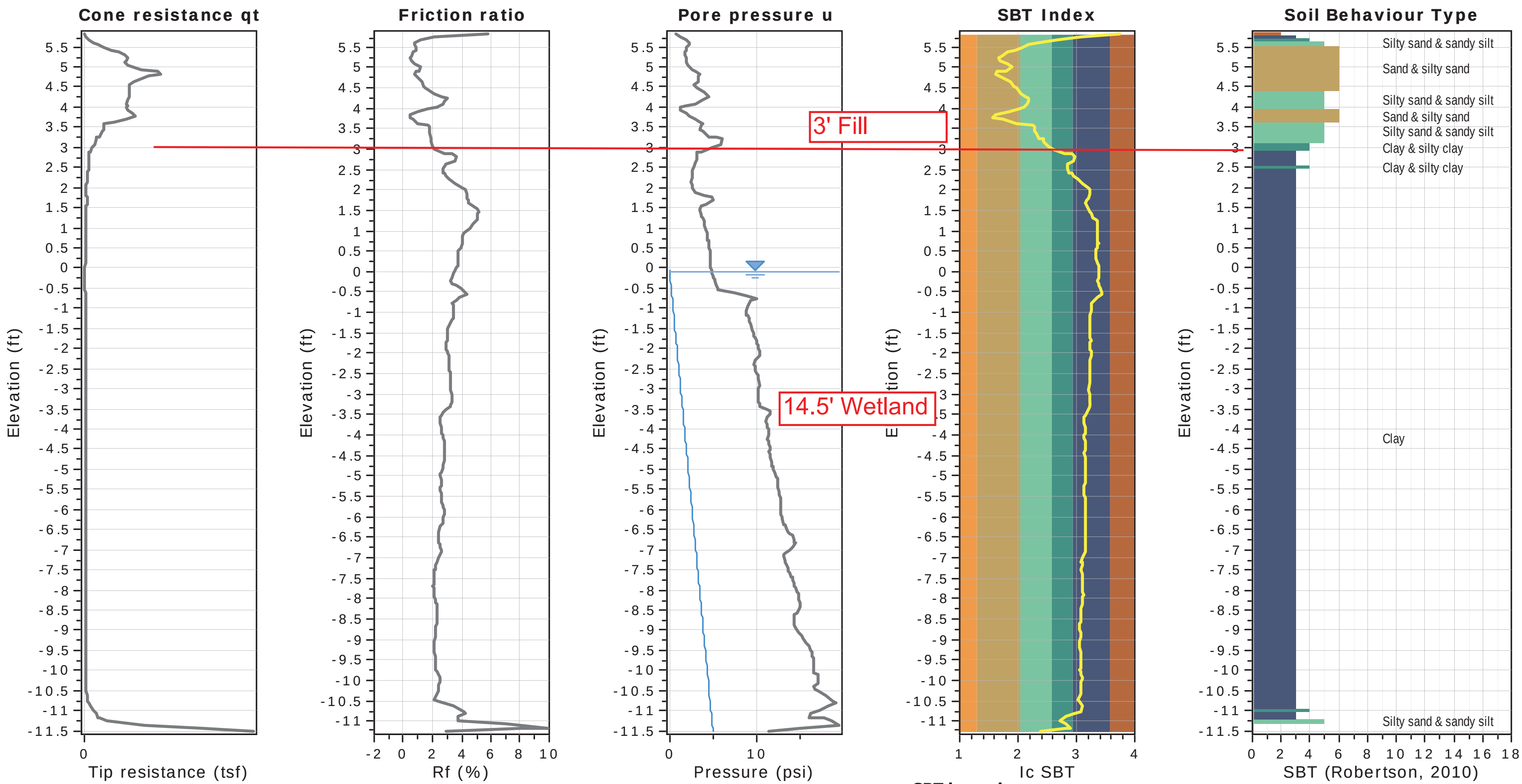

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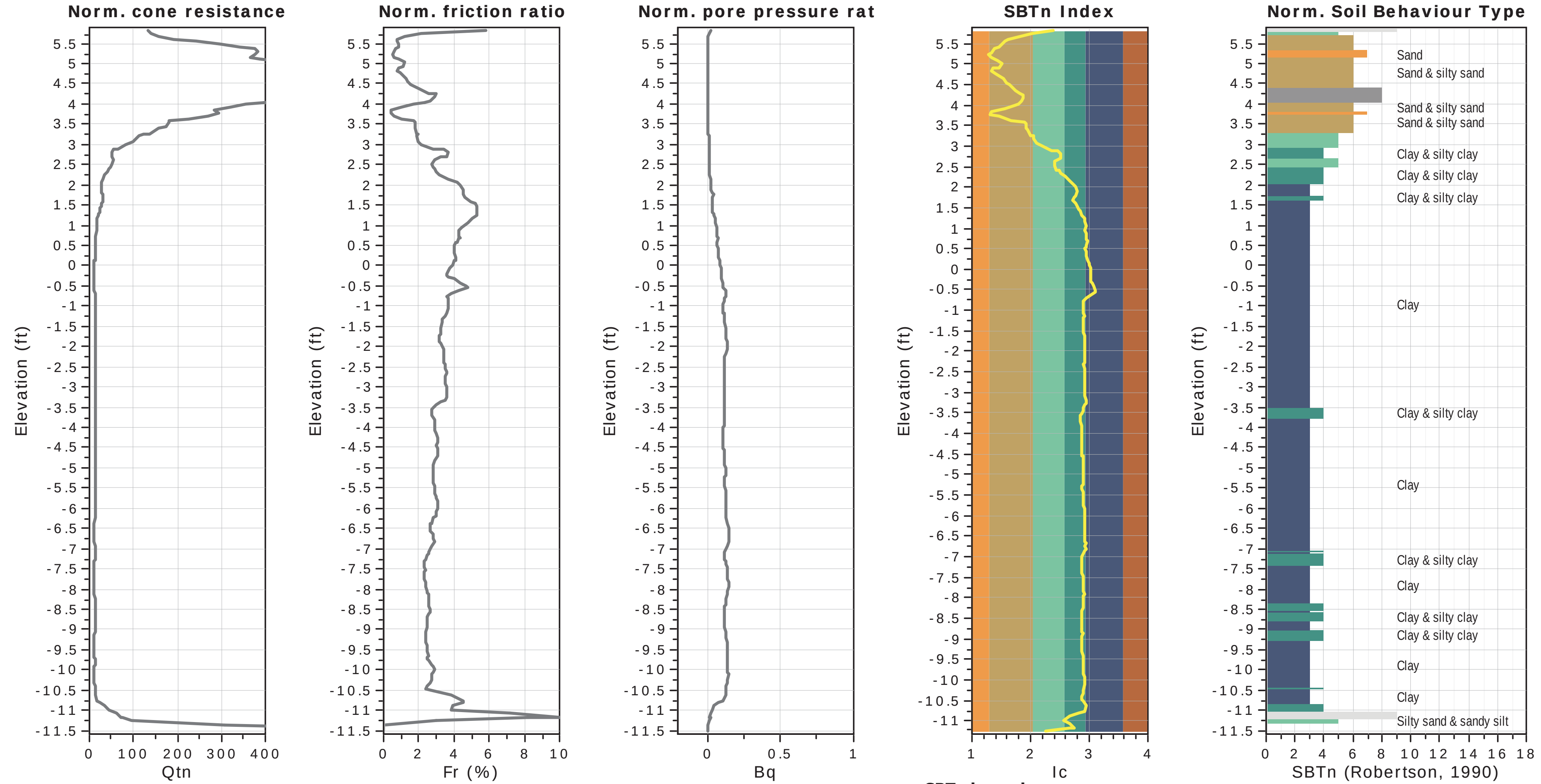

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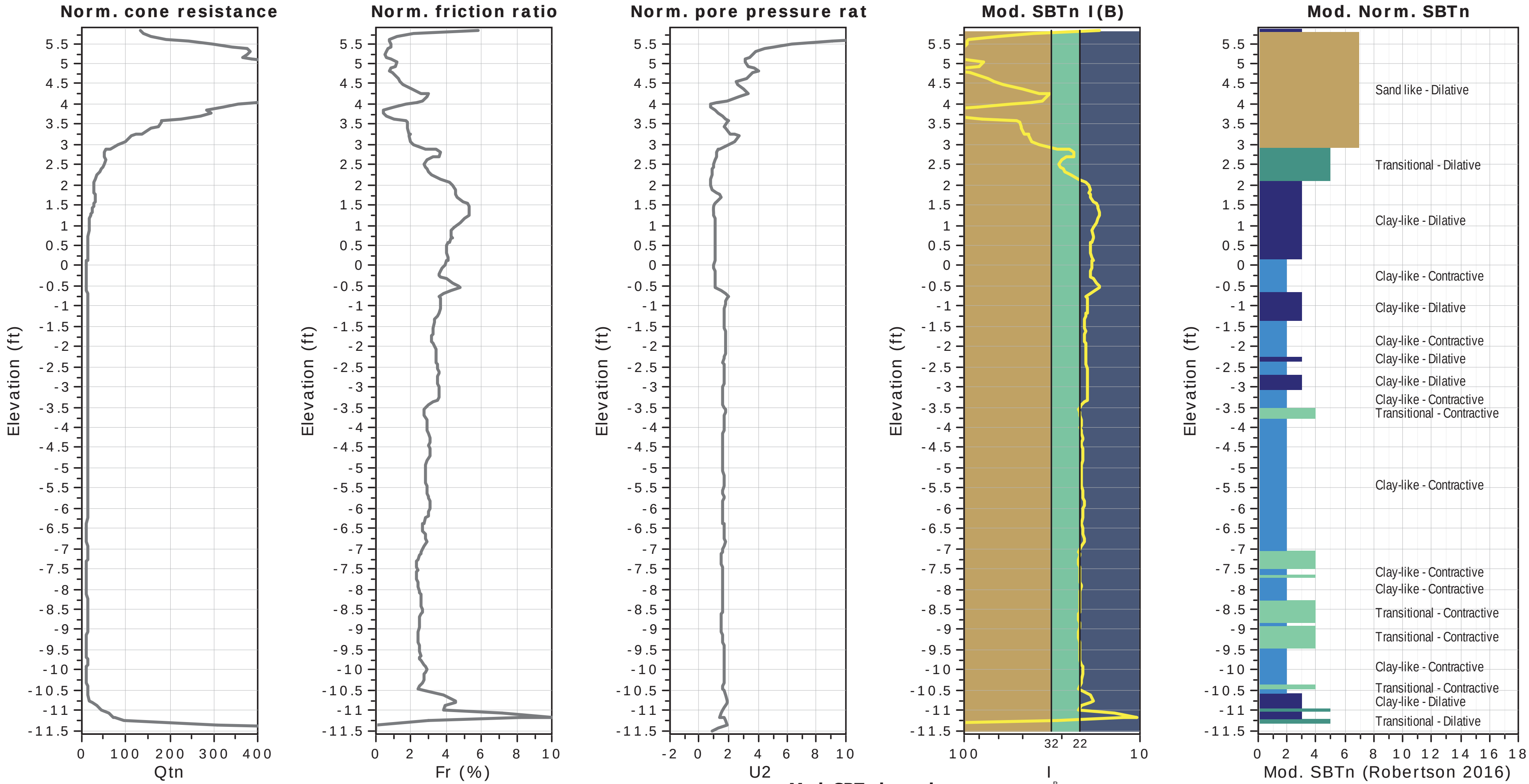

Mod. SBTn legend

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
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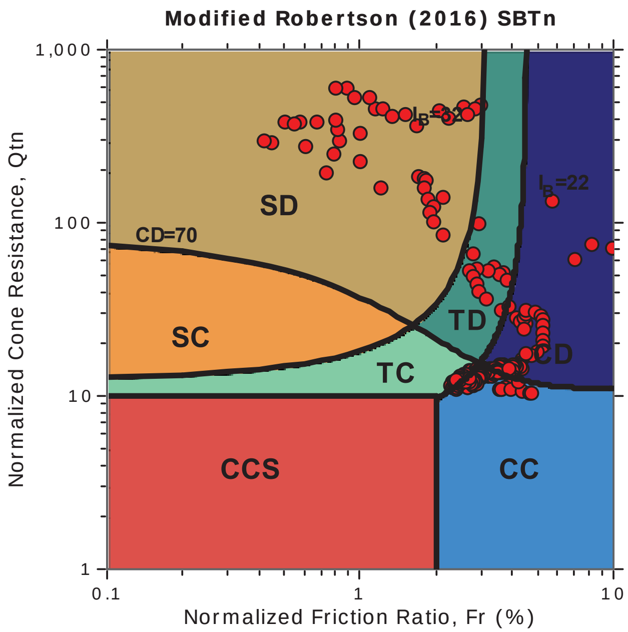
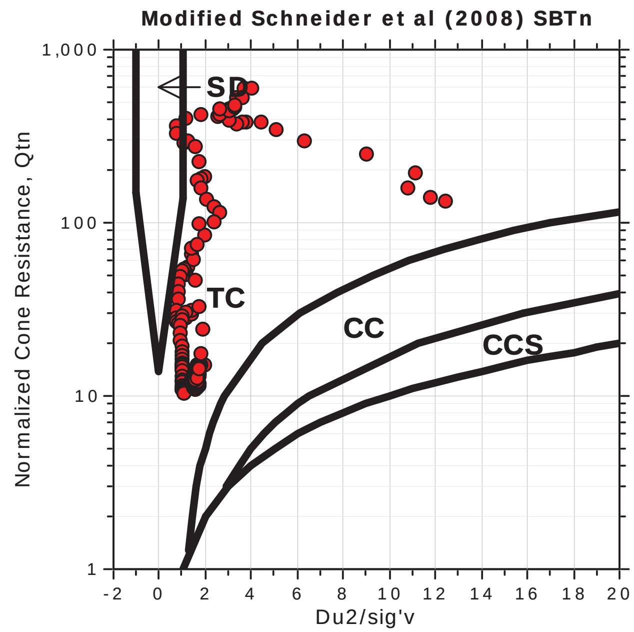
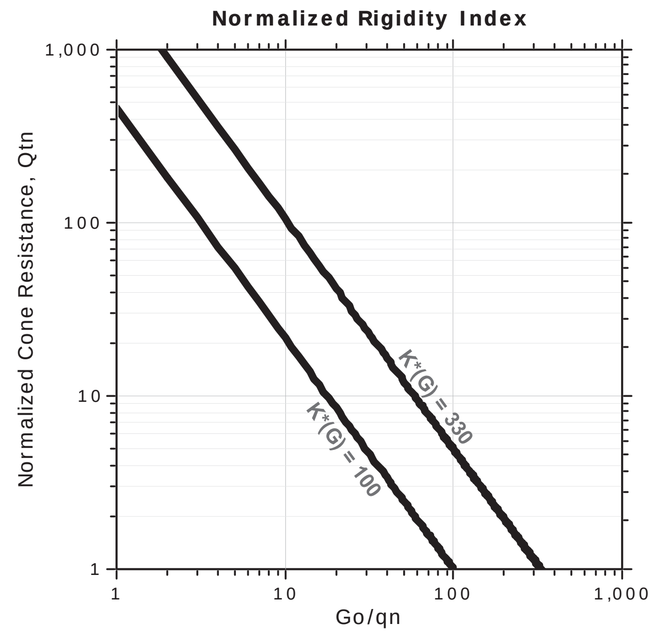
Cone Type:
Cone Operator:

Updated SBTn plots







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

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Project: **Station 46 Bridge Replacement**
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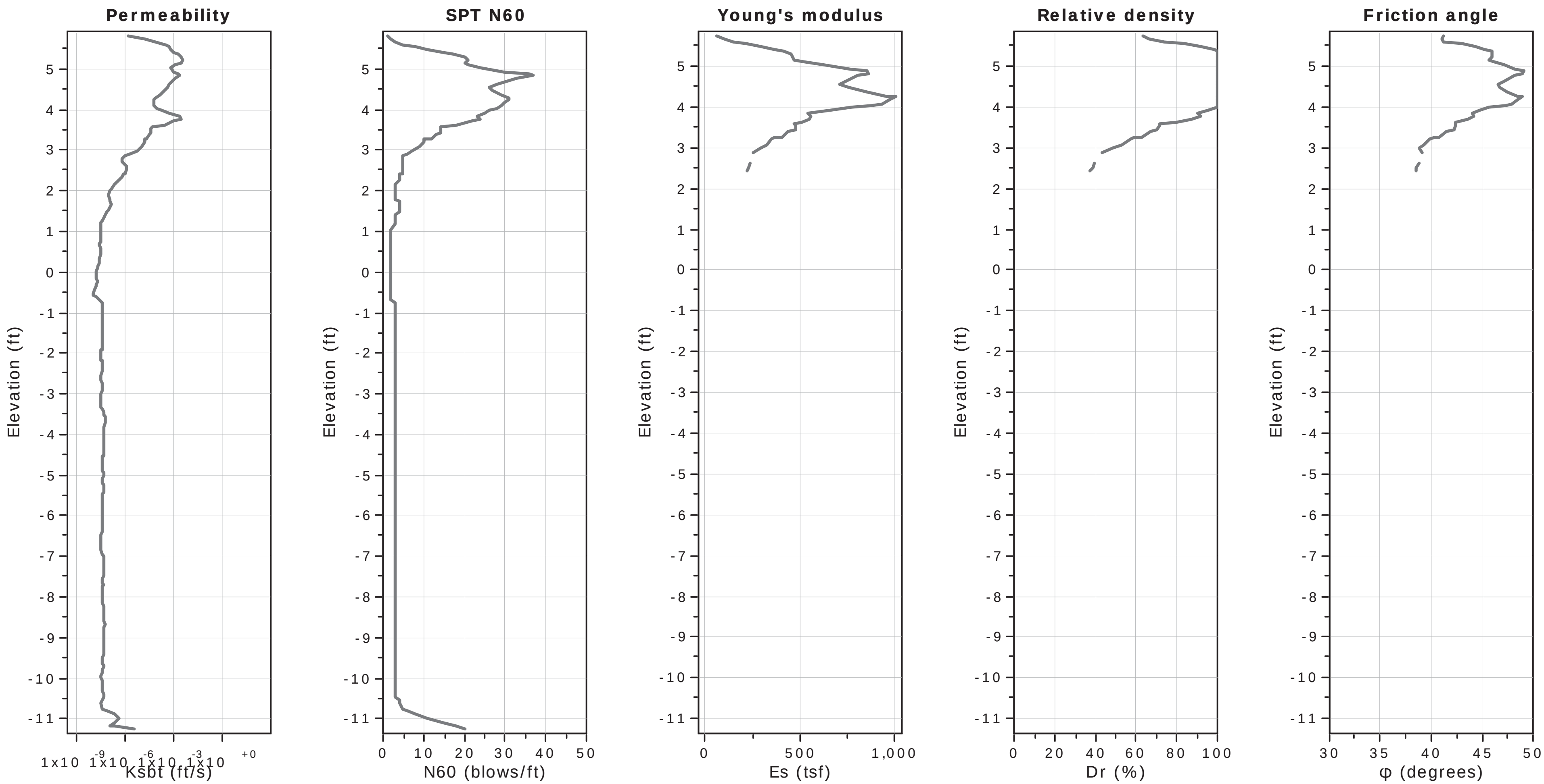

Calculation parameters
Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative density constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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Project: **Station 46 Bridge Replacement**
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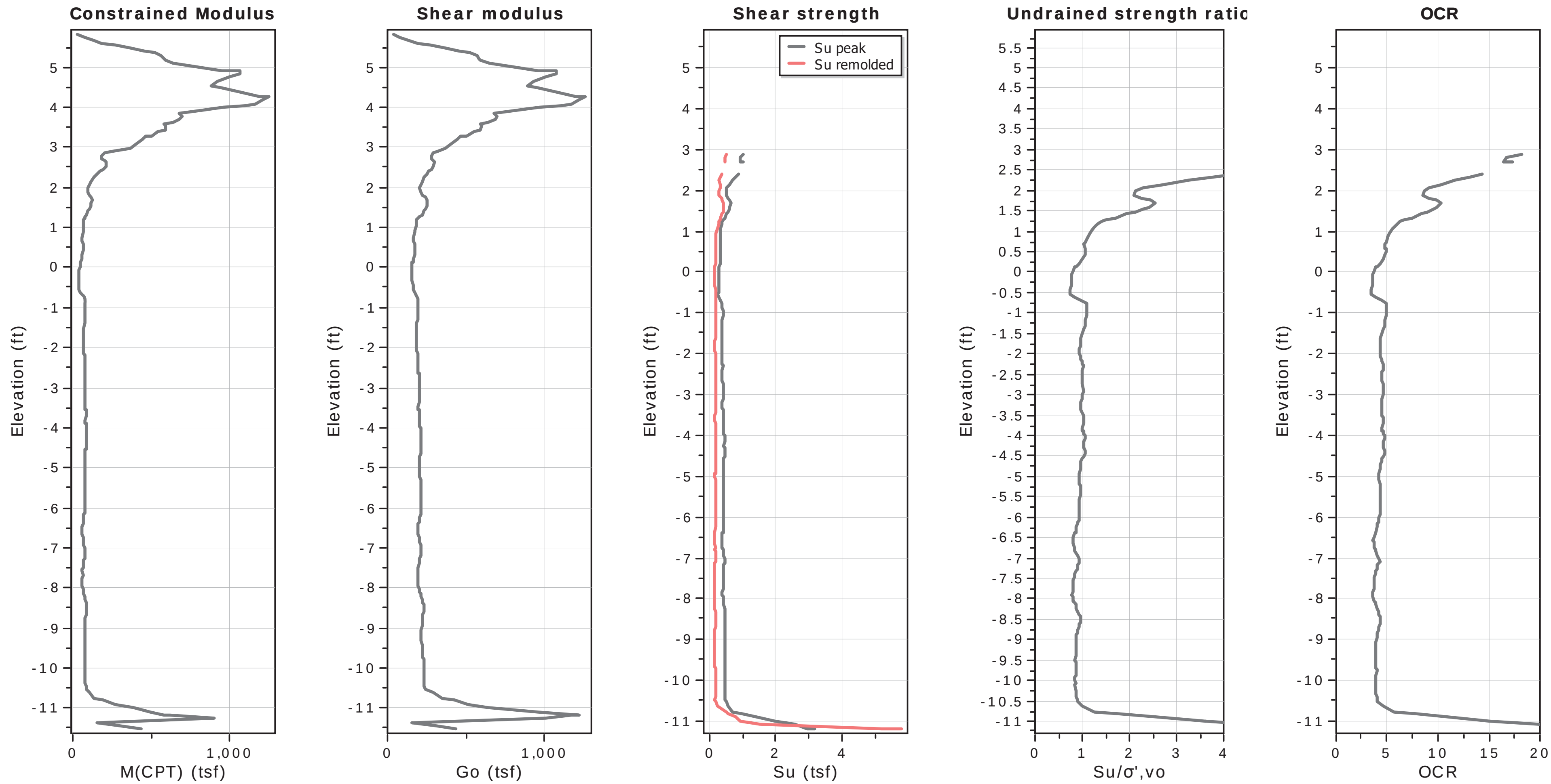

Calculation parameters
Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14

OCR factor for clays, N_{kt}: 0.33
User defined estimation data
Flat Dilatometer Test data

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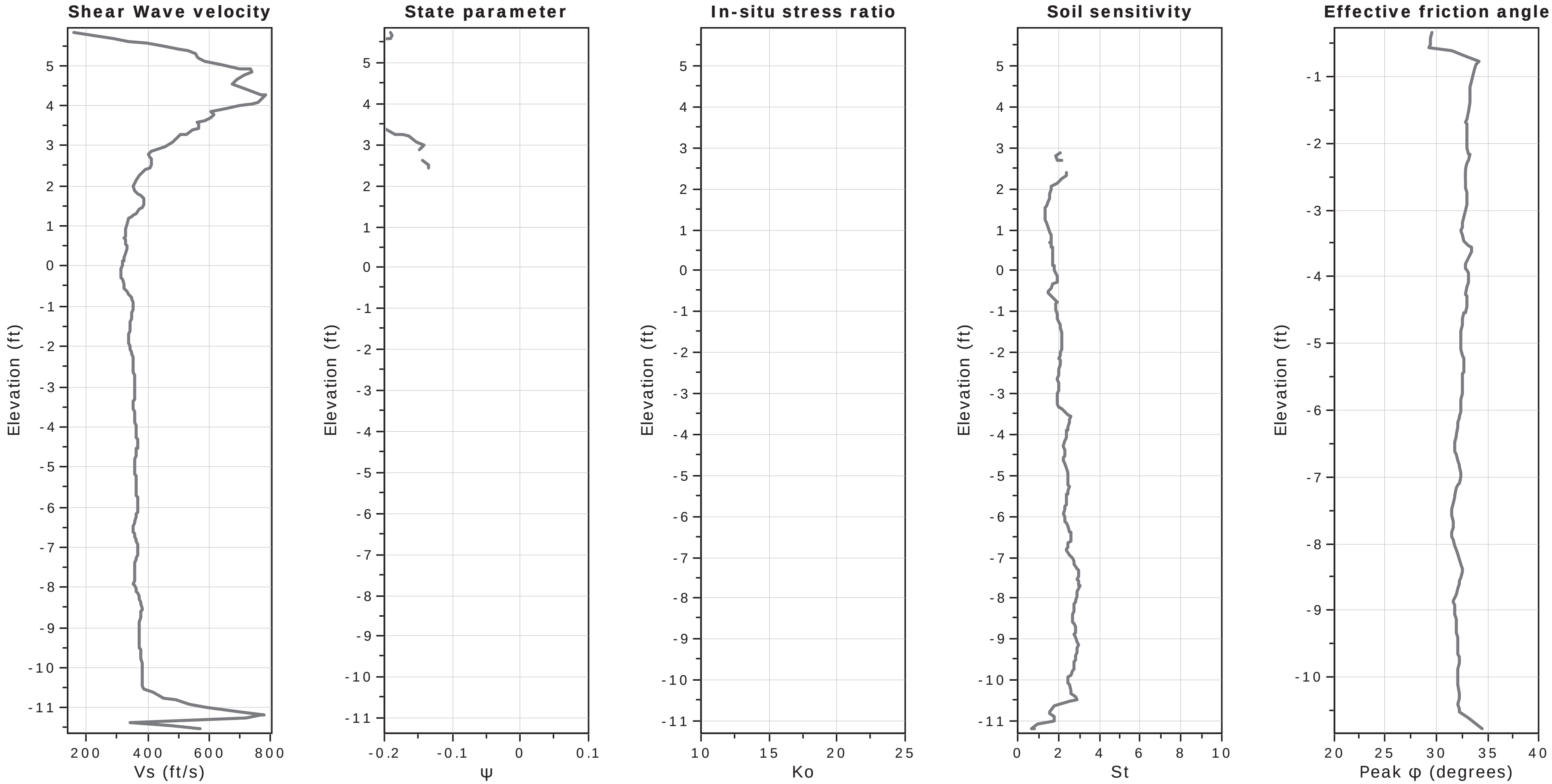
Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**



Calculation parameters

Soil Sensitivity factor, N_S: 7.00
User defined estimation data

GZA GeoEnvironmental, Inc.
707 Sable Oaks Drive, Suite 150
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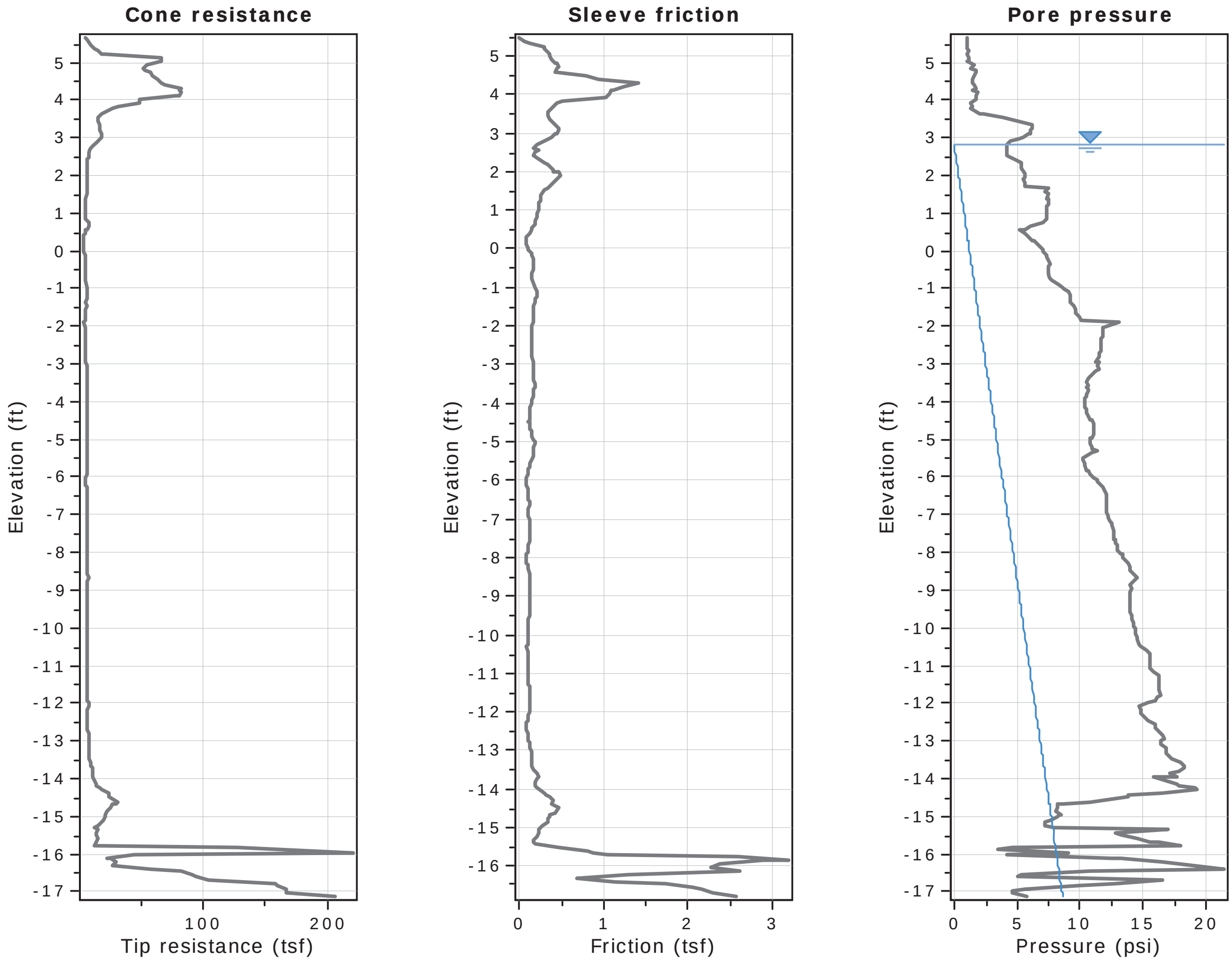
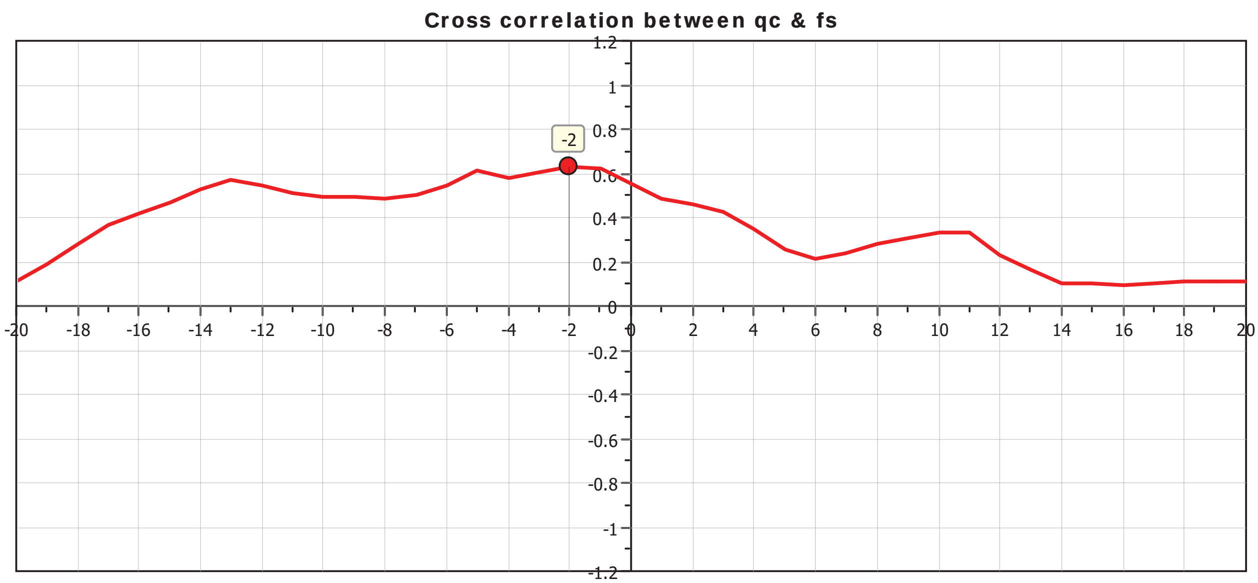
CPT: CPT-WS46-203
Total depth: 22.93 ft, Date: 4/26/2021
Surface Elevation: 5.80 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Station 46 Bridge Replacement**
Location: **Woolwich, Maine**



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).



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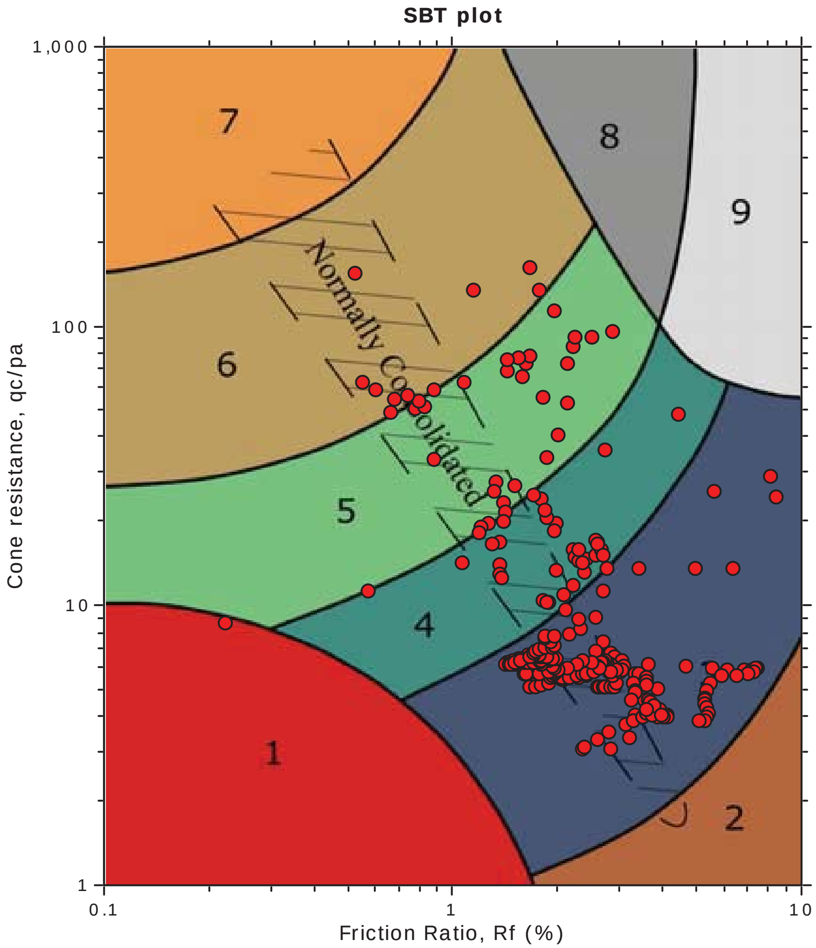
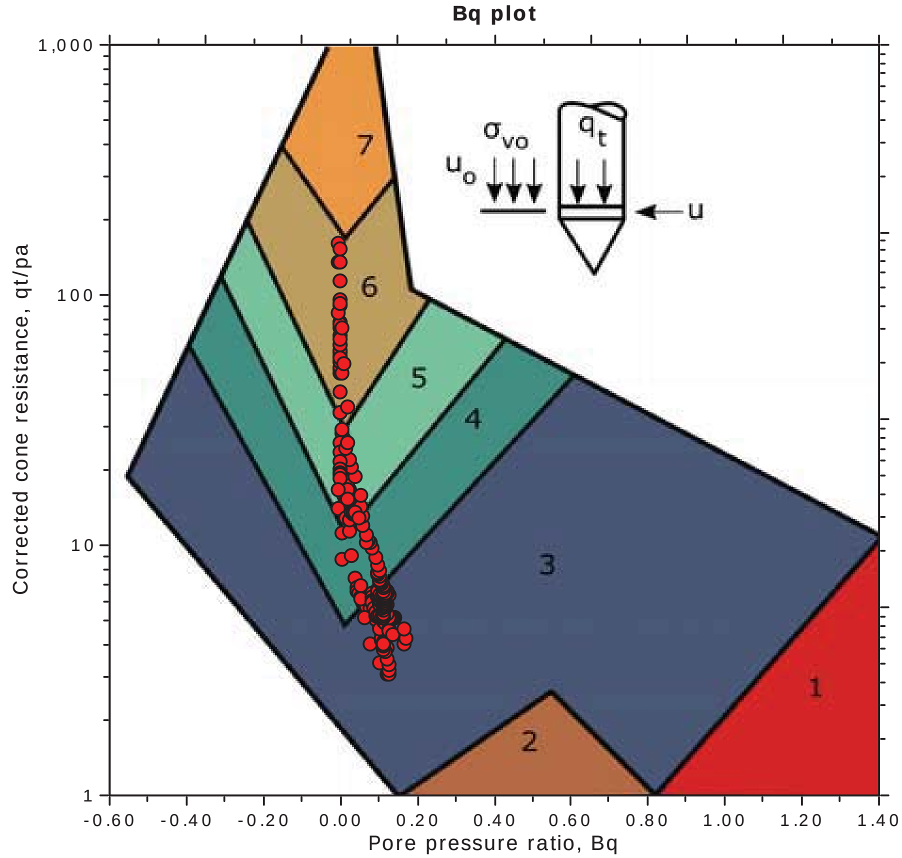
Project: Station 46 Bridge Replacement
Location: Woolwich, Maine

SBT - Bq plots





SBT legend

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Cone Operator:

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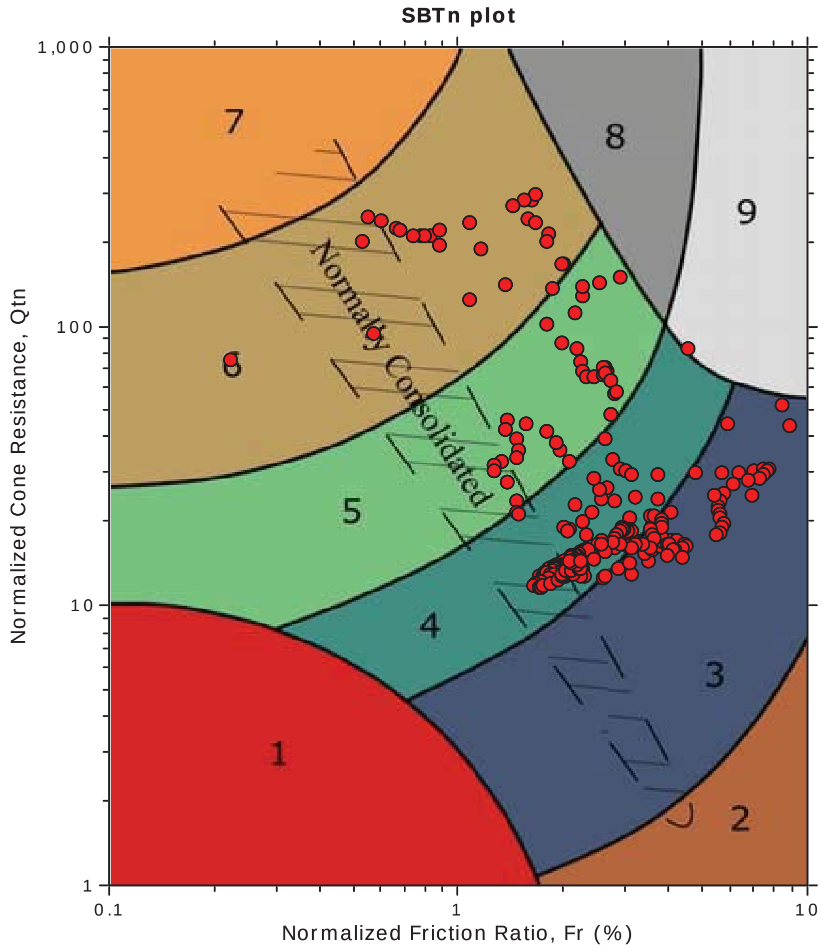
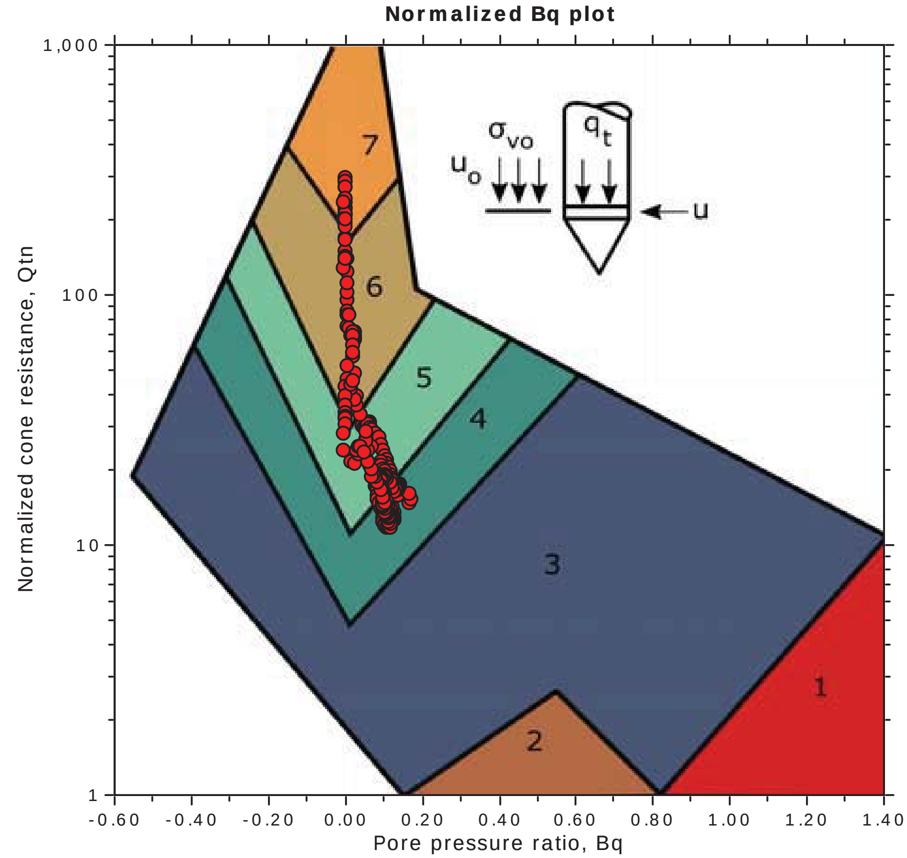
Location: Woolwich, Maine

SBT - Bq plots (normalized)





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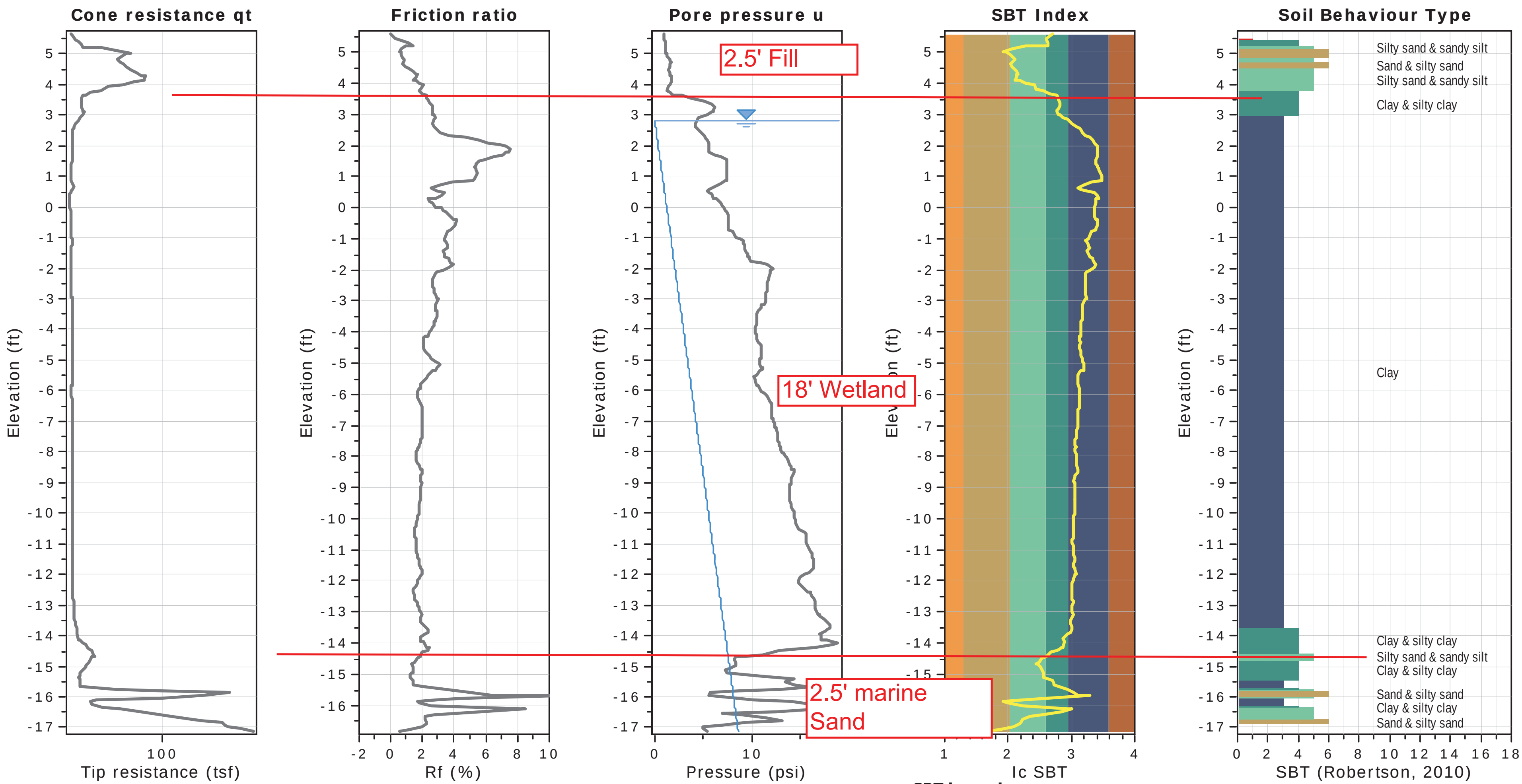

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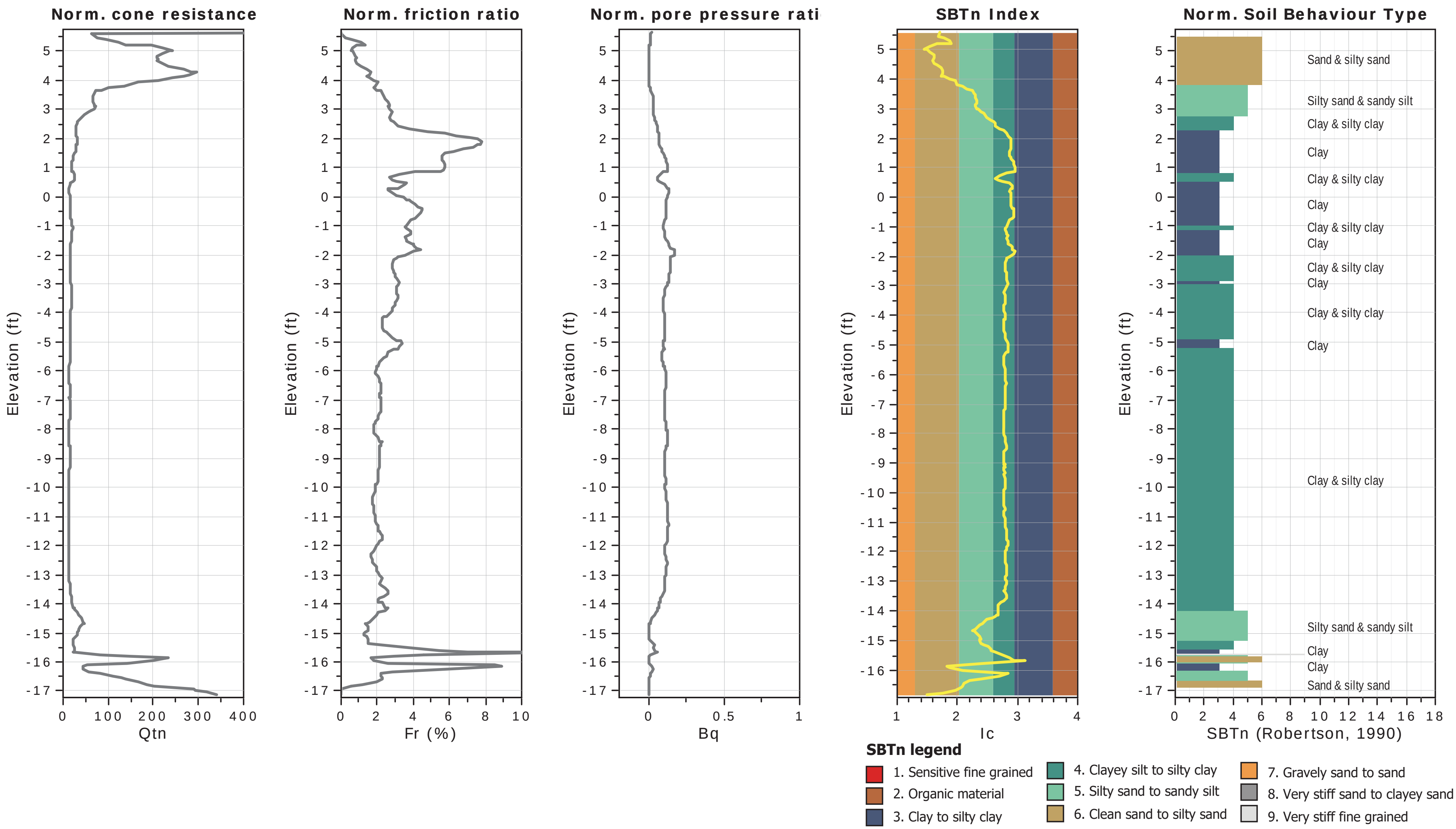

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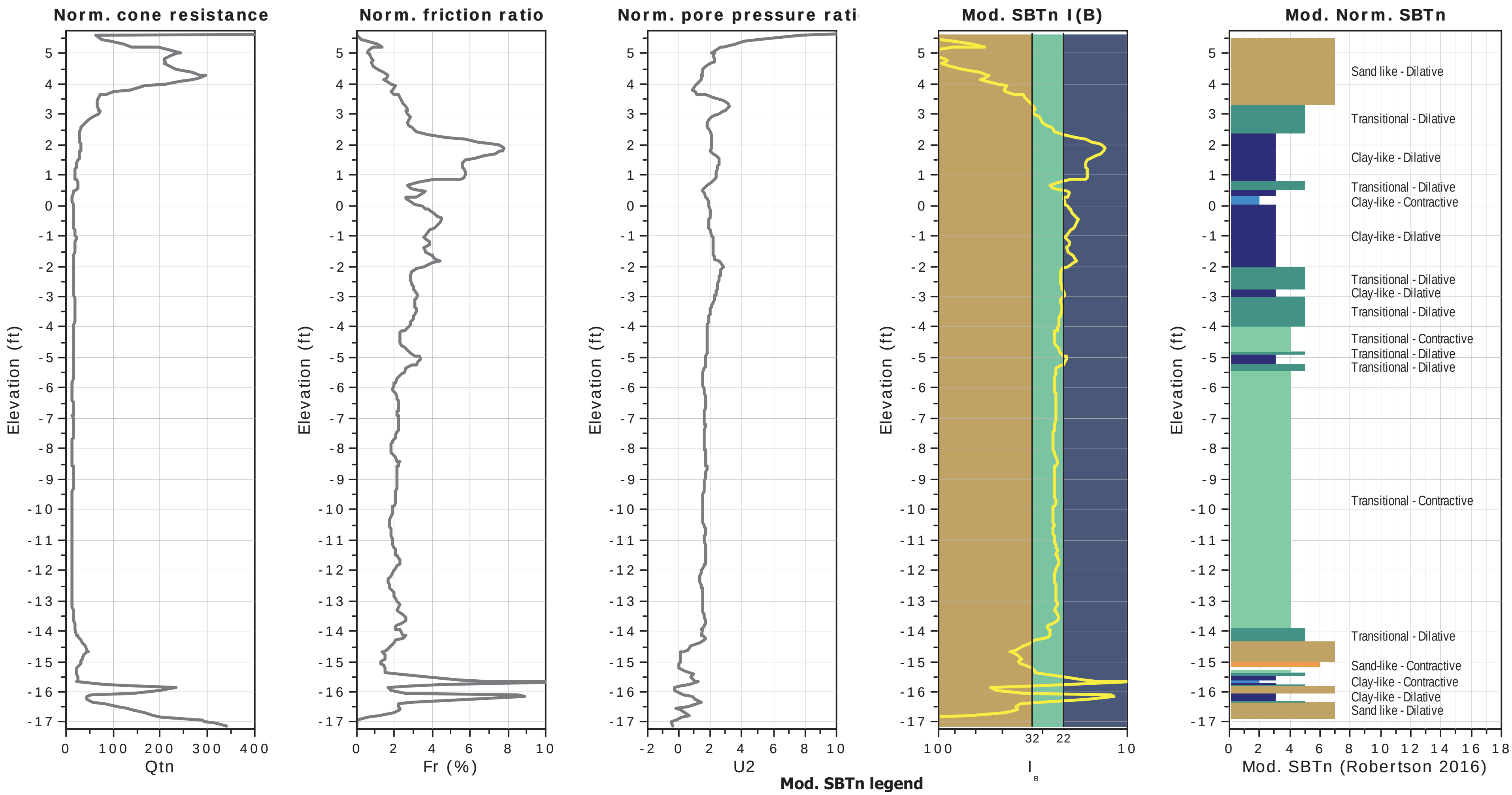

Mod. SBTn legend

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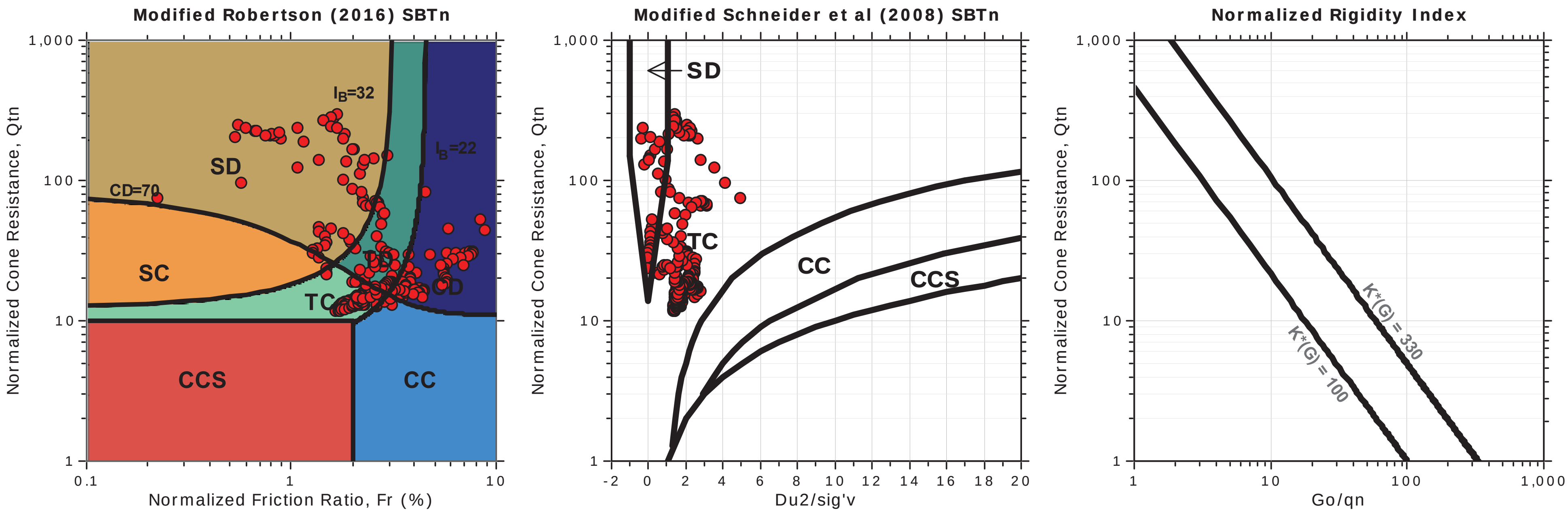
Updated SBTn plots



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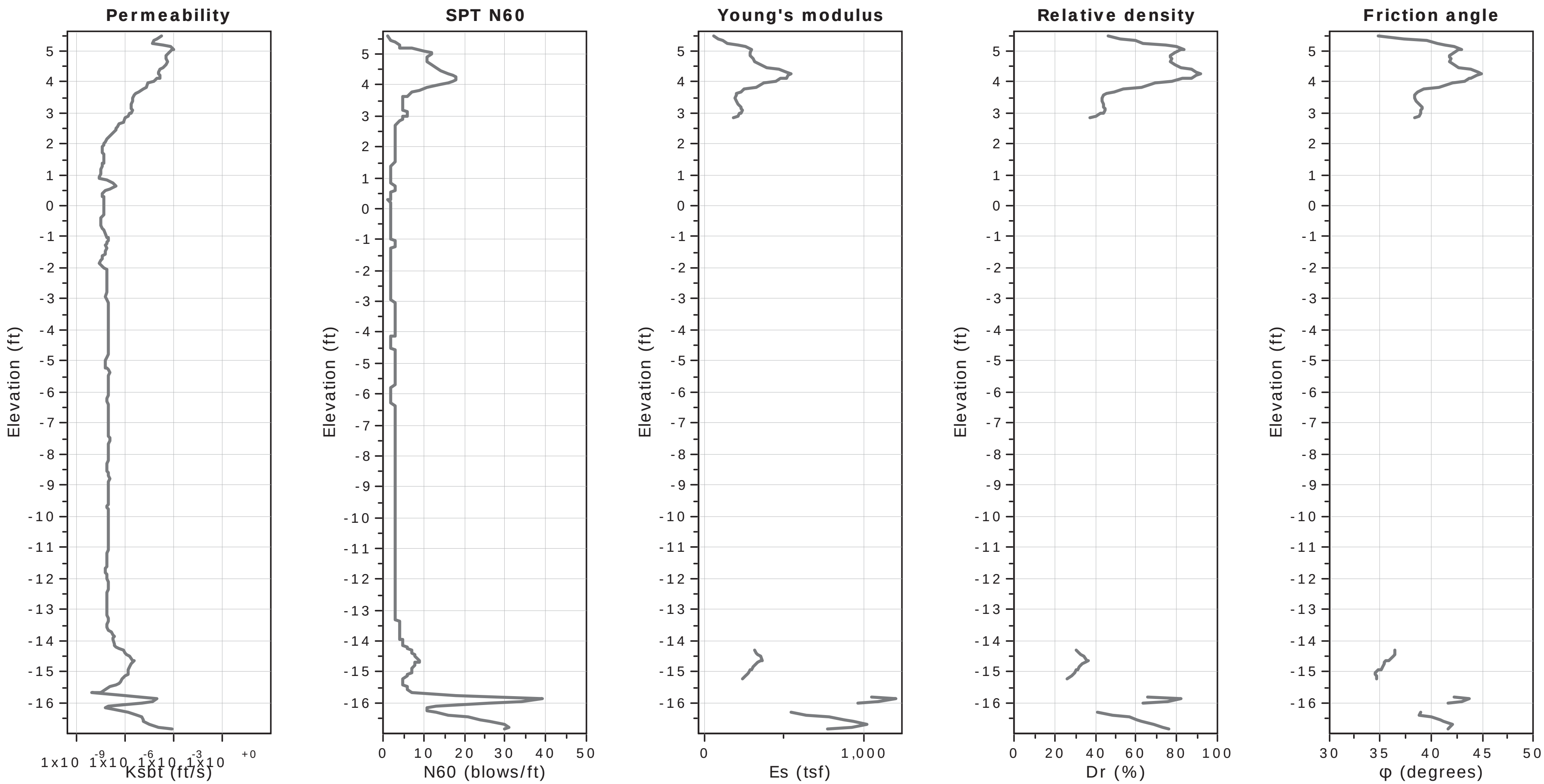

Calculation parameters
Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
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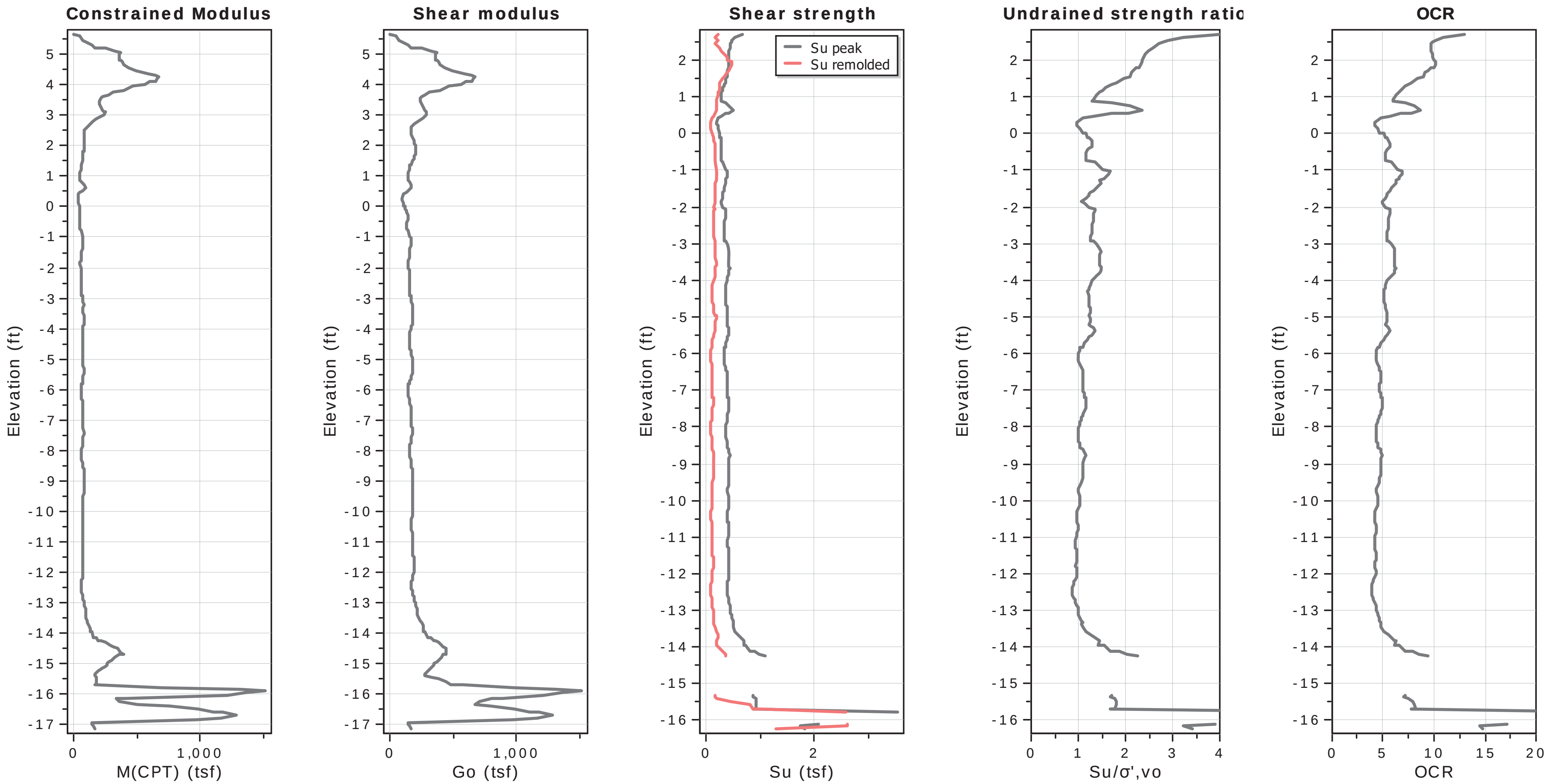

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OCR factor for clays, N_{kt}: 0.33
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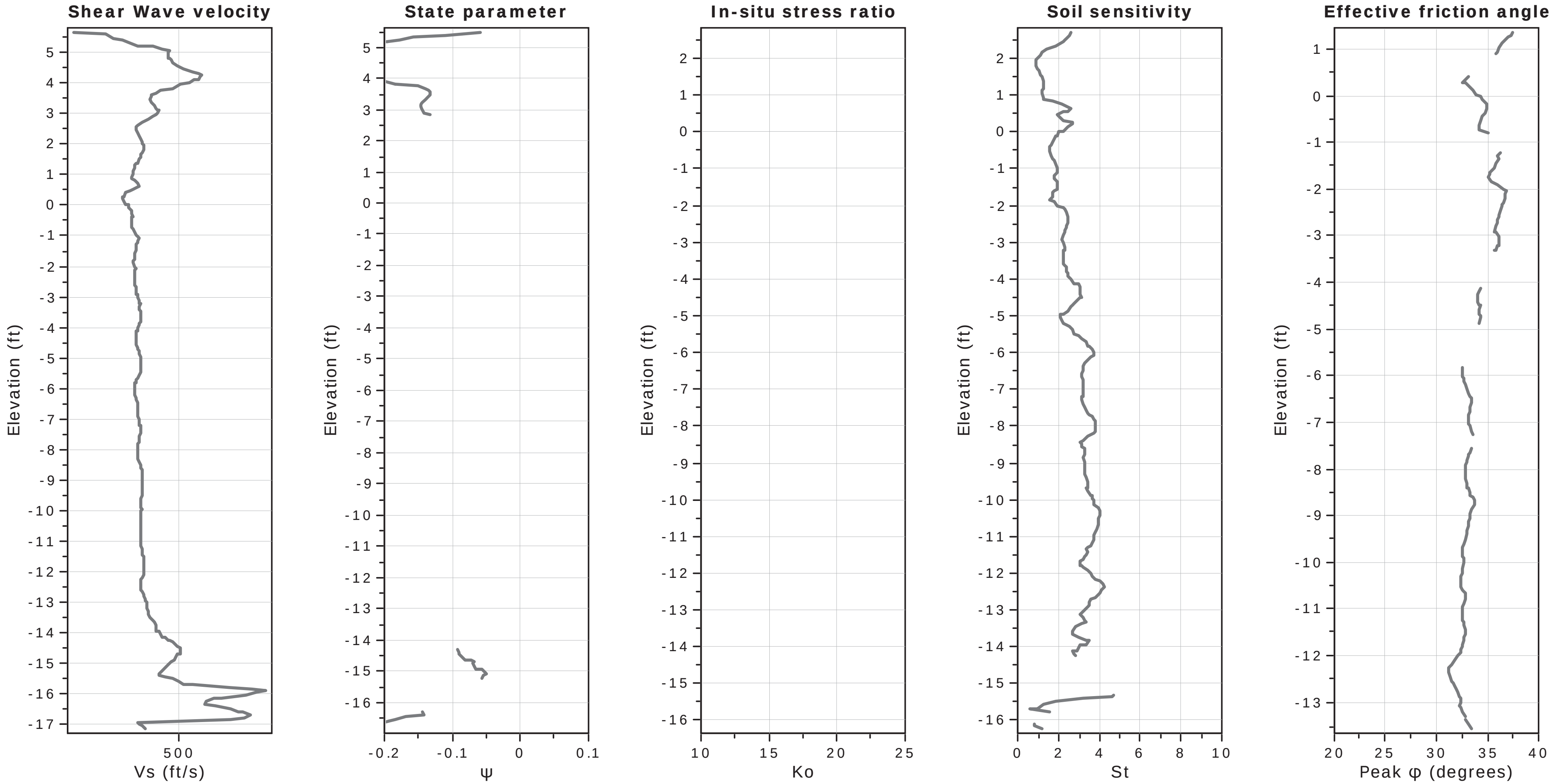


Calculation parameters

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 E – GEOPHYSICAL REPORTS

SEISMIC MASW SURVEY
AT THE
STATION 46 BRIDGE 3039 PROJECT
WOOLWICH, MAINE

INTRODUCTION

At the request of GZA GeoEnvironmental Inc., a MASW (multichannel analysis of shear waves) survey was conducted at a site called Bridge Number 3039 - Route One Over Tidal Estuary in Woolwich, Maine. The purpose of the survey was to estimate the shear wave velocity to a depth of 100 feet at this location. The field survey was undertaken by Rudy Rawcliffe and Jack Rawcliffe of Northeast Geophysical Services on April 2, 2021. This report describes the equipment and methods used and the results of the survey.

LOCATION AND SITE CONDITIONS

The survey location was centered on Station 83+74 survey post which is located about 20 feet south of the Route 1 bridge. The location of the test location and orientation of the two lines are shown on the Seismic Line Location Map (following page). Line 1 was oriented west to east parallel and just south of Route 1. Line 2 was oriented south to north with the north side passing underneath the bridge. Surface conditions were generally wet marsh land. The south side of Line 2 crossed fill material from about 20 to 80 feet north along the line.

SEISMIC METHODS AND INSTRUMENTATION

The MASW survey was conducted using a Geometrics Geode, 24-channel seismograph and 4 Hzt vertical geophones spaced fifteen feet apart for Line 1 and ten feet apart for Line 2. This resulted in a spread lengths of 345 and 230 feet respectively. On each line several 30-second ambient “noise” seismic energy was recorded. In addition to the noise measurements, several active source measurements were taken on each line. Seismic energy was collected off from either end of each spread using an energy source that consisted of a hammer striking a metal plate.

Seismic energy travels through subsurface as a number of different seismic waves that include pressure waves (P-waves), shear waves (S-waves) and surface waves called Rayleigh and Love waves. Of these, the P-wave is the fastest and will be the first to arrive at the geophones. S-waves travel slower, roughly about 40 to 50% slower than the P-waves. The surface waves are slightly slower than the S-waves, roughly about 20% slower.

The MASW method measures the dispersion pattern of the different wavelength frequencies produced by Rayleigh surface waves. The high frequency surface waves travel near to the surface and the low frequency waves penetrate more deeply into the subsurface. Scientists have discovered that this dispersion pattern can be used to calculate S-wave velocities and also how that S-wave velocity changes with depth. A more thorough discussion of the MASW method can be found at http://www.masw.com/. The surface wave (MASW) data were processed and interpreted by Dr Choon Park, one of the developers of the MASW method.

Seismic Survey Location
Bridge 46 Woolwich, Maine

Location is approximate

SEISMIC SURVEY RESULTS

The shear wave velocities were estimated by Dr. Choon Park using the MASW method as described earlier. The modeled shear velocity profiles for the site are attached. The Site Classification for this site is Site Class “E” (soft clay soil) with an average Vs(100 ft.) = 490 feet per second.

Overall the data quality was good at these sites and the modeled results appear to be consistent with the expected velocities for these materials. However, as with any indirect method, the S-wave estimates for these sites cannot be guaranteed to be accurate.

April 28, 2021
Rudy Rawcliffe, CG
NGS, Inc.
4 Union Street
Bangor, Maine

MASW Analysis for 1-D Shear-Velocity (Vs) Profiling (@ Woolwich – Lines 1&2)

Park Seismic
Geotechnical Seismic Investigation

Prepared by

Choon B. Park, Ph.D.
Principal Geophysicist

Disclaimer

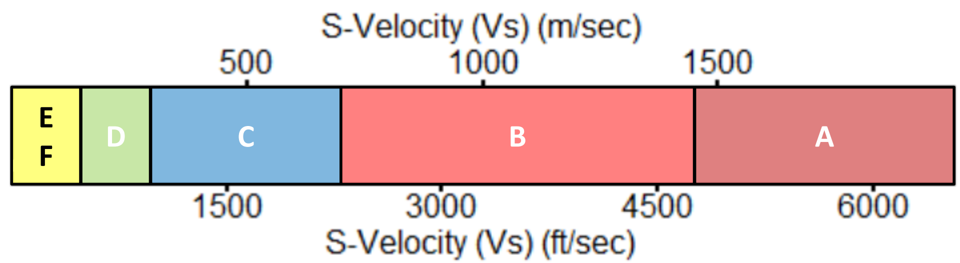
Park Seismic LLC does not guarantee this report to be free from errors or inaccuracies and disclaims any responsibility or liability for decisions made based on the information provided in this report.

April 14, 2021

Revised Compact Report to

Rudy Rawcliffe
Northeast Geophysical Services
4 Union Street, Suite 3
Bangor, ME 04401

Seismic Site Classification ($Vs^{30\text{-}m}$ or $Vs^{100\text{-}ft}$)



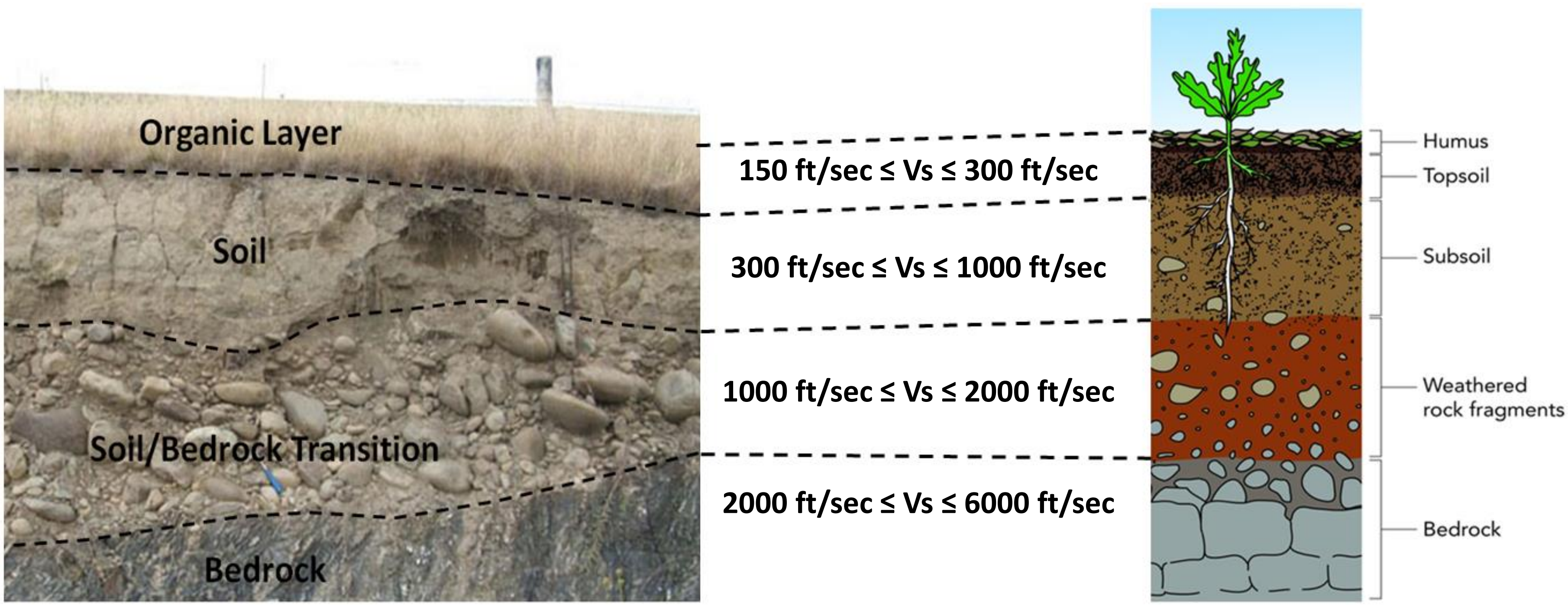
NEHRP* Seismic site classification based on shear-velocity (Vs) ranges.

Site Class	S-Velocity (Vs) (ft/sec)	S-Velocity (Vs) (m/sec)
A (Hard Rock)	> 5,000	**> 1500**
B (Rock)	2,500 – 5000	**760 – 1500**
C (Very Dense Soil and Soft Rock)	1,200 – 2,500	**360 – 760**
D (Stiff Soil)	600 – 1,200	**180 – 360**
E (Soft Clay Soil)	< 600	**< 180**
F (Soils Requiring Add'l Response)	< 600, and meeting some additional conditions.	**< 180, and meeting some additional conditions.**

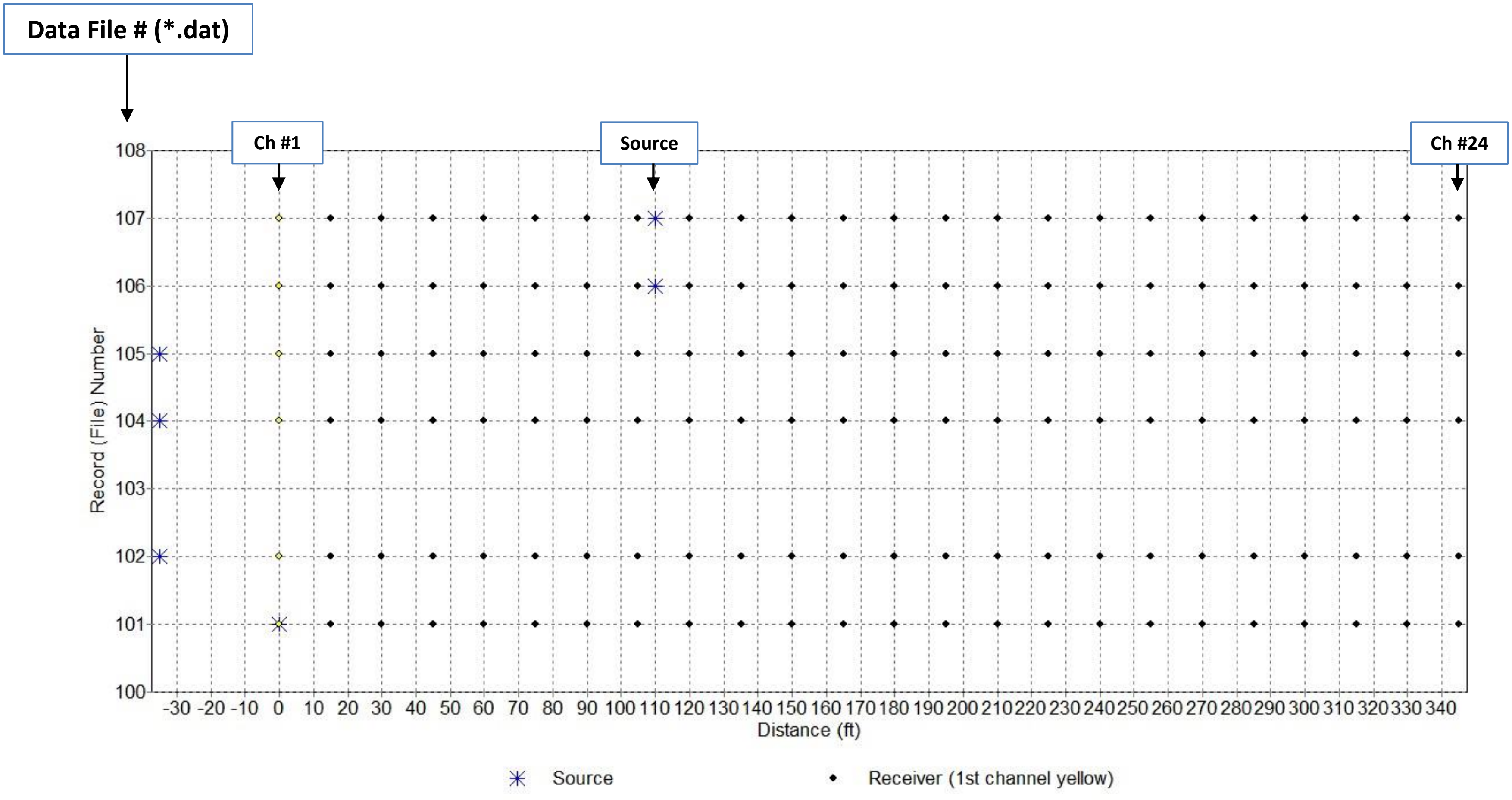
*** National Earthquake Hazard Reduction Program (www.nehrp.gov)**

Near-Surface Materials and "Approximate" Seismic Velocity (Vs) (ft/sec)

- Vs ≤ 300 ft/sec – **"extremely soft" soil**
- 300 ft/sec ≤ Vs ≤ 600 ft/sec – **"soft" soil**
- 600 ft/sec ≤ Vs ≤ 1000 ft/sec – **"stiff" soil**
- 1000 ft/sec ≤ Vs ≤ 2000 ft/sec – **"weathered" zone**
- 2000 ft/sec ≤ Vs – **"rock"**
- 3000 ft/sec ≤ Vs – **"competent" rock**



Source/Receiver (SR) Setup (Woolwich – Line 1)



Result: 1D S-Velocity (Vs) Profile – Line 1

Dispersion

Frequency (Hz)	1-10
Phase Velocity (ft/s)	10-2000
Data Quality	**GOOD-FAIR**

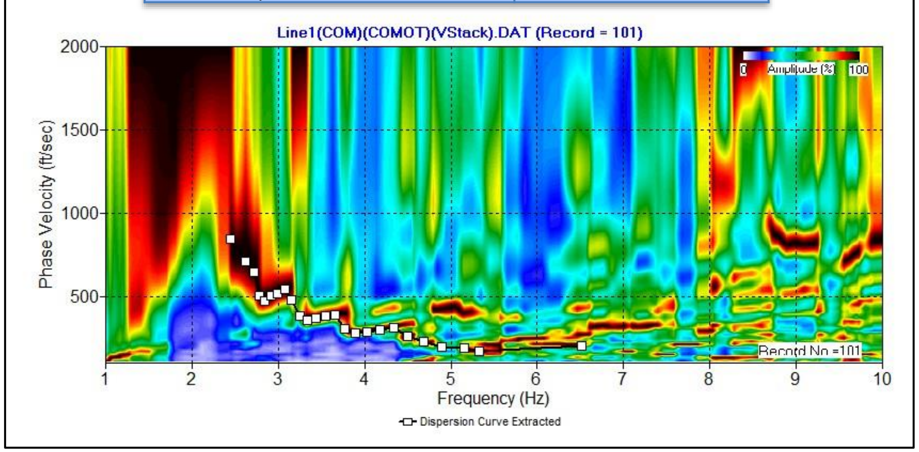


**Table of values for more parameters used for inversion is provided in a separate excel file (*.xlsx)*

1-D Vs Profile

Max. Depth (ft)	152
Number of Layers	10
Seismic Site Class	**E (Soft Clay Soil)**

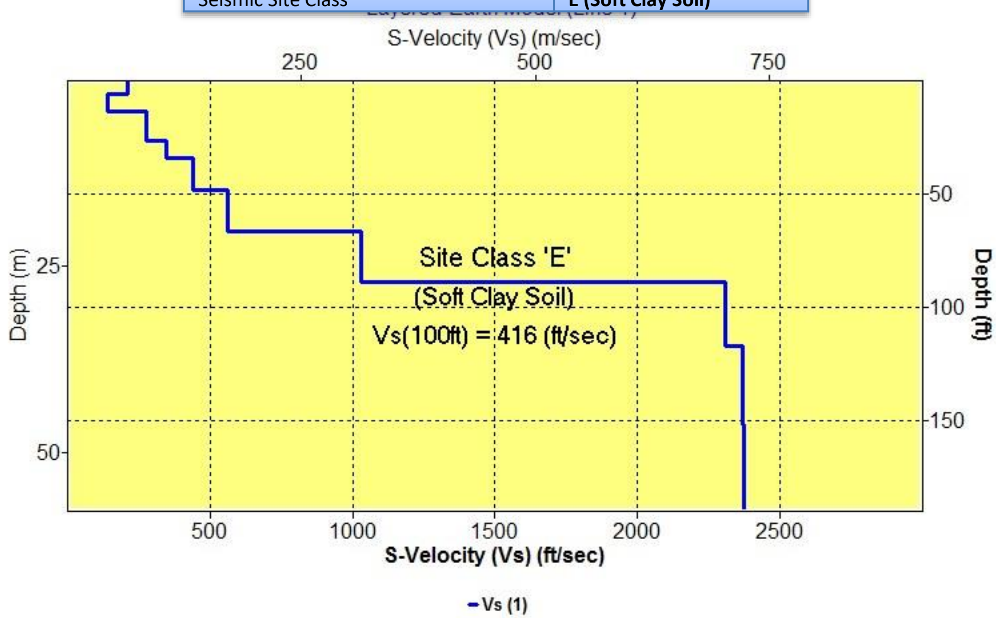
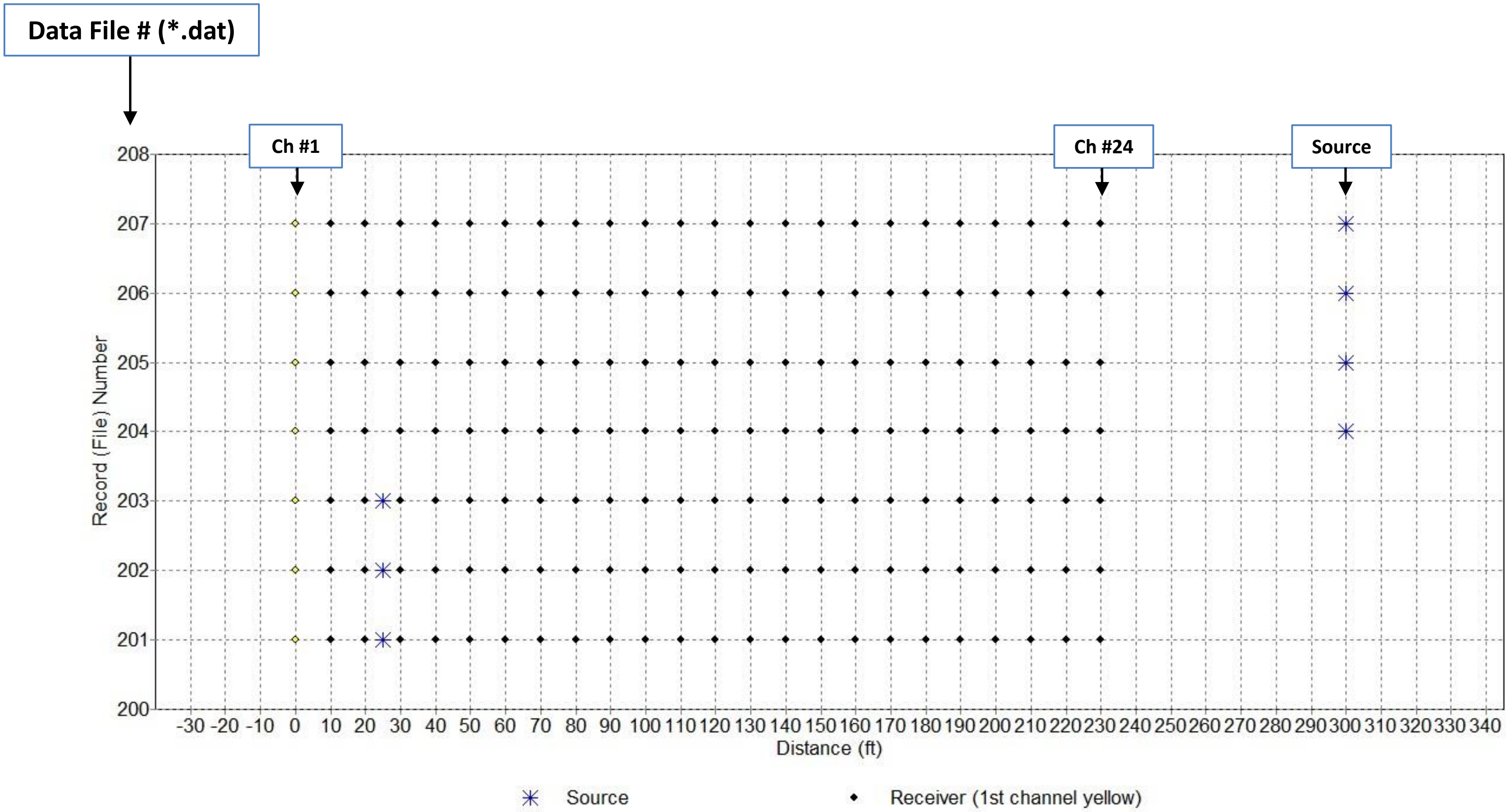


Table* of Vs Values

No.	Depth (ft)	Final Vs (ft/s)
1	5.891	**208.39**
2	13.255	**142.72**
3	26.179	**274.09**
4	33.965	**347.82**
5	48.347	**442.14**
6	66.325	**561.72**
7	88.797	**1029.95**
8	116.887	**2308.61**
9	152	**2367.95**
10	**HS***	**2373.89**

*HS: half space

Source/Receiver (SR) Setup (Woolwich – Line 2)



Result: 1D S-Velocity (Vs) Profile – Line 2

Dispersion

Frequency (Hz)	1-10
Phase Velocity (ft/s)	10-2000
Data Quality	**EXCELLENT-GOOD**

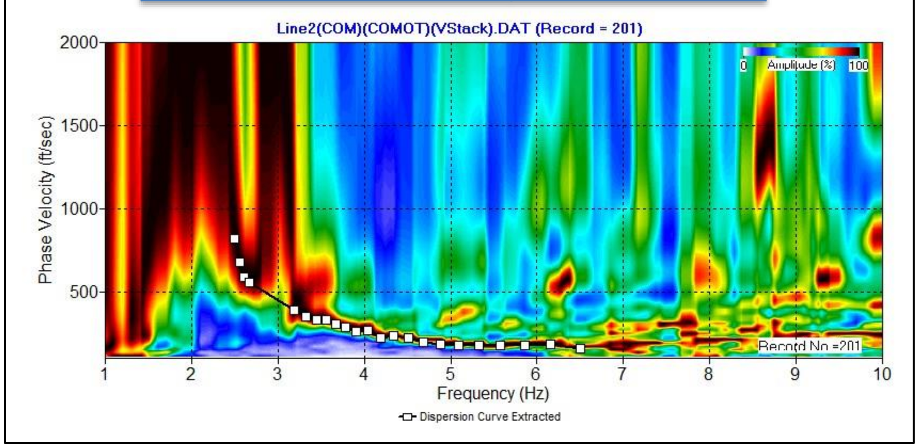
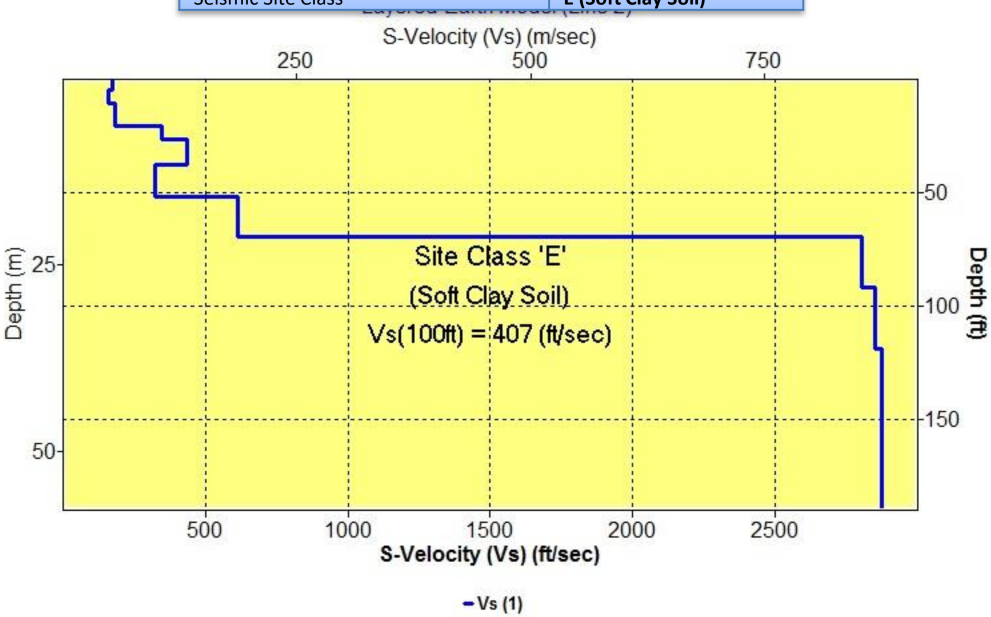


**Table of values for more parameters used for inversion is provided in a separate excel file (*.xlsx)*

1-D Vs Profile

Max. Depth (ft)	119
Number of Layers	10
Seismic Site Class	**E (Soft Clay Soil)**



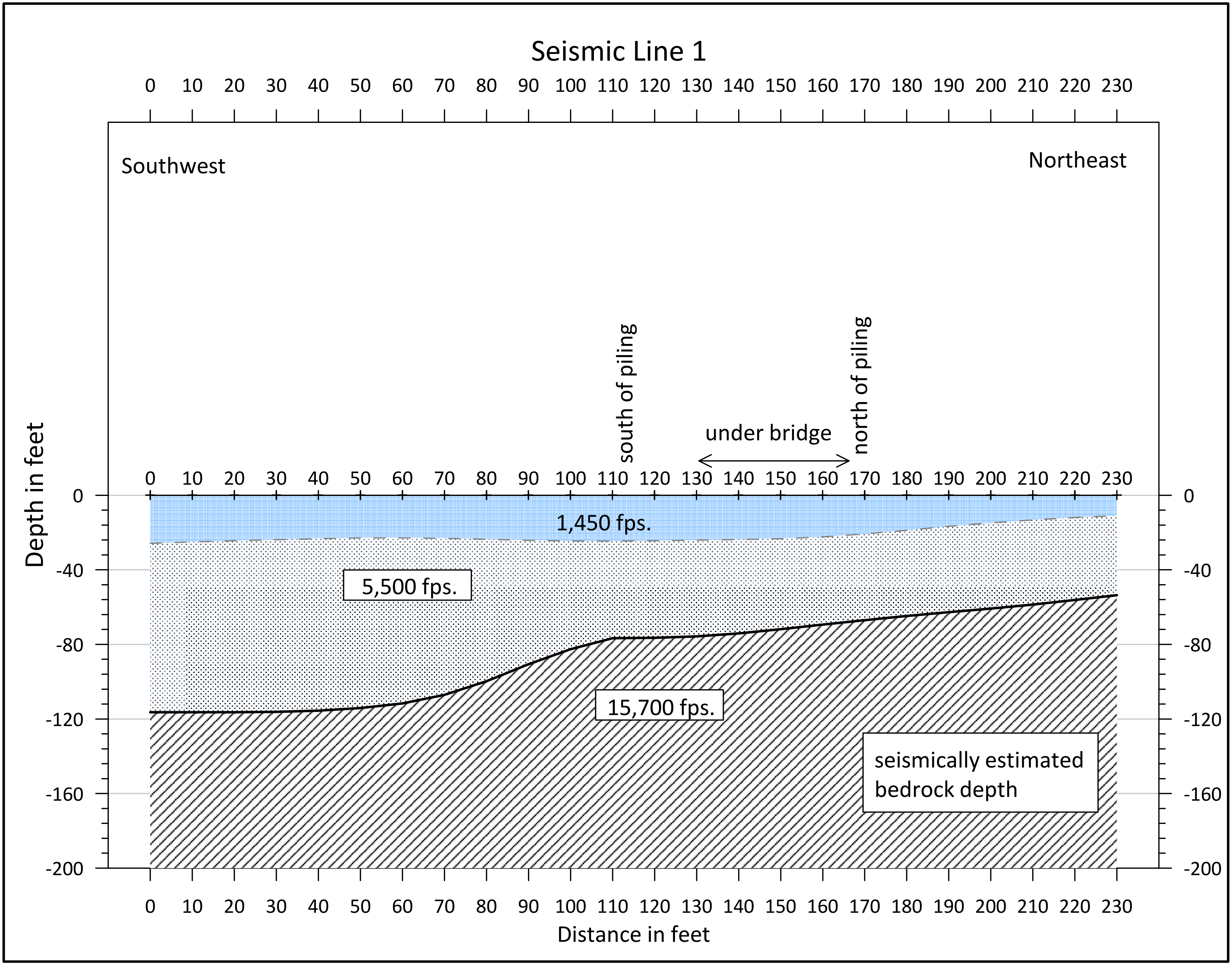
<u>Table* of Vs Values</u>

No.	Depth (ft)	Final Vs (ft/s)
1	4.612	**171.87**
2	10.377	**157.93**
3	20.495	**181.79**
4	26.591	**347.36**
5	37.851	**435.47**
6	51.925	**321.46**
7	69.519	**612.07**
8	91.51	**2804.15**
9	119	**2848.66**
10	**HS***	**2873.39**

*HS: half space

Additional Geophysical at Abutment 2

Seismic Line Location
Woolwich, Maine


Seismic Line 1
Southwest
Northeast
south of piling
under bridge
north of piling
Depth in feet
1,450 fps.
5,500 fps.
15,700 fps.
seismically estimated bedrock depth
0
-40
-80
-120
-160
-200
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230
Distance in feet

APPENDIX F – LABORATORY TESTING

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:
Station 46 Bridge No 3039
Woolwich, ME
GZA Project Number: 09.0026035.01

Report Date: 05.06.21

LABORATORY TESTING DATA SHEET, Report No.: 7421-D-197, Rev.1

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-WS46-201	2D	4-6	21-S-1479	23.3			3.6	51.7	44.7											Brown clayey silty fine to medium SAND, trace fine Gravel
BB-WS46-202	2D	2-4	21-S-1480	15.1			12.6	79.7	7.7											Red-Brown f-c SAND, little fine Gravel, trace Silt
BB-WS46-202	6D	10-11.9	21-S-1481	23.3			1.7	86.9	11.4											Brown f-m SAND, little Silt, trace fine Gravel
BB-WS46-203	1D	0-2	21-S-1482	21.6			14.8	78.0	7.2											Brown f-c SAND, little fine Gravel, trace Silt
BB-WS46-204	4D	5-7	21-S-1483	50.6																Water Content Only
BB-WS46-204	5D	10-12	21-S-1484	95.1	108	60														Brown Organic SILT
BB-WS46-204	7D	20-22	21-S-1485	35.7																Water Content Only
BB-WS46-204	8D	25-27	21-S-1486	37.9	37	19														Gray CLAY & SILT
BB-WS46-205	3D	10-12	21-S-1487	92.7	103	58														Brown Fine Grained Peat
BB-WS46-205	6D	30-32	21-S-1488	30.4																Water Content Only
BB-WS46-205	8D	40-42	21-S-1489	41.3																Water Content Only
BB-WS46-205	9D	50-52	21-S-1490	38.7	42	19														Gray 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: **Station 46 Bridge No 3039** **Woolwich, ME** GZA Project Number: 09.0026035.01 Summary Page: 2 of 3 Report Date: 05.06.21

LABORATORY TESTING DATA SHEET, Report No.: 7421-D-197, Rev.1

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-WS46-205	10D	60-62	21-S-1491	37.2																Water Content Only
BB-WS46-205	11D	70-72	21-S-1492	36.8																Water Content Only
BB-WS46-205	12D	80-82	21-S-1493				73.8	22.6	3.6											Gray f-c GRAVEL, some f-c Sand, trace Silt
BB-WS46-206	2D	5-7	21-S-1494	106.6																Water Content Only
BB-WS46-206	4D	15-17	21-S-1495	85.4	93	50														Brown Fine Grained Peat
BB-WS46-206	5D	20-22	21-S-1496	82.9																Water Content Only
BB-WS46-206	8D	26-28	21-S-1497	85.8	94	50														Brown Fine Grained Peat
BB-WS46-206	11D	35-37	21-S-1498	41.3	46	24														Gray Silty CLAY
BB-WS46-206	14D	55-57	21-S-1499	41.3																Water Content Only
BB-WS46-206	15D	65-67	21-S-1500	37.4	37	21														Gray CLAY & SILT
BB-WS46-206	17D	85-87	21-S-1501	36.8																Water Content Only
BB-WS46-206	19D	110-112	21-S-1502				18.4	50.0	31.6											Gray f-c SAND, some Silt, little fine Gravel

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: **Station 46 Bridge No 3039** **Woolwich, ME** GZA Project Number: 09.0026035.01 Summary Page: 3 of 3 Report Date: 05.06.21

LABORATORY TESTING DATA SHEET, Report No.: 7421-D-197, Rev.1

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-WS46-207	2D	4-5.8	21-S-1503	3.1			25.2	61.1	13.7											Brown f-c SAND, some fine Gravel, little Silt
BB-WS46-207	3D	10-12	21-S-1504	33.3			15.7	25.4	58.9											Brown SILT & CLAY, some f-c Sand, little coarse Gravel
BB-WS46-301	2D	2.5-4.5	21-S-1505	21.1			21.4	37.4	41.2											Brown sandy SILT, some f-c Gravel
BB-WS46-301	7D	13-15	21-S-1506				12.8	64.8	22.4											Red - Brown f-c SAND, some Silt, little fine Gravel
BB-WS46-305	2D	5-7	21-S-1507	106.7																Water Content Only
BB-WS46-305	3D	15-17	21-S-1508	83.8	94	49														Brown Fine Grained Peat
BB-WS46-305	4D	21.5-22	21-S-1509	31.0																Water Content Only
BB-WS46-305	5D	27-28.4	21-S-1510	22.3	28	16														Gray CLAY & SILT

Date Received: *04.27.21*　　　Reviewed By: ______　　　Date Reviewed: *05.06.21*

THIELSCH ENGINEERING

State of Maine - Department of Transportation
Laboratory Testing Summary Sheet

Station 46 Bridge No 3039

MDOT Project Number:

GZA Project Number: 09.0026035.01

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
BB-WS46-201		2D	4-6	21-S-1479		23.3			SM	A-4(0)	III
BB-WS46-202		2D	2-4	21-S-1480		15.1			SW-SM	A-1-b	II
BB-WS46-202		6D	10-11.9	21-S-1481		23.3			SP-SM	A-2-4(0)	II
BB-WS46-203		1D	0-2	21-S-1482		21.6			SP-SM	A-1-b	II
BB-WS46-204		4D	5-7	21-S-1483		50.6					
BB-WS46-204		5D	10-12	21-S-1484		95.1	108	48			
BB-WS46-204		7D	20-22	21-S-1485		35.7					
BB-WS46-204		8D	25-27	21-S-1486		37.9	37	18			
BB-WS46-205		3D	10-12	21-S-1487		92.7	103	45			
BB-WS46-205		6D	30-32	21-S-1488		30.4					
BB-WS46-205		8D	40-42	21-S-1489		41.3					
BB-WS46-205		9D	50-52	21-S-1490		38.7	42	23			
BB-WS46-205		10D	60-62	21-S-1491		37.2					
BB-WS46-205		11D	70-72	21-S-1492		36.8					
BB-WS46-205		12D	80-82	21-S-1493					GW	A-1-a	0
BB-WS46-206		2D	5-7	21-S-1494		106.6					
BB-WS46-206		4D	15-17	21-S-1495		85.4	93	43			
BB-WS46-206		5D	20-22	21-S-1496		82.9					
BB-WS46-206		8D	26-28	21-S-1497		85.8	94	44			
BB-WS46-206		11D	35-37	21-S-1498		41.3	46	22			
BB-WS46-206		14D	55-57	21-S-1499		41.3					
BB-WS46-206		15D	65-67	21-S-1500		37.4	37	16			
BB-WS46-206		17D	85-87	21-S-1501		36.8					
BB-WS46-206		19D	110-112	21-S-1502					SM	A-2-4(0)	II
BB-WS46-207		2D	4-5.8	21-S-1503		3.1			SM	A-1-b	II
BB-WS46-207		3D	10-12	21-S-1504		33.3			CL	A-4(0)	IV
BB-WS46-301		2D	2.5-4.5	21-S-1505		21.1			SM	A-4(0)	III
BB-WS46-301		7D	13-15	21-S-1506					SM	A-2-4(0)	II
BB-WS46-305		2D	5-7	21-S-1507		106.7					
BB-WS46-305		3D	15-17	21-S-1508		83.8	94	45			
BB-WS46-305		4D	21.5-22	21-S-1509		31.0					
BB-WS46-305		5D	27-28.4	21-S-1510		22.3	28	12			

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.

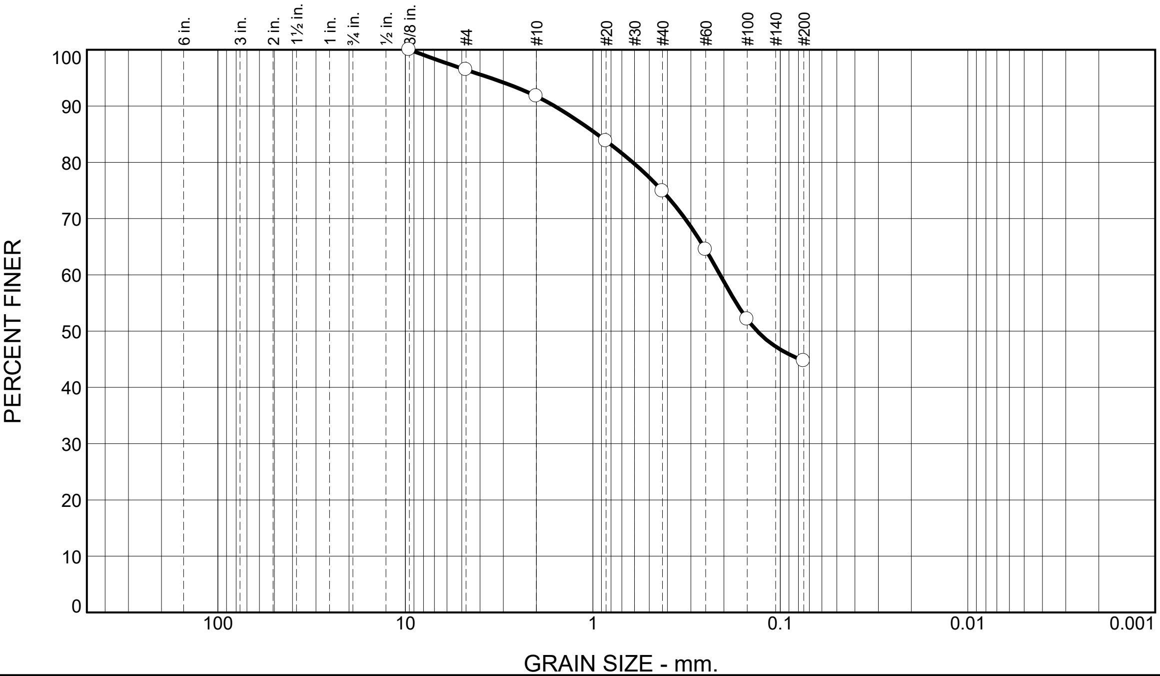
GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-93 (1996) and/or ASTM D 422-63 (Reapproved 1998)

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	0.0	3.6	4.7	16.8	30.2	44.7	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.375"	100.0		
#4	96.4		
#10	91.7		
#20	83.8		
#40	74.9		
#60	64.5		
#100	52.1		
#200	44.7		

* (no specification provided)

Material Description

Brown clayey silty fine to medium SAND, trace fine Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

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

Coefficients

D_{90}= 1.5997 D_{85}= 0.9511 D_{60}= 0.2094
D_{50}= 0.1327 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as plastic. Sample rolled to 1/4".

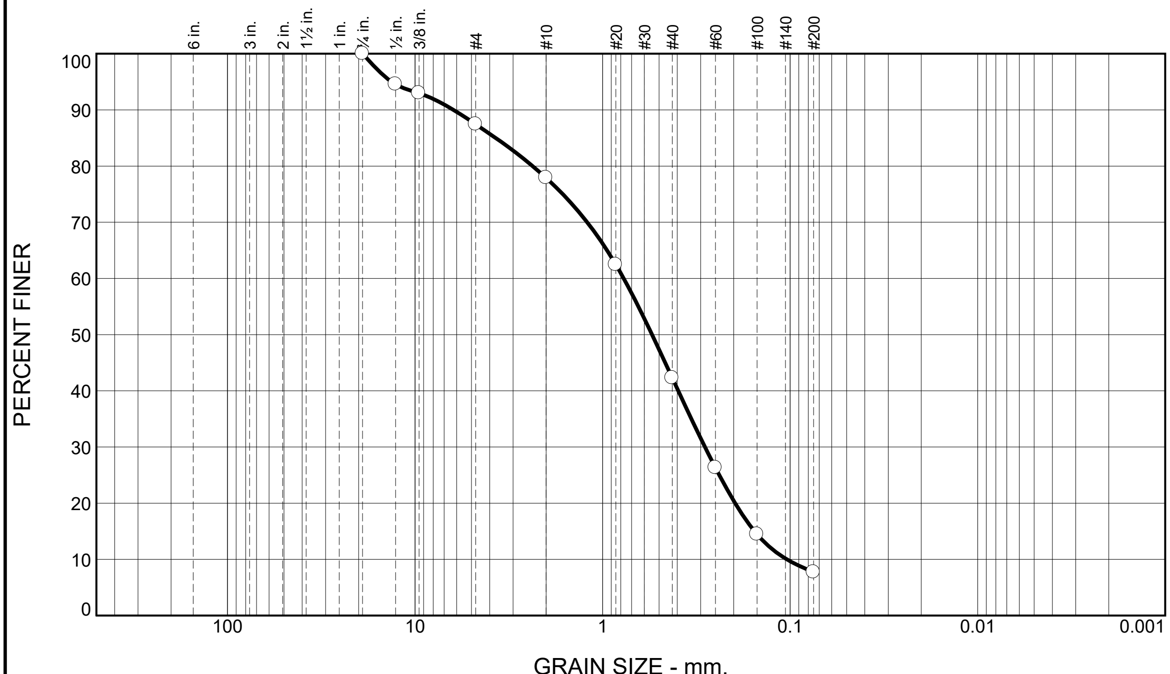
Date Received: 04.27.21 **Date Tested:** 04.29.21
Tested By: RR / AD / SA
Checked By: Steven Accetta
Title: Laboratory Coordinator

Source of Sample: BB-WS46-201 **Depth:** 4-6' **Date Sampled:**
Sample Number: 2D

Thielsch Engineering Inc.
Cranston, RI

Client: GZA GeoEnvironmental
Project: Station 46 Bridge No. 3039
Woolwich, ME
Project No: 09.0026035.01 **Figure** 21-S-1479

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.6	9.5	35.6	34.6	7.7	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	94.5		
0.375"	93.0		
#4	87.4		
#10	77.9		
#20	62.5		
#40	42.3		
#60	26.3		
#100	14.5		
#200	7.7		

* (no specification provided)

Material Description

Red-Brown f-c SAND, little fine Gravel, trace Silt

Atterberg Limits (ASTM D 4318)

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

Classification

USCS (D 2487)= SW-SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 6.2409 D_{85}= 3.7122 D_{60}= 0.7720
D_{50}= 0.5449 D_{30}= 0.2845 D_{15}= 0.1548
D_{10}= 0.1041 C_u= 7.41 C_c= 1.01

Remarks

Date Received: 04.27.21 **Date Tested:** 04.29.21

Tested By: RR / AD / SA

Checked By: Steven Accetta

Title: Laboratory Coordinator

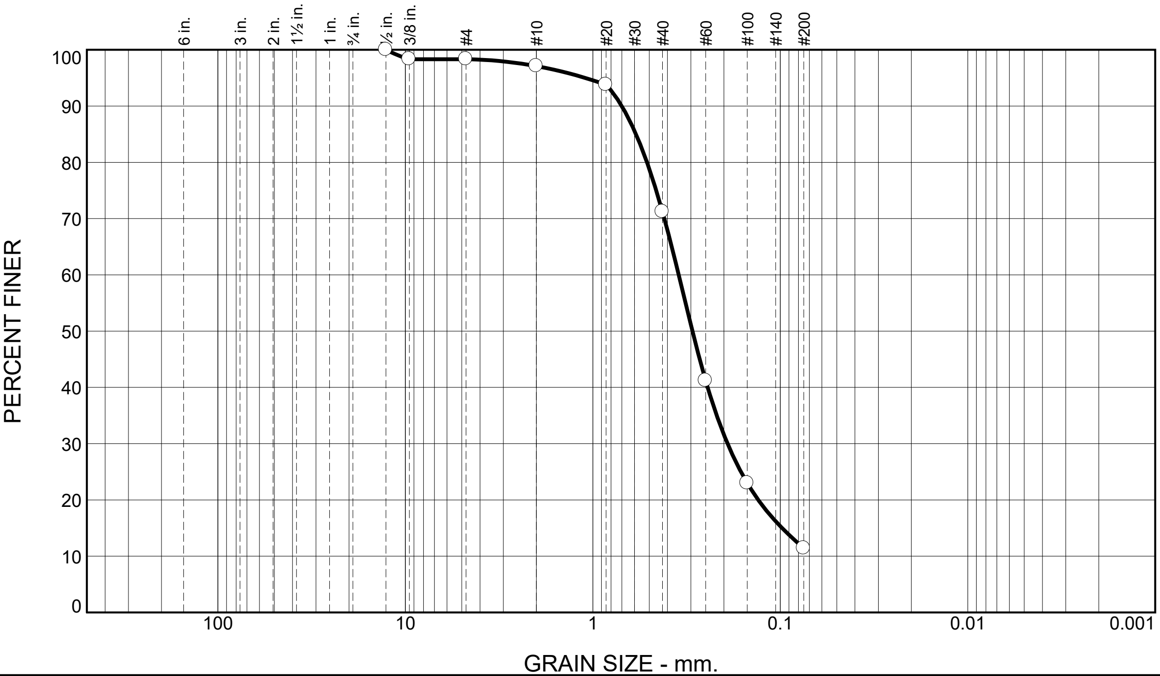
Source of Sample: BB-WS46-202 **Depth:** 2-4' **Date Sampled:**
Sample Number: 2D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Station 46 Bridge No. 3039
Woolwich, ME
Project No: 09.0026035.01 **Figure** 21-S-1480

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.7	1.2	25.9	59.8	11.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.5"	100.0		
0.375"	98.3		
#4	98.3		
#10	97.1		
#20	93.8		
#40	71.2		
#60	41.2		
#100	23.0		
#200	11.4		

* (no specification provided)

Material Description

Brown f-m SAND, little Silt, trace fine Gravel

Atterberg Limits (ASTM D 4318)

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

Classification

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

Coefficients

D_{90}= 0.7008 D_{85}= 0.5888 D_{60}= 0.3483
D_{50}= 0.2940 D_{30}= 0.1912 D_{15}= 0.0979
D_{10}= C_u= C_c=

Remarks

Date Received: 04.27.21 **Date Tested:** 04.29.21

Tested By: RR / AD / SA

Checked By: Steven Accetta

Title: Laboratory Coordinator

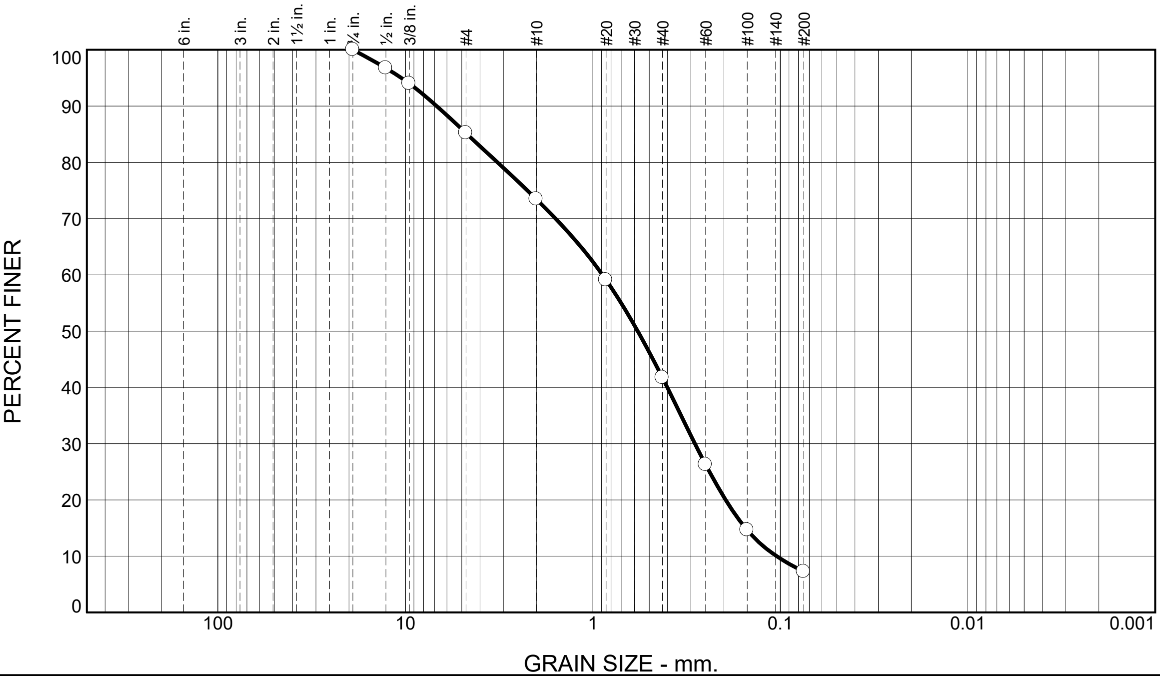
Source of Sample: BB-WS46-202 **Depth:** 10-11.9' **Date Sampled:**
Sample Number: 6D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Station 46 Bridge No. 3039
Woolwich, ME
Project No: 09.0026035.01 **Figure** 21-S-1481

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	14.8	11.8	31.7	34.5	7.2	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	96.7		
0.375"	94.0		
#4	85.2		
#10	73.4		
#20	59.1		
#40	41.7		
#60	26.3		
#100	14.6		
#200	7.2		

* (no specification provided)

Material Description

Brown f-c SAND, little fine 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}= 6.8013 D_{85}= 4.6817 D_{60}= 0.8884
D_{50}= 0.5762 D_{30}= 0.2854 D_{15}= 0.1532
D_{10}= 0.1047 C_u= 8.49 C_c= 0.88

Remarks

Date Received: 04.27.21 **Date Tested:** 05.05.21

Tested By: RR

Checked By: Steven Accetta

Title: Laboratory Coordinator

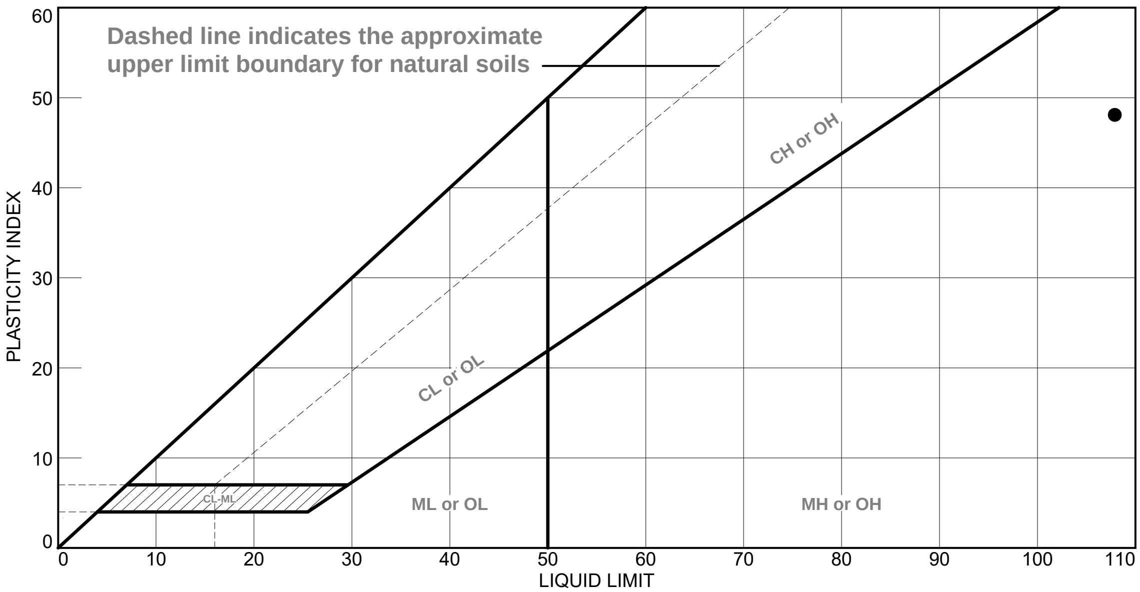
Source of Sample: BB-WS46-203 **Depth:** 0-2' **Date Sampled:**
Sample Number: 1D

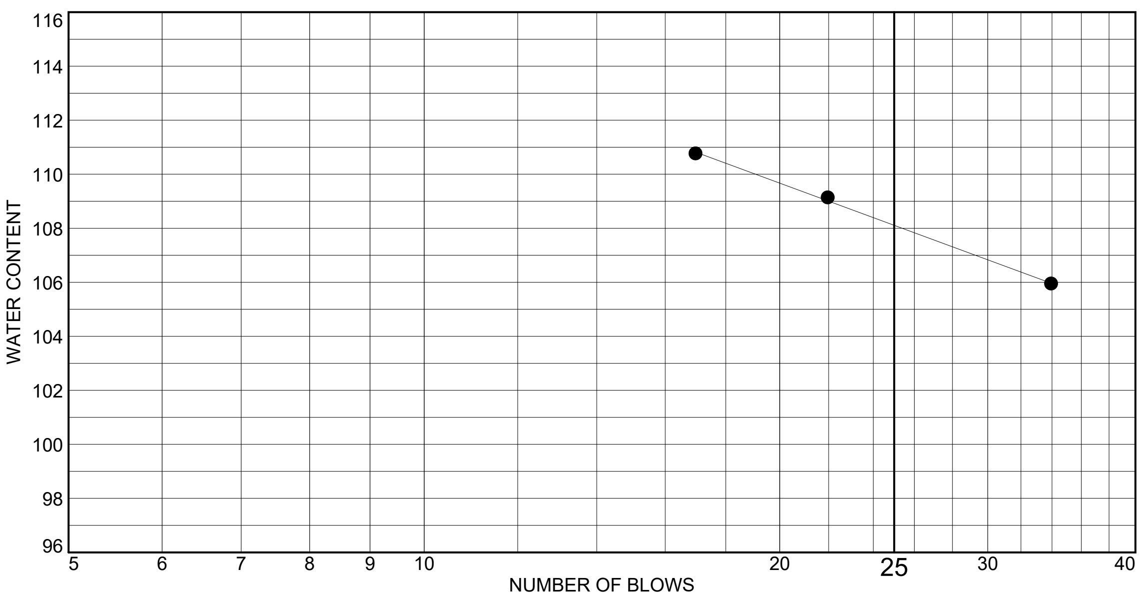
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Station 46 Bridge No. 3039
Woolwich, ME
Project No: 09.0026035.01 **Figure** 21-S-1482

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Organic SILT	108	60	48			

Project No. 09.0026035.01 **Client:** GZA GeoEnvironmental

Project: Station 46 Bridge No. 3039

Woolwich, ME

Source of Sample: BB-WS46-204 **Depth:** 10-12'

Sample Number: 5D

Remarks:

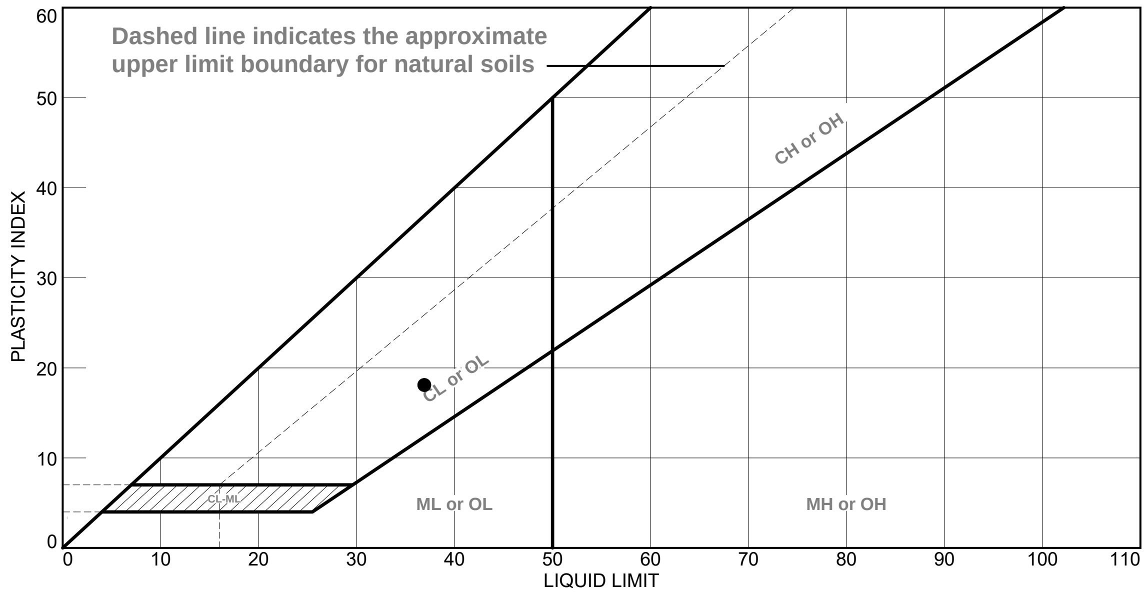
Thielsch Engineering Inc.

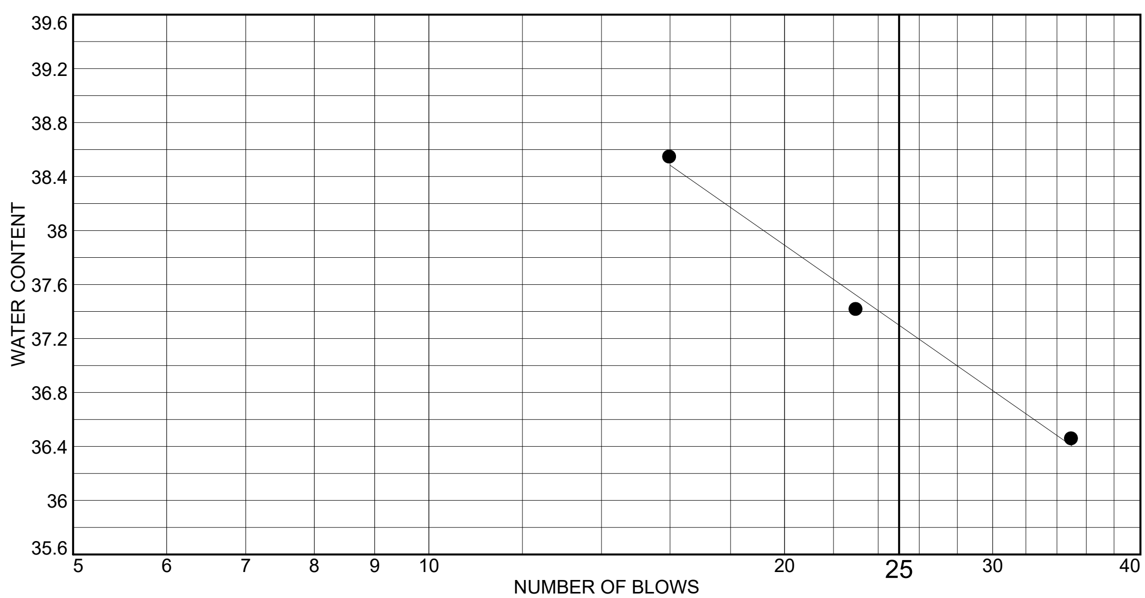
Cranston, RI

Figure 21-L-1484

Tested By: RR **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray CLAY & SILT	37	19	18			

Project No. 09.0026035.01 **Client:** GZA GeoEnvironmental

Project: Station 46 Bridge No. 3039

Woolwich, ME

Source of Sample: BB-WS46-204 **Depth:** 25-27'

Sample Number: 8D

Thielsch Engineering Inc.

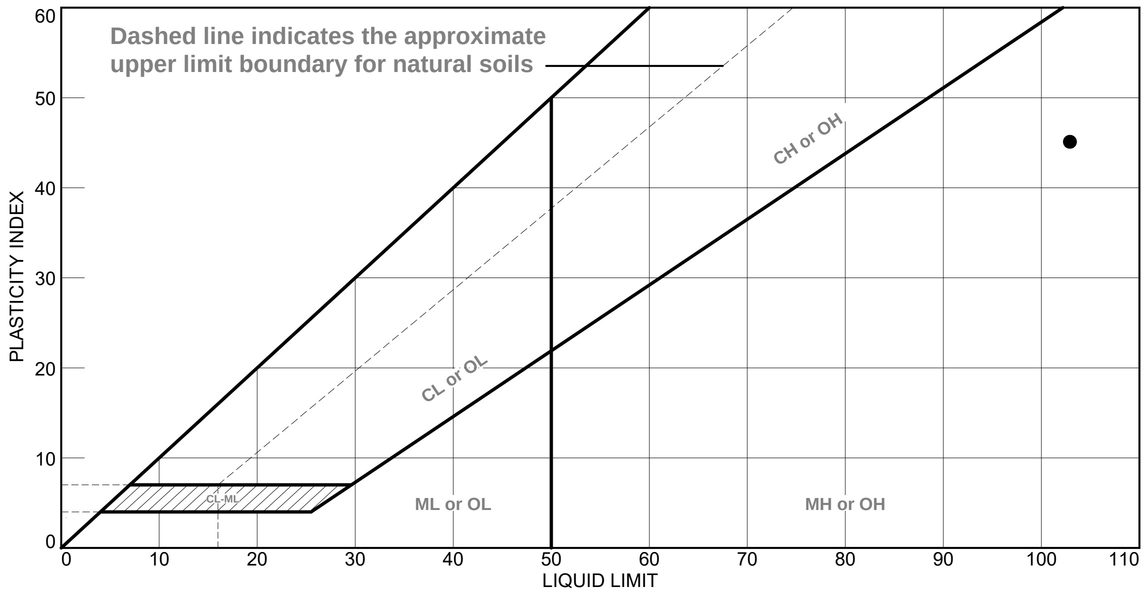
Cranston, RI

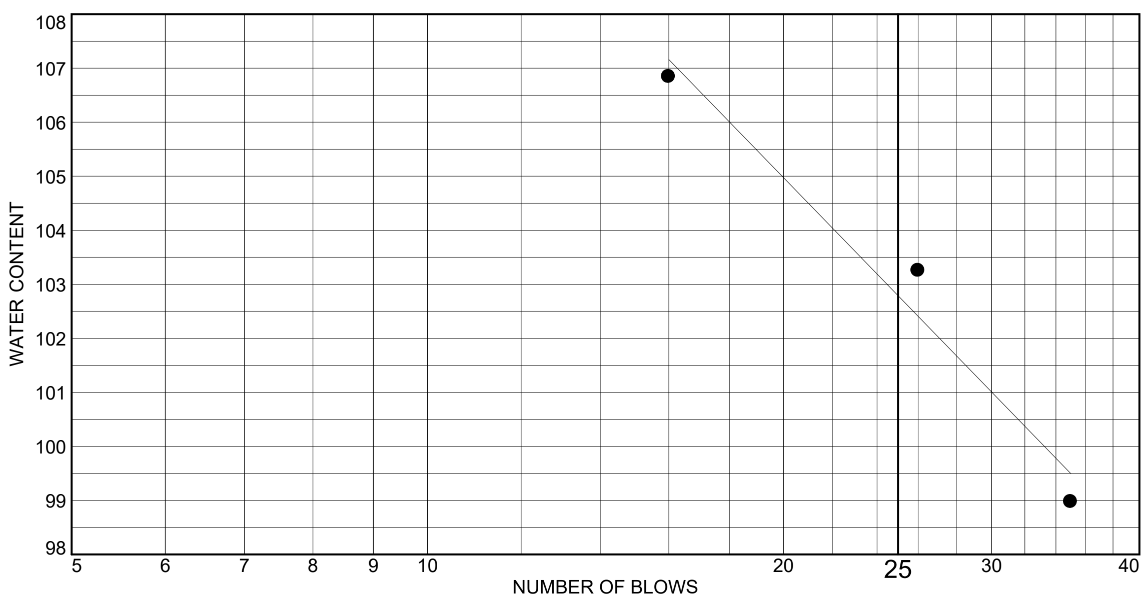
Remarks:

Figure 21-L-1486

Tested By: JM **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Fine Grained Peat	103	58	45			

Project No. 09.0026035.01 **Client:** GZA GeoEnvironmental

Project: Station 46 Bridge No. 3039

Woolwich, ME

Source of Sample: BB-WS46-205 **Depth:** 10-12'

Sample Number: 3D

Remarks:

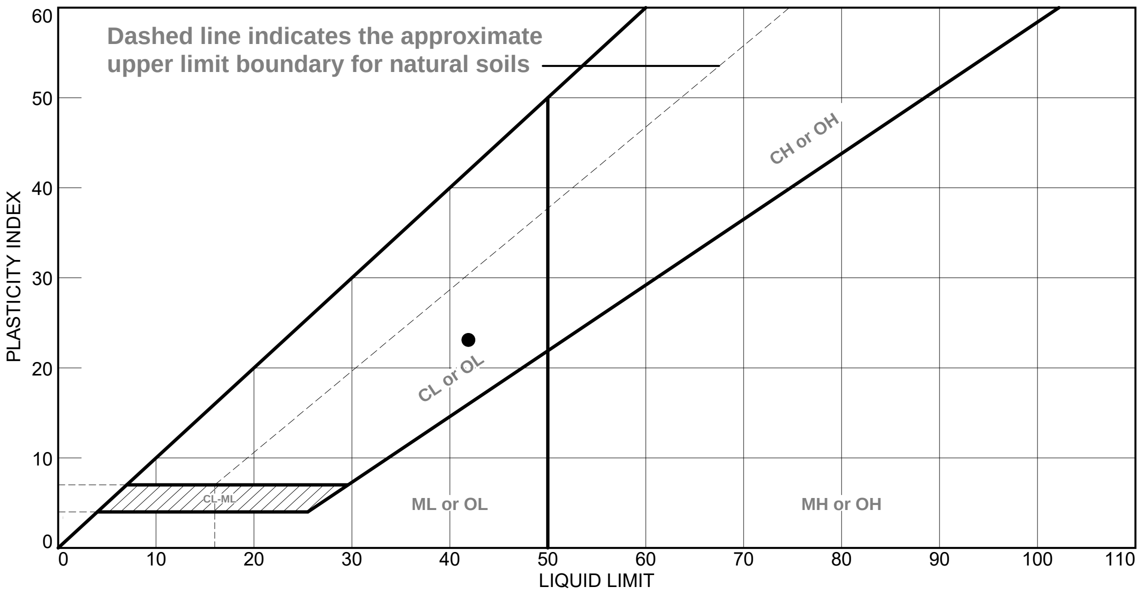
Thielsch Engineering Inc.

Cranston, RI

Figure 21-L-1487

Tested By: RR **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	42	19	23			

Project No. 09.0026035.01 **Client:** GZA GeoEnvironmental

Project: Station 46 Bridge No. 3039

Woolwich, ME

Source of Sample: BB-WS46-205 **Depth:** 50-52'

Sample Number: 9D

Thielsch Engineering Inc.

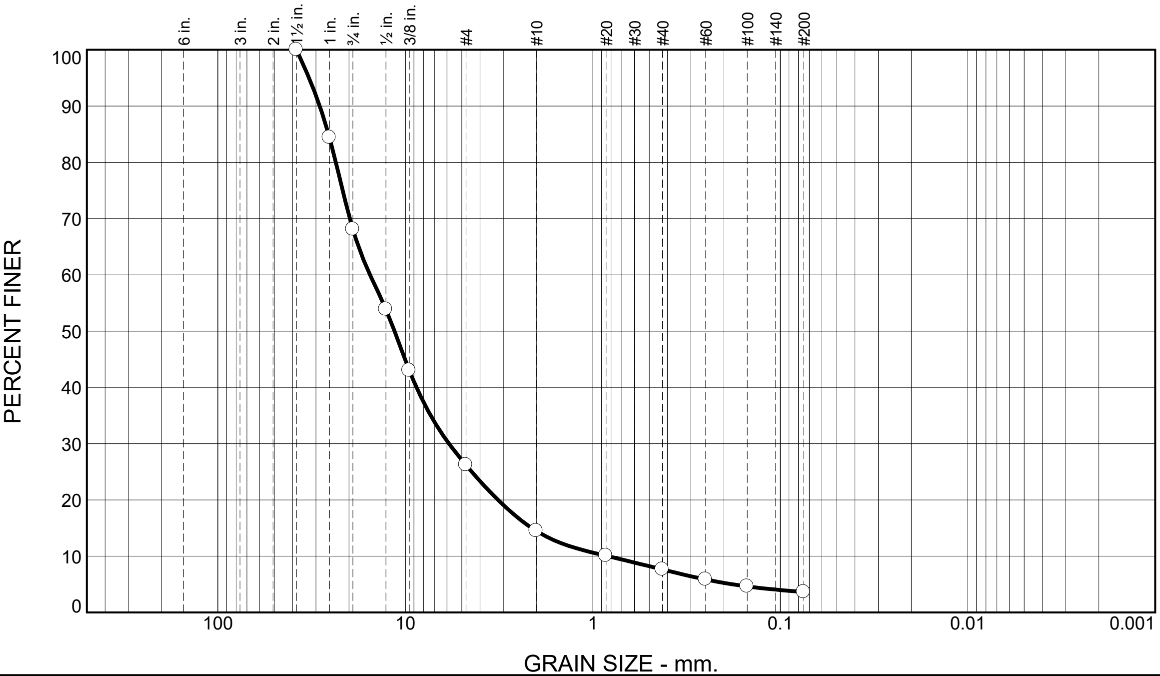
Cranston, RI

Remarks:

Figure 21-L-1490

Tested By: JM **Checked By:** SA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	31.9	41.9	11.7	6.9	4.0	3.6	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	84.4		
3/4"	68.1		
1/2"	53.9		
3/8"	43.0		
#4	26.2		
#10	14.5		
#20	10.1		
#40	7.6		
#60	5.9		
#100	4.6		
#200	3.6		

* (no specification provided)

Material Description

Gray f-c GRAVEL, some f-c Sand, trace Silt

Atterberg Limits (ASTM D 4318)

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

Classification

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

Coefficients

D_{90}= 28.6002 D_{85}= 25.6940 D_{60}= 15.4464
D_{50}= 11.4321 D_{30}= 5.8513 D_{15}= 2.1160
D_{10}= 0.8306 C_u= 18.60 C_c= 2.67

Remarks

Date Received: 04.27.21 **Date Tested:** 04.29.21

Tested By: RR / AD / SA

Checked By: Steven Accetta

Title: Laboratory Coordinator

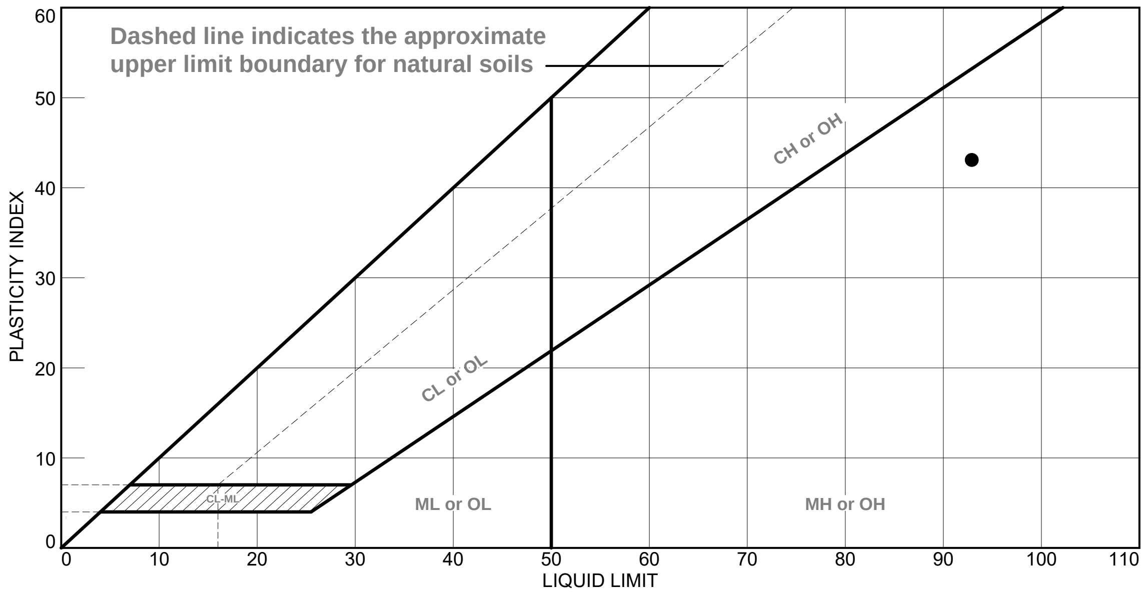
Source of Sample: BB-WS46-205 **Depth:** 80-82' **Date Sampled:**
Sample Number: 12D

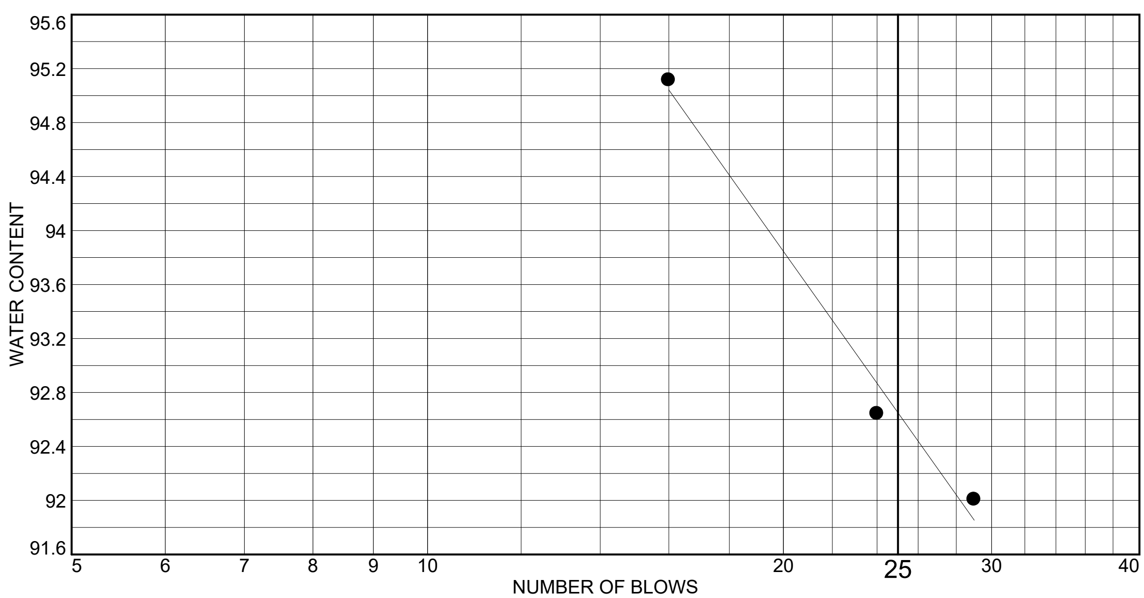
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Station 46 Bridge No. 3039
Woolwich, ME
Project No: 09.0026035.01 **Figure** 21-S-1493

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Fine Grained Peat	93	50	43			

Project No. 09.0026035.01 **Client:** GZA GeoEnvironmental

Project: Station 46 Bridge No. 3039

Woolwich, ME

Source of Sample: BB-WS46-206 **Depth:** 15-17'

Sample Number: 4D

Remarks:

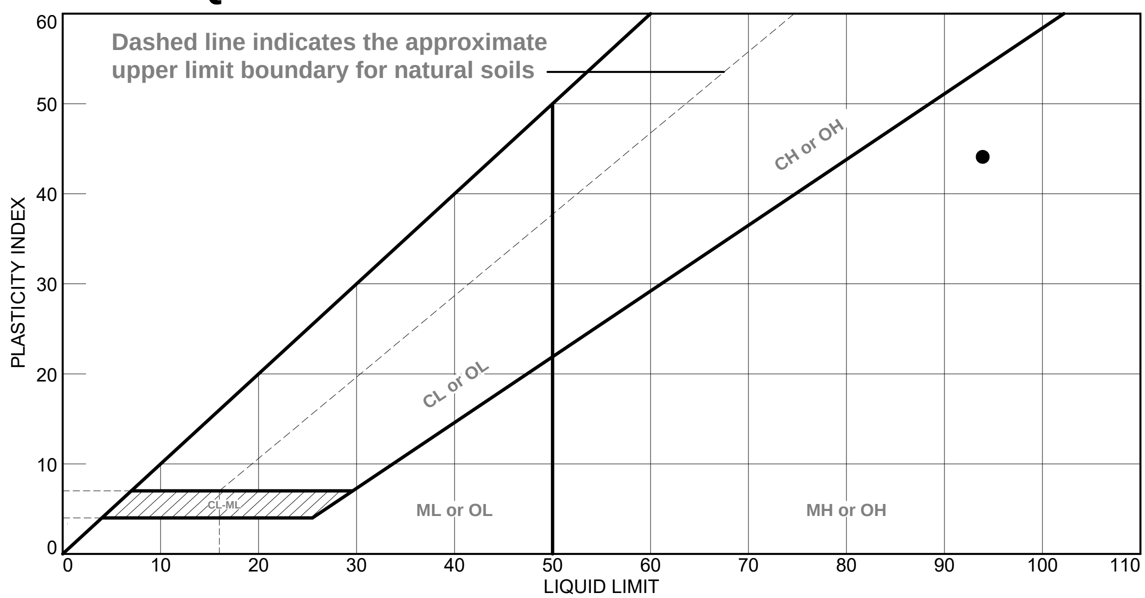
Thielsch Engineering Inc.

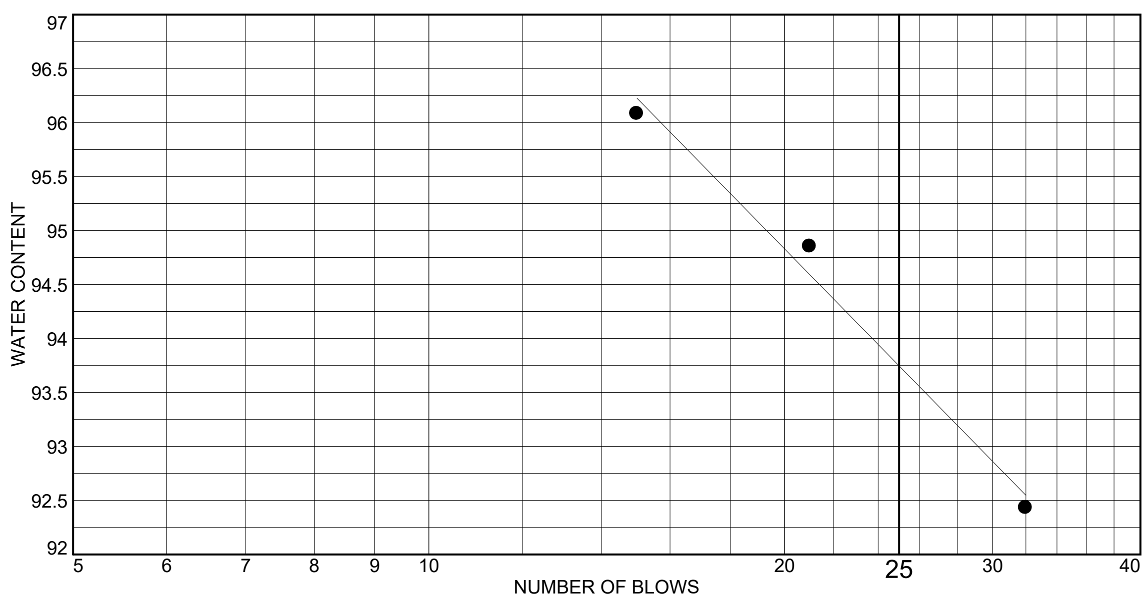
Cranston, RI

Figure 21-L-1495

Tested By: RR **Checked By:** sa

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Fine Grained Peat	94	50	44			

Project No. 09.0026035.01 **Client:** GZA GeoEnvironmental

Project: Station 46 Bridge No. 3039

Woolwich, ME

Source of Sample: BB-WS46-206 **Depth:** 26-28'

Sample Number: 8D

Thielsch Engineering Inc.

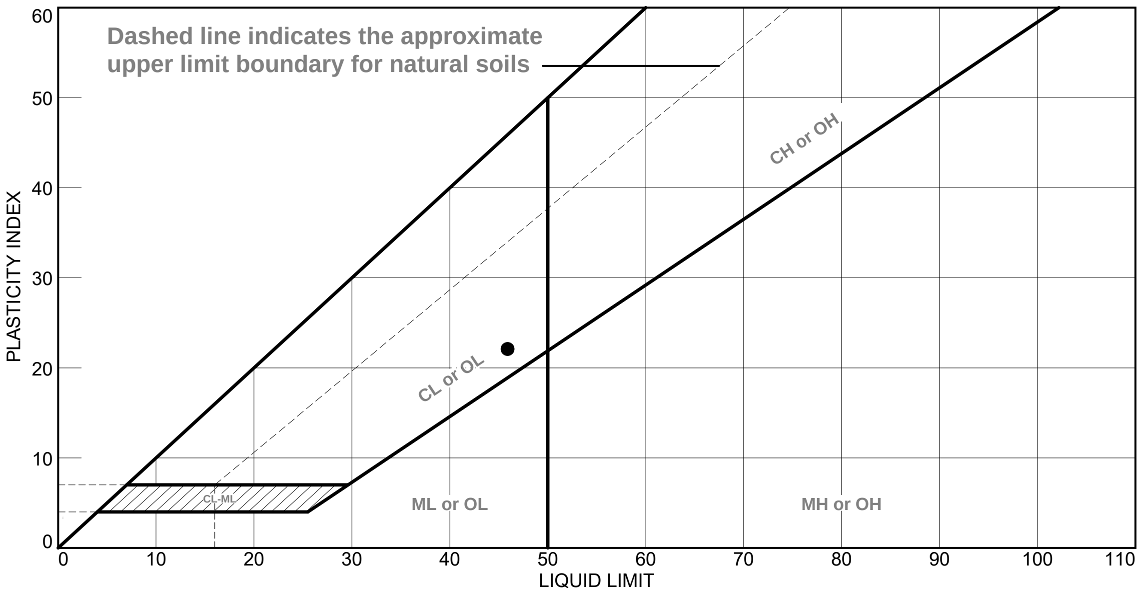
Cranston, RI

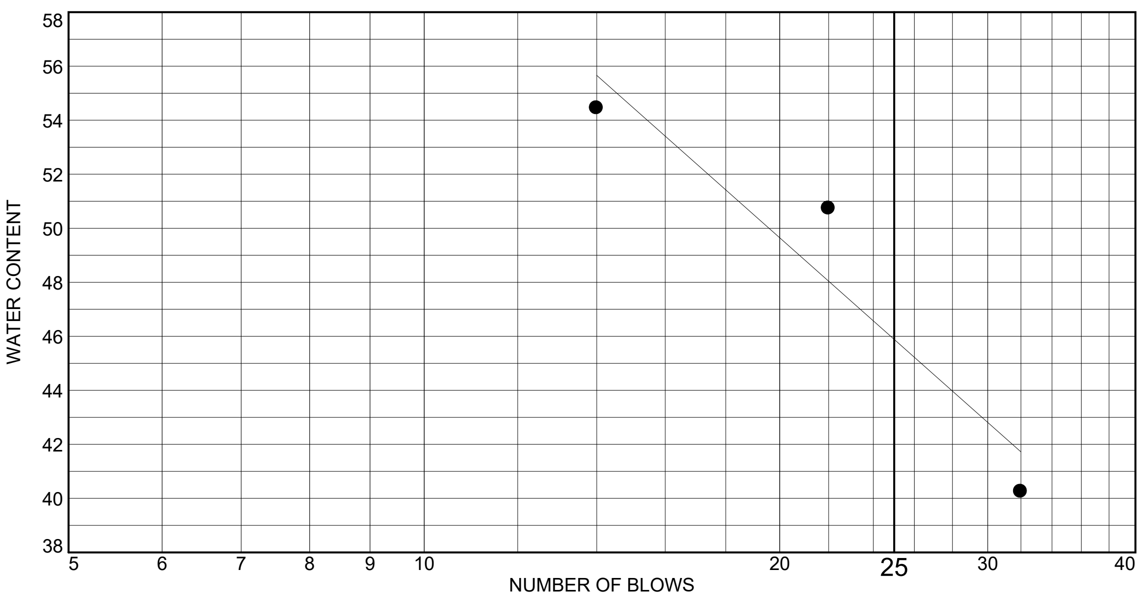
Remarks:

Figure 21-L-1497

Tested By: RR **Checked By:** sa

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	46	24	22			

Project No. 09.0026035.01 **Client:** GZA GeoEnvironmental

Project: Station 46 Bridge No. 3039

Woolwich, ME

Source of Sample: BB-WS46-206 **Depth:** 35-37'

Sample Number: 11D

Remarks:

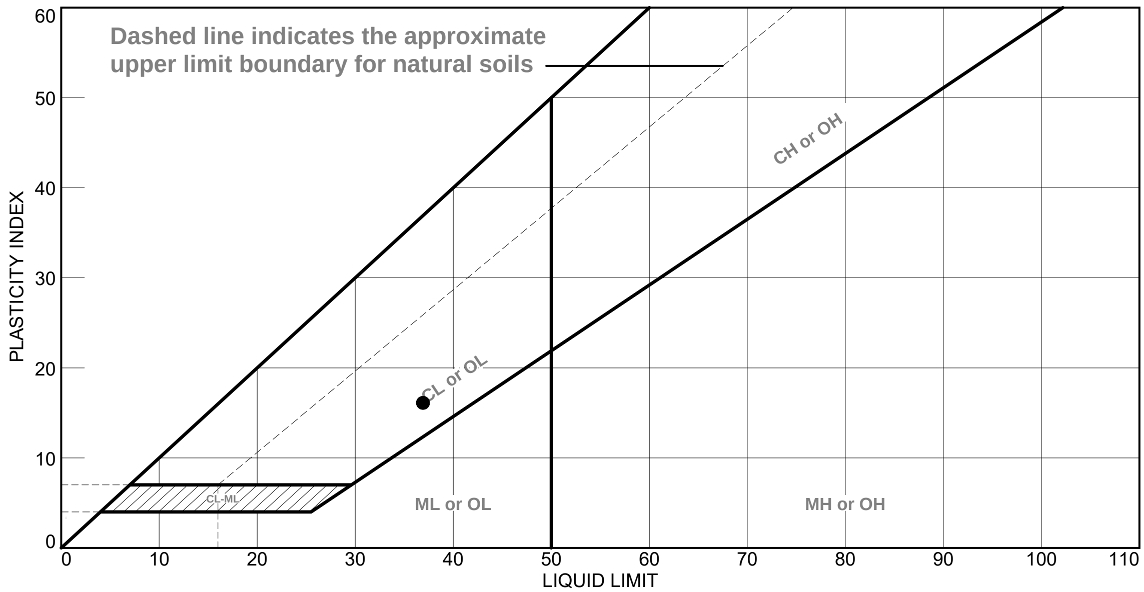
Thielsch Engineering Inc.

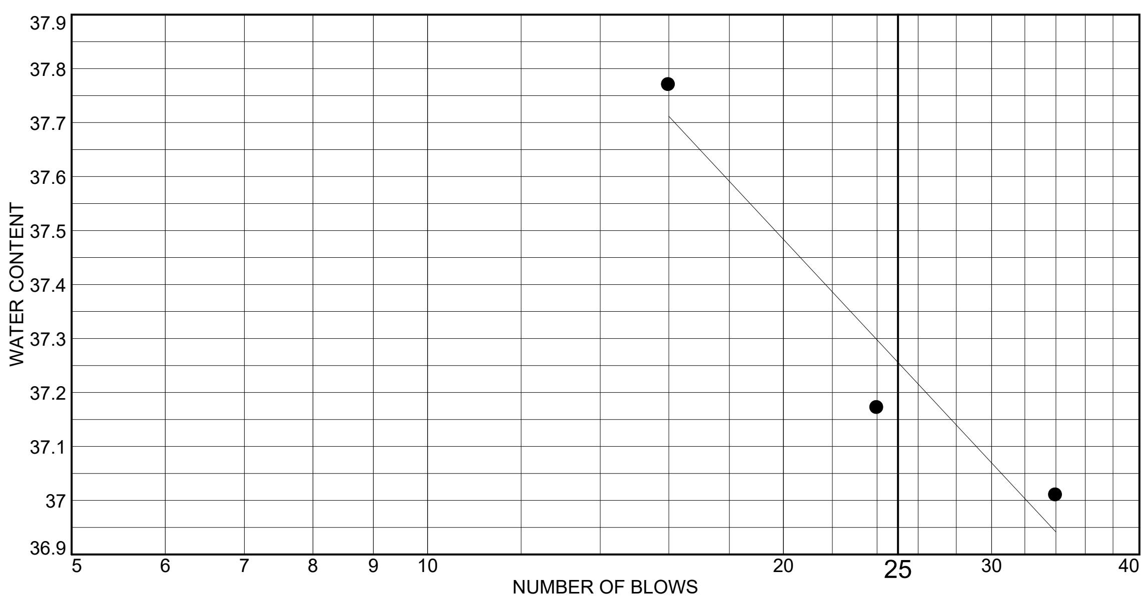
Cranston, RI

Figure 21-L-1498

Tested By: AV **Checked By:** sa

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray CLAY & SILT	37	21	16			

Project No. 09.0026035.01 **Client:** GZA GeoEnvironmental

Project: Station 46 Bridge No. 3039

Woolwich, ME

Source of Sample: BB-WS46-206 **Depth:** 65-67'

Sample Number: 15D

Thielsch Engineering Inc.

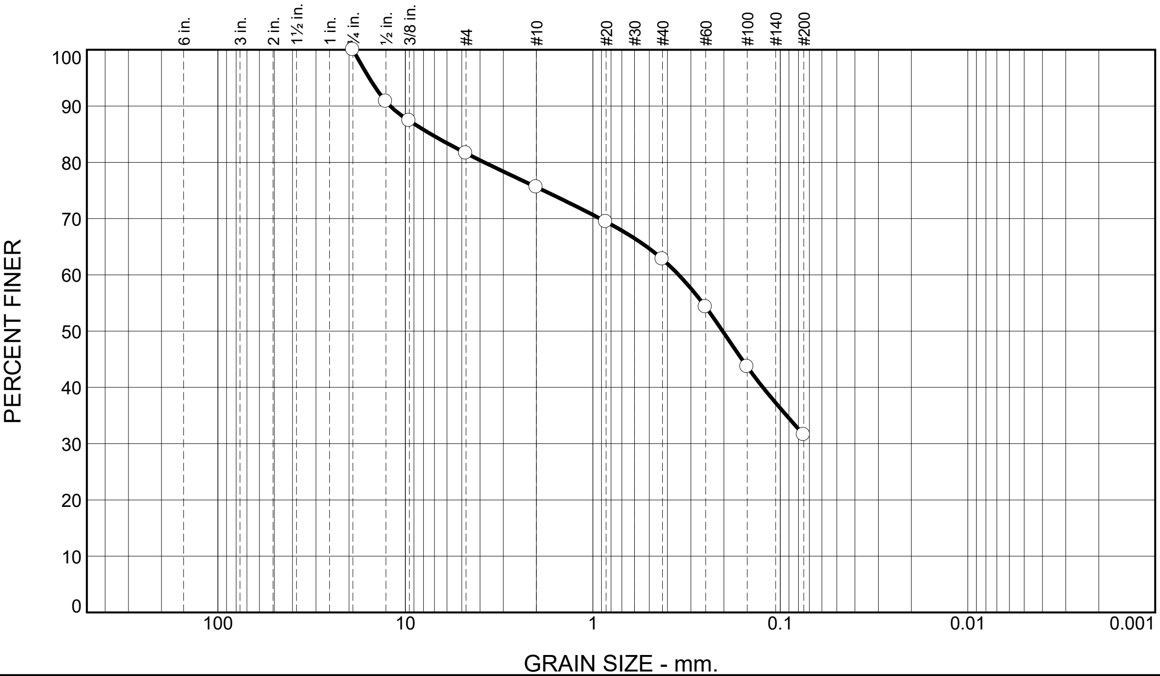
Cranston, RI

Remarks:

Figure 21-L-1500

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	18.4	6.0	12.8	31.2	31.6	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	90.8		
0.375"	87.4		
#4	81.6		
#10	75.6		
#20	69.4		
#40	62.8		
#60	54.3		
#100	43.7		
#200	31.6		

* (no specification provided)

Material Description

Gray 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}= 12.0567 D_{85}= 7.2869 D_{60}= 0.3482
D_{50}= 0.2029 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as non-plastic.

Date Received: 04.27.21 **Date Tested:** 04.29.21

Tested By: RR / sa

Checked By: Steven Accetta

Title: Laboratory Coordinator

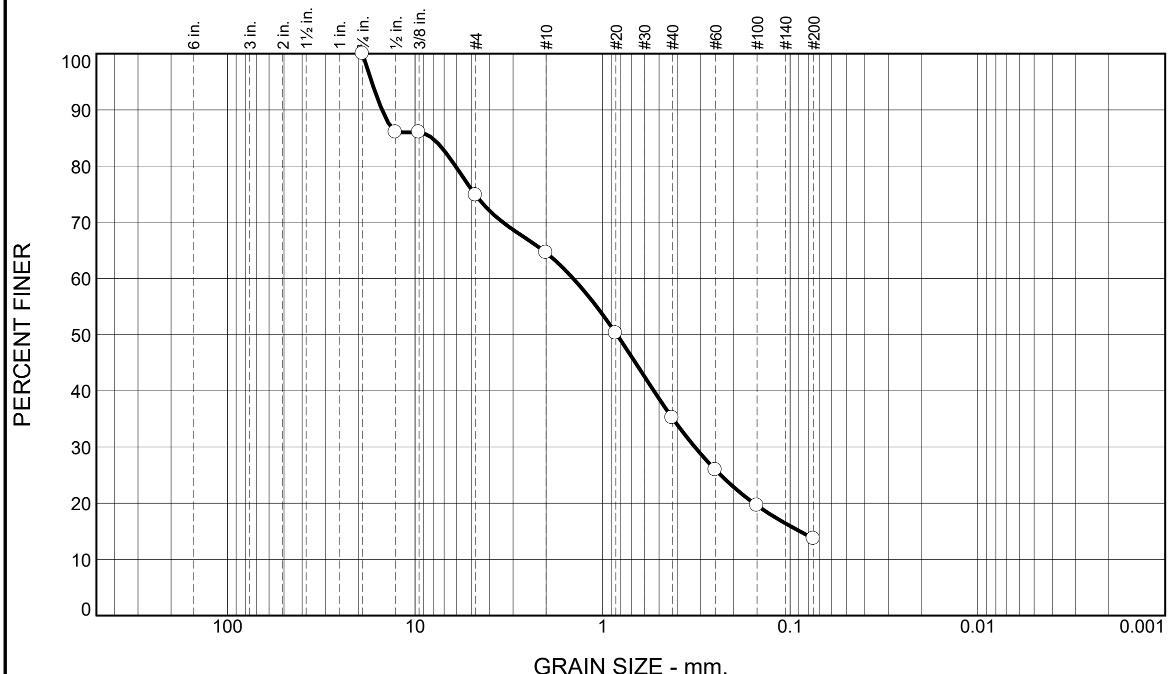
Source of Sample: BB-WS46-206 **Depth:** 110-112' **Date Sampled:**
Sample Number: 19D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Station 46 Bridge No. 3039
Woolwich, ME
Project No: 09.0026035.01 **Figure** 21-S-1502

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	25.2	10.2	29.4	21.5	13.7	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	86.0		
0.375"	86.0		
#4	74.8		
#10	64.6		
#20	50.2		
#40	35.2		
#60	25.9		
#100	19.6		
#200	13.7		

* (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}= 15.0037 D_{85}= 8.0983 D_{60}= 1.4342
D_{50}= 0.8401 D_{30}= 0.3221 D_{15}= 0.0888
D_{10}= C_u= C_c=

Remarks

Date Received: 02.27.21 **Date Tested:** 04.29.21
Tested By: RR / sa
Checked By: Steven Accetta
Title: Laboratory Coordinator

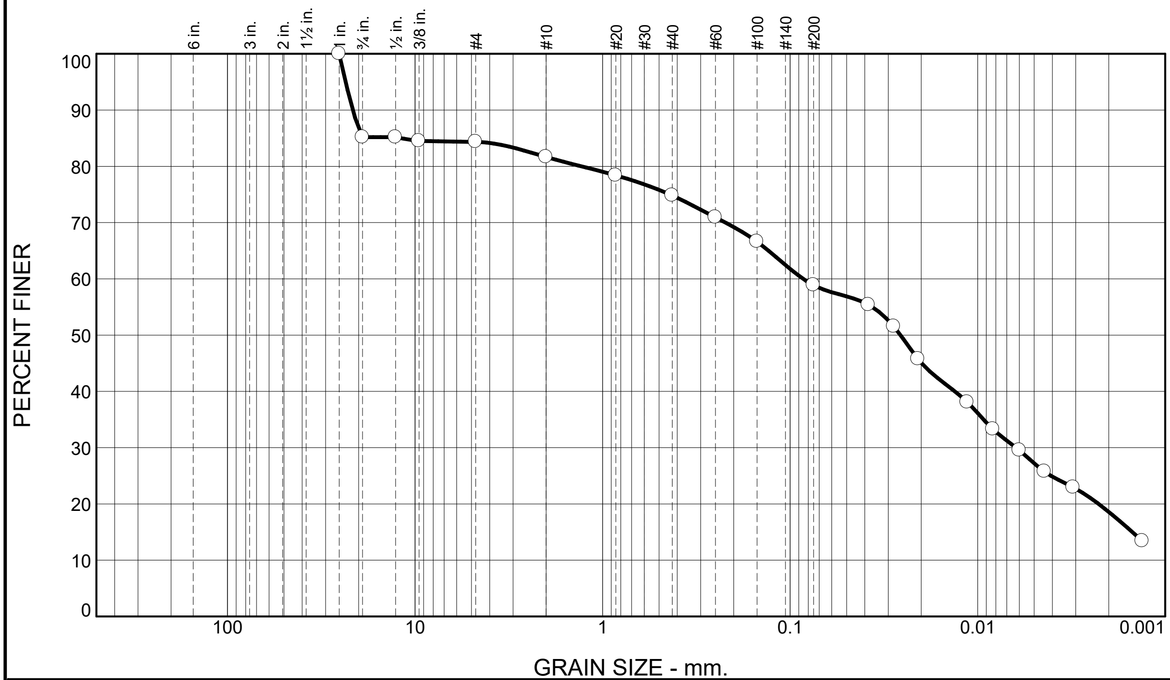
Source of Sample: BB-WS46-207 **Depth:** 4-5.8' **Date Sampled:**
Sample Number: 2D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Station 46 Bridge No. 3039
Woolwich, ME
Project No: 09.0026035.01 **Figure** 21-S-1503

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.8	0.9	2.6	6.9	15.9	40.3	18.6

Test Results (D7928 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	85.2		
0.5"	85.2		
0.375"	84.5		
#4	84.3		
#10	81.7		
#20	78.4		
#40	74.8		
#60	70.9		
#100	66.6		
#200	58.9		
0.0383 mm.	55.4		
0.0280 mm.	51.5		
0.0208 mm.	45.8		
0.0114 mm.	38.1		
0.0083 mm.	33.3		
0.0060 mm.	29.5		
0.0044 mm.	25.8		
0.0031 mm.	22.9		
0.0013 mm.	13.4		

* (no specification provided)

Material Description

Brown SILT & CLAY, some f-c Sand, little coarse Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

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

Coefficients

D_{90}= 21.4609 D_{85}= 11.9060 D_{60}= 0.0852
D_{50}= 0.0258 D_{30}= 0.0062 D_{15}= 0.0015
D_{10}= C_u= C_c=

Remarks

Sample visually classified as plastic. Sample rolled to 1/8".

Date Received: 02.27.21 **Date Tested:** 04.30.21

Tested By: JM / RR

Checked By: Steven Accetta

Title: Laboratory Coordinator

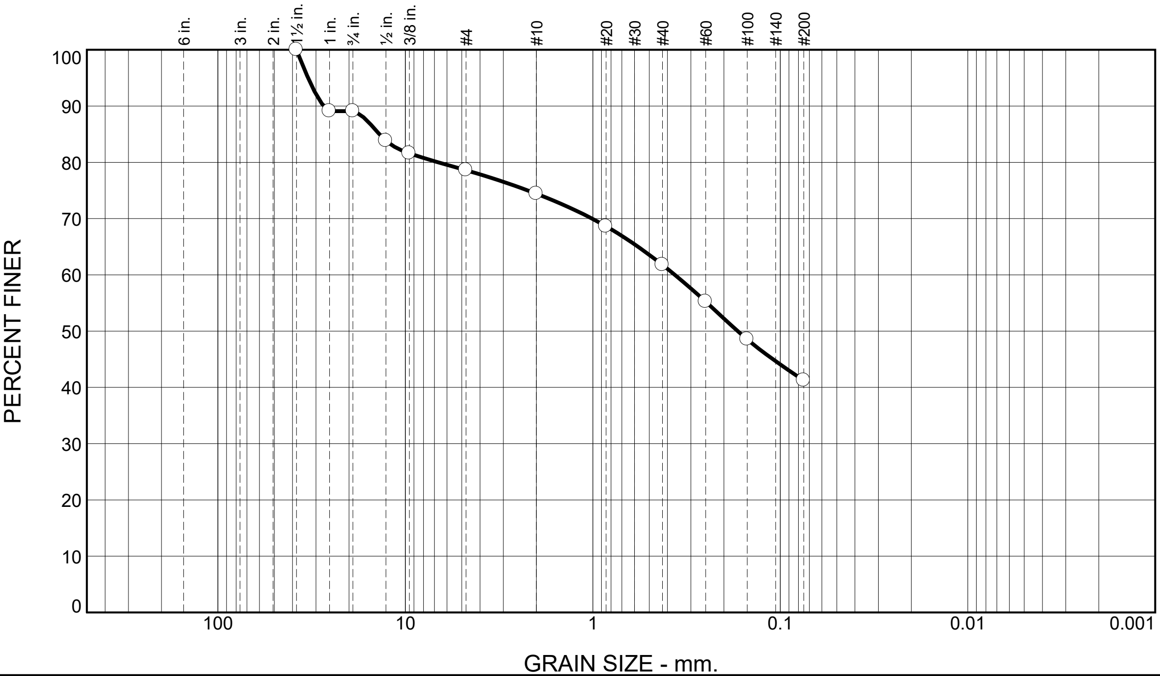
Source of Sample: BB-WS46-207 **Depth:** 10-12' **Date Sampled:**
Sample Number: 3D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Station 46 Bridge No. 3039
Woolwich, ME
Project No: 09.0026035.01 **Figure** 21-S-1504

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.9	10.5	4.2	12.6	20.6	41.2	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	89.1		
3/4"	89.1		
1/2"	83.8		
3/8"	81.6		
#4	78.6		
#10	74.4		
#20	68.6		
#40	61.8		
#60	55.2		
#100	48.5		
#200	41.2		

* (no specification provided)

Material Description

Brown sandy SILT, some f-c Gravel

Atterberg Limits (ASTM D 4318)

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

Classification

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

Coefficients

D_{90}= 27.2327 D_{85}= 13.7542 D_{60}= 0.3650
D_{50}= 0.1685 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as non-plastic.

Date Received: 02.27.21 **Date Tested:** 04.29.21

Tested By: RR / sa

Checked By: Steven Accetta

Title: Laboratory Coordinator

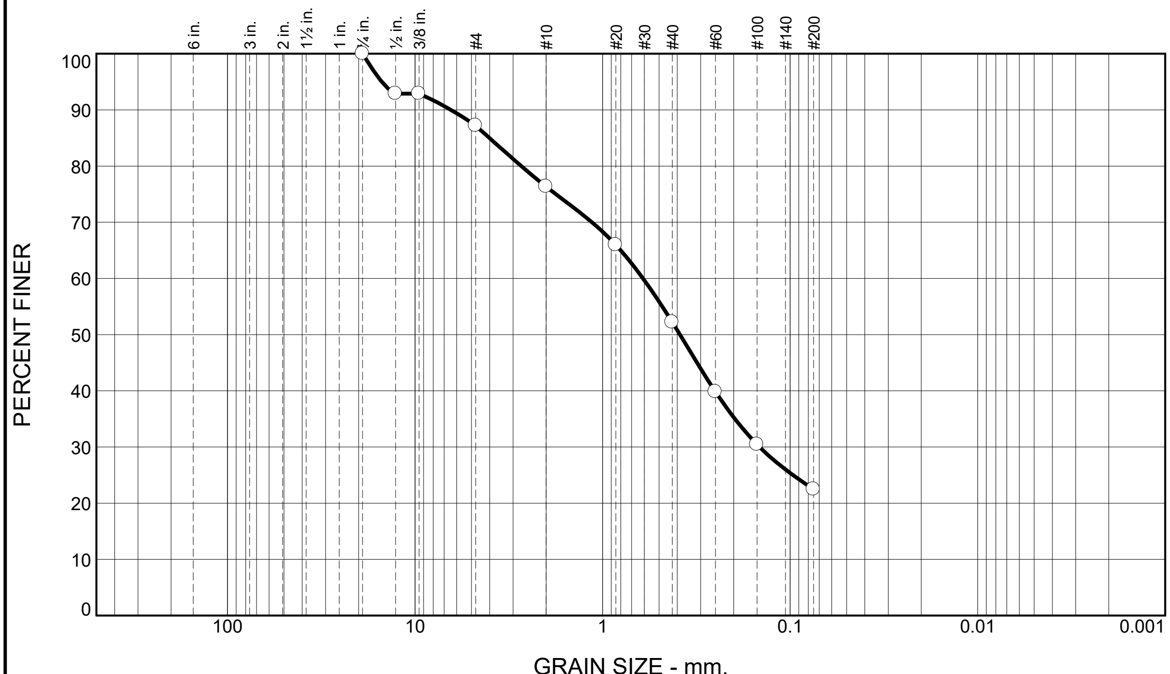
Source of Sample: BB-WS46-301 **Depth:** 2.5-4.5' **Date Sampled:**
Sample Number: 2D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Station 46 Bridge No. 3039
Woolwich, ME
Project No: 09.0026035.01 **Figure** 21-S-1505

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.8	10.9	24.1	29.8	22.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	92.9		
0.375"	92.9		
#4	87.2		
#10	76.3		
#20	66.0		
#40	52.2		
#60	39.8		
#100	30.4		
#200	22.4		

* (no specification provided)

Material Description

Red - 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}= 6.4297 D_{85}= 4.0085 D_{60}= 0.6089
D_{50}= 0.3867 D_{30}= 0.1455 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 04.27.21 **Date Tested:** 04.29.21

Tested By: RR / sa

Checked By: Steven Accetta

Title: Laboratory Coordinator

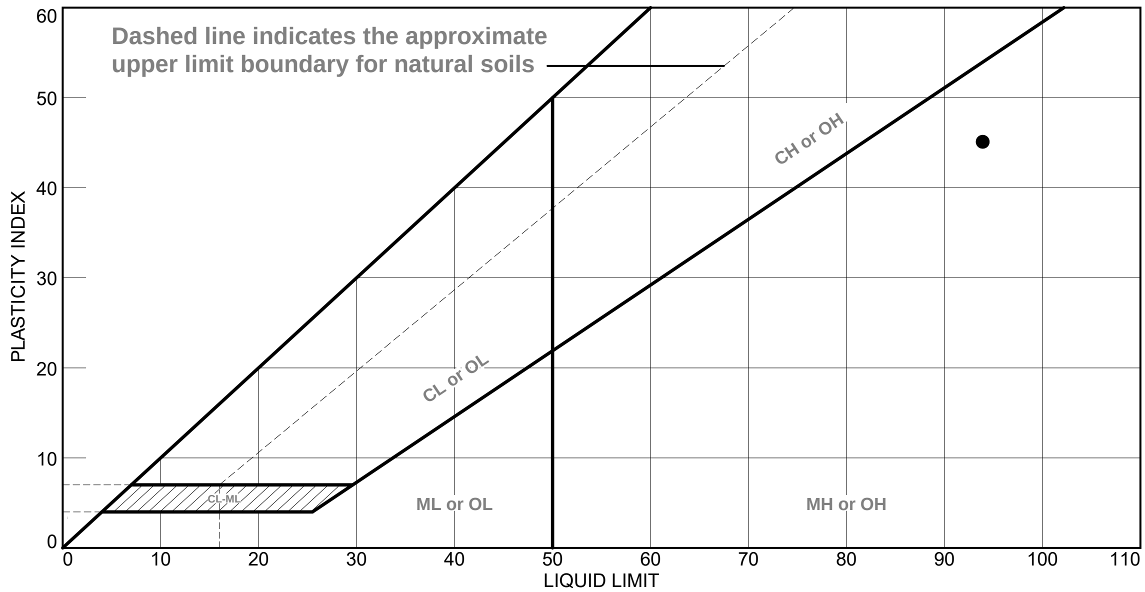
Source of Sample: BB-WS46-301 **Depth:** 13-15' **Date Sampled:**
Sample Number: 7D

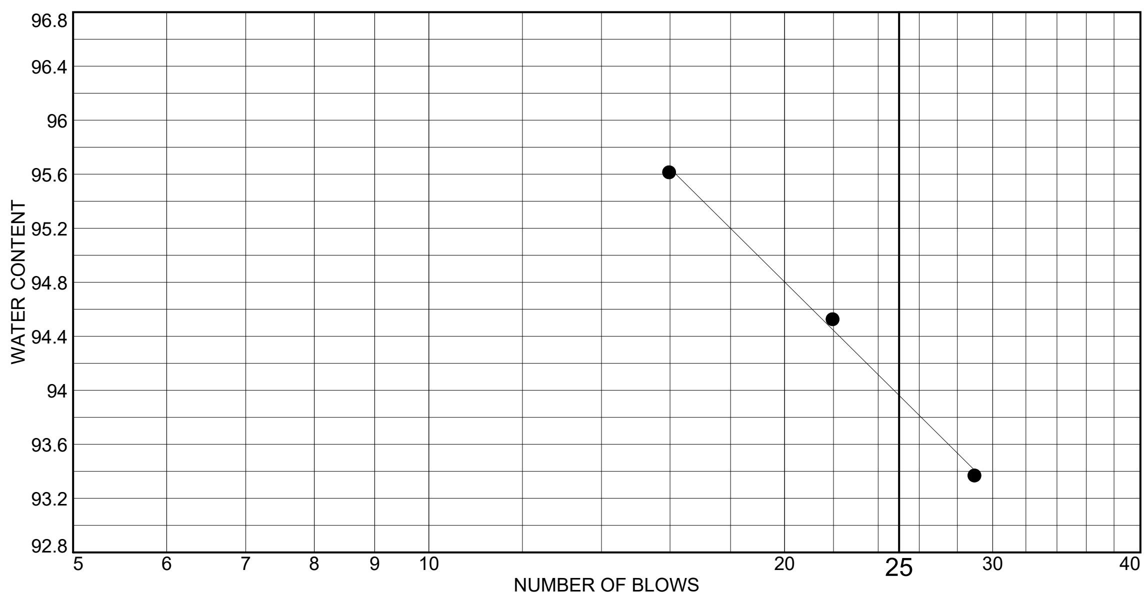
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Station 46 Bridge No. 3039
Woolwich, ME
Project No: 09.0026035.01 **Figure** 21-S-1506

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Fine Grained Peat	94	49	45			

Project No. 09.0026035.01 **Client:** GZA GeoEnvironmental

Project: Station 46 Bridge No. 3039

Woolwich, ME

Source of Sample: BB-WS46-305 **Depth:** 15-17'

Sample Number: 3D

Remarks:

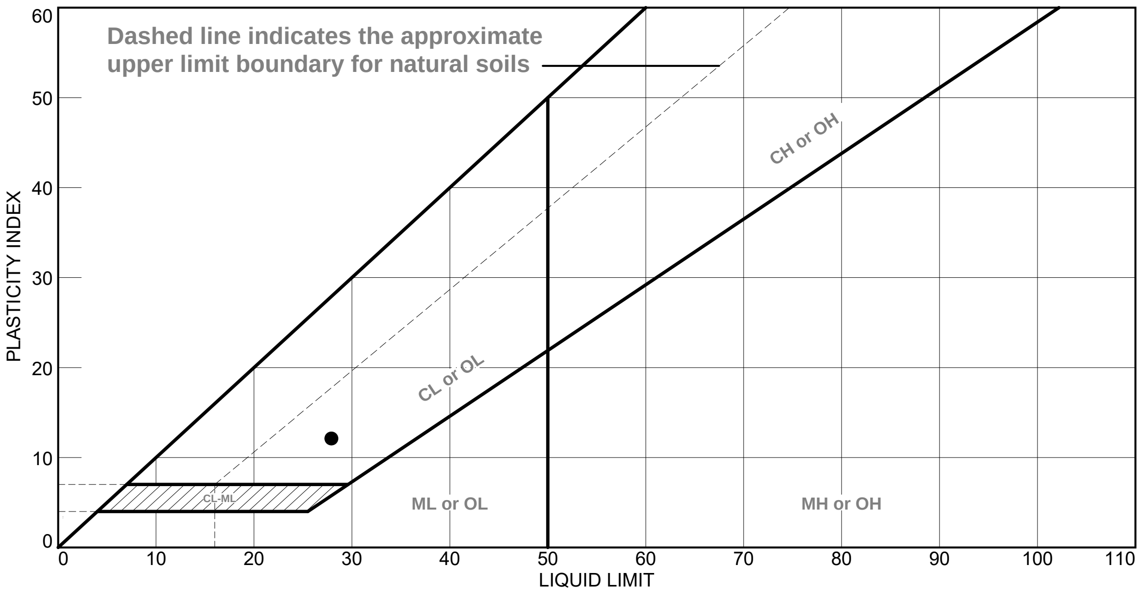
Thielsch Engineering Inc.

Cranston, RI

Figure 21-L-1508

Tested By: RR **Checked By:** sa

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray CLAY & SILT	28	16	12			

Project No. 09.0026035.01 **Client:** GZA GeoEnvironmental

Project: Station 46 Bridge No. 3039

Woolwich, ME

Source of Sample: BB-WS46-305 **Depth:** 27-28.4'

Sample Number: 5D

Remarks:

Thielsch Engineering Inc.

Cranston, RI

Figure 21-L-1510

Tested By: JM **Checked By:** sa

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: **Station 46 Bridge Replacement** **Woolwich, ME** GZA Project Number: 09.0026035.01 Summary Page: 1 of 1 Report Date: 05.03.21

LABORATORY TESTING DATA SHEET, Report No.: 7421-D-197

Boring No.	Sample No.	Depth (ft)	Laboratory No.	Specimen Data						Compressive Strength Tests								Rock Formation or Description or Remarks
				Mohs Hard-ness	Diameter (in)	Length (in)	(1) Unit Weight (PCF)	(2) Wet Density (PCF)	Bulk G_s	(3) Other Tests	(4) Strength PSI	(5) Strain %	(6) E sec PSI EE+06	(7) Poisson's Ratio	$\sigma\tau$ PSI	Is_{50} PSI	(8) s_c PSI	
BB-WS46-203	R1	11.4-12.8	21-S-1477		1.992	4.354	161.4				8745	0.336	2.34	0.01				Granite
Break was partial along existing fault and partial fresh.																		
BB-WS46-207	R1	27.3-28	21-S-1478		1.999	4.264	170.8				4521	0.353	1.55	0.46				Schist
Break was fresh.																		

(1) Volume Determined By Measuring Dimensions
(2) Determined by Measuring Dimensions and Weight of Saturated Sample

Notes

(3) PLD=Point Load (diametrical),
PLA= Point Load (Axial) ST= Splitting Tensile
U= Unconfined Compressive Strength
(4) Taken at Peak Deviator Stress

Notes

(5) Strain at Peak Deviator Stress
(6) Represents Secant Modulus at 50% of Total Failure Stress
(7) Represents Secant Poisson's Ratio at 50% of Total Failure Stress
(8) Estimated UCS from Table 1 of ASTM D5731 for NX cores (Is x 24)

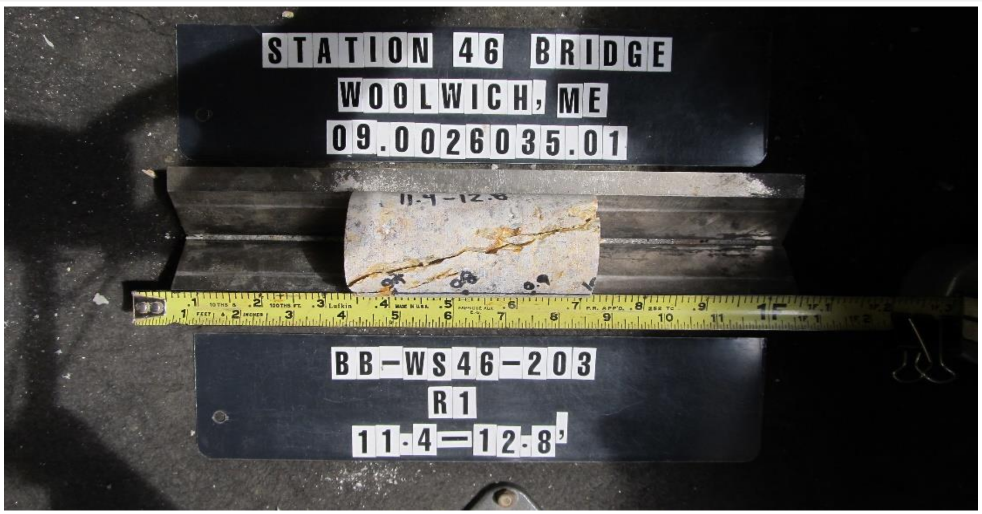
Date Received: *04.27.21* Reviewed By: Date Reviewed: *05.03.21*

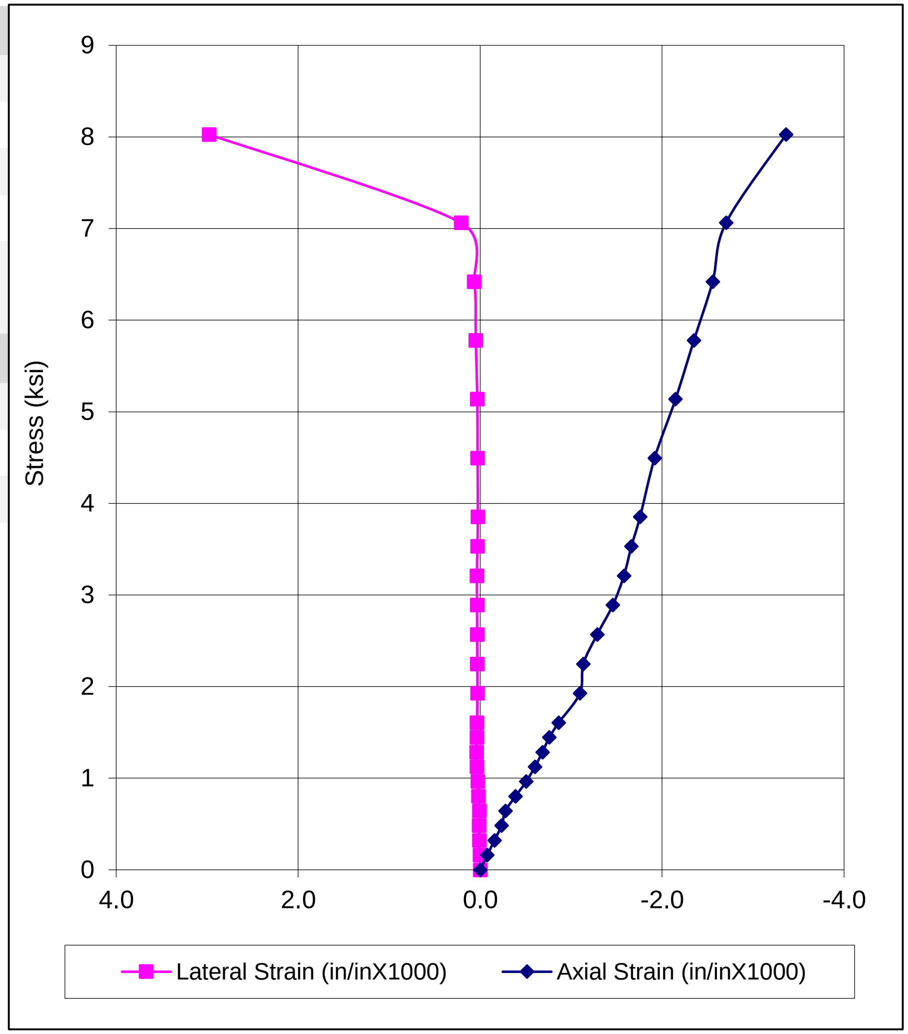
THIELSCH ENGINEERING	195 Frances Avenue Cranston, Rhode Island 02910 Phone: (401) 467-6454 Fax: (401) 467-2398 www.thielsch.com *Let's Build a Solid Foundation*	**Client Information:** GZA GeoEnvironmental South Portland, ME PM: Blaine Cardali Assigned by: Blaine Cardali Collected by: L. Navarrete	**Project Information:** Station 46 Bridge Replacement Woolwich, ME Project Number: 09.0026035.01 Technician: JM Report Date: 04.30.21

ASTM D7012 Compressive Strength and Elastic Moduli of Intact Rock Core Specimens

Sample Information		Compressive Test Information	
Boring ID:	BB-WS46-203	**Unit Weight (pcf):**	161.4
Sample #:	R1	**Failure Stress (psi):**	8,745
Depth (ft):	11.4-12.8	**Failure Mode:**	Along Faults
Tested Depth (ft):	11.6-12.0	**Time to Failure (min)**	2.52
Rock Type:	Granite		
Features:			

Test Specimen Information		Elastic Moduli Test Information	
Diameter, D (in):	1.992	**Poisson's Ratio @ 50%:**	0.01
Length, L (in):	4.354	**Strain %:**	0.336
L:D Ratio:	2.19	**E sec PSI @ 50%:**	2.34E+06



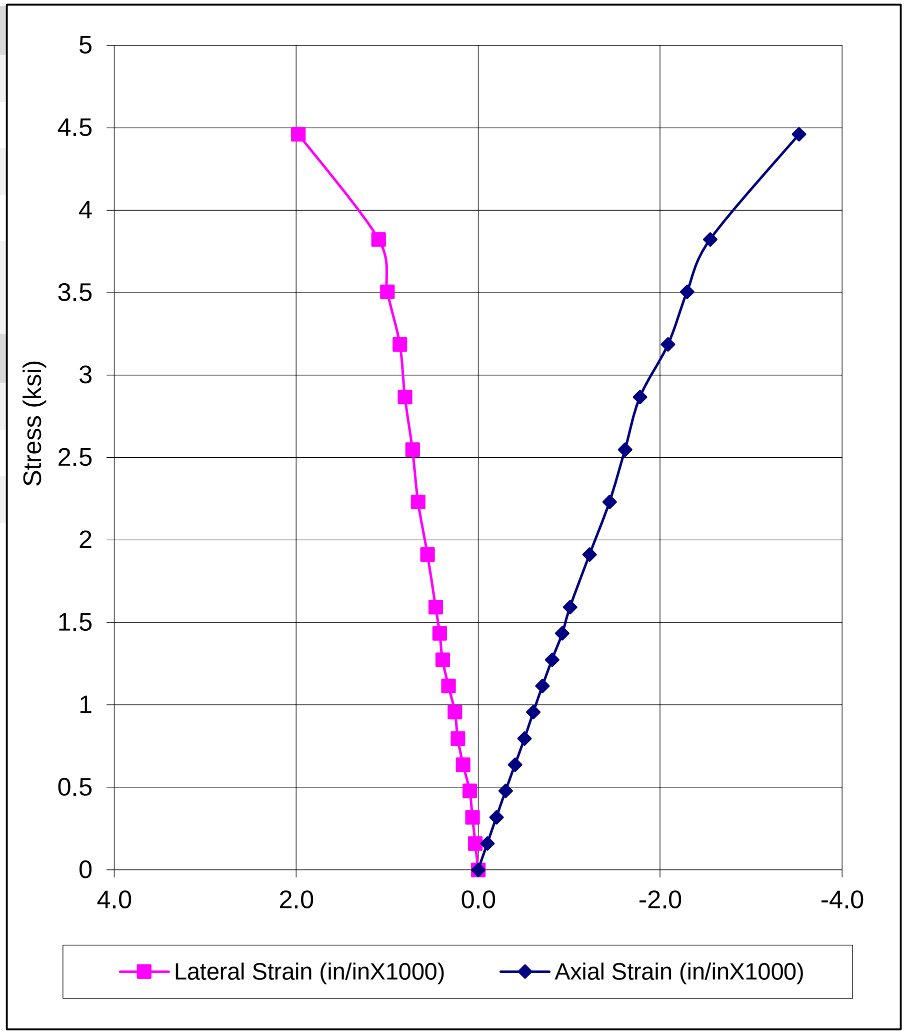


Testing Notes: **Break was partial along existing fault and partial fresh.**

THIELSCH ENGINEERING	195 Frances Avenue Cranston, Rhode Island 02910 Phone: (401) 467-6454 Fax: (401) 467-2398 www.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:** Station 46 Bridge Replacement Woolwich, ME Project Number: 09.0026035.01 Technician: JM Report Date: 04.30.21

ASTM D7012 Compressive Strength and Elastic Moduli of Intact Rock Core Specimens

Sample Information		Compressive Test Information	
Boring ID:	BB-WS46-207	**Unit Weight (pcf):**	170.8
Sample #:	R1	**Failure Stress (psi):**	4,521
Depth (ft):	27.3-28	**Failure Mode:**	Fresh
Tested Depth (ft):	27.4-28	**Time to Failure (min)**	2.2
Rock Type:	Schist		
Features:	Low Fissility		
Test Specimen Information		**Elastic Moduli Test Information**	
Diameter, D (in):	1.999	**Poisson's Ratio @ 50%:**	0.46
Length, L (in):	4.264	**Strain %:**	0.353
L:D Ratio:	2.13	**E sec PSI @ 50%:**	1.55E+06

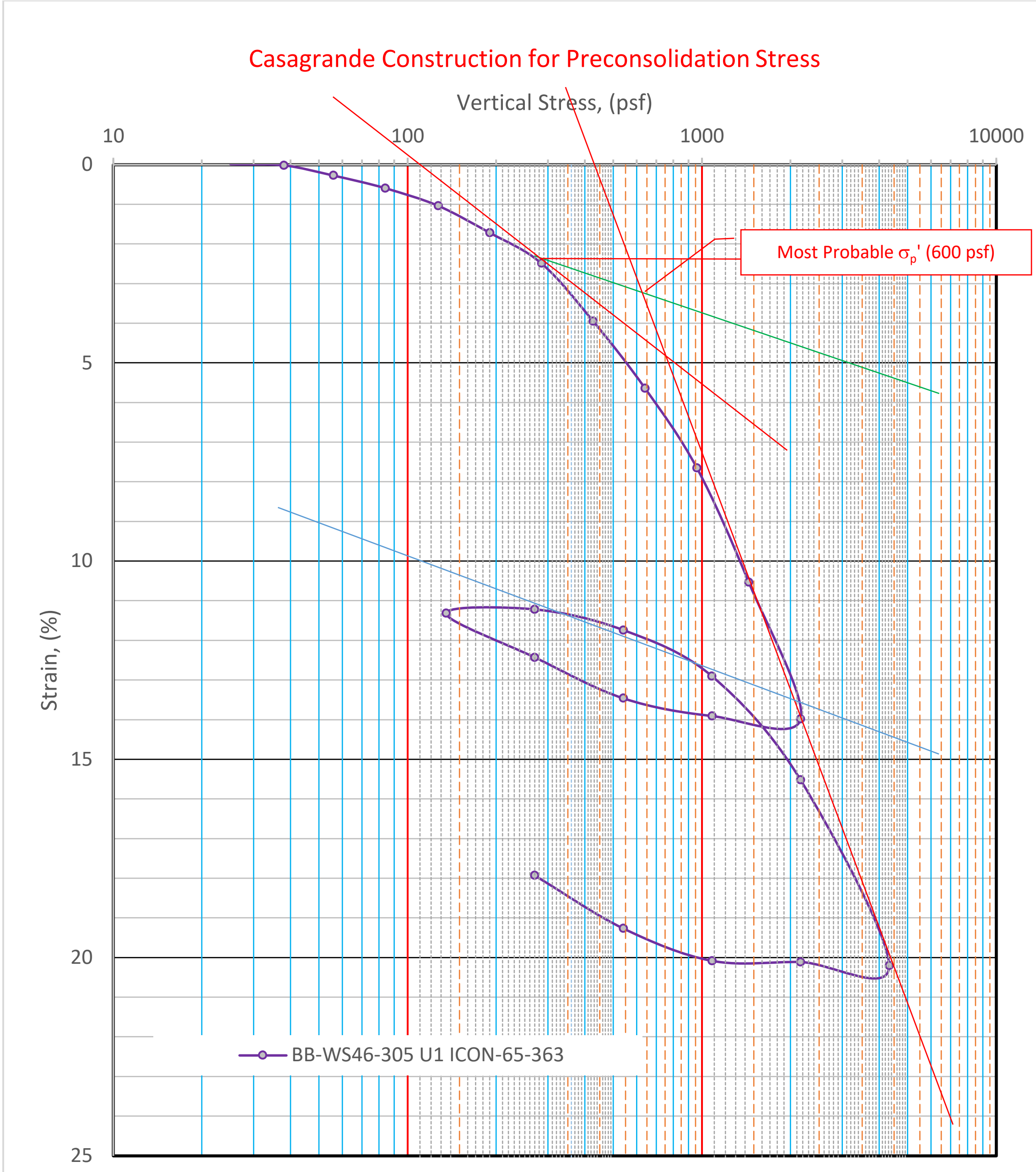


Testing Notes: **Break was fresh.**

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

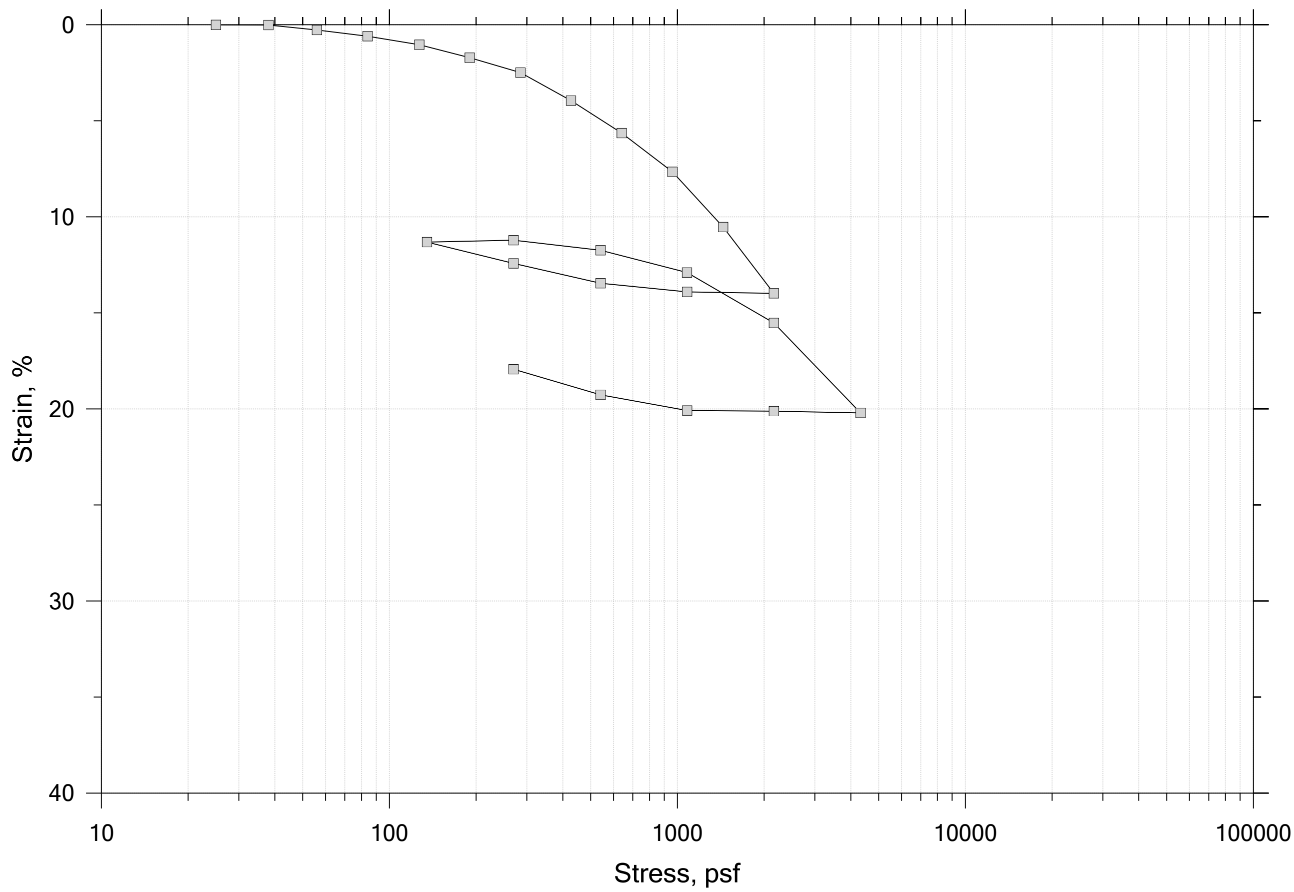
Lab Test No:	ICON 65-363			
Boring No.	BB-WS46-305			
Sample No:	U1			
Boring Elevation (ft).				
Sample Depth (ft):	8-10			
Test Specimen Depth (Ft):	9.35			
Test Specimen Elevation:				
Water Content (%):	84.1			
Dry Unit Weight (pcf):	50.1			
Wet Unit Weight (pcf):	92.2			
Saturation Before (%):	95.7			
Saturation After (%):	100			
Void Ratio Before:	2.37			
Void Ratio After:	1.77			
Overburden Pressure (psf):	--			
Max Previous stress (psf):	600			
Max Prev. stress (Work) (psf):	600			
OCR:	--			
Compression Index (C_{CE}):	0.2			
Recompression Index (C_{RE}):	0.028			
Liquid Limit:	85.2			
Plastic Limit:	50.7			
Plasticity Index:	34.5			
Liquidity Index:	0.97			
Specific Gravity (implied)	2.7			
Organic Content (%)	5.3			
Tested By:	sjr			
Date Tested:	5/12/2021			
Checked By:	sjr			

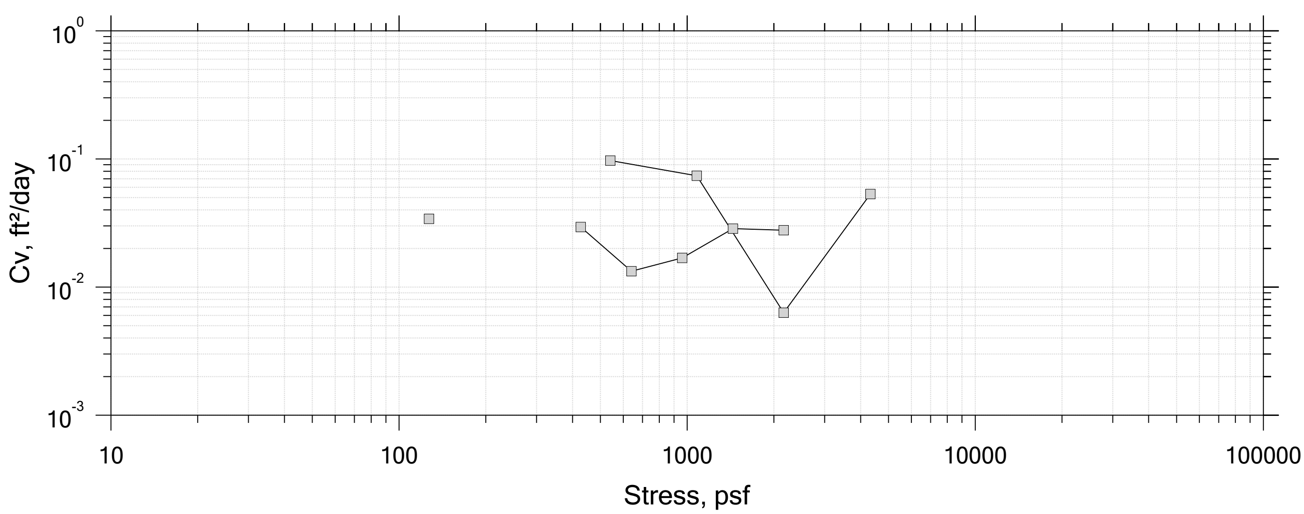


Soil Metrics LLC Geotechnical Engineering

One-Dimensional Consolidation by ASTM D2435 - Method B

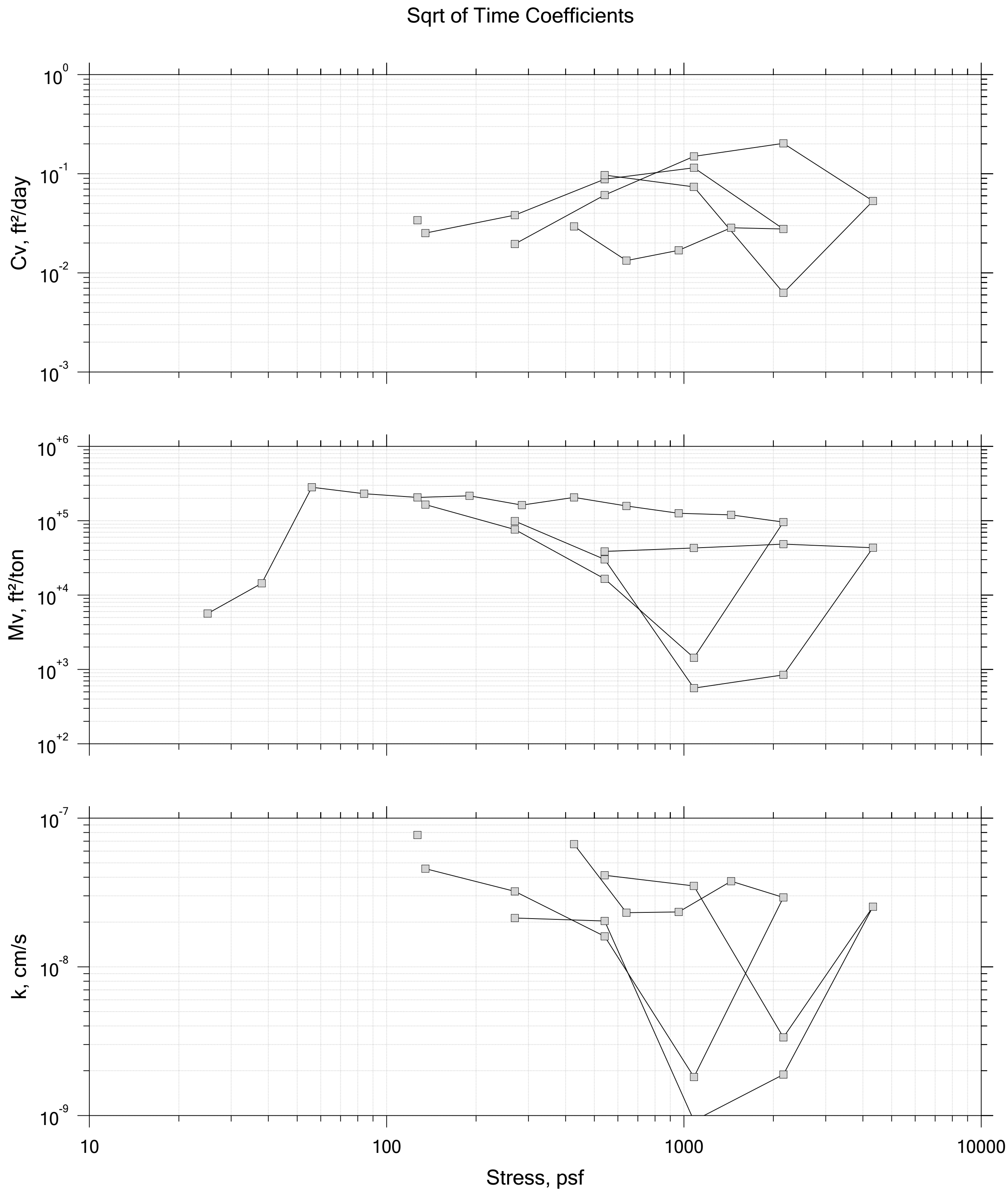
Summary Report





Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B



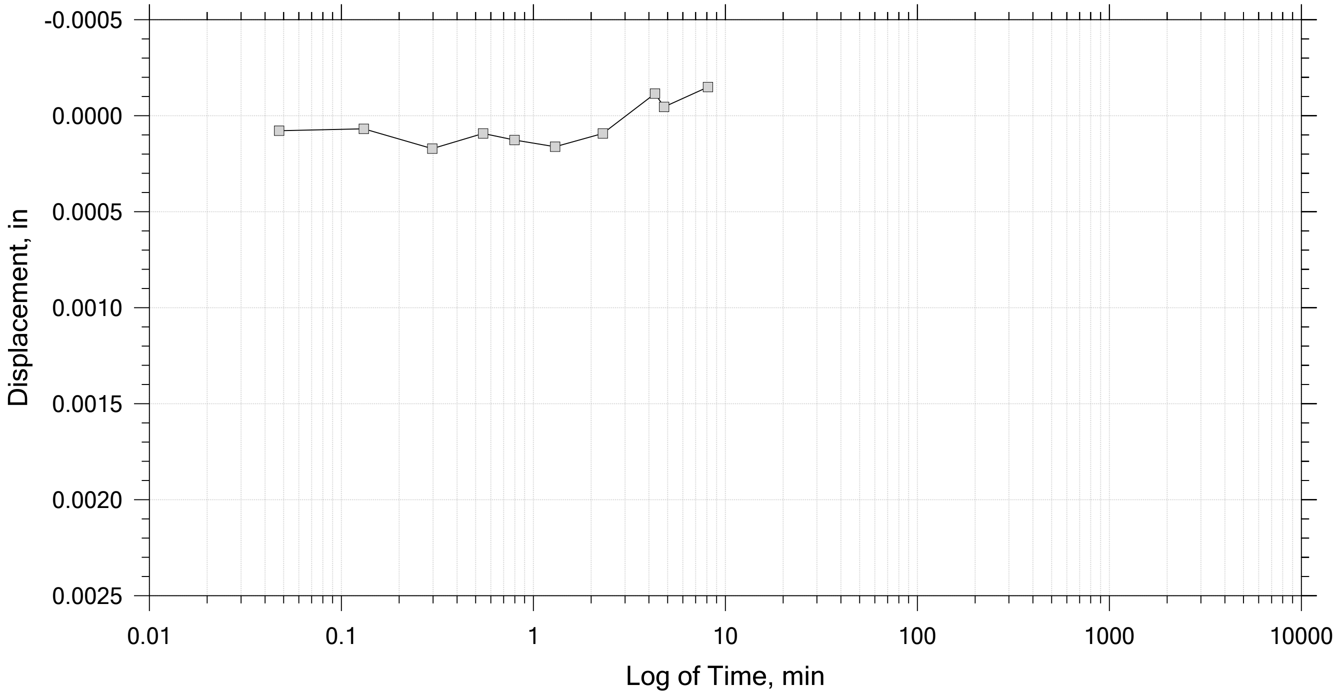
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

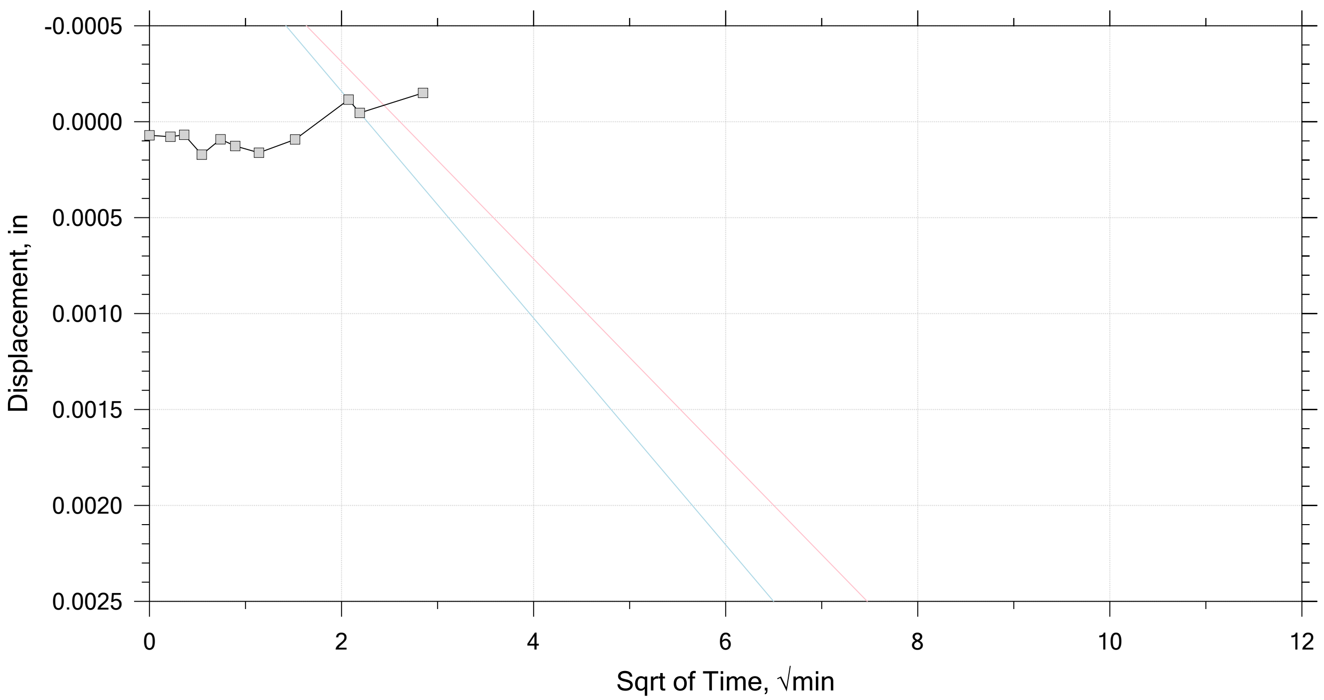
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 25

Constant Load Step

Stress: 25 psf

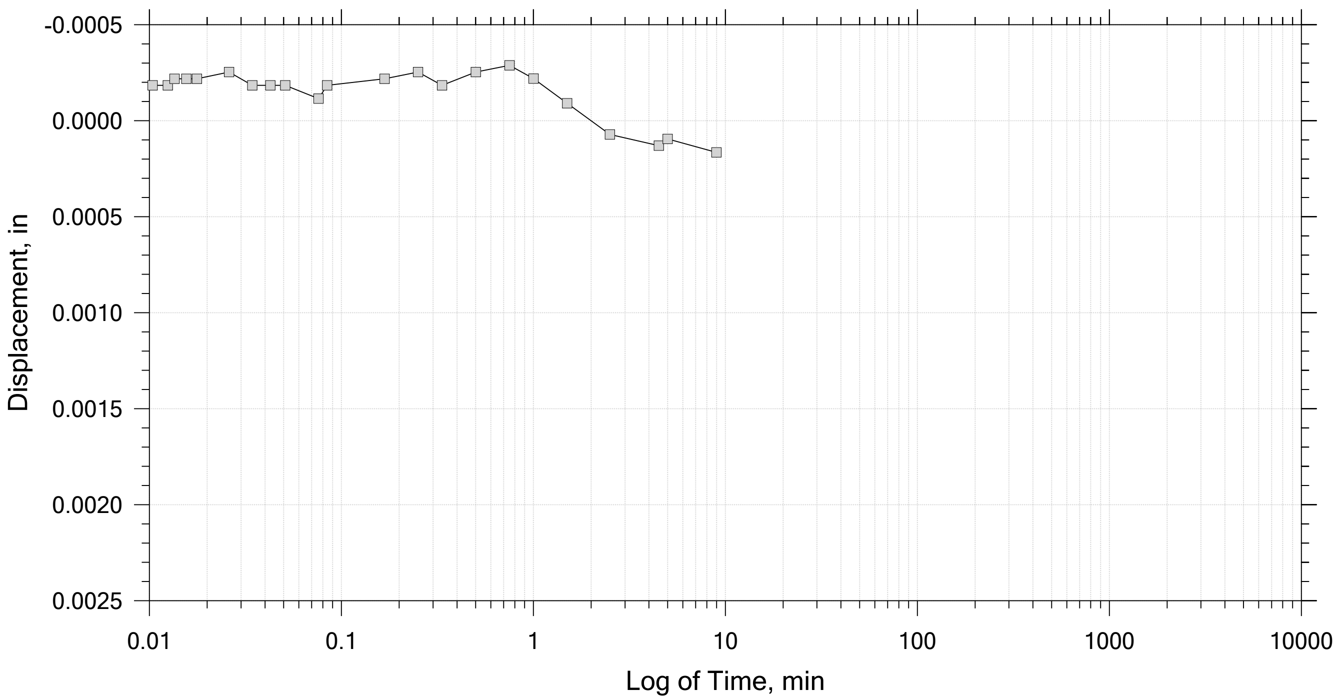


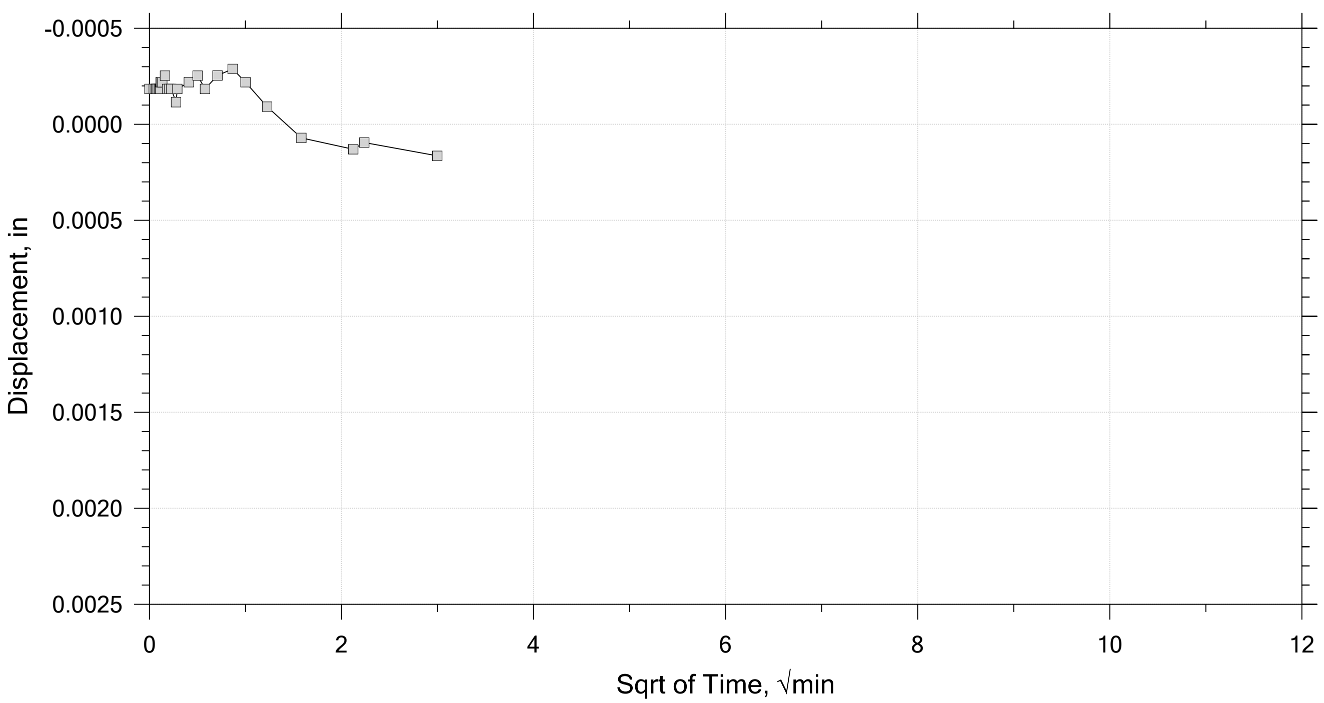


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 25
Constant Load Step
Stress: 38 psf

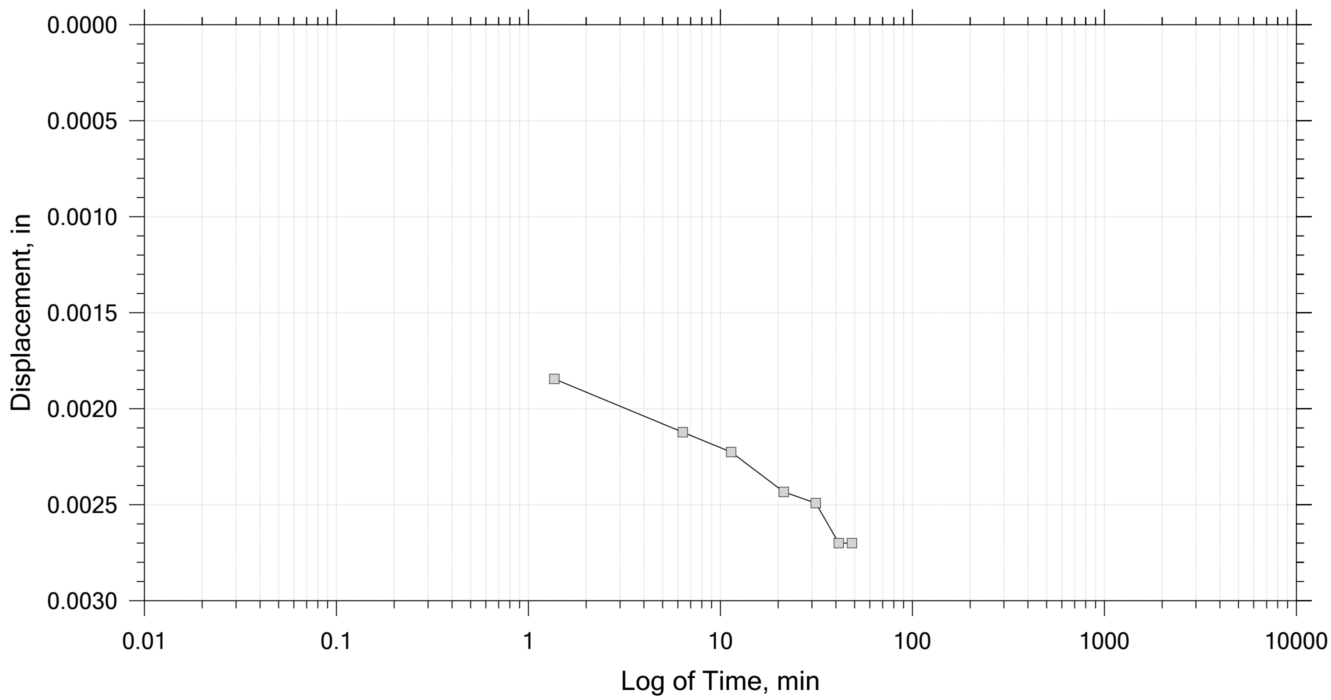


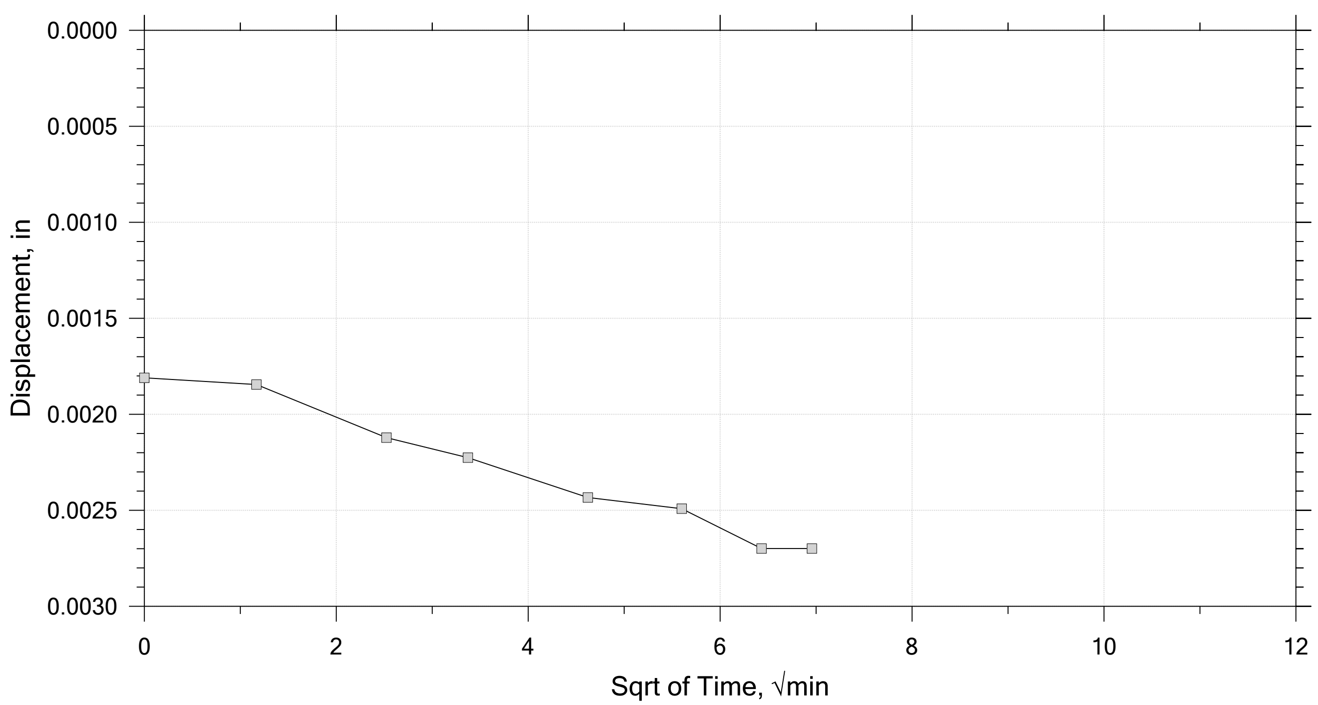


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 25
Constant Load Step
Stress: 56 psf

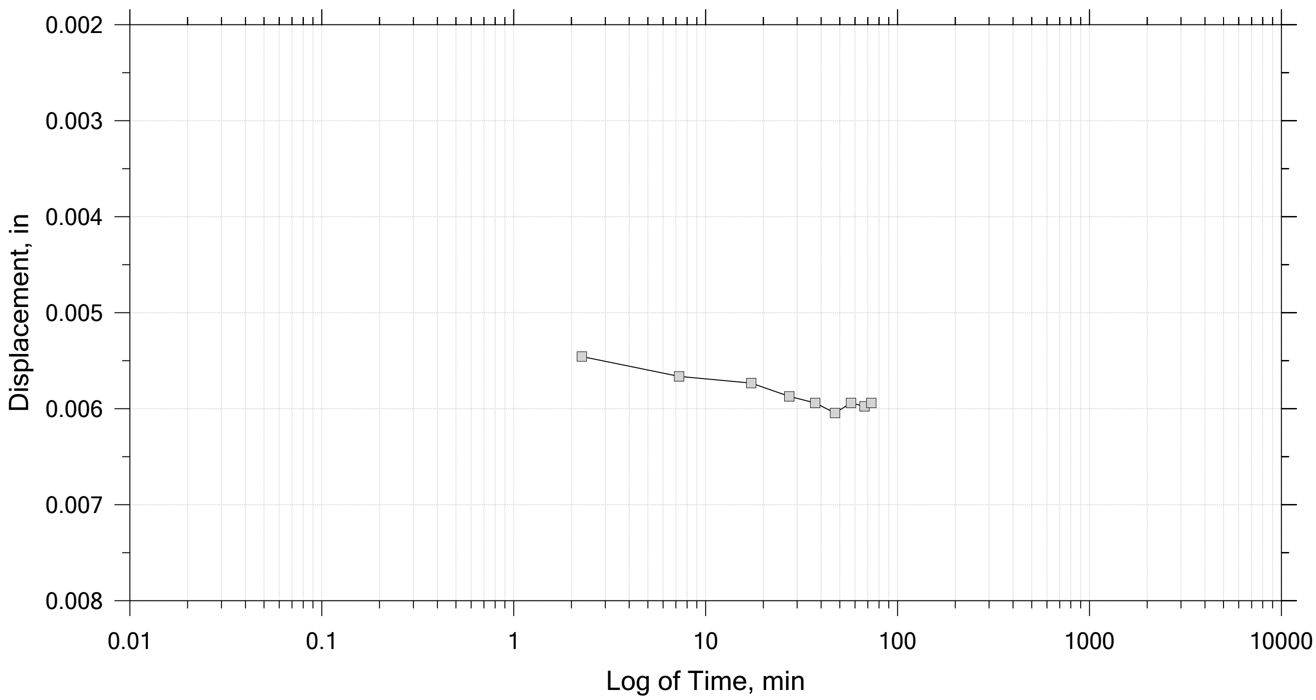


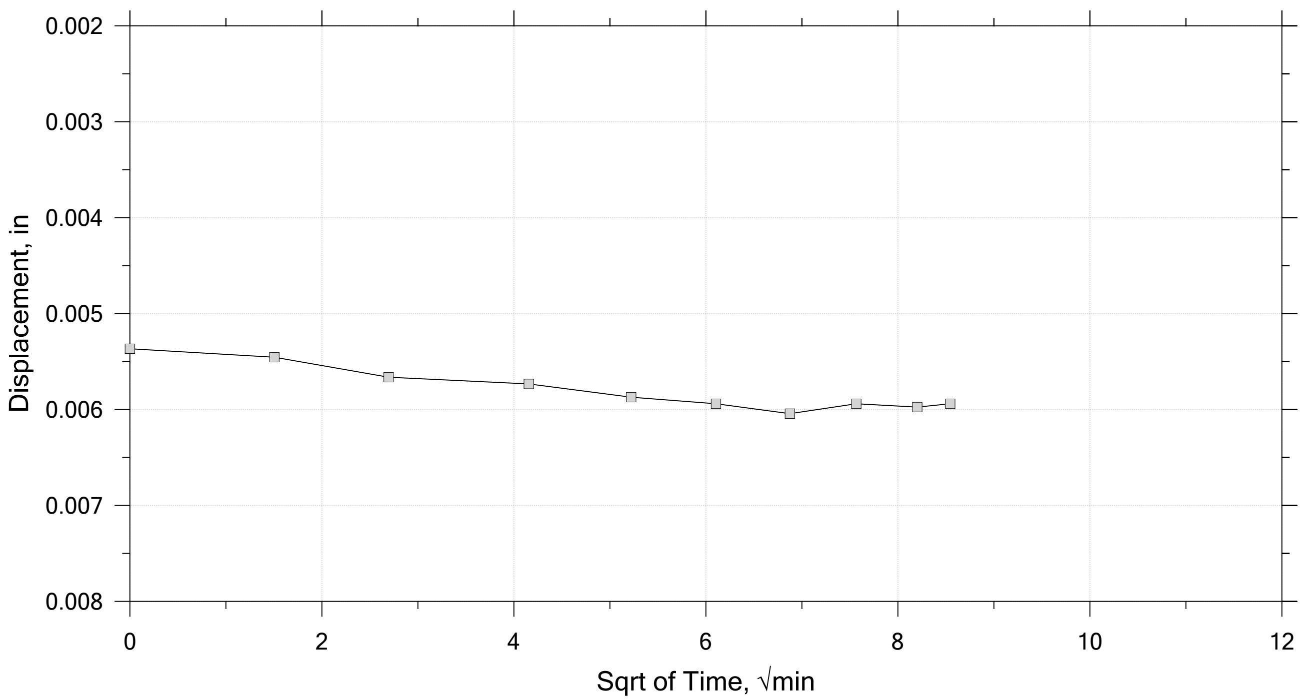


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 25
Constant Load Step
Stress: 84 psf





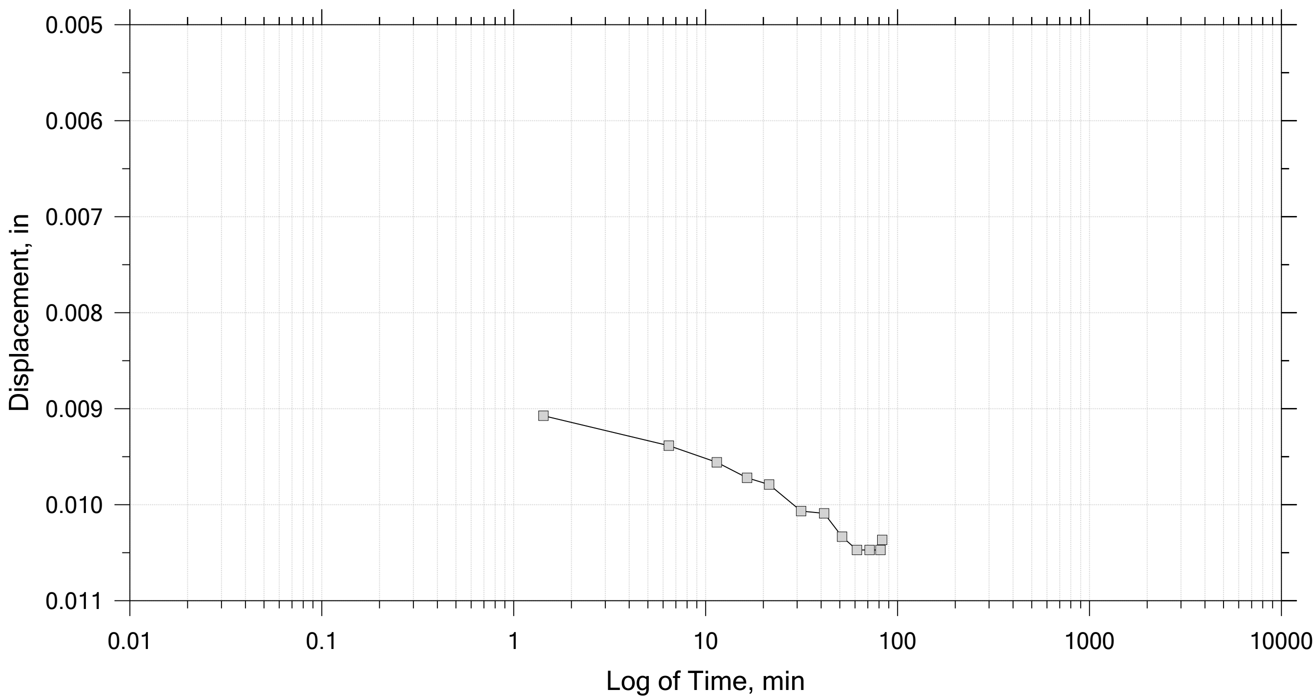
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

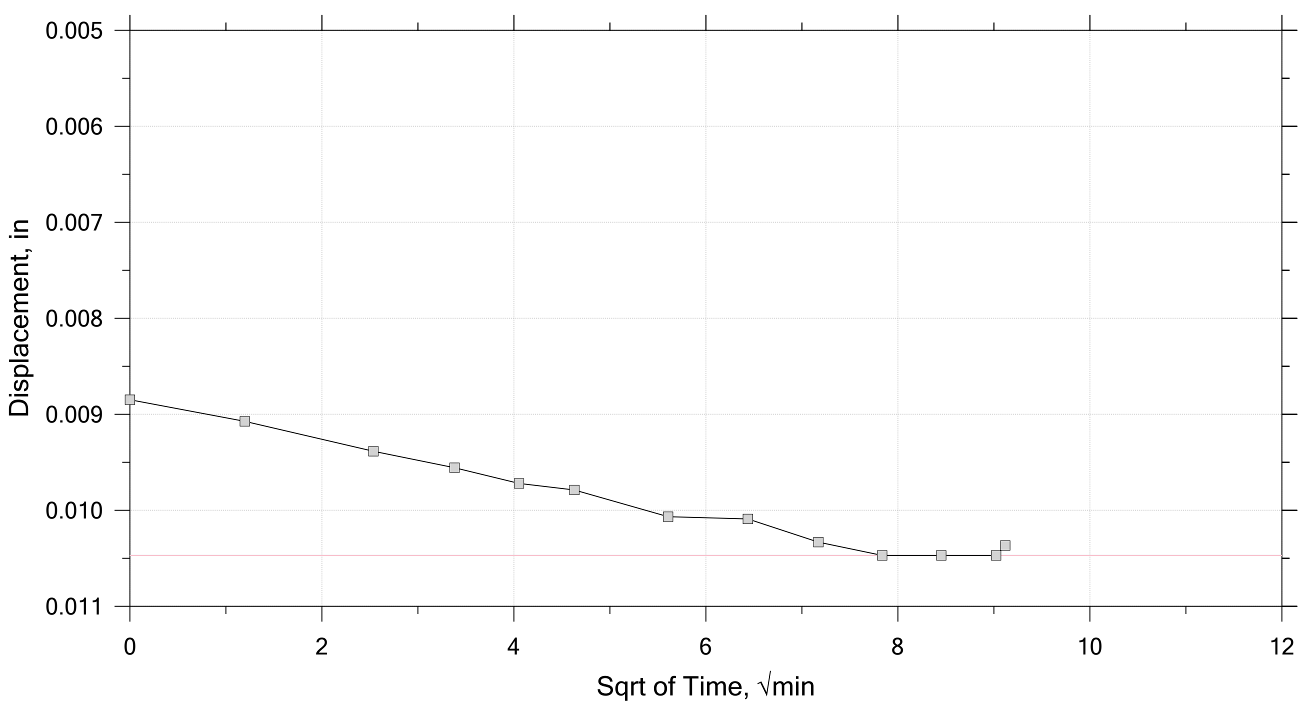
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 25

Constant Load Step

Stress: 127 psf





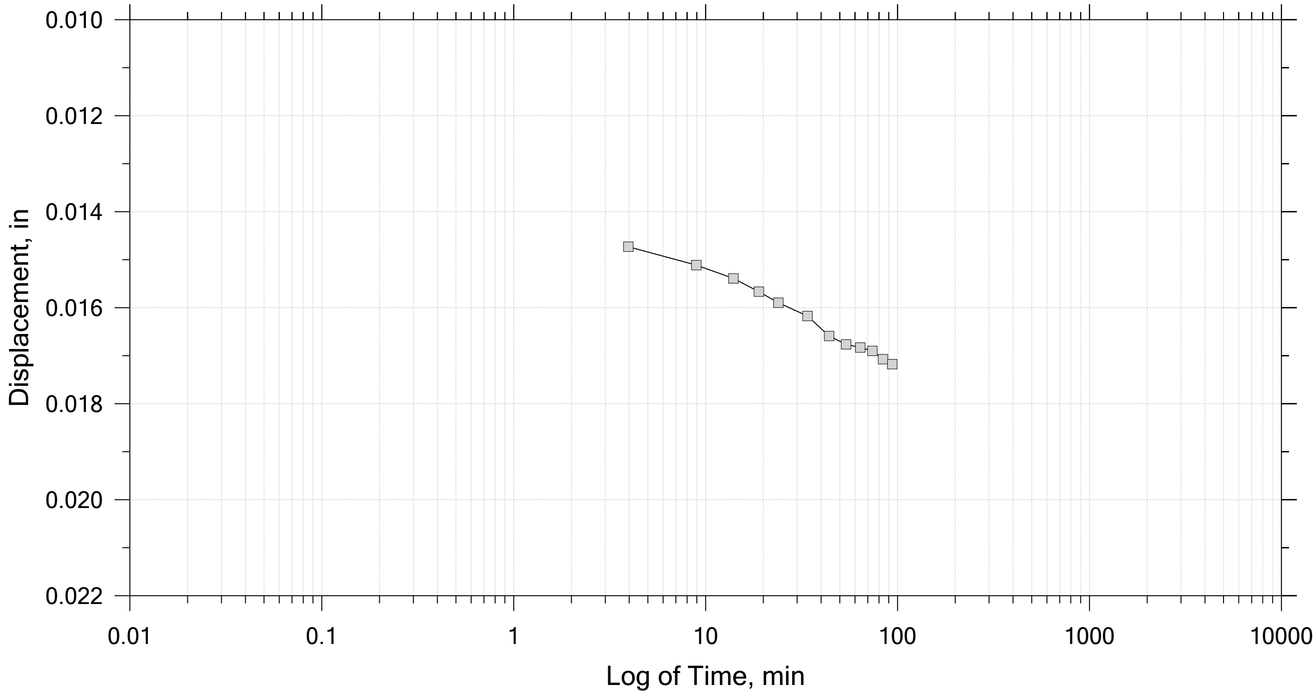
Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

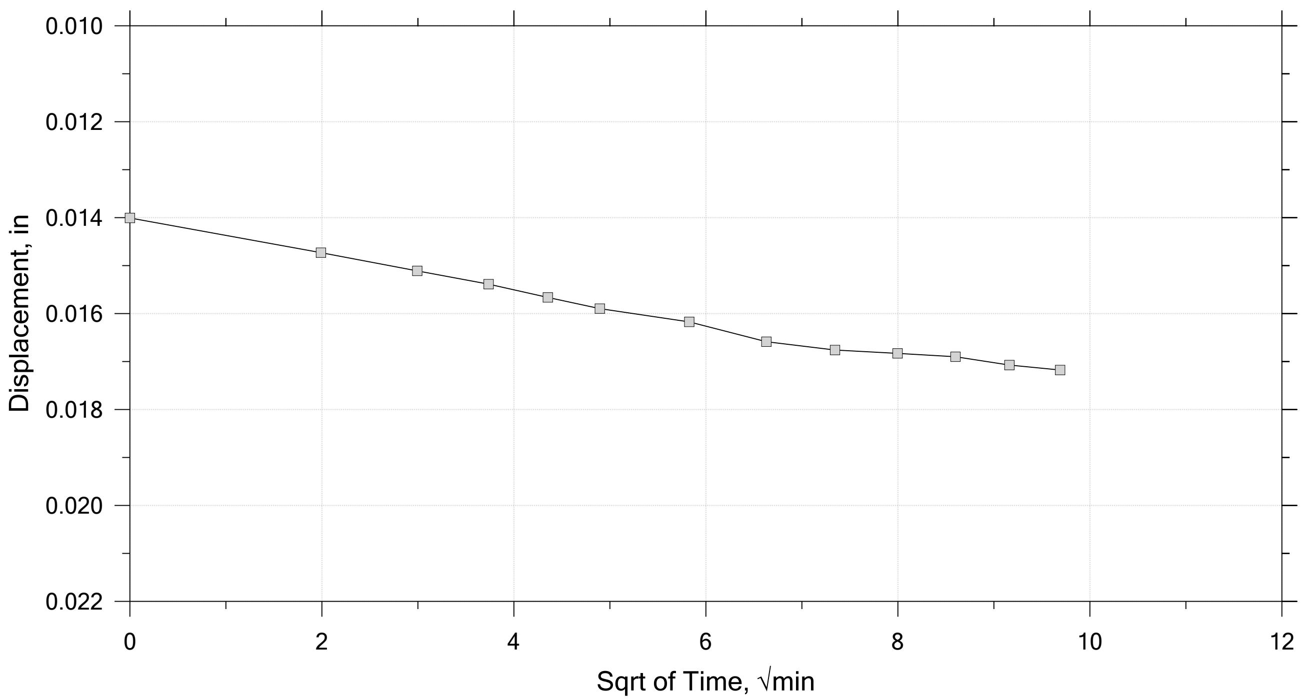
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 25

Constant Load Step

Stress: 190 psf

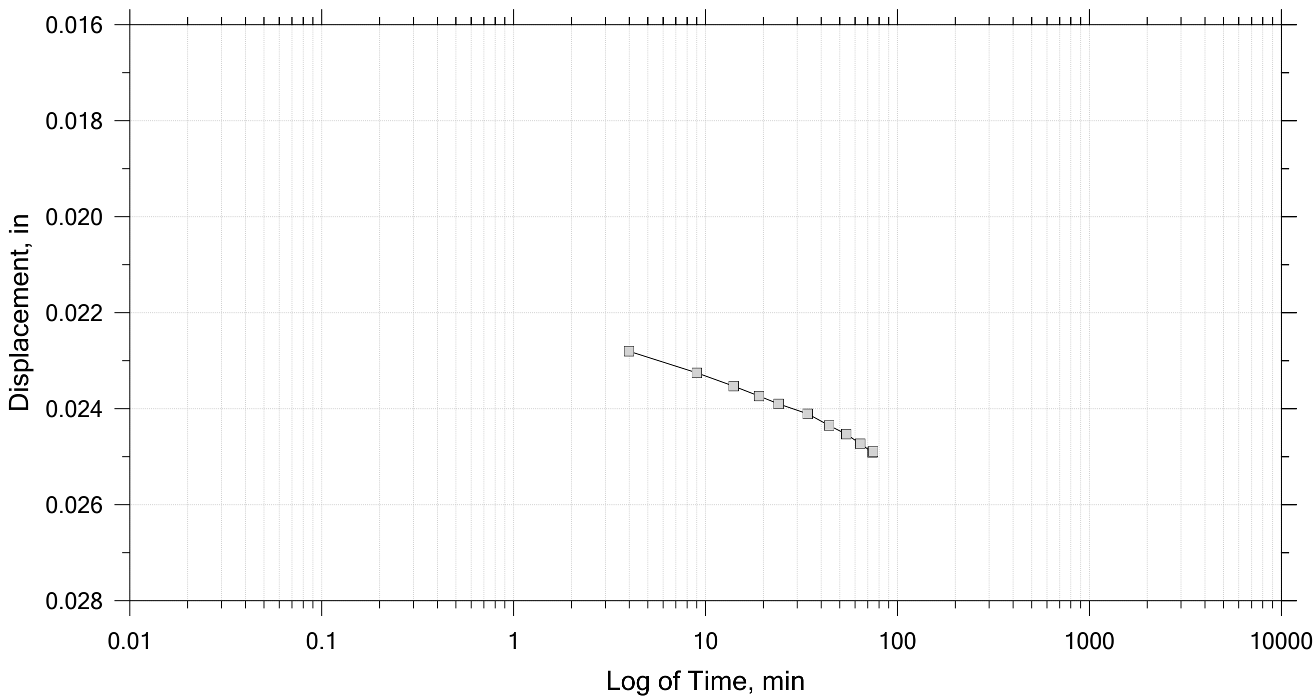


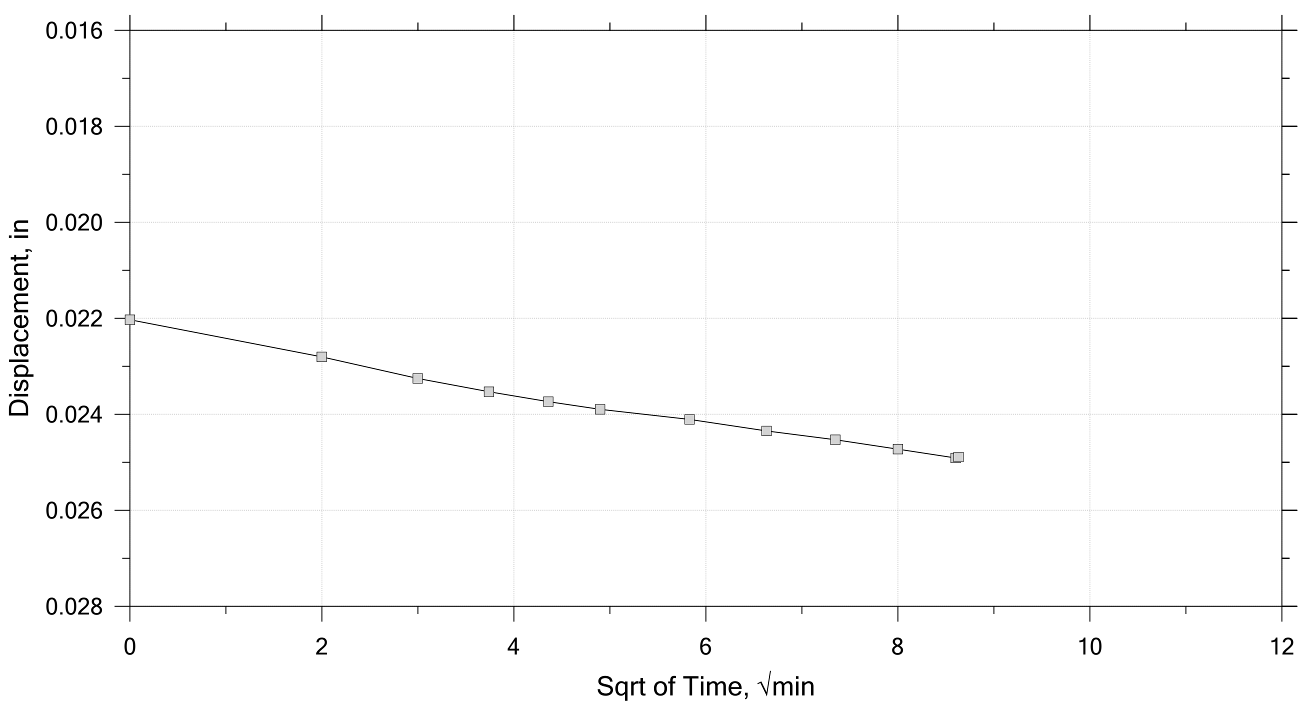


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 25
Constant Load Step
Stress: 285 psf





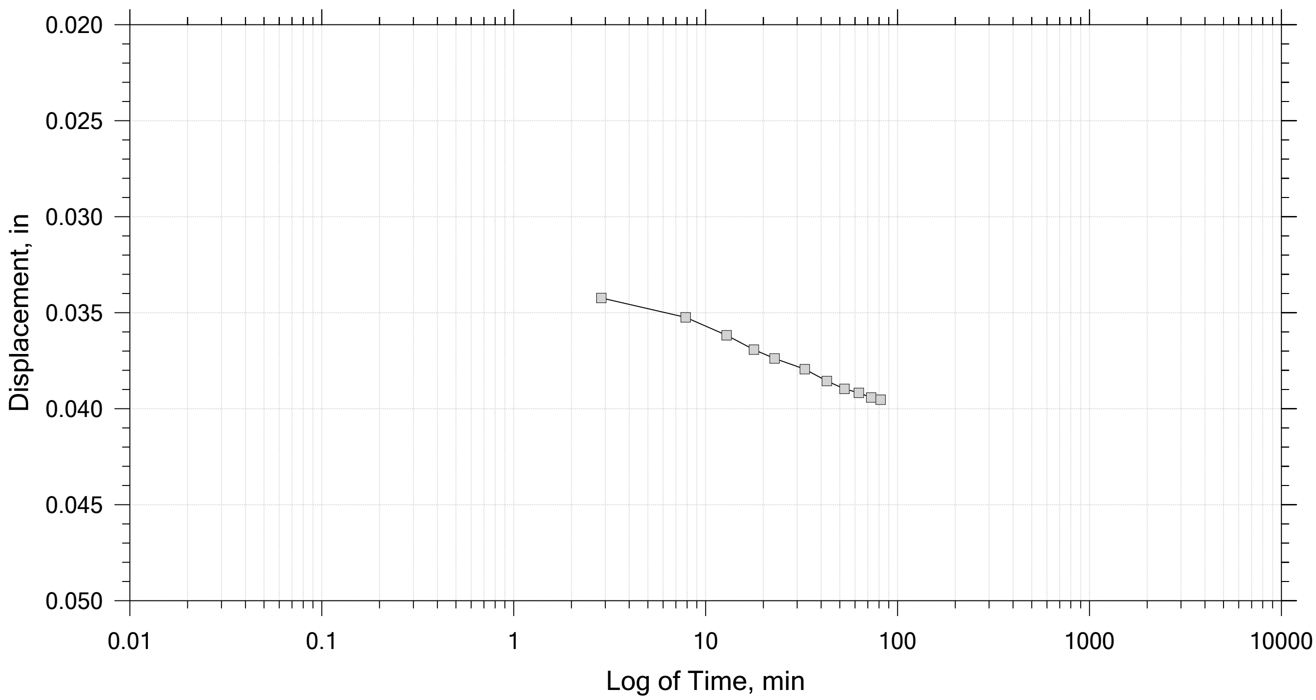
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

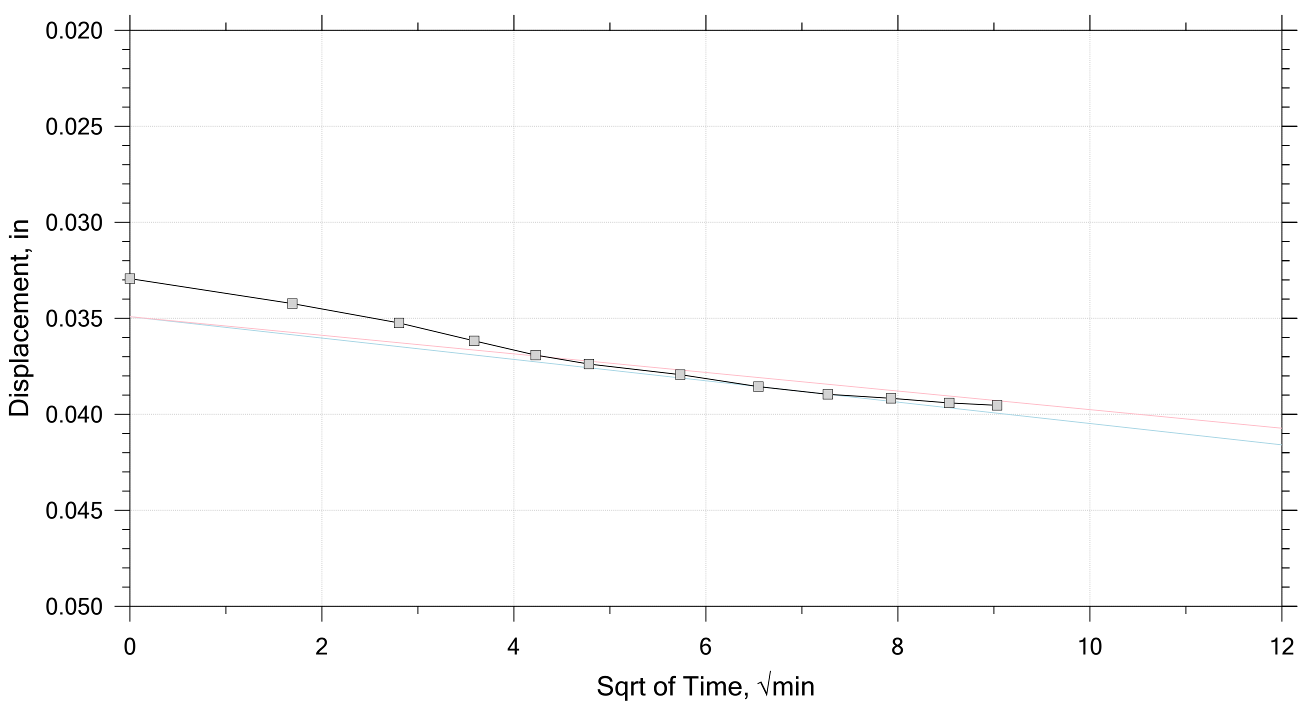
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 25

Constant Load Step

Stress: 427 psf

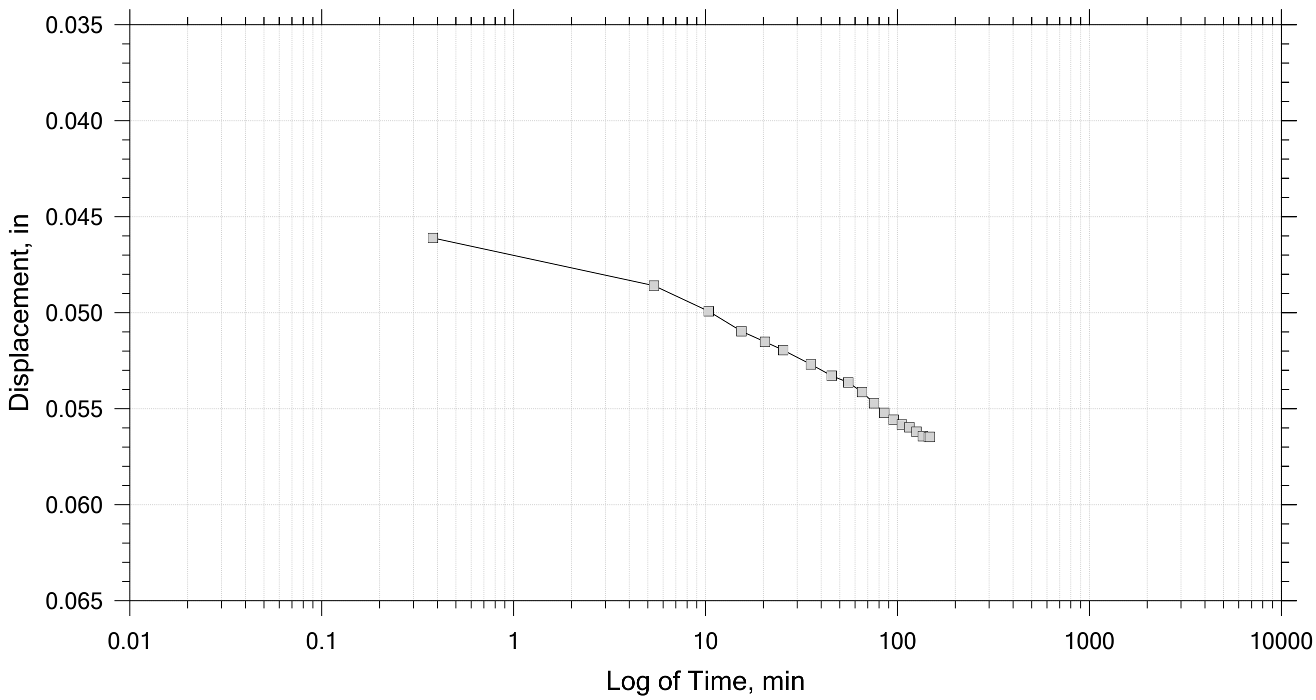


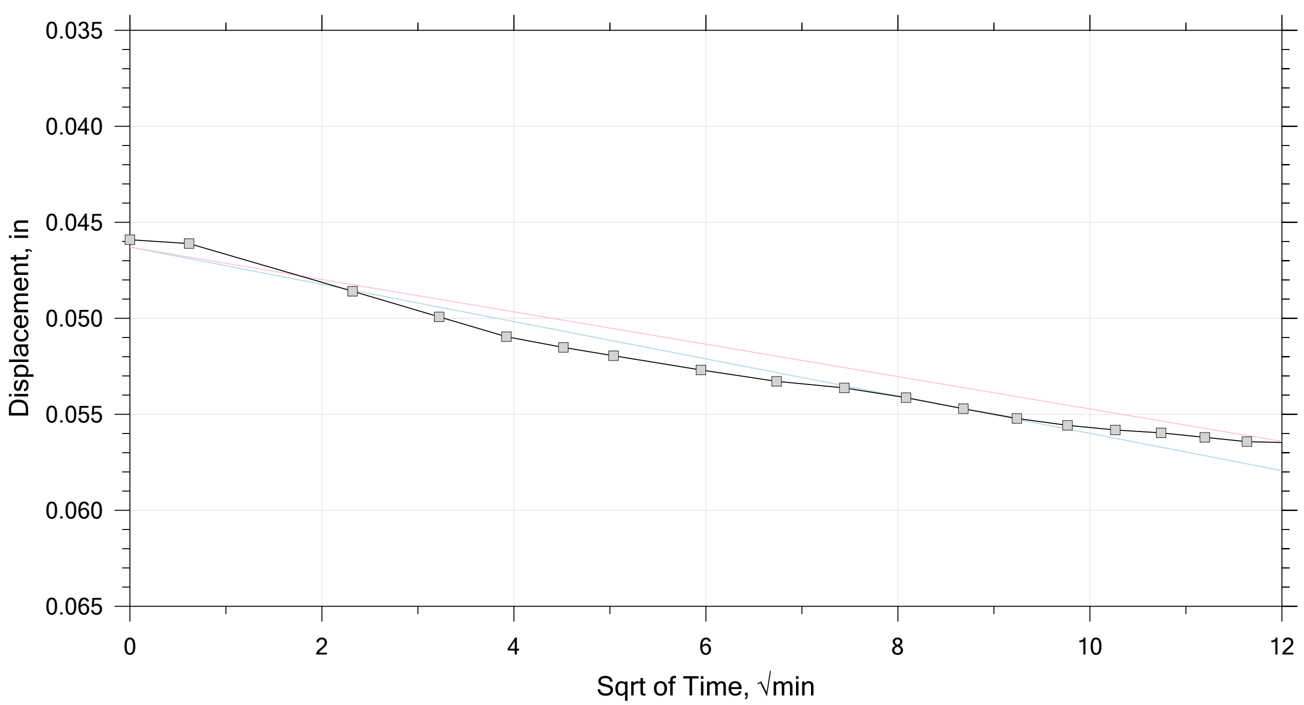


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 25
Constant Load Step
Stress: 641 psf





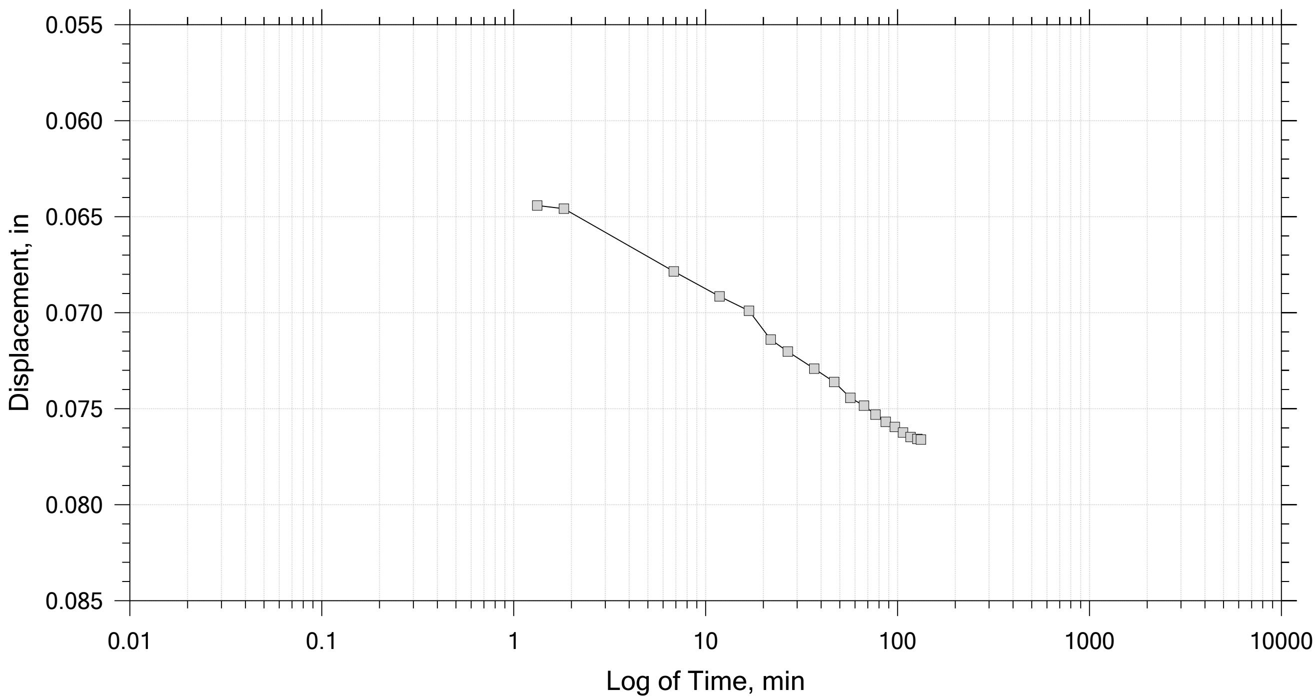
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

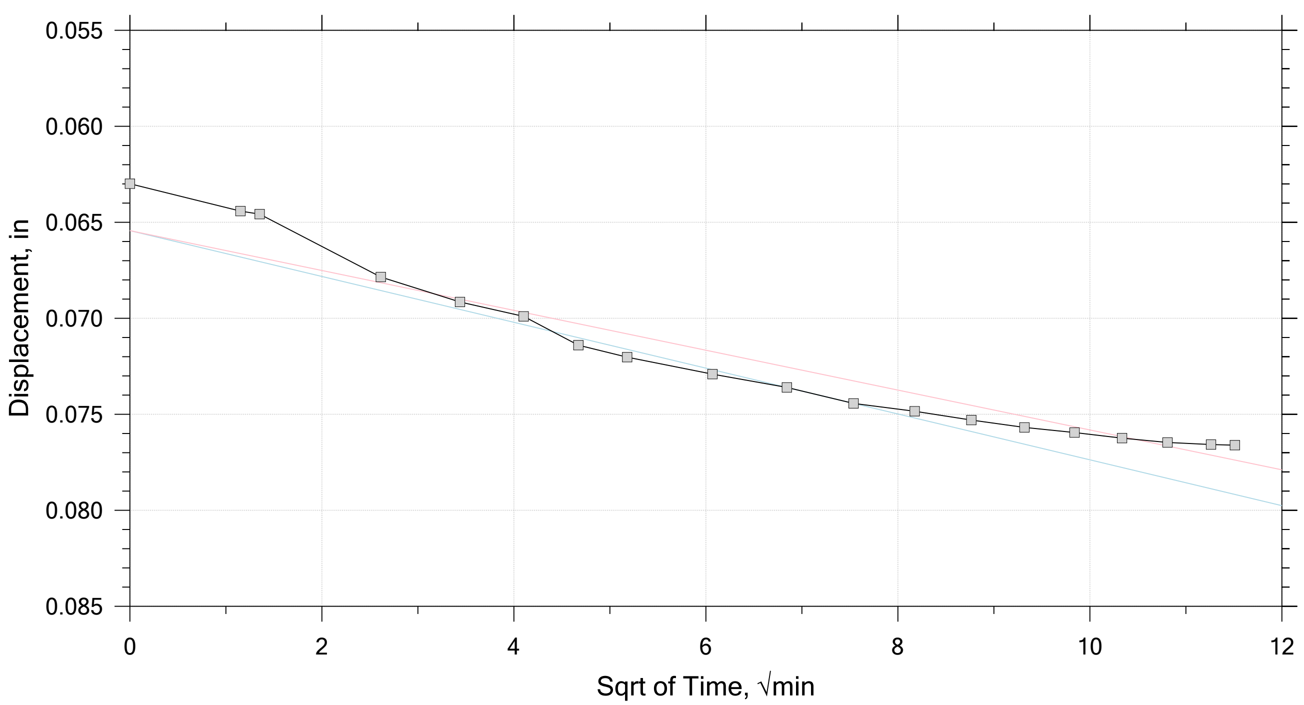
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 25

Constant Load Step

Stress: 961 psf

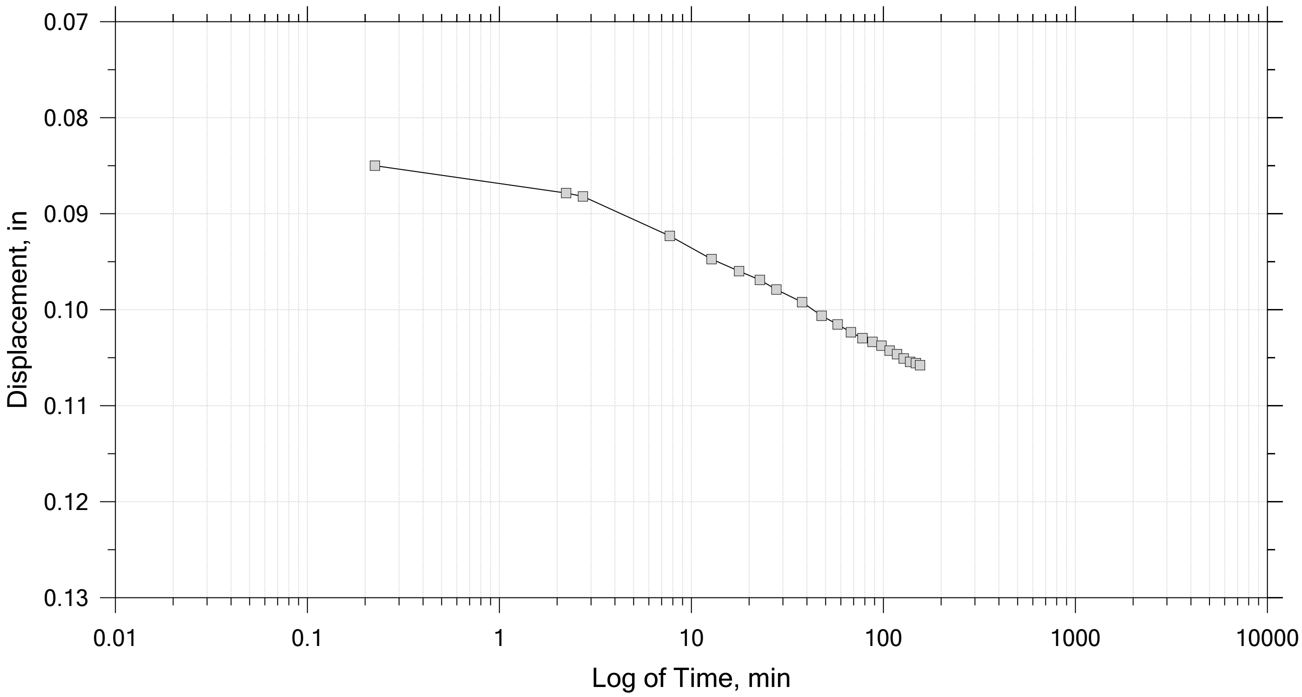


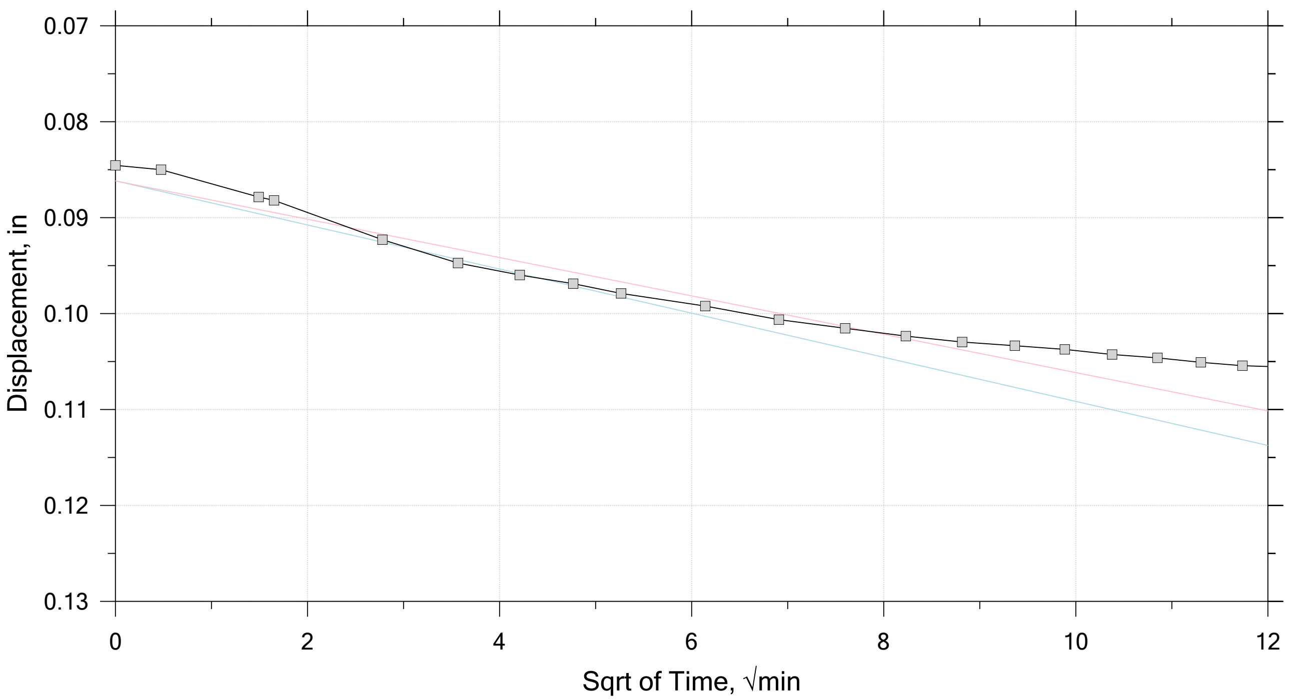


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 25
Constant Load Step
Stress: 1.44e+03 psf

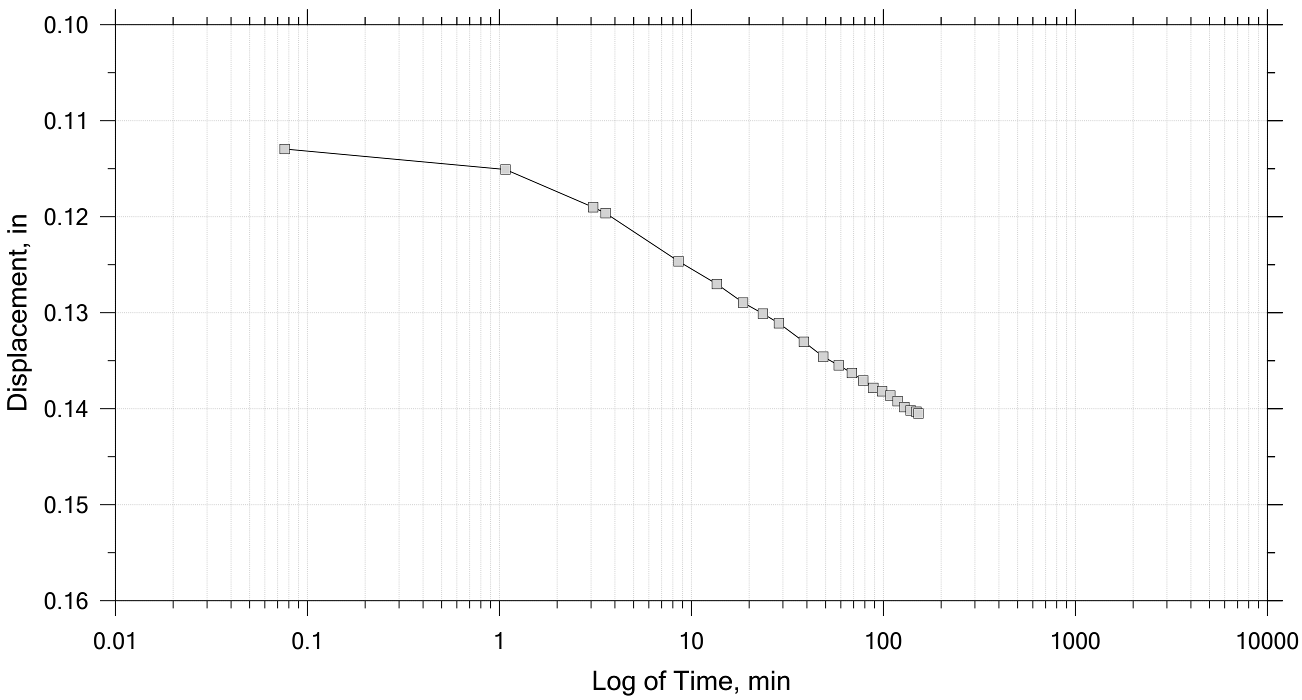


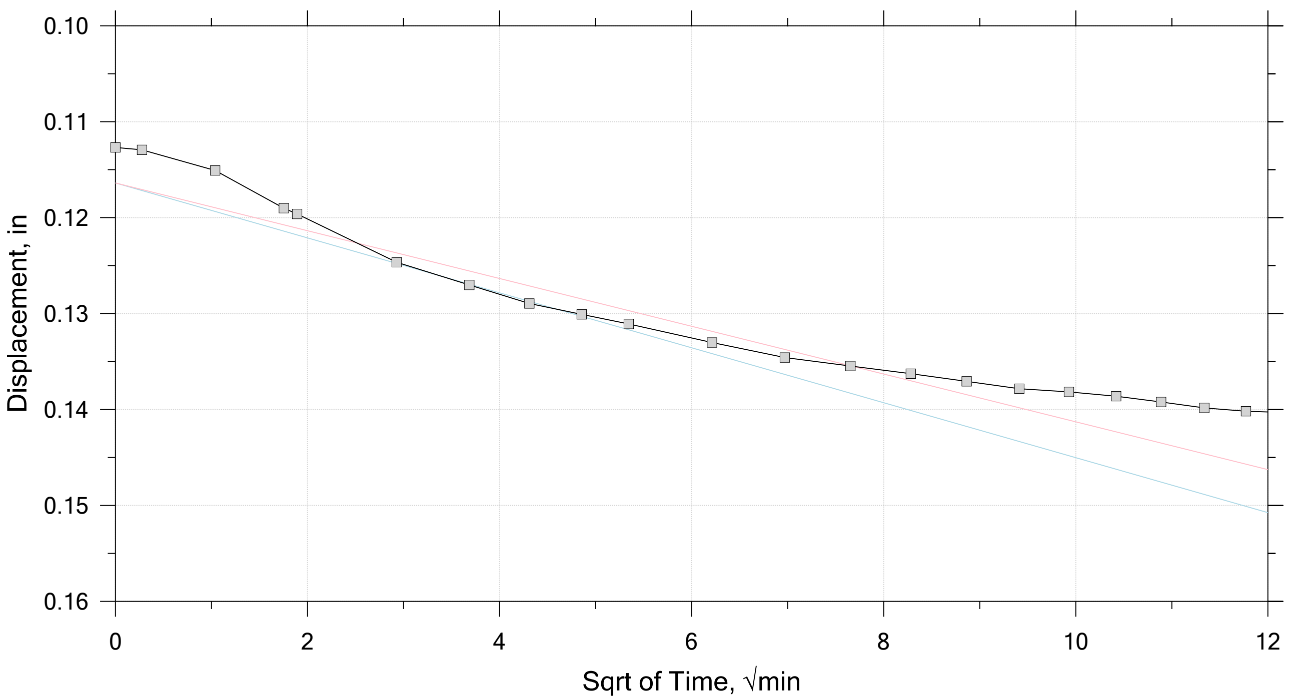


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 25
Constant Load Step
Stress: 2.16e+03 psf





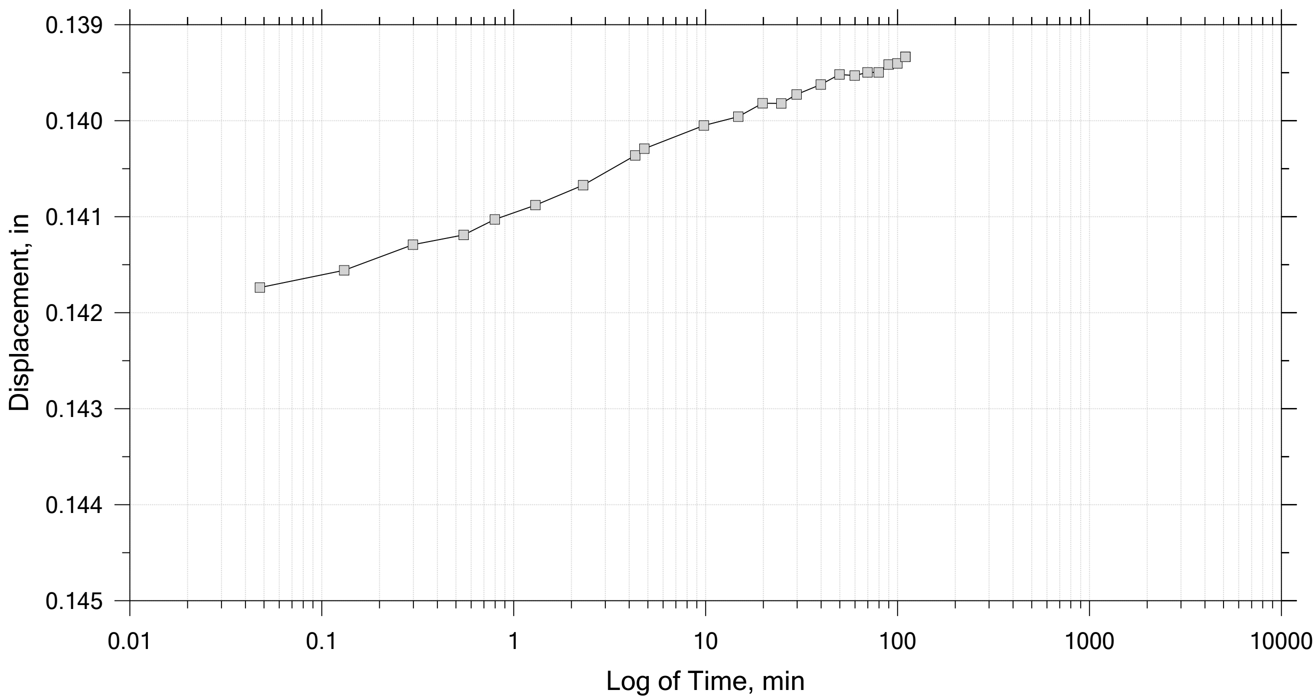
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

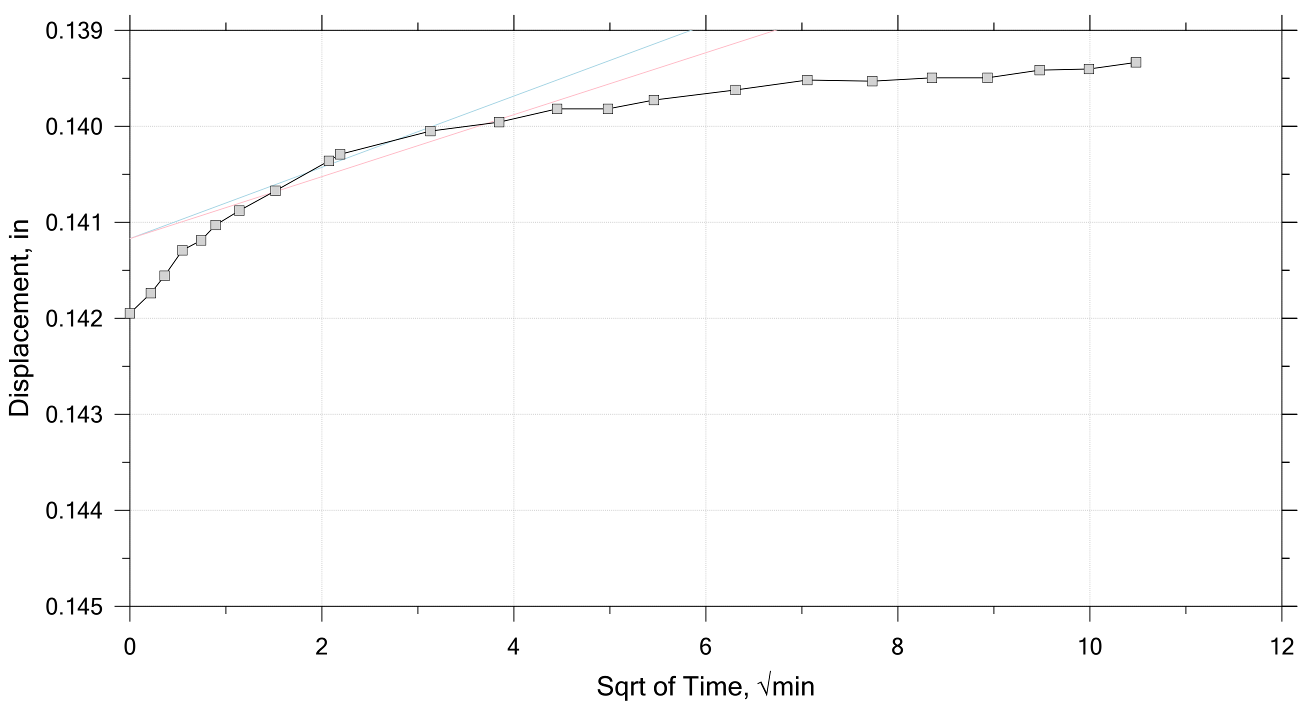
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 25

Constant Load Step

Stress: 1.08e+03 psf





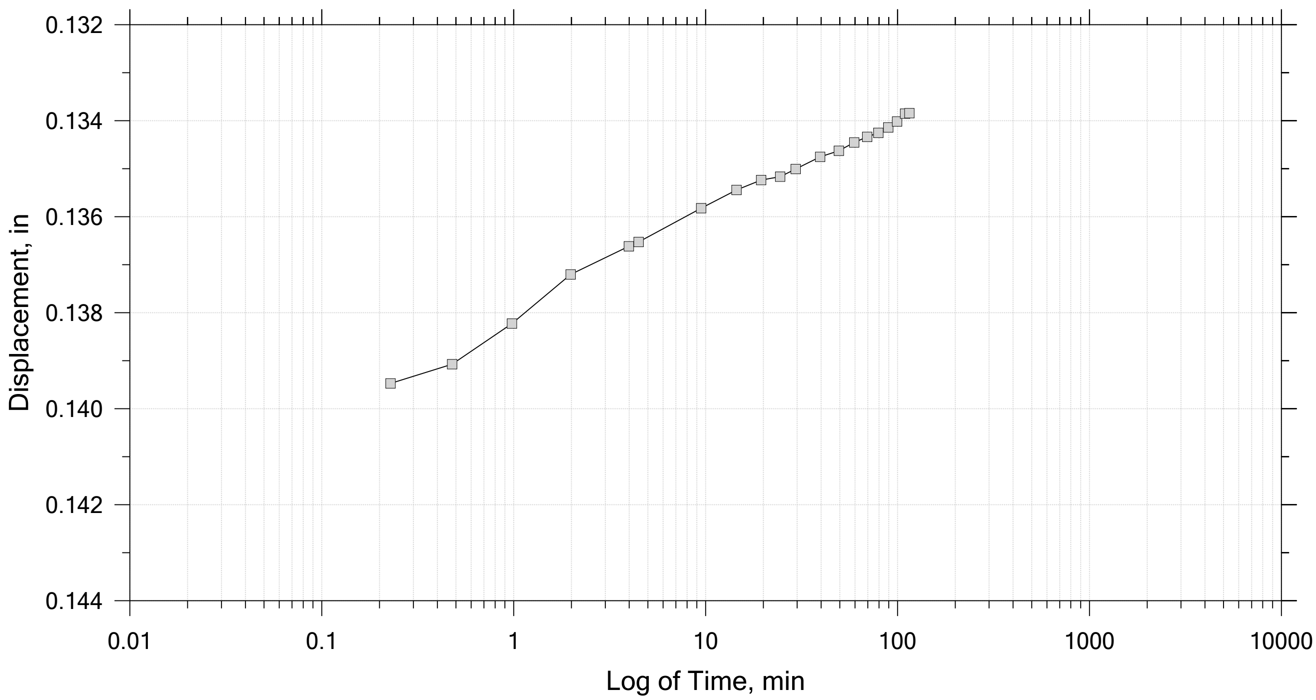
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

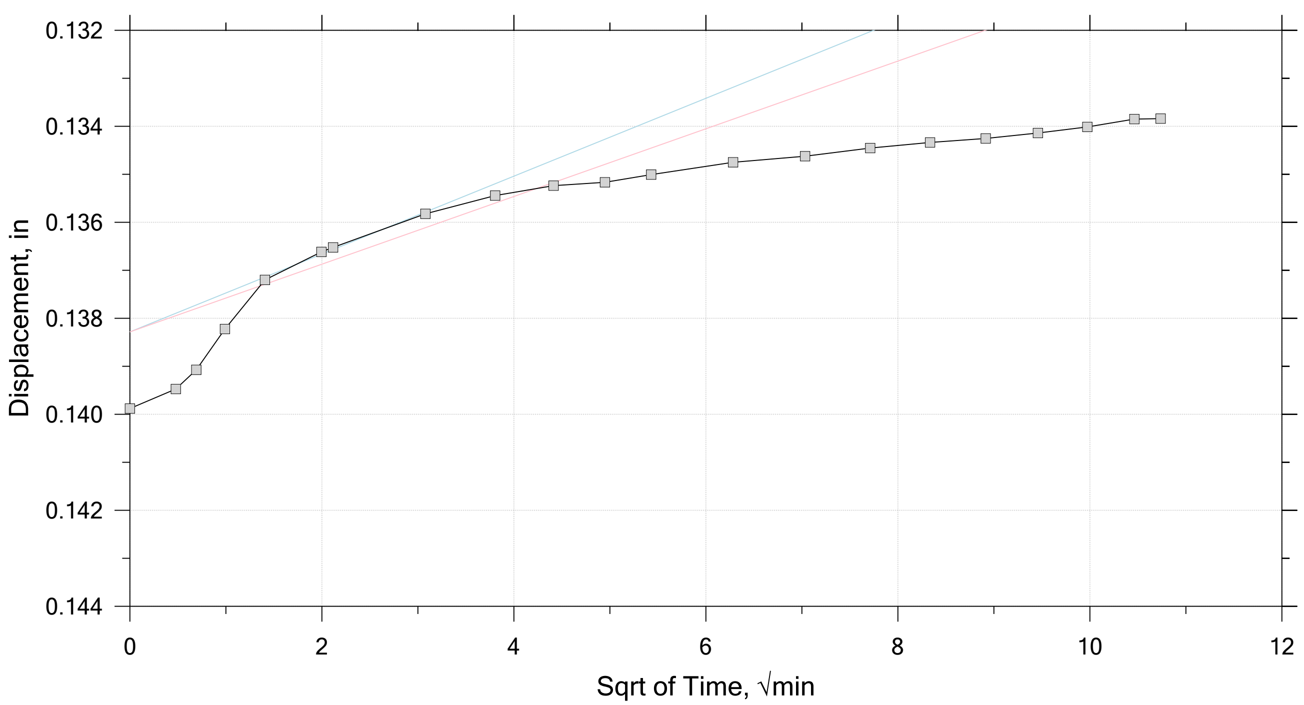
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 25

Constant Load Step

Stress: 541 psf

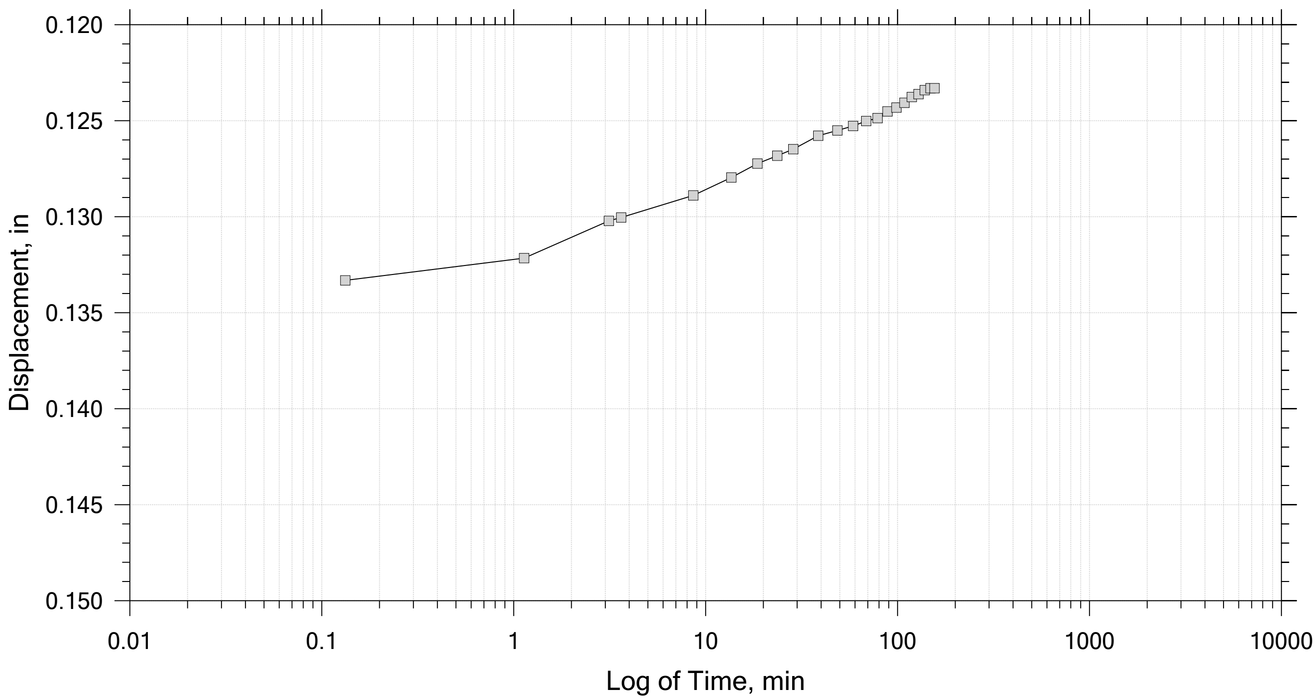


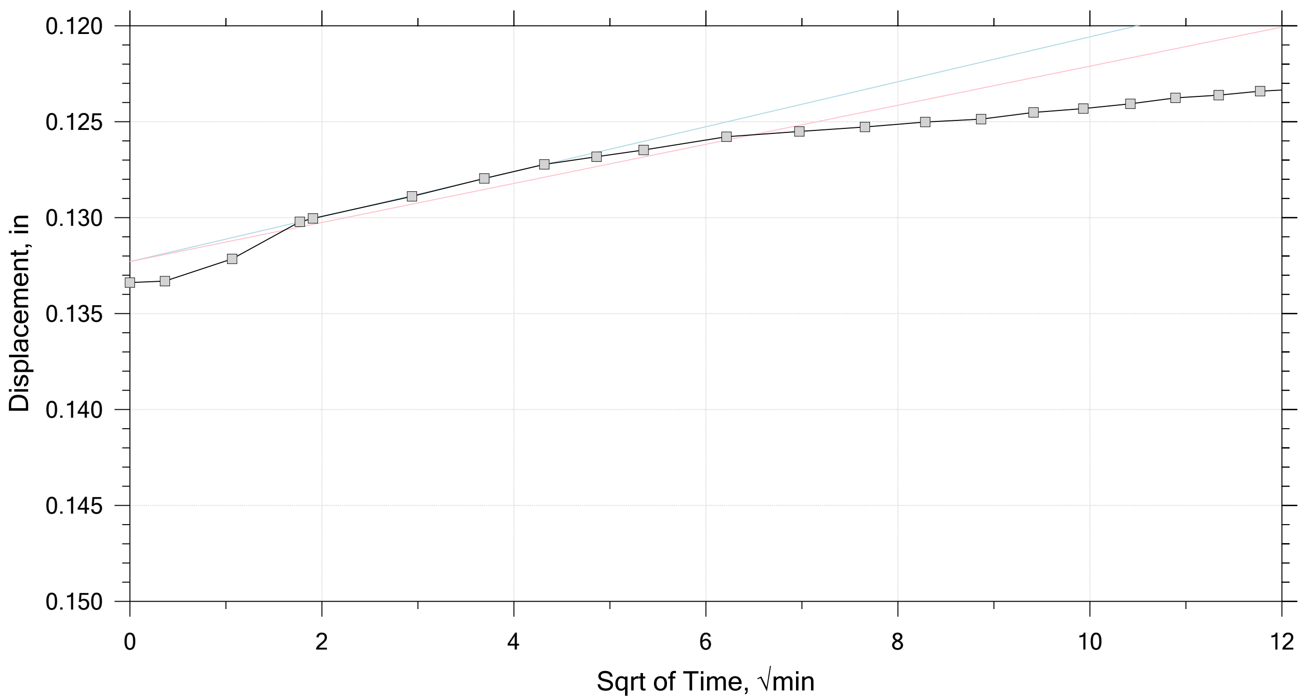


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 25
Constant Load Step
Stress: 270 psf

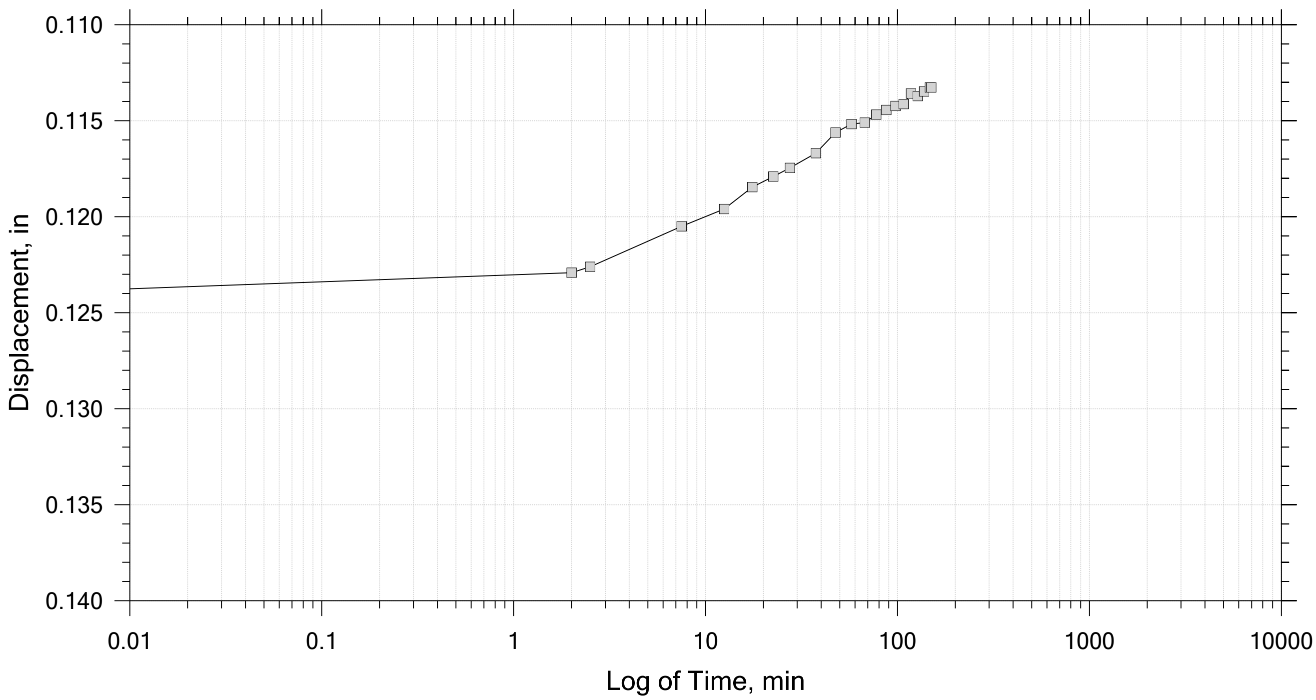


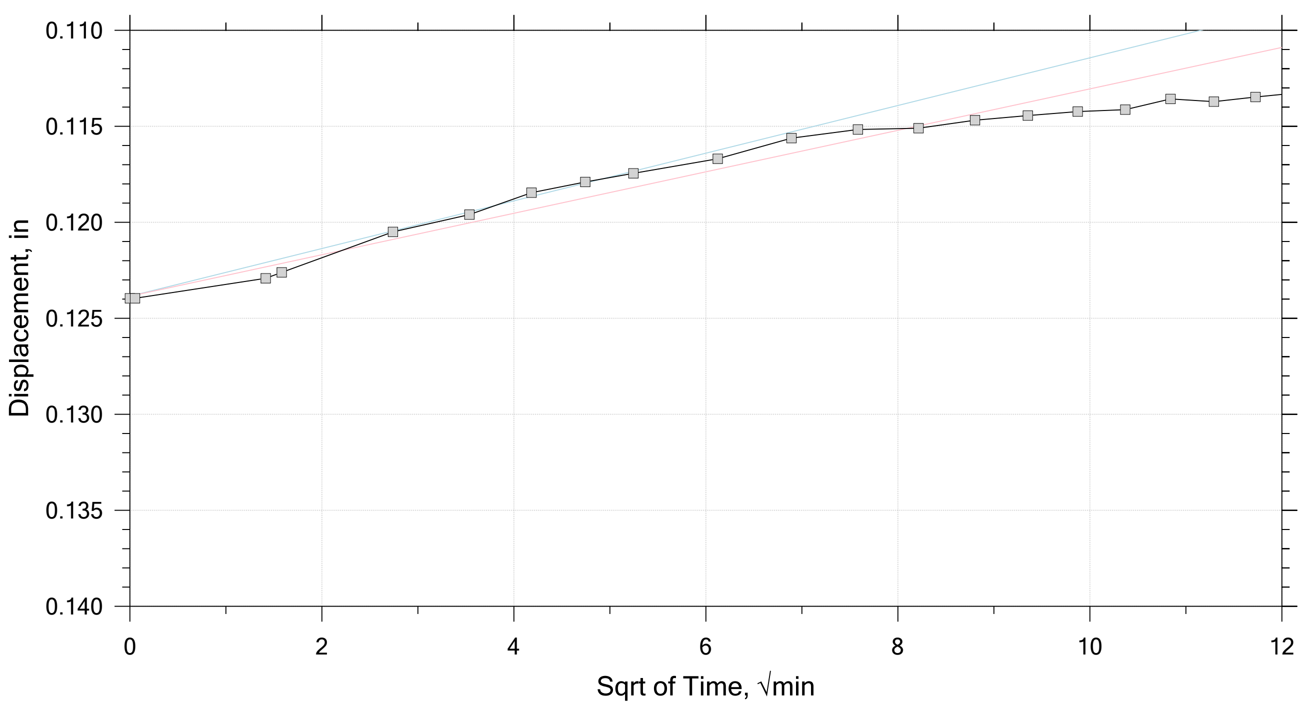


Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 16 of 25
Constant Load Step
Stress: 135 psf





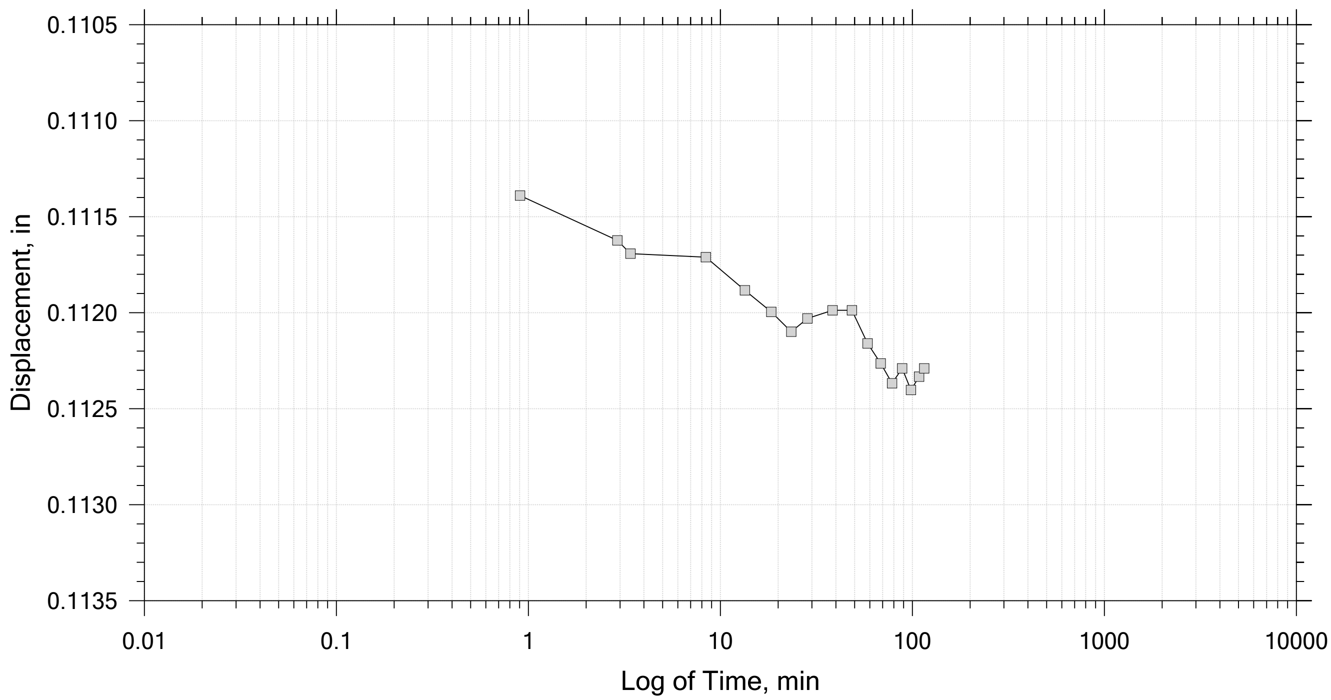
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

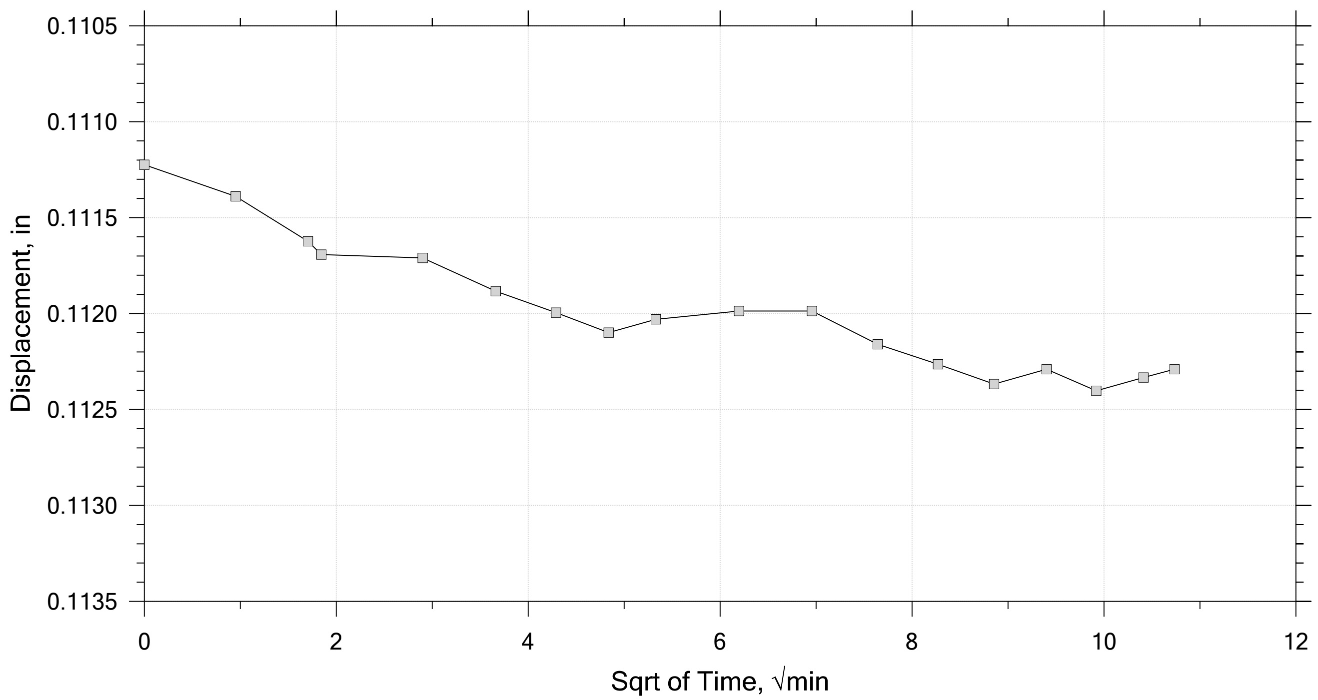
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 17 of 25

Constant Load Step

Stress: 270 psf





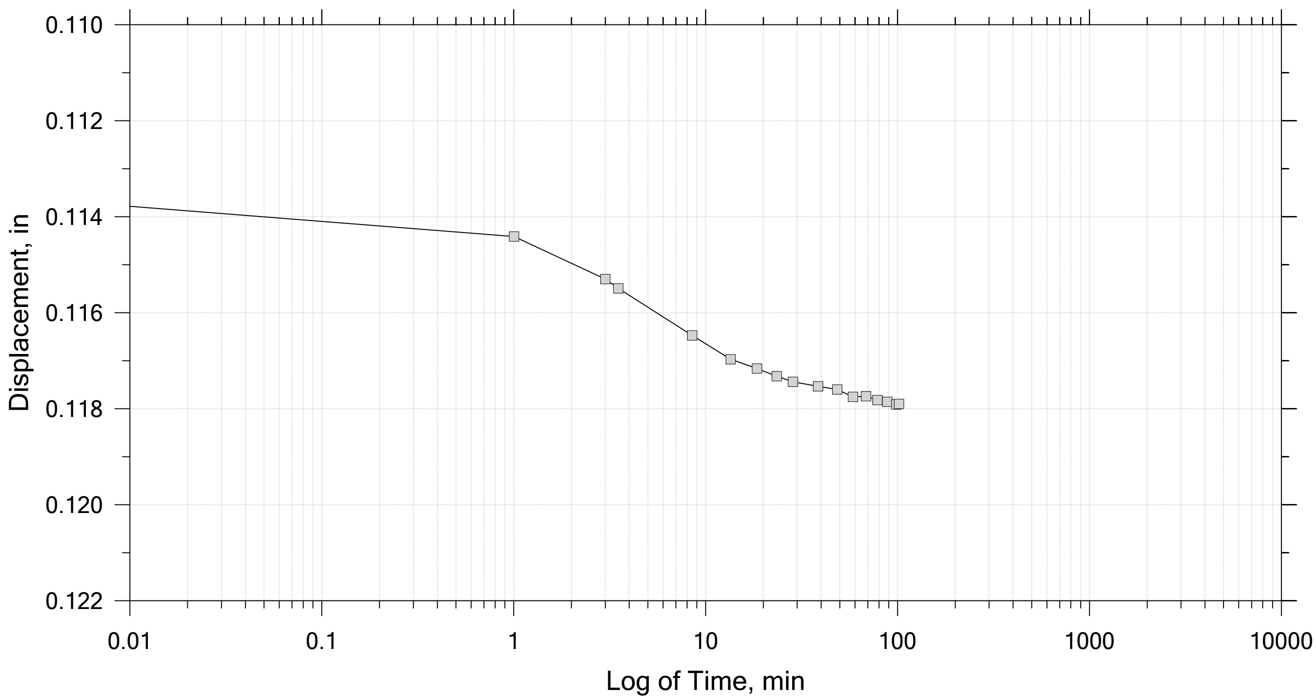
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

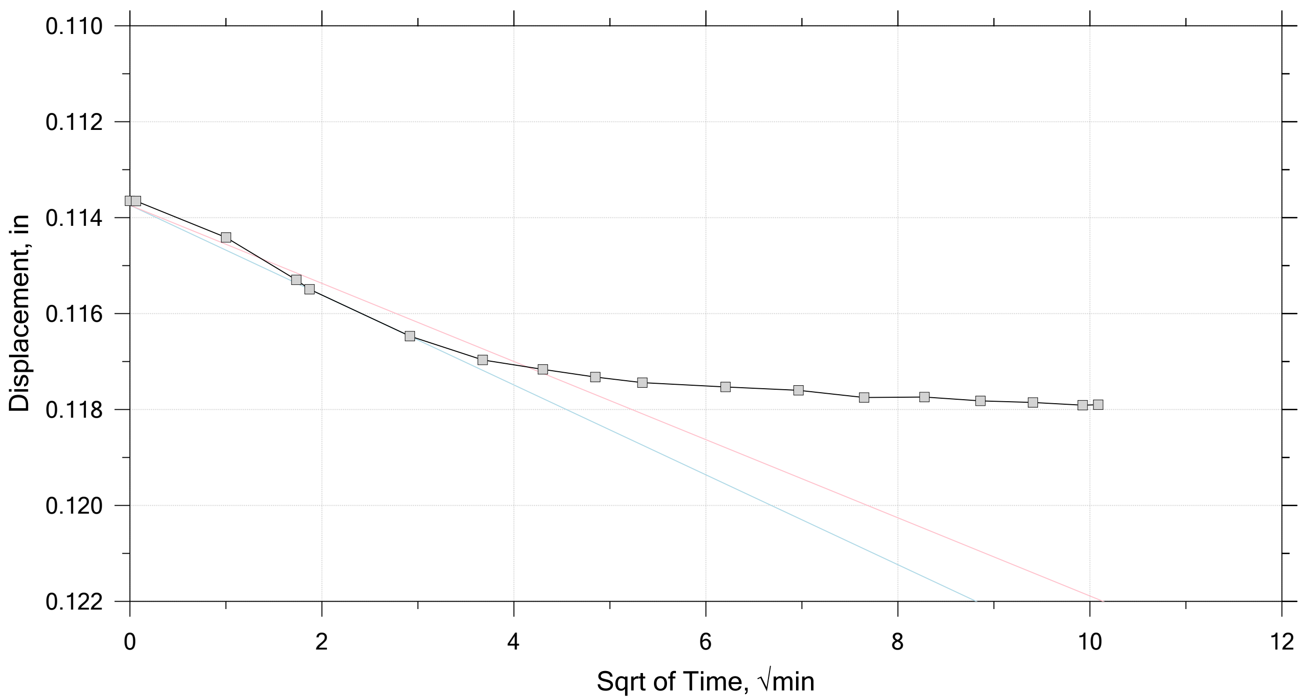
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 18 of 25

Constant Load Step

Stress: 541 psf





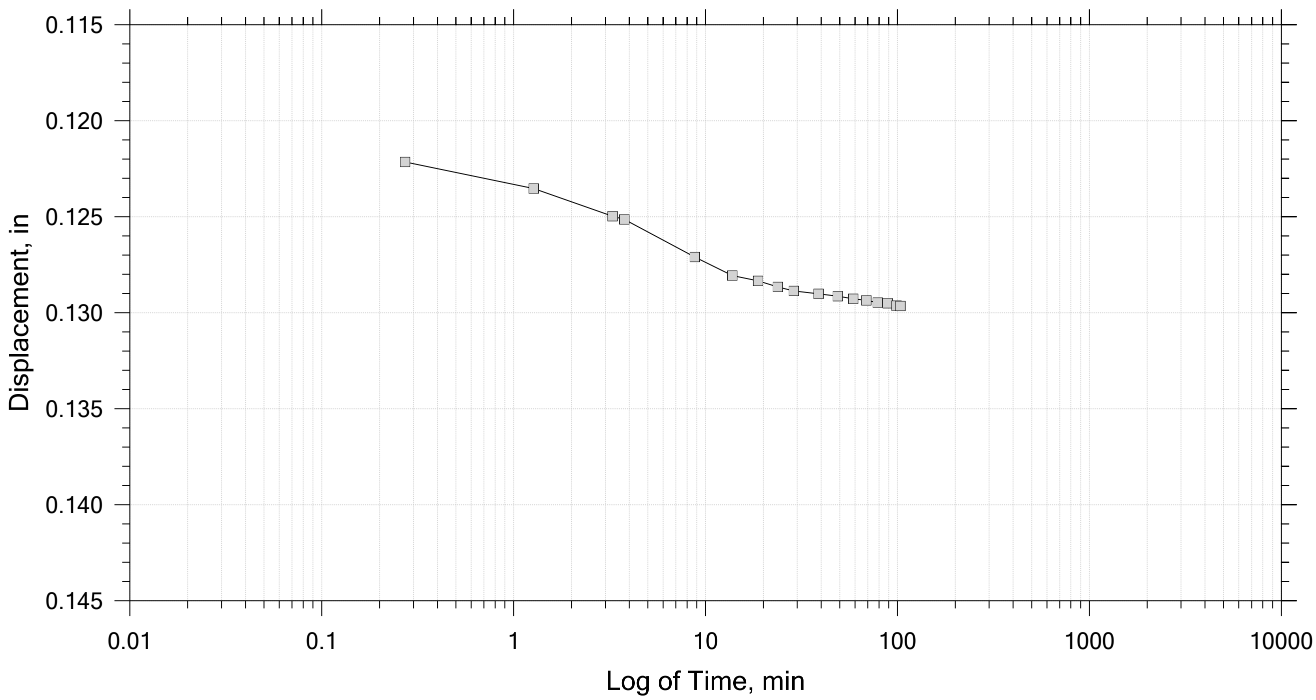
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

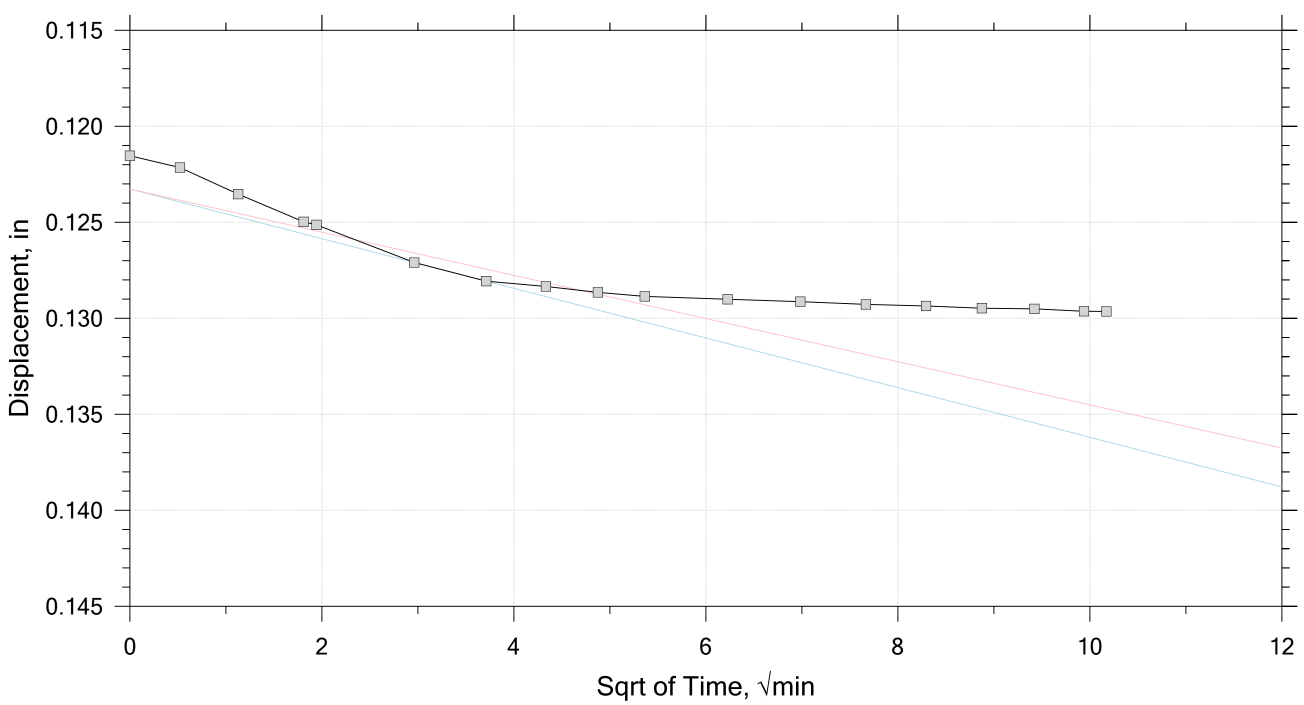
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 19 of 25

Constant Load Step

Stress: 1.08e+03 psf

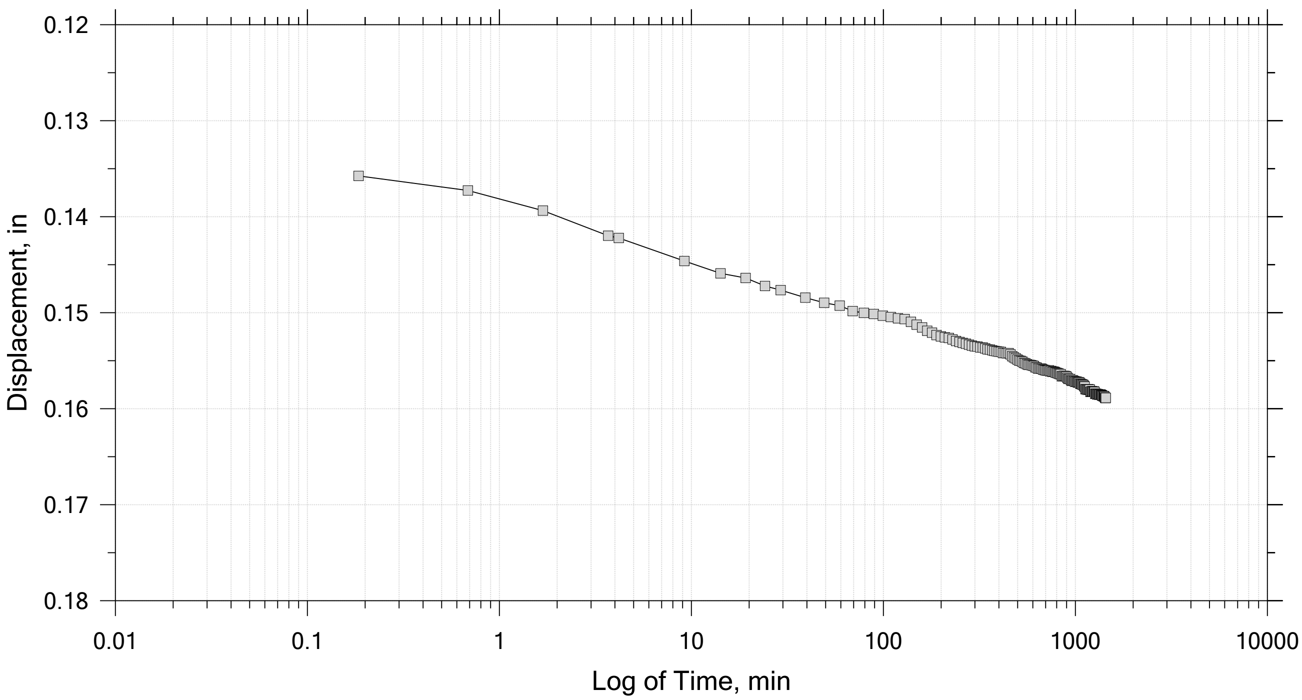


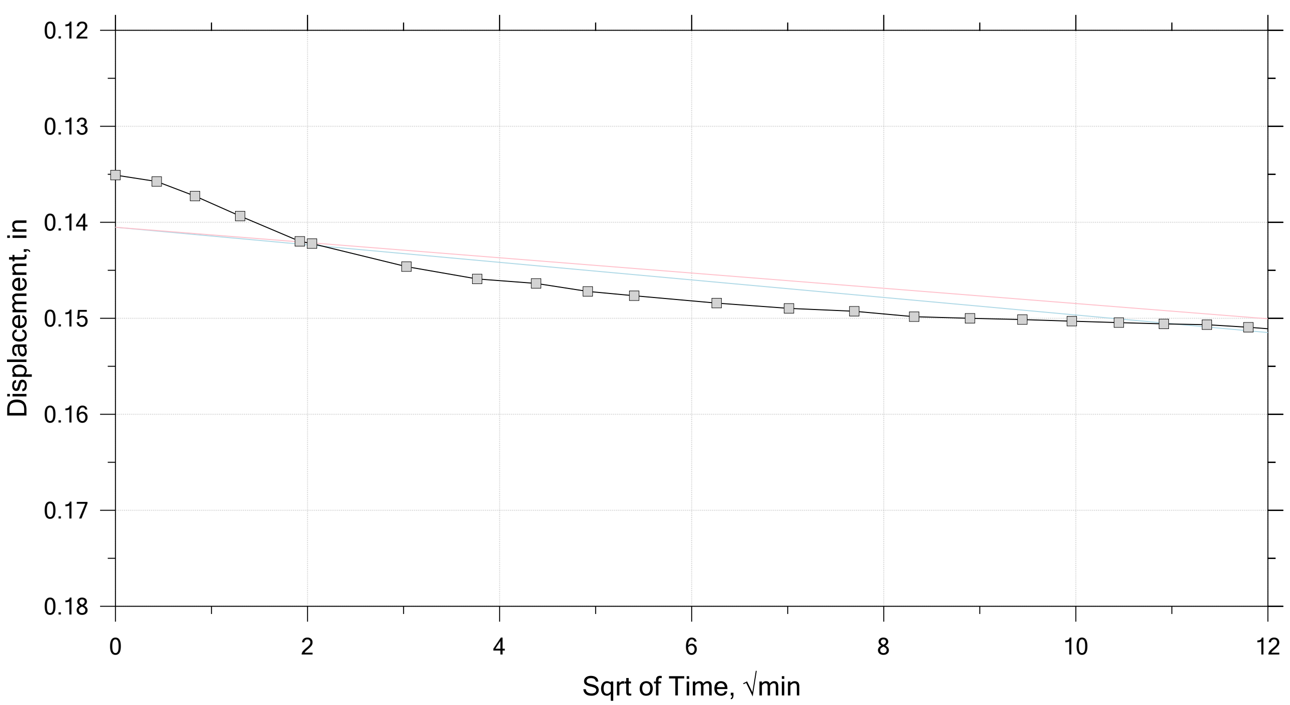


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 20 of 25
Constant Load Step
Stress: 2.16e+03 psf

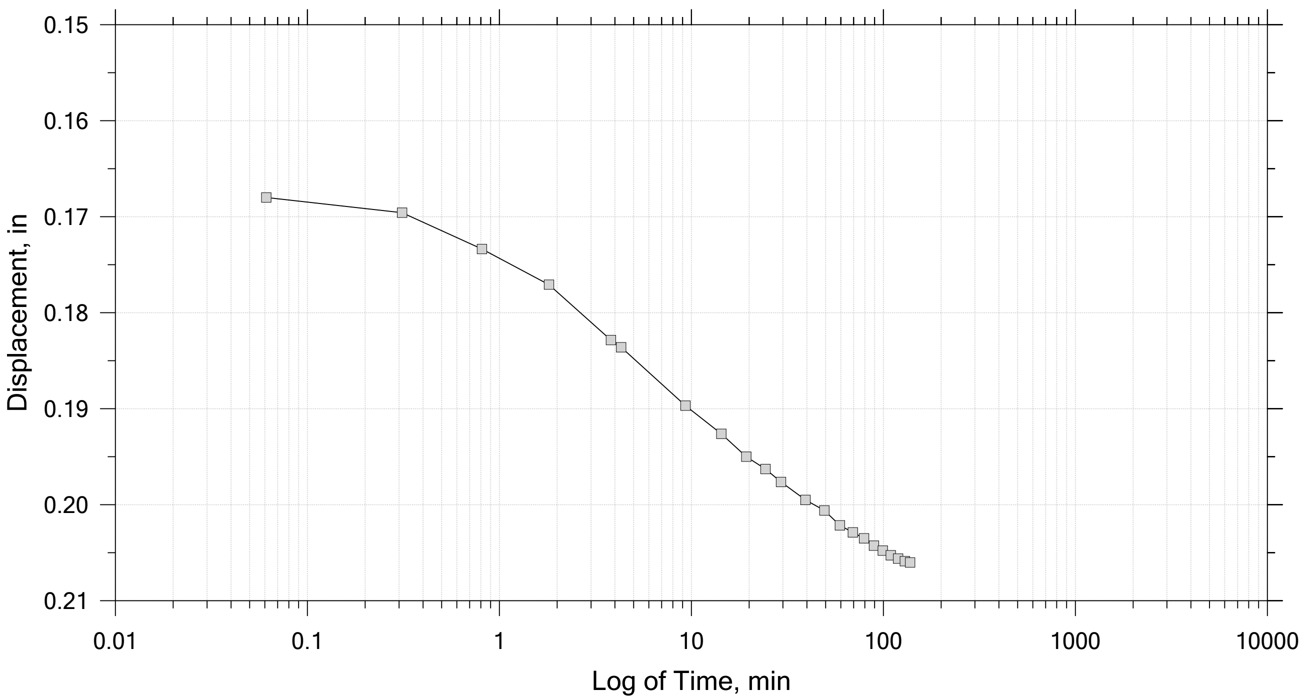


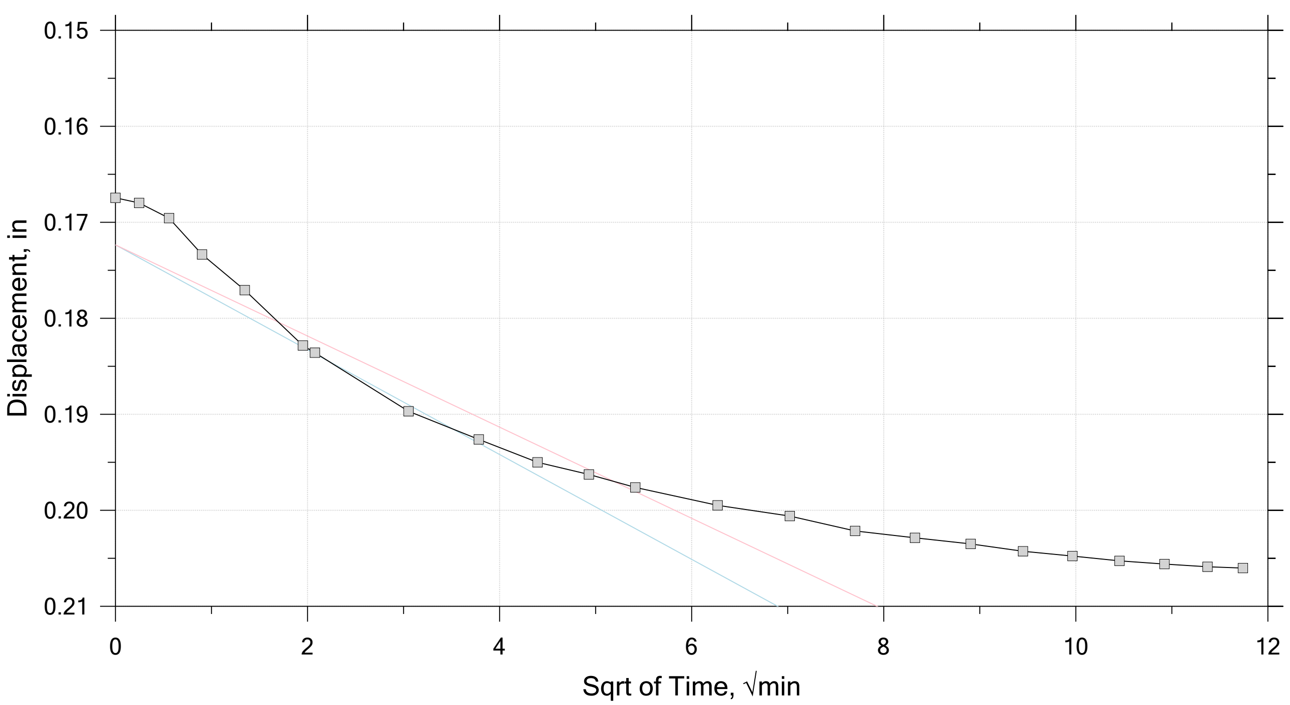


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 21 of 25
Constant Load Step
Stress: 4.33e+03 psf

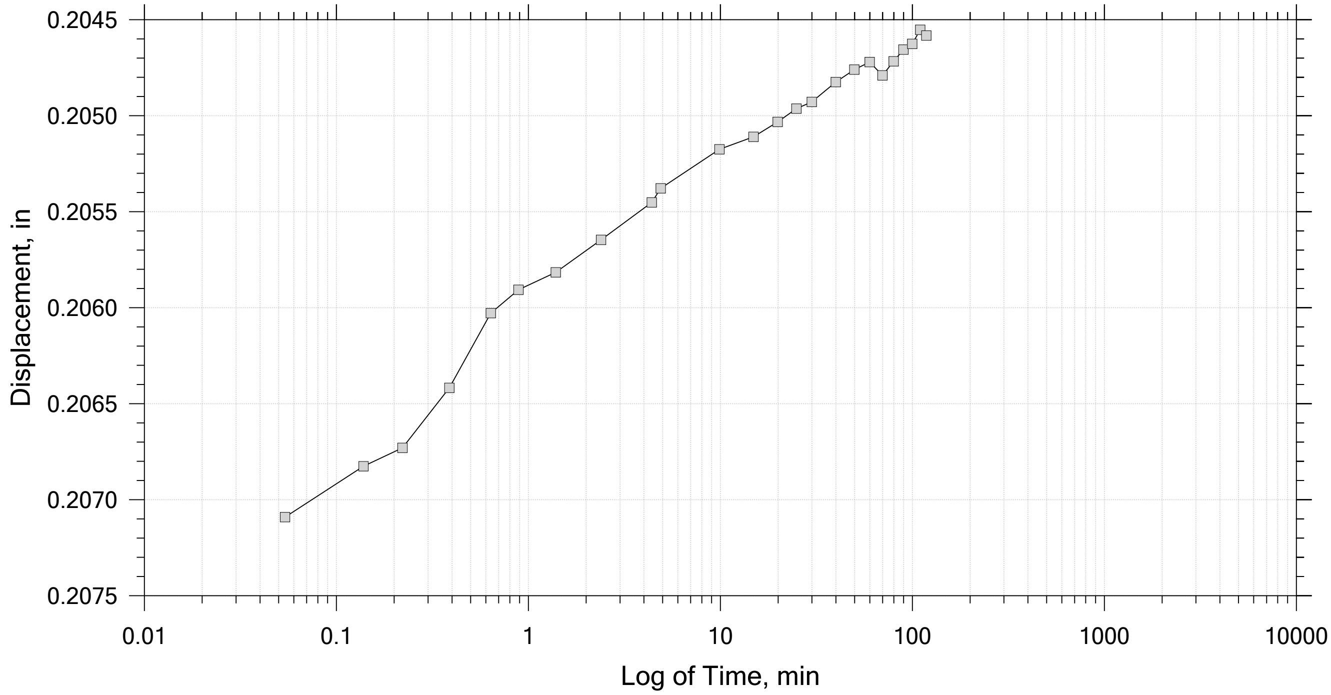


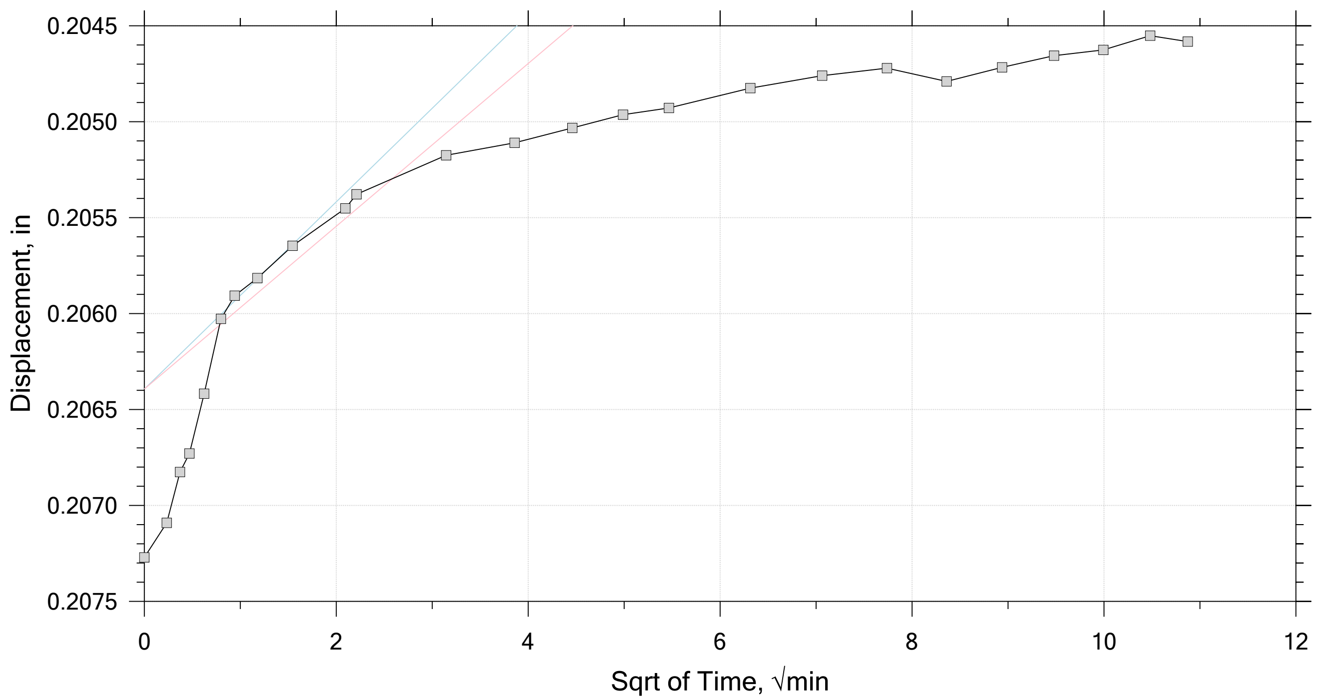


Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 22 of 25
Constant Load Step
Stress: 2.16e+03 psf





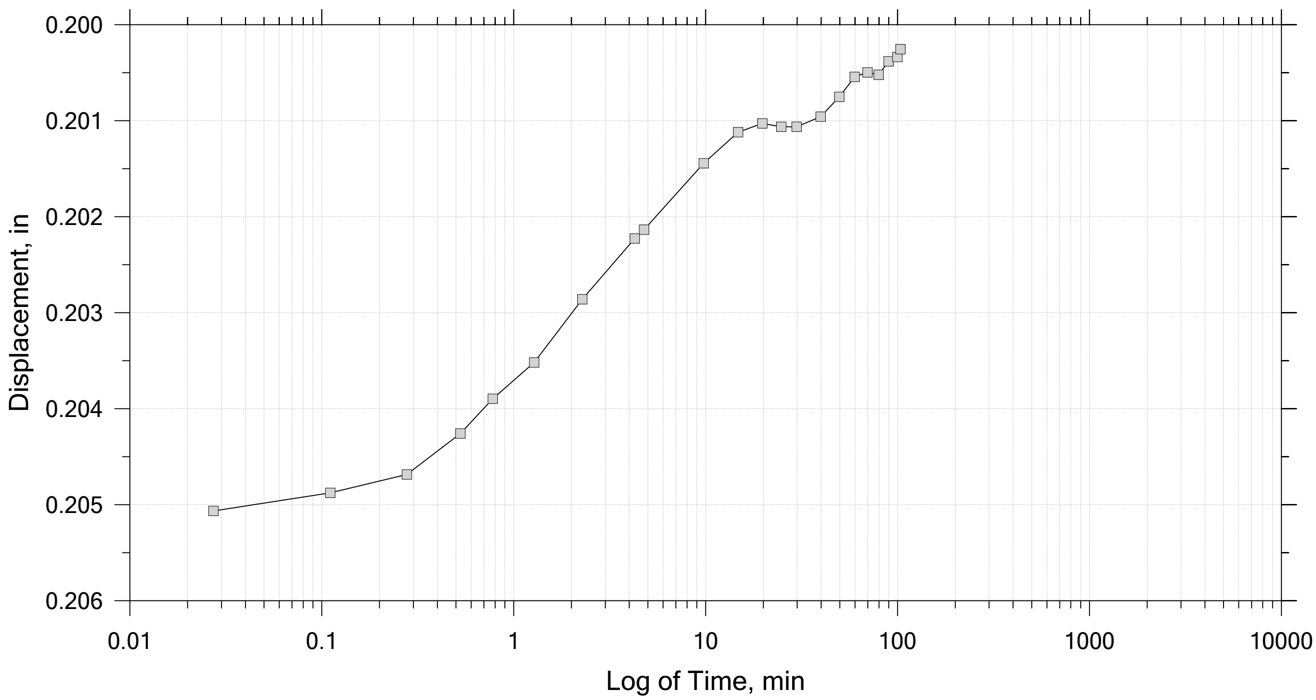
Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

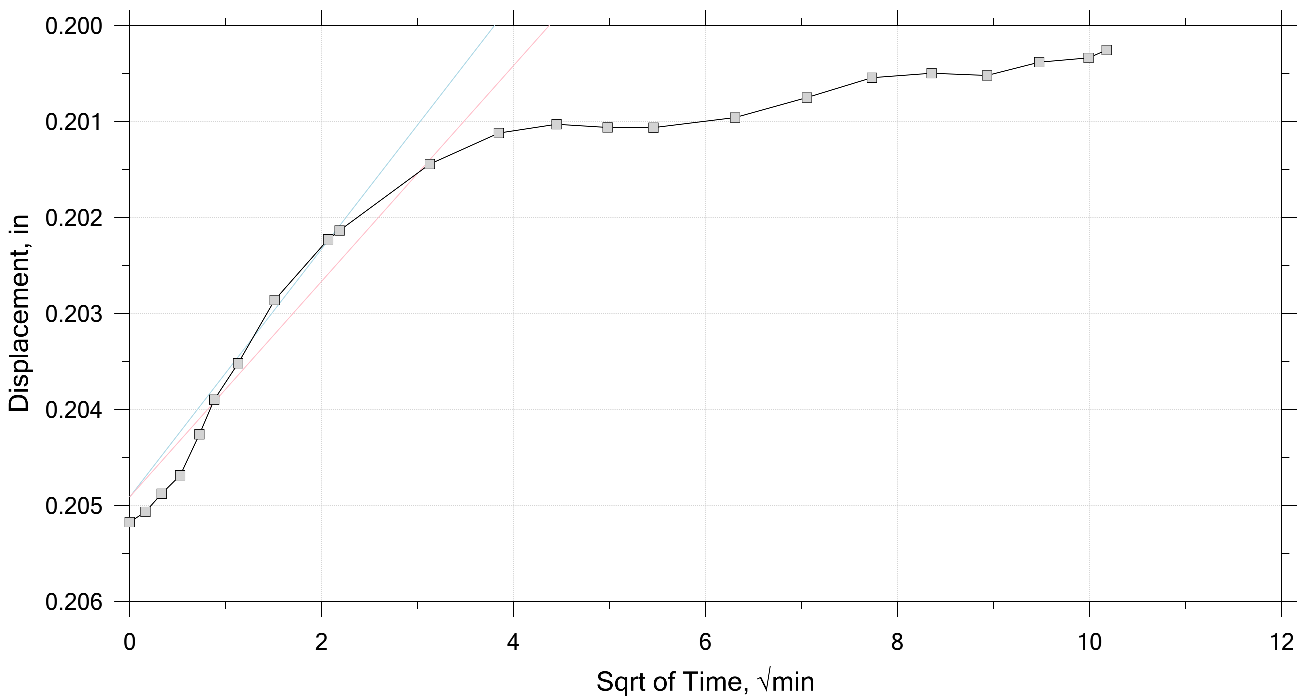
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 23 of 25

Constant Load Step

Stress: 1.08e+03 psf

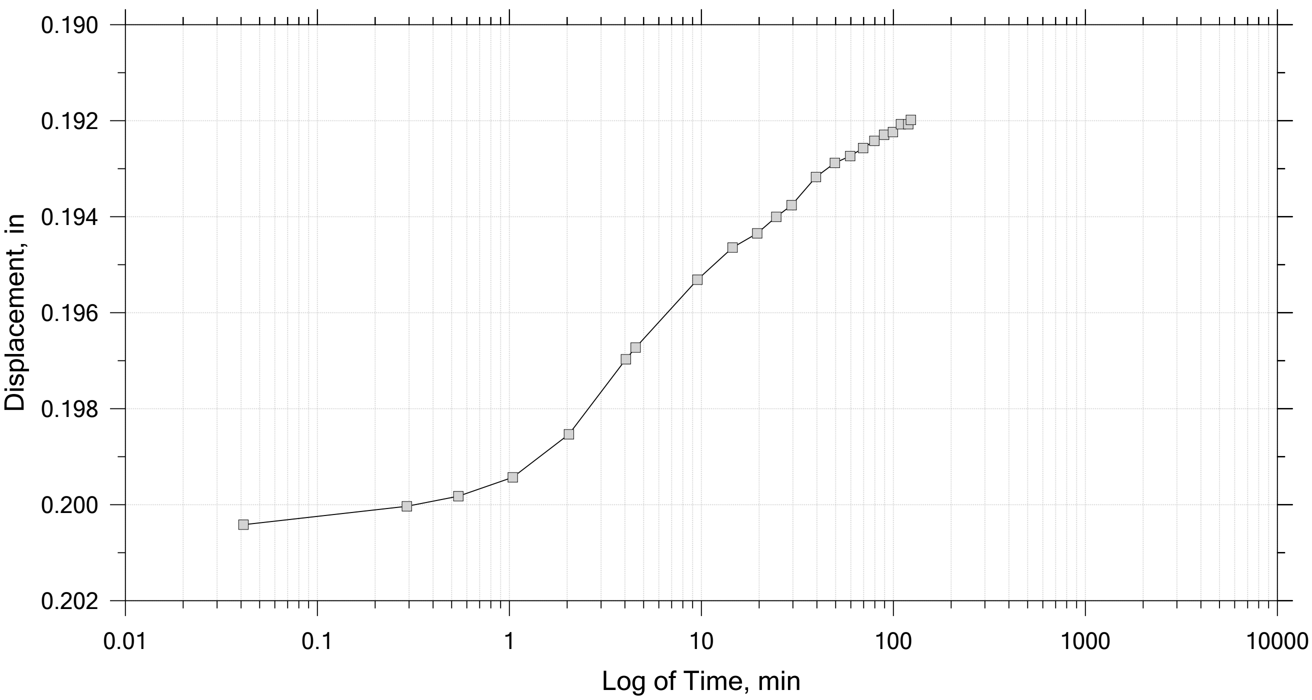


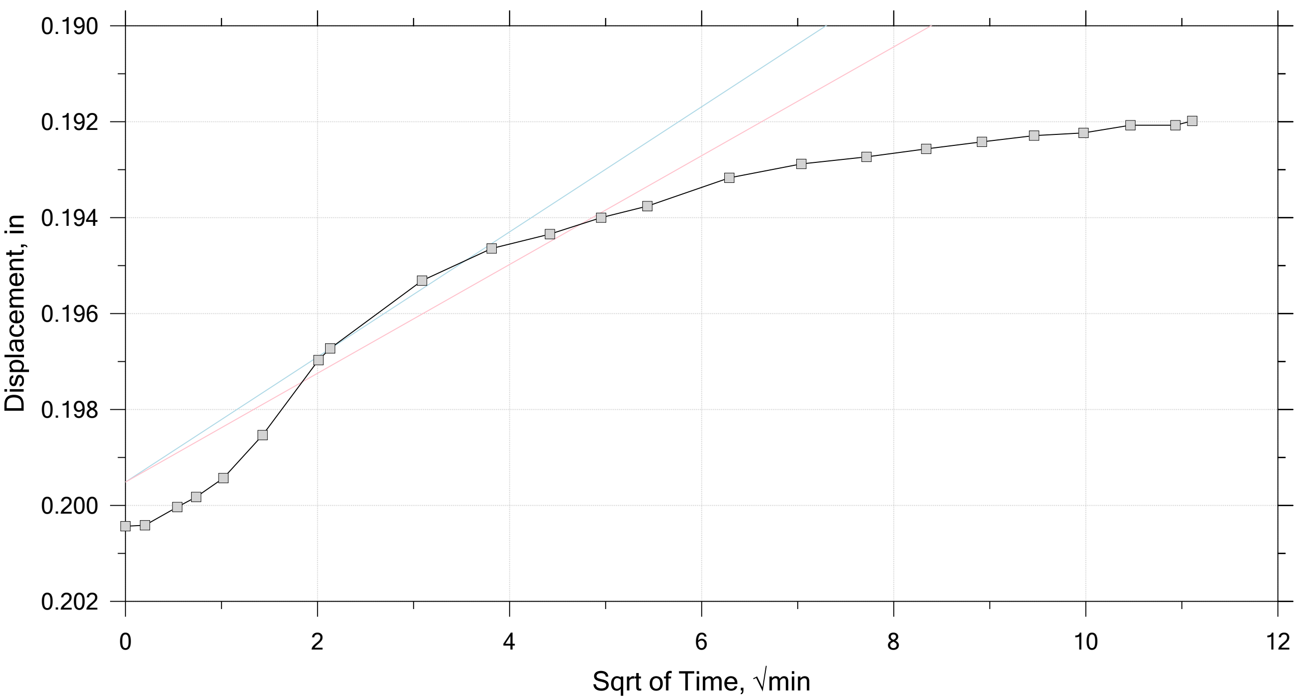


Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 24 of 25
Constant Load Step
Stress: 541 psf





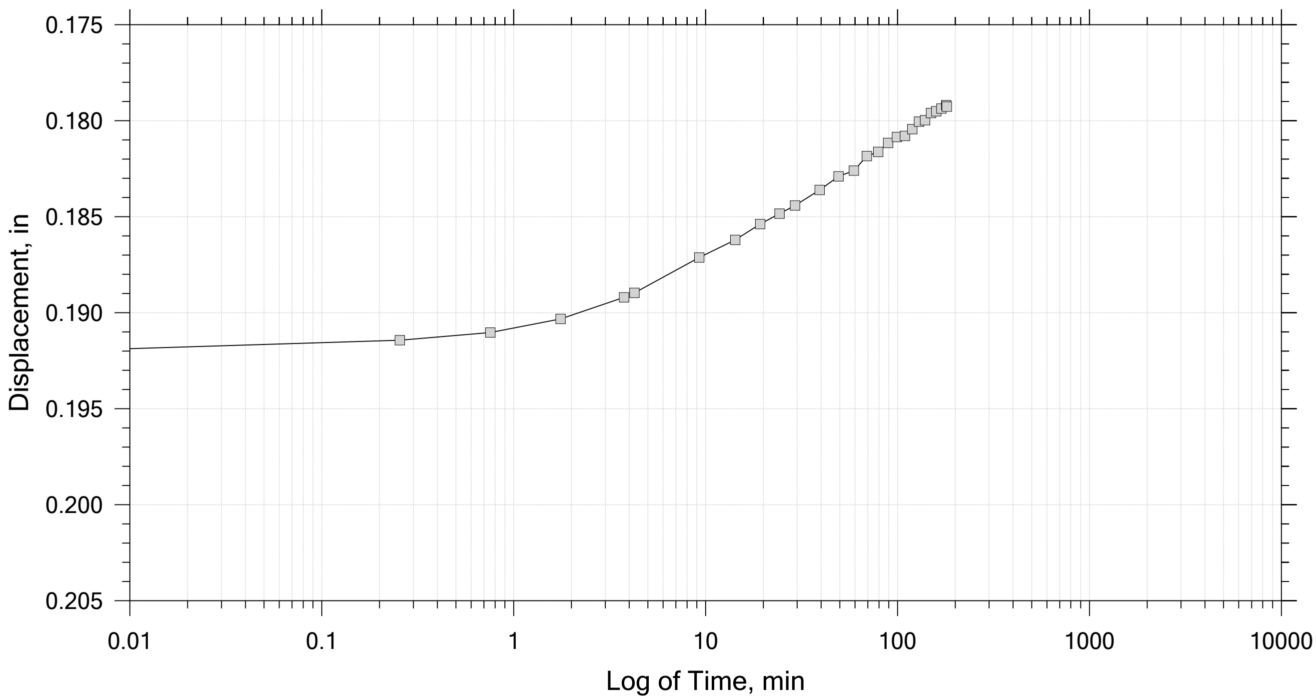
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

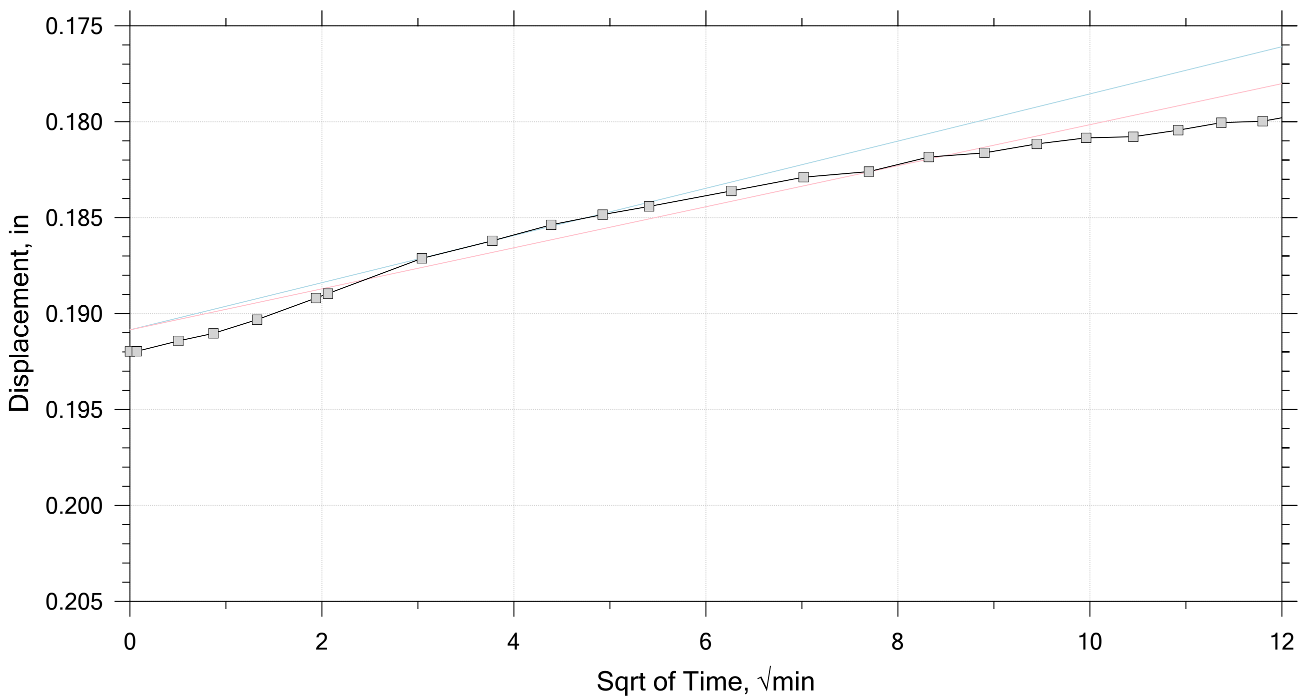
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 25 of 25

Constant Load Step

Stress: 270 psf





Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter, in: 2.50	Specific Gravity: 2.70 (Implied)	Liquid Limit: 85
Specimen Height, in: 1.00	Initial Void Ratio: 2.37	Plastic Limit: 51
Final Height, in: 0.82	Final Void Ratio: 1.77	Plasticity Index: 35

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	211	---	"ring"	319
Mass Container, gm	36.99	110.26	110.26	60.6
Mass Container + Wet Soil, gm	127.1	228.99	217.03	167.29
Mass Container + Dry Soil, gm	85.93	174.82	174.82	125.11
Mass Dry Soil, gm	48.94	64.558	64.558	64.51
Water Content, %	84.12	83.91	65.39	65.39
Void Ratio	---	2.37	1.77	---
Degree of Saturation, %	---	95.66	100.00	---
Dry Unit Weight, pcf	---	50.053	60.972	---

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: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	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	25.0	7.066e-05	2.37	0.00706	3.132	1.58e-01	5.65e+03	9.80e-09	0.00e+00
2	38.0	0.0001644	2.37	0.0164	1.988	2.48e-01	1.44e+04	3.94e-08	0.00e+00
3	56.0	0.002700	2.36	0.270	0.000	0.00e+00	2.81e+05	0.00e+00	0.00e+00
4	84.0	0.005940	2.35	0.593	0.000	0.00e+00	2.31e+05	0.00e+00	0.00e+00
5	127.	0.01037	2.34	1.04	0.000	0.00e+00	2.06e+05	0.00e+00	0.00e+00
6	190.	0.01718	2.31	1.72	0.000	0.00e+00	2.16e+05	0.00e+00	0.00e+00
7	285.	0.02489	2.29	2.49	0.000	0.00e+00	1.62e+05	0.00e+00	0.00e+00
8	427.	0.03954	2.24	3.95	0.000	0.00e+00	2.06e+05	0.00e+00	0.00e+00
9	641.	0.05646	2.18	5.64	0.000	0.00e+00	1.58e+05	0.00e+00	0.00e+00
10	961.	0.07661	2.11	7.65	13.327	3.23e-02	1.26e+05	4.47e-08	0.00e+00
11	1.44e+03	0.1054	2.02	10.5	0.000	0.00e+00	1.20e+05	0.00e+00	0.00e+00
12	2.16e+03	0.1400	1.90	14.0	0.000	0.00e+00	9.59e+04	0.00e+00	0.00e+00
13	1.08e+03	0.1392	1.90	13.9	0.000	0.00e+00	1.43e+03	0.00e+00	0.00e+00
14	541.	0.1347	1.92	13.5	0.000	0.00e+00	1.65e+04	0.00e+00	0.00e+00
15	270.	0.1244	1.95	12.4	0.000	0.00e+00	7.63e+04	0.00e+00	0.00e+00
16	135.	0.1133	1.99	11.3	0.000	0.00e+00	1.65e+05	0.00e+00	0.00e+00
17	270.	0.1123	1.99	11.2	0.000	0.00e+00	-1.45e+04	-0.00e+00	0.00e+00
18	541.	0.1175	1.97	11.7	0.000	0.00e+00	3.86e+04	0.00e+00	0.00e+00
19	1.08e+03	0.1292	1.94	12.9	4.775	7.95e-02	4.31e+04	3.77e-08	0.00e+00
20	2.16e+03	0.1554	1.85	15.5	0.000	0.00e+00	4.84e+04	0.00e+00	0.00e+00
21	4.33e+03	0.2023	1.69	20.2	5.540	6.01e-02	4.33e+04	2.87e-08	0.00e+00
22	2.16e+03	0.2013	1.69	20.1	0.000	0.00e+00	8.46e+02	0.00e+00	0.00e+00
23	1.08e+03	0.2010	1.69	20.1	1.949	1.62e-01	5.60e+02	9.98e-10	0.00e+00
24	541.	0.1929	1.72	19.3	4.445	7.16e-02	3.02e+04	2.38e-08	0.00e+00
25	270.	0.1795	1.77	17.9	0.000	0.00e+00	9.87e+04	0.00e+00	0.00e+00

Soil Metrics LLC			
	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	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	25.0	7.066e-05	2.37	0.00706	0.000	0.00e+00	5.65e+03	0.00e+00
2	38.0	0.0001644	2.37	0.0164	0.000	0.00e+00	1.44e+04	0.00e+00
3	56.0	0.002700	2.36	0.270	0.000	0.00e+00	2.81e+05	0.00e+00
4	84.0	0.005940	2.35	0.593	0.000	0.00e+00	2.31e+05	0.00e+00
5	127.	0.01037	2.34	1.04	61.421	3.40e-02	2.06e+05	7.71e-08
6	190.	0.01718	2.31	1.72	0.000	0.00e+00	2.16e+05	0.00e+00
7	285.	0.02489	2.29	2.49	0.000	0.00e+00	1.62e+05	0.00e+00
8	427.	0.03954	2.24	3.95	67.631	2.94e-02	2.06e+05	6.68e-08
9	641.	0.05646	2.18	5.64	144.874	1.33e-02	1.58e+05	2.31e-08
10	961.	0.07661	2.11	7.65	109.636	1.69e-02	1.26e+05	2.34e-08
11	1.44e+03	0.1054	2.02	10.5	61.468	2.86e-02	1.20e+05	3.77e-08
12	2.16e+03	0.1400	1.90	14.0	58.980	2.77e-02	9.59e+04	2.93e-08
13	1.08e+03	0.1392	1.90	13.9	13.680	1.15e-01	1.43e+03	1.81e-09
14	541.	0.1347	1.92	13.5	17.963	8.81e-02	1.65e+04	1.60e-08
15	270.	0.1244	1.95	12.4	42.085	3.83e-02	7.63e+04	3.21e-08
16	135.	0.1133	1.99	11.3	65.469	2.52e-02	1.65e+05	4.57e-08
17	270.	0.1123	1.99	11.2	0.000	0.00e+00	-1.45e+04	-0.00e+00
18	541.	0.1175	1.97	11.7	17.155	9.70e-02	3.86e+04	4.13e-08
19	1.08e+03	0.1292	1.94	12.9	22.115	7.38e-02	4.31e+04	3.50e-08
20	2.16e+03	0.1554	1.85	15.5	248.124	6.30e-03	4.84e+04	3.36e-09
21	4.33e+03	0.2023	1.69	20.2	26.963	5.32e-02	4.33e+04	2.54e-08
22	2.16e+03	0.2013	1.69	20.1	6.686	2.03e-01	8.46e+02	1.89e-09
23	1.08e+03	0.2010	1.69	20.1	9.067	1.50e-01	5.60e+02	9.23e-10
24	541.	0.1929	1.72	19.3	22.447	6.11e-02	3.02e+04	2.03e-08
25	270.	0.1795	1.77	17.9	71.842	1.96e-02	9.87e+04	2.13e-08

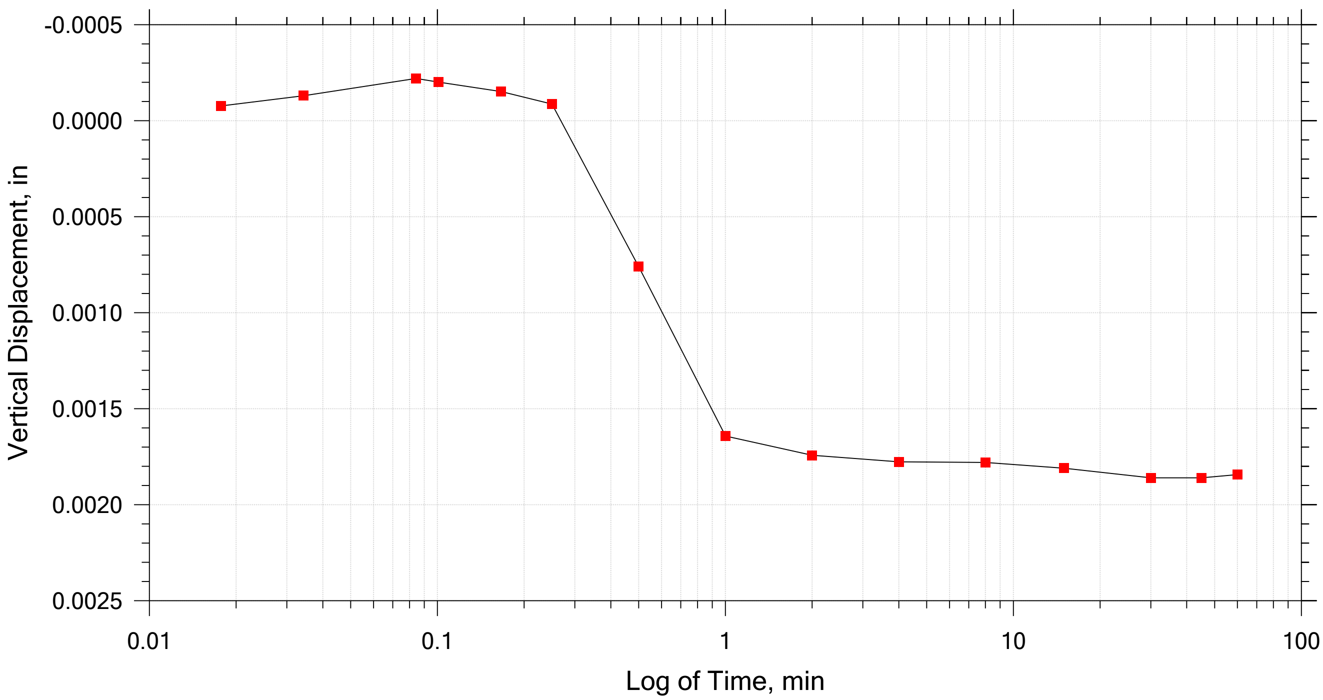
Soil Metrics LLC	Project Name: Pleasant Cove Bridge	Location: Woolwich, ME	Project Number: 110-01
	Boring Number: BB-WS46-305	Tester: SJR	Checker: SJR
	Sample Number: U1	Test Date: 5/4/2021	Depth: 9.35
	Test Number: ICON-65-363	Preparation: Shelby Tube	Elevation:
	Description: Brown organic silt		
	Remarks:		
	Displacement at End of Primary		

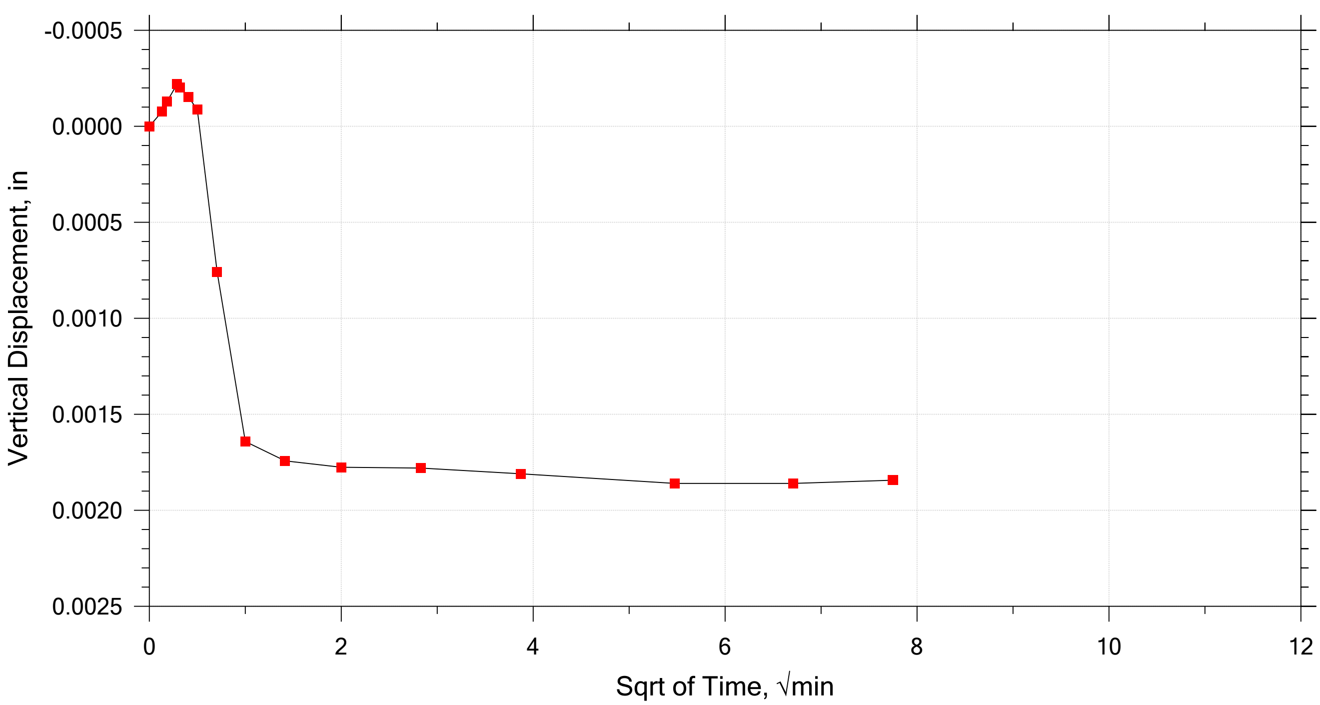
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 1 of 3

Constant Load Step

Stress: 180 psf





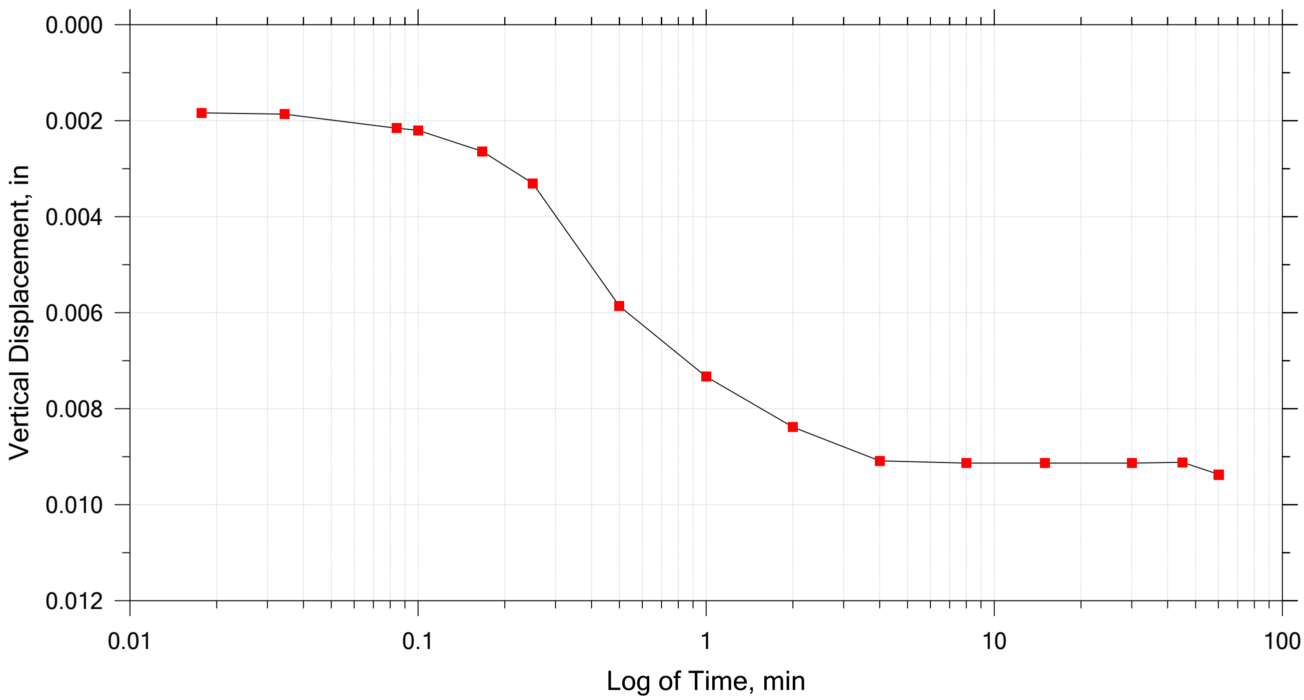
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: BB-WS46-305	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/30/2021	Depth: 8.95
	Test Number: DSS 144	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 600 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

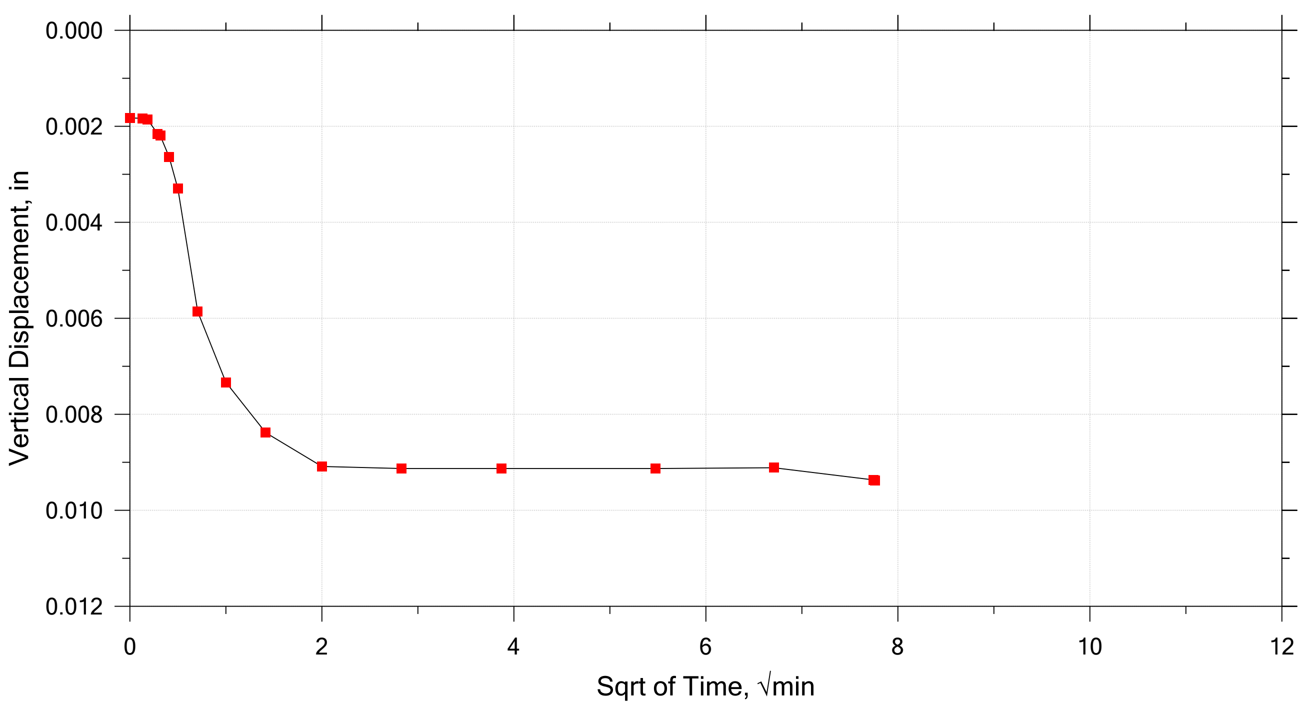
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 2 of 3

Constant Load Step

Stress: 270 psf





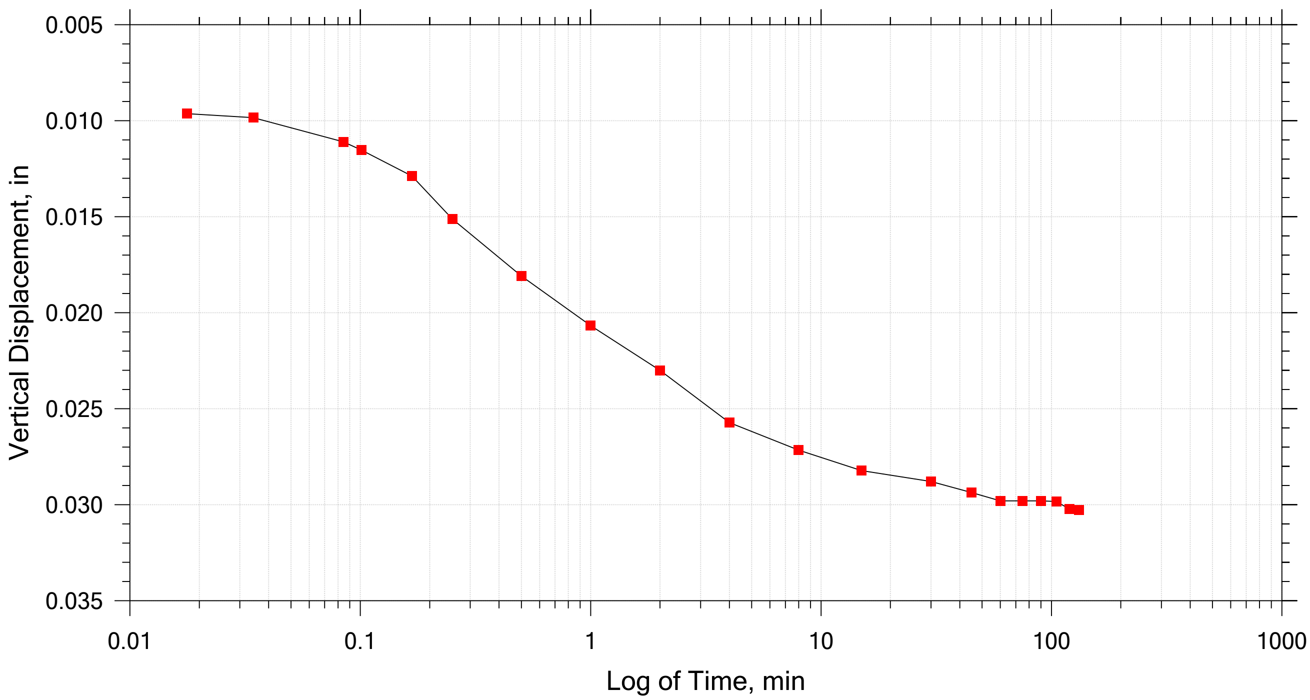
Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: BB-WS46-305	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/30/2021	Depth: 8.95
	Test Number: DSS 144	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 600 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

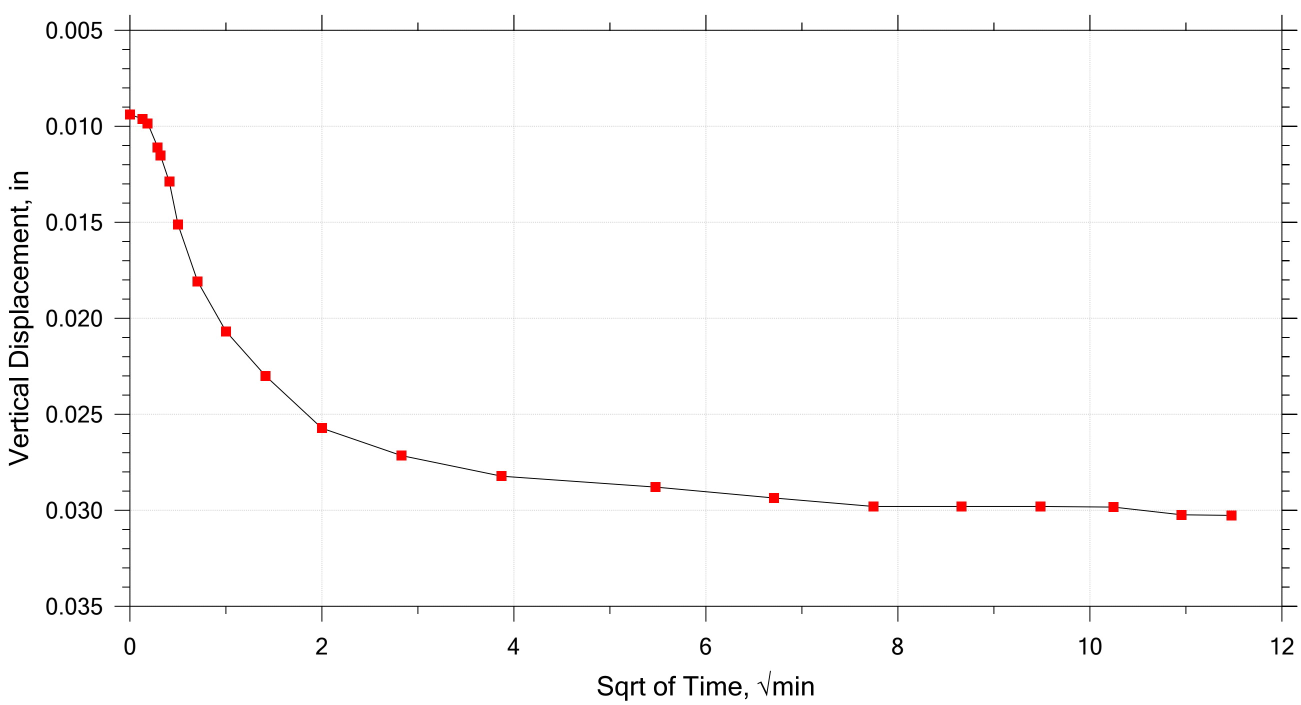
Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 3 of 3

Constant Load Step

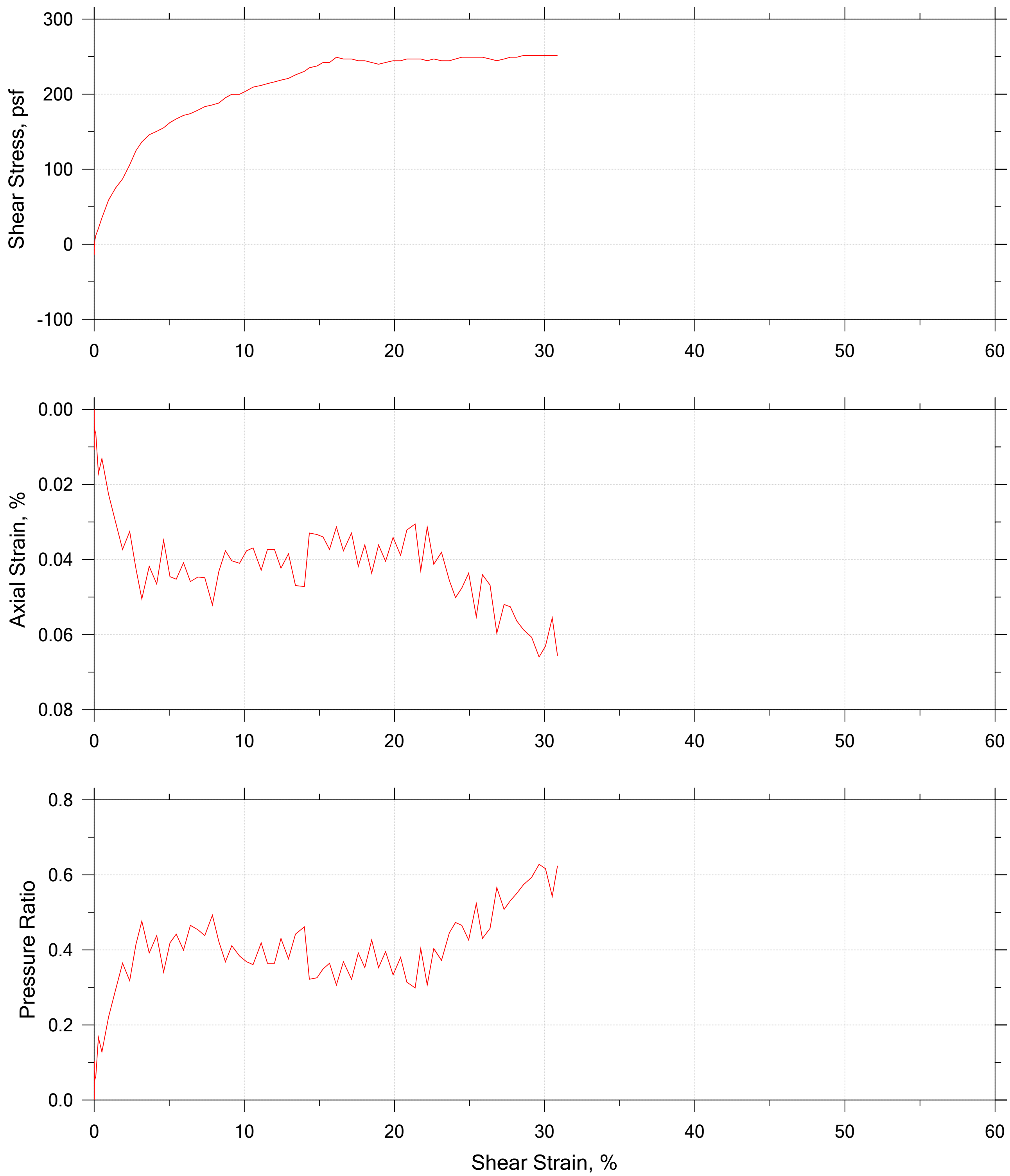
Stress: 608 psf





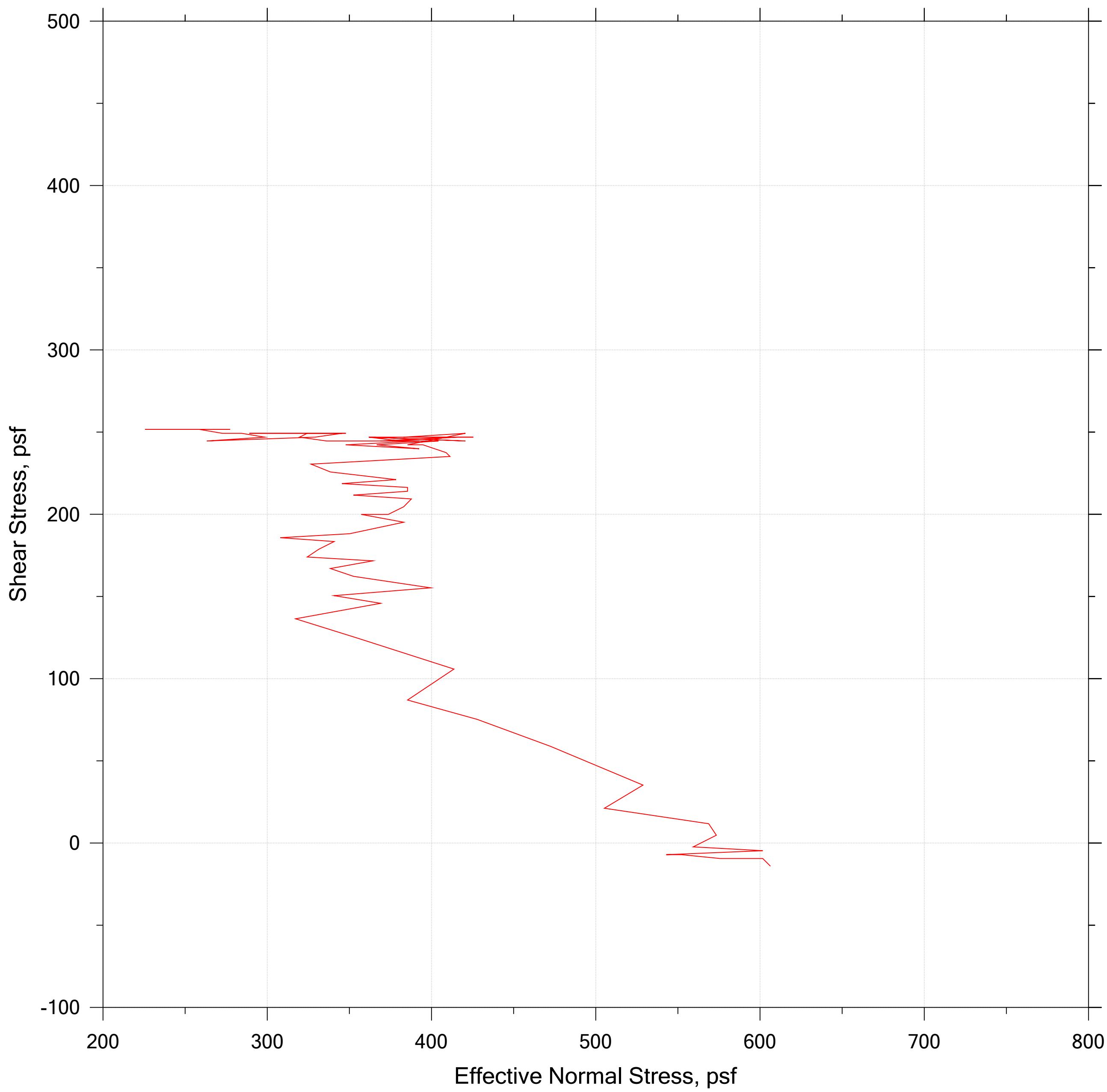
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: BB-WS46-305	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/30/2021	Depth: 8.95
	Test Number: DSS 144	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 600 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



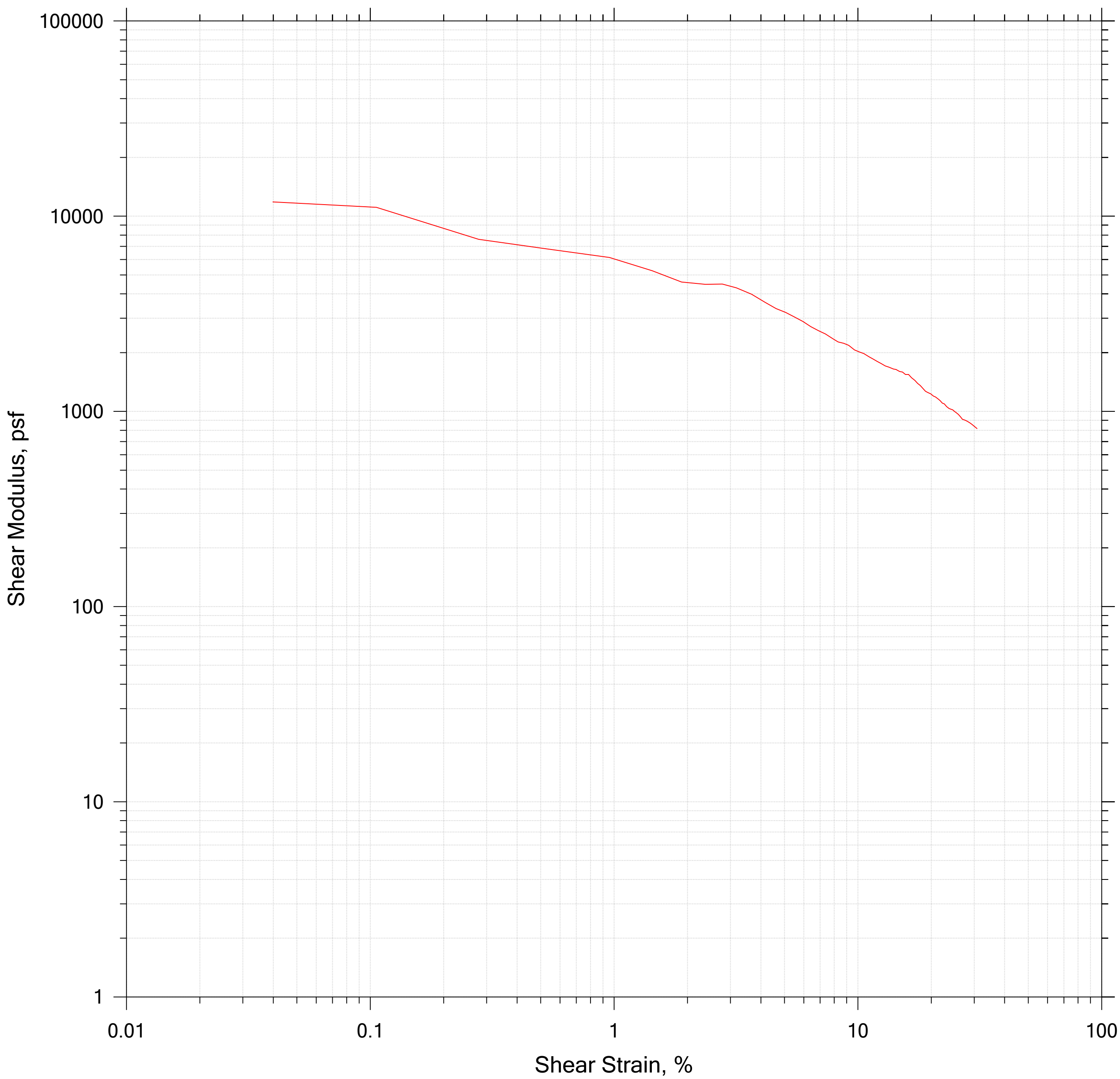
Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: BB-WS46-305	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/30/2021	Depth: 8.95
	Test Number: DSS 144	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 600 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: BB-WS46-305	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/30/2021	Depth: 8.95
	Test Number: DSS 144	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 600 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: BB-WS46-305	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/30/2021	Depth: 8.95
	Test Number: DSS 144	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 600 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: 2.60 (Implied)	Liquid Limit: 85
Specimen Height, in: 1.00	Initial Void Ratio: 2.36	Plastic Limit: 51
Final Height, in: 0.97	Final Void Ratio: 2.26	Plasticity Index: 35

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	222	---		307
Mass Container, gm	36.91	0	0	60.45
Mass Container + Wet Soil, gm	141.13	117.26	116.37	176.82
Mass Container + Dry Soil, gm	92.49	62.28	62.28	122.73
Mass Dry Soil, gm	55.58	62.28	62.28	62.28
Water Content, %	87.51	88.28	86.85	86.85
Void Ratio	---	2.36	2.26	---
Degree of Saturation, %	---	97.18	100.00	---
Dry Unit Weight, pcf	---	48.286	49.824	---

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: BB-WS46-305	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/30/2021	Depth: 8.95
	Test Number: DSS 144	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 600 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 1 of 3

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	4.70	0.002196	0.0000	0.000	2.36
0.018	0.133	51.7	0.002323	-7.698e-05	-0.00769	2.36
0.034	0.185	77.6	0.002393	-0.0001302	-0.0130	2.36
0.084	0.290	129.	0.002533	-0.0002199	-0.0220	2.36
0.101	0.318	141.	0.002565	-0.0002014	-0.0201	2.36
0.167	0.408	160.	0.002616	-0.0001517	-0.0152	2.36
0.250	0.500	167.	0.002635	-8.697e-05	-0.00869	2.36
0.500	0.707	176.	0.002661	0.0007597	0.0759	2.36
1.001	1.000	179.	0.002667	0.001642	0.164	2.36
2.001	1.415	179.	0.002667	0.001743	0.174	2.36
4.000	2.000	179.	0.002667	0.001776	0.177	2.36
8.000	2.828	176.	0.002663	0.001780	0.178	2.36
15.001	3.873	179.	0.002667	0.001810	0.181	2.36
30.000	5.477	179.	0.002667	0.001860	0.186	2.36
45.001	6.708	179.	0.002667	0.001860	0.186	2.36
60.001	7.746	179.	0.002667	0.001843	0.184	2.36
60.054	7.749	179.	0.002667	0.001843	0.184	2.36

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: BB-WS46-305	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/30/2021	Depth: 8.95
	Test Number: DSS 144	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 600 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 2 of 3

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.	0.002667	0.001827	0.182	2.36
0.018	0.133	188.	0.002692	0.001835	0.183	2.36
0.034	0.185	190.	0.002699	0.001862	0.186	2.36
0.084	0.290	165.	0.002656	0.002156	0.215	2.36
0.100	0.316	169.	0.002664	0.002198	0.220	2.36
0.167	0.408	179.	0.002680	0.002636	0.263	2.35
0.250	0.500	197.	0.002718	0.003302	0.330	2.35
0.500	0.707	261.	0.002890	0.005864	0.586	2.34
1.000	1.000	263.	0.002896	0.007333	0.733	2.34
2.000	1.414	266.	0.002902	0.008383	0.838	2.33
4.001	2.000	266.	0.002902	0.009088	0.908	2.33
8.001	2.829	268.	0.002909	0.009132	0.912	2.33
15.000	3.873	268.	0.002909	0.009132	0.912	2.33
30.001	5.477	268.	0.002909	0.009132	0.912	2.33
45.001	6.708	268.	0.002909	0.009115	0.911	2.33
60.000	7.746	268.	0.002909	0.009367	0.936	2.33
60.242	7.762	268.	0.002909	0.009383	0.937	2.33

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: BB-WS46-305	Tester: SJR	Checker: sjr
Sample Number: U1	Test Date: 5/30/2021	Depth: 8.95
Test Number: DSS 144	Preparation: wet	Elevation:

Description: Brown organic Silt

Remarks: Sample consolidated to 600 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.

Direct Simple Shear Test by ASTM D6528

Consolidation Time Curve 3 of 3

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	270.	0.002915	0.009377	0.937	2.33
0.018	0.133	270.	0.002915	0.009628	0.962	2.33
0.034	0.185	284.	0.002953	0.009842	0.983	2.33
0.084	0.290	329.	0.003074	0.01110	1.11	2.33
0.101	0.318	345.	0.003119	0.01152	1.15	2.32
0.168	0.410	407.	0.003284	0.01288	1.29	2.32
0.251	0.501	496.	0.003526	0.01512	1.51	2.31
0.500	0.707	552.	0.003679	0.01809	1.81	2.30
1.000	1.000	583.	0.003762	0.02067	2.07	2.29
2.000	1.414	599.	0.003806	0.02301	2.30	2.29
4.000	2.000	606.	0.003825	0.02572	2.57	2.28
8.001	2.829	604.	0.003821	0.02715	2.71	2.27
15.001	3.873	606.	0.003825	0.02822	2.82	2.27
30.000	5.477	606.	0.003825	0.02879	2.88	2.27
45.001	6.708	606.	0.003825	0.02936	2.93	2.26
60.000	7.746	606.	0.003825	0.02980	2.98	2.26
75.001	8.660	606.	0.003825	0.02980	2.98	2.26
90.000	9.487	606.	0.003825	0.02980	2.98	2.26
105.001	10.247	606.	0.003825	0.02983	2.98	2.26
120.001	10.954	606.	0.003825	0.03024	3.02	2.26
131.704	11.476	606.	0.003825	0.03027	3.02	2.26

Soil Metrics LLC	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: BB-WS46-305	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/30/2021	Depth: 8.95
	Test Number: DSS 144	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 600 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	-14.110	0.00000	0.00000	606.35	0.00000
0.00025000	0.00000	-14.110	0.00000	0.00000	606.35	0.00000
0.017683	0.0033115	-11.759	-3.5508e+05	0.00039664	604.00	0.0038760
0.034350	0.0066231	-9.4069	-1.4203e+05	0.0025209	601.65	0.0077519
0.084333	0.0099346	-9.4069	-94689.	0.0087527	585.19	0.034884
0.10100	0.0066231	-9.4069	-1.4203e+05	0.0086116	575.79	0.050388
0.16770	0.016558	-7.0552	-42610.	0.0091226	552.29	0.089147
0.25325	0.0099346	-7.0552	-71017.	0.010709	542.89	0.10465
0.50008	0.0099346	-4.7035	-47344.	0.0025209	601.65	0.0077519
1.0002	0.026492	-2.3517	-8877.1	0.0062050	559.34	0.077519
2.0004	0.039738	4.7035	11836.	0.0055529	573.44	0.054264
4.0005	0.10597	11.759	11096.	0.0063462	568.74	0.062016
8.0008	0.27817	21.166	7608.9	0.017055	505.29	0.16667
15.001	0.51660	35.276	6828.5	0.013089	528.79	0.12791
30.000	0.95703	58.793	6143.3	0.022608	472.39	0.22093
45.001	1.4339	75.255	5248.3	0.030144	427.73	0.29457
60.001	1.8909	87.014	4601.8	0.037284	385.43	0.36434
75.001	2.3644	105.83	4475.8	0.032524	413.63	0.31783
90.001	2.7784	124.64	4486.2	0.042440	354.88	0.41473
105.00	3.1758	136.40	4295.1	0.050514	317.27	0.47674
120.00	3.6625	145.81	3981.0	0.041788	368.98	0.39147
135.00	4.1626	150.51	3615.8	0.046547	340.78	0.43798
150.00	4.6196	155.21	3359.9	0.034904	399.53	0.34109
165.00	5.0501	162.27	3213.2	0.044564	352.53	0.41860
180.00	5.4673	166.97	3054.0	0.045216	338.43	0.44186
195.00	5.9475	171.68	2886.5	0.040853	364.28	0.39922
210.00	6.4045	174.03	2717.3	0.045869	324.32	0.46512
225.00	6.9078	178.73	2587.4	0.044679	331.38	0.45349
240.00	7.3615	183.44	2491.8	0.044820	340.78	0.43798
255.00	7.8748	185.79	2359.3	0.052100	307.87	0.49225
270.00	8.2987	188.14	2267.1	0.043233	350.18	0.42248
285.00	8.7424	195.19	2232.7	0.037680	383.08	0.36822
300.00	9.1696	199.90	2180.0	0.040316	357.23	0.41085
315.00	9.6829	199.90	2064.4	0.040995	373.68	0.38372
330.00	10.147	204.60	2016.5	0.037680	383.08	0.36822
345.00	10.584	209.30	1977.6	0.036887	387.78	0.36047
360.00	11.123	211.66	1902.8	0.042837	352.53	0.41860
375.00	11.541	214.01	1854.4	0.037284	385.43	0.36434
390.00	12.004	216.36	1802.4	0.037284	385.43	0.36434
405.00	12.445	218.71	1757.5	0.042299	345.48	0.43023
420.00	12.945	221.06	1707.7	0.038474	378.38	0.37597
435.00	13.405	225.77	1684.2	0.046944	338.43	0.44186
450.00	13.998	230.47	1646.5	0.047200	326.67	0.46124
465.00	14.336	235.17	1640.5	0.032921	411.28	0.32171
480.00	14.842	237.53	1600.3	0.033317	408.93	0.32558
495.00	15.243	242.23	1589.1	0.033969	394.83	0.34884
510.00	15.673	242.23	1545.5	0.037284	385.43	0.36434
525.00	16.134	249.28	1545.1	0.031334	420.68	0.30620
540.00	16.597	246.93	1487.8	0.037680	383.08	0.36822
555.00	17.140	246.93	1440.6	0.032921	411.28	0.32171

Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
Boring Number: BB-WS46-305	Tester: SJR	Checker: sjr
Sample Number: U1	Test Date: 5/30/2021	Depth: 8.95
Test Number: DSS 144	Preparation: wet	Elevation:
Description: Brown organic Silt		
Remarks: Sample consolidated to 600 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	17.594	244.58	1390.1	0.041788	368.98	0.39147
585.00	18.025	244.58	1356.9	0.036094	392.48	0.35271
600.00	18.482	242.23	1310.6	0.043630	347.83	0.42636
615.00	18.939	239.88	1266.6	0.036094	392.48	0.35271
630.00	19.409	242.23	1248.0	0.040457	366.63	0.39535
645.00	19.909	244.58	1228.5	0.034111	404.23	0.33333
660.00	20.409	244.58	1198.4	0.038870	376.03	0.37984
675.00	20.823	246.93	1185.9	0.032127	415.98	0.31395
690.00	21.373	246.93	1155.4	0.030541	425.38	0.29845
705.00	21.753	246.93	1135.1	0.042978	361.93	0.40310
720.00	22.187	244.58	1102.3	0.031334	420.68	0.30620
735.00	22.614	246.93	1091.9	0.041250	361.93	0.40310
750.00	23.131	244.58	1057.4	0.038077	380.73	0.37209
765.00	23.654	244.58	1034.0	0.045613	336.08	0.44574
780.00	24.068	246.93	1026.0	0.050117	319.62	0.47287
795.00	24.485	249.28	1018.1	0.047596	324.32	0.46512
810.00	24.946	249.28	999.30	0.043630	347.83	0.42636
825.00	25.449	249.28	979.54	0.055273	289.07	0.52326
840.00	25.860	249.28	963.99	0.044026	345.48	0.43023
855.00	26.363	246.93	936.66	0.046803	329.03	0.45736
870.00	26.813	244.58	912.16	0.059636	263.22	0.56589
885.00	27.300	246.93	904.51	0.051959	298.47	0.50775
900.00	27.721	249.28	899.27	0.052611	284.37	0.53101
915.00	28.141	249.28	885.83	0.056322	272.62	0.55039
930.00	28.588	251.64	880.20	0.058702	258.52	0.57364
945.00	29.131	251.64	863.79	0.060685	246.77	0.59302
960.00	29.632	251.64	849.22	0.065983	225.62	0.62791
975.00	30.059	251.64	837.15	0.063065	232.67	0.61628
990.00	30.512	251.64	824.70	0.055529	277.32	0.54264
1002.4	30.857	251.64	815.49	0.065586	227.97	0.62403

Soil Metrics LLC			
	Project Name: Pleasant Cove	Location: Woolwich, ME	Project Number: 166-21
	Boring Number: BB-WS46-305	Tester: SJR	Checker: sjr
	Sample Number: U1	Test Date: 5/30/2021	Depth: 8.95
	Test Number: DSS 144	Preparation: wet	Elevation:
	Description: Brown organic Silt		
	Remarks: Sample consolidated to 600 psf held for 2 hours then sheared. CKoDSS Test - Constant volume control.		

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

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
Portland, ME
PM: B. Cardali
Assigned By: B. Cardali
Collected By: L. Navarret

Project Information:
MEDOT - Woolwich - Bridge 3039
Woolwich, ME
GZA Project Number: 09.0026035.00
Summary Page: 1 of 3
Report Date: 11.27.19

LABORATORY TESTING DATA SHEET, Report No.: 7419-L-159

Boring ID	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	
BB-WS46-				D2216	D4318		D6913			D2974	D854			D1557						
101	2D	3-5	19-S-2627	2.7			36.2	53.4	10.4											Brown Gravelly fine to coarse SAND, little Silt
101	3D	10-12	19-S-2628	23.3	31	22														Brown Clayey SILT
101	4D	15-17	19-S-2629	10.6			52.8	35.9	11.3											Brown Sandy fine to coarse GRAVEL, little Silt
101	6D	25-27	19-S-2630	26.1																Water content only
102	4D	20-22	19-S-2631	83.7																Water content only
102	6D	30-32	19-S-2632	37.8	53	24														Gray Silty CLAY
102	8D	40-42	19-S-2633	40.9	44	22														Gray Silty CLAY
102	13D	65-67	19-S-2634	18.7			4.6	91.5	3.9											Brown f-m SAND, trace fine Gravel, trace Silt
103	2D	6-8	19-S-2635	104.1																Water content only
103	4D	21-23	19-S-2636	79.9	88	57														Brown Organic Silty CLAY
103	8D	41-43	19-S-2637	43.4																Water content only
103	9D	51-53	19-S-2638	40.7	41	21														Gray Silty CLAY

Date Received: *11.19.19*   Reviewed By: [illegible]   Date Reviewed: *12.02.19*

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 Portland, ME PM: B. Cardali Assigned By: B. Cardali Collected By: L. Navarret	Project Information: **MEDOT - Woolwich - Bridge 3039** **Woolwich, ME** GZA Project Number: 09.0026035.00 Summary Page: 2 of 3 Report Date: 11.27.19

LABORATORY TESTING DATA SHEET, Report No.: 7419-L-159

Boring ID	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	
BB-WS46-				D2216	D4318		D6913			D2974	D854			D1557						
103	10D	56-58	19-S-2639	40.0																Water content only
103	11D	61-63	19-S-2640	33.0	32	19														Gray Silty CLAY
103	13D	76-78	19-S-2641	43.6	34	19														Dark Gray Silty CLAY
103	14D	81-83	19-S-2642	39.8																Water content only
103	15D	107.5-109.5	19-S-2643	23.4																Water content only
103	18D	121-123	19-S-2644	9.2			28.3	47.4	24.3											Gray f-c SAND, some f-c Gravel, some Silt
104	4D	20-22	19-S-2645	83.4	101	59														Brown Organic CLAY
104	6D	30-32	19-S-2646	32.0																Water content only
104	9D	50-52	19-S-2647	40.6	41	23														Gray Silty CLAY
104	12D	65-67	19-S-2648	7.4																Water content only
104	15D	80-82	19-S-2649	39.6	34	19														Gray Silty CLAY

Date Received: *11.19.19*   Reviewed By: [illegible]   Date Reviewed: *12.02.19*

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 Portland, ME PM: B. Cardali Assigned By: B. Cardali Collected By: L. Navarret	Project Information: **MEDOT - Woolwich - Bridge 3039** **Woolwich, ME** GZA Project Number: 09.0026035.00 Summary Page: 3 of 3 Report Date: 11.27.19

LABORATORY TESTING DATA SHEET, Report No.: 7419-L-159

Boring ID	Sample No.	Depth (Ft)	Laboratory No.	Identification Tests: As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Proctor / CBR / Permeability Tests: 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
BB-WS46-				D2216	D4318		D6913			D2974	D854			D1557						
105	1D	1-3	19-S-2650	3.7			48.1	39.1	12.8											Brown Sandy fine to coarse GRAVEL, little Silt
105	5D	19-21	19-S-2651	62.2																Water content only

Date Received: 11.19.19 Reviewed By: Sh ho Date Reviewed: 12.02.19

THIELSCH ENGINEERING

State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

MEDOT - Woolwich - Bridge #3039

MDOT Project Number:

GZA Project Number: 09.0026035.00

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
BB-WS46-101		2D	3-5	19-S-2627		2.7			SP-SM	A-1-a	II
BB-WS46-101		3D	10-12	19-S-2628		23.3	31	9	CL	A-4	IV
BB-WS46-101		4D	15-17	19-S-2629		10.6			GP-GM	A-1-a	I
BB-WS46-101		6D	25-27	19-S-2630		26.1					
BB-WS46-102		4D	20-22	19-S-2631		83.7					
BB-WS46-102		6D	30-32	19-S-2632		37.8	53	29	CH	A-7	III
BB-WS46-102		8D	40-42	19-S-2633		40.9	44	22	CL	A-7	III
BB-WS46-102		13D	65-67	19-S-2634		18.7			SP	A-1-b	0
BB-WS46-103		2D	6-8	19-S-2635		104.1					
BB-WS46-103		4D	21-23	19-S-2636		79.9	88	31	OH	A-7	III
BB-WS46-103		8D	41-43	19-S-2637		43.4					
BB-WS46-103		9D	51-53	19-S-2638		40.7	41	20	CL	A-7	III
BB-WS46-103		10D	56-58	19-S-2639		40.0					
BB-WS46-103		11D	61-63	19-S-2640		33.0	32	13	CL	A-6	III
BB-WS46-103		13D	76-78	19-S-2641		43.6	34	15	CL	A-6	III
BB-WS46-103		14D	81-83	19-S-2642		39.8					
BB-WS46-103		15D	107.5-109.5	19-S-2643		23.4					
BB-WS46-103		18D	121-123	19-S-2644		9.2			SM	A-1-b	II
BB-WS46-104		4D	20-22	19-S-2645		83.4	101	42	OH	A-7	III
BB-WS46-104		6D	30-32	19-S-2646		32.0					
BB-WS46-104		9D	50-52	19-S-2647		40.6	41	18	CL	A-7	III
BB-WS46-104		12D	65-67	19-S-2648		7.4					
BB-WS46-104		15D	80-82	19-S-2649		39.6	34	15	CL	A-6	III
BB-WS46-105		1D	1-3	19-S-2650		3.7			GM	A-1-a	I
BB-WS46-105		5D	19-21	19-S-2651		62.2					

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.

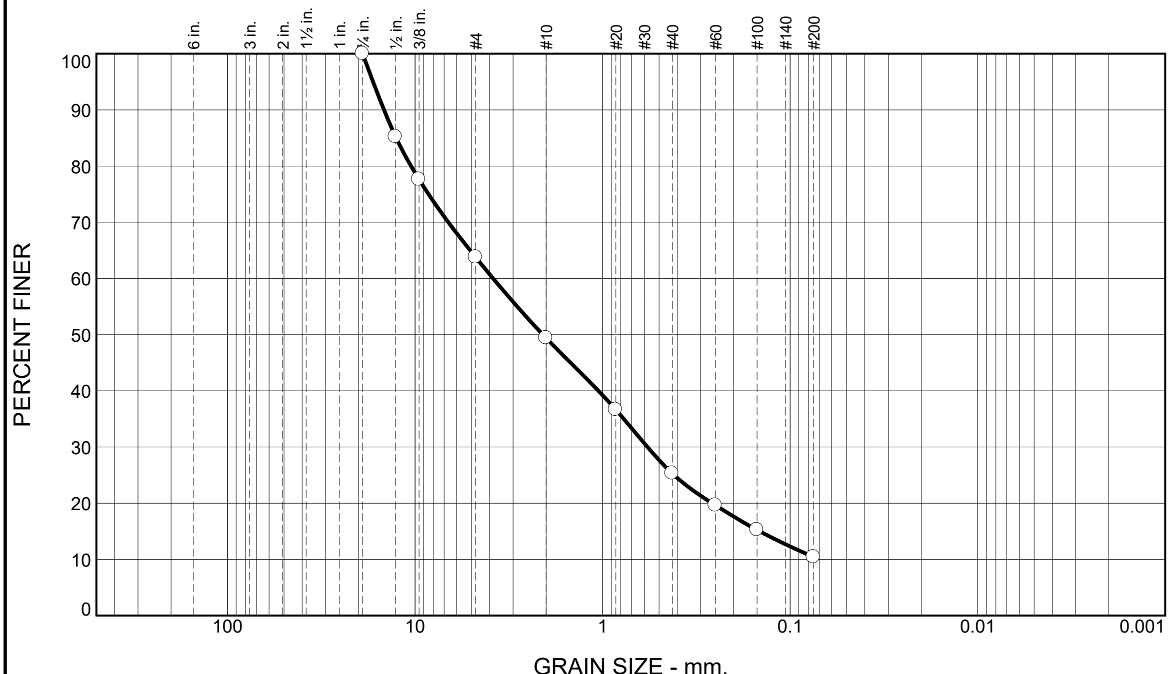
GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-19 and/or ASTM D6913-17

WC = water content as determined by AASHTO T 265-19 and/or ASTM D 2216-16

LL = Liquid limit as determined by AASHTO T 89-17 and/or ASTM D 4318-17

PI = Plasticity Index as determined by AASHTO 90-16 and/or ASTM D4318-17

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	36.2	14.4	24.1	14.9	10.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	85.2		
0.375"	77.6		
#4	63.8		
#10	49.4		
#20	36.6		
#40	25.3		
#60	19.6		
#100	15.2		
#200	10.4		

* (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)= SP-SM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 14.6471 D_{85}= 12.6090 D_{60}= 3.8341
D_{50}= 2.0820 D_{30}= 0.5764 D_{15}= 0.1456
D_{10}= C_u= C_c=

Remarks

Date Received: 11.19.19 **Date Tested:** 11.21.19

Tested By: IA / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

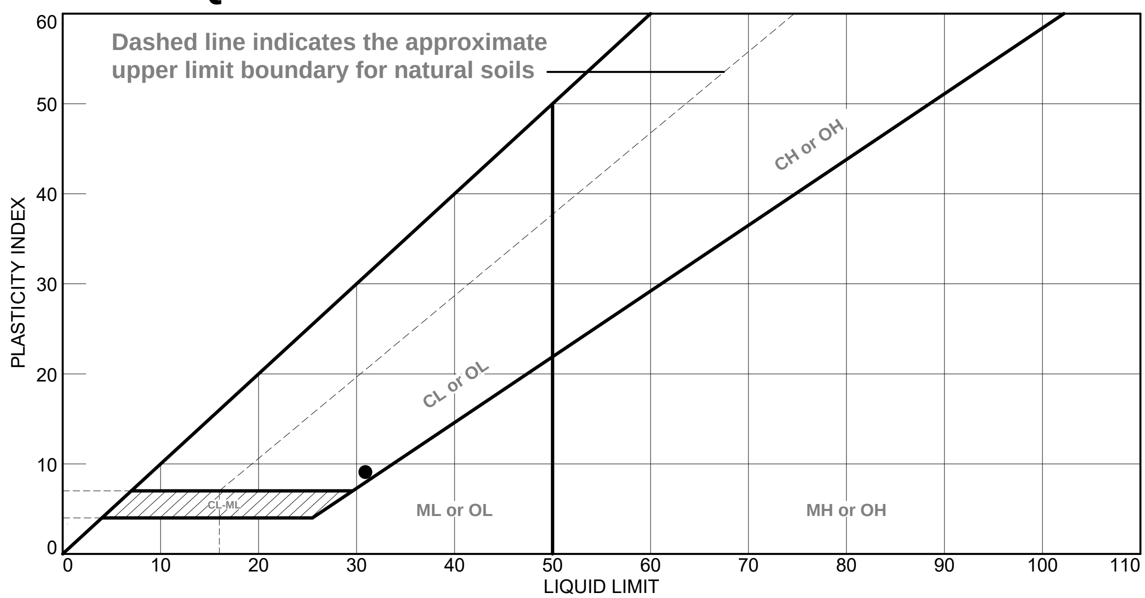
Source of Sample: BB-WS46-101 **Depth:** 3-5' **Date Sampled:**
Sample Number: 2D

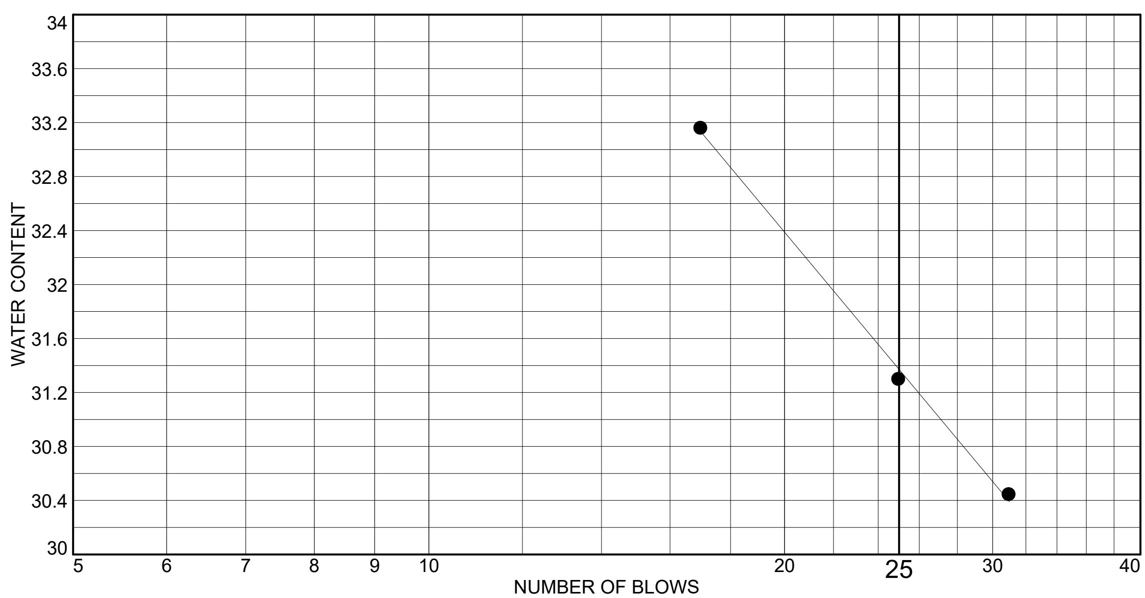
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: MEDOT - Woolwich - Bridge 3039
Woolwich, ME
Project No: 09.0026035.00 **Figure** 19-S-2627

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Clayey SILT	31	22	9			CL

Project No. 09.0026035.00 **Client:** GZA GeoEnvironmental

Project: MEDOT - Woolwich - Bridge 3039

Woolwich, ME

Source of Sample: BB-WS46-101 **Depth:** 10-12'

Sample Number: 3D

Thielsch Engineering Inc.

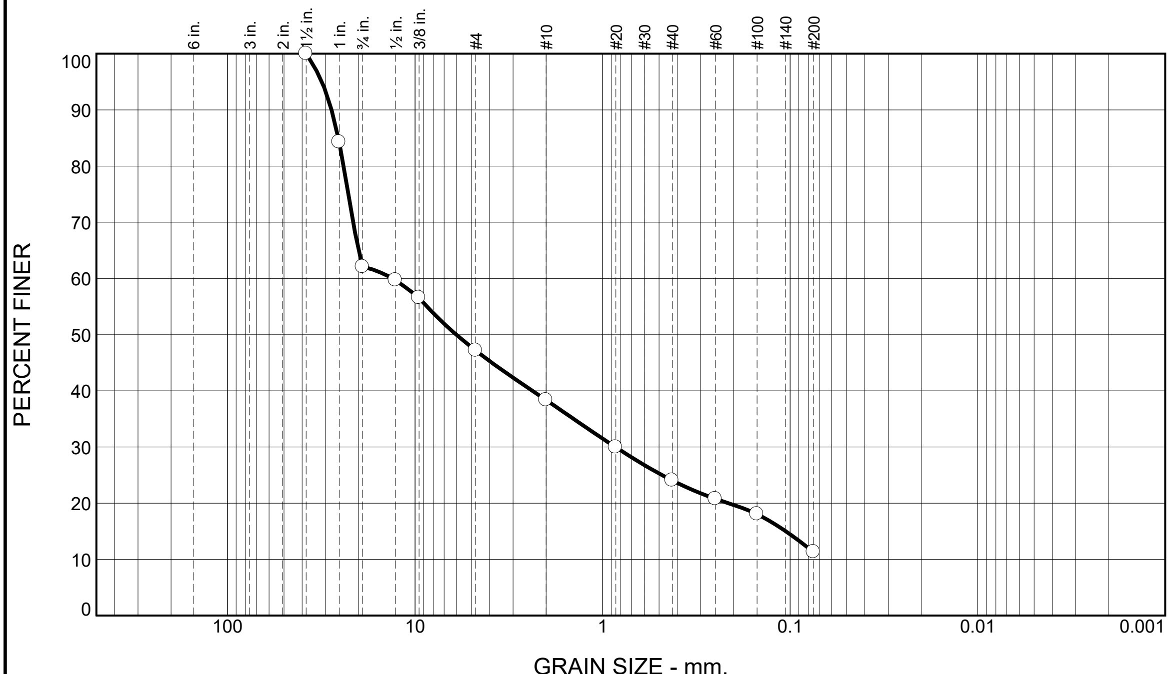
Cranston, RI

Remarks:

Figure 19-L-2628

Tested By: IA **Checked By:** SA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	37.9	14.9	8.8	14.3	12.8	11.3	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	84.3		
3/4"	62.1		
1/2"	59.7		
3/8"	56.6		
#4	47.2		
#10	38.4		
#20	29.9		
#40	24.1		
#60	20.8		
#100	18.0		
#200	11.3		

* (no specification provided)

Material Description

Brown Sandy fine to coarse GRAVEL, little 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}= 27.8597 D_{85}= 25.6568 D_{60}= 13.1904
D_{50}= 6.0257 D_{30}= 0.8552 D_{15}= 0.1056
D_{10}= C_u= C_c=

Remarks

Date Received: 11.19.19 **Date Tested:** 11.21.19

Tested By: IA / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

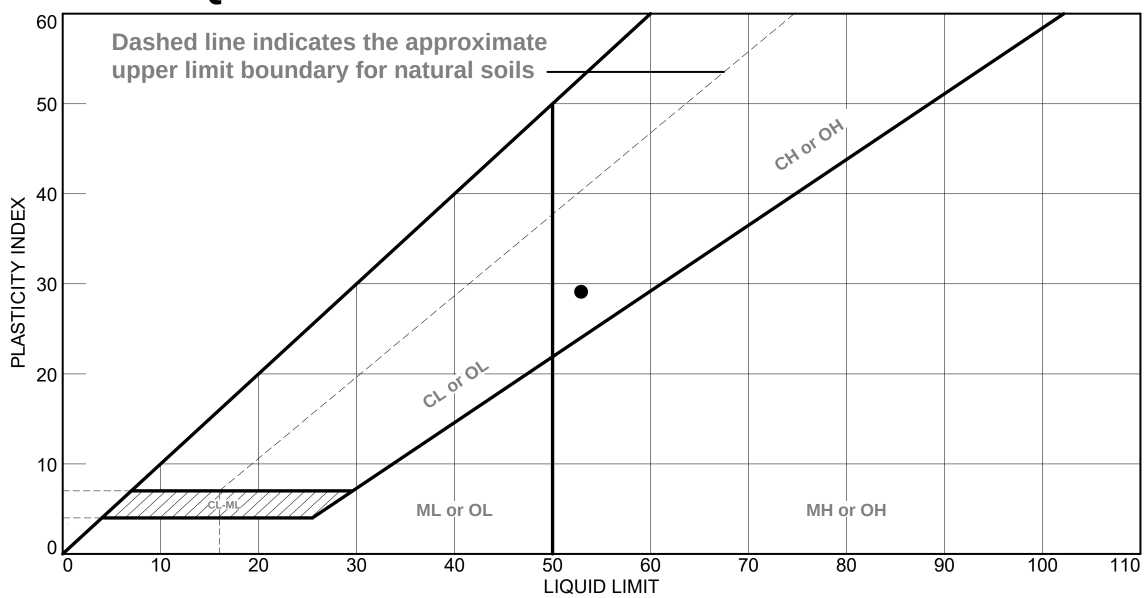
Source of Sample: BB-WS46-101 **Depth:** 15-17' **Date Sampled:**
Sample Number: 4D

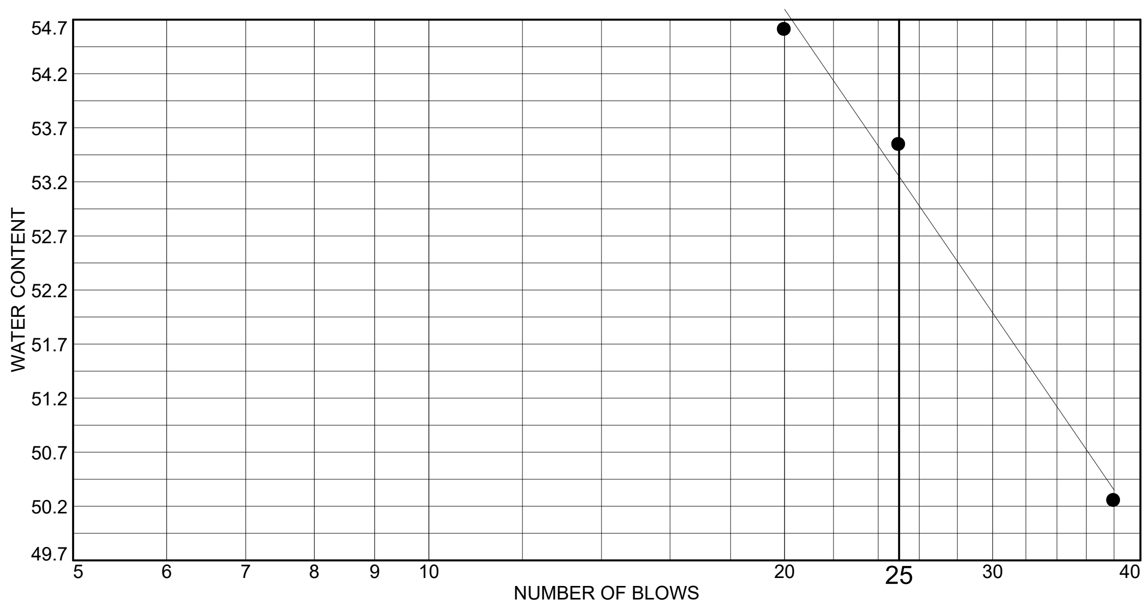
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: MEDOT - Woolwich - Bridge 3039
Woolwich, ME
Project No: 09.0026035.00 **Figure** 19-S-2629

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	53	24	29			CH

Project No. 09.0026035.00 **Client:** GZA GeoEnvironmental

Project: MEDOT - Woolwich - Bridge 3039

Woolwich, ME

Source of Sample: BB-WS46-102 **Depth:** 30-32'

Sample Number: 6D

Thielsch Engineering Inc.

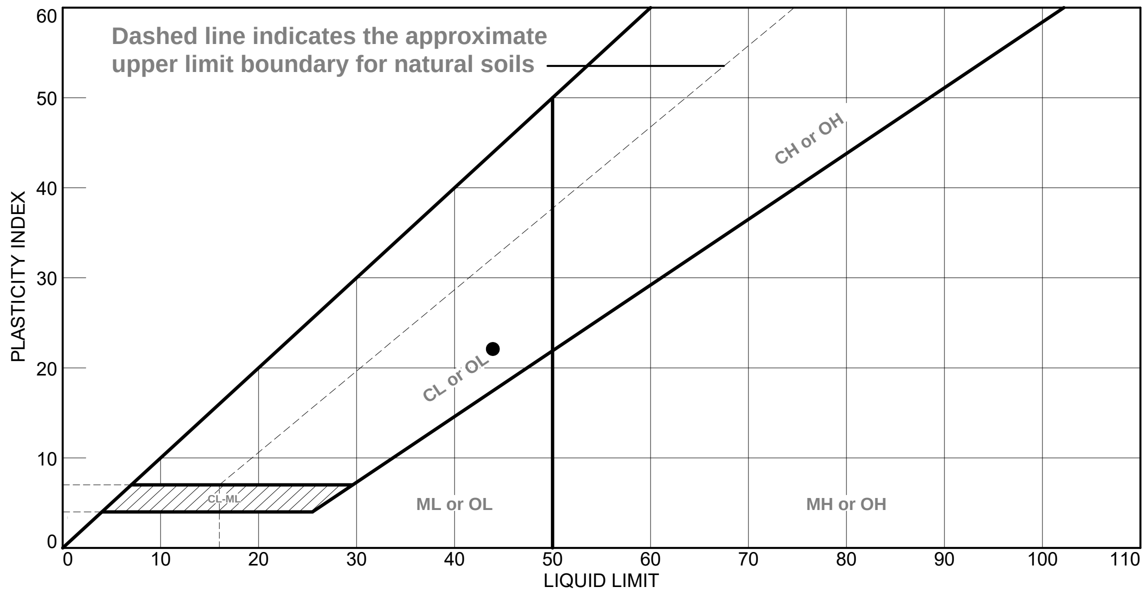
Cranston, RI

Remarks:

Figure 19-L-2632

Tested By: IA **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	44	22	22			CL

Project No. 09.0026035.00 **Client:** GZA GeoEnvironmental

Project: MEDOT - Woolwich - Bridge 3039

Woolwich, ME

Source of Sample: BB-WS46-102 **Depth:** 40-42'

Sample Number: 8D

Thielsch Engineering Inc.

Cranston, RI

Remarks:

Figure 19-L-2633

Tested By: IA **Checked By:** SA

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.6	9.0	46.7	35.8	3.9	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.5"	100.0		
0.375"	98.7		
#4	95.4		
#10	86.4		
#20	64.7		
#40	39.7		
#60	19.7		
#100	8.5		
#200	3.9		

* (no specification provided)

Material Description

Brown f-m SAND, trace fine Gravel, trace Silt

Atterberg Limits (ASTM D 4318)

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

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 2.5481 D_{85}= 1.8538 D_{60}= 0.7364
D_{50}= 0.5559 D_{30}= 0.3332 D_{15}= 0.2112
D_{10}= 0.1655 C_u= 4.45 C_c= 0.91

Remarks

Date Received: 11.19.19 **Date Tested:** 11.21.19

Tested By: IA / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

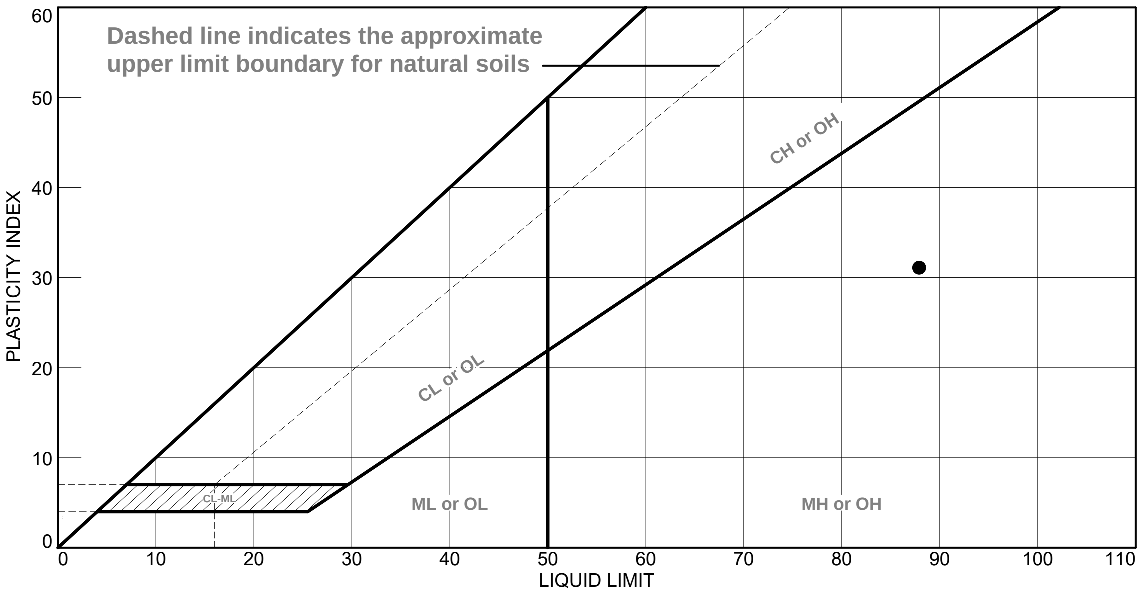
Source of Sample: BB-WS46-102 **Depth:** 65-67' **Date Sampled:**
Sample Number: 13D

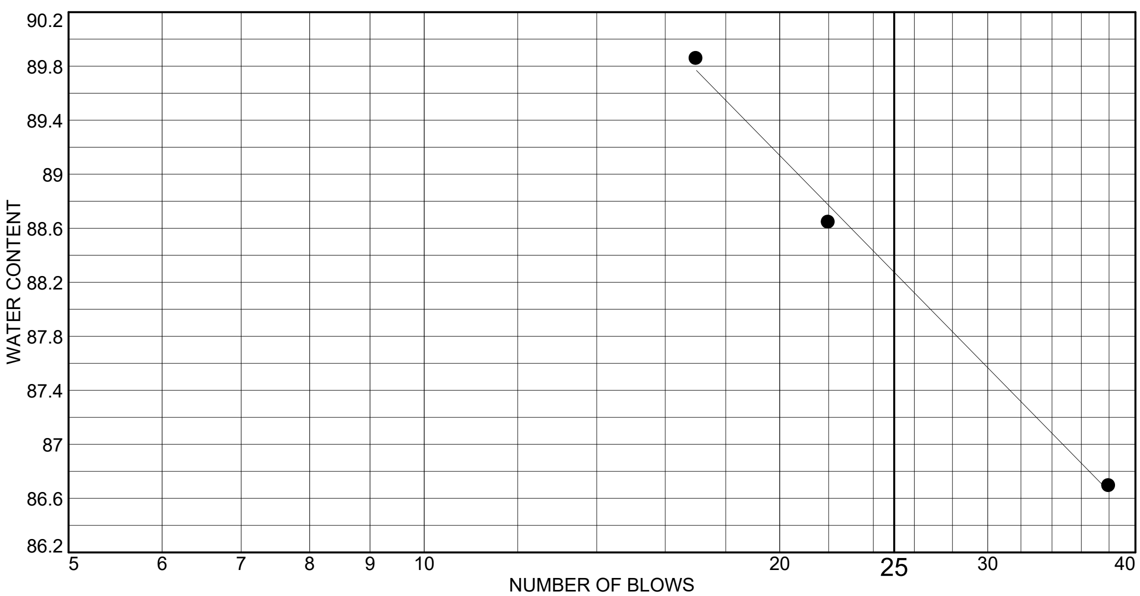
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: MEDOT - Woolwich - Bridge 3039
Woolwich, ME
Project No: 09.0026035.00 **Figure** 19-S-2634

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Organic Silty CLAY	88	57	31			OH

Project No. 09.0026035.00 **Client:** GZA GeoEnvironmental

Project: MEDOT - Woolwich - Bridge 3039

Woolwich, ME

Source of Sample: BB-WS46-103 **Depth:** 21-23'

Sample Number: 4D

Thielsch Engineering Inc.

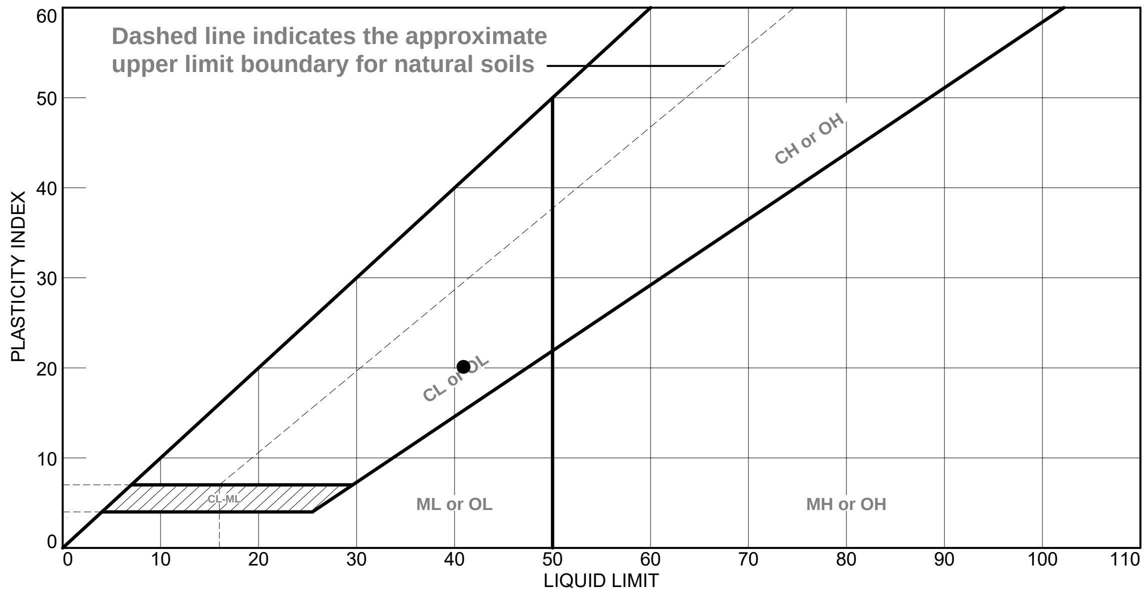
Cranston, RI

Remarks:

Figure 19-L-2636

Tested By: IA **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	41	21	20			CL

Project No. 09.0026035.00 **Client:** GZA GeoEnvironmental

Project: MEDOT - Woolwich - Bridge 3039

Woolwich, ME

Source of Sample: BB-WS46-103 **Depth:** 51-53'

Sample Number: 9D

Remarks:

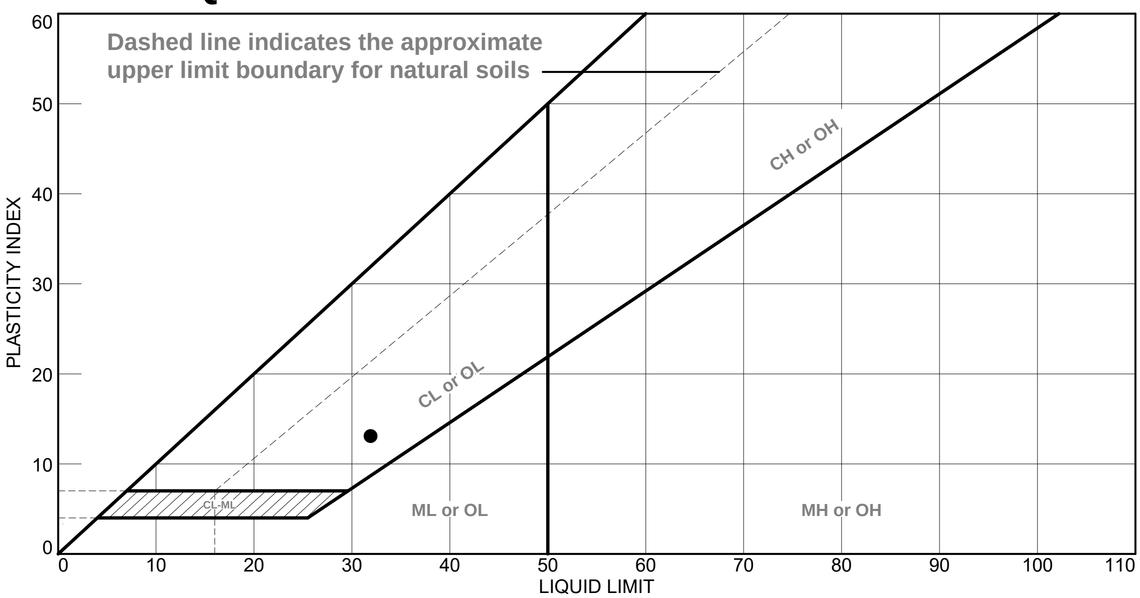
Thielsch Engineering Inc.

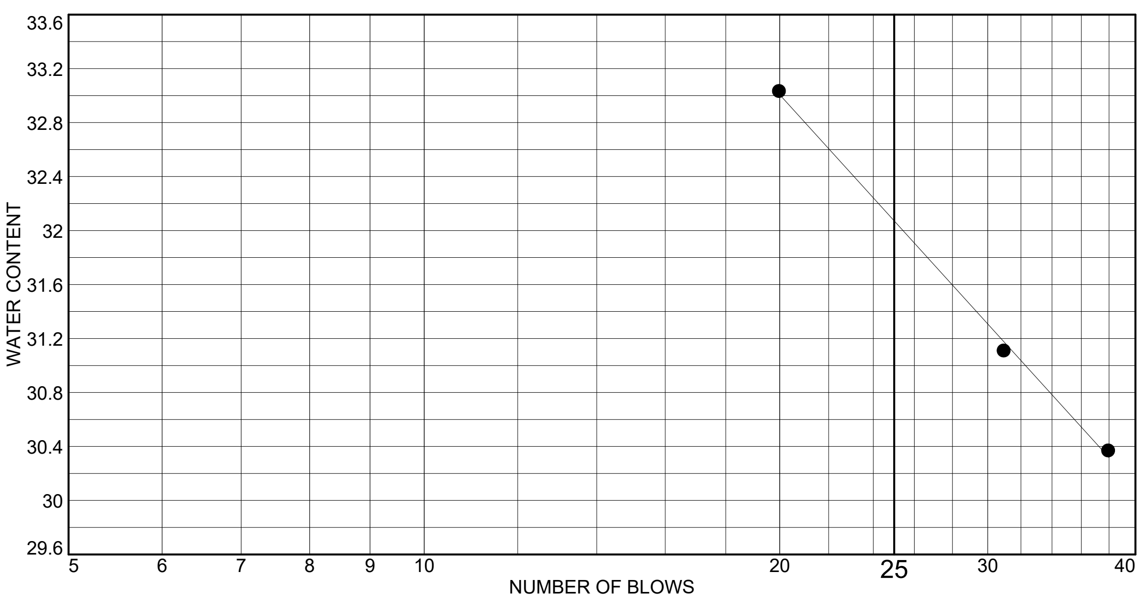
Cranston, RI

Figure 19-L-2638

Tested By: IA **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	32	19	13			CL

Project No. 09.0026035.00 **Client:** GZA GeoEnvironmental

Project: MEDOT - Woolwich - Bridge 3039

Woolwich, ME

Source of Sample: BB-WS46-103 **Depth:** 61-63'

Sample Number: 11D

Thielsch Engineering Inc.

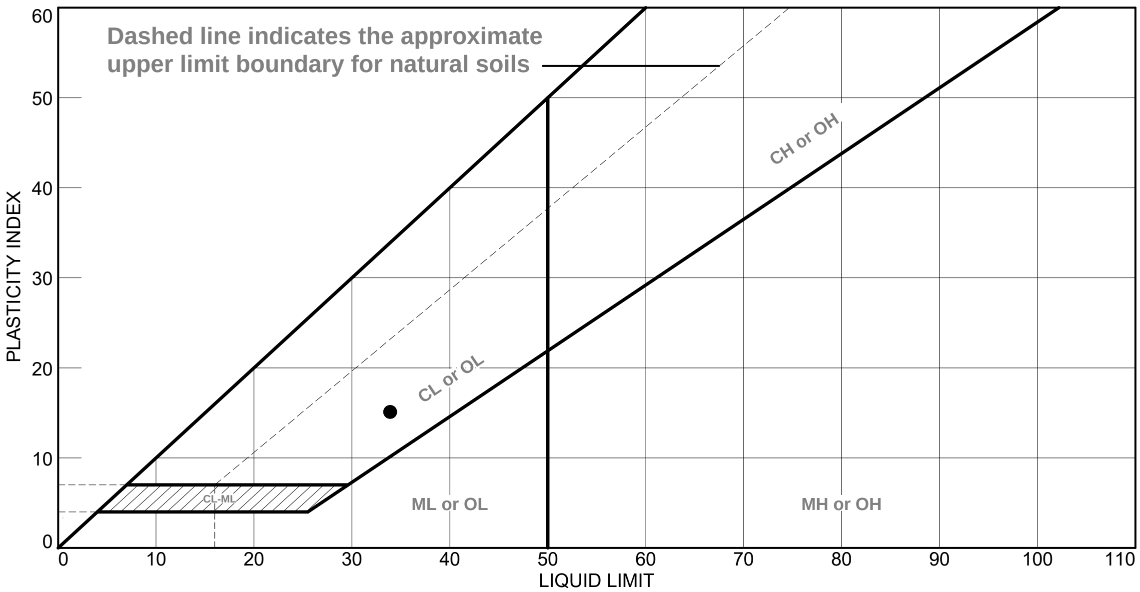
Cranston, RI

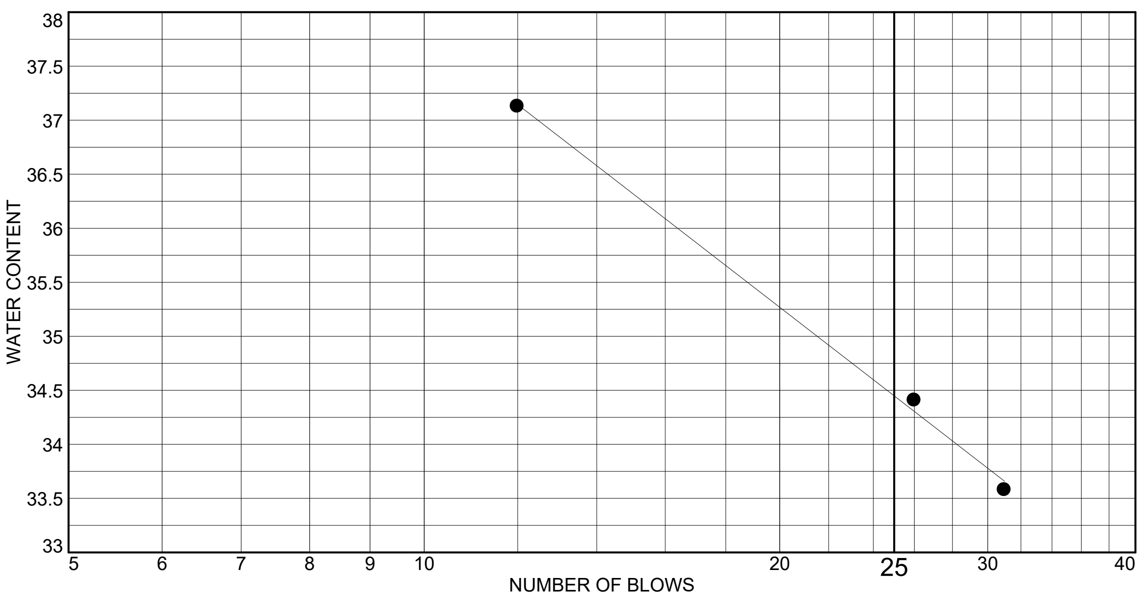
Remarks:

Figure 19-L-2640

Tested By: IA **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark Gray Silty CLAY	34	19	15			CL

Project No. 09.0026035.00 **Client:** GZA GeoEnvironmental

Project: MEDOT - Woolwich - Bridge 3039

Woolwich, ME

Source of Sample: BB-WS46-103 **Depth:** 76-78'

Sample Number: 13D

Thielsch Engineering Inc.

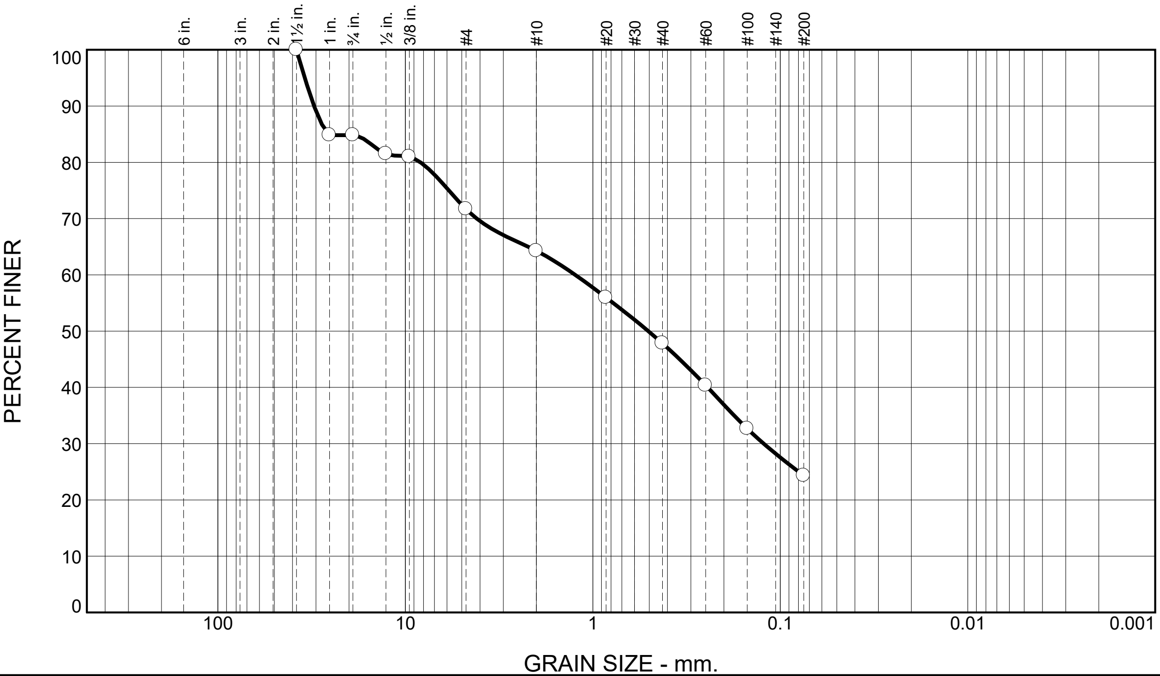
Cranston, RI

Remarks:

Figure 19-L-2641

Tested By: IA **Checked By:** SA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	15.2	13.1	7.4	16.5	23.5	24.3	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	84.8		
3/4"	84.8		
1/2"	81.5		
3/8"	81.0		
#4	71.7		
#10	64.3		
#20	56.0		
#40	47.8		
#60	40.4		
#100	32.7		
#200	24.3		

* (no specification provided)

Material Description

Gray f-c SAND, some f-c Gravel, some 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}= 30.6723	D_{85}= 25.6891	D_{60}= 1.2416
D_{50}= 0.5058	D_{30}= 0.1227	D_{15}=
D_{10}=	C_u=	C_c=

Remarks

Date Received: 11.19.19 **Date Tested:** 11.21.19

Tested By: IA / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: BB-WS46-103 **Depth:** 121-123' **Date Sampled:**

Sample Number: 18D

Thielsch Engineering Inc.

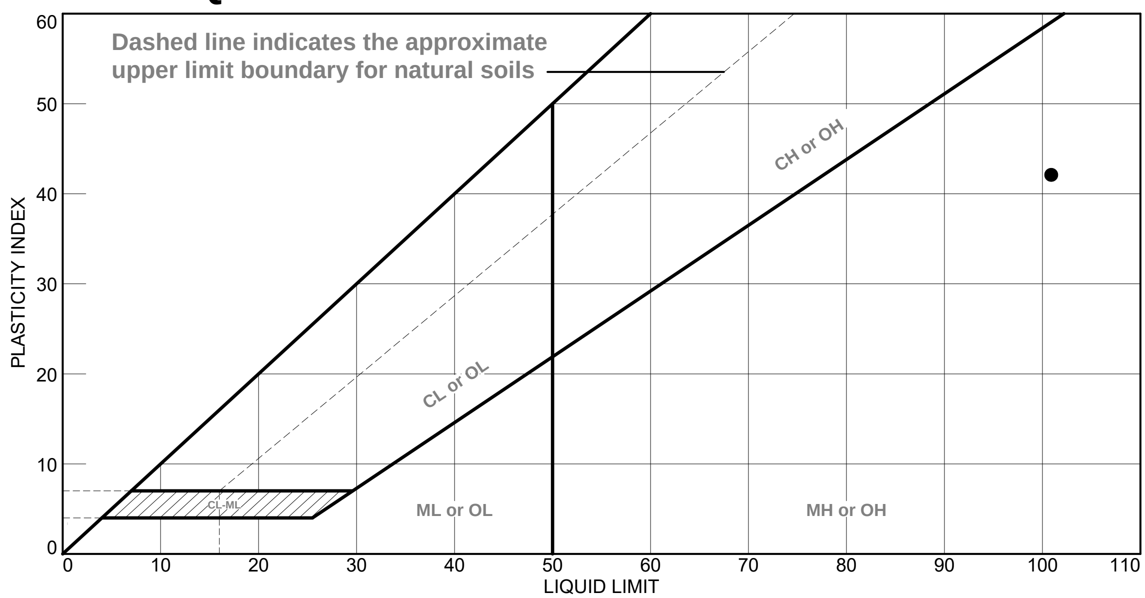
Cranston, RI

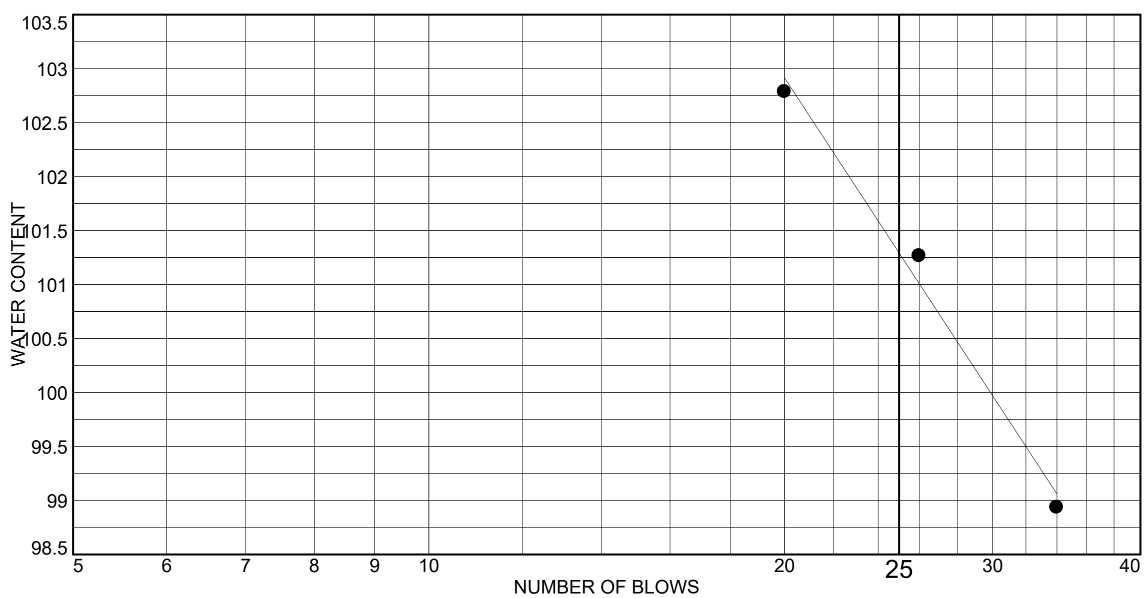
Client: GZA GeoEnvironmental

Project: MEDOT - Woolwich - Bridge 3039
Woolwich, ME

Project No: 09.0026035.00 **Figure** 19-S-2644

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Organic CLAY	101	59	42			OH

Project No. 09.0026035.00 **Client:** GZA GeoEnvironmental

Project: MEDOT - Woolwich - Bridge 3039

Woolwich, ME

Source of Sample: BB-WS46-104 **Depth:** 20-22'

Sample Number: 4D

Thielsch Engineering Inc.

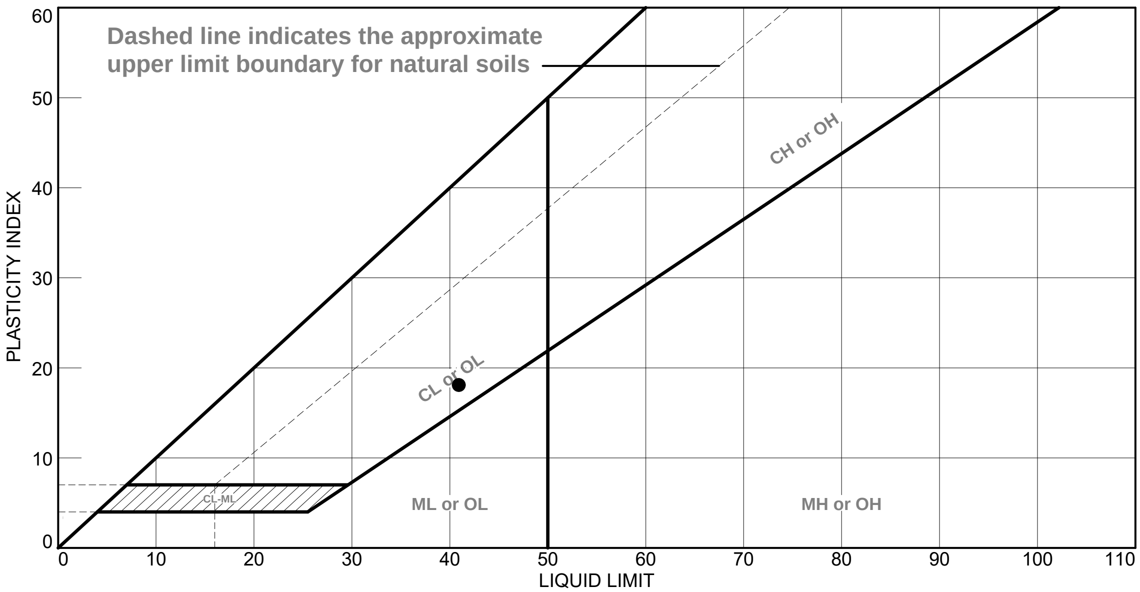
Cranston, RI

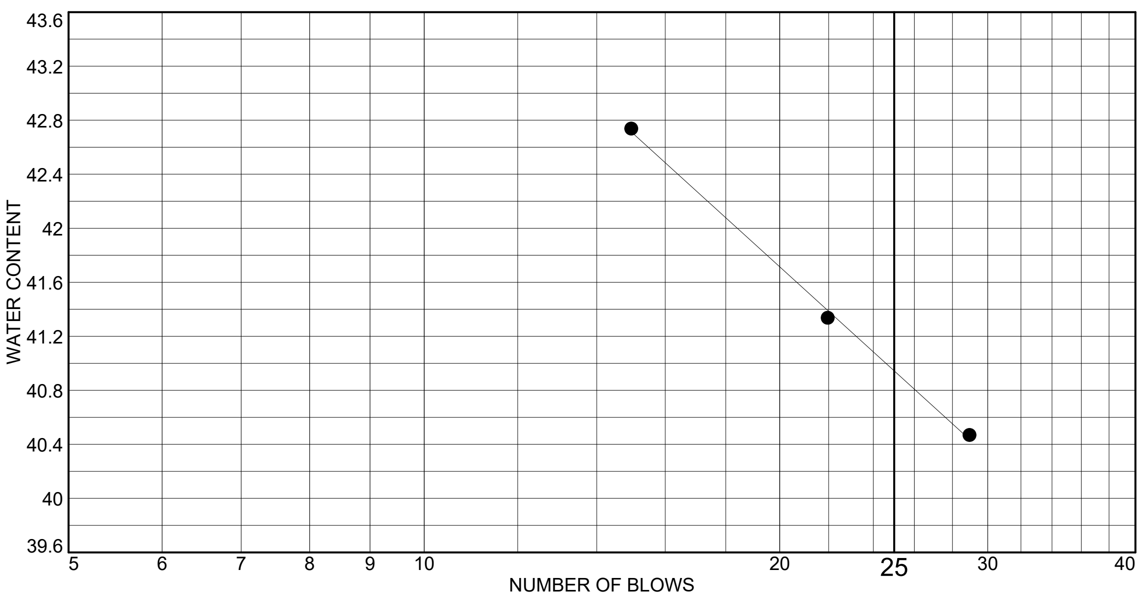
Remarks:

Figure 19-L-2645

Tested By: IA **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	41	23	18			CL

Project No. 09.0026035.00 **Client:** GZA GeoEnvironmental

Project: MEDOT - Woolwich - Bridge 3039

Woolwich, ME

Source of Sample: BB-WS46-104 **Depth:** 50-52'

Sample Number: 9D

Thielsch Engineering Inc.

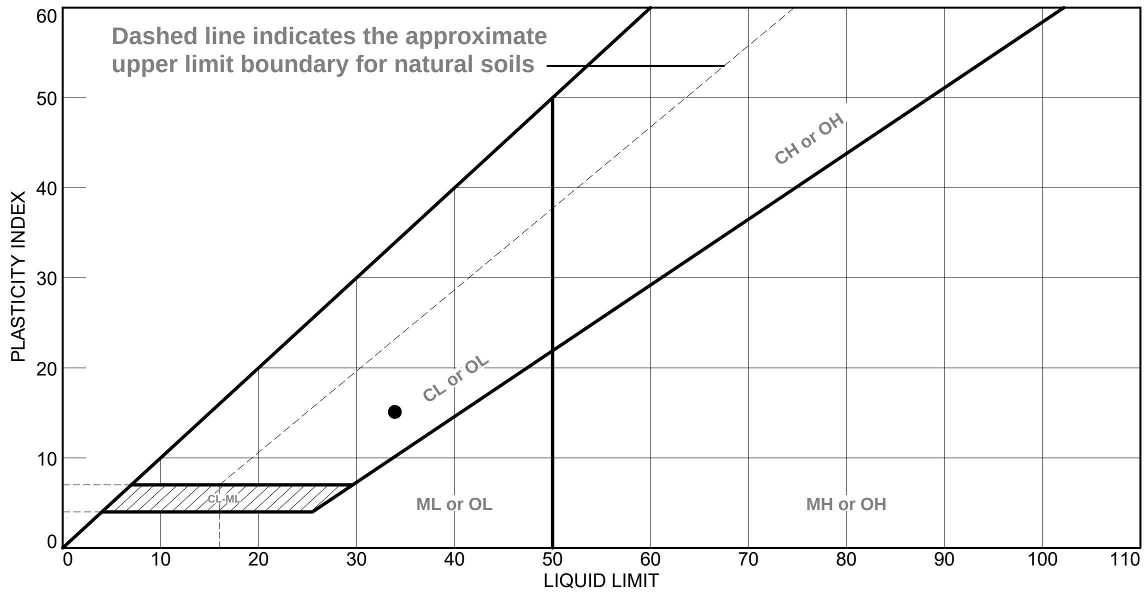
Cranston, RI

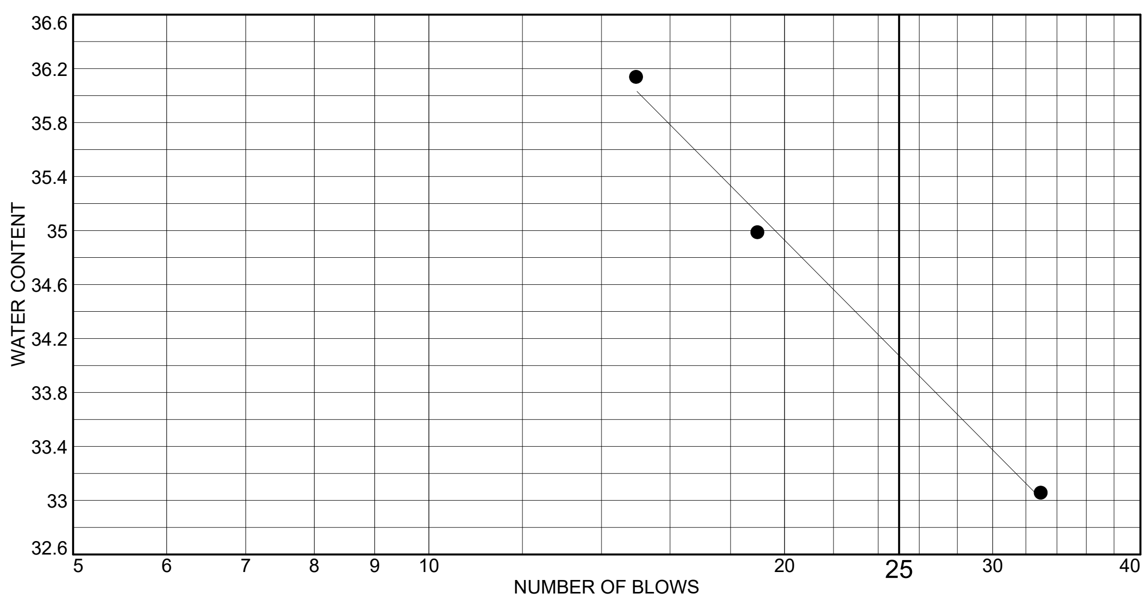
Remarks:

Figure 19-L-2647

Tested By: IA **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Silty CLAY	34	19	15			CL

Project No. 09.0026035.00 **Client:** GZA GeoEnvironmental

Project: MEDOT - Woolwich - Bridge 3039

Woolwich, ME

Source of Sample: BB-WS46-104 **Depth:** 80-82'

Sample Number: 15D

Thielsch Engineering Inc.

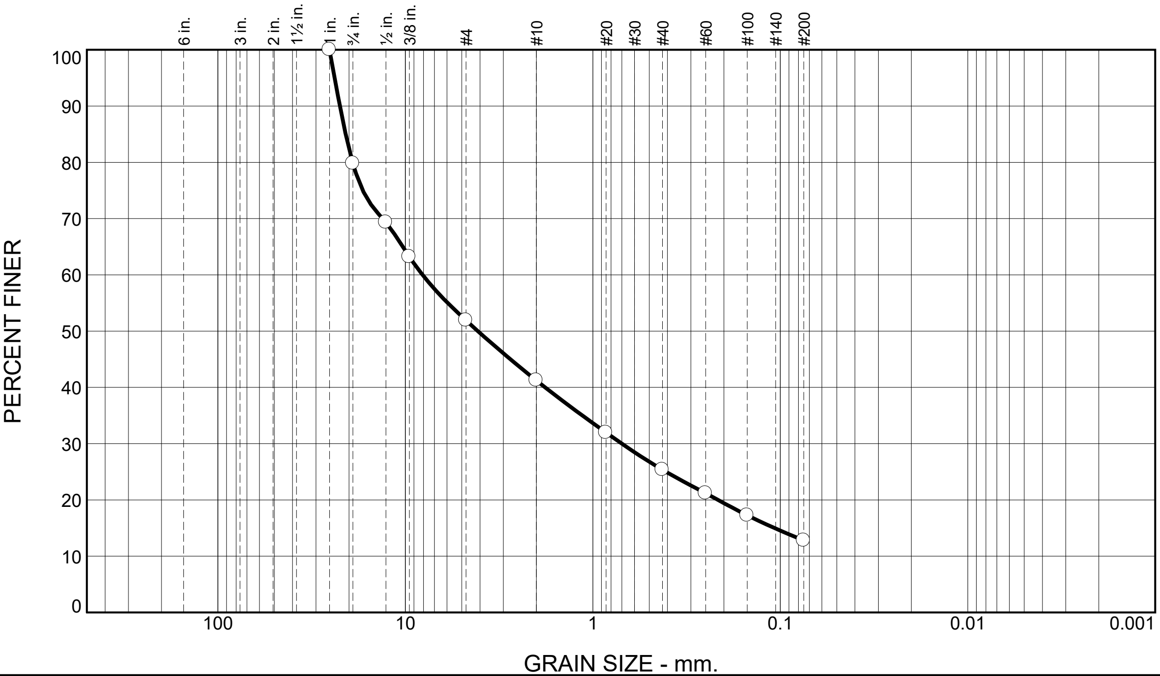
Cranston, RI

Remarks:

Figure 19-L-2649

Tested By: IA **Checked By:** SA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.2	27.9	10.7	15.8	12.6	12.8	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	79.8		
0.5"	69.3		
0.375"	63.2		
#4	51.9		
#10	41.2		
#20	32.0		
#40	25.4		
#60	21.2		
#100	17.3		
#200	12.8		

* (no specification provided)

Material Description

Brown Sandy fine to coarse GRAVEL, little Silt

Atterberg Limits (ASTM D 4318)

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

Classification

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

Coefficients

D_{90}= 22.3497 D_{85}= 20.8181 D_{60}= 8.0926
D_{50}= 4.1043 D_{30}= 0.7000 D_{15}= 0.1073
D_{10}= C_u= C_c=

Remarks

Date Received: 11.19.19 **Date Tested:** 11.21.19

Tested By: IA / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: BB-WS46-105 **Depth:** 1-3' **Date Sampled:**
Sample Number: 1D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: MEDOT - Woolwich - Bridge 3039
Woolwich, ME
Project No: 09.0026035.00 **Figure** 19-S-2650

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 Portland, ME PM: Blaine Cardali Assigned By: Blaine Cardali Collected By: MRJ	Project Information: **Woolwich Station 46 Brdige WIN 23929.00** **Woolwich, ME** GZA Project Number: 09.0026035.00 Summary Page: 1 of 1 Report Date: 04.28.2020

LABORATORY TESTING DATA SHEET, Report No.: 7420-D-184

Boring No.	Sample No.	Depth (ft)	Laboratory No.	Specimen Data						Compressive Strength Tests								Rock Formation or Description or Remarks
				Mohs Hard-ness	Diameter (in)	Length (in)	(1) Unit Weight (PCF)	(2) Wet Density (PCF)	Bulk G_s	(3) Other Tests	(4) Strength PSI	(5) Strain %	(6) E sec PSI EE+06	(7) Poisson's Ratio	στ PSI	Is_{50} PSI	(8) s_c PSI	
BB-WS46-101	R1	33.0-33.6	20-S-1136		1.991	4.106	169.2				3083	0.258	0.836	0.22				Schist
Break was along foliation. Minor break occurred at 800 psi that did affect Secant Modulus and Poisson's Ratio. Secant Mdoulus and Poisson't Ratio taken at 26% of Total Failure due to minor break.																		
BB-WS46-105	R1	23.8-24.5	20-S-1137		1.994	4.631	171.8				4336	0.256	1.31	0.23				Schist
Break was fresh.																		

(1) Volume Determined By Measuring Dimensions

(2) Determined by Measuring Dimensions and Weight of Saturated Sample

Notes

(3) PLD=Point Load (diametrical),

PLA= Point Load (Axial) ST= Splitting Tensile

U= Unconfined Compressive Strength

(4) Taken at Peak Deviator Stress

Notes

(5) Strain at Peak Deviator Stress

(6) Represents Secant Modulus at 50% of Total Failure Stress

(7) Represents Secant Poisson's Ratio at 50% of Total Failure Stress

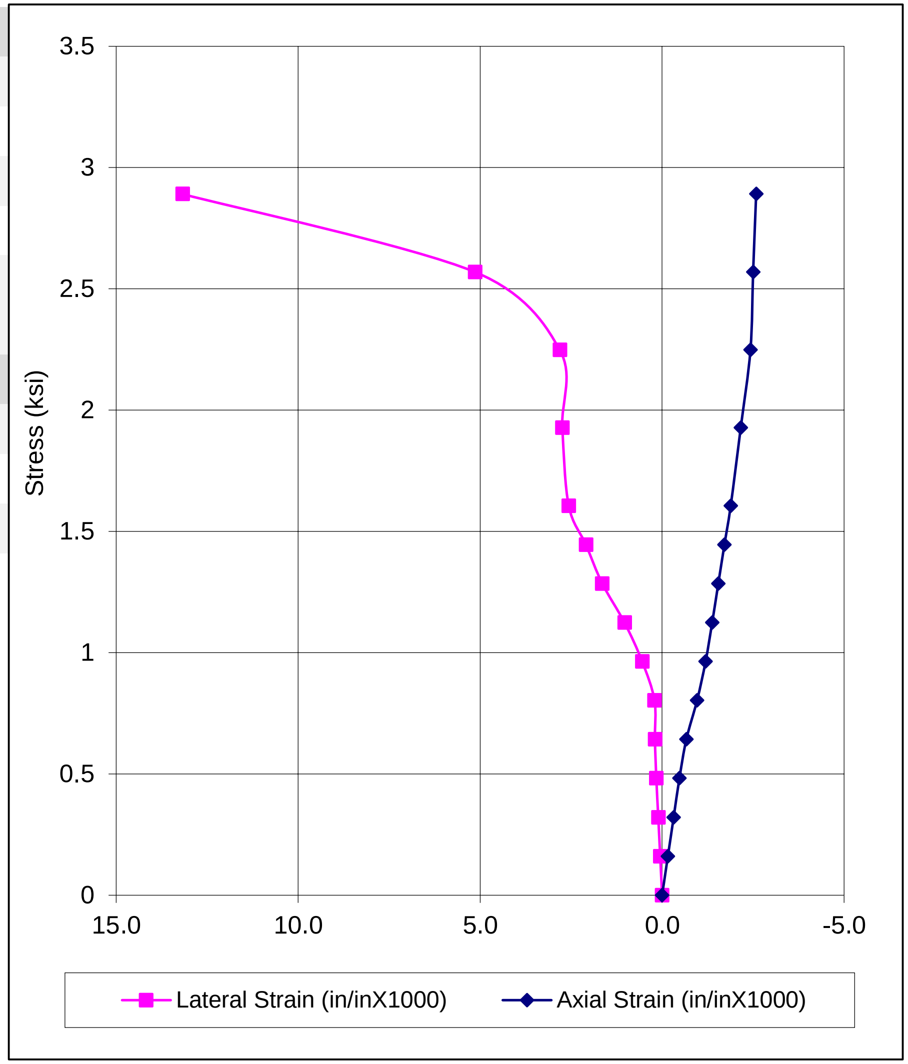
(8) Estimated UCS from Table 1 of ASTM D5731 for NX cores (Is x 24)

Date Received: *04.27.2020* Reviewed By: [signature] Date Reviewed: *04.29.2020*

THIELSCH ENGINEERING	195 Frances Avenue Cranston, Rhode Island 02910 Phone: (401) 467-6454 Fax: (401) 467-2398 www.thielsch.com *Let's Build a Solid Foundation*	**Client Information:** GZA GeoEnvironmental Portland, ME PM: Blaine Cardali Assigned by: Blaine Cardali Collected by: MRJ	**Project Information:** Woolwich Station 46 Bridge Woolwich, ME Project Number: 09.0026035.00 Technician: JM Report Date: 04.28.2020

ASTM D7012 Compressive Strength and Elastic Moduli of Intact Rock Core Specimens

Rock Information			
Boring ID:	BB-WS46-101	**Diameter, D (in):**	1.991
Sample #:	R1	**Length, L (in):**	4.106
Depth (ft):	33.0-33.6'	**L:D Ratio:**	2.06
Tested Depth (ft):	33.2-33.6'	**Time to Failure (min)**	3.1
Rock Type:	Schist		
Features:	Pegmatite, very fissile		
Compressive Test Information		**Elastic Moduli Test Information**	
Unit Weight (pcf):	169.2	**Poisson's Ratio @ 50%:**	0.22
Failure Stress (psi):	3,083	**Strain %:**	0.258
Failure Mode:	Along foliation	**E sec PSI @ 50%:**	8.36E+05

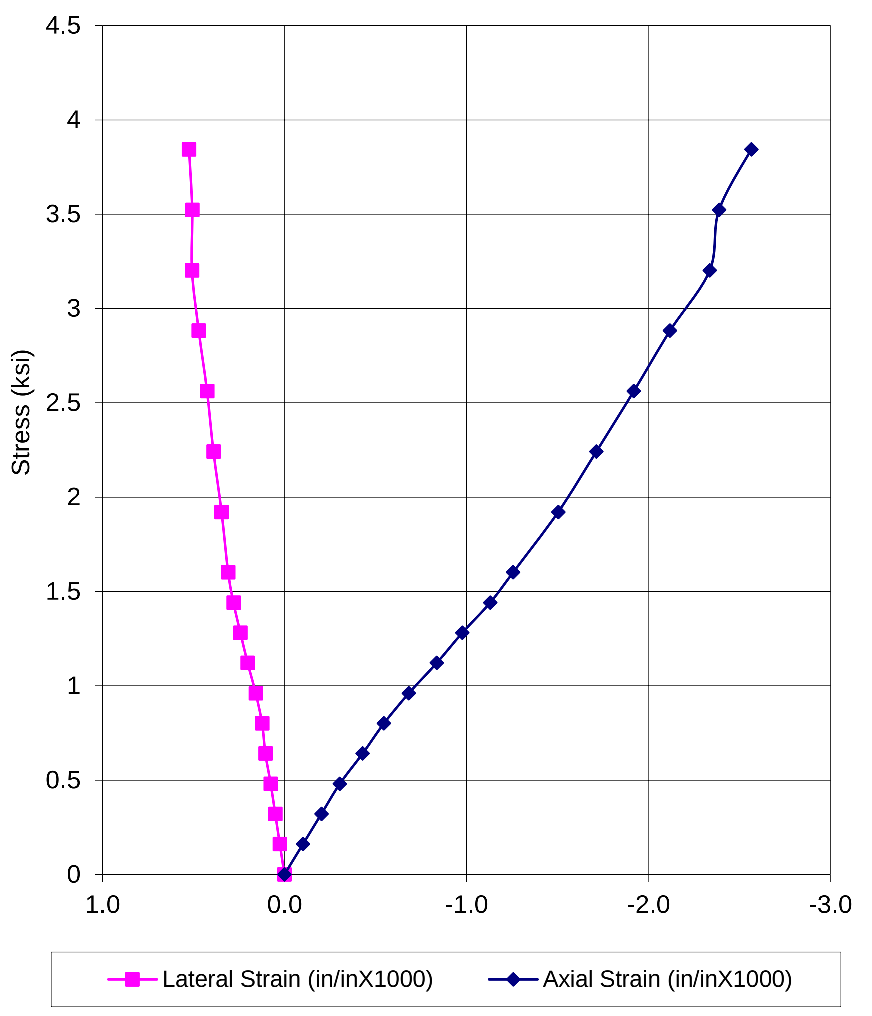


Testing Notes: Minor break occurred at 800 psi that did affect Secant Modulus and Poisson's Ratio. Secant Mdoulus and Poisson't Ratio taken at 26% of Total Failure due to minor break.

THIELSCH ENGINEERING	195 Frances Avenue Cranston, Rhode Island 02910 Phone: (401) 467-6454 Fax: (401) 467-2398 www.thielsch.com *Let's Build a Solid Foundation*	**Client Information:** GZA GeoEnvironmental Portland, ME PM: Blaine Cardali Assigned by: Blaine Cardali Collected by: MRJ	**Project Information:** Woolwich Station 46 Bridge Woolwich, ME Project Number: 09.0026035.00 Technician: JM Report Date: 04.28.2020

ASTM D7012 Compressive Strength and Elastic Moduli of Intact Rock Core Specimens

Rock Information			
Boring ID:	BB-WS46-105	**Diameter, D (in):**	1.994
Sample #:	R1	**Length, L (in):**	4.631
Depth (ft):	23.8-24.5	**L:D Ratio:**	2.32
Tested Depth (ft):	23.9-24.3	**Time to Failure (min)**	3.6
Rock Type:	Schist		
Features:	Medium fissility		
Compressive Test Information		**Elastic Moduli Test Information**	
Unit Weight (pcf):	171.8	**Poisson's Ratio @ 50%:**	0.23
Failure Stress (psi):	4,336	**Strain %:**	0.256
Failure Mode:	Fresh	**E sec PSI @ 50%:**	1.31E+06



Testing Notes:

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: **DECEMBER 19, 2019**

SUBJECT: **WOOLWICH BRIDGE NO 3039 LAB TEST RESULTS**

Attached please find the lab test results for the Woolwich Bridge No 3039 Project. The following test results are included:

Incremental Consolidation Tests:
- BB-WS46-103 1U (see time curve for load step 7 for c_{alpha})
- BB-WS46-103 2U
- BB-WS46-103 3U

Consolidated (K_o) Direct Simple Shear Tests:
- BB-WS46-103 1U
- BB-WS46-104 1U (760 psf consolidation stress)
- BB-WS46-104 1U(1,700 psf consolidation stress)

Atterberg Limits: (Results included on Consolidation test or DSS Summary Sheets)
- BB-WS46-103 2U
- BB-WS46-103 3U
- BB-WS46-104 1U

Moisture/Organic Content Determination:
- BB-WS46-103 1U: MC = 83.5%, OC = 5.71% =
- BB-WS46-104 1U: MC = 64.25%, OC= 4.64%

Please call me if you have any questions.

Regards - Steve

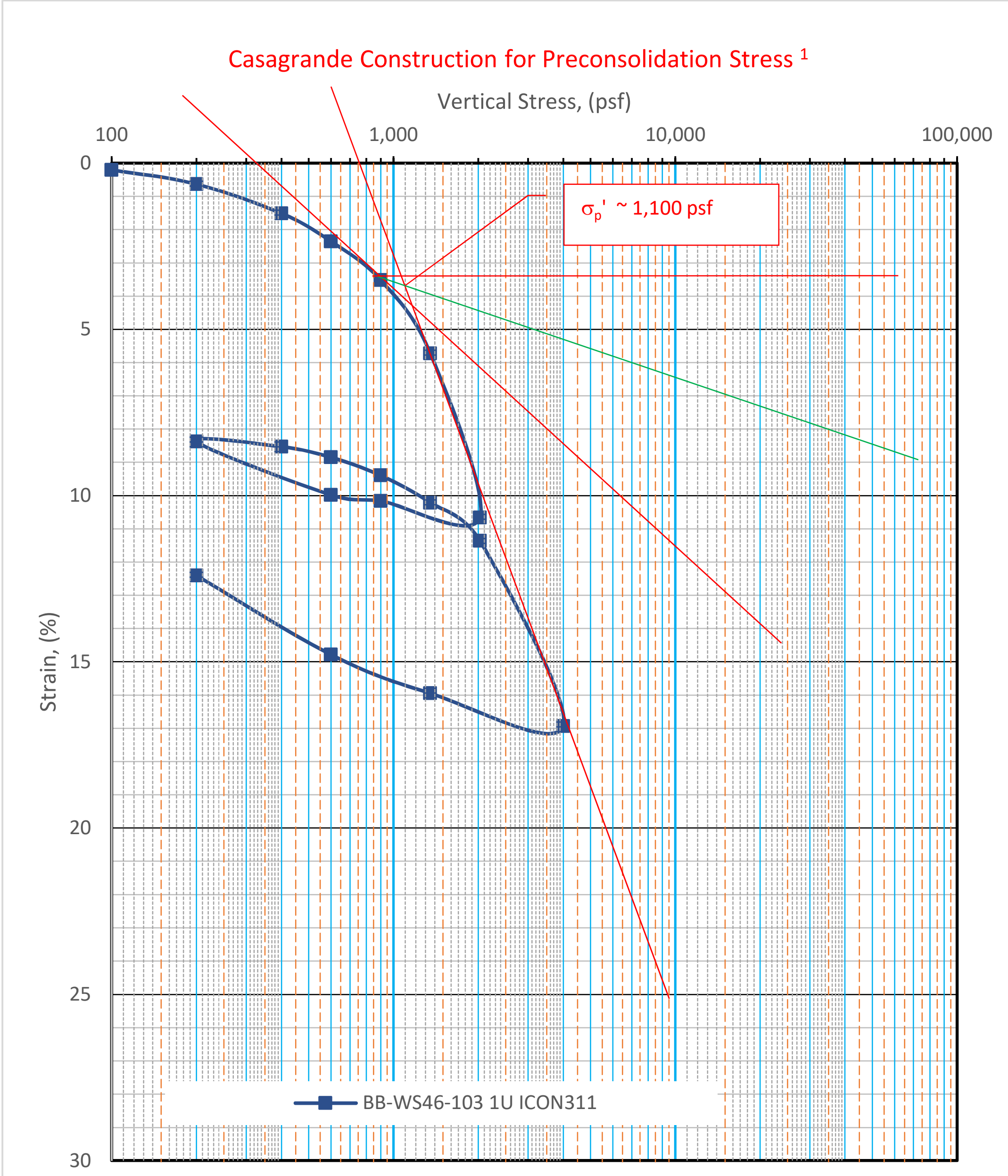
INCREMENTAL CONSOLIDATION

ICON: BB-WS46-103 1U

Consolidation Test Data
Summary Report

Project Name:	Woolwich Bridge No 3039
Project Number:	166-12
Project Location:	Woolwich, Maine
Client:	GZA Proj. No. 09.0026035.00
Sample Description:	Brown Organic Silt
Preparation:	Trimmed Shelby Tube

Lab Test No:	ICON 311			
Boring No.	BB WS46-103			
Sample No:	1U			
Boring Elevation (ft).	3.0			
Sample Depth (ft):	16 - 18			
Test Specimen Depth (Ft):	17.83			
Test Specimen Elevation:	-14.83			
Water Content (%):	85.29			
Dry Unit Weight (pcf):	49.62			
Wet Unit Weight (pcf):	91.94			
Saturation Before (%):	96.94			
Saturation After (%):	100			
Void Ratio Before:	2.32			
Void Ratio After:	1.91			
Overburden Pressure (psf):				
Max Previous stress (psf):	1,100			
Max Prev. stress (Work) (psf):	1,150			
OCR:				
Compression Index (C_{CE}):	0.23			
Recompression Index (C_{RE}):	0.028			
Liquid Limit:				
Plastic Limit:				
Plasticity Index:				
Liquidity Index:				
Specific Gravity (implied)	2.64			
Lab Vane Su at __ ft. (psf)				
Tested By:	sjr			
Date Tested:	12/2/2019			
Checked By:	sjr			

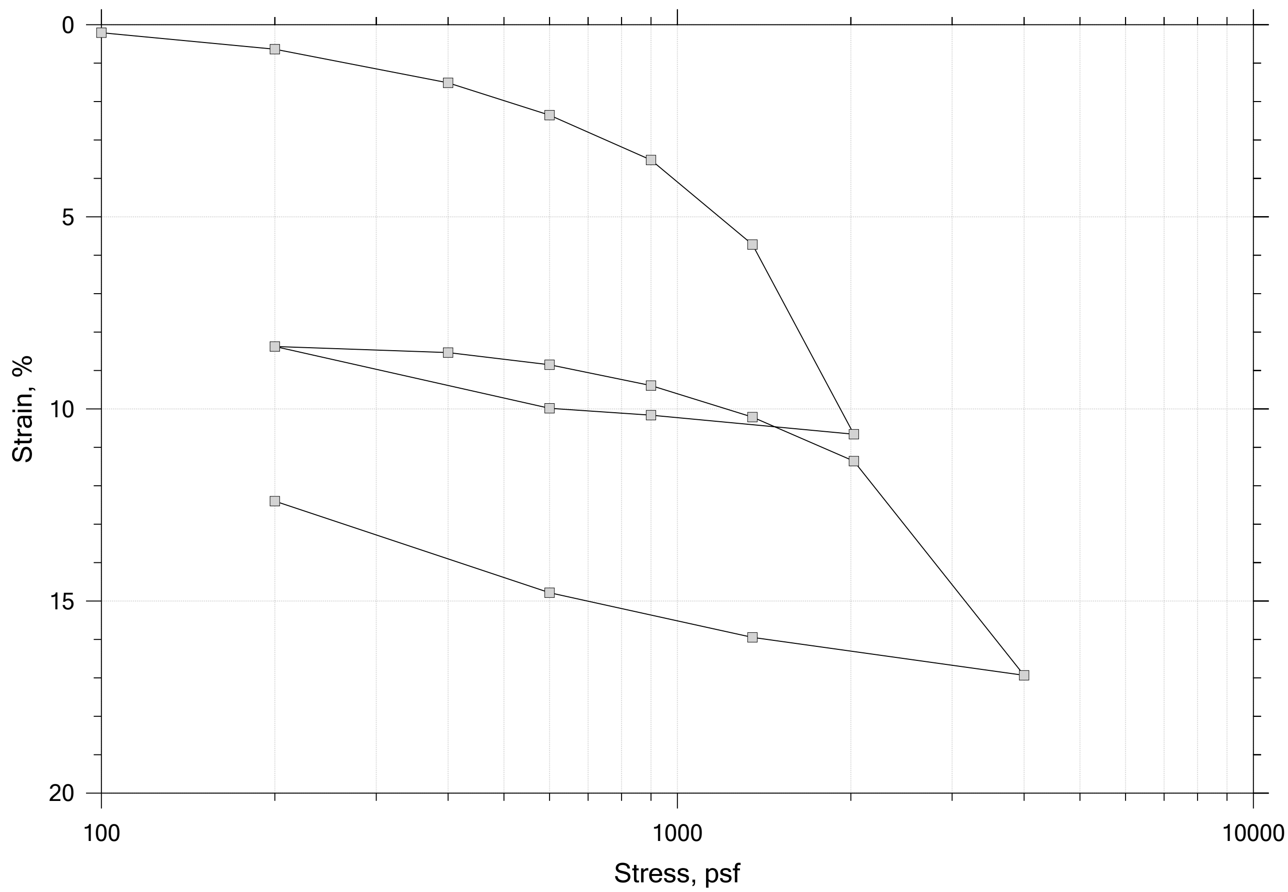


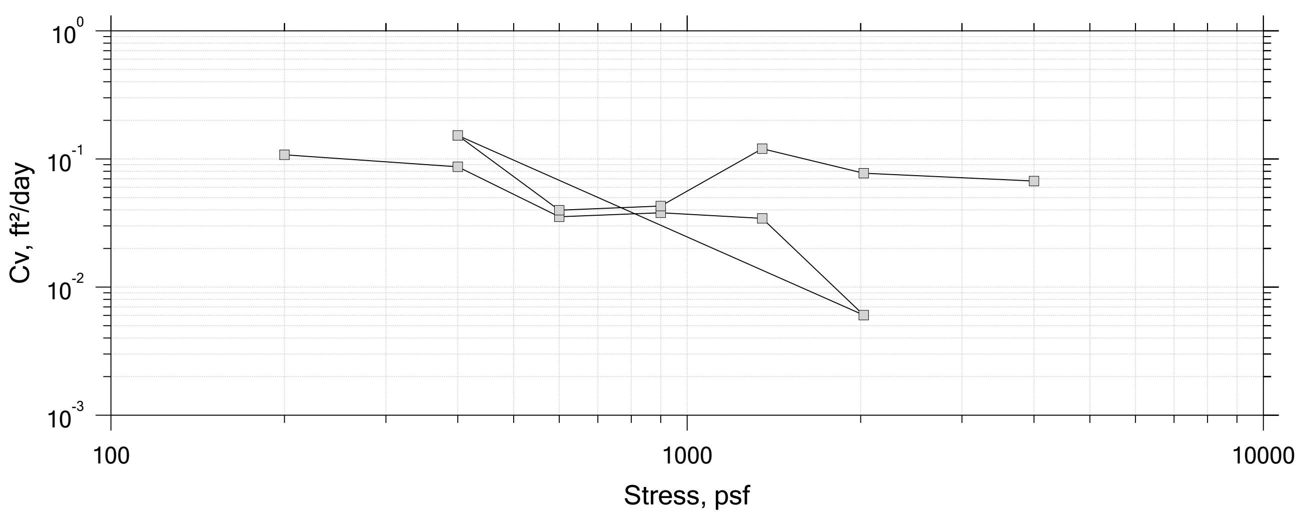
Note 1: The calculations for the Max Previous Stress, the Compression Index and the Recompression Index are provided for the convienience of the Specifier. The Specifier should make their own independent assessment of Maximum Previous stress, Cce and Cre for use in any engineering analyses.

Soil Metrics LLC Geotechnical Engineering

One-Dimensional Consolidation by ASTM D2435 - Method B

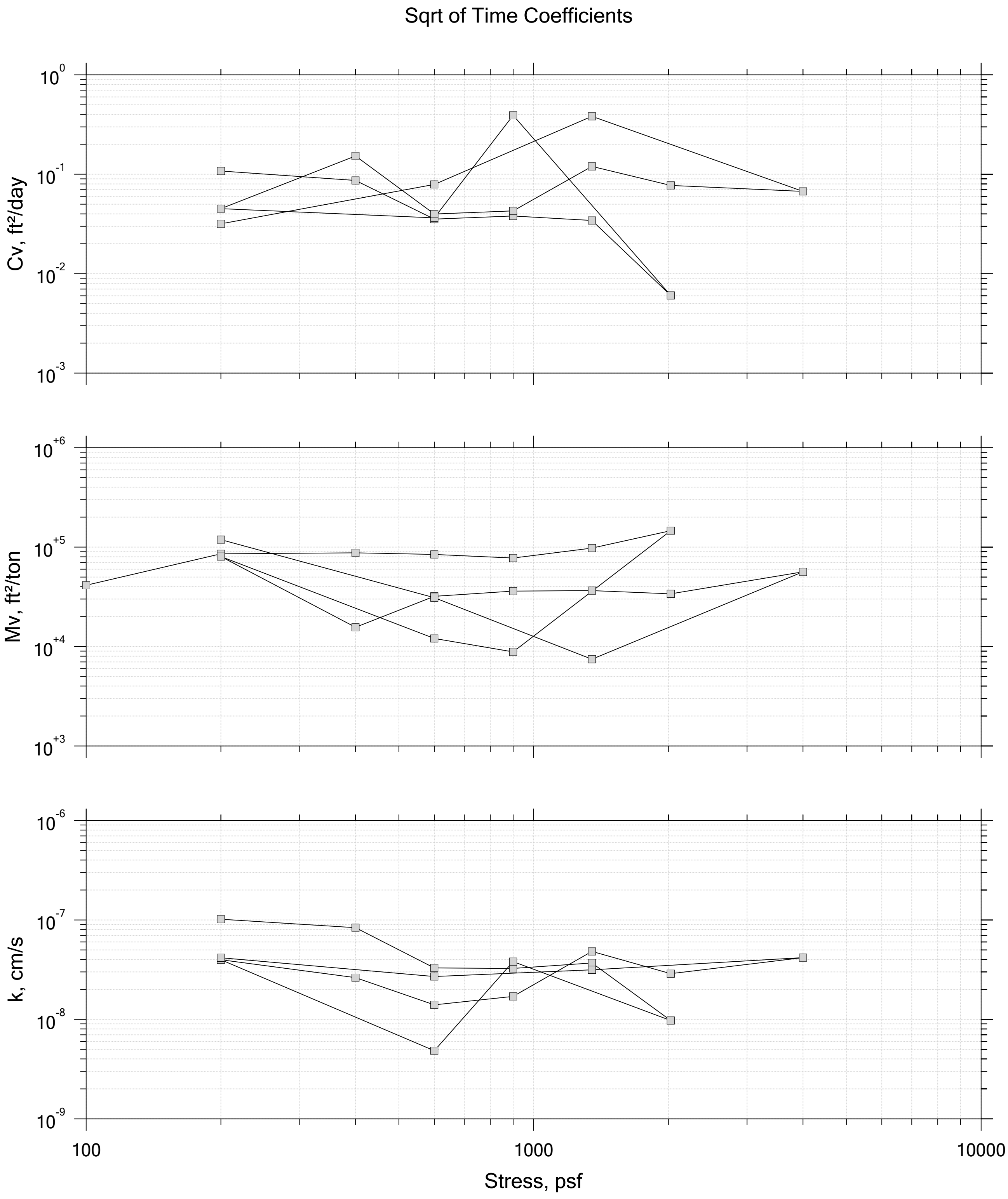
Summary Report





Soil Metrics LLC			
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		
	Displacement at End of Primary		

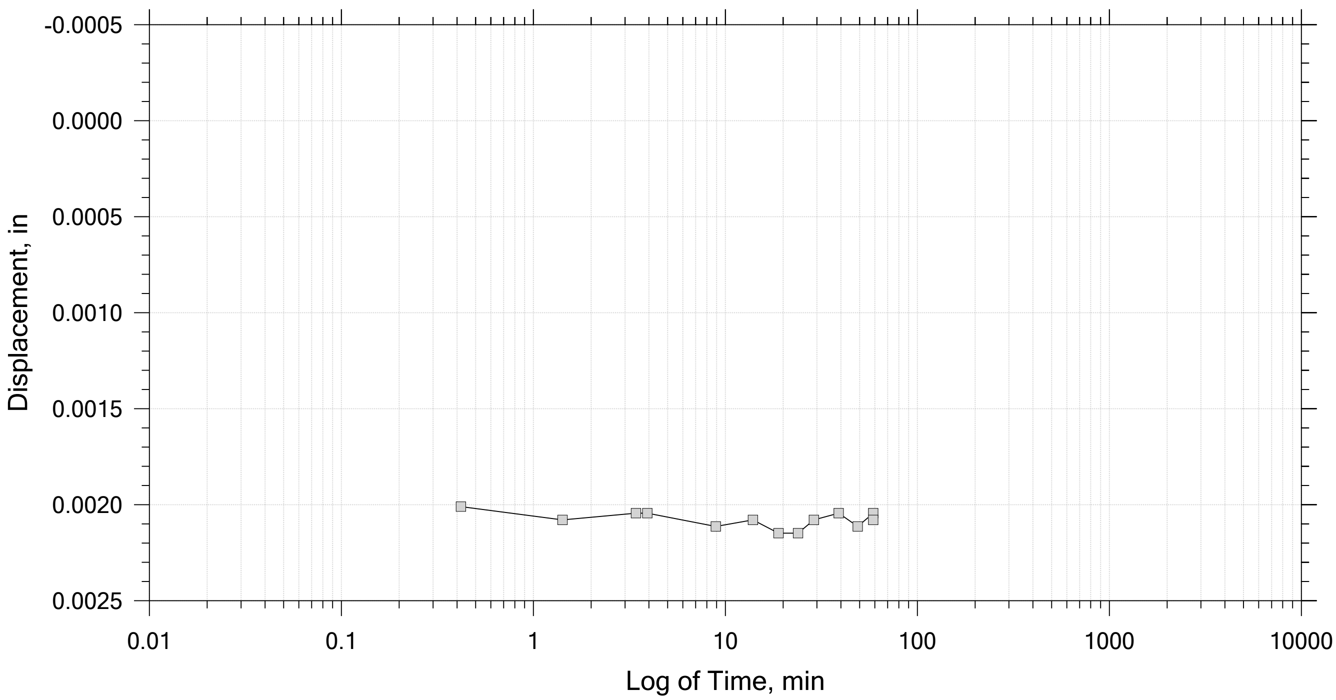
One-Dimensional Consolidation by ASTM D2435 - Method B

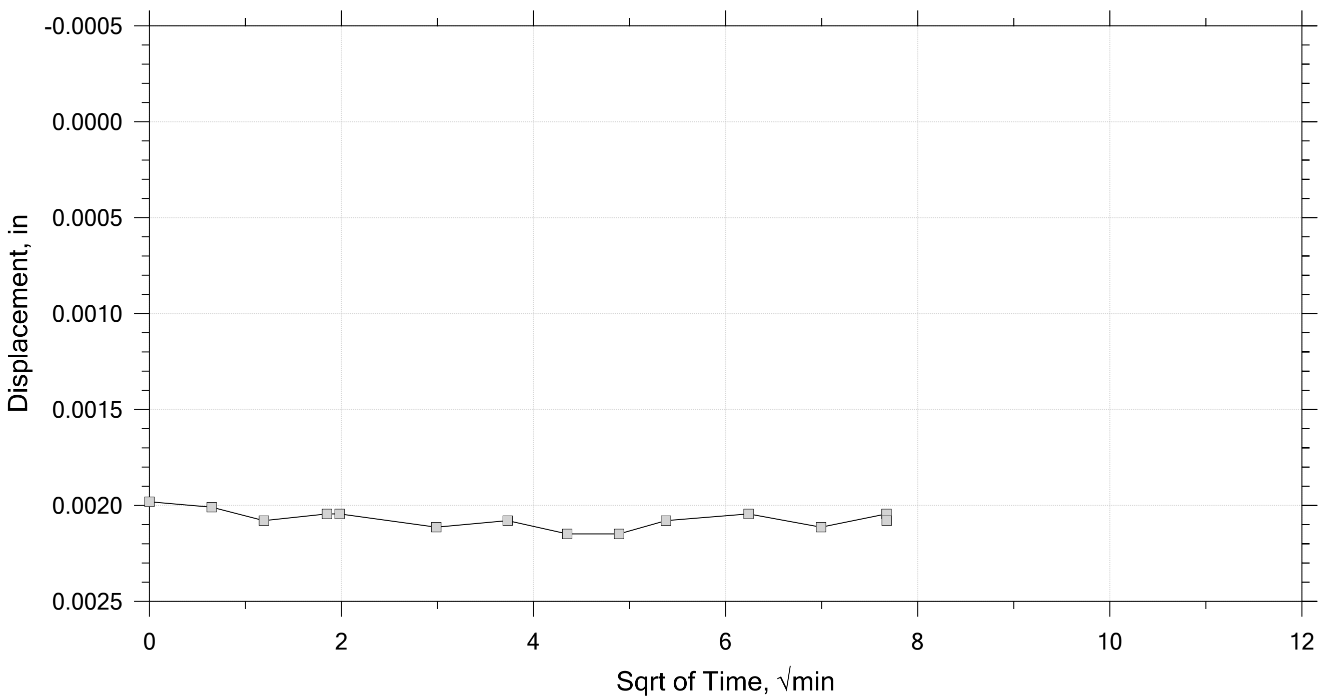


Soil Metrics LLC			
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 19
Constant Load Step
Stress: 100 psf

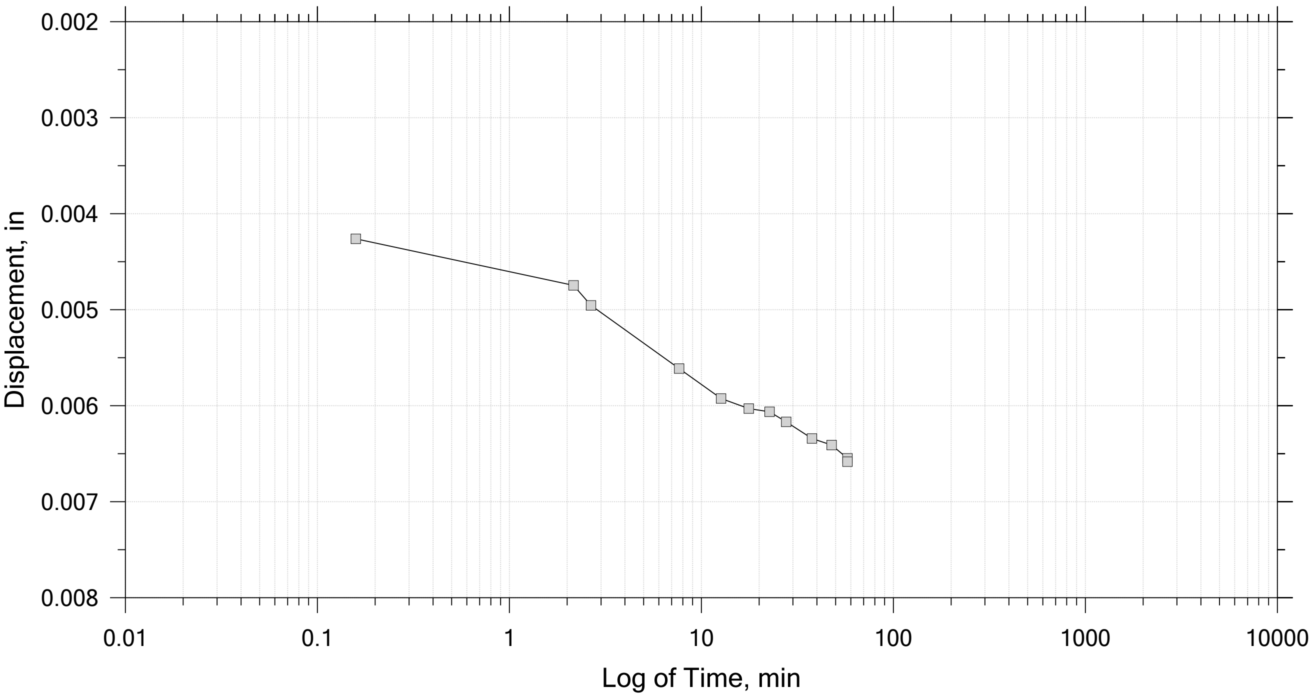


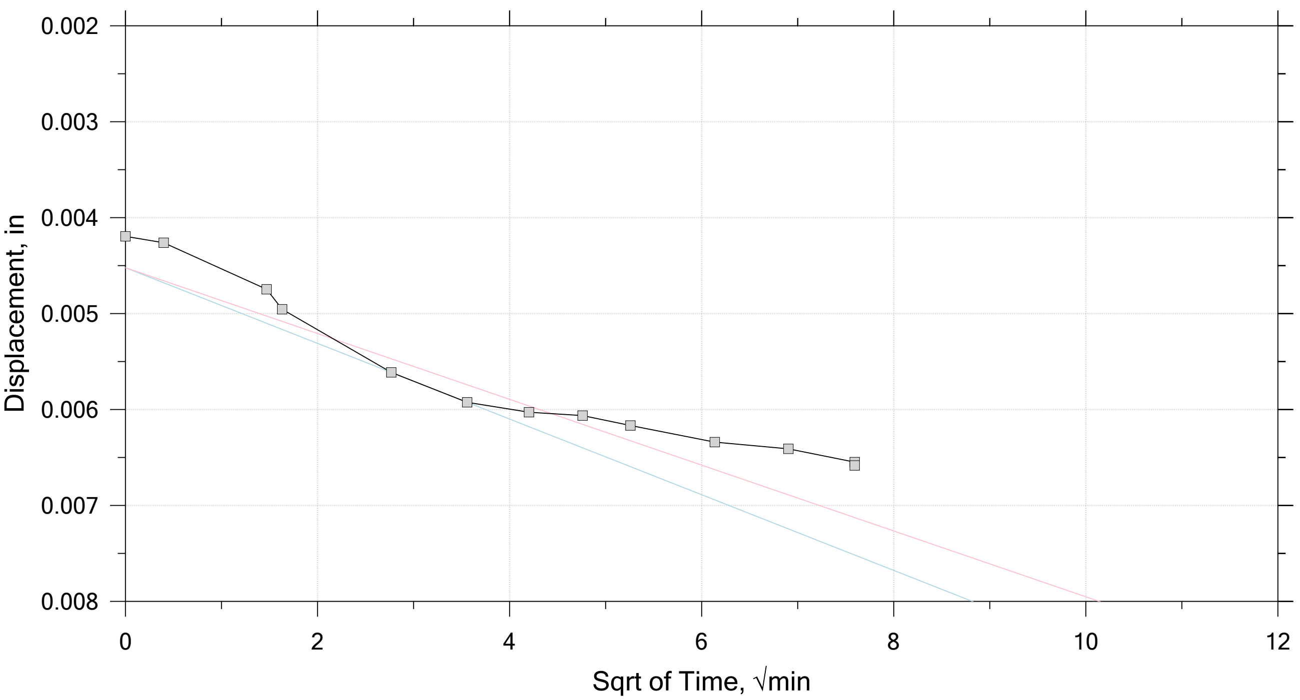


Soil Metrics LLC			
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 19
Constant Load Step
Stress: 200 psf





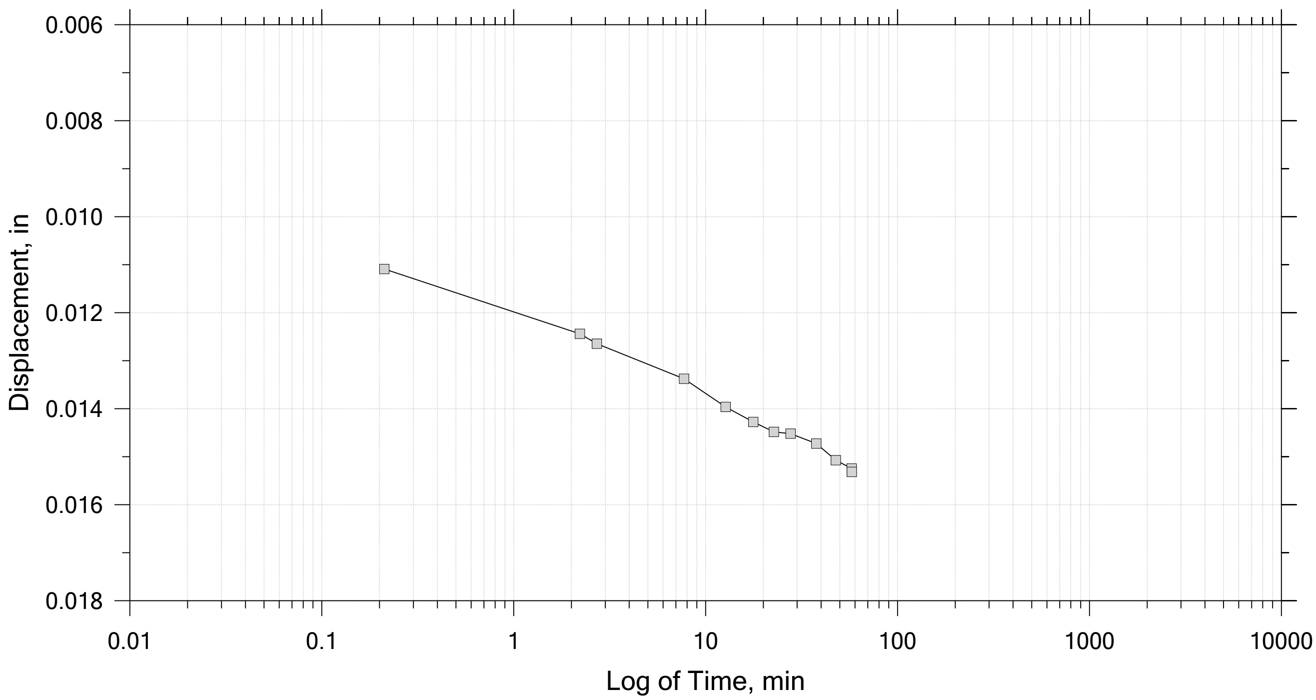
Soil Metrics LLC			
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

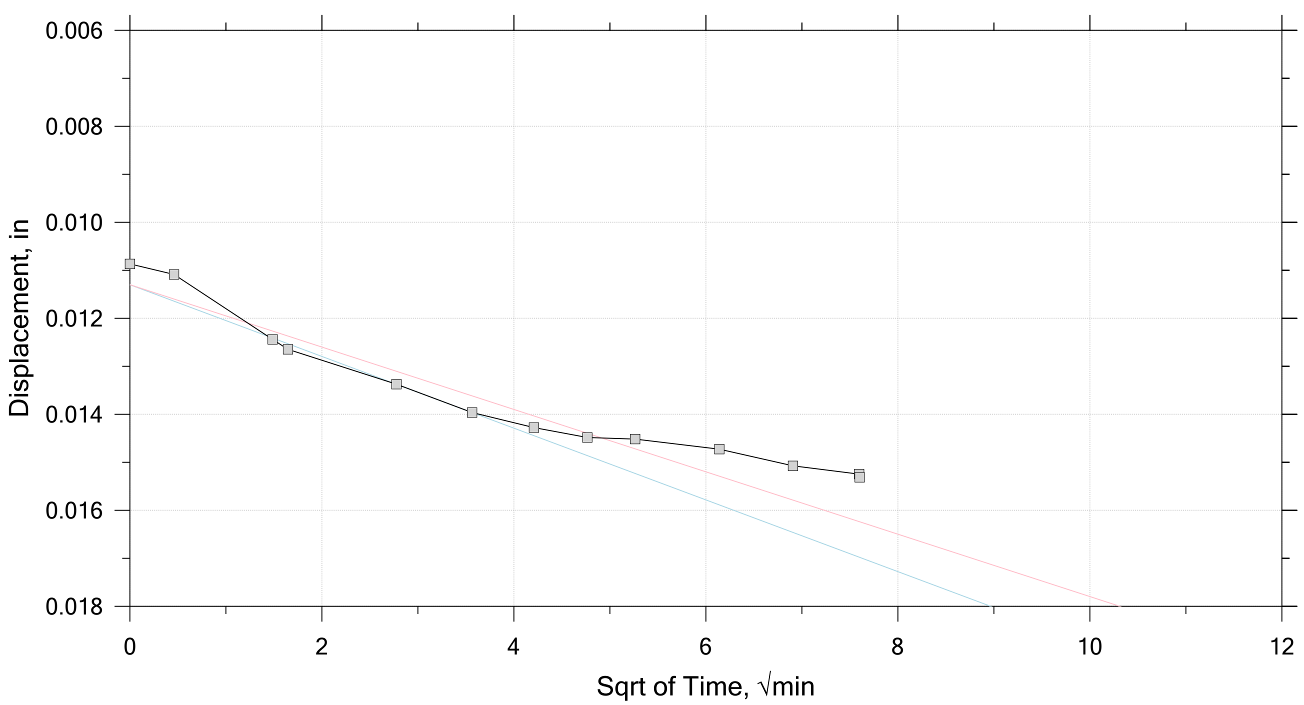
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 19

Constant Load Step

Stress: 400 psf

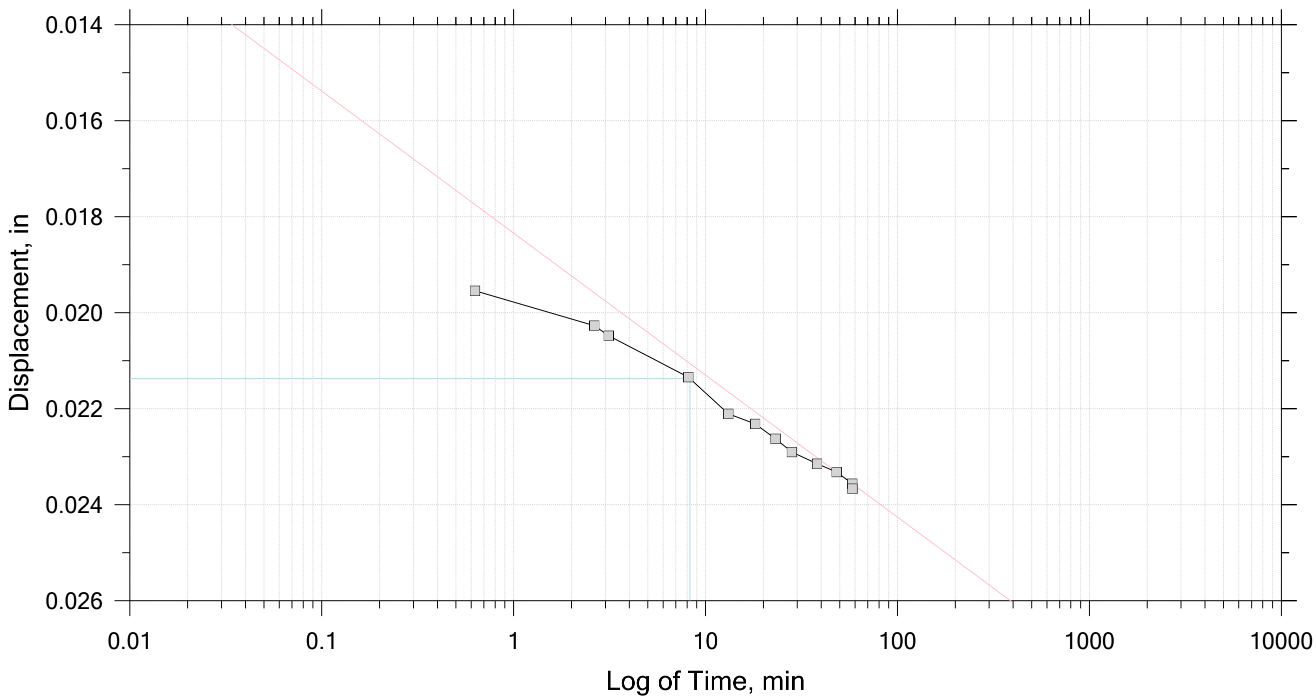


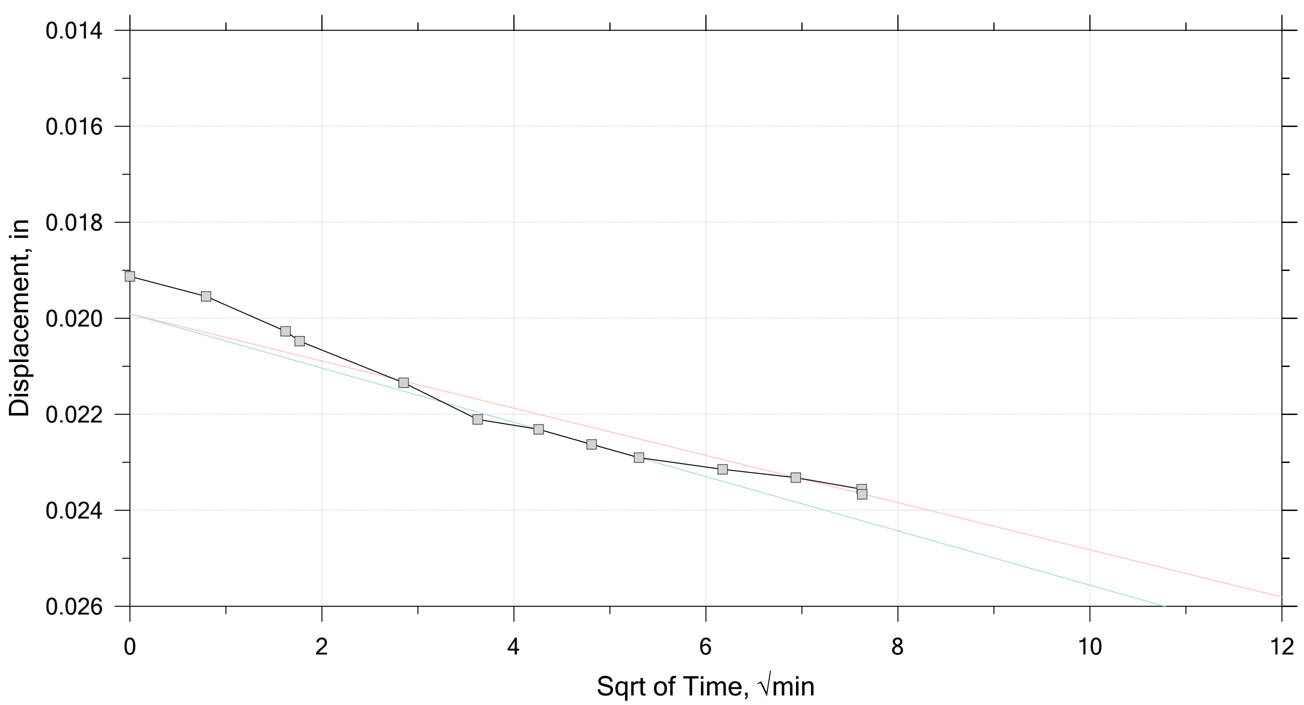


Soil Metrics LLC	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 19
Constant Load Step
Stress: 600 psf





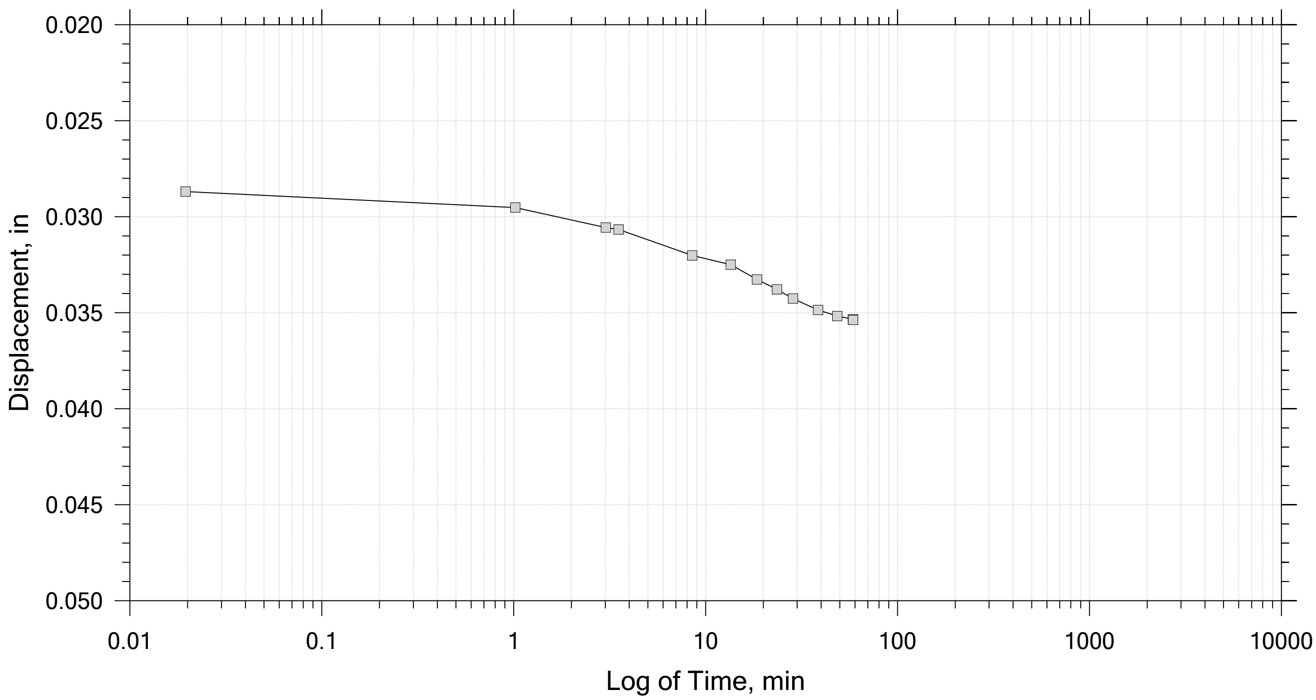
Soil Metrics LLC	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

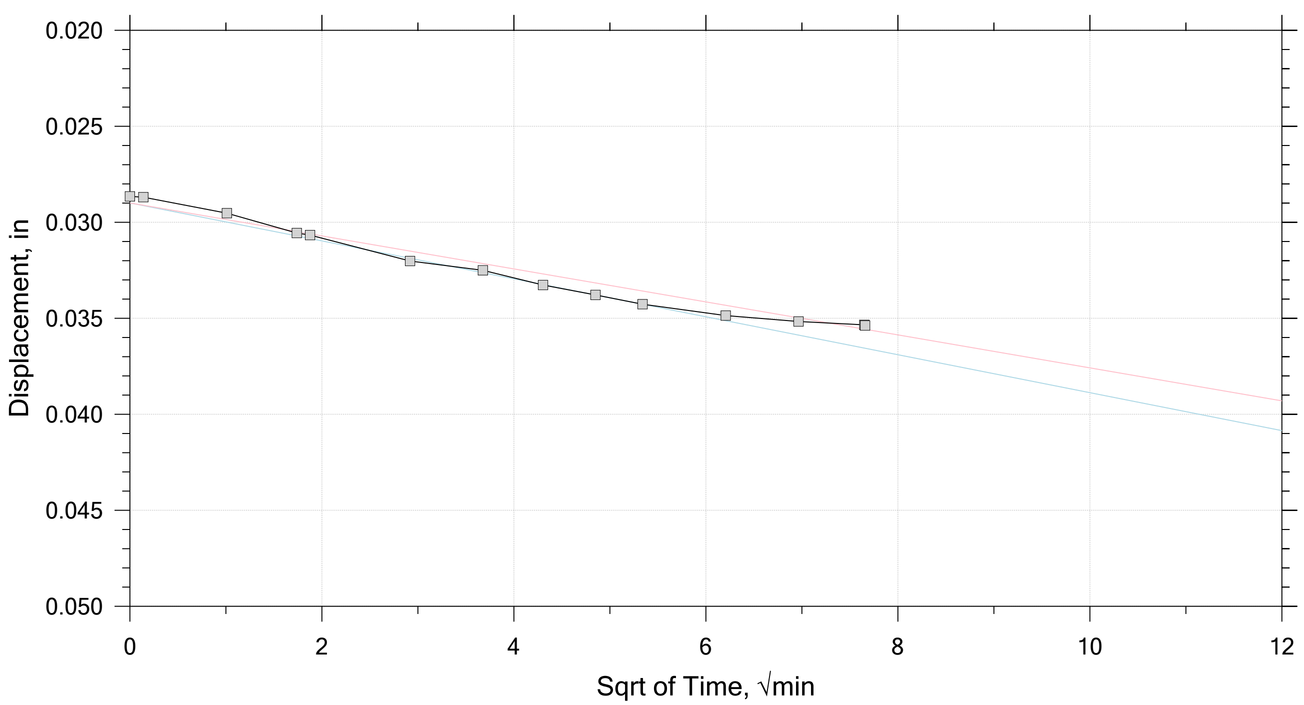
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 19

Constant Load Step

Stress: 900 psf





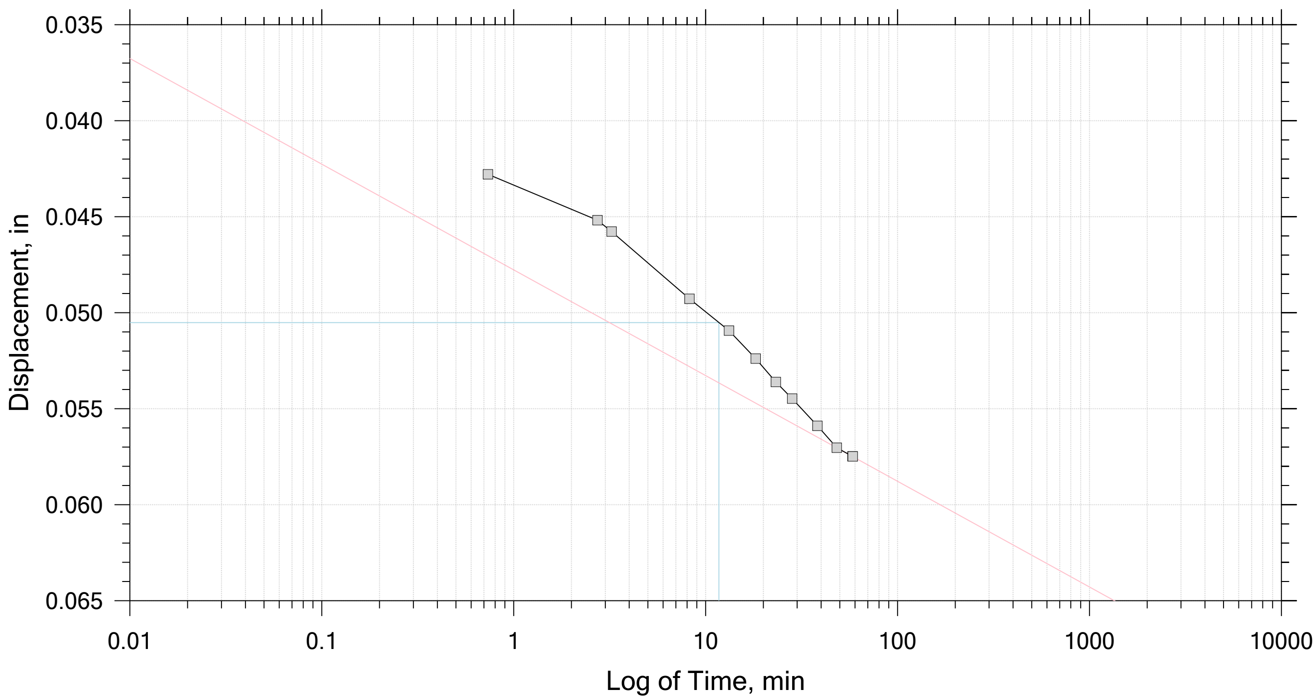
Soil Metrics LLC			
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

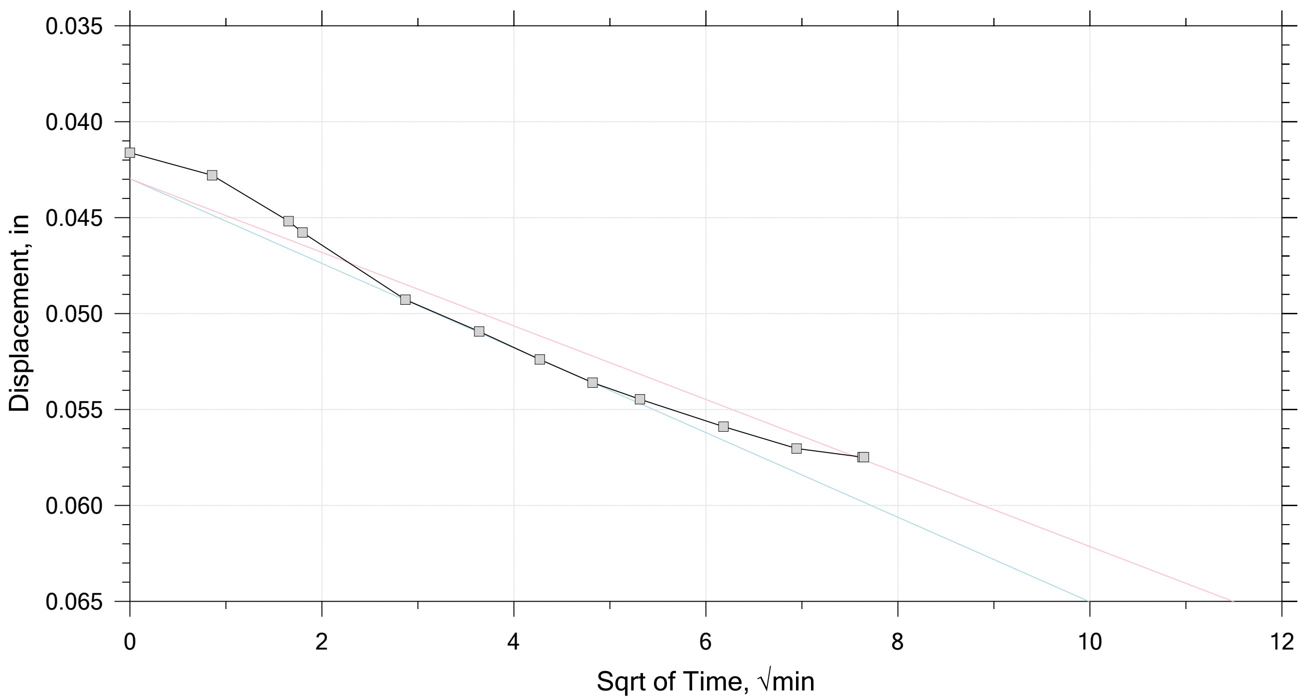
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 19

Constant Load Step

Stress: 1.35e+03 psf

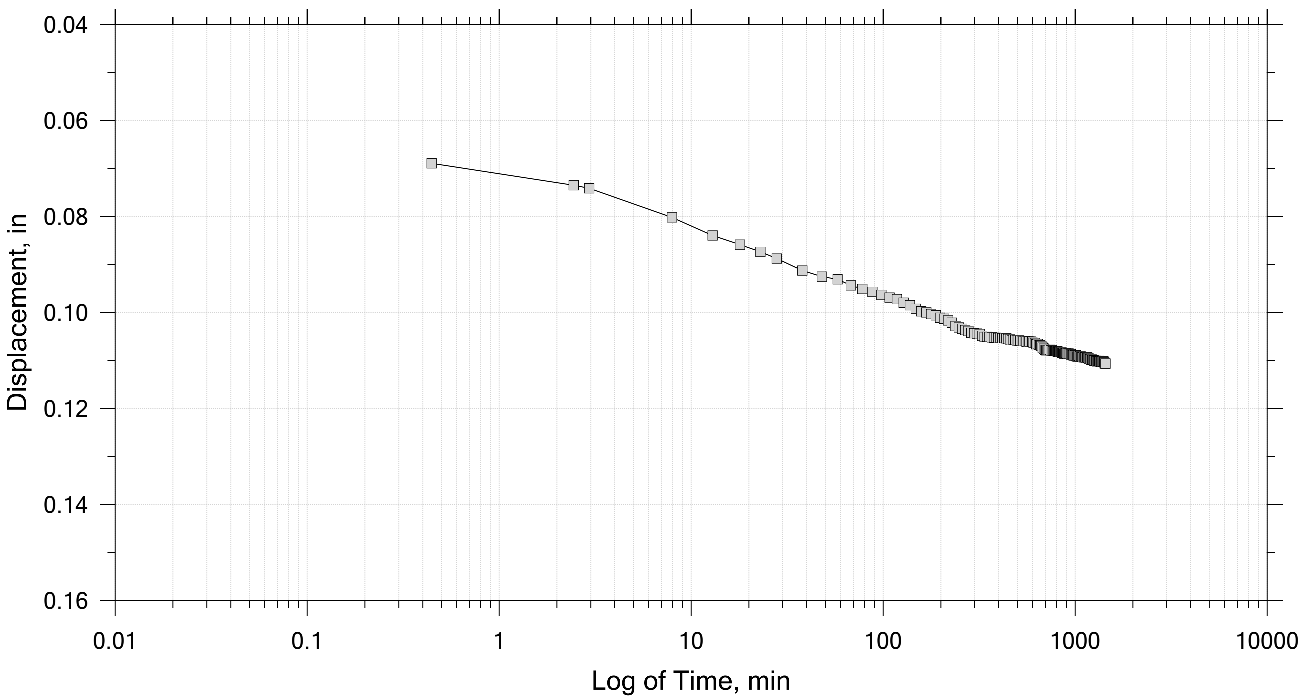


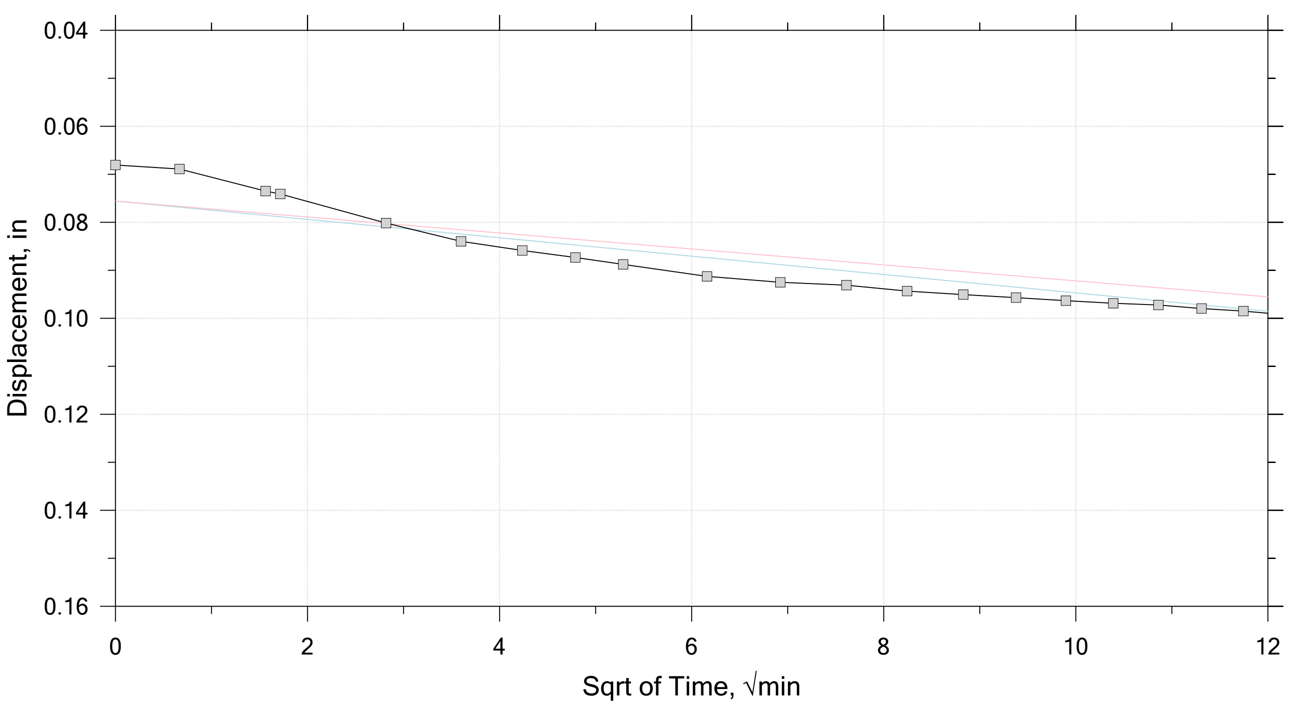


Soil Metrics LLC	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

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





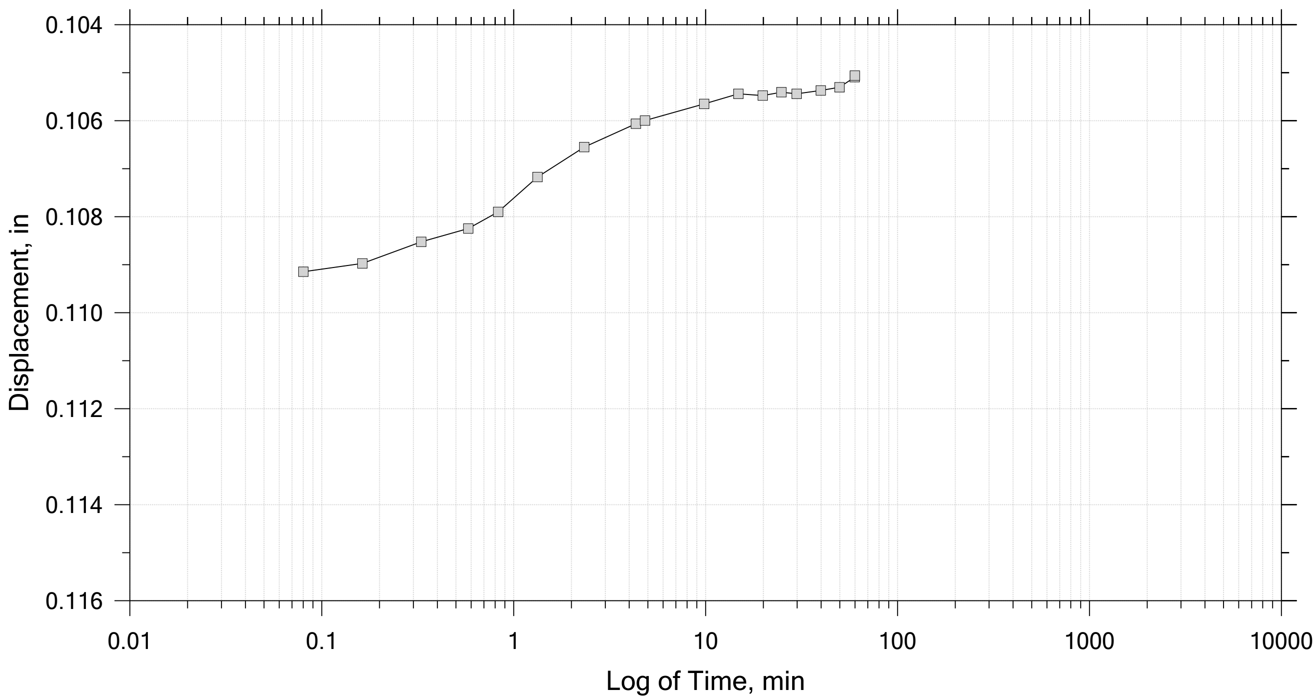
Soil Metrics LLC	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

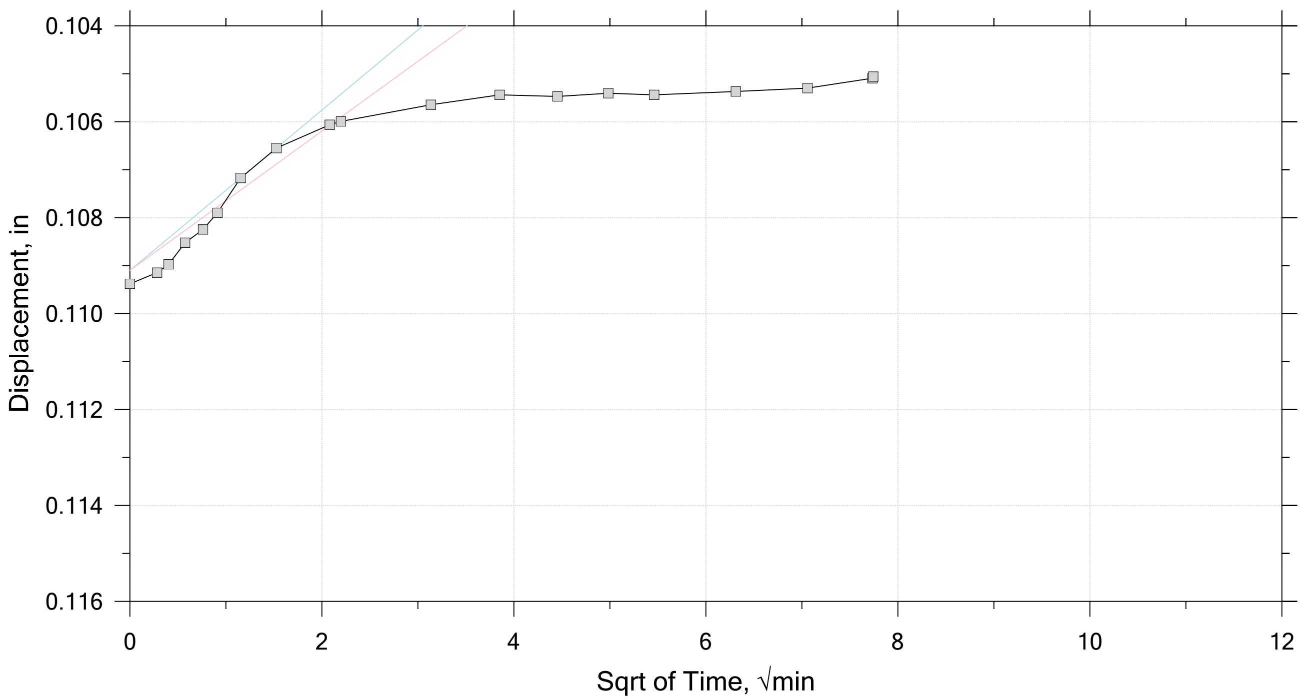
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 19

Constant Load Step

Stress: 900 psf





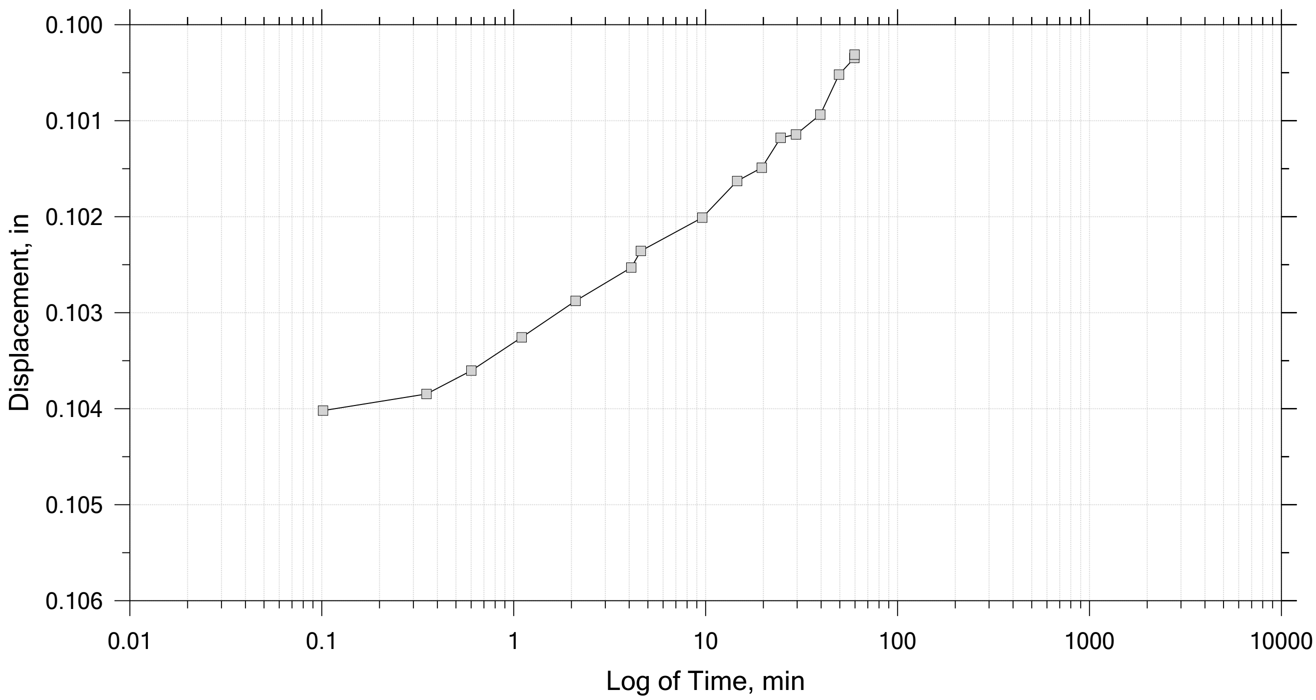
Soil Metrics LLC	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

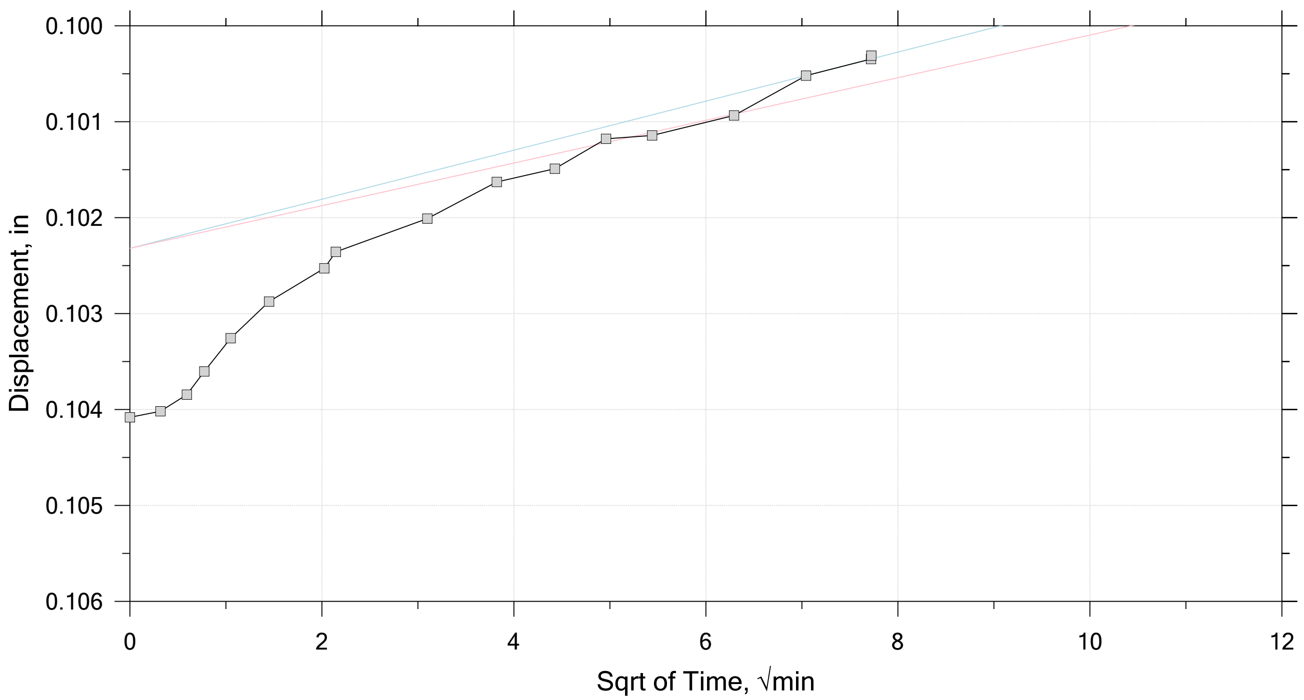
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 19

Constant Load Step

Stress: 600 psf





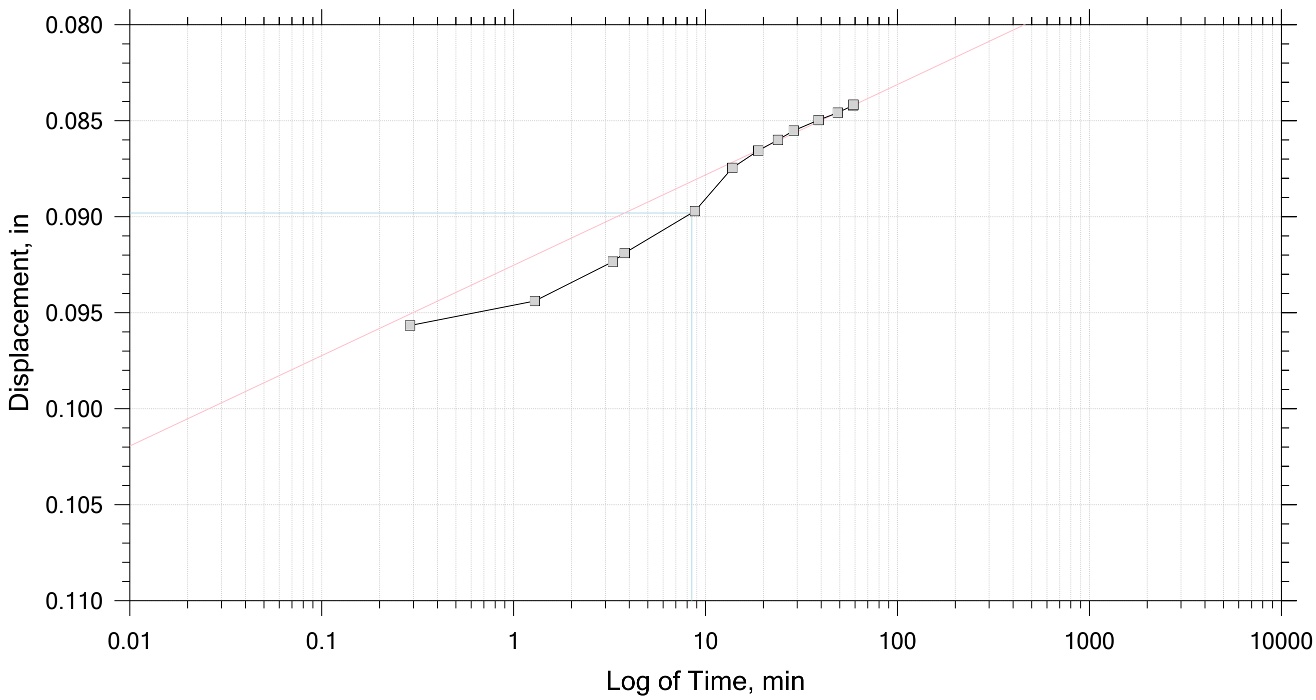
Soil Metrics LLC	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

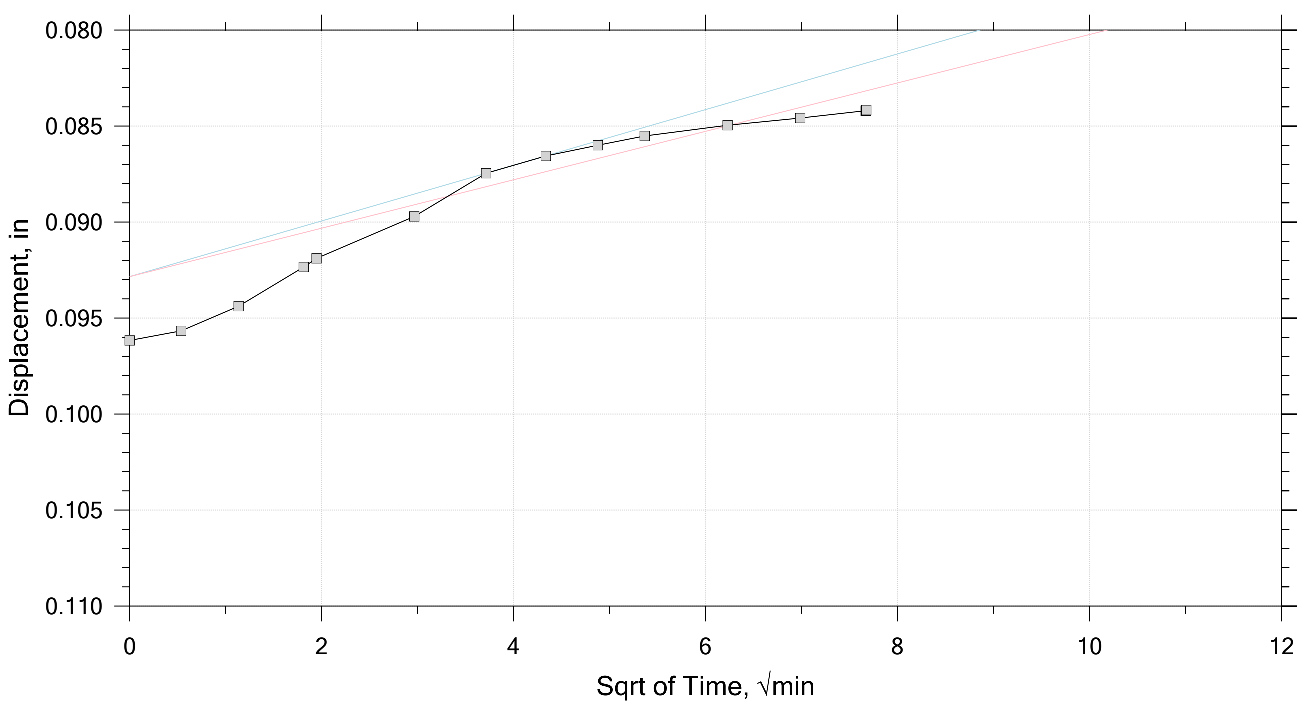
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 19

Constant Load Step

Stress: 200 psf

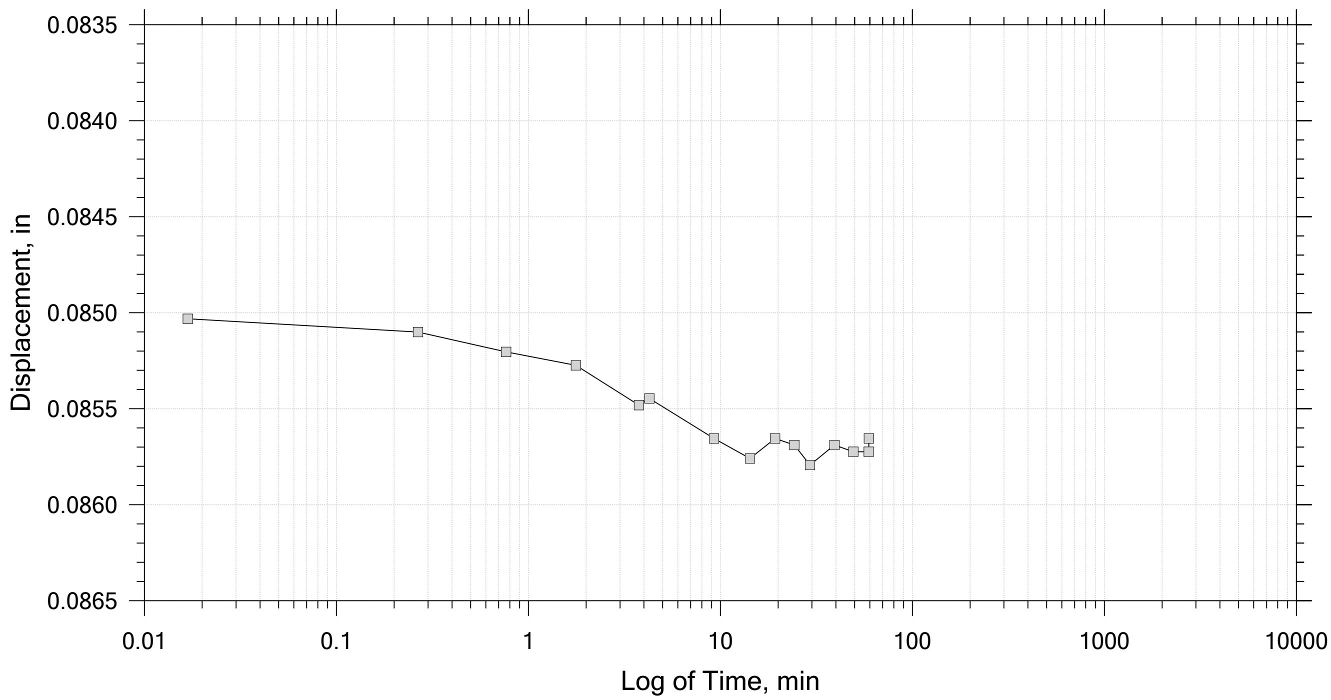


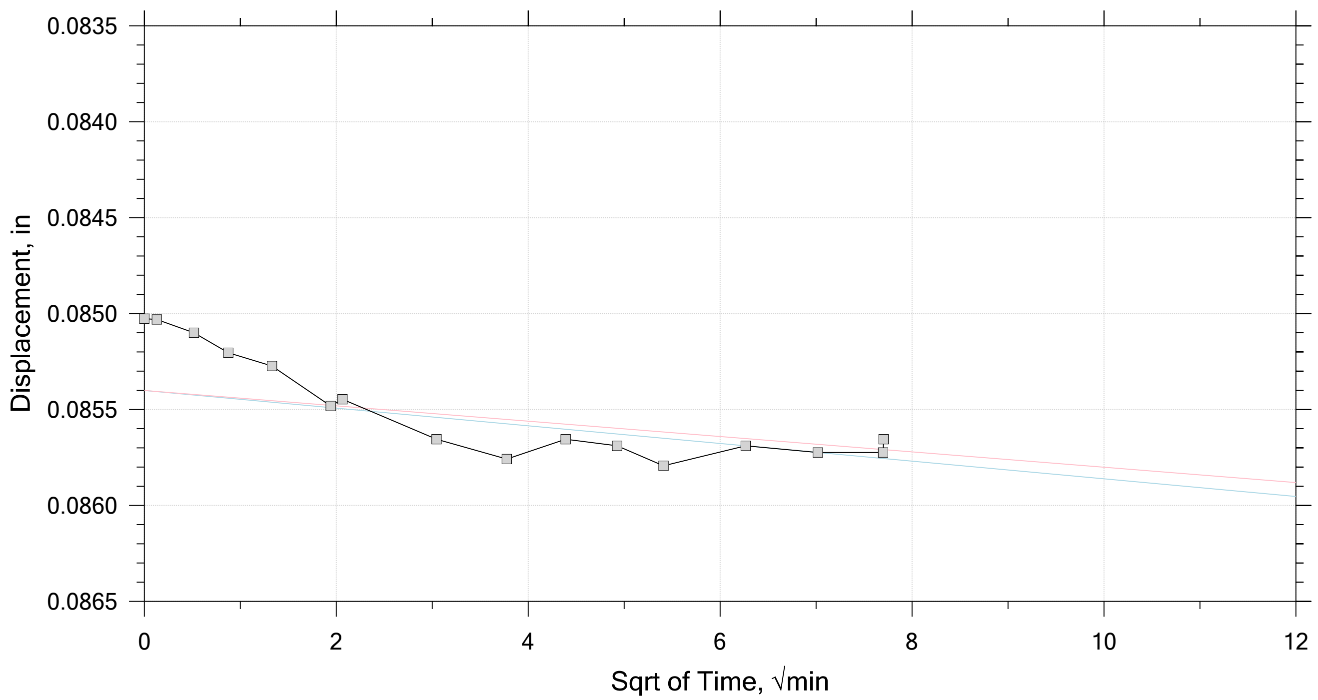


Soil Metrics LLC	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 19
Constant Load Step
Stress: 400 psf





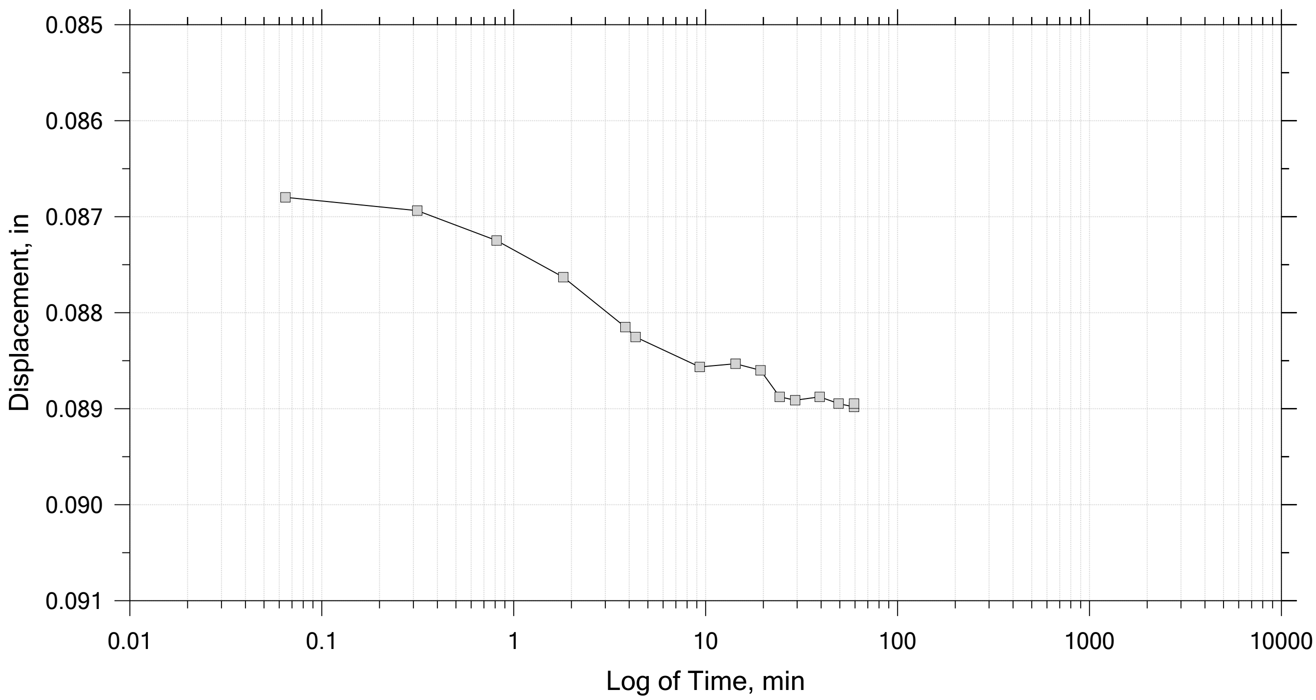
Soil Metrics LLC			
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

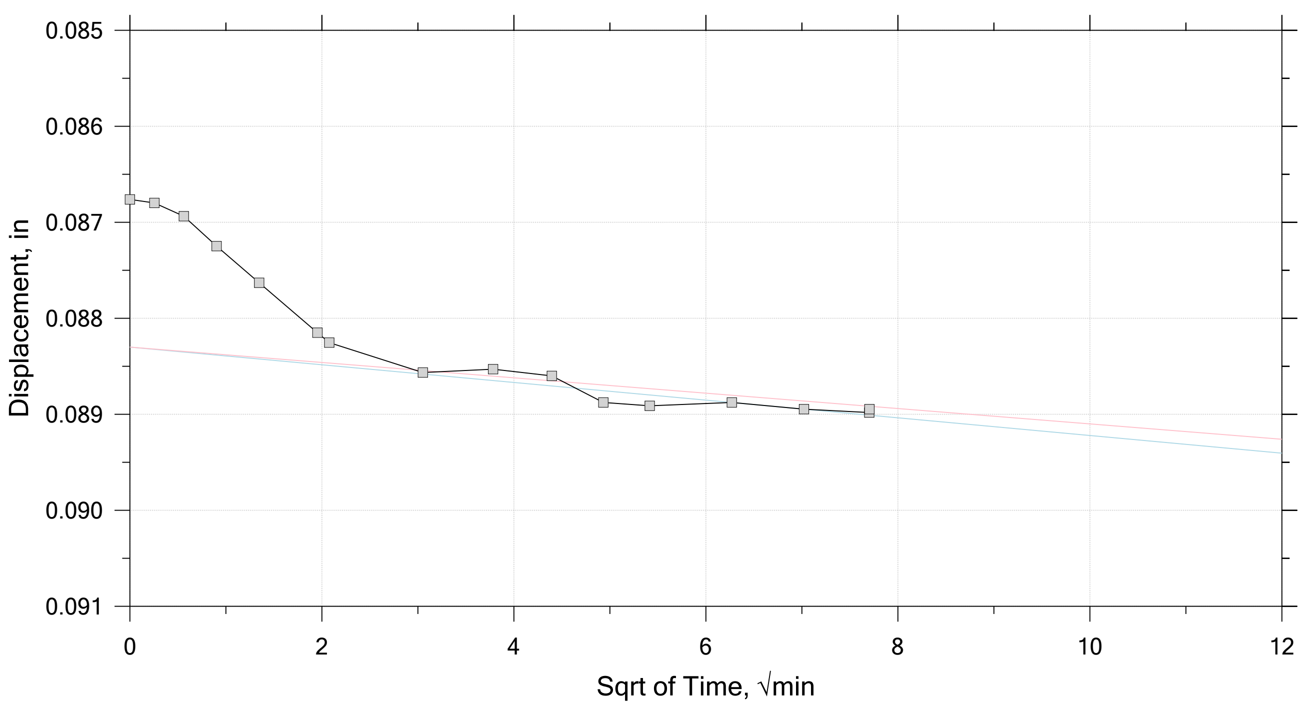
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 19

Constant Load Step

Stress: 600 psf





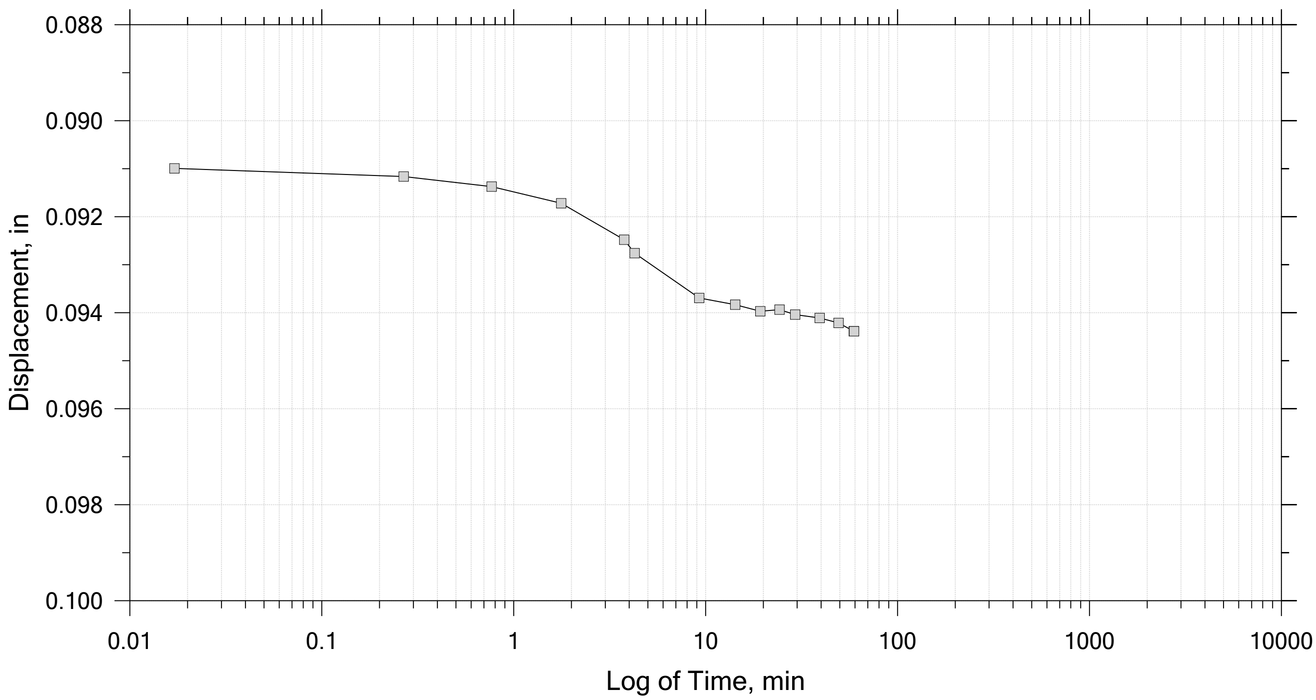
Soil Metrics LLC	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

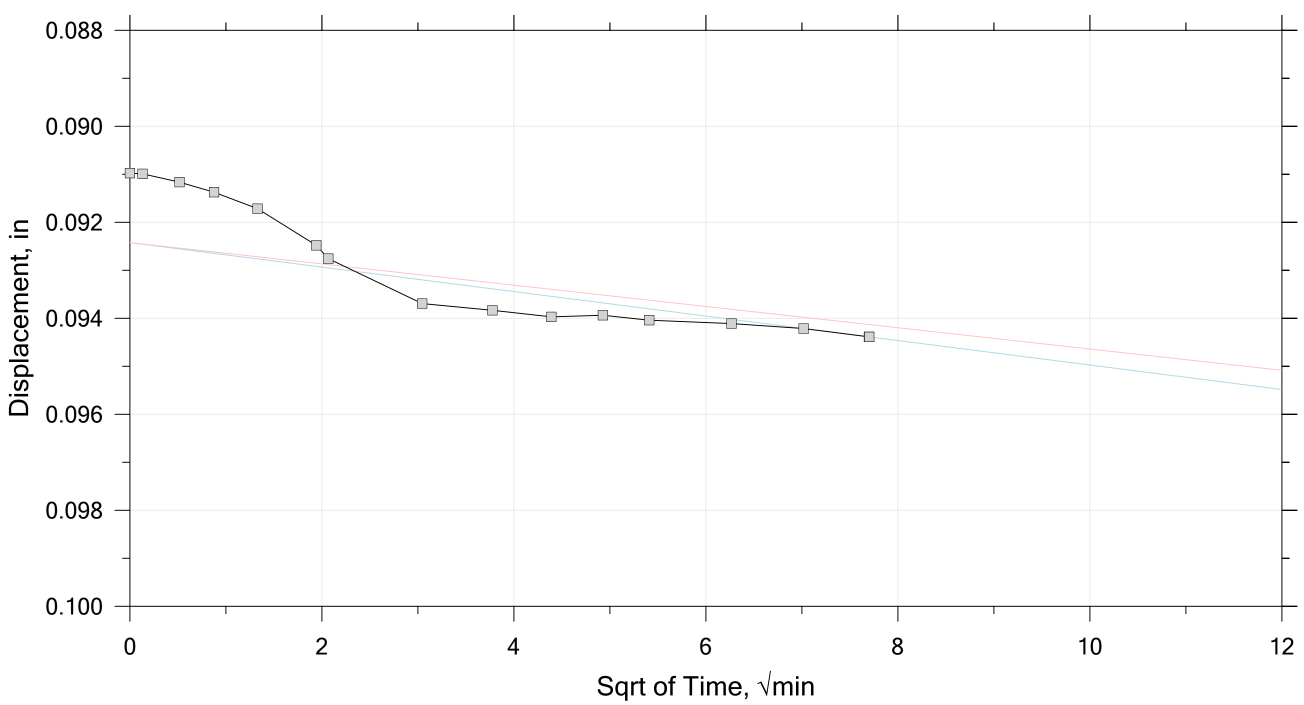
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 19

Constant Load Step

Stress: 900 psf

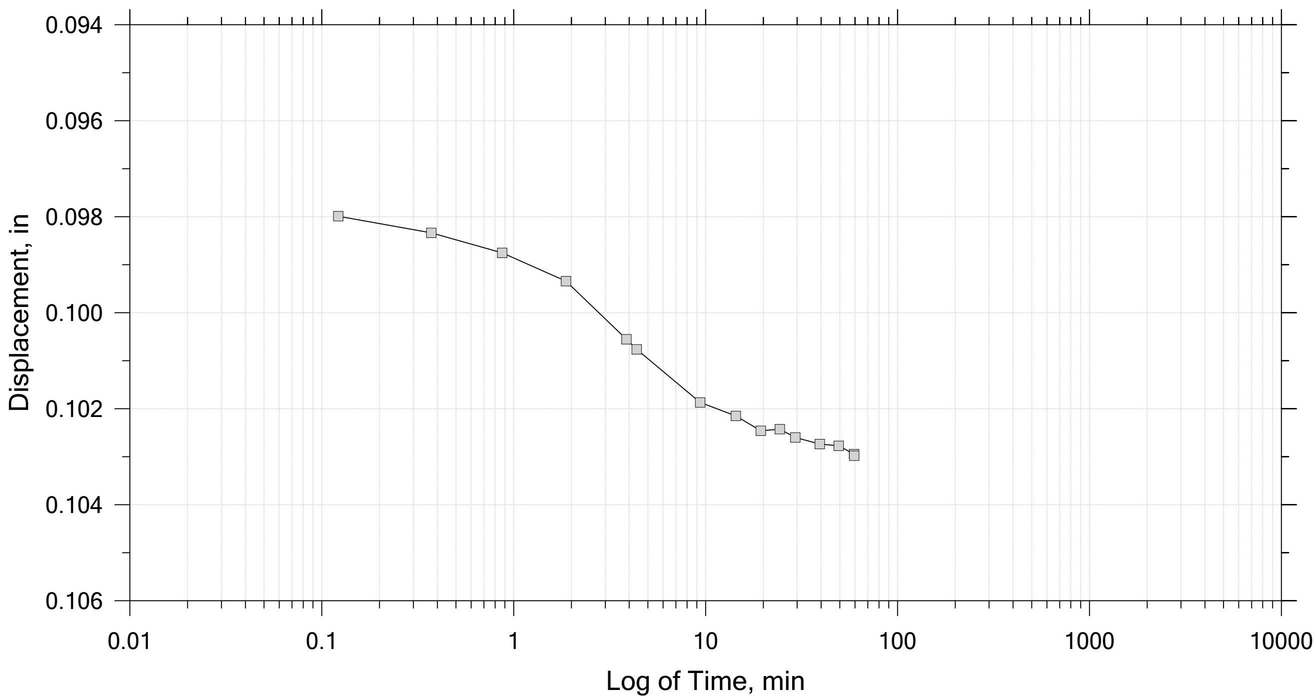


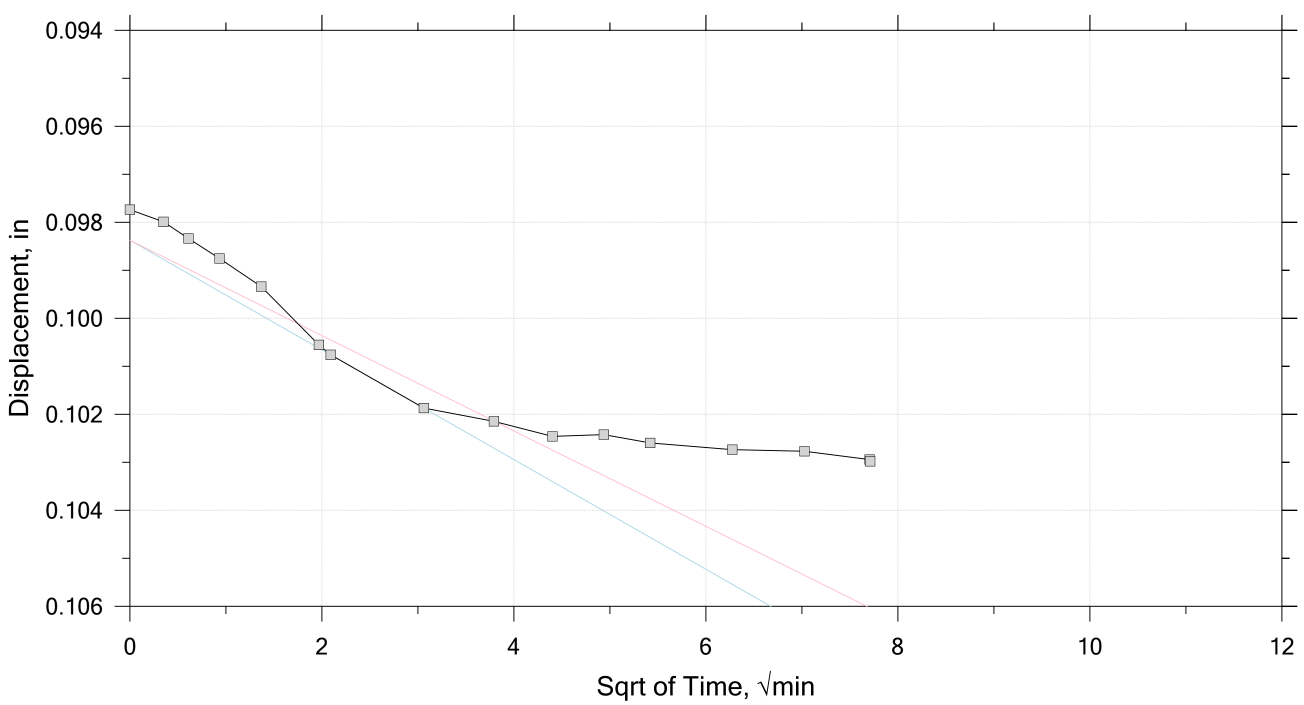


Soil Metrics LLC			
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

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

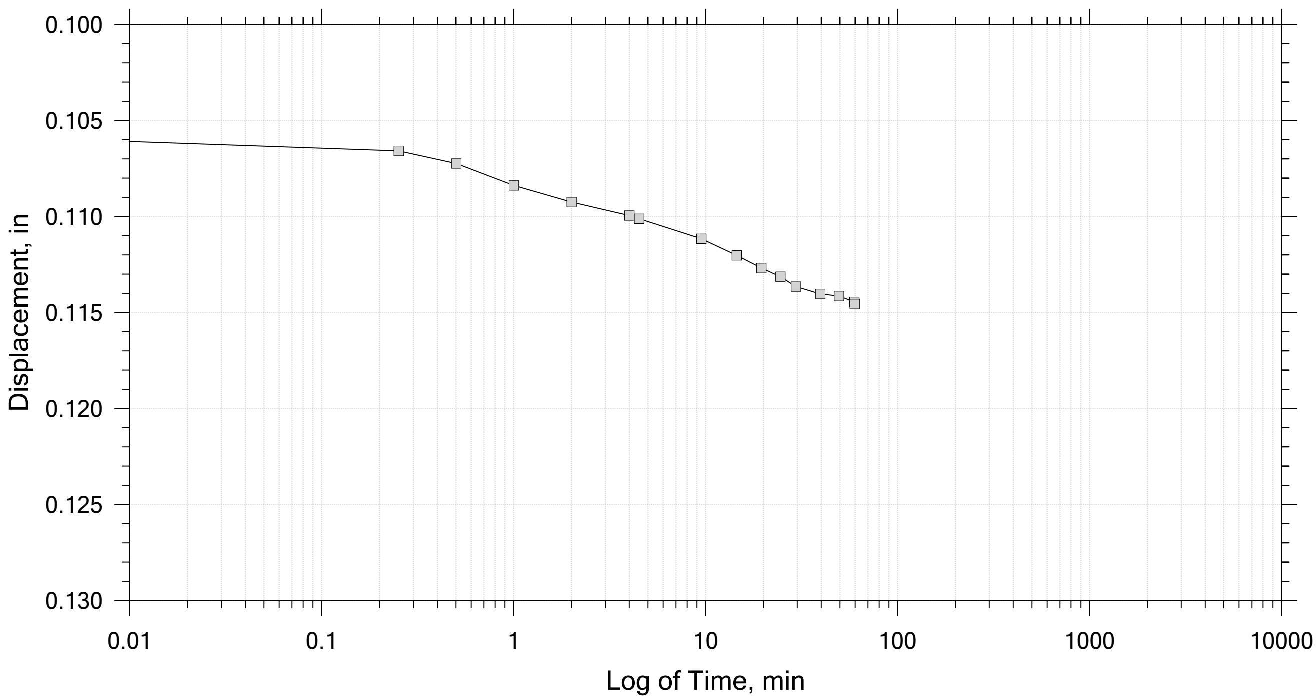


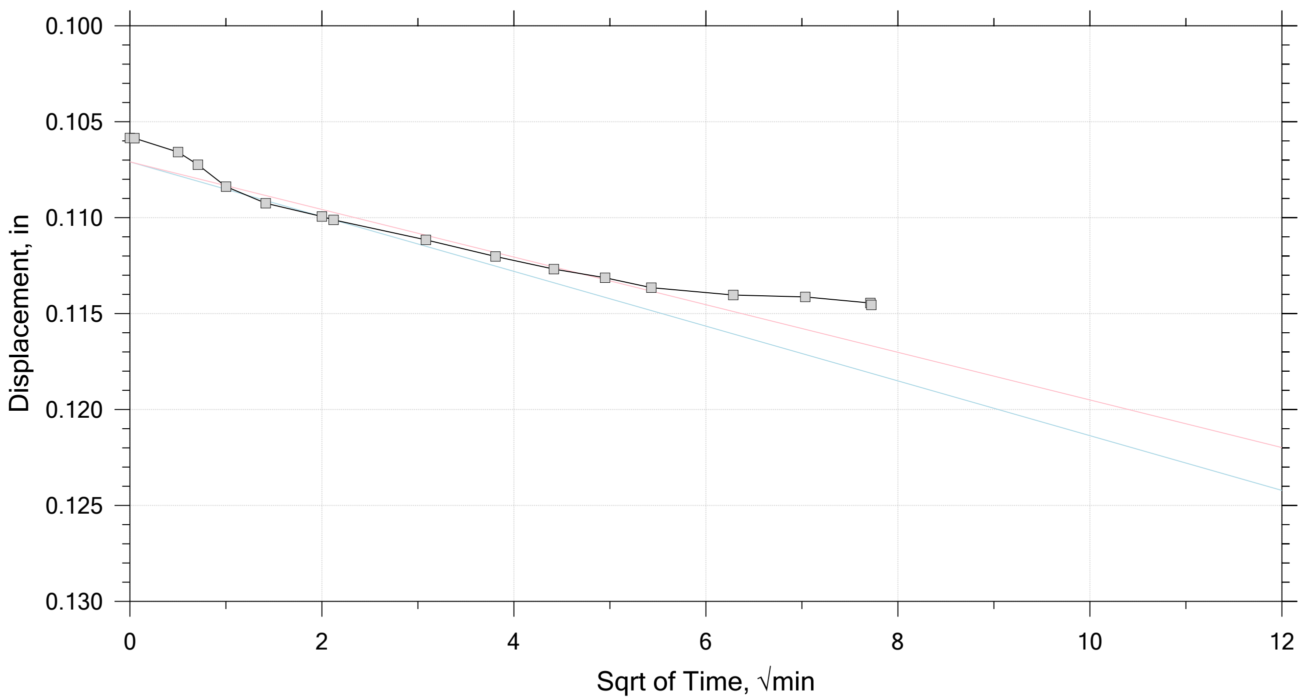


Soil Metrics LLC			
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

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

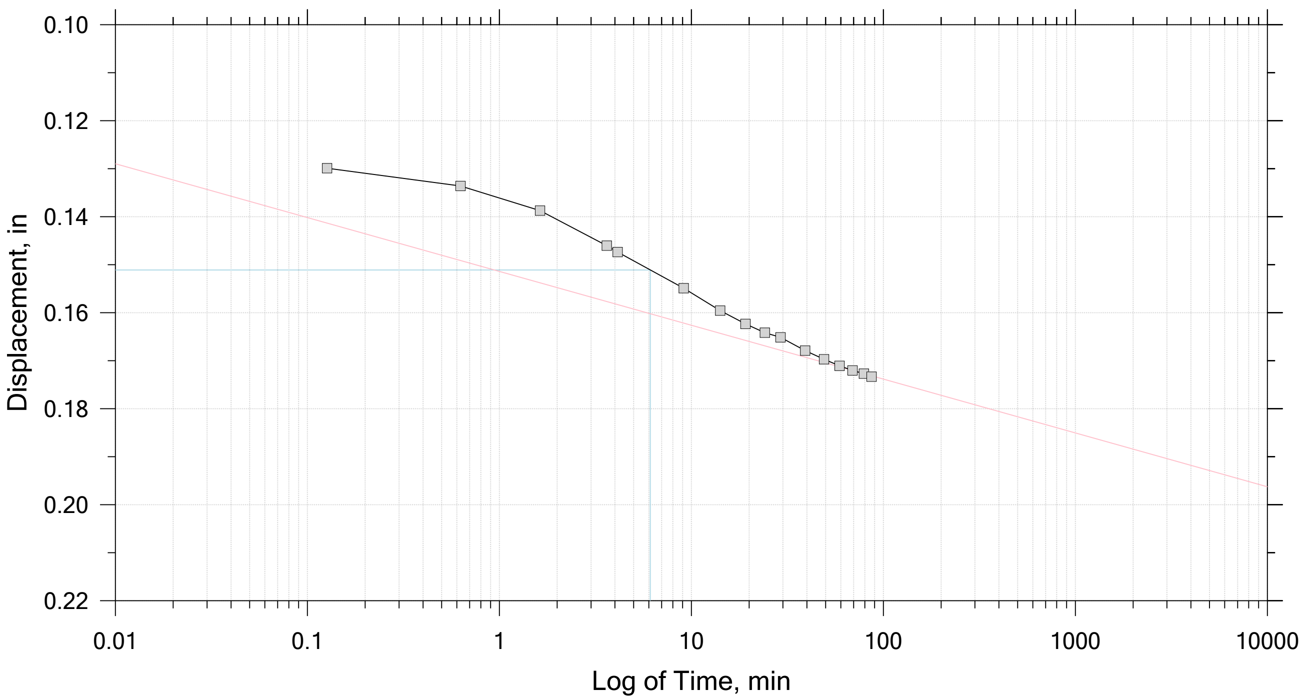


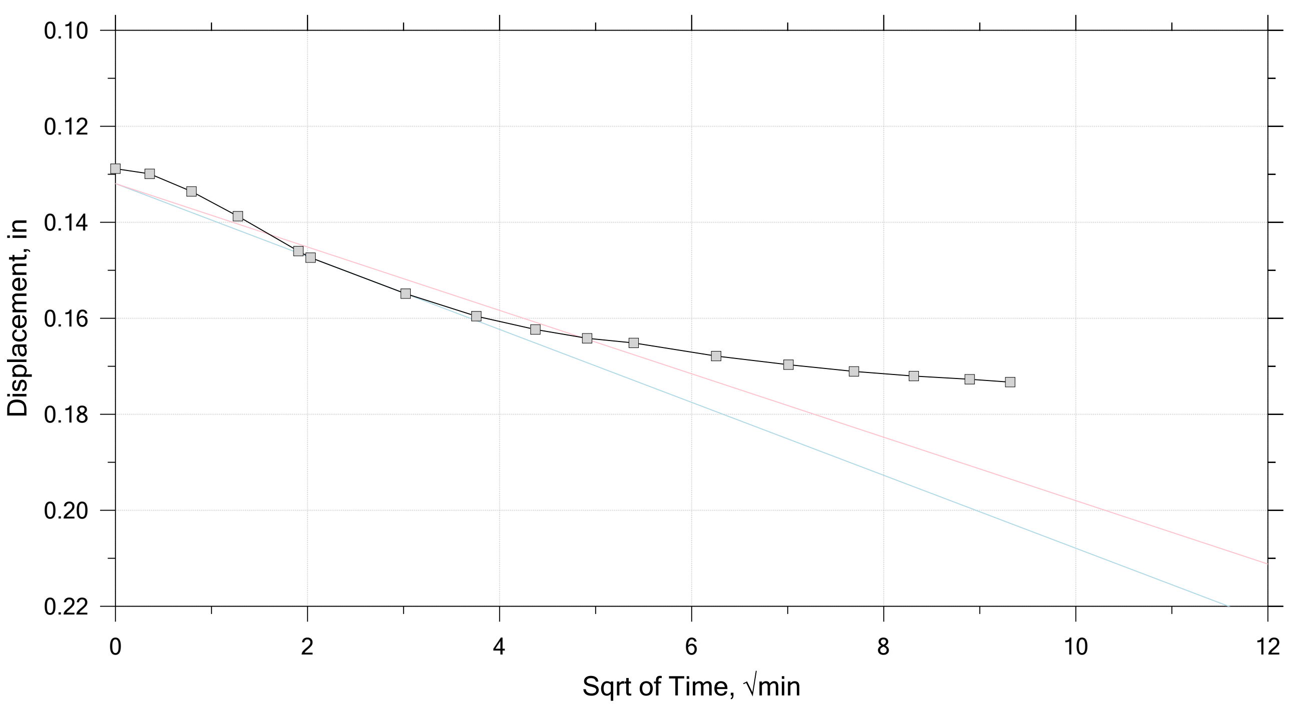


Soil Metrics LLC	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 16 of 19
Constant Load Step
Stress: 4e+03 psf





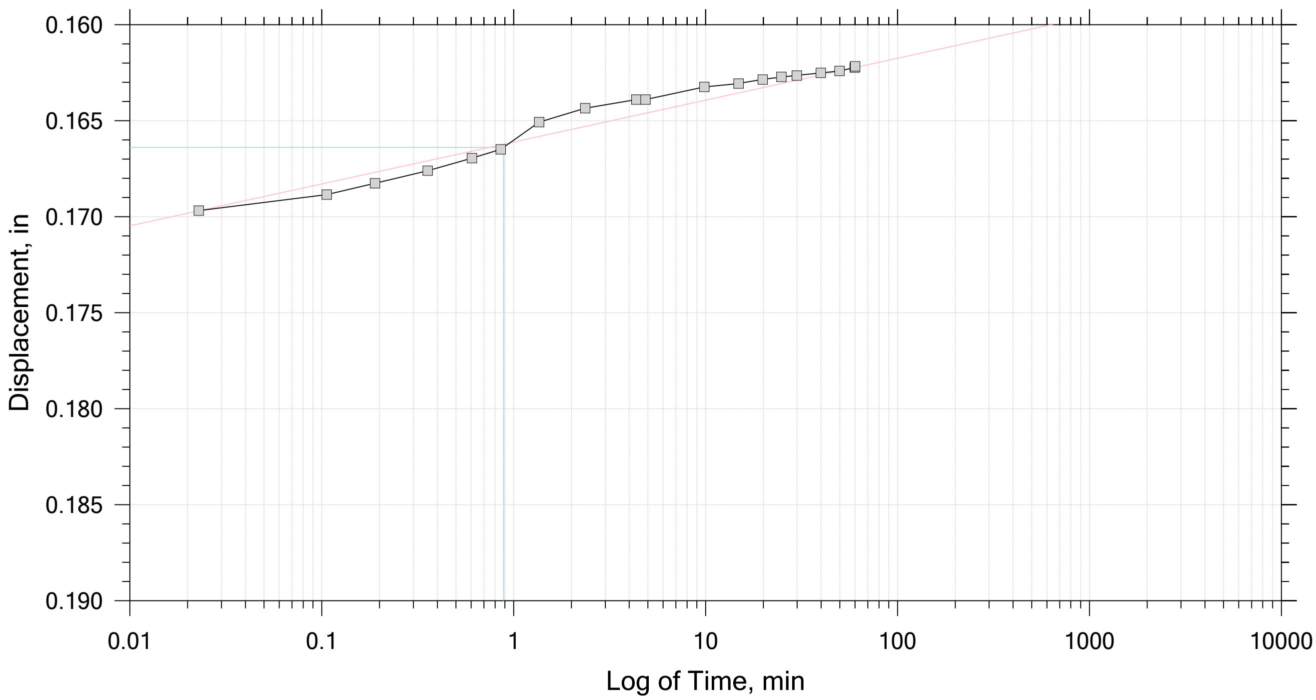
Soil Metrics LLC	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

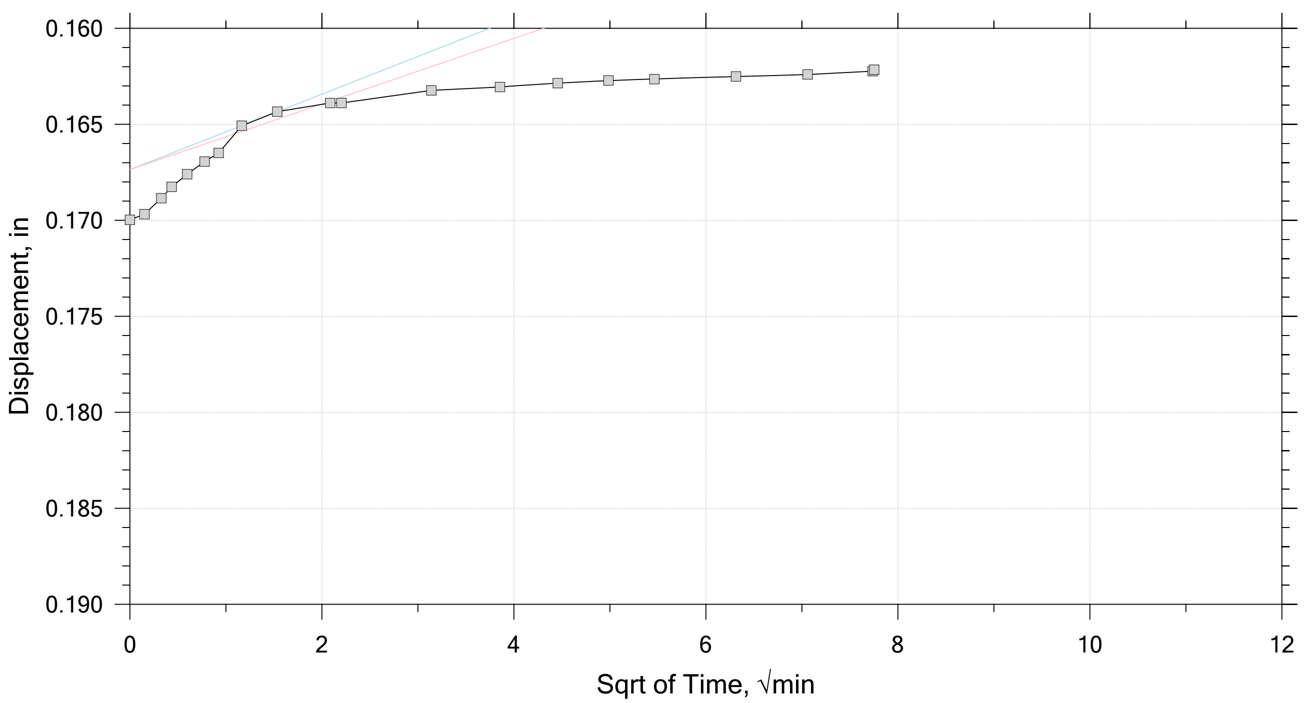
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 17 of 19

Constant Load Step

Stress: 1.35e+03 psf





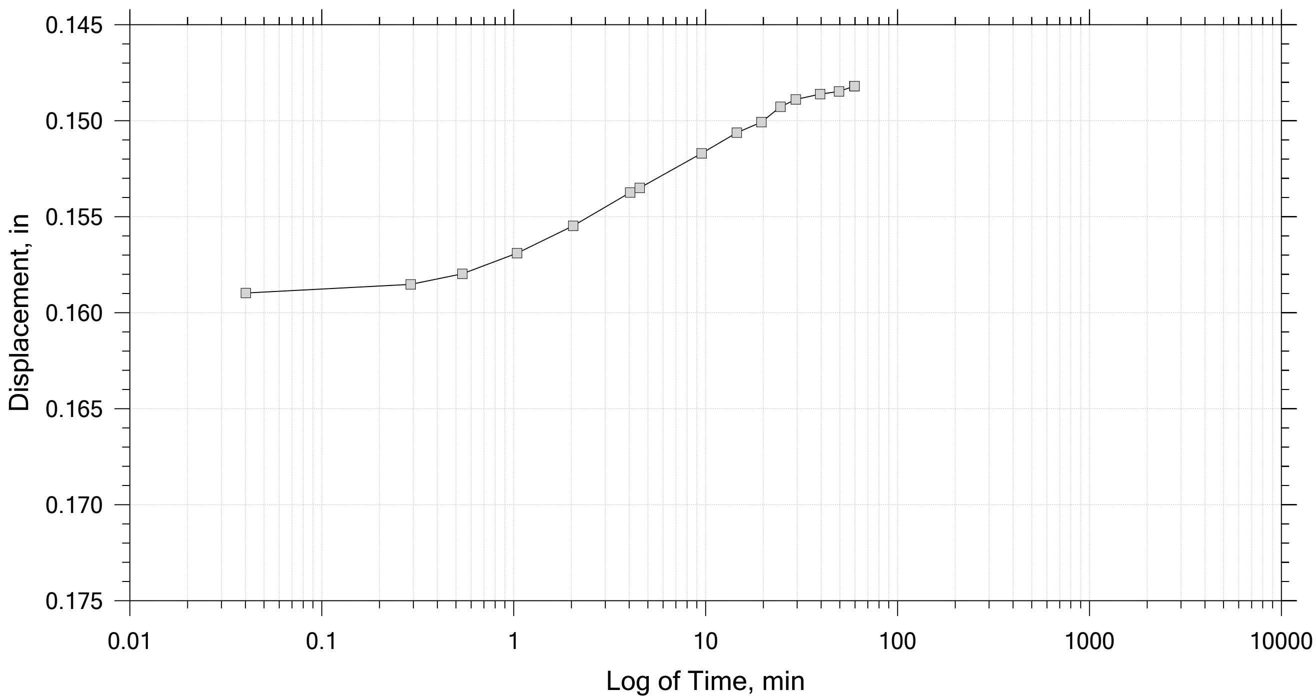
Soil Metrics LLC	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

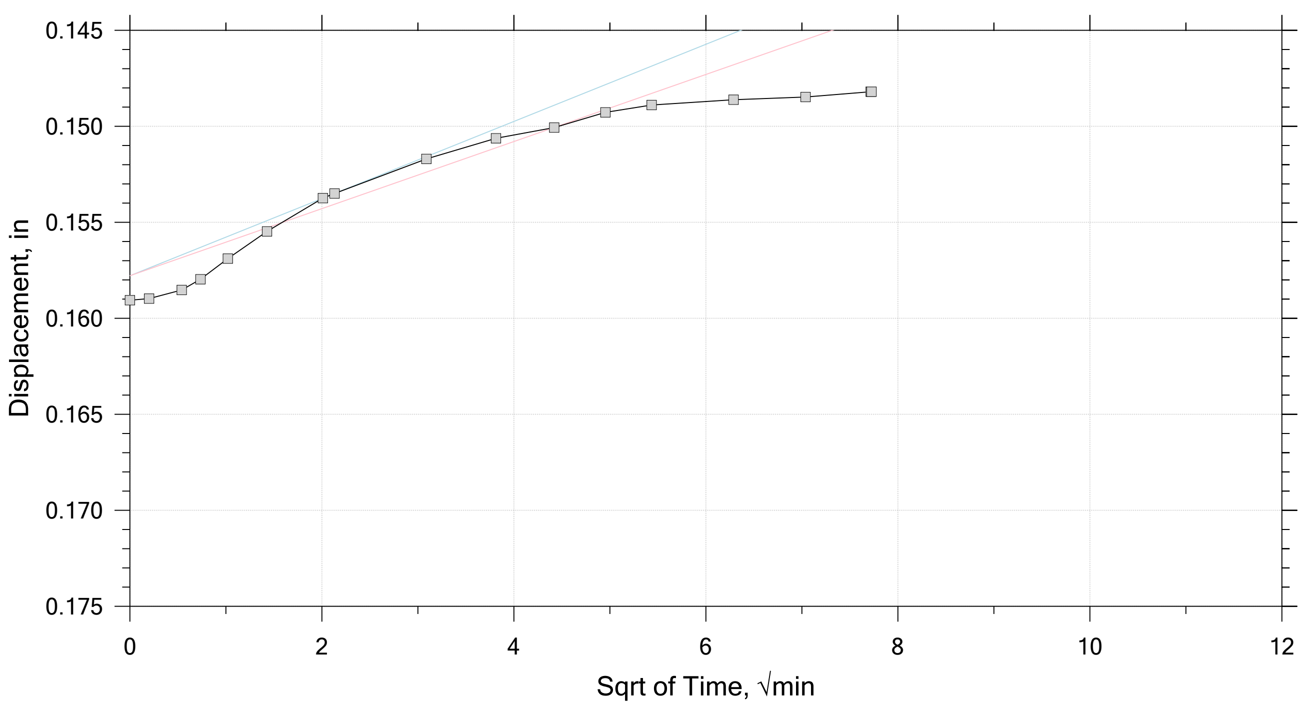
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 18 of 19

Constant Load Step

Stress: 600 psf





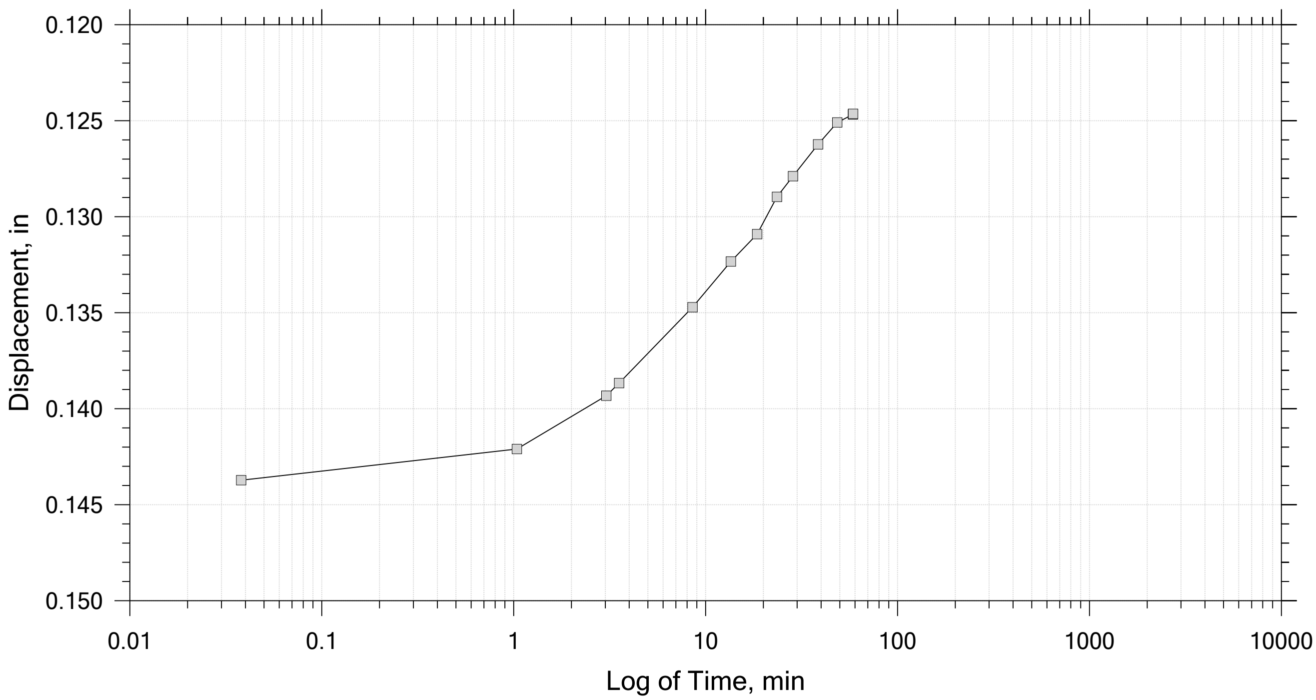
Soil Metrics LLC	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

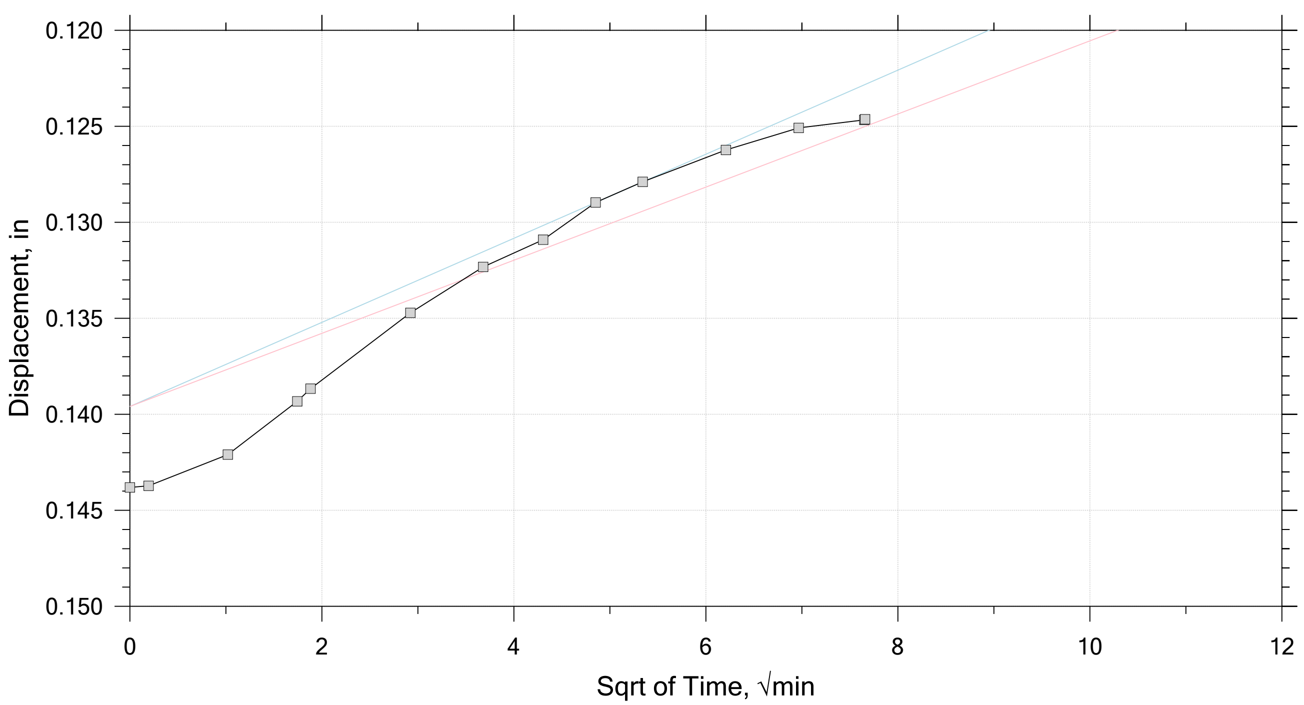
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 19 of 19

Constant Load Step

Stress: 200 psf





Soil Metrics LLC			
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter, in: 2.50	Specific Gravity: 2.64 (Implied)	Liquid Limit: 0
Specimen Height, in: 1.00	Initial Void Ratio: 2.32	Plastic Limit: 0
Final Height, in: 0.88	Final Void Ratio: 1.91	Plasticity Index: 0

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	209	---	"ring"	306
Mass Container, gm	36.67	111.11	111.11	60.86
Mass Container + Wet Soil, gm	125	230.35	222.04	171.73
Mass Container + Dry Soil, gm	84.78	175.46	175.46	125.18
Mass Dry Soil, gm	48.11	64.355	64.355	64.32
Water Content, %	83.60	85.29	72.37	72.37
Void Ratio	---	2.32	1.91	---
Degree of Saturation, %	---	96.94	100.00	---
Dry Unit Weight, pcf	---	49.617	56.641	---

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: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	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.	0.002079	2.32	0.207	0.000	0.00e+00	4.14e+04	0.00e+00
2	200.	0.006387	2.30	0.636	19.688	1.08e-01	8.57e+04	1.02e-07
3	400.	0.01519	2.27	1.51	24.166	8.67e-02	8.76e+04	8.36e-08
4	600.	0.02367	2.25	2.35	58.178	3.54e-02	8.44e+04	3.29e-08
5	900.	0.03538	2.21	3.52	53.041	3.80e-02	7.77e+04	3.25e-08
6	1.35e+03	0.05748	2.13	5.72	56.769	3.43e-02	9.78e+04	3.69e-08
7	2.02e+03	0.1071	1.97	10.7	298.590	6.04e-03	1.46e+05	9.74e-09
8	900.	0.1021	1.99	10.2	4.388	3.92e-01	8.83e+03	3.81e-08
9	600.	0.1003	1.99	9.98	47.498	3.65e-02	1.21e+04	4.84e-09
10	200.	0.08416	2.05	8.37	39.224	4.50e-02	8.03e+04	3.98e-08
11	400.	0.08573	2.04	8.53	11.749	1.53e-01	1.56e+04	2.63e-08
12	600.	0.08895	2.03	8.85	44.867	3.98e-02	3.20e+04	1.40e-08
13	900.	0.09439	2.01	9.39	41.294	4.28e-02	3.61e+04	1.70e-08
14	1.35e+03	0.1026	1.99	10.2	14.506	1.20e-01	3.65e+04	4.83e-08
15	2.02e+03	0.1141	1.95	11.4	22.038	7.73e-02	3.39e+04	2.89e-08
16	4.00e+03	0.1702	1.76	16.9	23.478	6.72e-02	5.65e+04	4.18e-08
17	1.35e+03	0.1603	1.79	15.9	3.902	3.83e-01	7.47e+03	3.15e-08
18	600.	0.1486	1.83	14.8	19.418	7.90e-02	3.10e+04	2.70e-08
19	200.	0.1246	1.91	12.4	50.322	3.18e-02	1.19e+05	4.16e-08

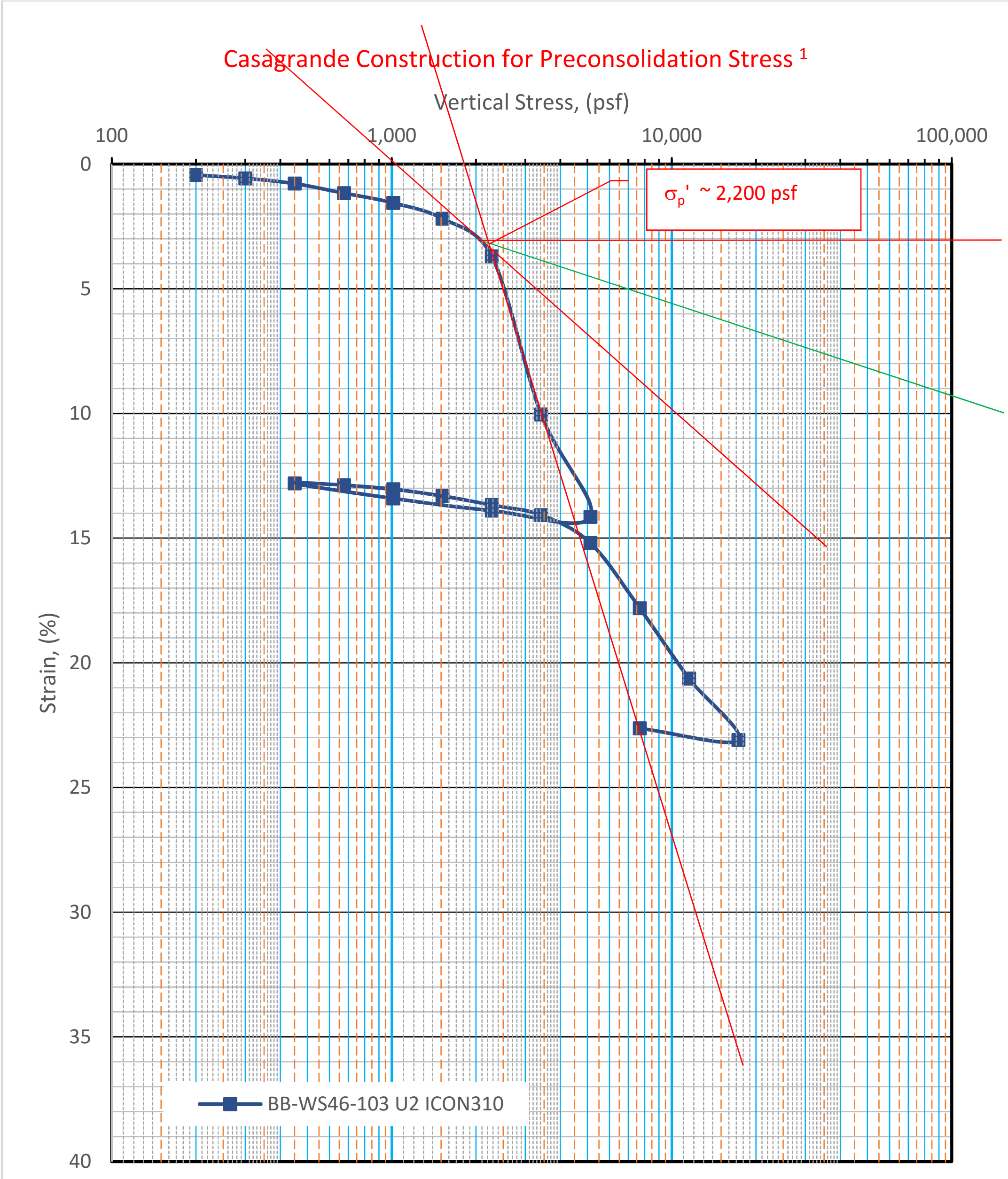
Soil Metrics LLC			
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/2/19	Depth: 17.83
	Test Number: ICON311	Preparation: Shelby Tube	Elevation: -14.83
	Description: Brown Organic Silt		
	Remarks:		
	Displacement at End of Primary		

ICON: BB-WS46-103 2U

Consolidation Test Data
Summary Report

Project Name:	Woolwich Bridge No 3039
Project Number:	166-12
Project Location:	Woolwich, Maine
Client:	GZA Proj. No. 09.0026035.00
Sample Description:	Gray Silty Clay
Preparation:	Trimmed Shelby Tube

Lab Test No:	ICON 310			
Boring No.	BB-WS46-103			
Sample No:	2U			
Boring Elevation (ft).	3.0			
Sample Depth (ft):	45 - 47			
Test Specimen Depth (Ft):	46.65			
Test Specimen Elevation:	-43.65			
Water Content (%):	46.8			
Dry Unit Weight (pcf):	75.13			
Wet Unit Weight (pcf):	110.29			
Saturation Before (%):	96.94			
Saturation After (%):	100			
Void Ratio Before:	1.39			
Void Ratio After:	0.91			
Overburden Pressure (psf):				
Max Previous stress (psf):	2,200			
Max Prev. stress (Work) (psf):	2,150			
OCR:				
Compression Index (C_{CE}):	0.28 to 0.38	Depending on stress range		
Recompression Index (C_{RE}):	0.017			
Liquid Limit:	40.5			
Plastic Limit:	22.9			
Plasticity Index:	17.6			
Liquidity Index:	1.4			
Specific Gravity (implied)	2.87			
Lab Vane Su at 21 ft. (psf)				
Tested By:	sjr			
Date Tested:	11/17/2019			
Checked By:	sjr			

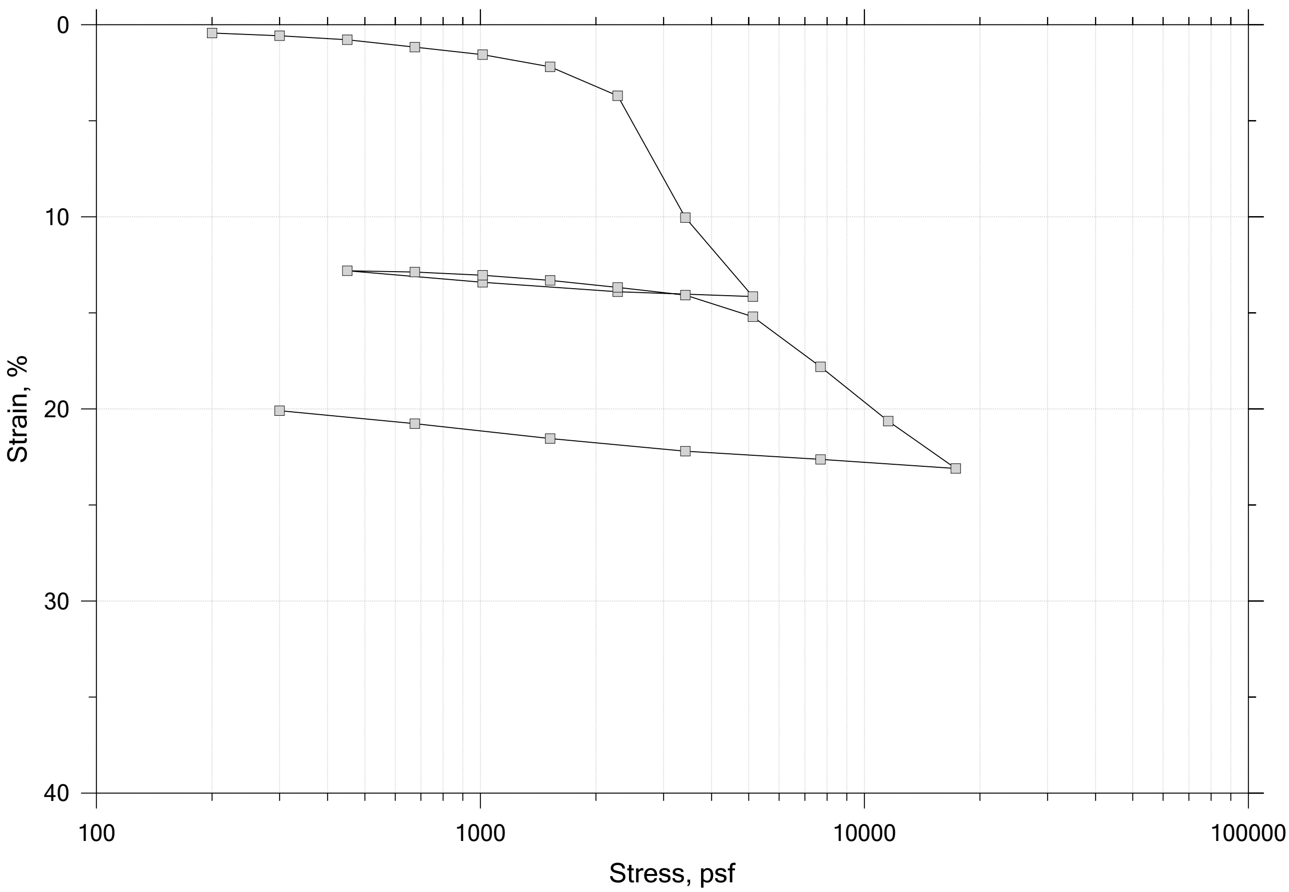


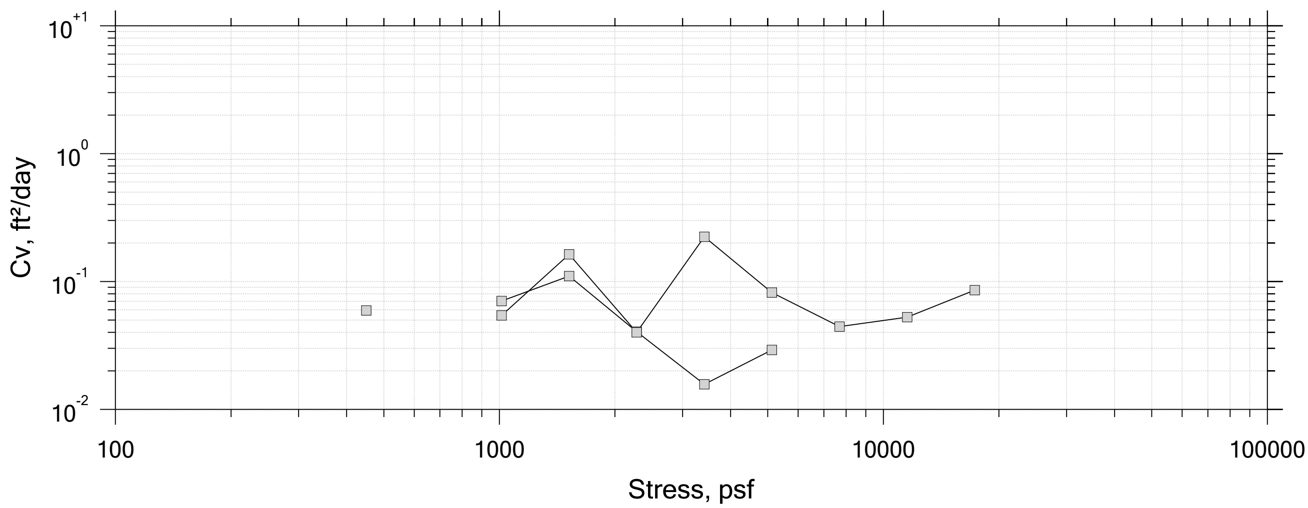
Note 1: The calculations for the Max Previous Stress, the Compression Index and the Recompression Index are provided for the convienience of the Specifier. The Specifier should make their own independent assessment of Maximum Previous stress, Cce and Cre for use in any engineering analyses.

Soil Metrics LLC Geotechnical Engineering

One-Dimensional Consolidation by ASTM D2435 - Method B

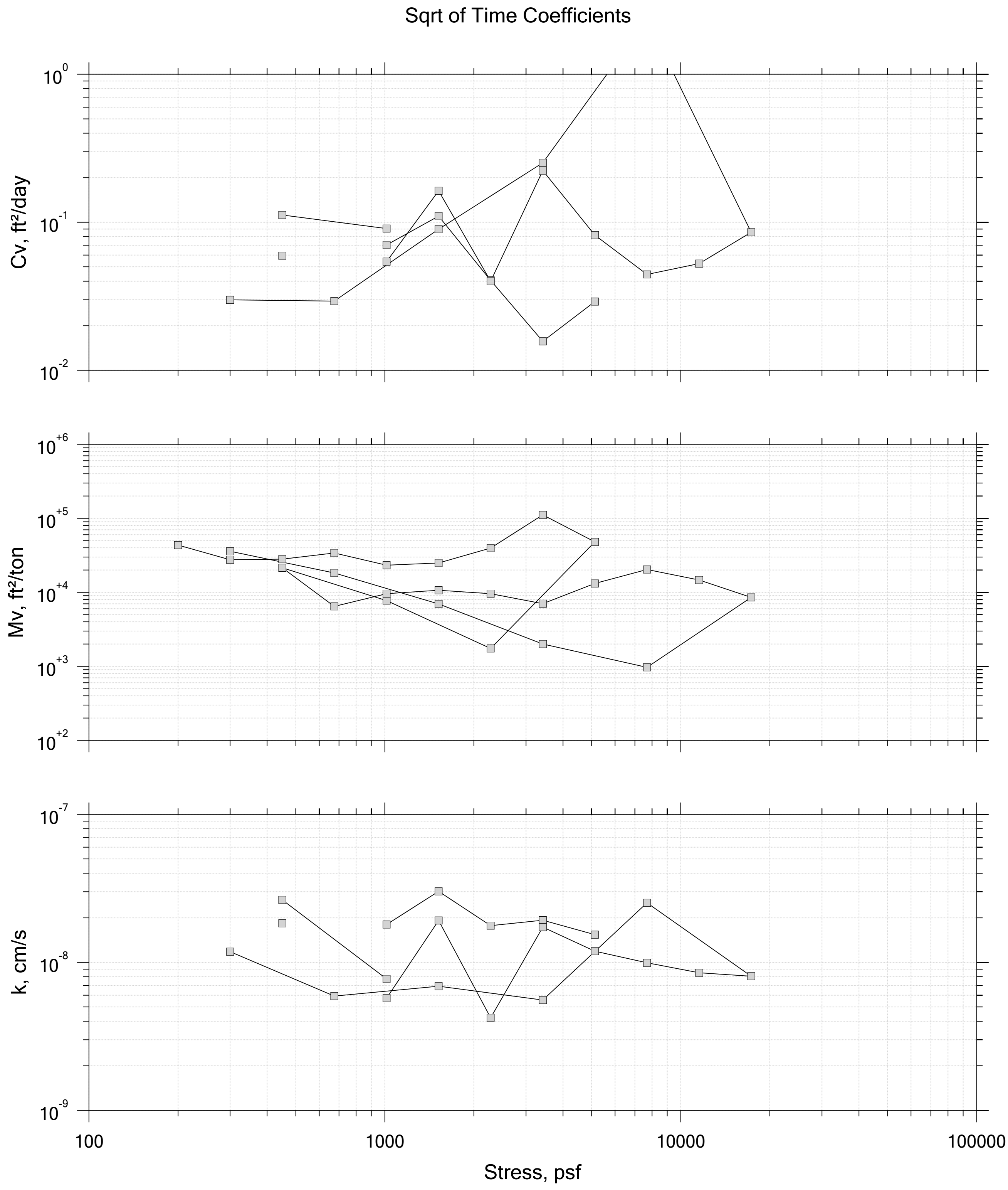
Summary Report





	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B



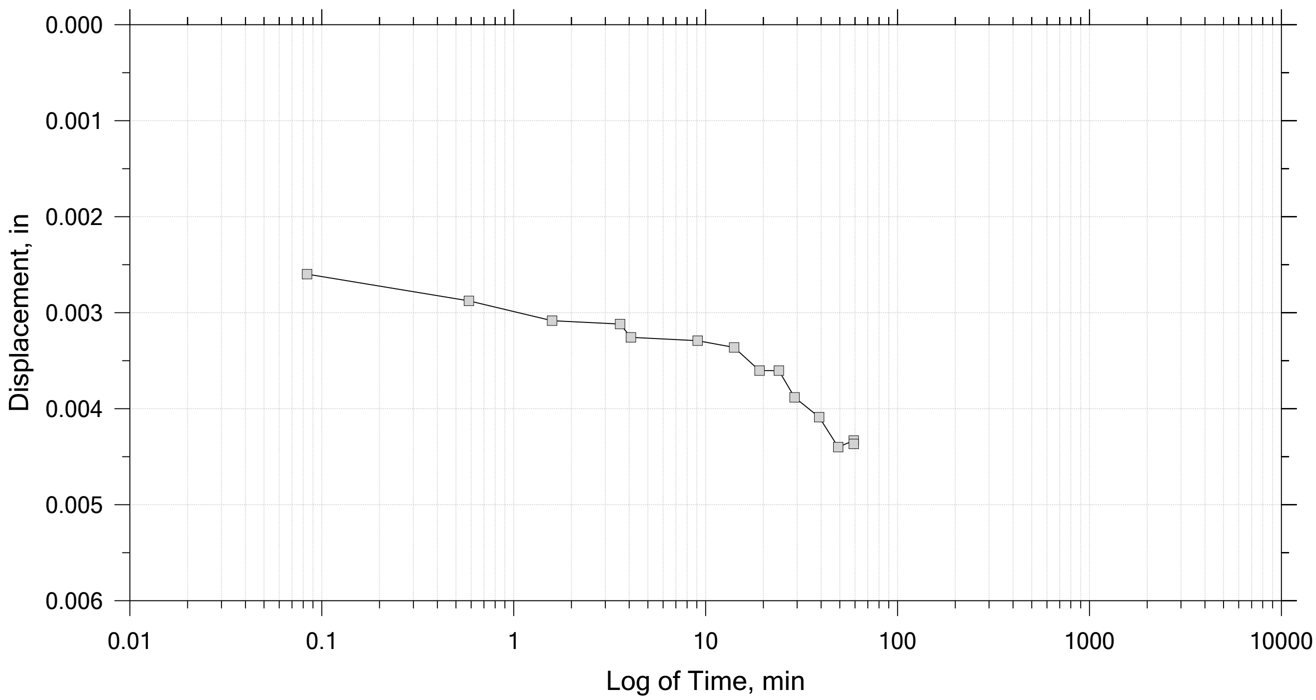
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

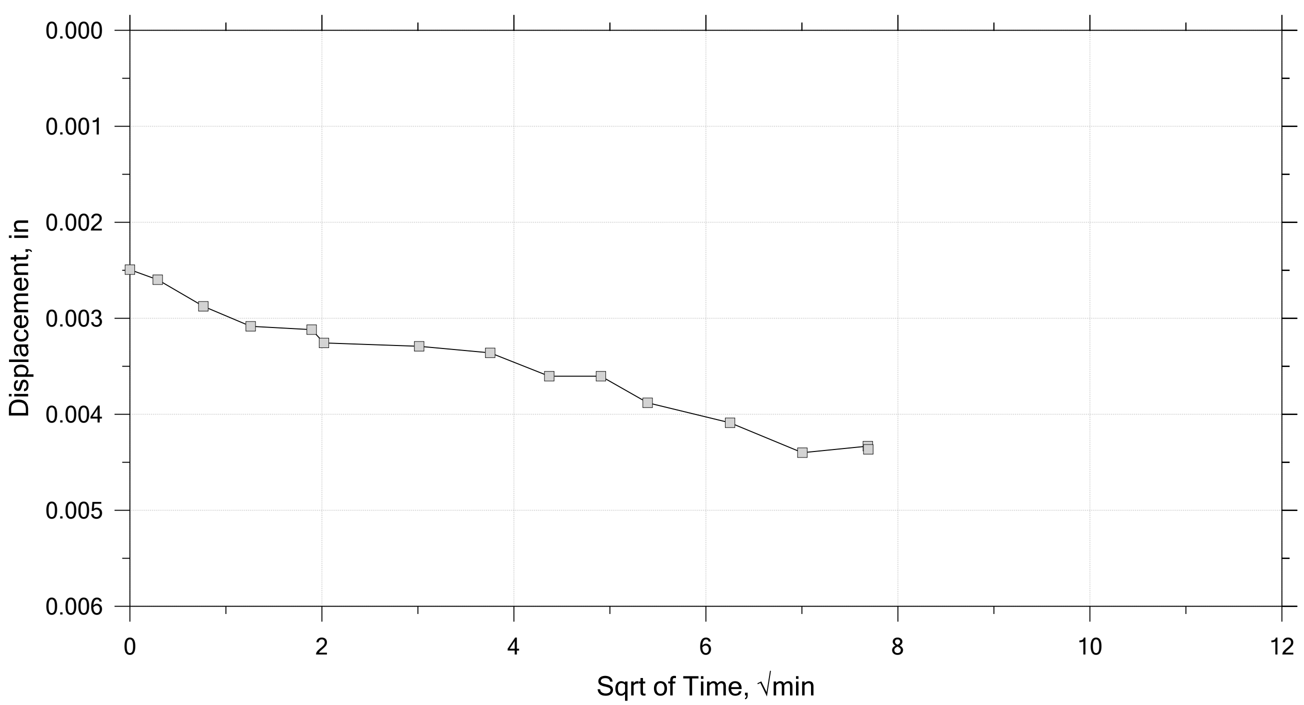
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 26

Constant Load Step

Stress: 200 psf





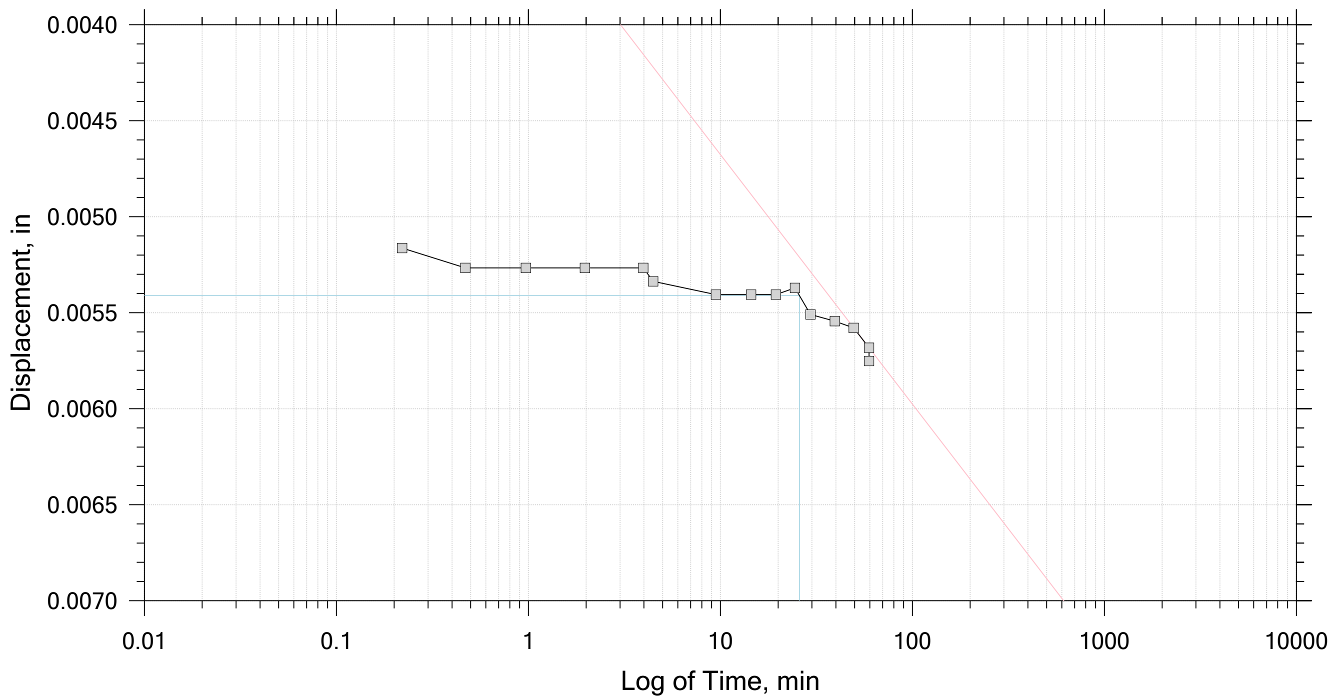
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

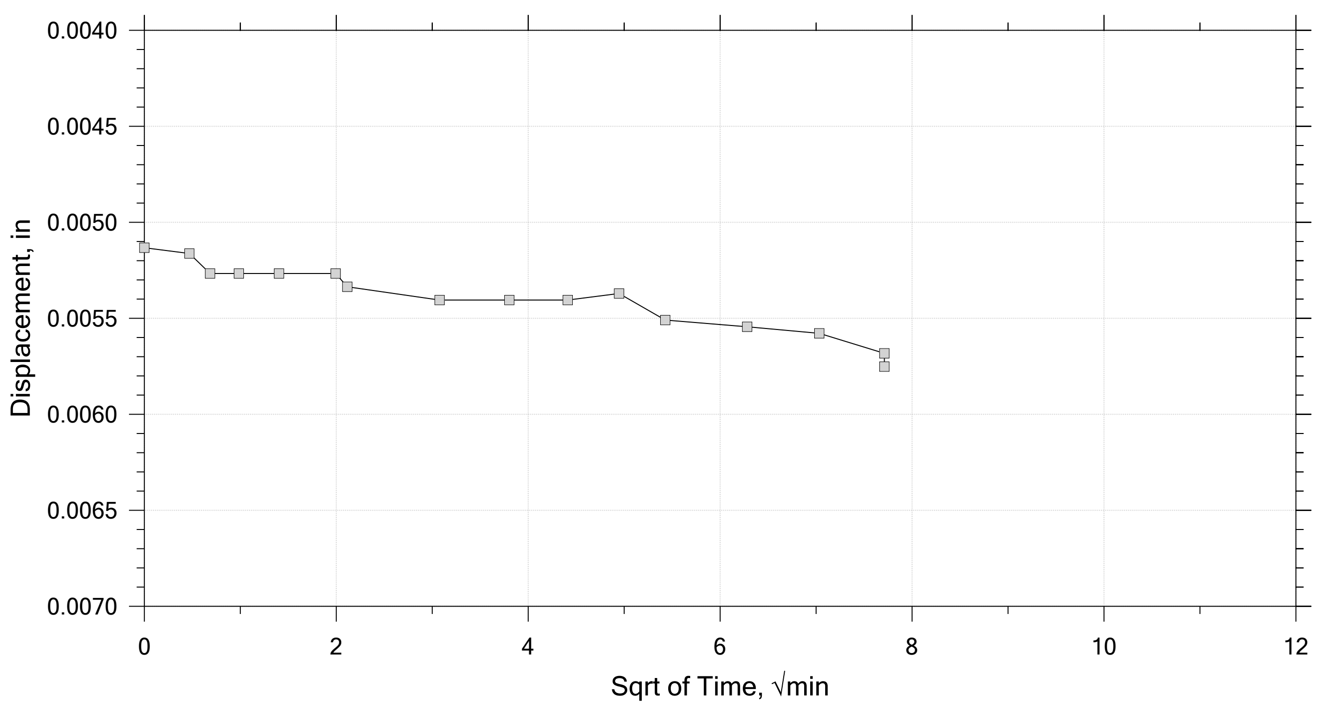
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 26

Constant Load Step

Stress: 300 psf





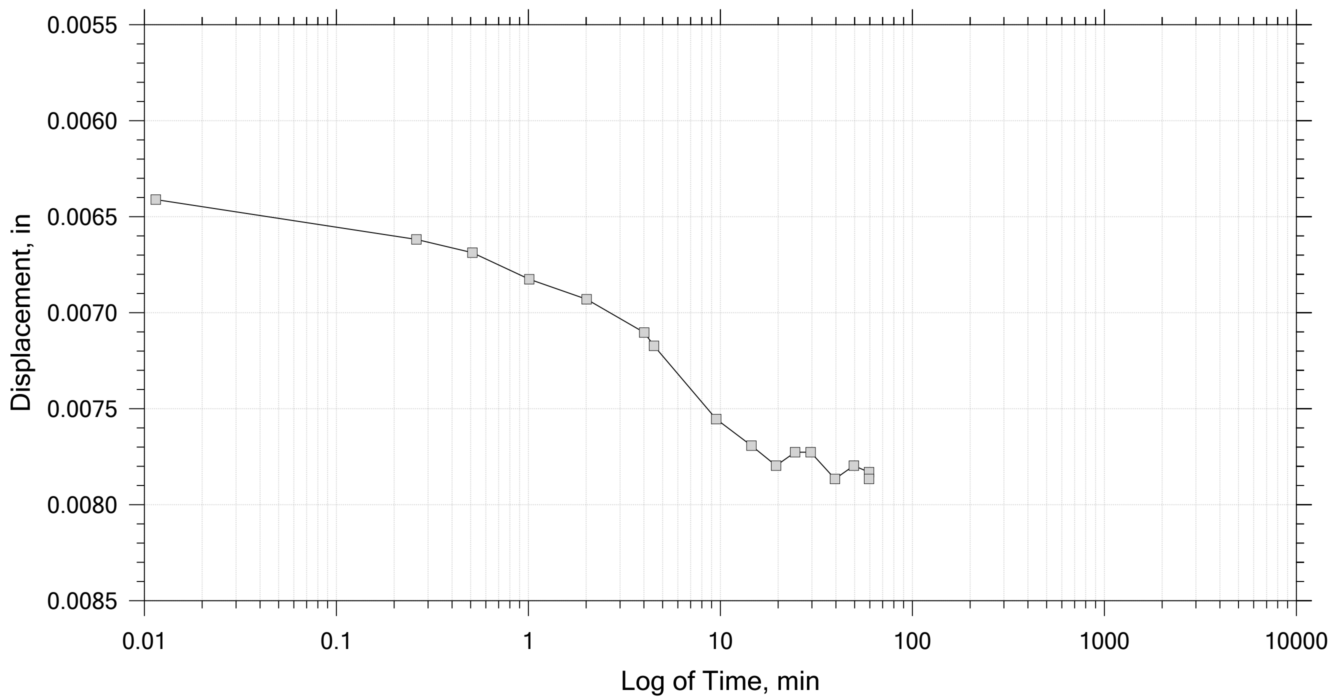
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

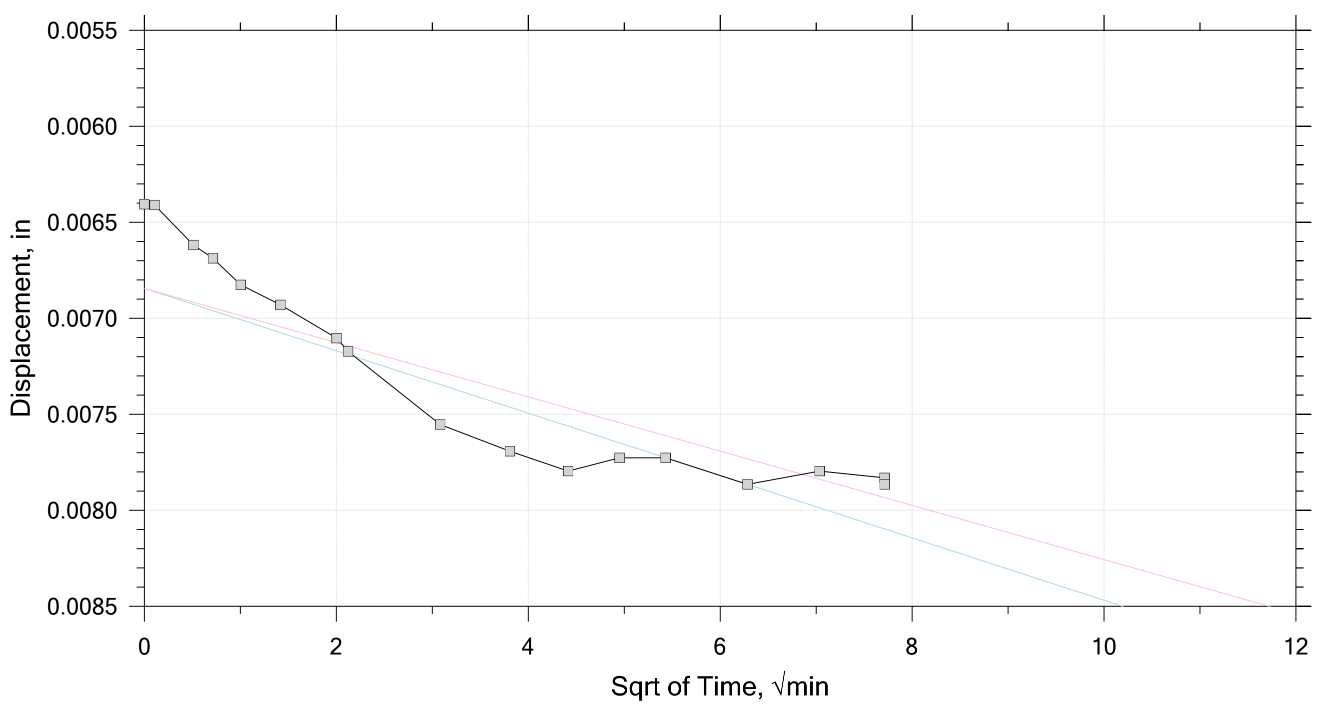
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 26

Constant Load Step

Stress: 450 psf

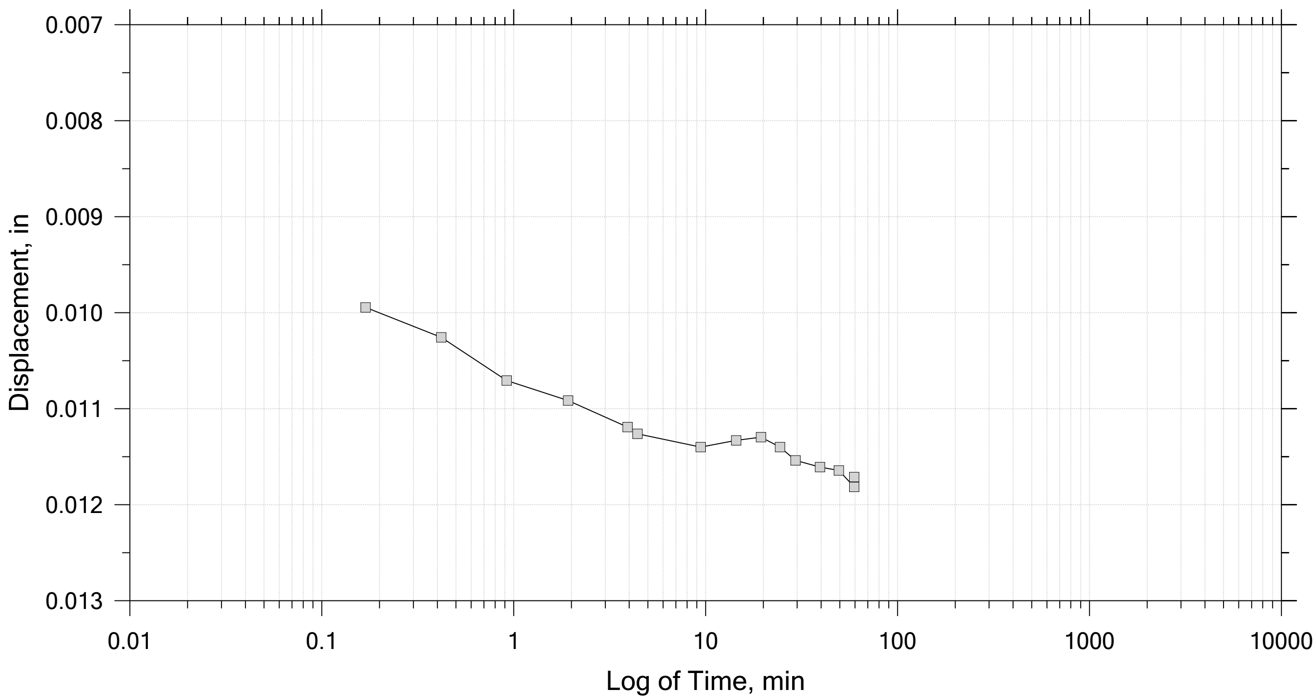


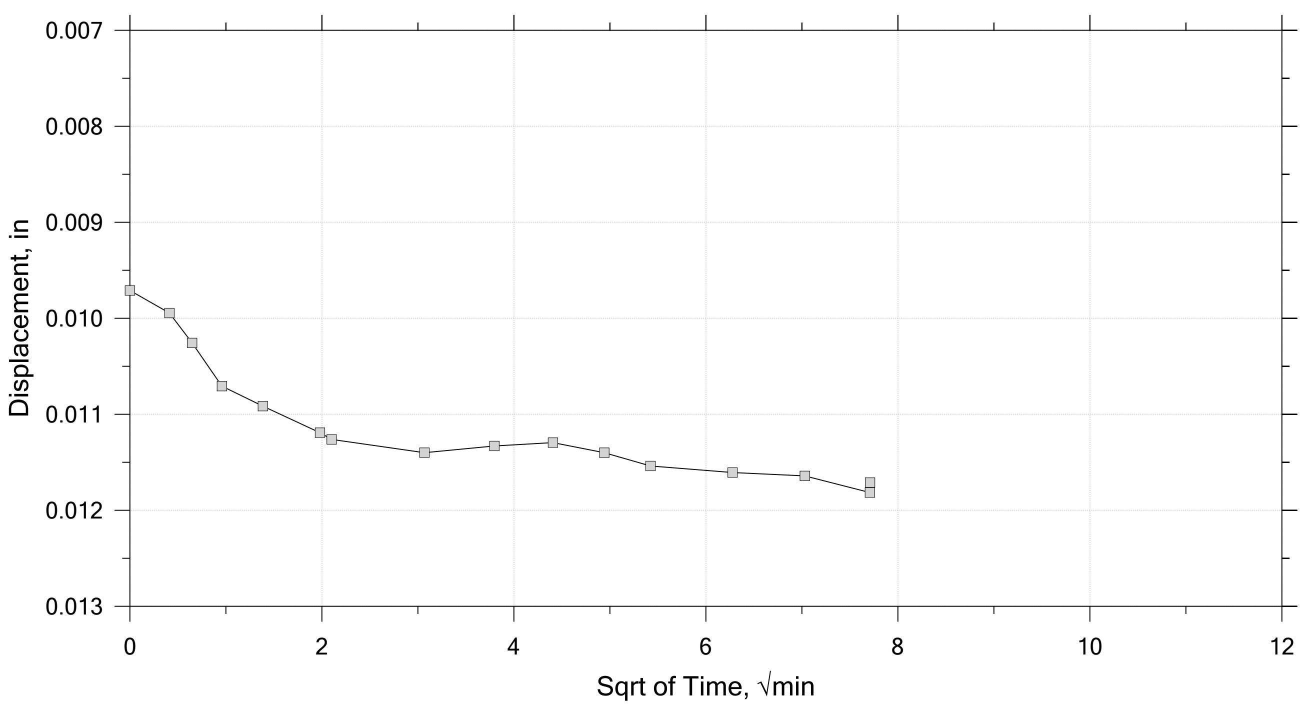


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 26
Constant Load Step
Stress: 675 psf





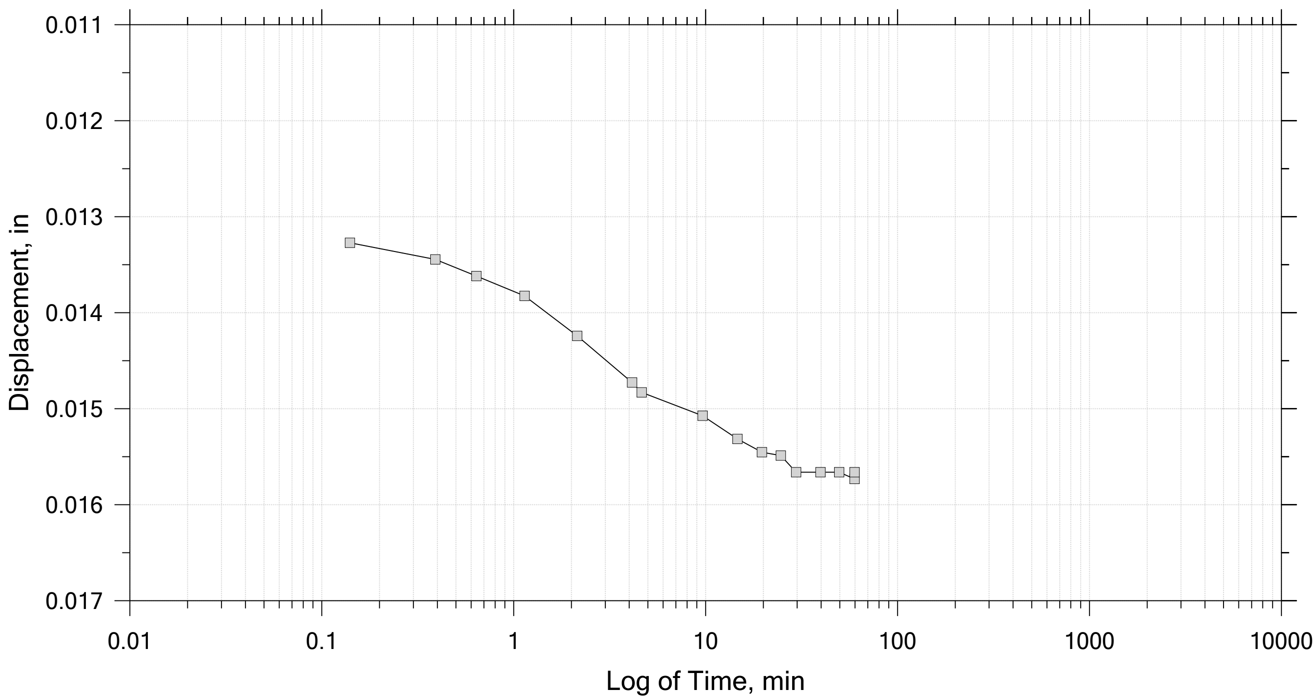
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

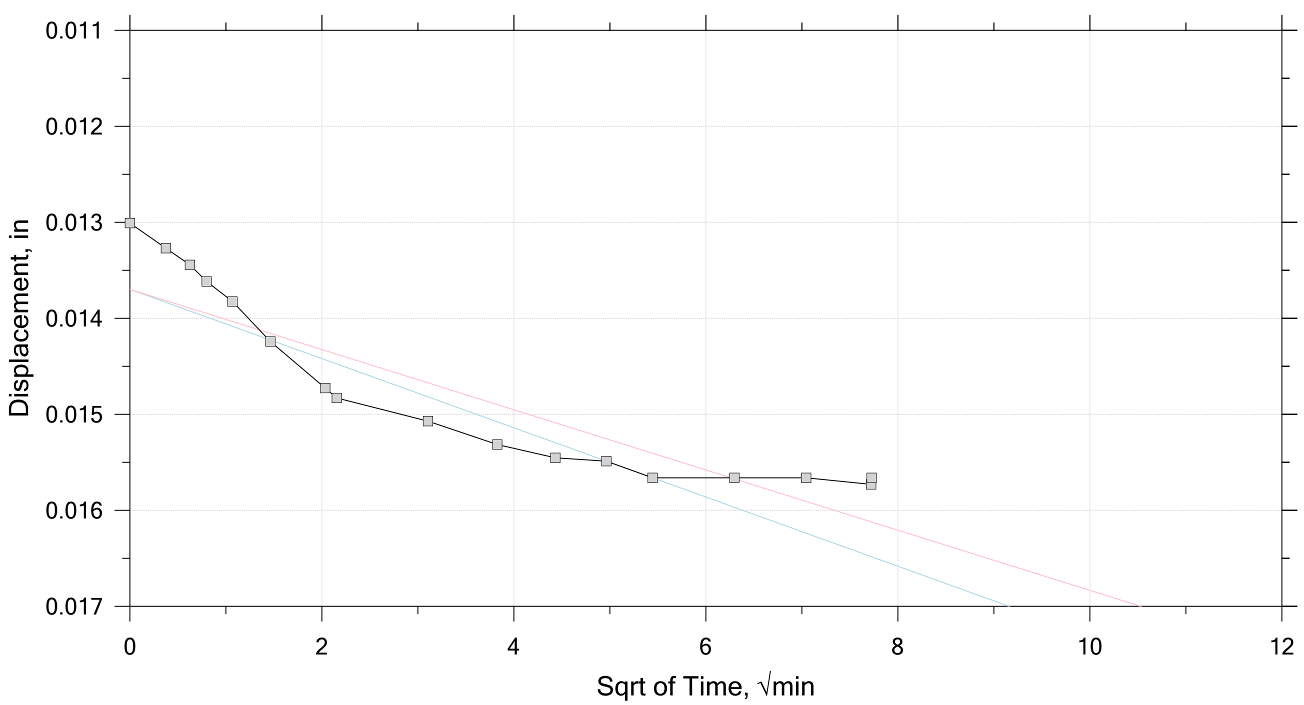
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 26

Constant Load Step

Stress: 1.01e+03 psf





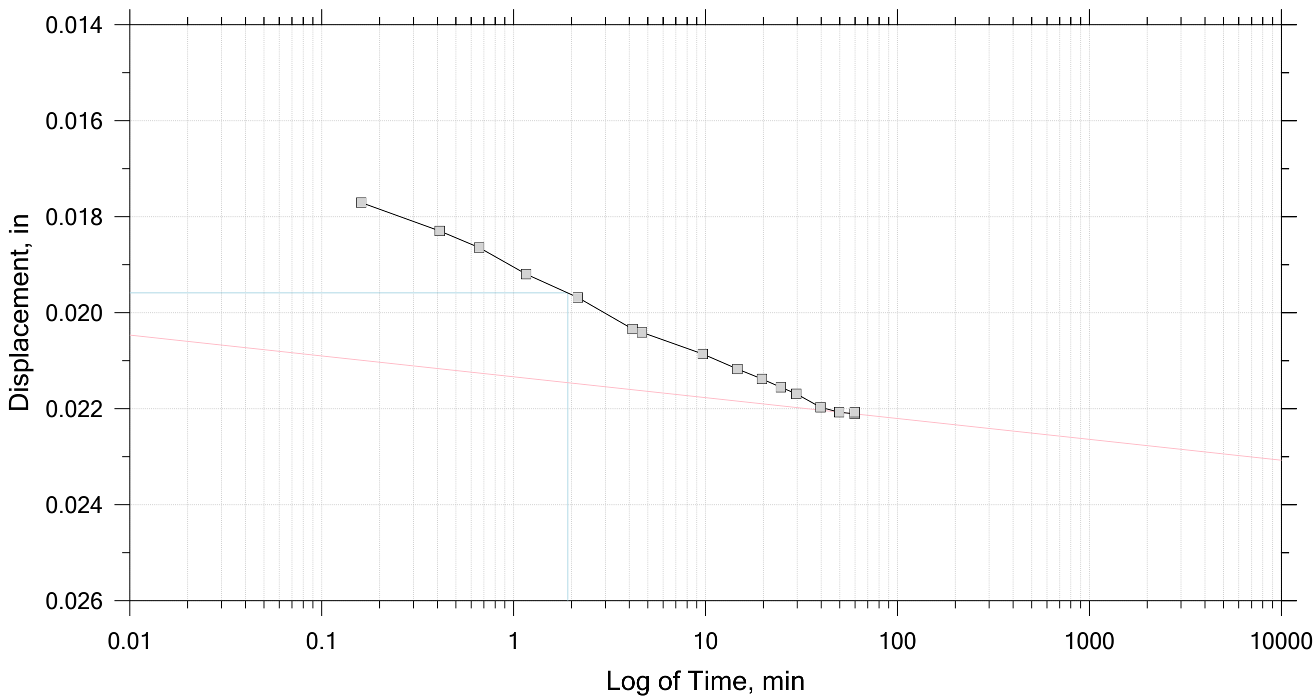
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

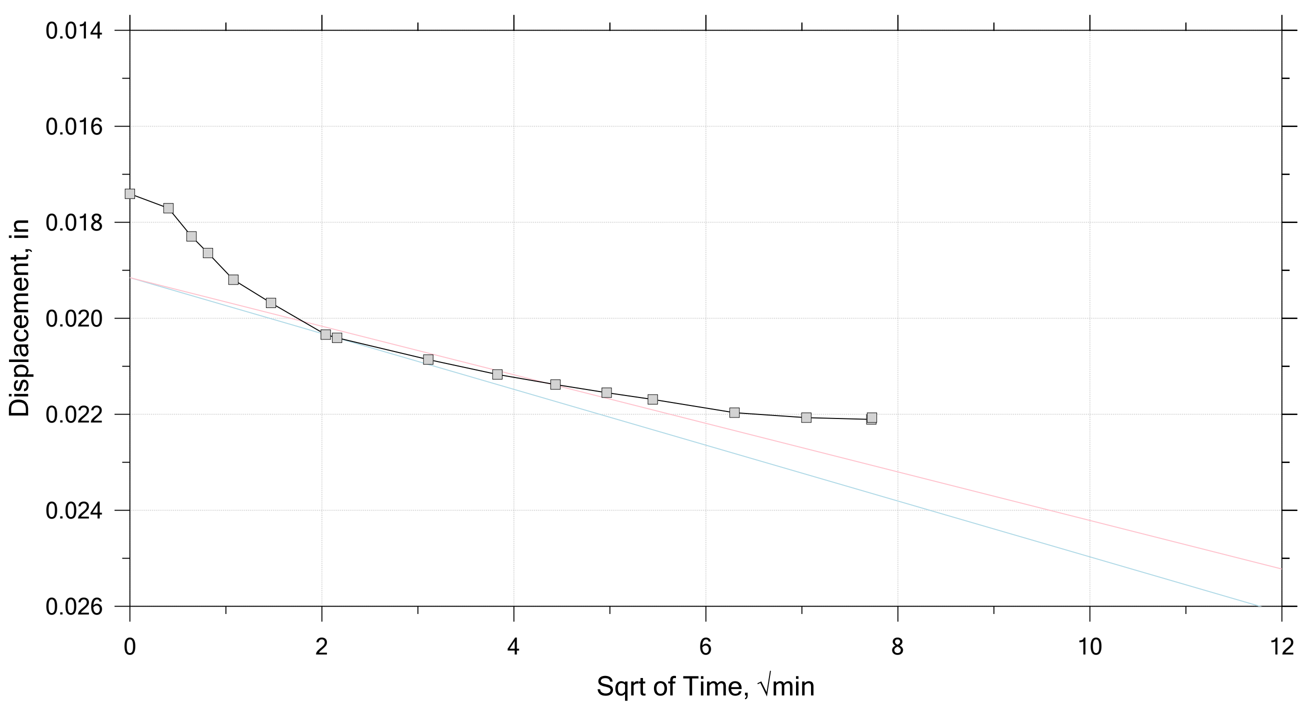
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 26

Constant Load Step

Stress: 1.52e+03 psf





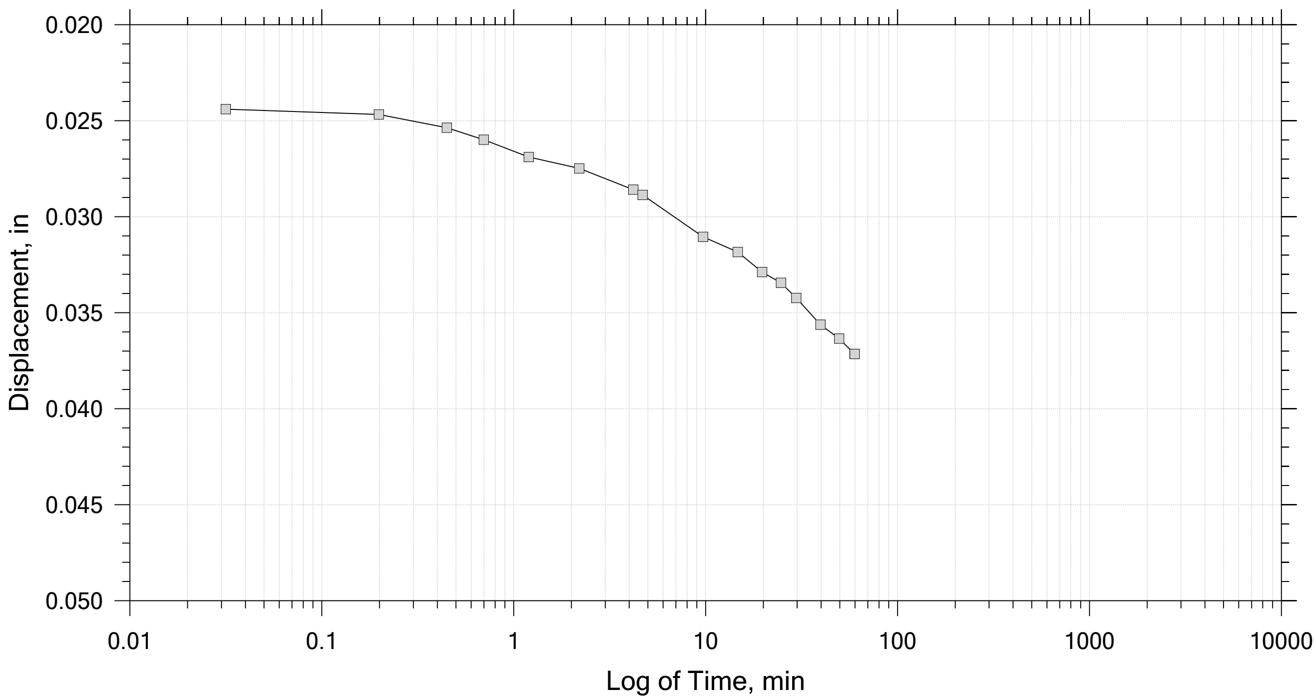
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

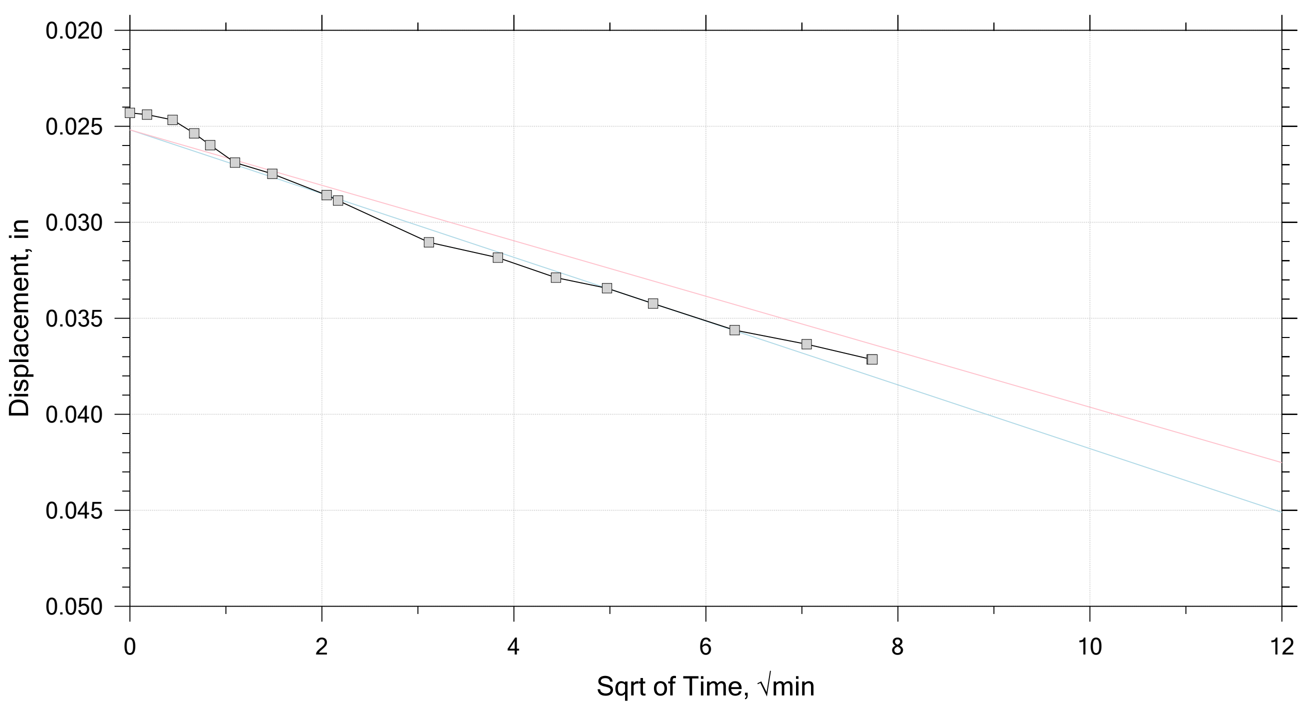
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 26

Constant Load Step

Stress: 2.28e+03 psf





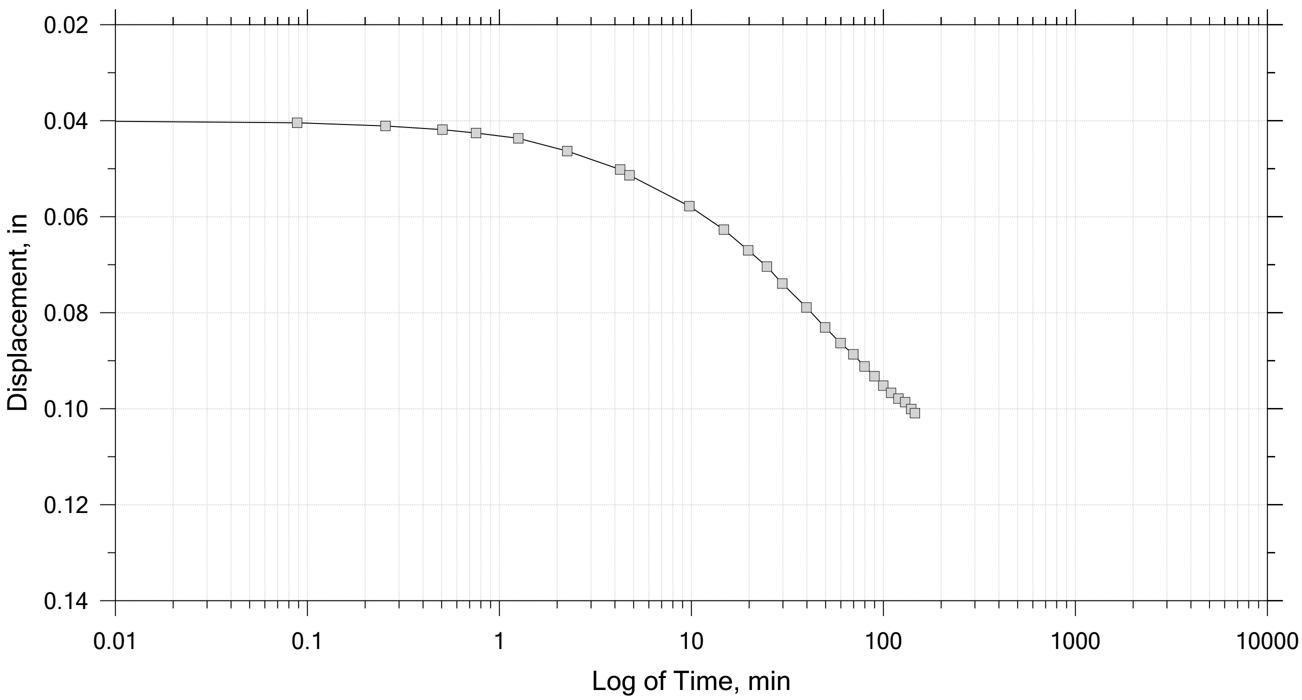
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

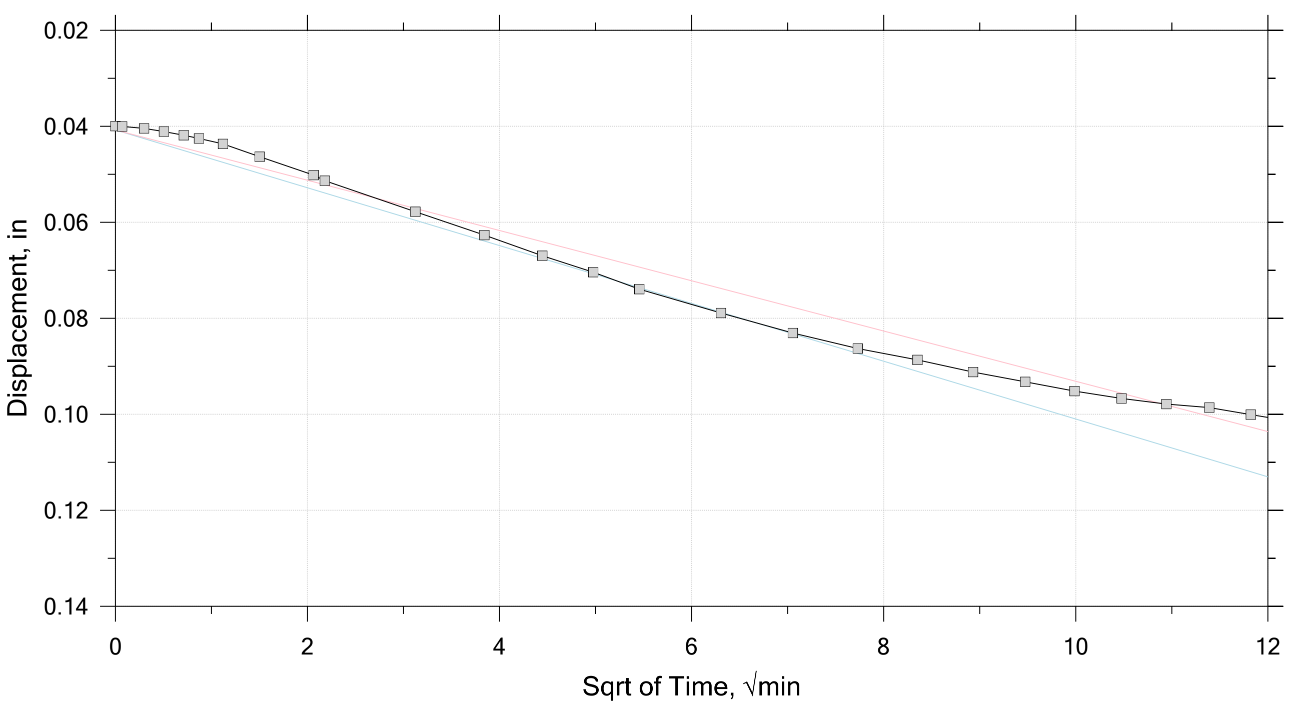
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 26

Constant Load Step

Stress: 3.42e+03 psf





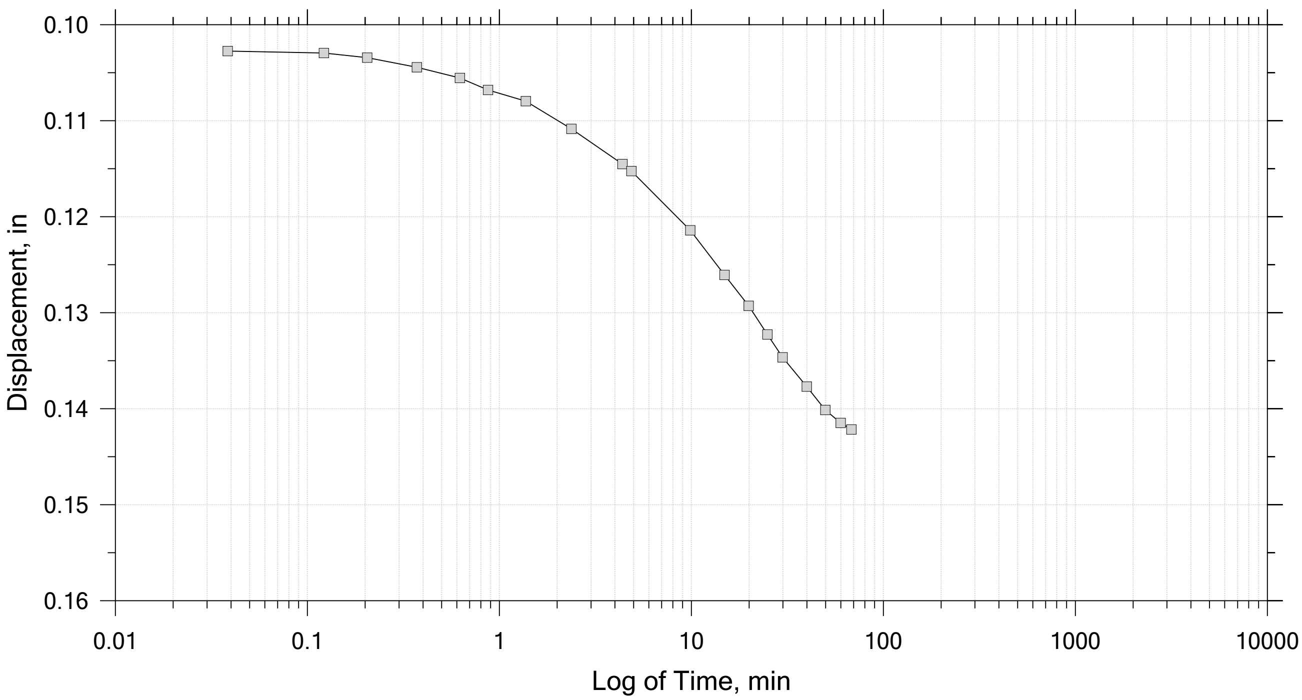
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

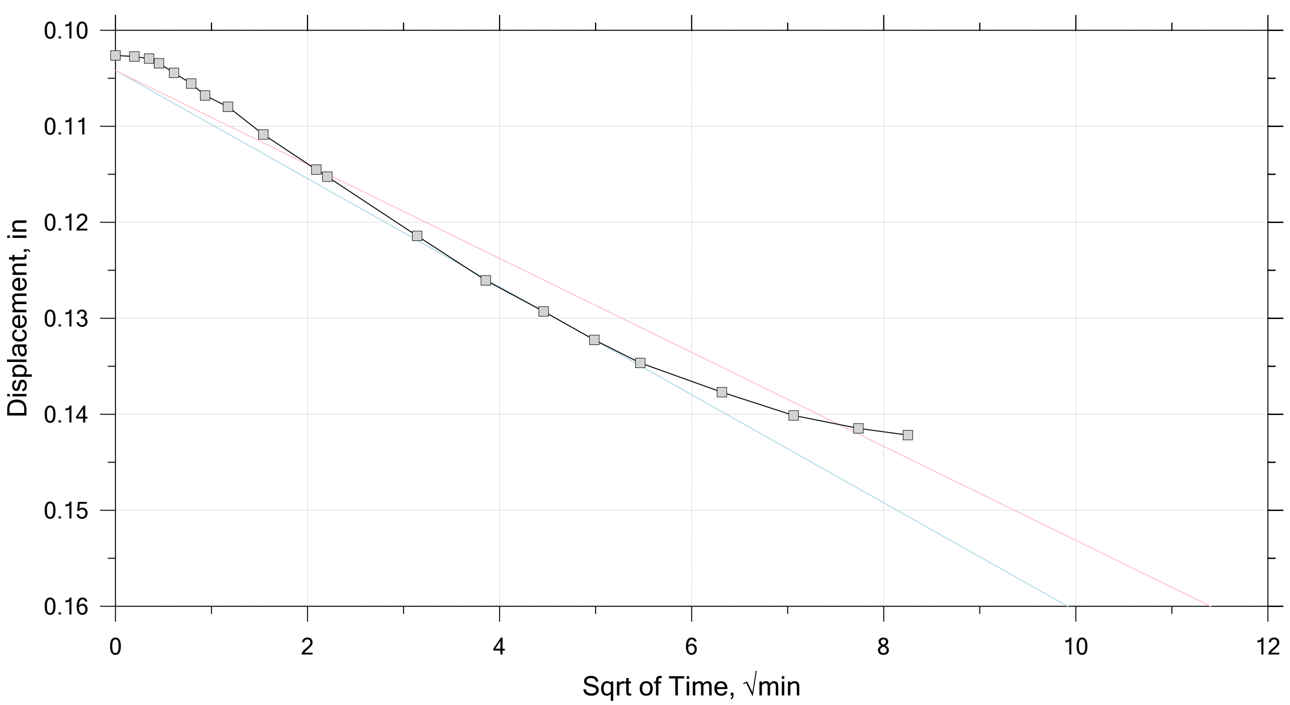
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 26

Constant Load Step

Stress: 5.13e+03 psf





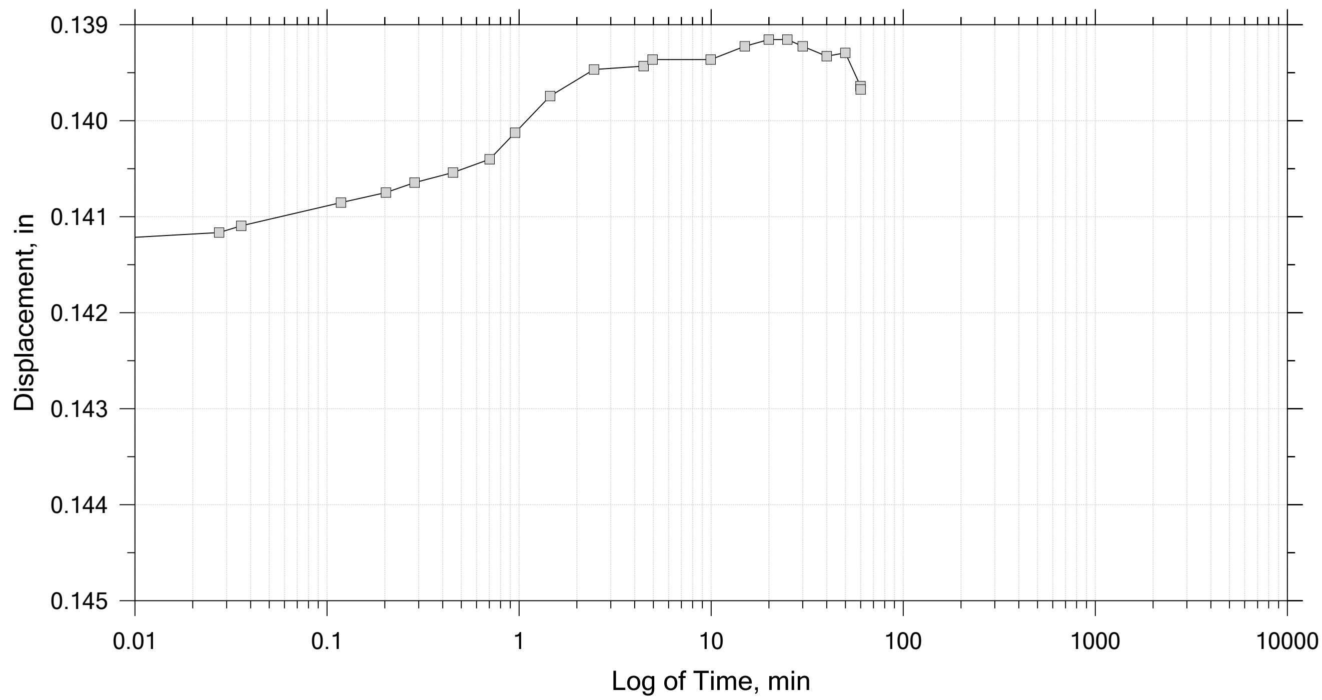
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

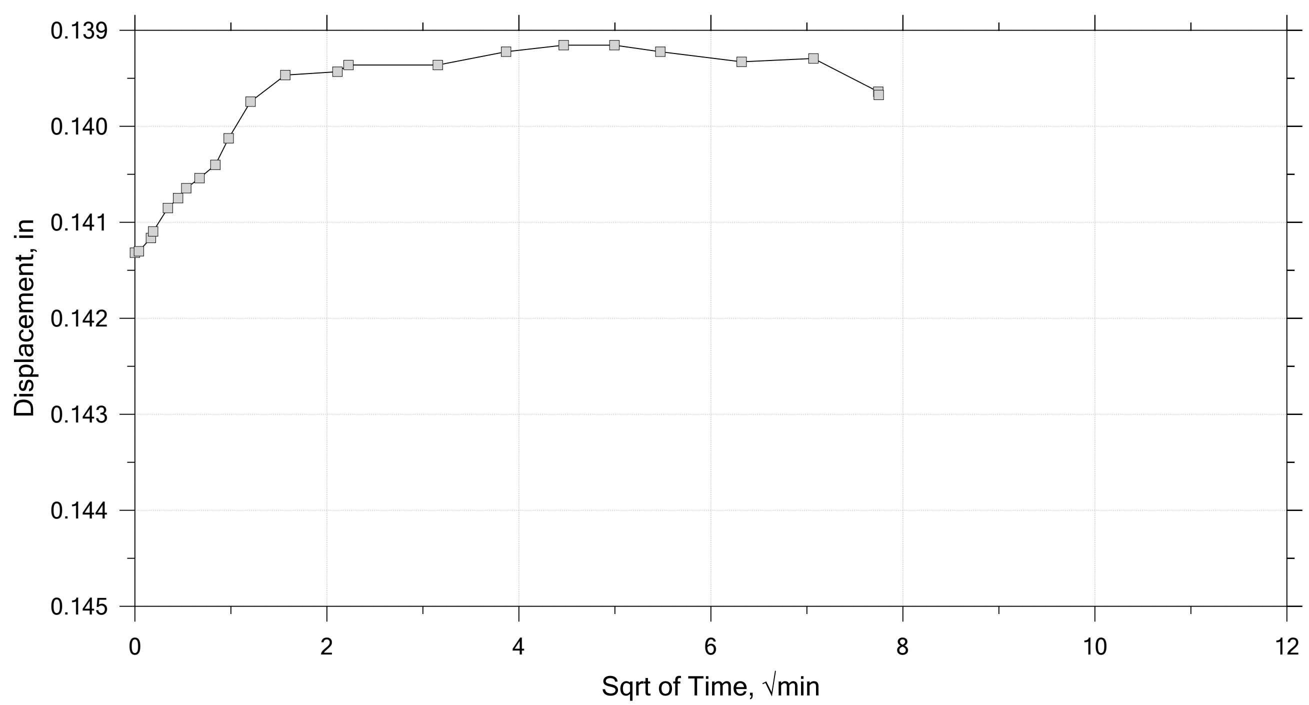
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 26

Constant Load Step

Stress: 2.28e+03 psf





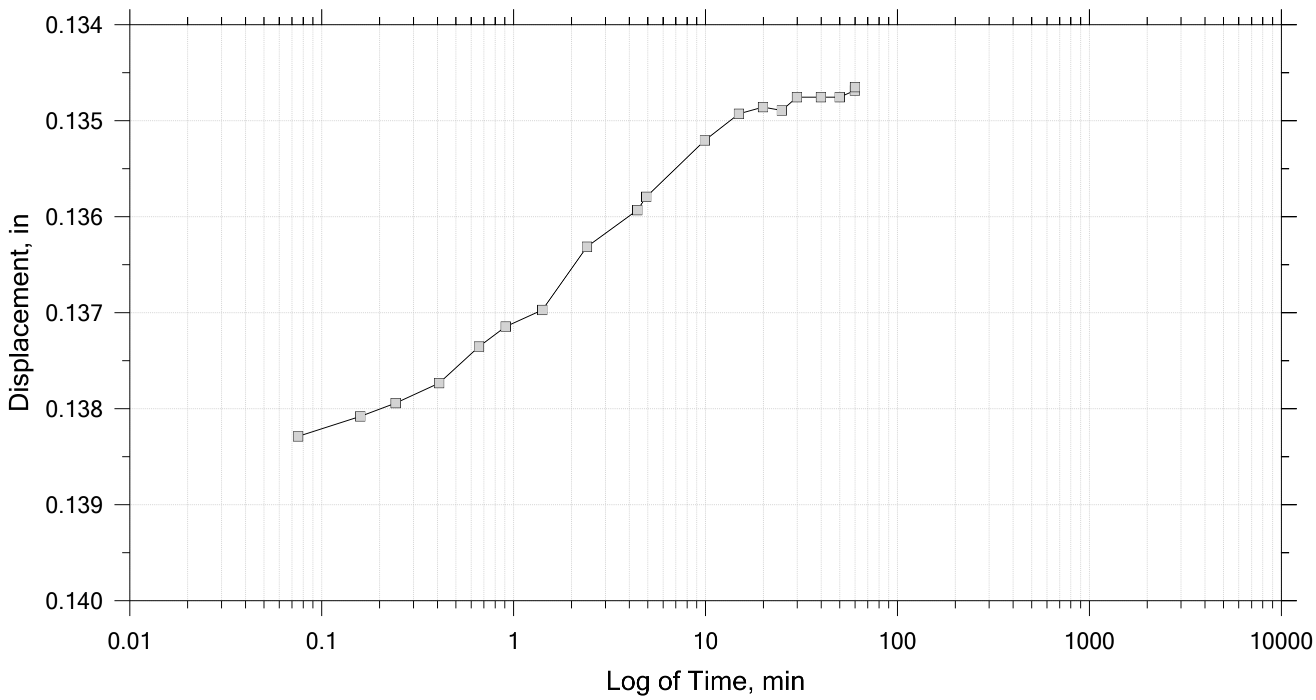
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

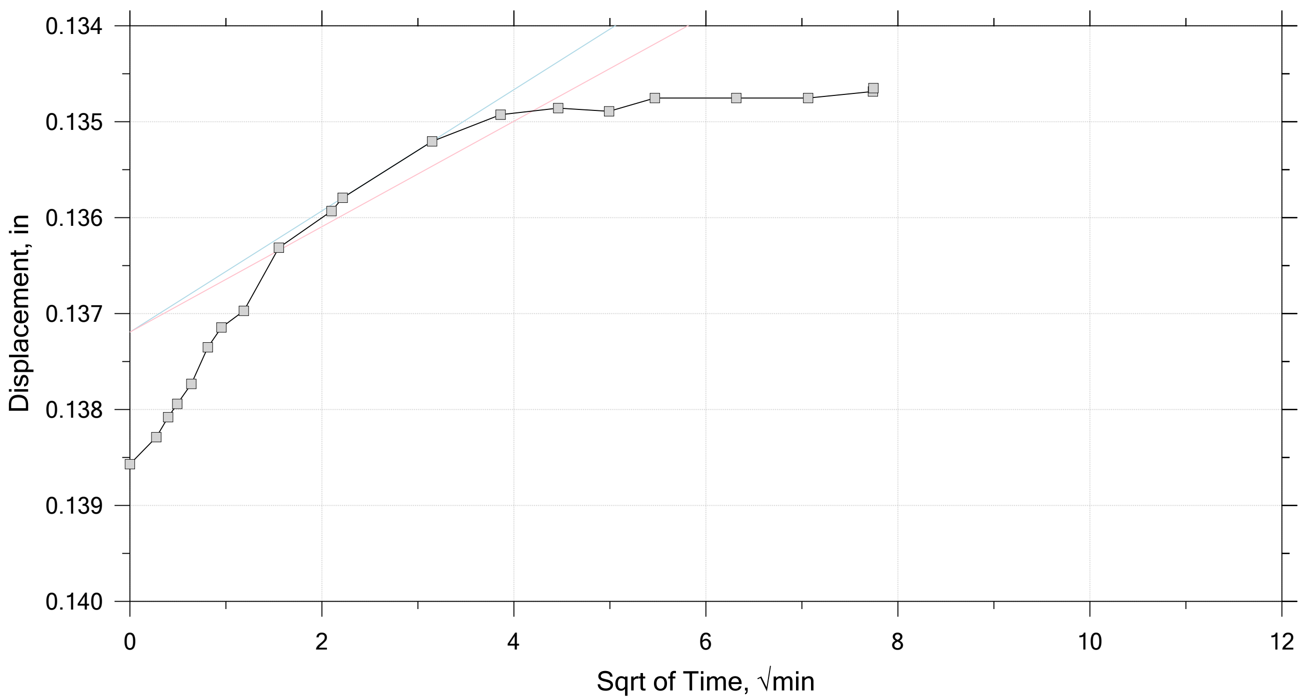
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 26

Constant Load Step

Stress: 1.01e+03 psf





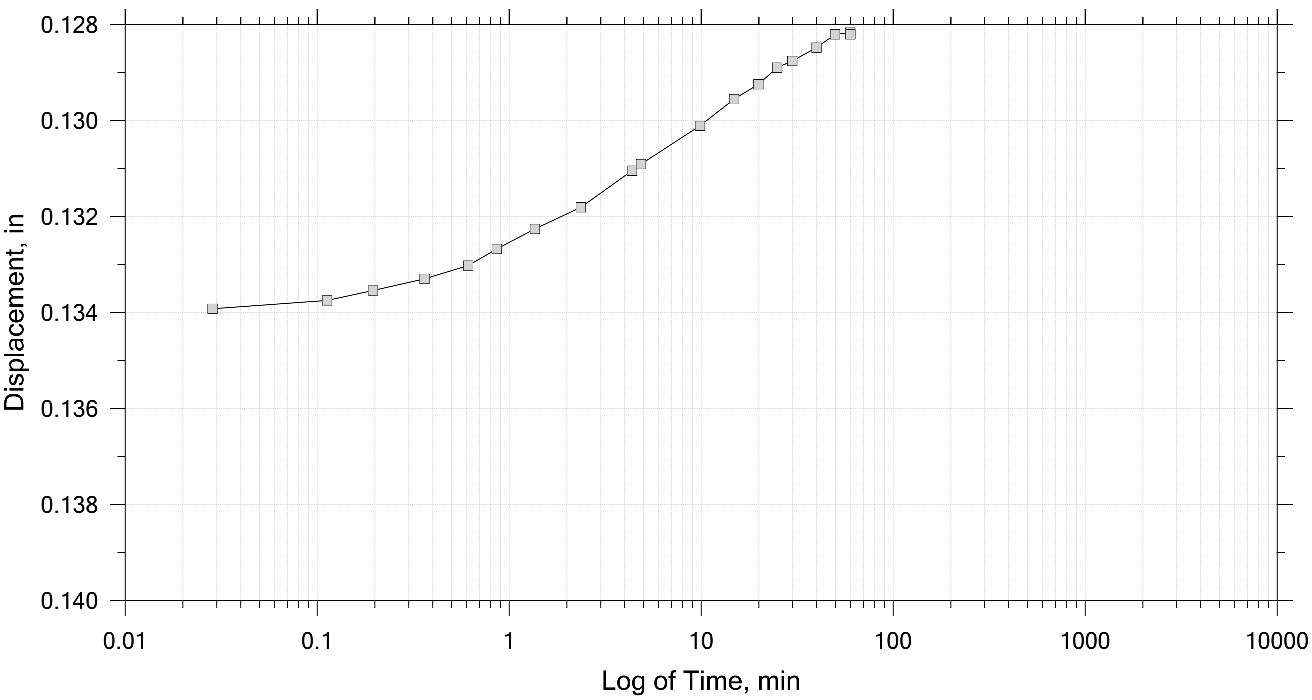
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

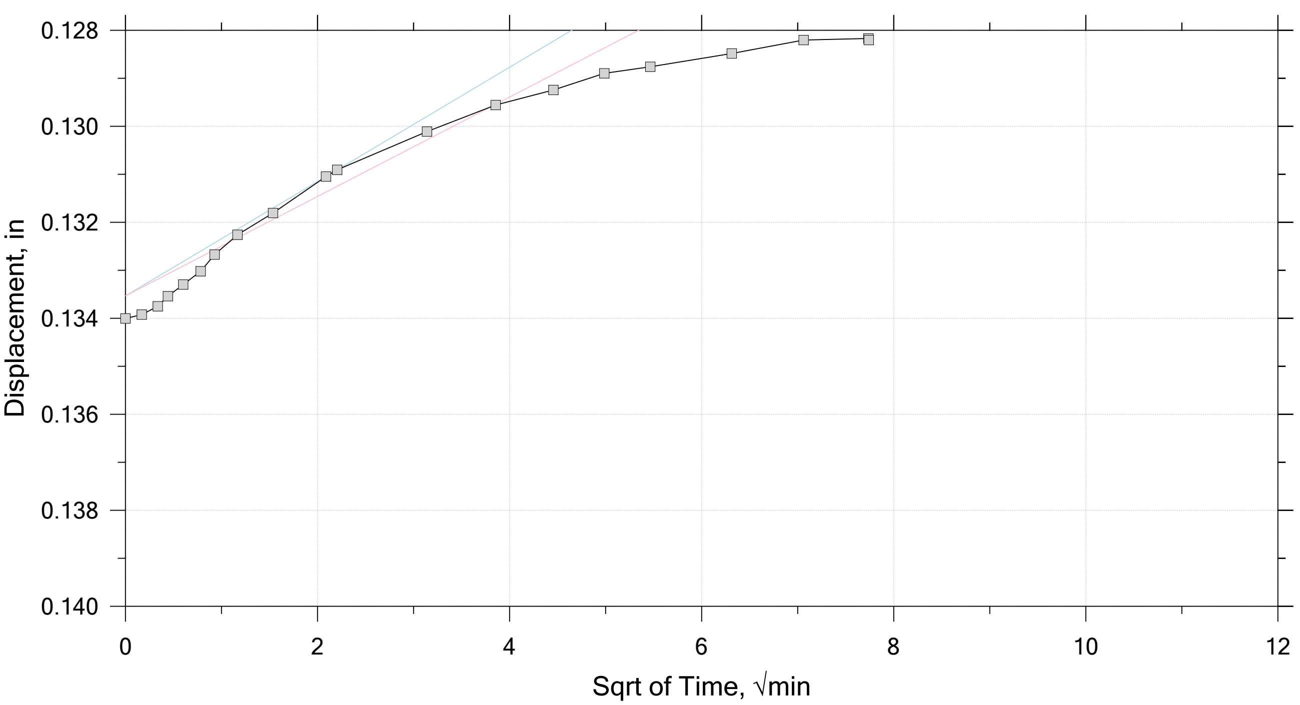
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 26

Constant Load Step

Stress: 450 psf





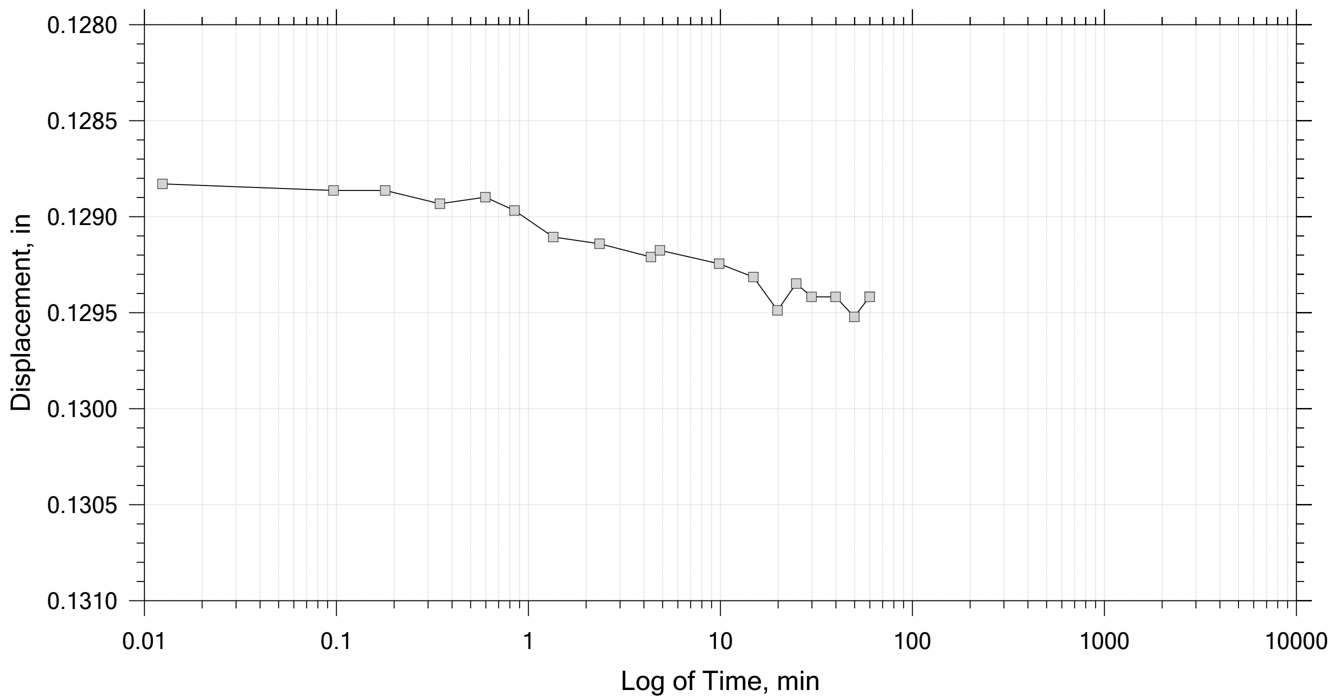
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

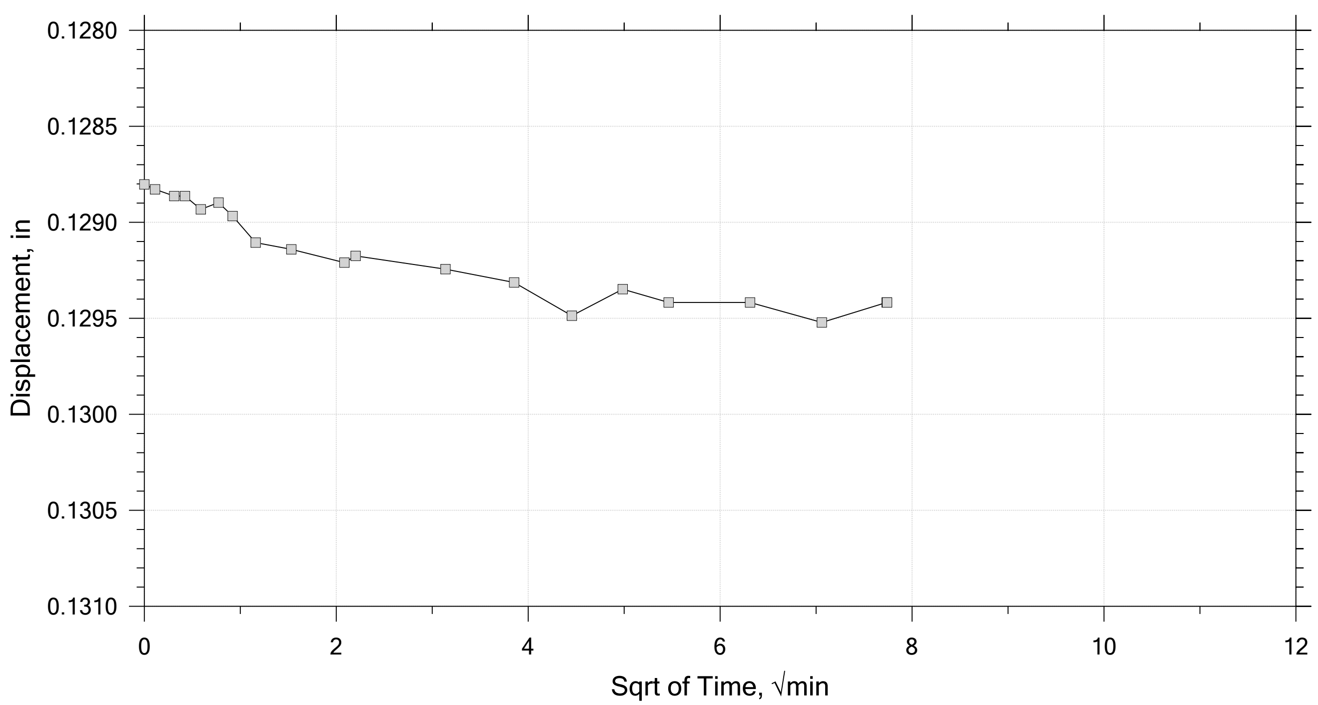
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 26

Constant Load Step

Stress: 675 psf





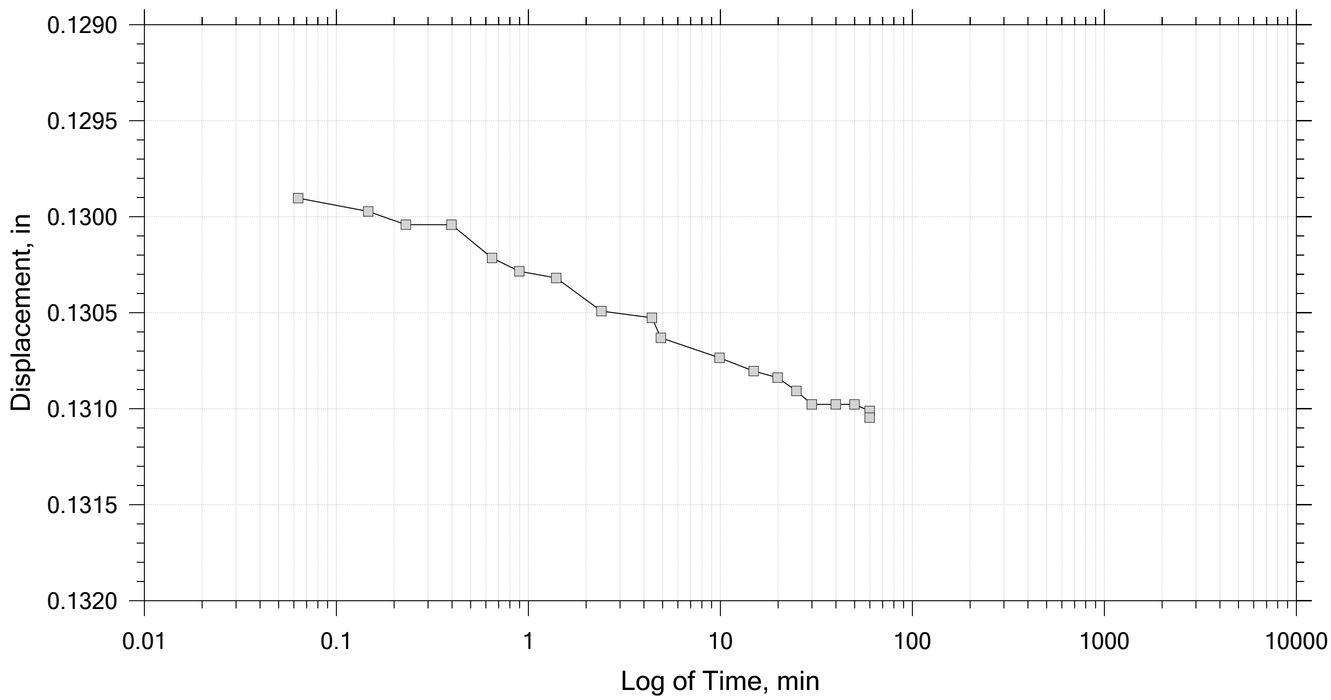
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

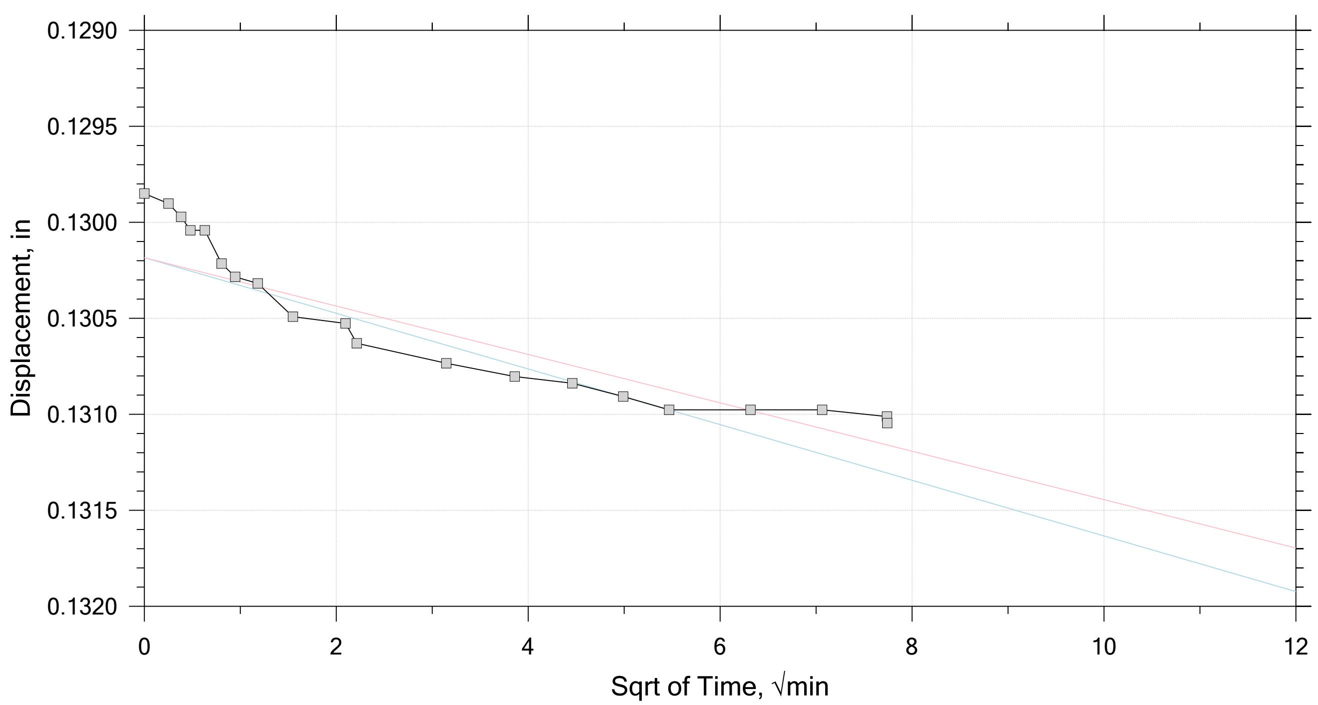
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 26

Constant Load Step

Stress: 1.01e+03 psf





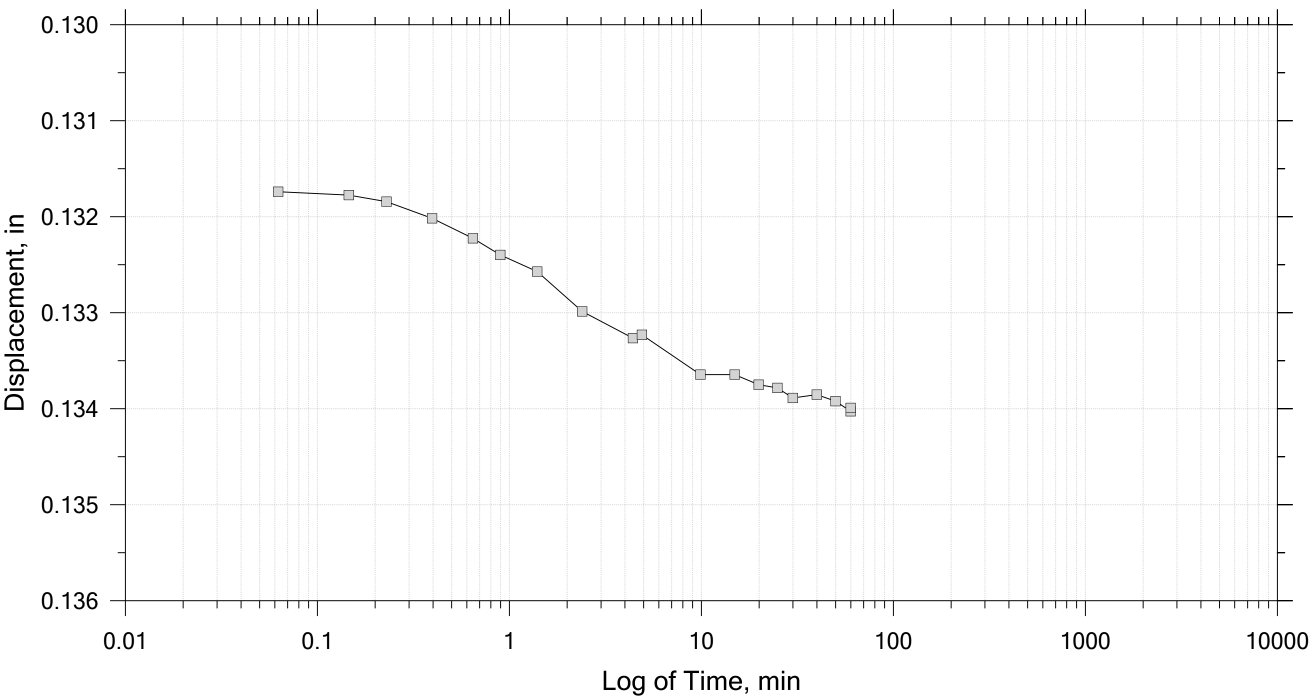
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

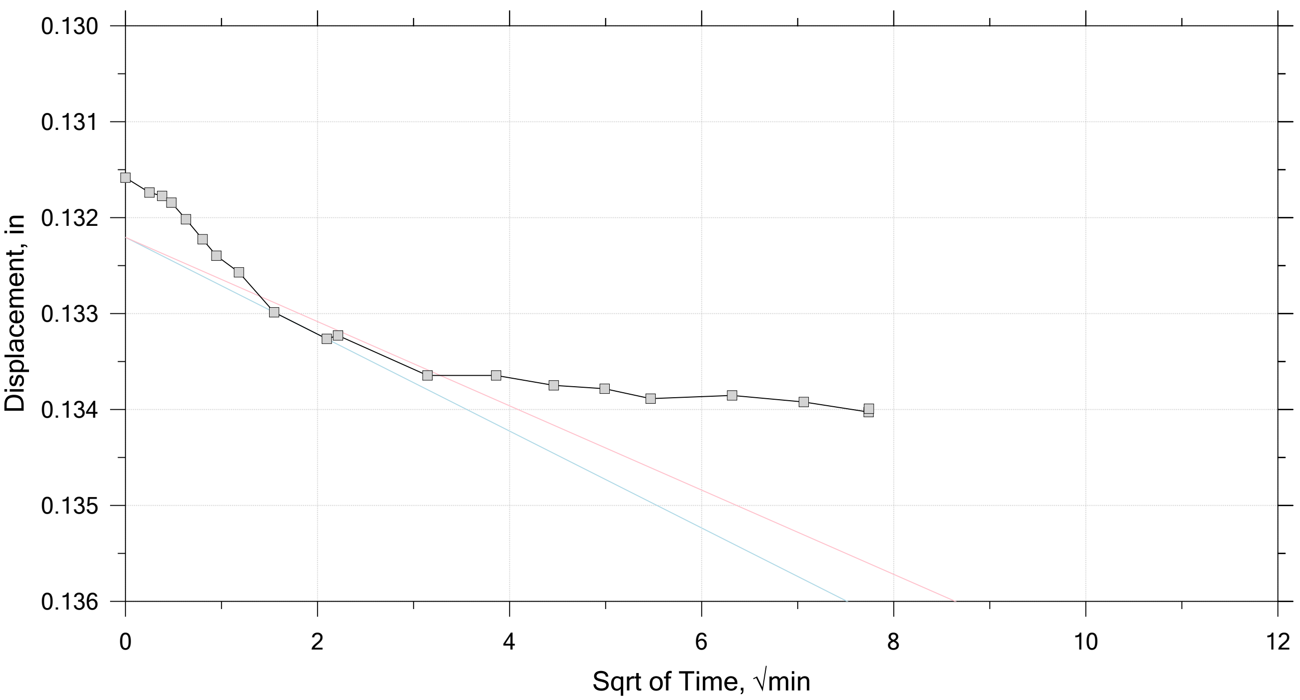
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 26

Constant Load Step

Stress: 1.52e+03 psf

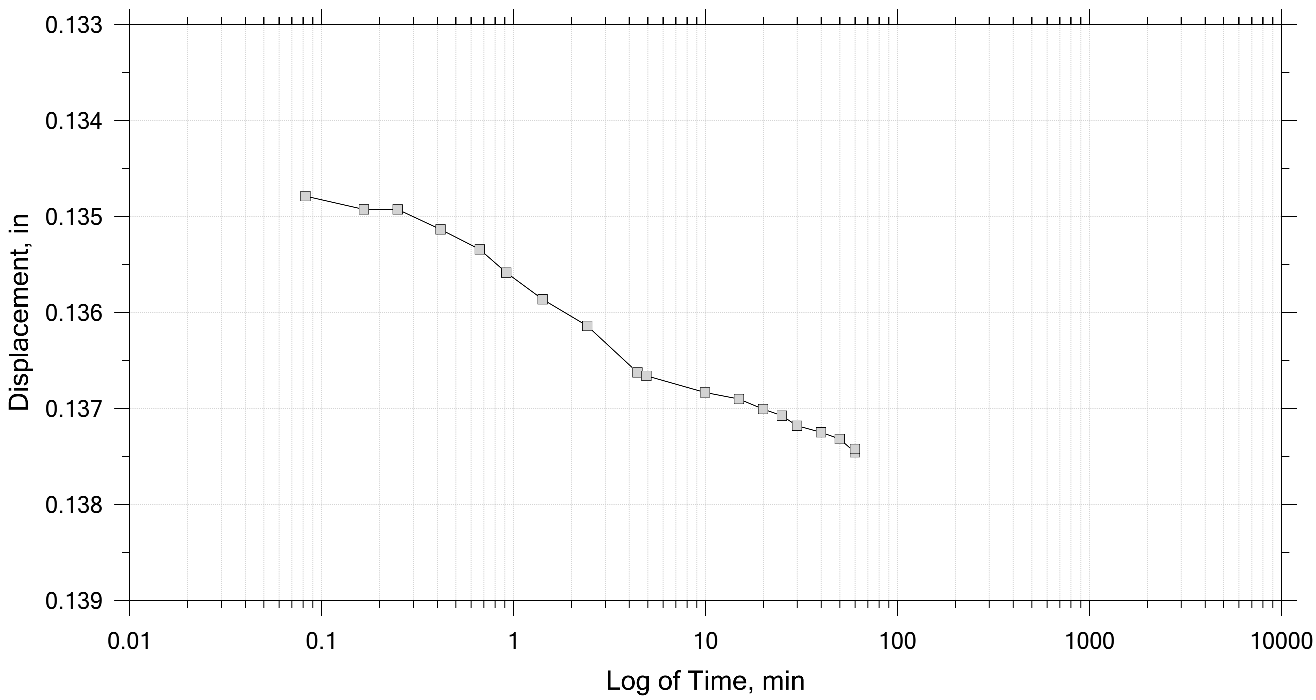


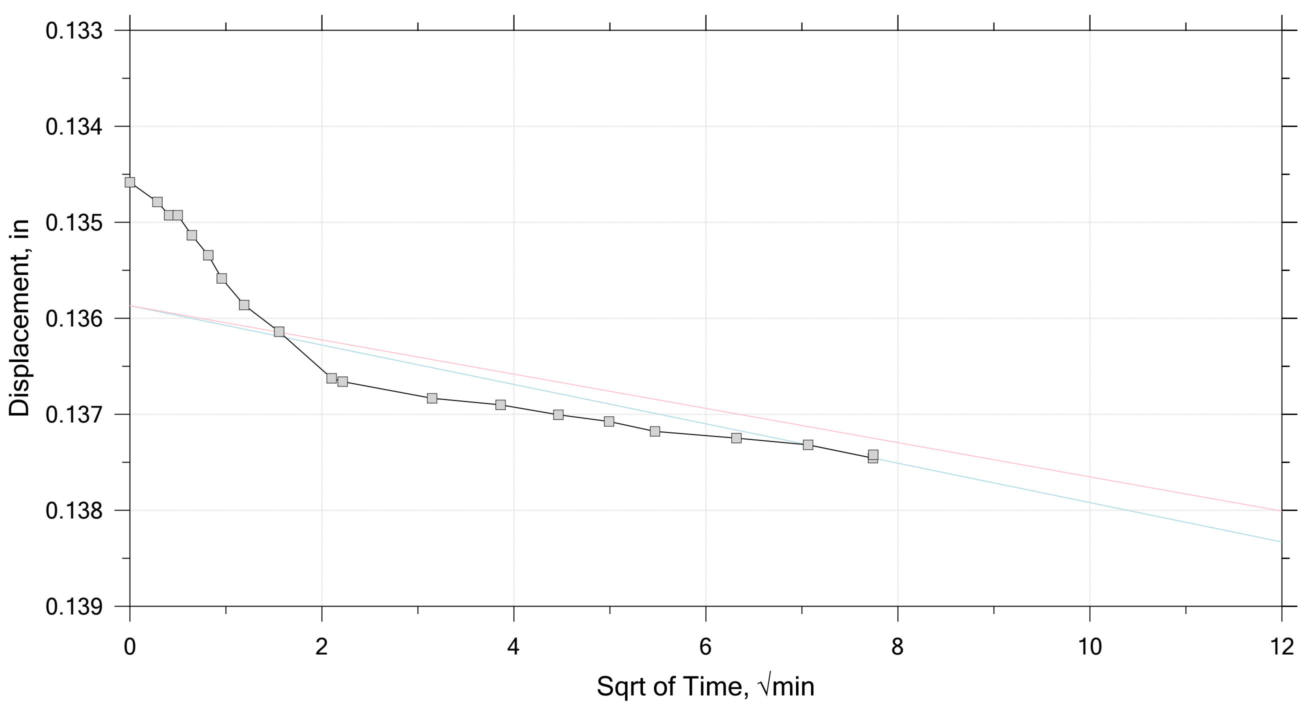


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 16 of 26
Constant Load Step
Stress: 2.28e+03 psf

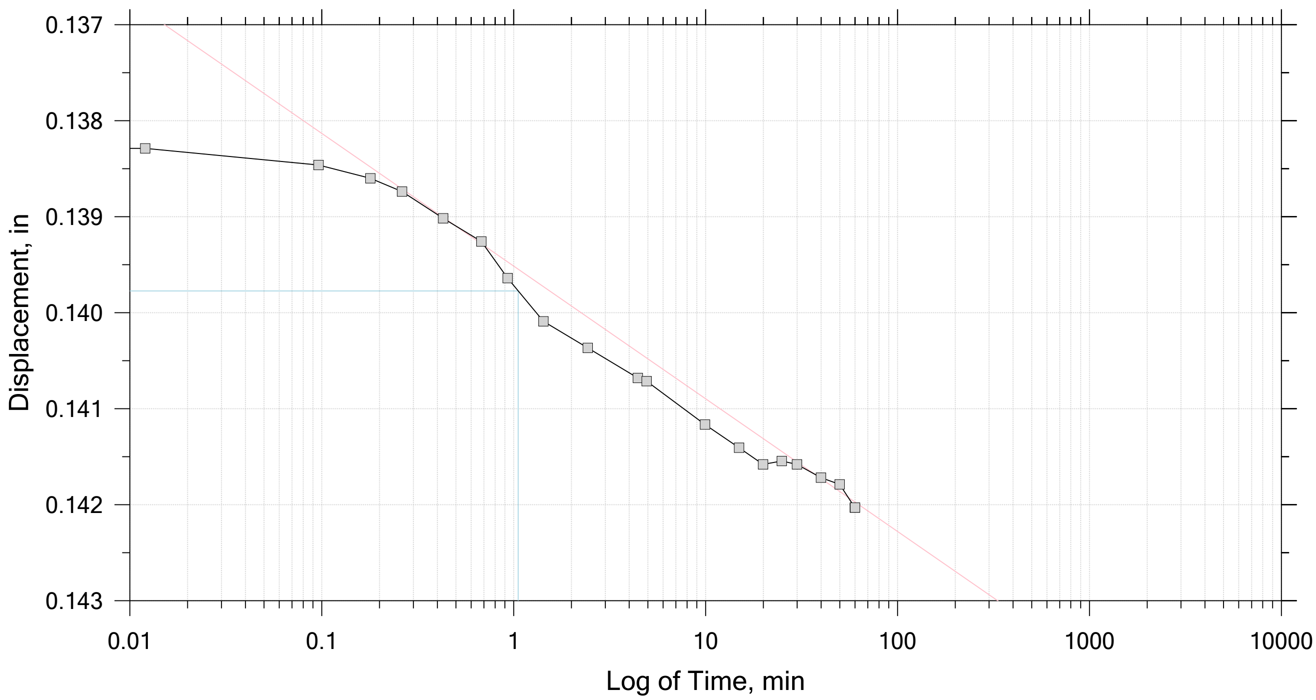


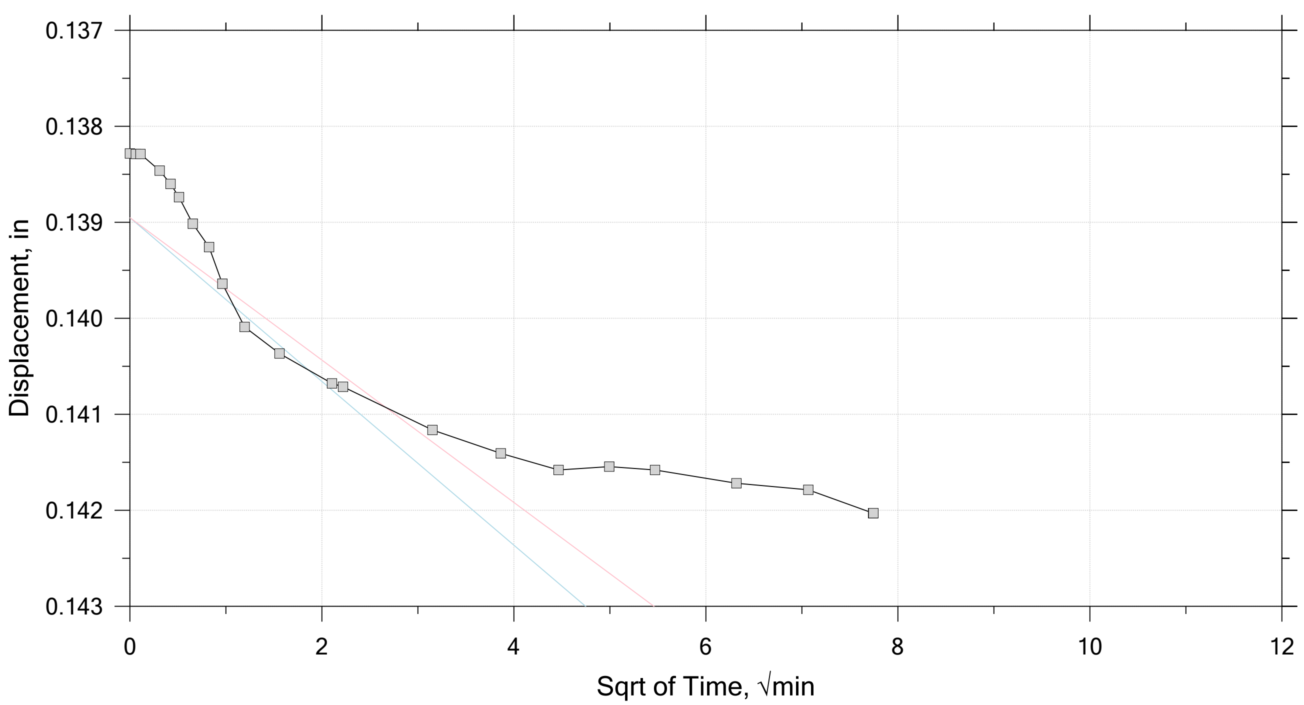


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 17 of 26
Constant Load Step
Stress: 3.42e+03 psf





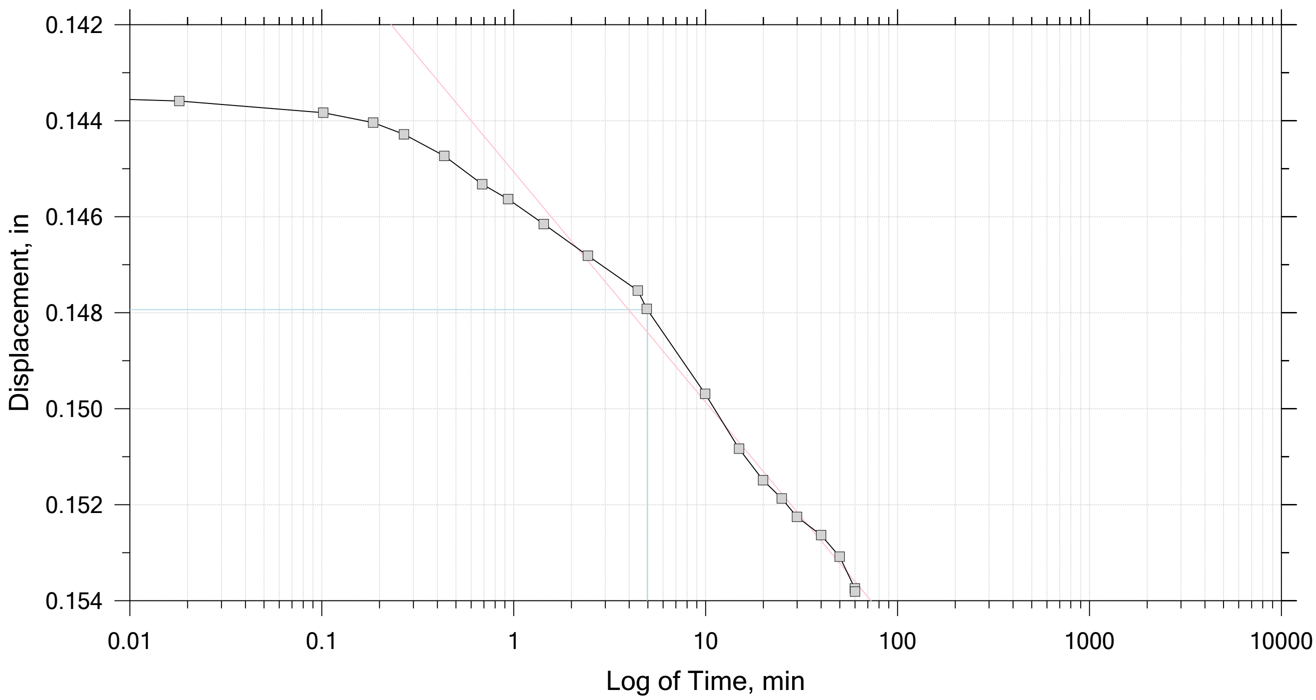
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

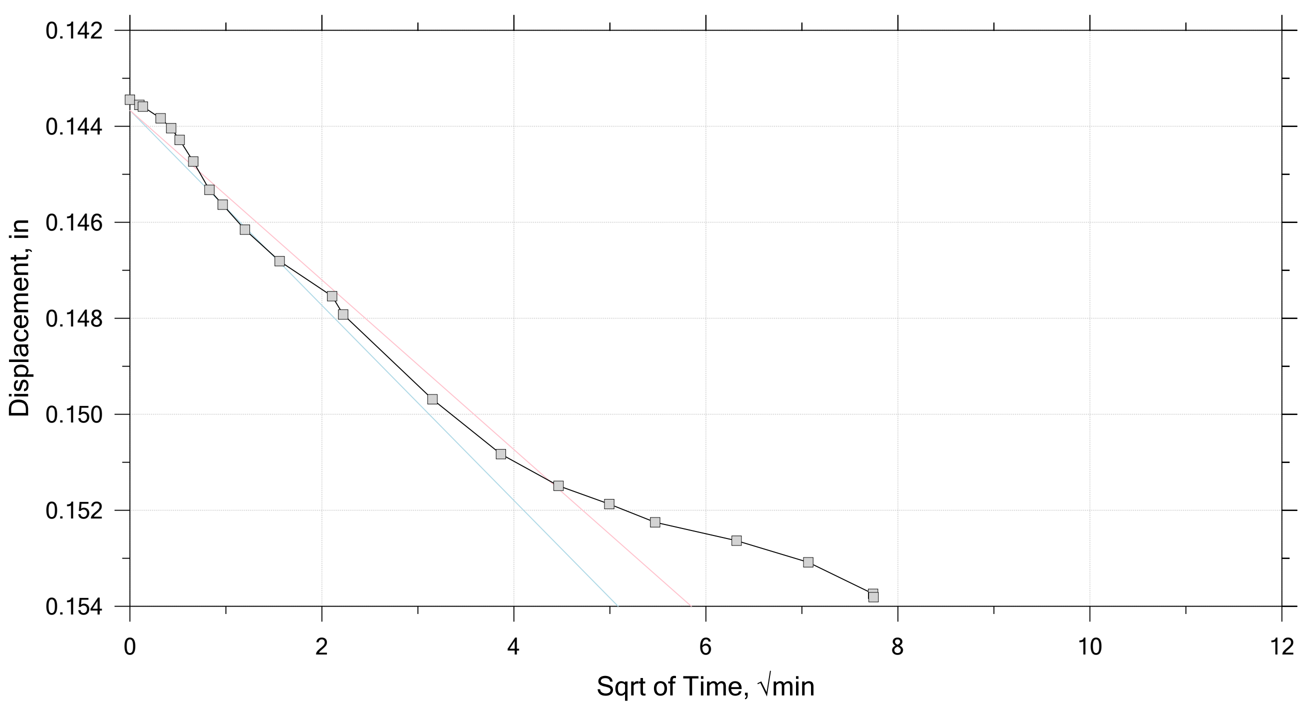
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 18 of 26

Constant Load Step

Stress: 5.13e+03 psf

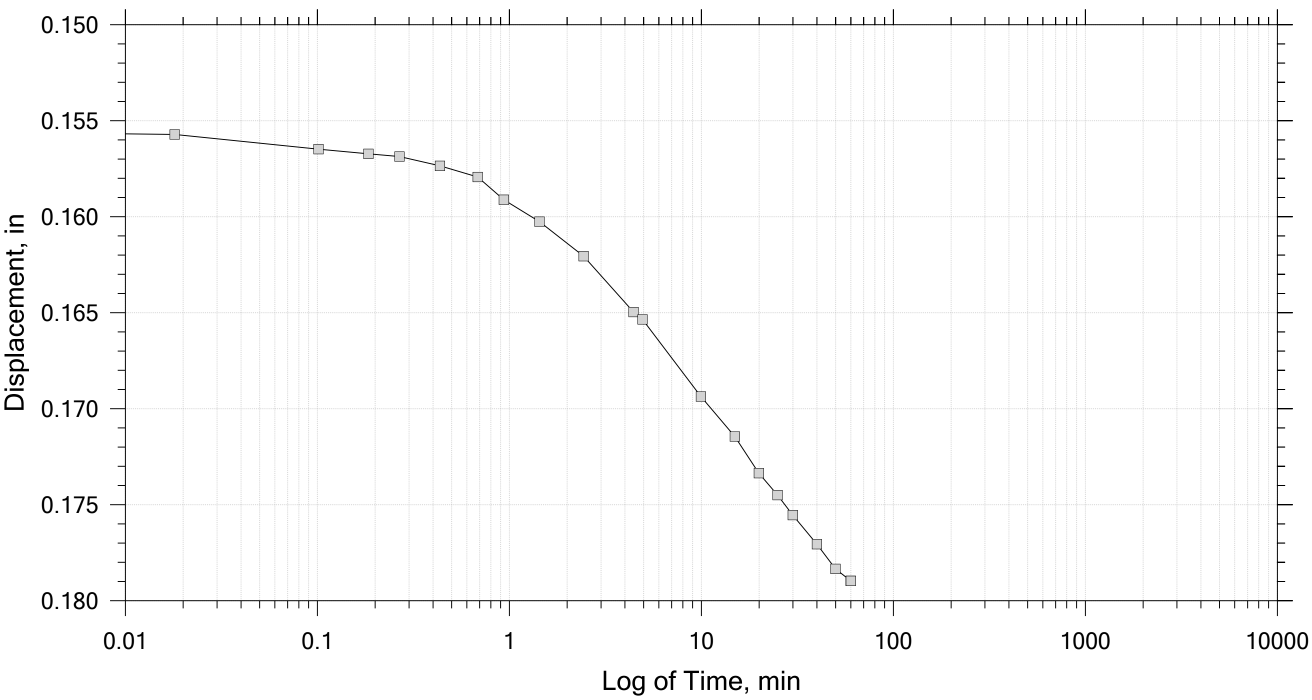


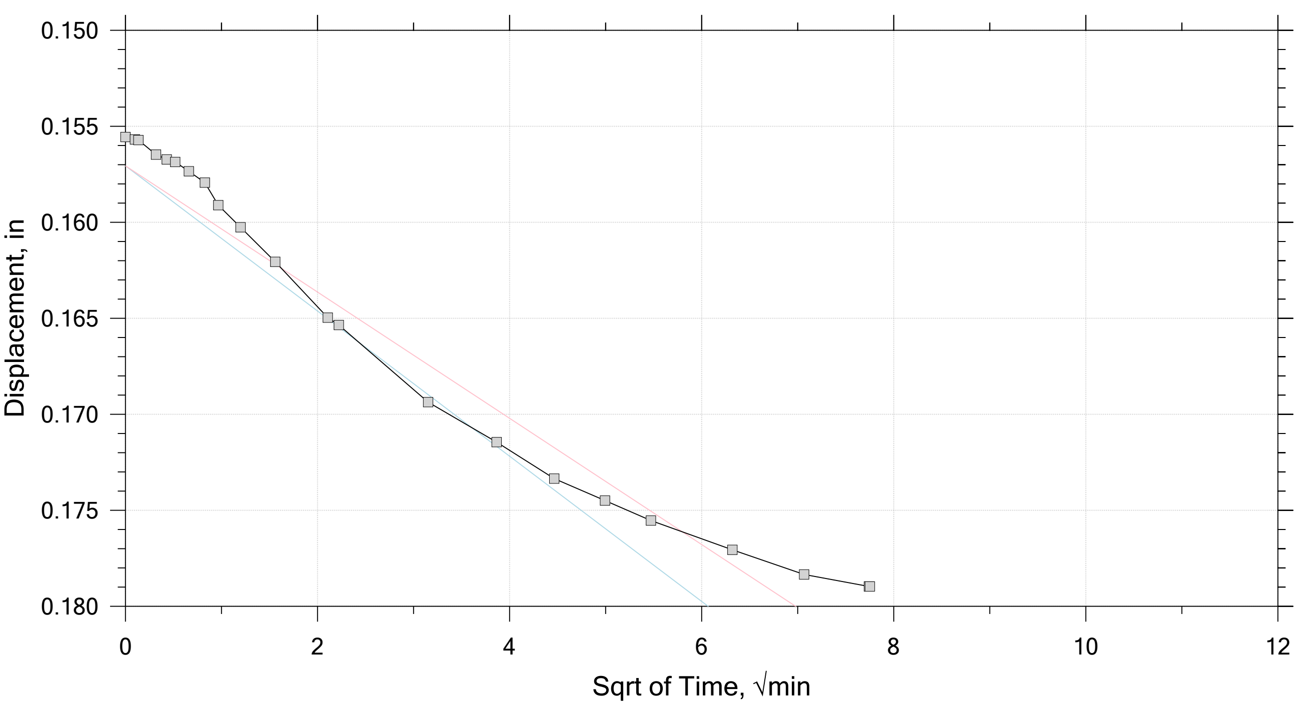


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 19 of 26
Constant Load Step
Stress: 7.69e+03 psf





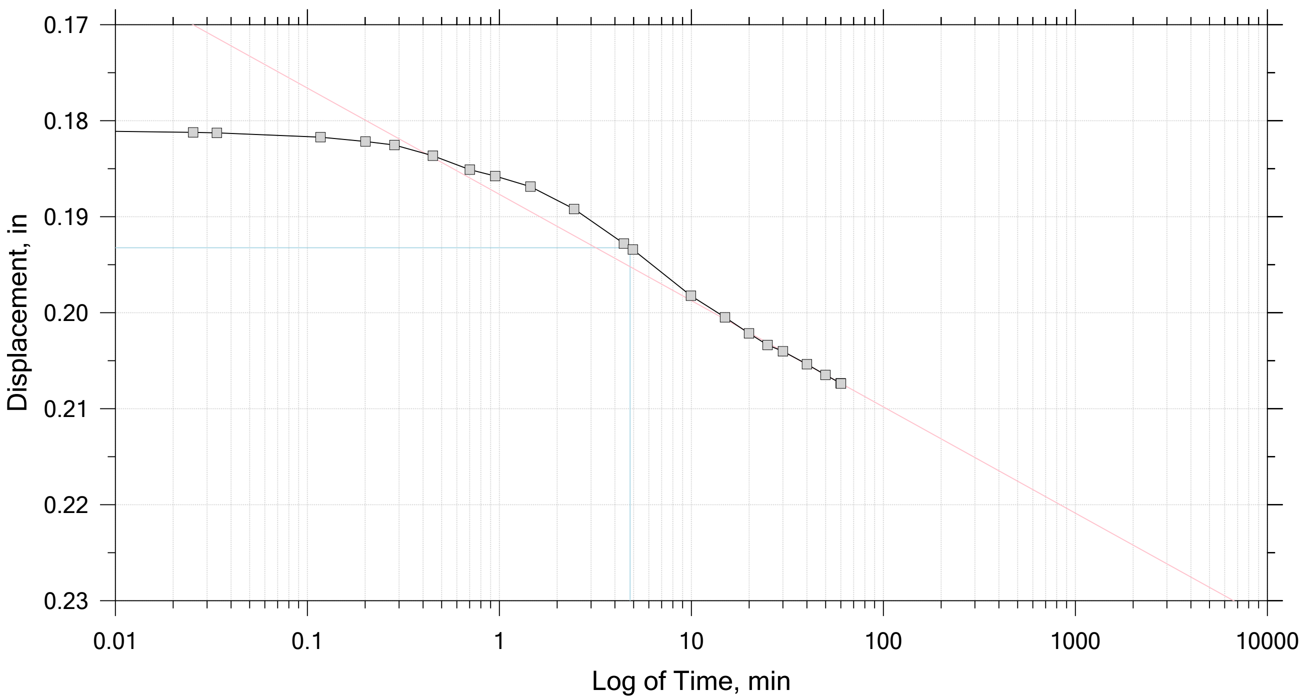
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

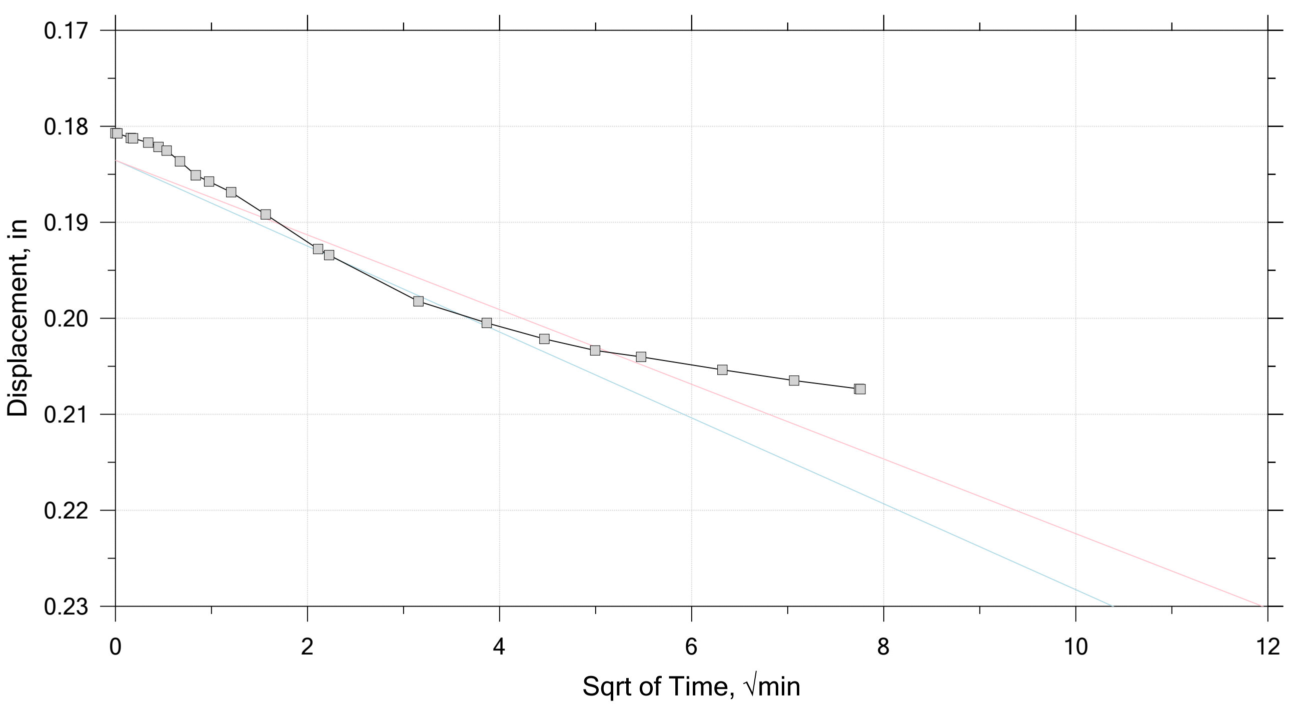
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 20 of 26

Constant Load Step

Stress: 1.15e+04 psf

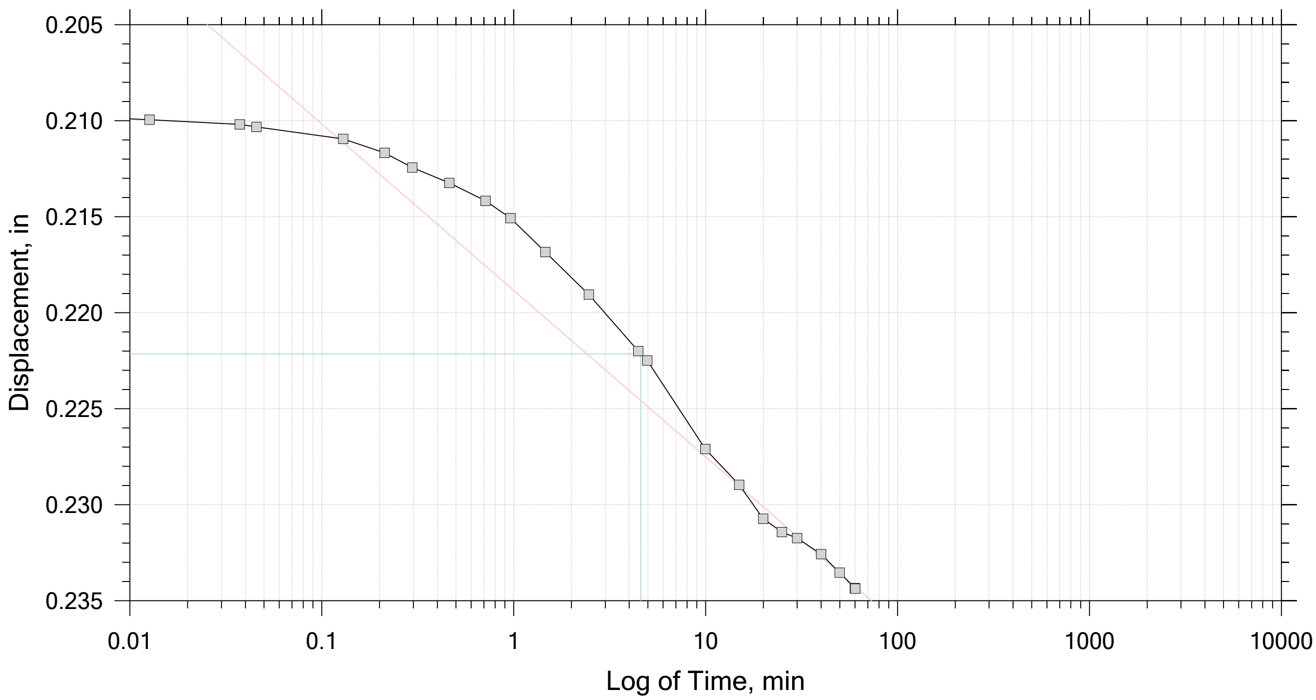


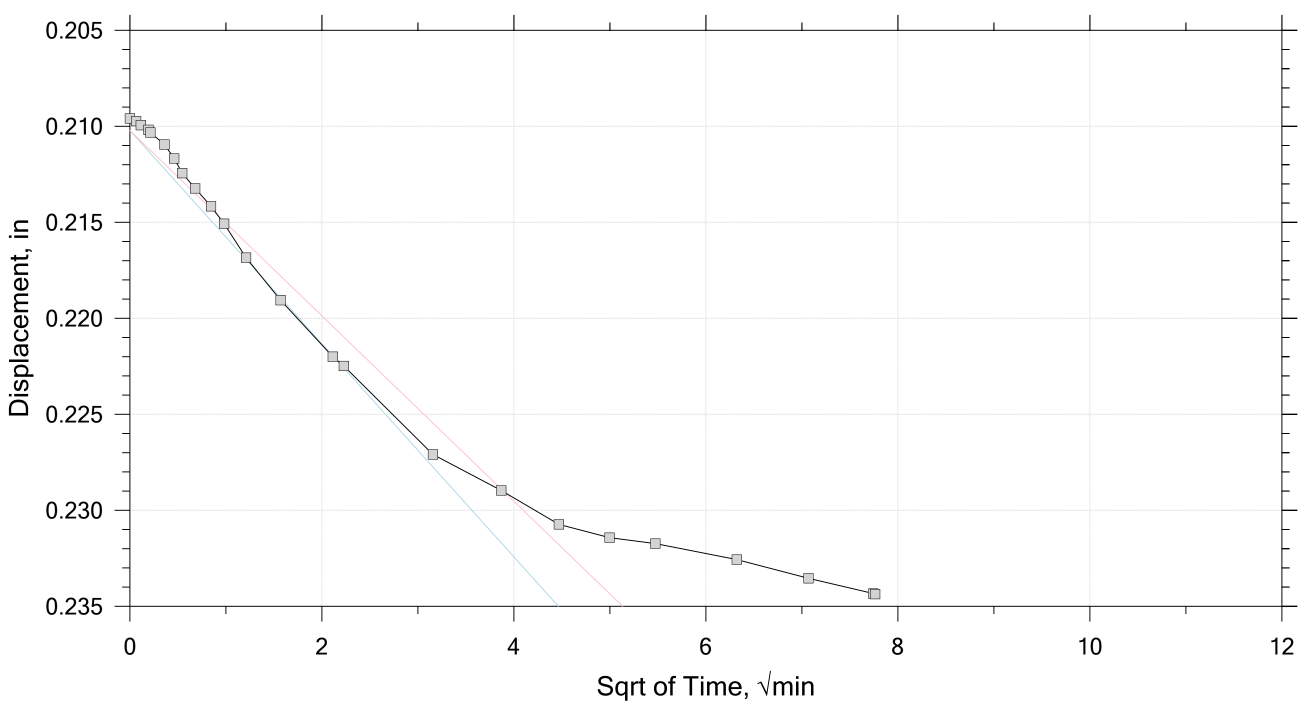


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 21 of 26
Constant Load Step
Stress: 1.73e+04 psf





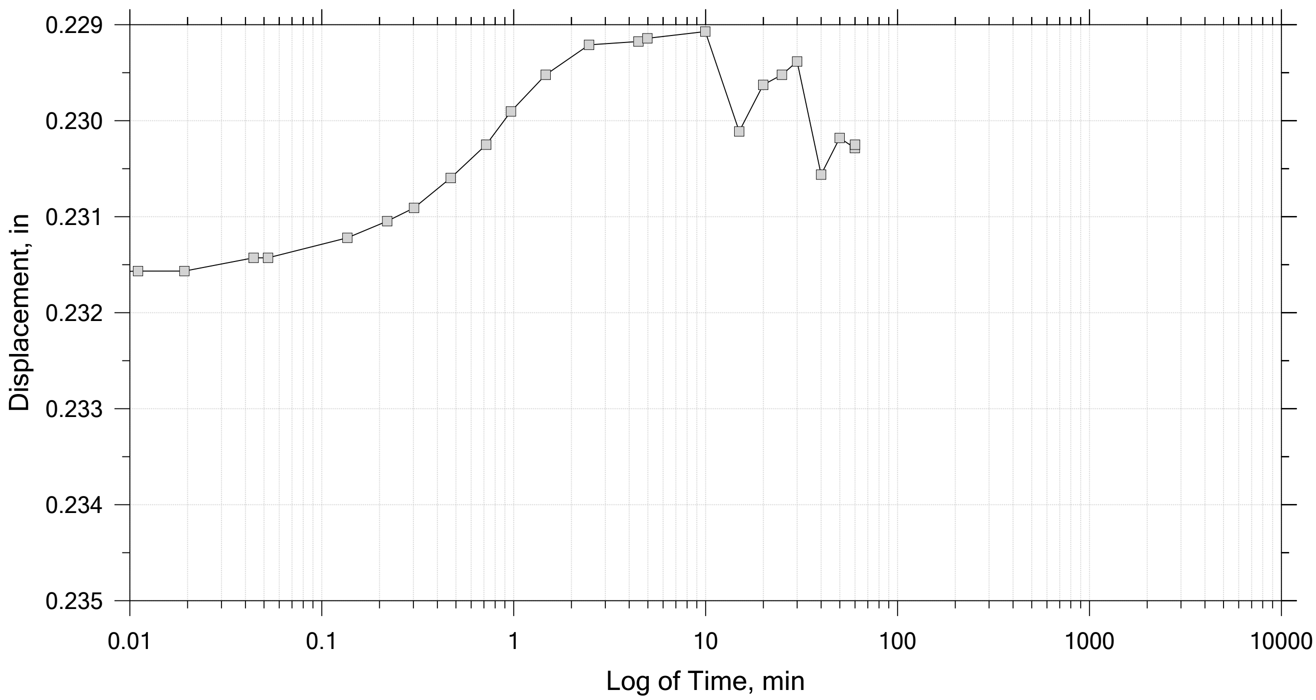
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

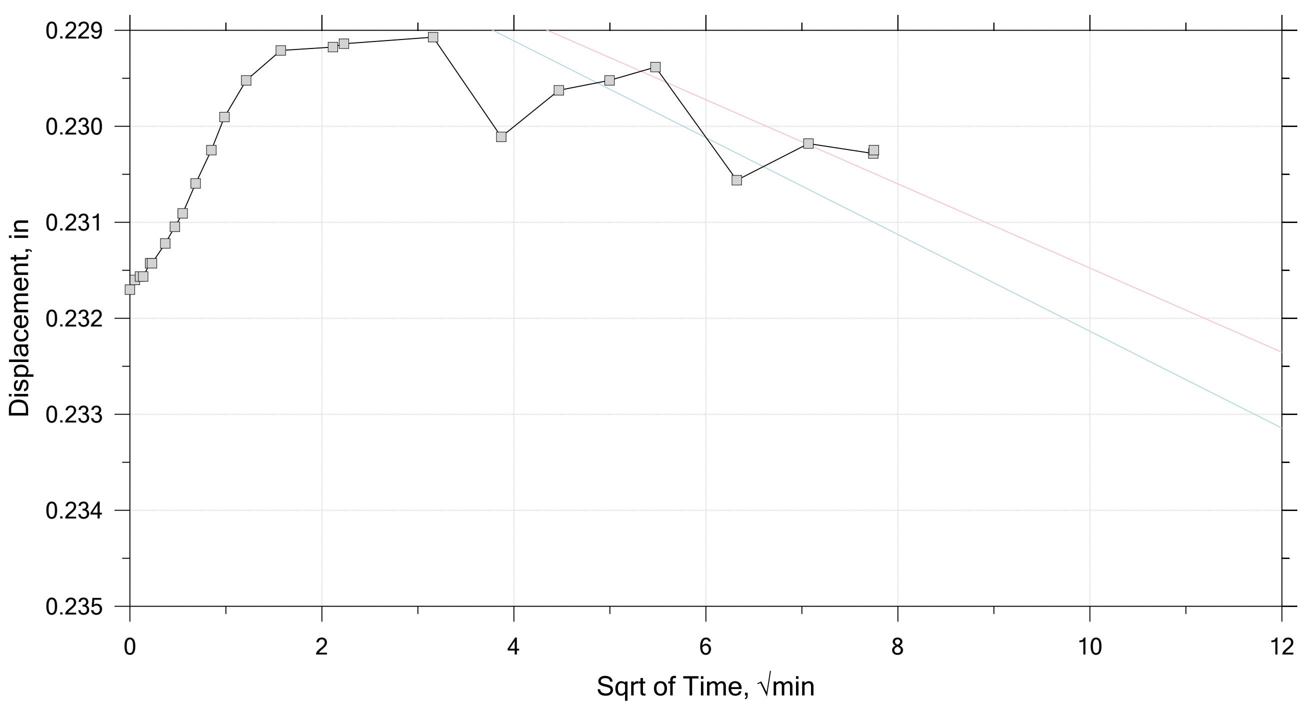
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 22 of 26

Constant Load Step

Stress: 7.69e+03 psf





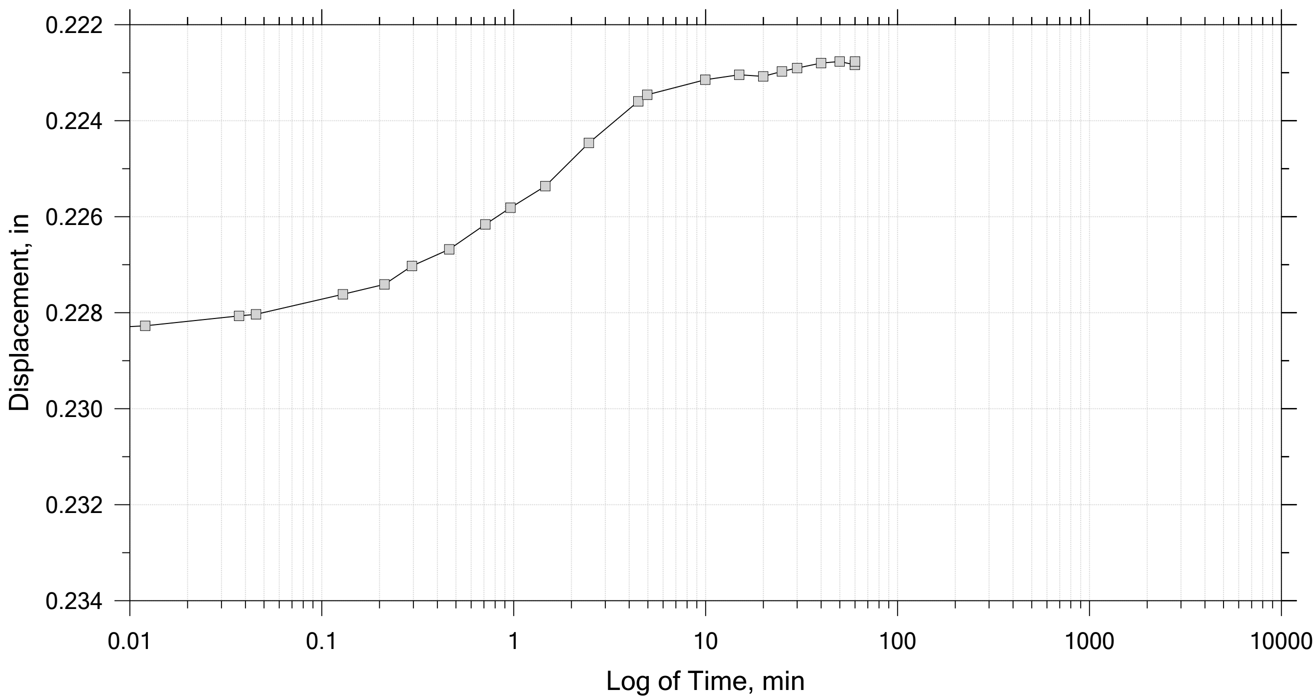
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

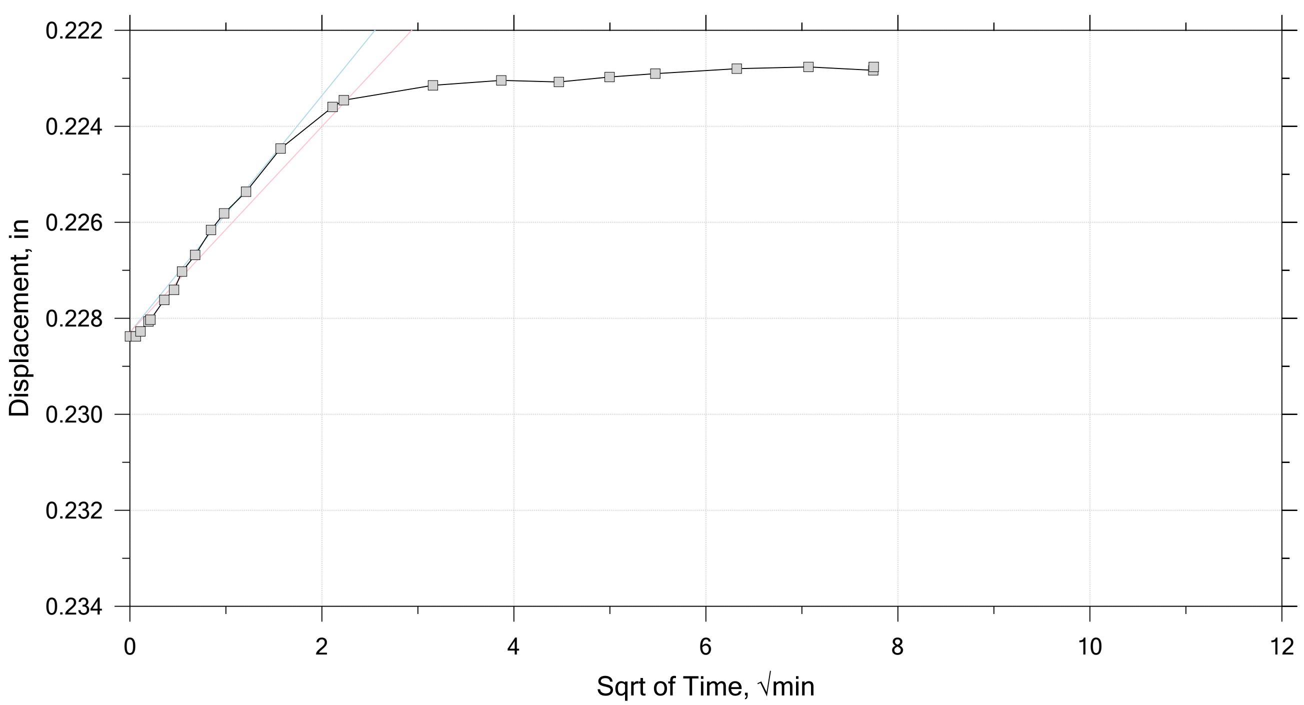
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 23 of 26

Constant Load Step

Stress: 3.42e+03 psf

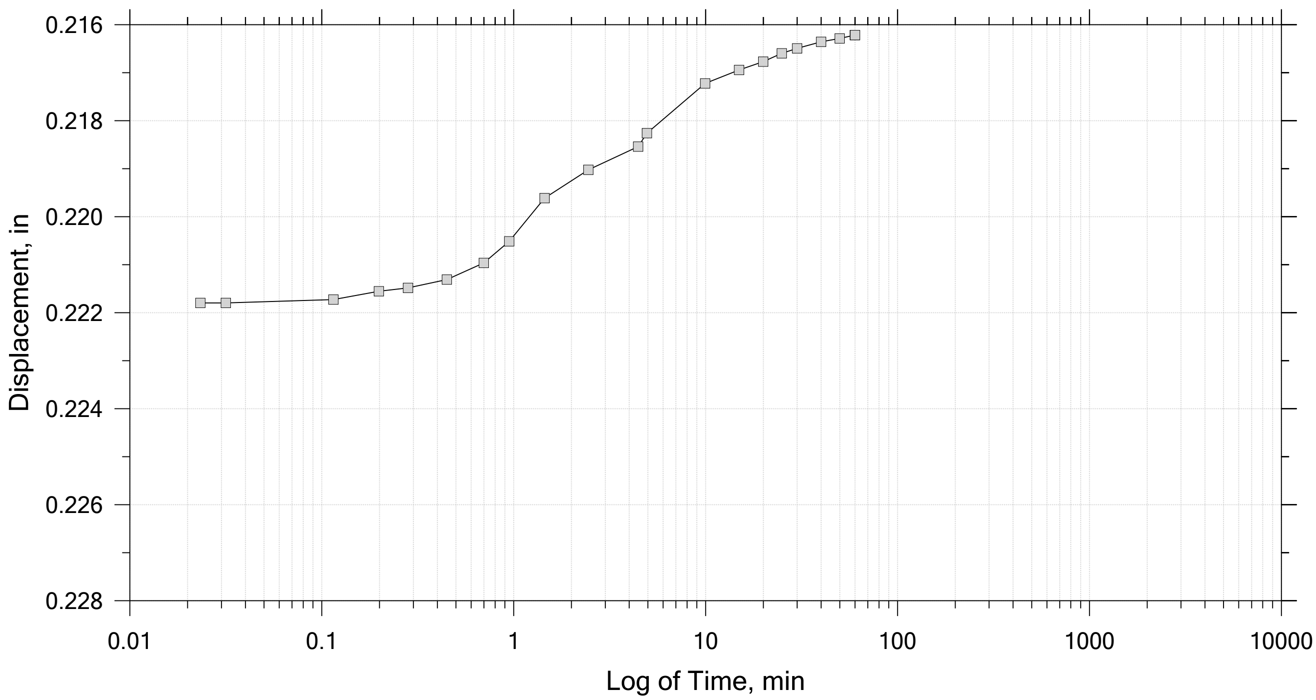


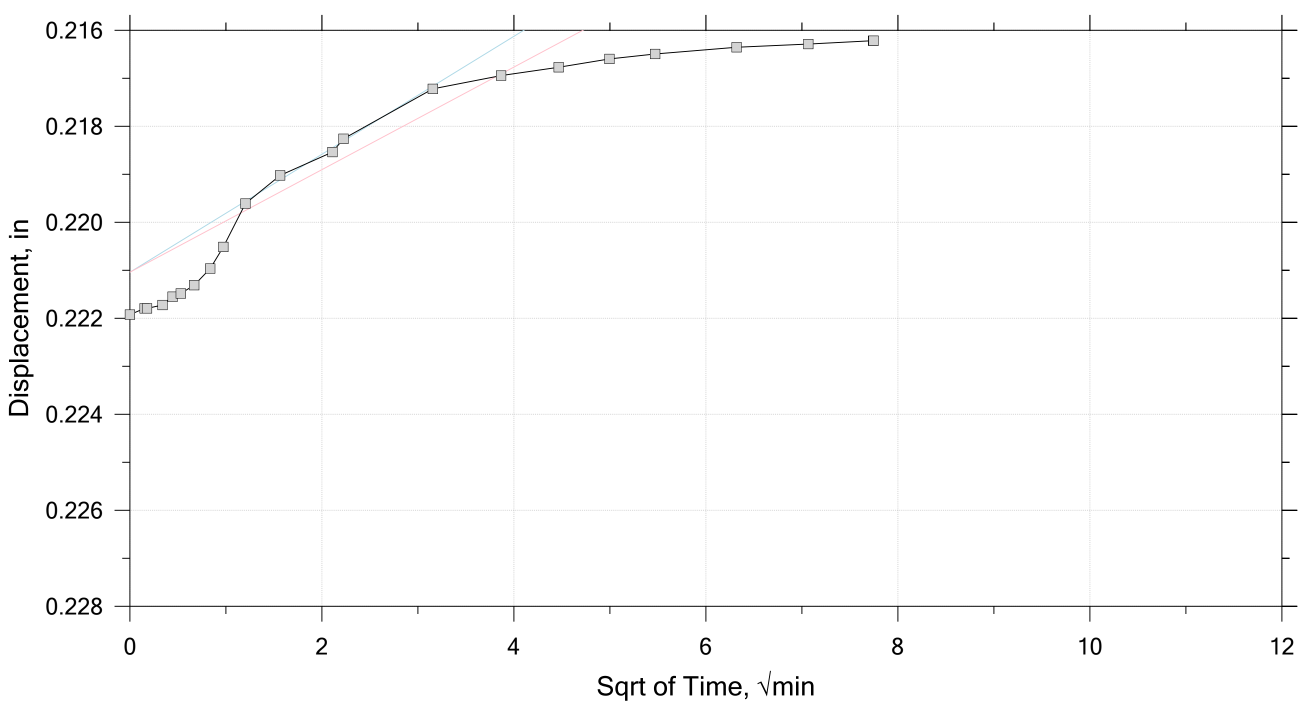


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 24 of 26
Constant Load Step
Stress: 1.52e+03 psf





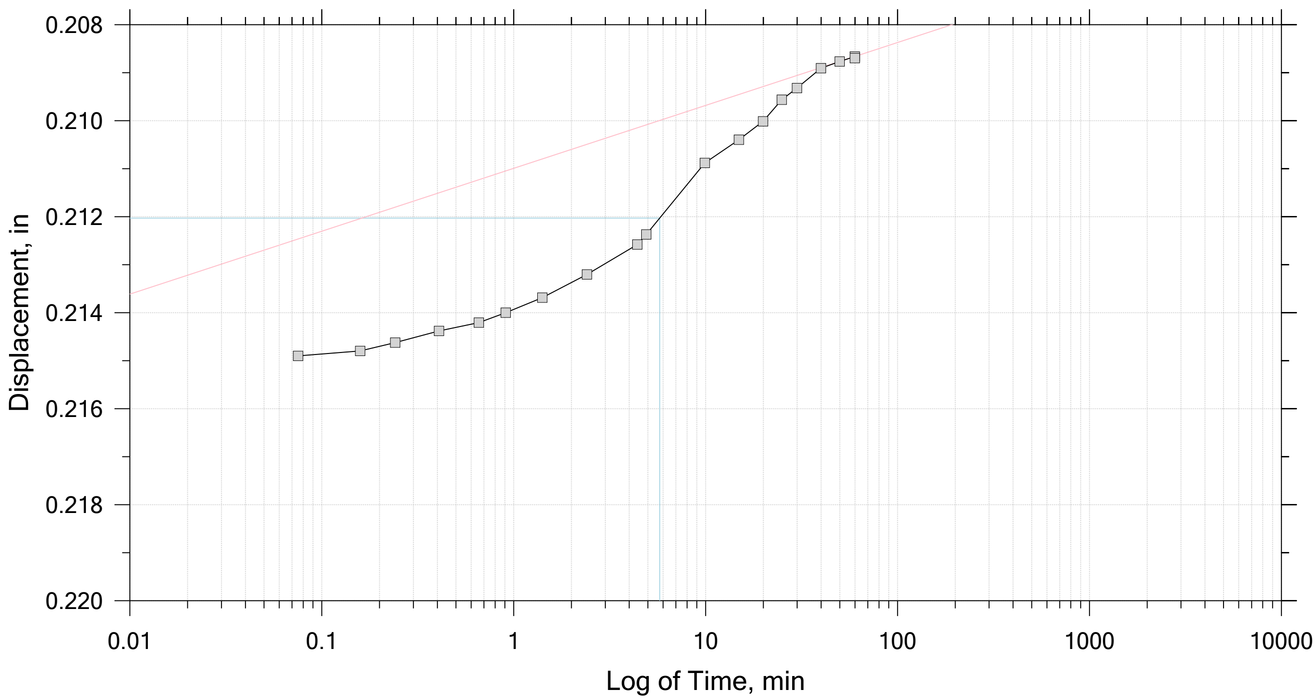
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

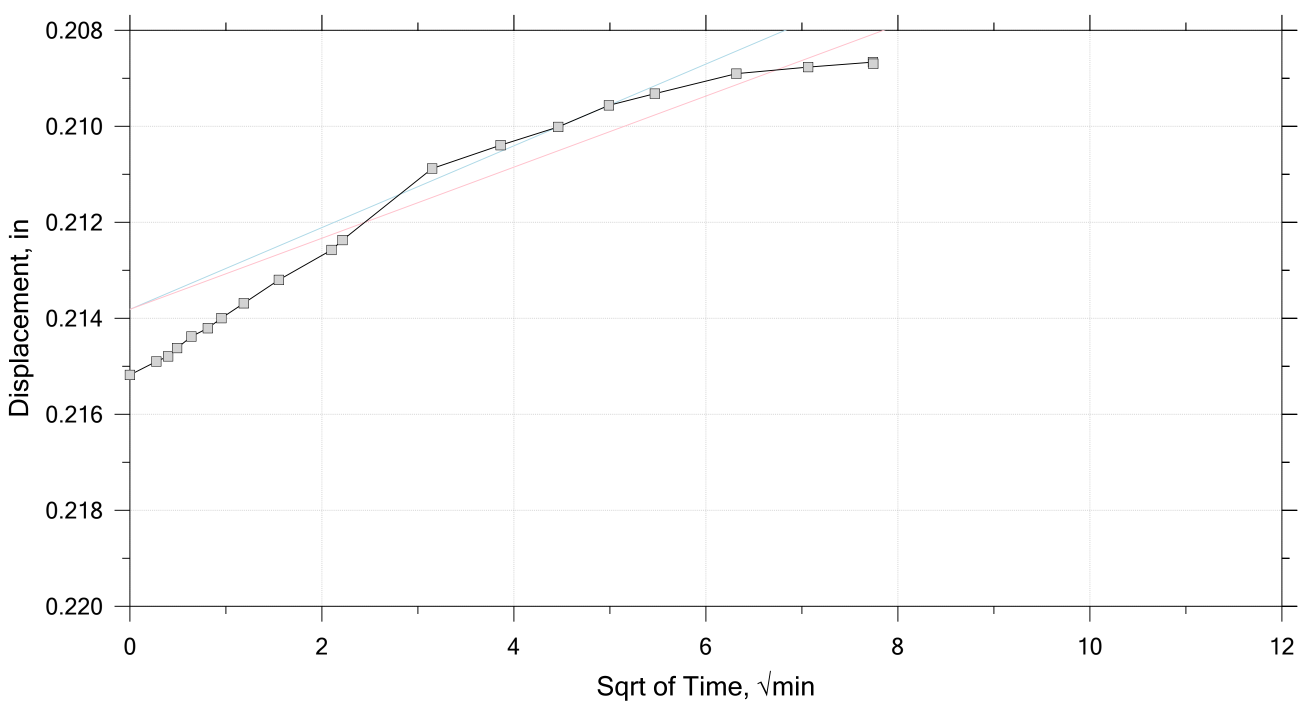
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 25 of 26

Constant Load Step

Stress: 675 psf





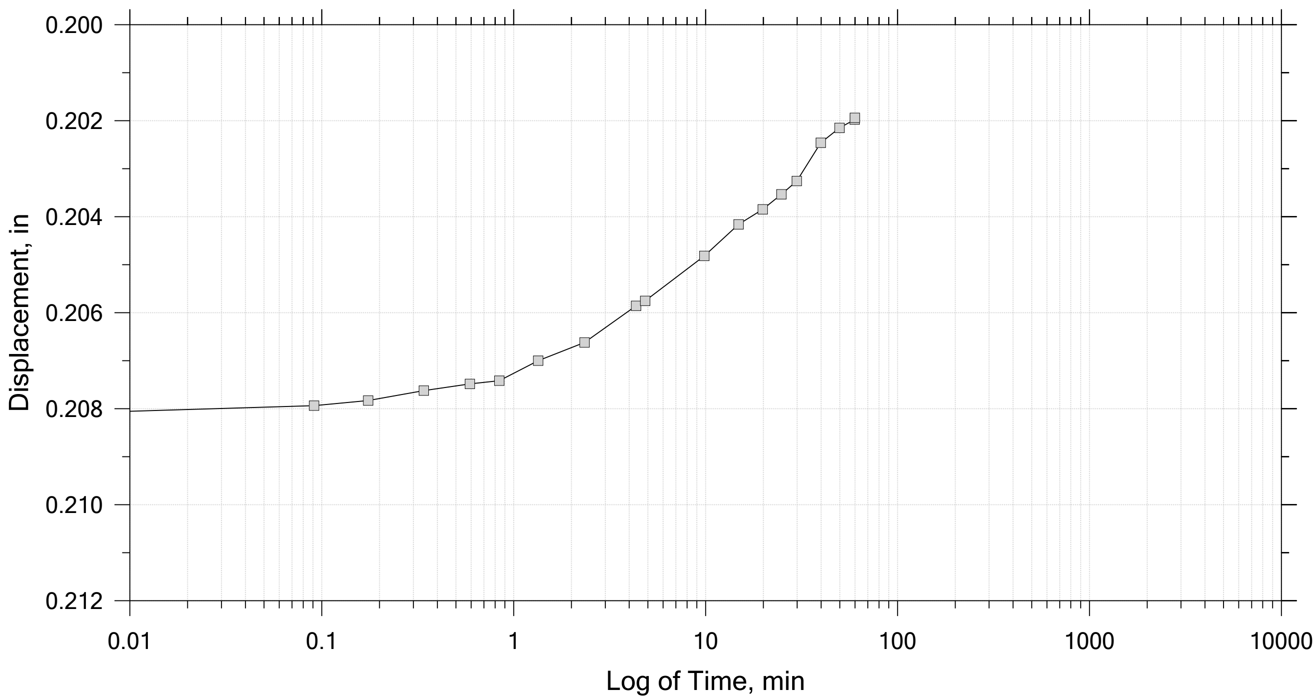
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

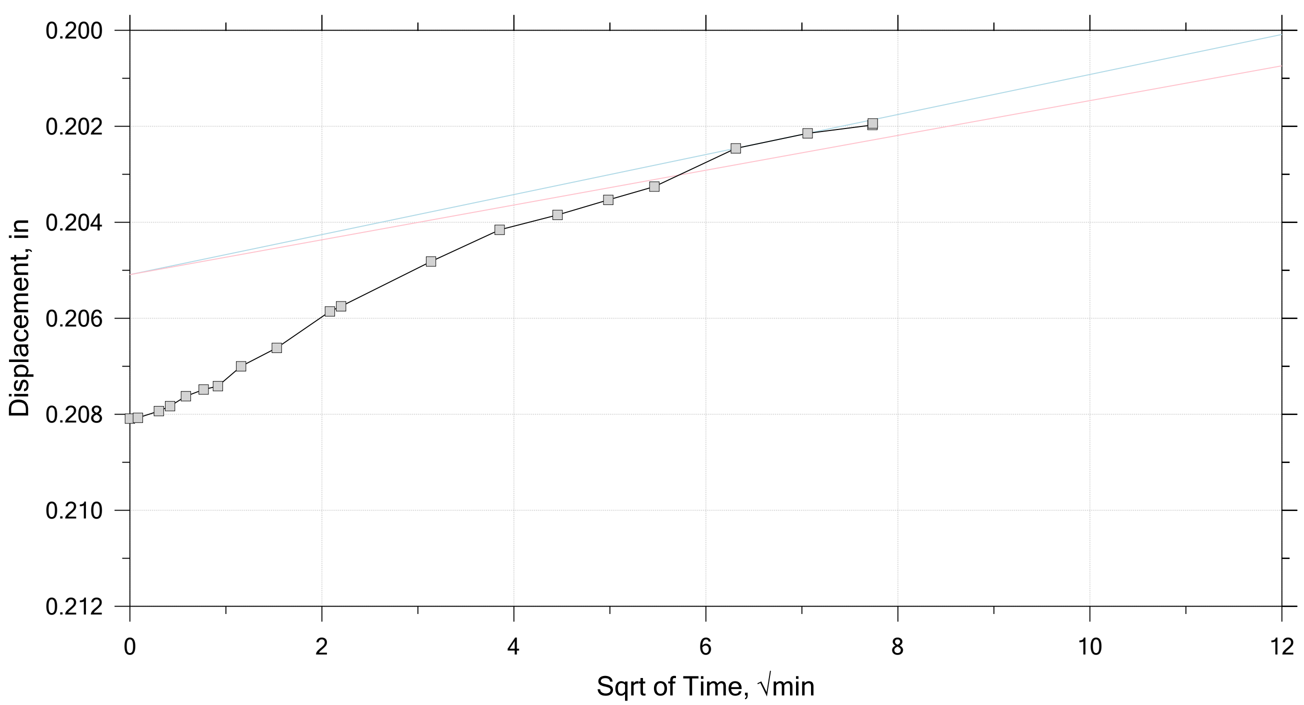
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 26 of 26

Constant Load Step

Stress: 300 psf





	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
	Test Number: ICON310	Preparation: Shelby Tube	Elevation:
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter, in: 2.50	Specific Gravity: 2.87 (Implied)	Liquid Limit: 41
Specimen Height, in: 1.00	Initial Void Ratio: 1.39	Plastic Limit: 23
Final Height, in: 0.80	Final Void Ratio: 0.907	Plasticity Index: 18

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	214	---	"ring"	312
Mass Container, gm	37.01	111.11	111.11	60.67
Mass Container + Wet Soil, gm	139.76	254.17	239.34	188.74
Mass Container + Dry Soil, gm	109	208.56	208.56	158
Mass Dry Soil, gm	71.99	97.452	97.452	97.33
Water Content, %	42.73	46.80	31.58	31.58
Void Ratio	---	1.39	0.91	---
Degree of Saturation, %	---	96.94	100.00	---
Dry Unit Weight, pcf	---	75.134	94.027	---

Preconsolidation Stress, psf	1488
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: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
Test Number: ICON310	Preparation: Shelby Tube	Elevation:
Description: Gray Silty Clay		
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	200.	0.004366	1.38	0.434	0.000	0.00e+00	4.34e+04	0.00e+00
2	300.	0.005752	1.37	0.572	0.000	0.00e+00	2.76e+04	0.00e+00
3	450.	0.007866	1.37	0.783	35.542	5.94e-02	2.80e+04	1.84e-08
4	675.	0.01171	1.36	1.17	0.000	0.00e+00	3.40e+04	0.00e+00
5	1.01e+03	0.01566	1.35	1.56	29.640	7.03e-02	2.33e+04	1.80e-08
6	1.52e+03	0.02199	1.33	2.19	18.731	1.10e-01	2.49e+04	3.02e-08
7	2.28e+03	0.03714	1.30	3.70	49.782	4.05e-02	3.97e+04	1.77e-08
8	3.42e+03	0.1009	1.15	10.0	118.310	1.57e-02	1.11e+05	1.93e-08
9	5.13e+03	0.1422	1.05	14.1	56.784	2.91e-02	4.80e+04	1.54e-08
10	2.28e+03	0.1397	1.06	13.9	0.000	0.00e+00	1.74e+03	0.00e+00
11	1.01e+03	0.1348	1.07	13.4	17.594	9.07e-02	7.74e+03	7.73e-09
12	450.	0.1287	1.08	12.8	14.421	1.12e-01	2.14e+04	2.65e-08
13	675.	0.1294	1.08	12.9	0.000	0.00e+00	6.46e+03	0.00e+00
14	1.01e+03	0.1310	1.08	13.0	29.897	5.43e-02	9.59e+03	5.73e-09
15	1.52e+03	0.1338	1.07	13.3	9.895	1.63e-01	1.07e+04	1.92e-08
16	2.28e+03	0.1374	1.06	13.7	40.094	4.00e-02	9.59e+03	4.22e-09
17	3.42e+03	0.1414	1.05	14.1	7.102	2.24e-01	7.03e+03	1.73e-08
18	5.13e+03	0.1528	1.02	15.2	19.045	8.19e-02	1.32e+04	1.19e-08
19	7.69e+03	0.1790	0.962	17.8	33.618	4.44e-02	2.03e+04	9.95e-09
20	1.15e+04	0.2073	0.895	20.6	26.549	5.26e-02	1.47e+04	8.51e-09
21	1.73e+04	0.2321	0.836	23.1	15.268	8.56e-02	8.55e+03	8.06e-09
22	7.69e+03	0.2274	0.847	22.6	0.539	2.36e+00	9.71e+02	2.53e-08
23	3.42e+03	0.2231	0.857	22.2	5.109	2.52e-01	2.00e+03	5.56e-09
24	1.52e+03	0.2165	0.873	21.5	14.552	8.98e-02	6.98e+03	6.91e-09
25	675.	0.2087	0.891	20.8	45.325	2.94e-02	1.83e+04	5.92e-09
26	300.	0.2019	0.907	20.1	45.277	2.99e-02	3.59e+04	1.18e-08

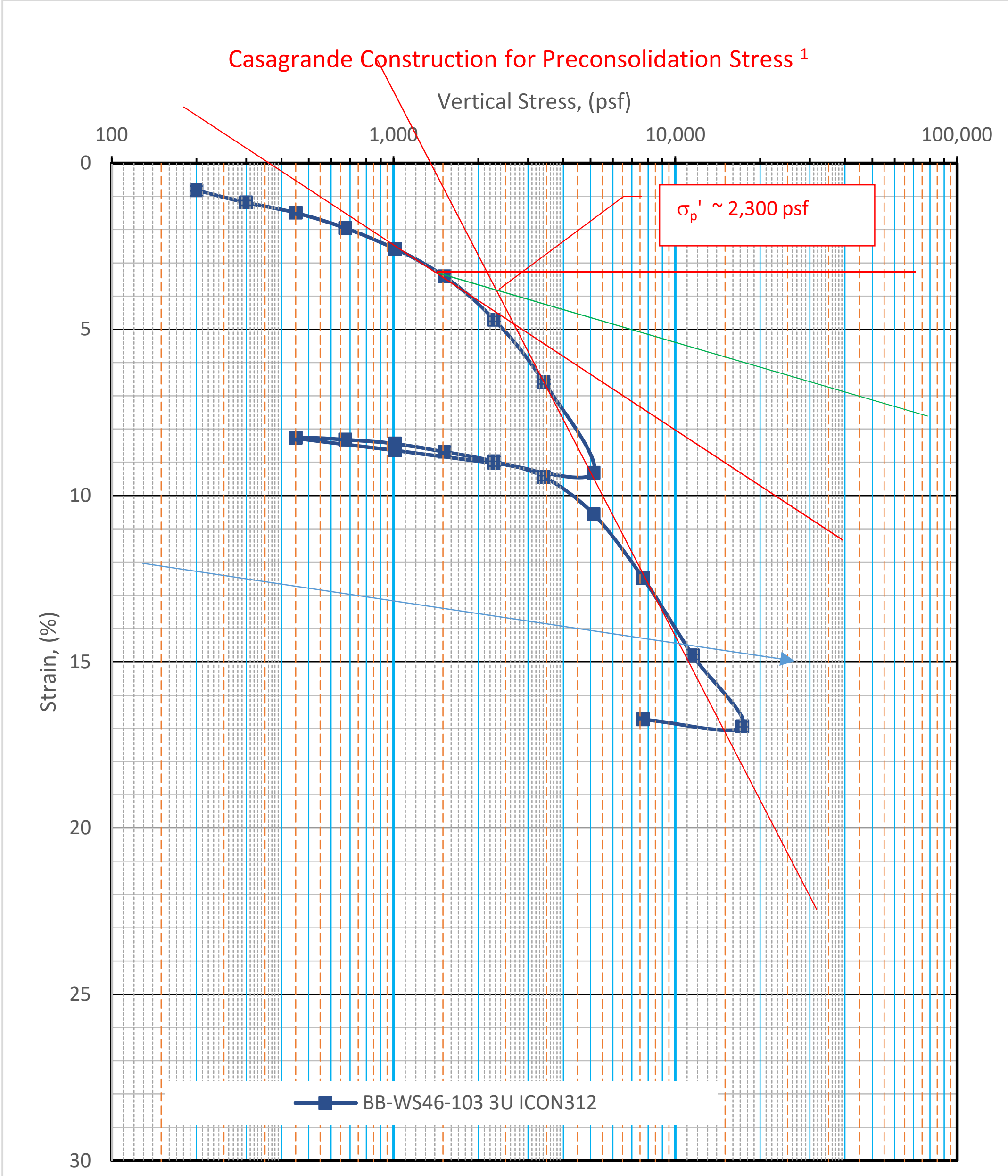
Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
Sample Number: U2	Test Date: 11/19/19	Depth: 46.65
Test Number: ICON310	Preparation: Shelby Tube	Elevation:
Description: Gray Silty Clay		
Remarks:		
Displacement at End of Primary		

ICON: BB-WS46-103 3U

Consolidation Test Data
Summary Report

Project Name:	Woolwich Bridge No 3039
Project Number:	166-12
Project Location:	Woolwich, Maine
Client:	GZA Proj. No. 09.0026035.00
Sample Description:	Gray Silty Clay
Preparation:	Trimmed Shelby Tube

Lab Test No:	ICON 312			
Boring No.	BB-WS46-103			
Sample No:	3U			
Boring Elevation (ft).	3.0			
Sample Depth (ft):	70 - 72			
Test Specimen Depth (Ft):	71.07			
Test Specimen Elevation:	-68.07			
Water Content (%):	33.78			
Dry Unit Weight (pcf):	88.78			
Wet Unit Weight (pcf):	118.77			
Saturation Before (%):	97.25			
Saturation After (%):	100			
Void Ratio Before:	0.98			
Void Ratio After:	0.69			
Overburden Pressure (psf):				
Max Previous stress (psf):	2,300			
Max Prev. stress (Work) (psf):	2,300			
OCR:				
Compression Index (C_{CE}):	0.165			
Recompression Index (C_{RE}):	0.012			
Liquid Limit:	27.7			
Plastic Limit:	18.7			
Plasticity Index:	9.0			
Liquidity Index:	1.7			
Specific Gravity (implied)	2.81			
Lab Vane Su at __ ft. (psf)				
Tested By:	sjr			
Date Tested:	12/7/2019			
Checked By:	sjr			

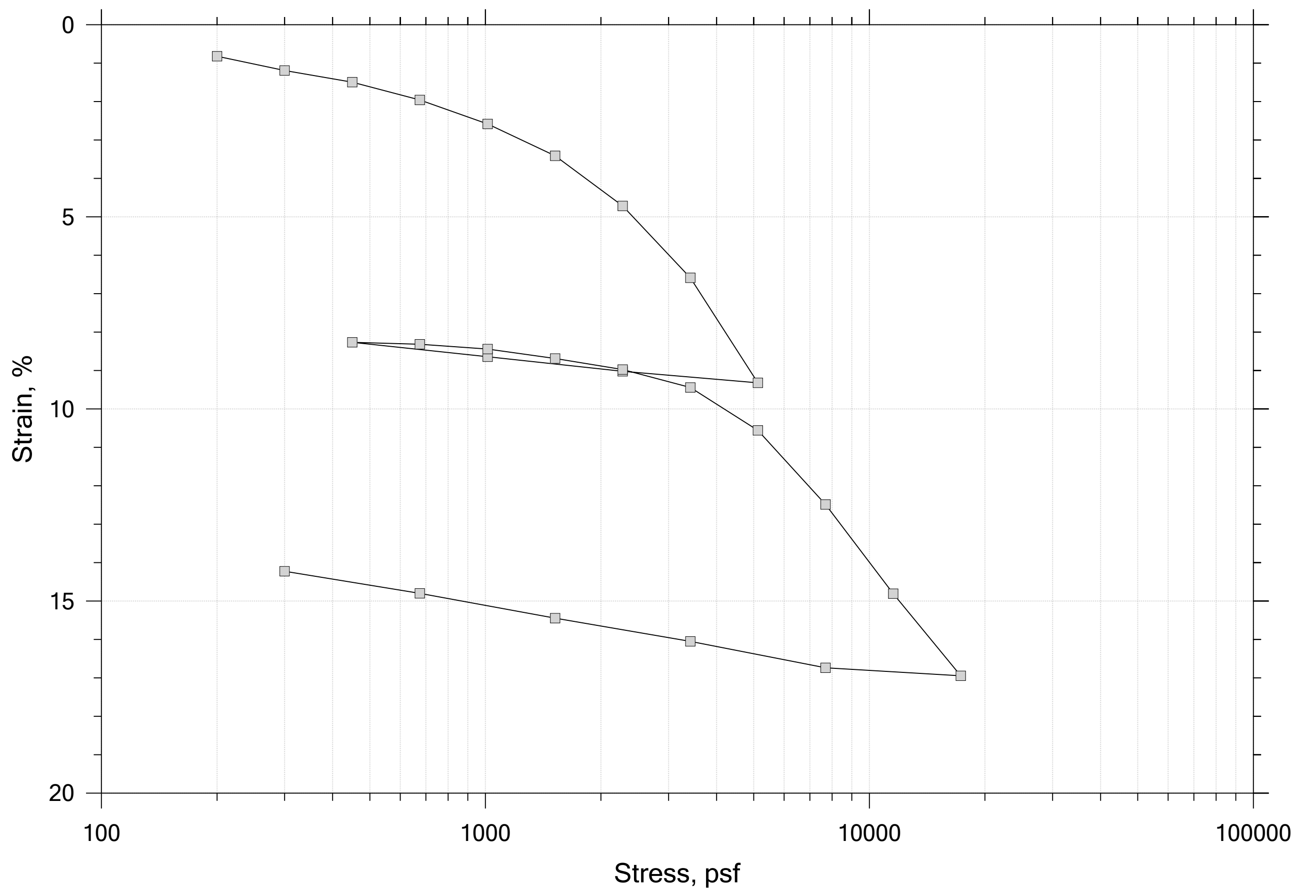


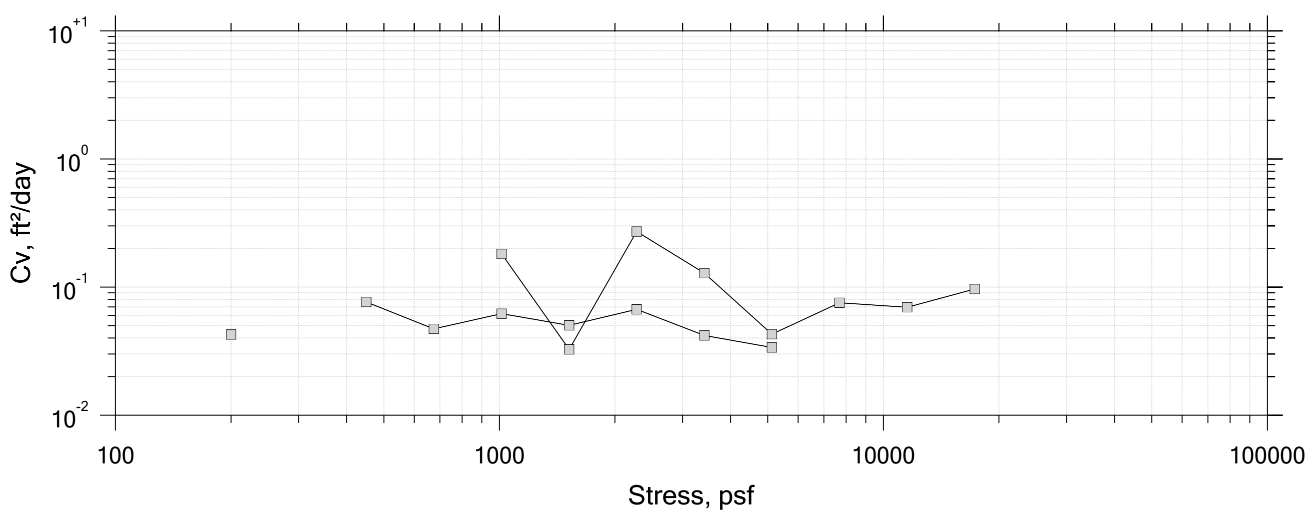
Note 1: The calculations for the Max Previous Stress, the Compression Index and the Recompression Index are provided for the convienience of the Specifier. The Specifier should make their own independent assessment of Maximum Previous stress, Cce and Cre for use in any engineering analyses.

Soil Metrics LLC Geotechnical Engineering

One-Dimensional Consolidation by ASTM D2435 - Method B

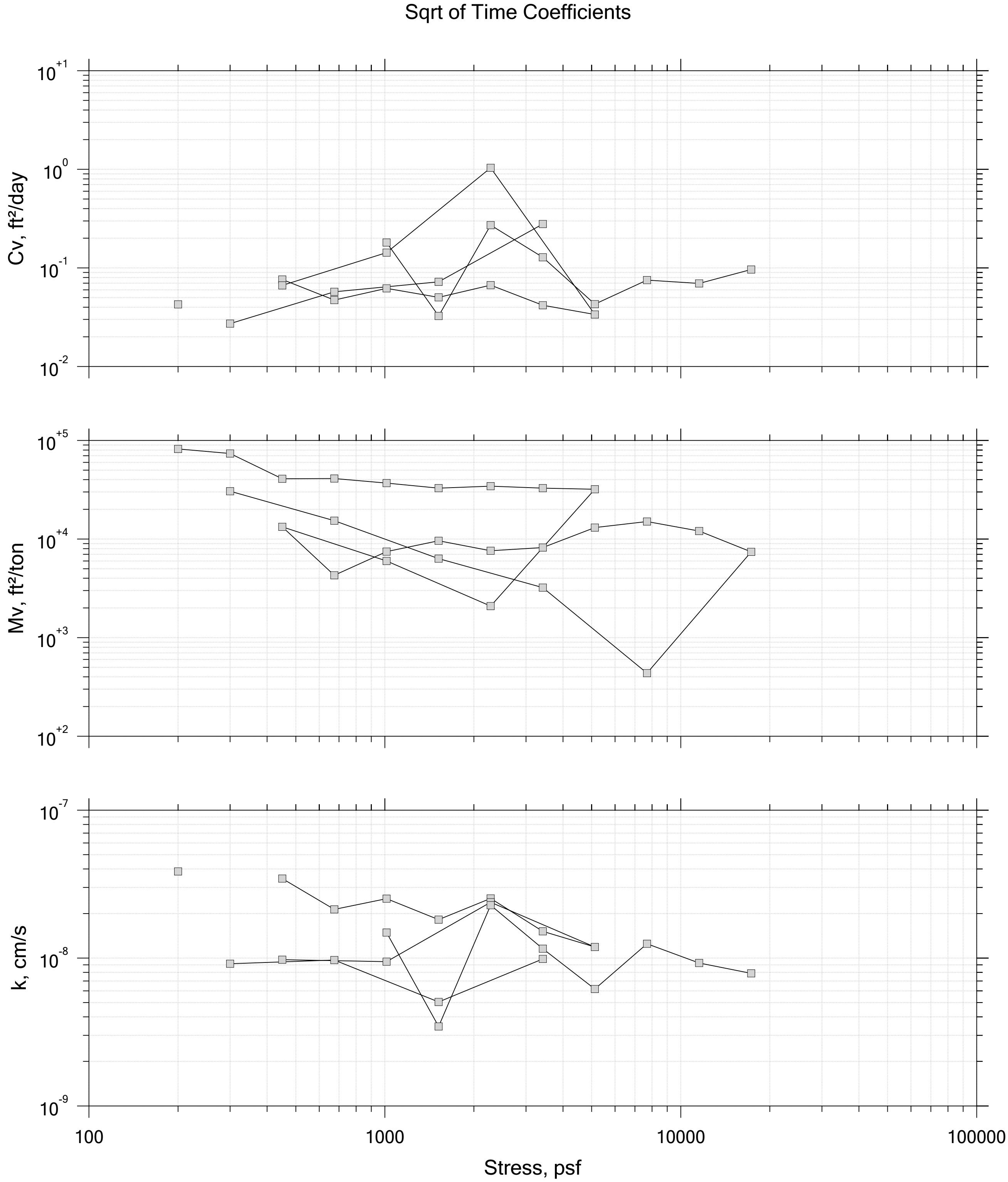
Summary Report





	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method B



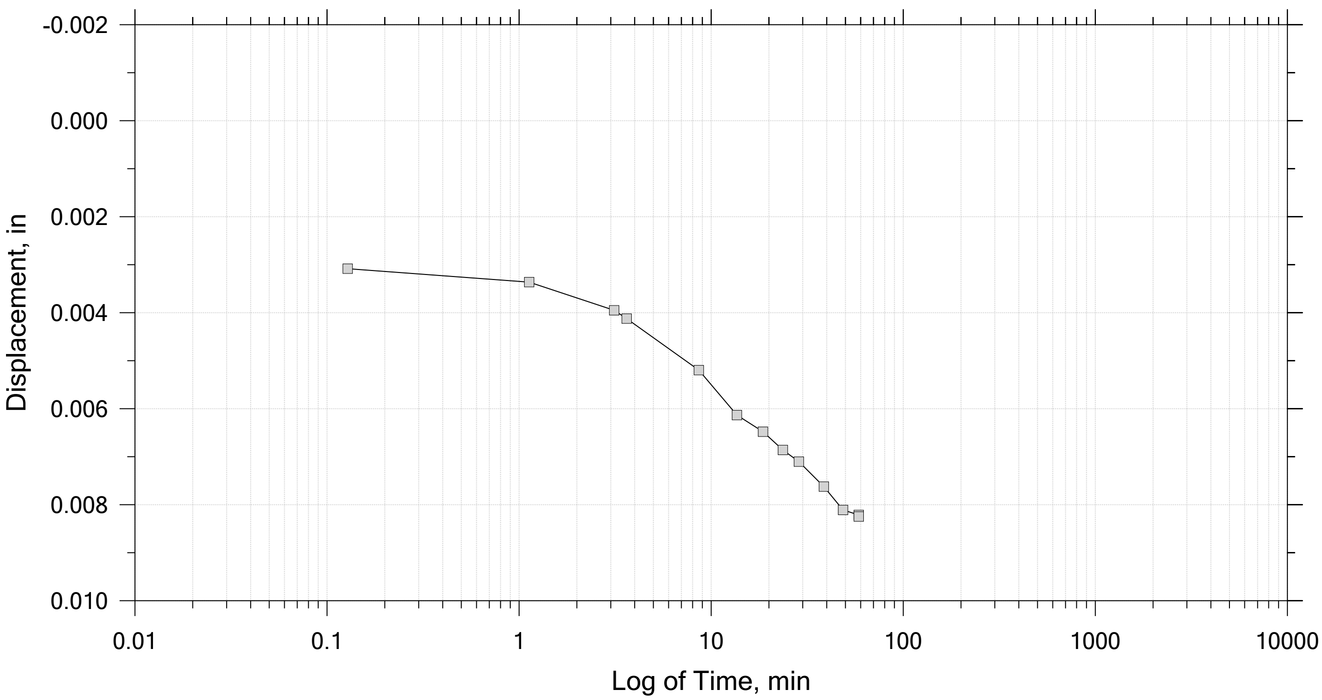
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

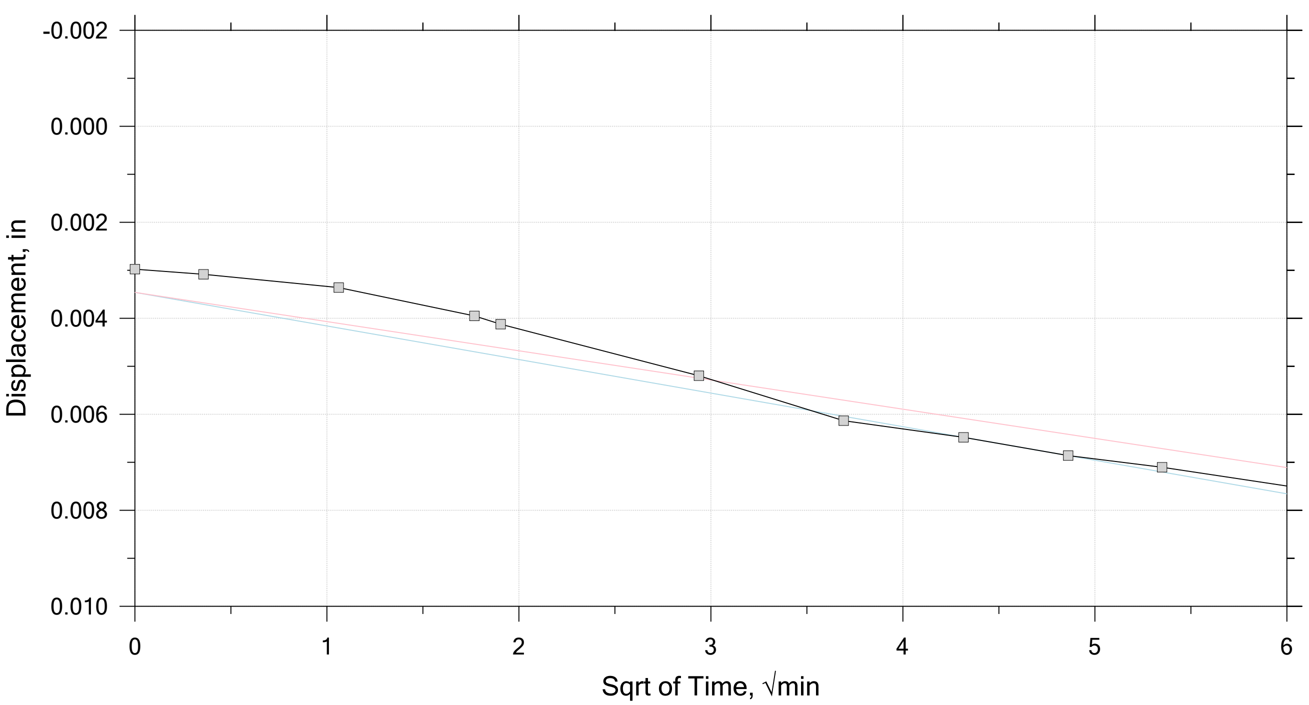
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 1 of 26

Constant Load Step

Stress: 200 psf





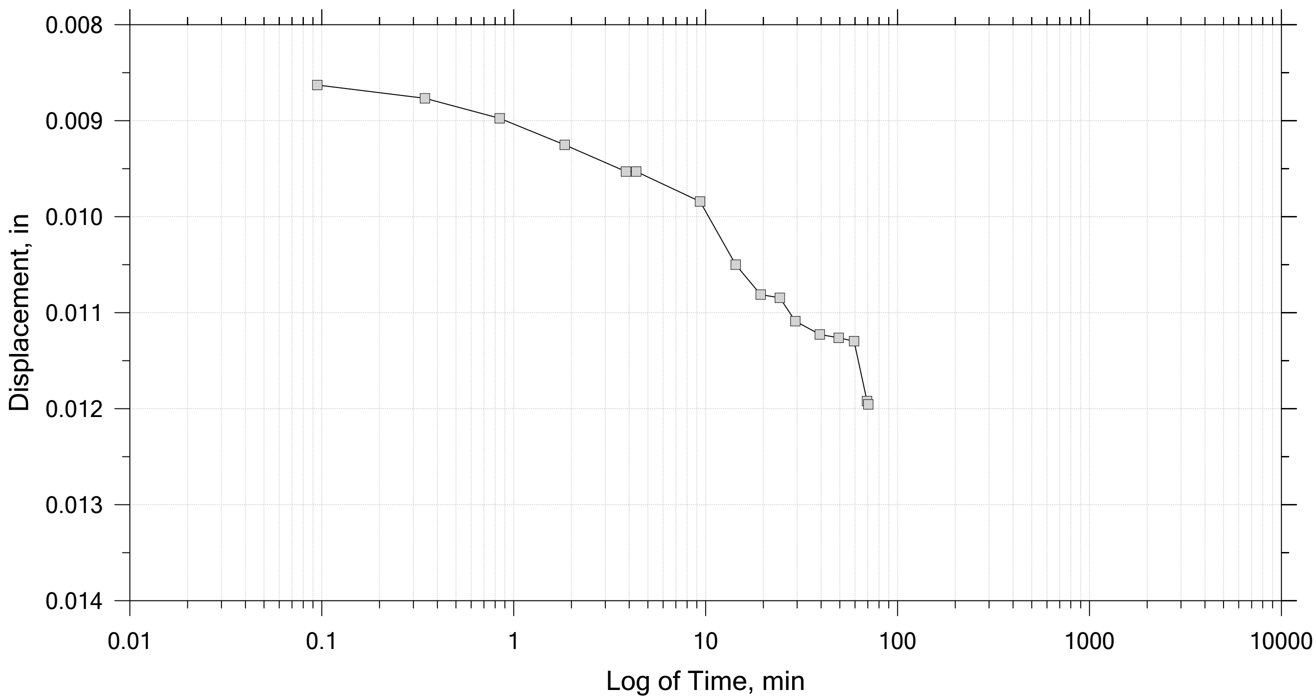
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

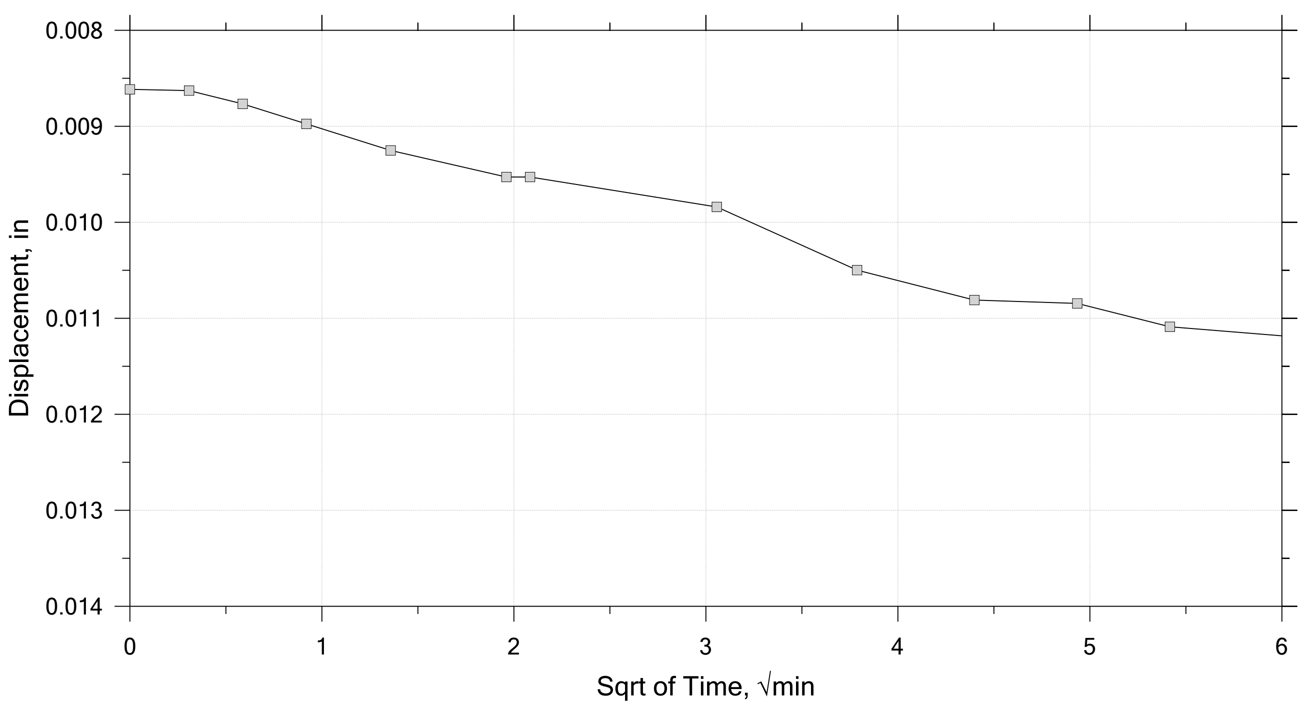
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 2 of 26

Constant Load Step

Stress: 300 psf





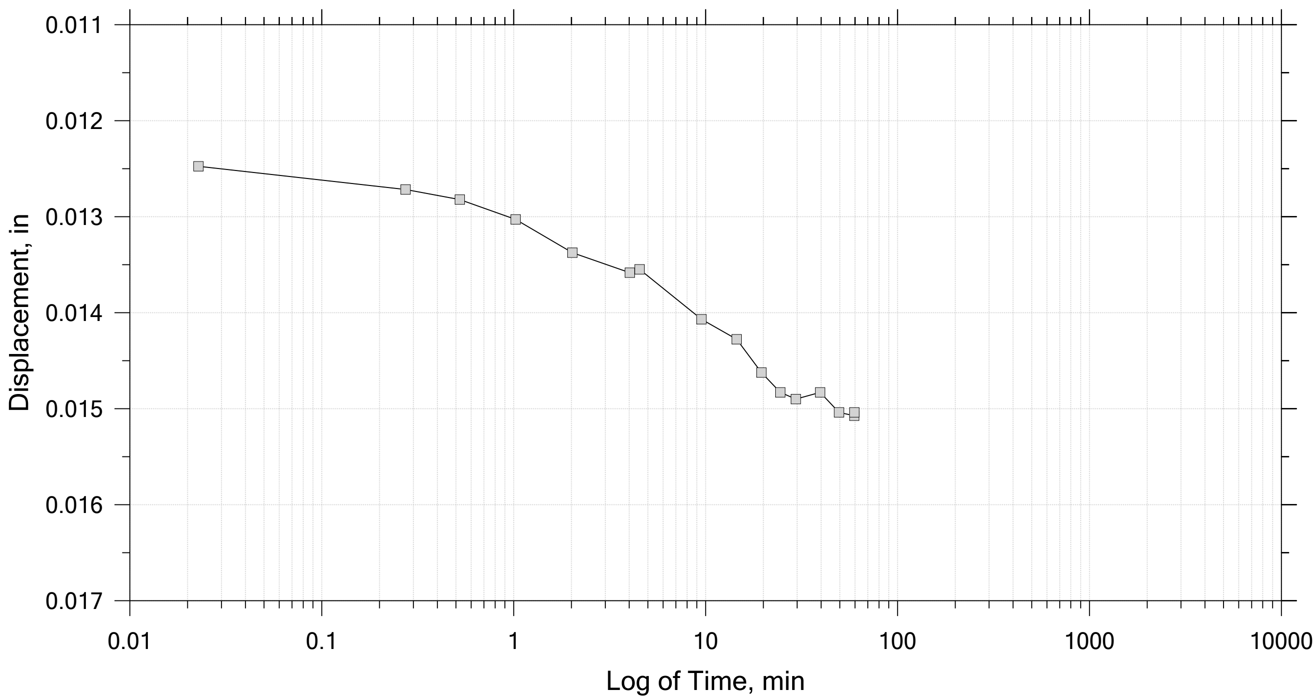
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

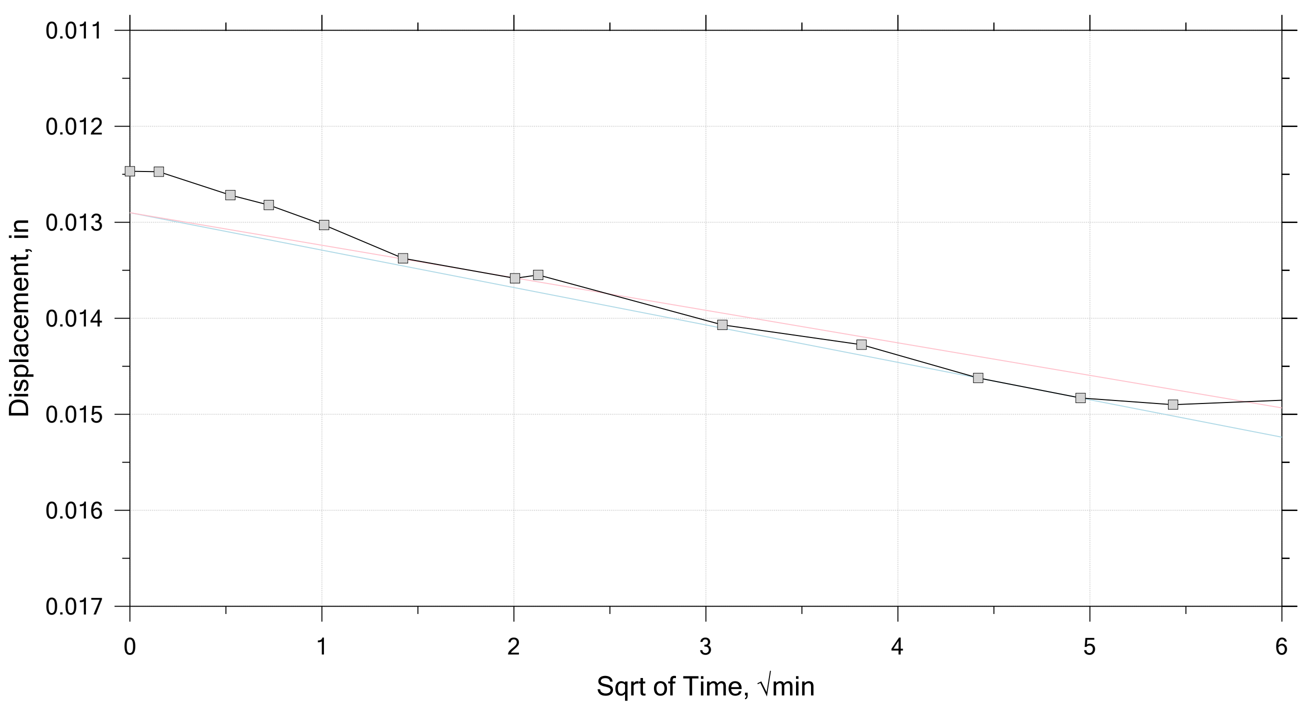
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 3 of 26

Constant Load Step

Stress: 450 psf





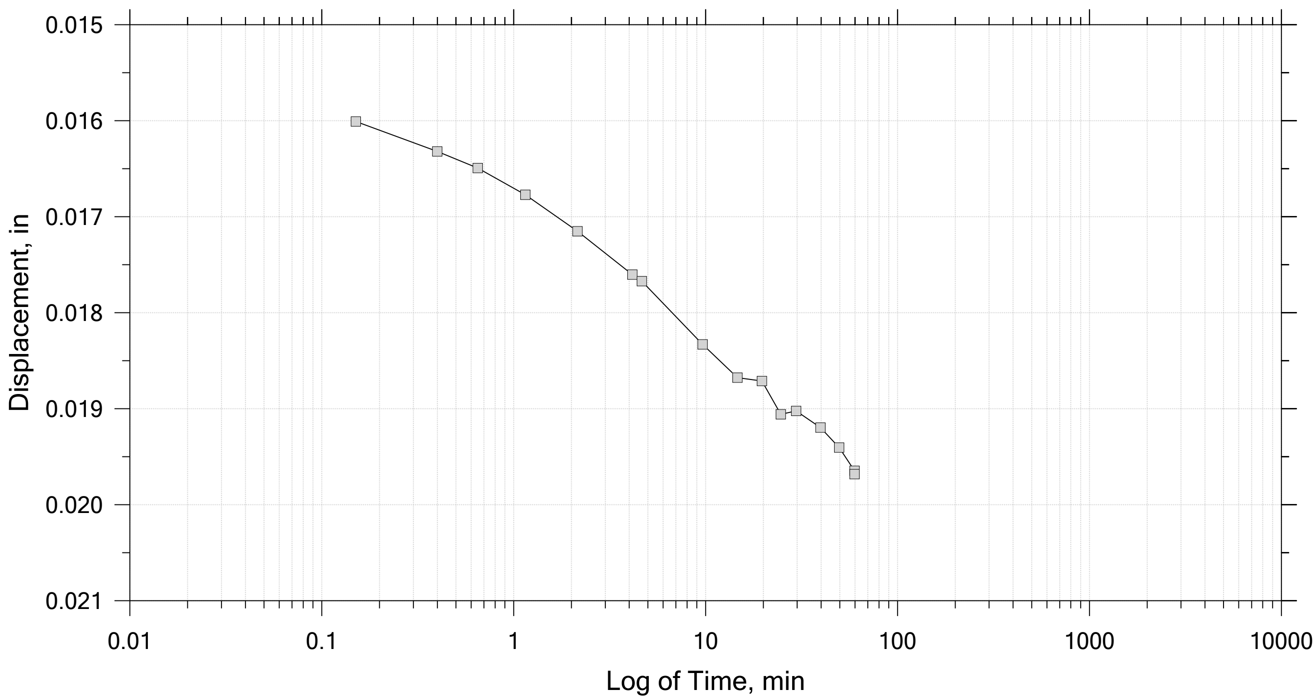
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

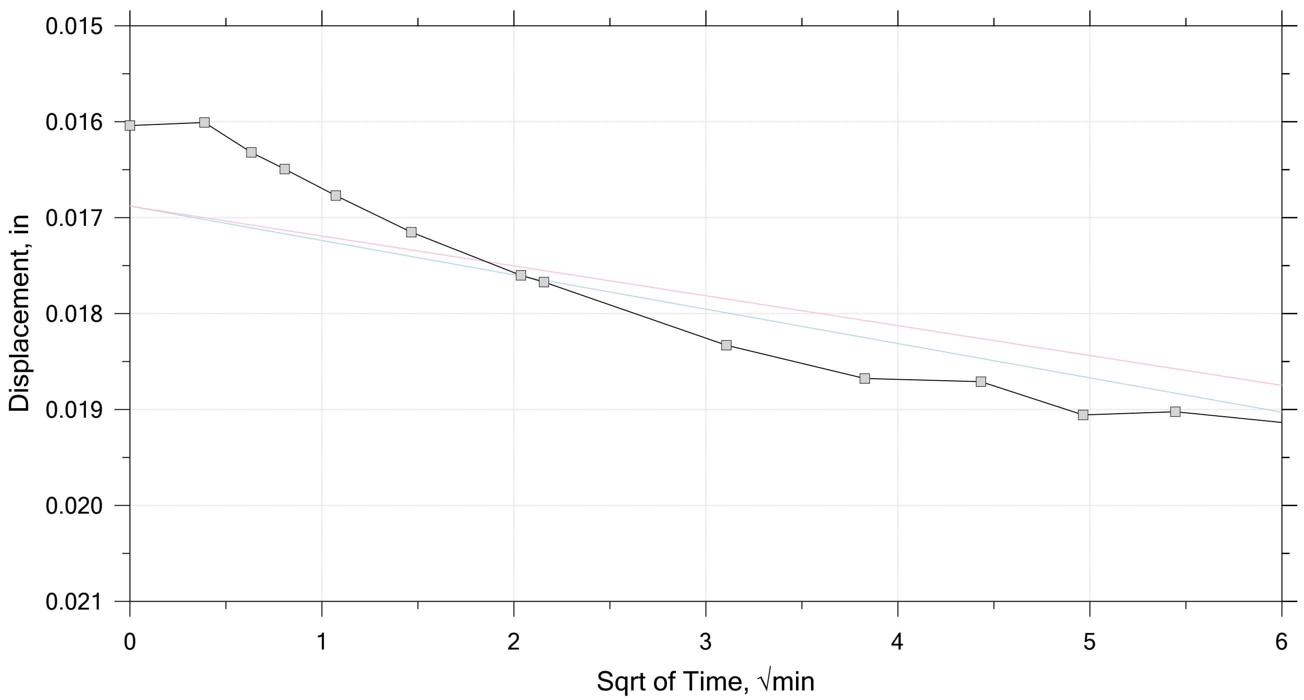
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 4 of 26

Constant Load Step

Stress: 675 psf





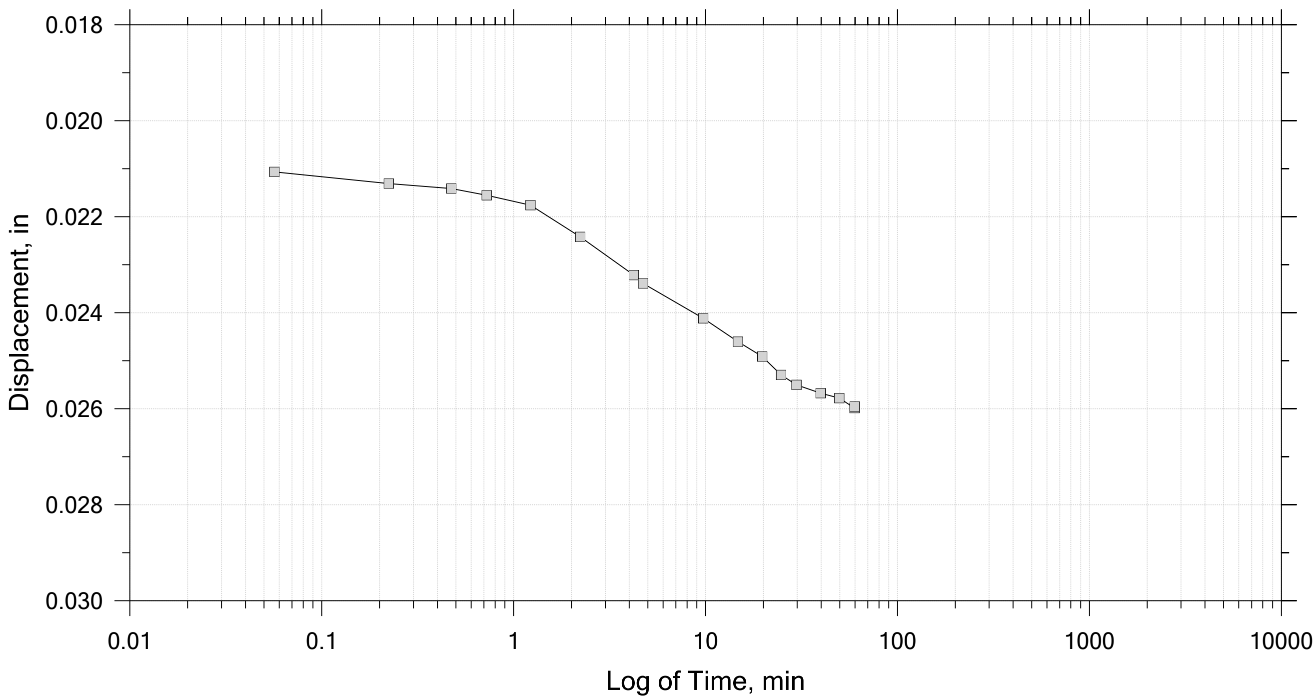
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

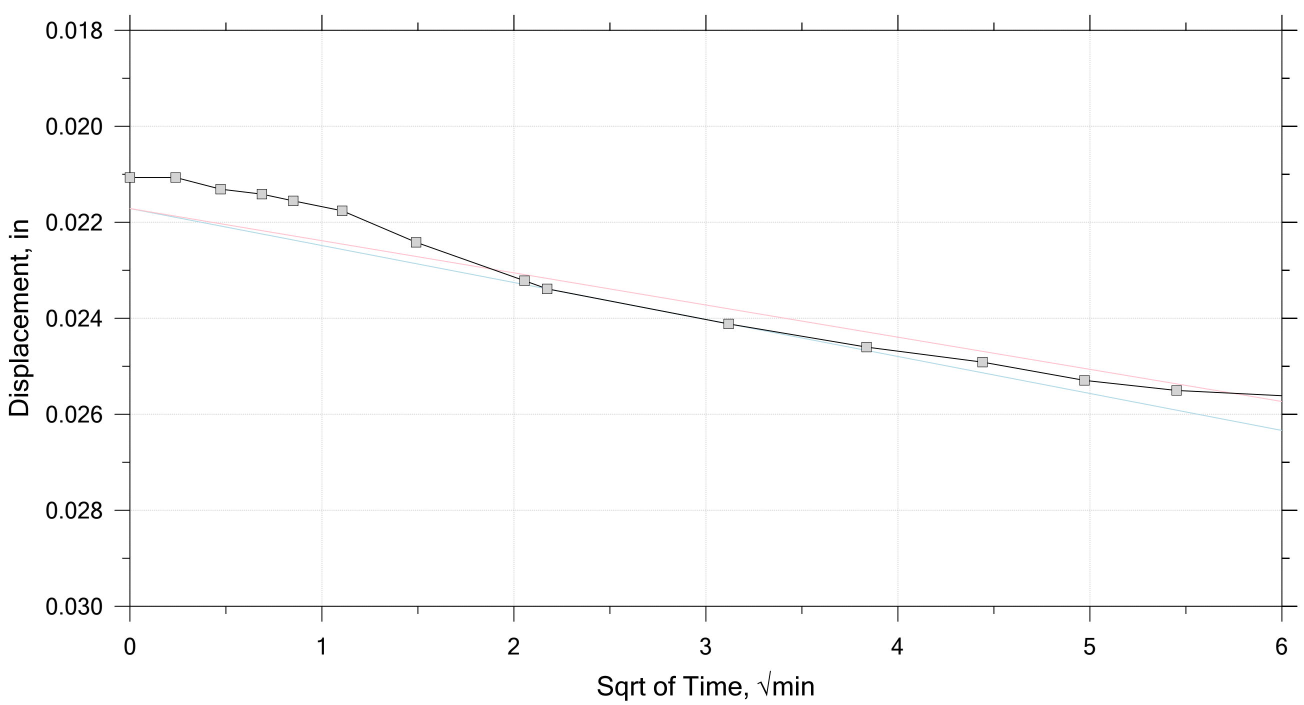
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 5 of 26

Constant Load Step

Stress: 1.01e+03 psf





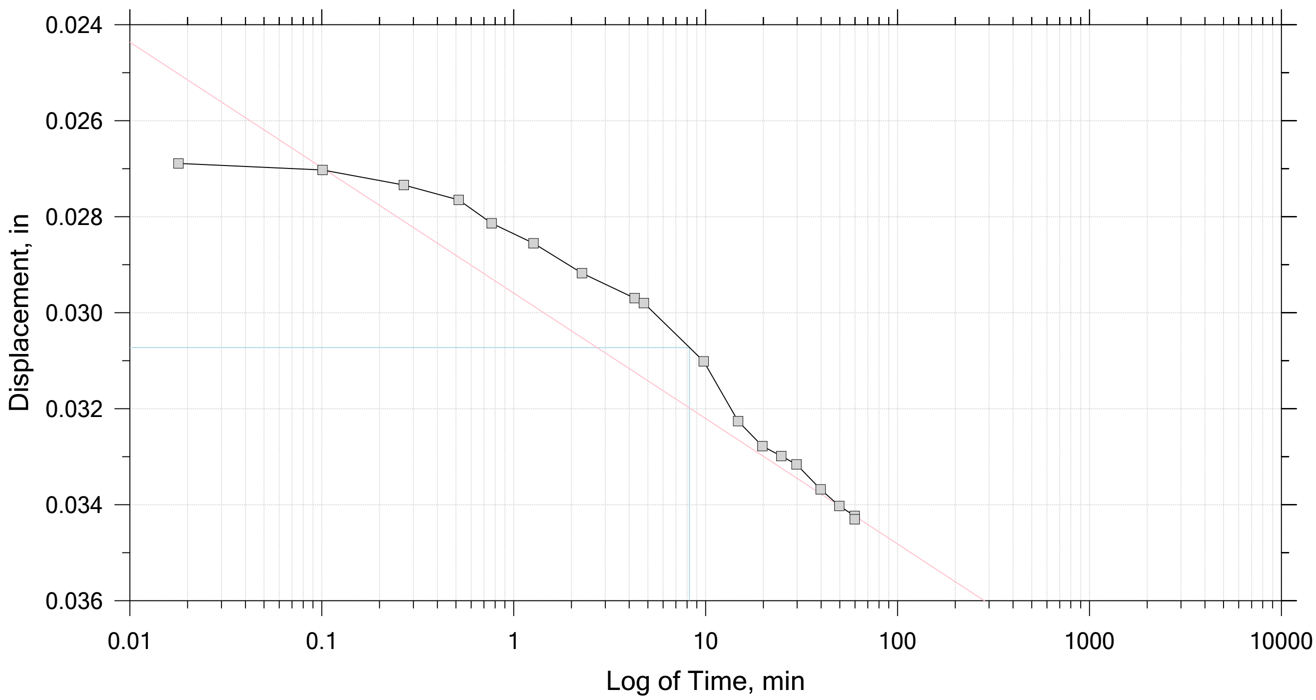
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

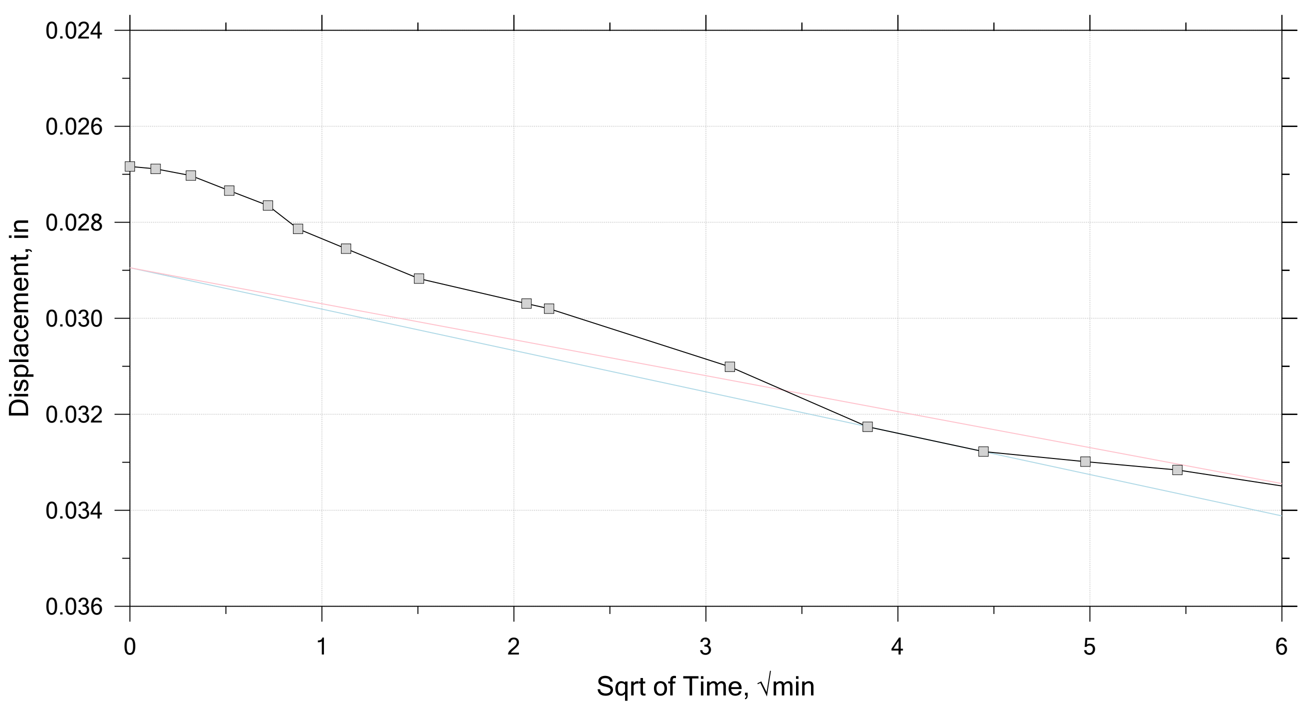
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 6 of 26

Constant Load Step

Stress: 1.52e+03 psf





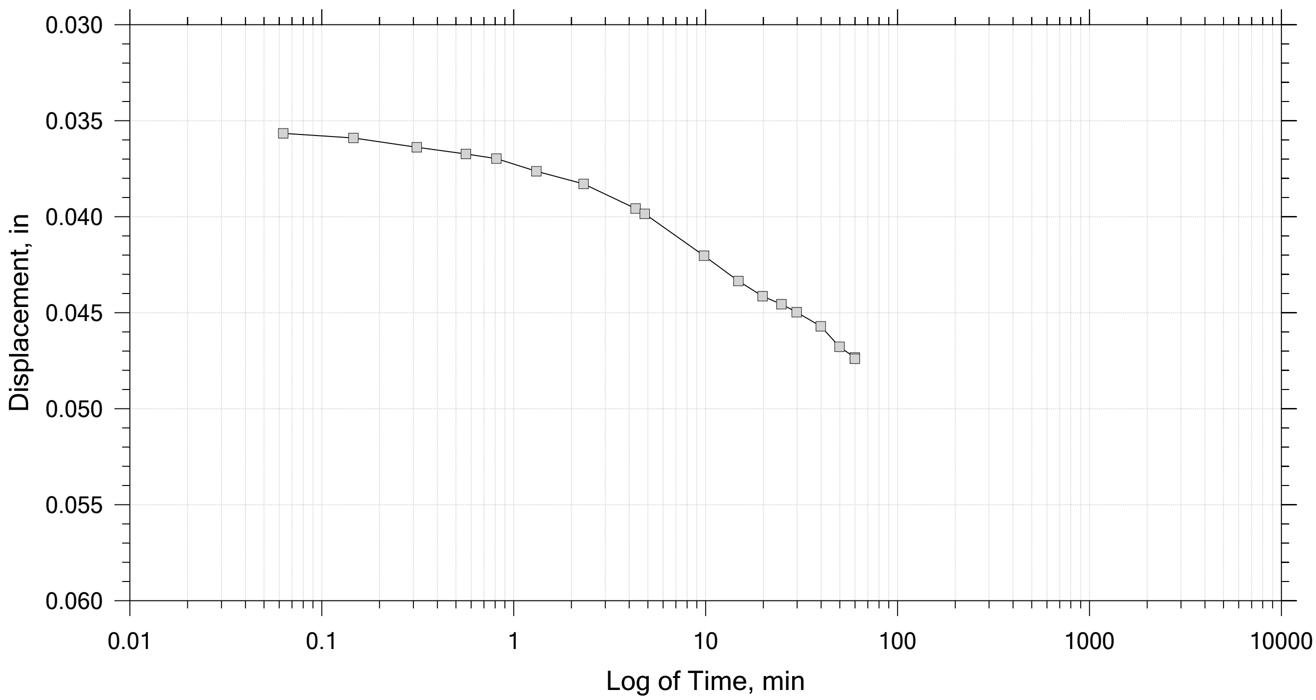
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

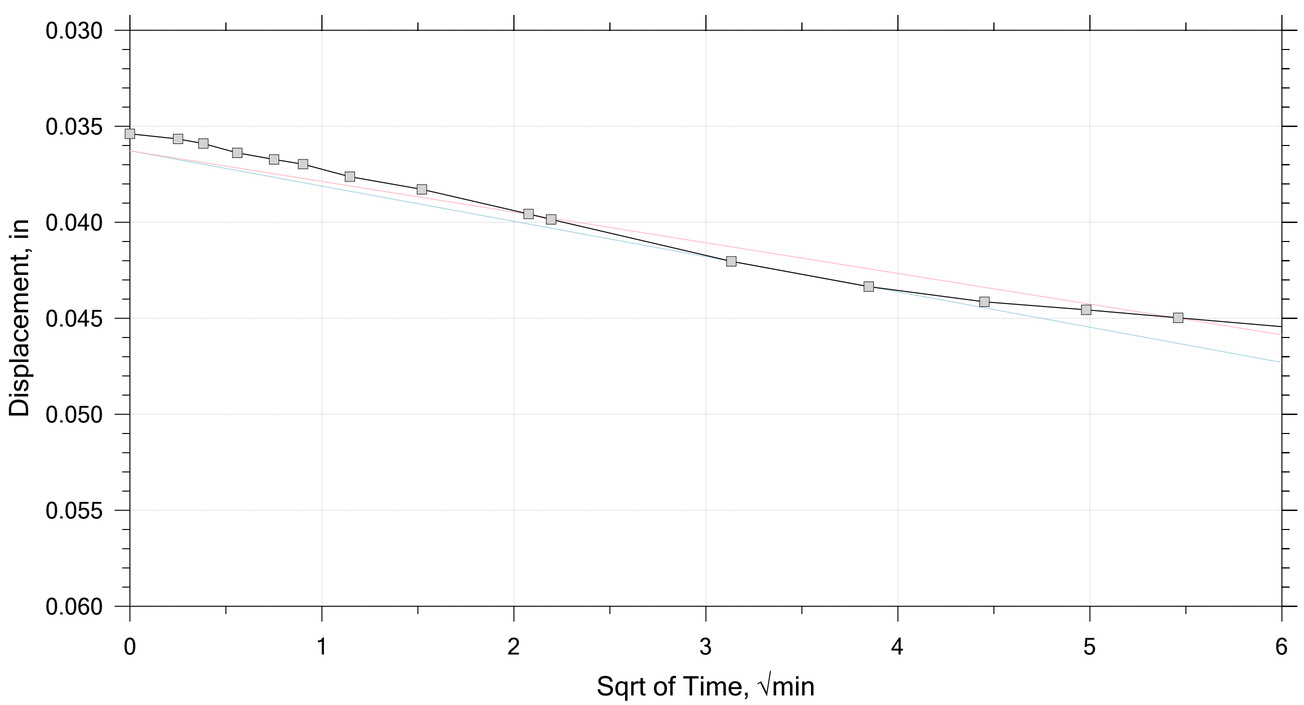
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 7 of 26

Constant Load Step

Stress: 2.28e+03 psf





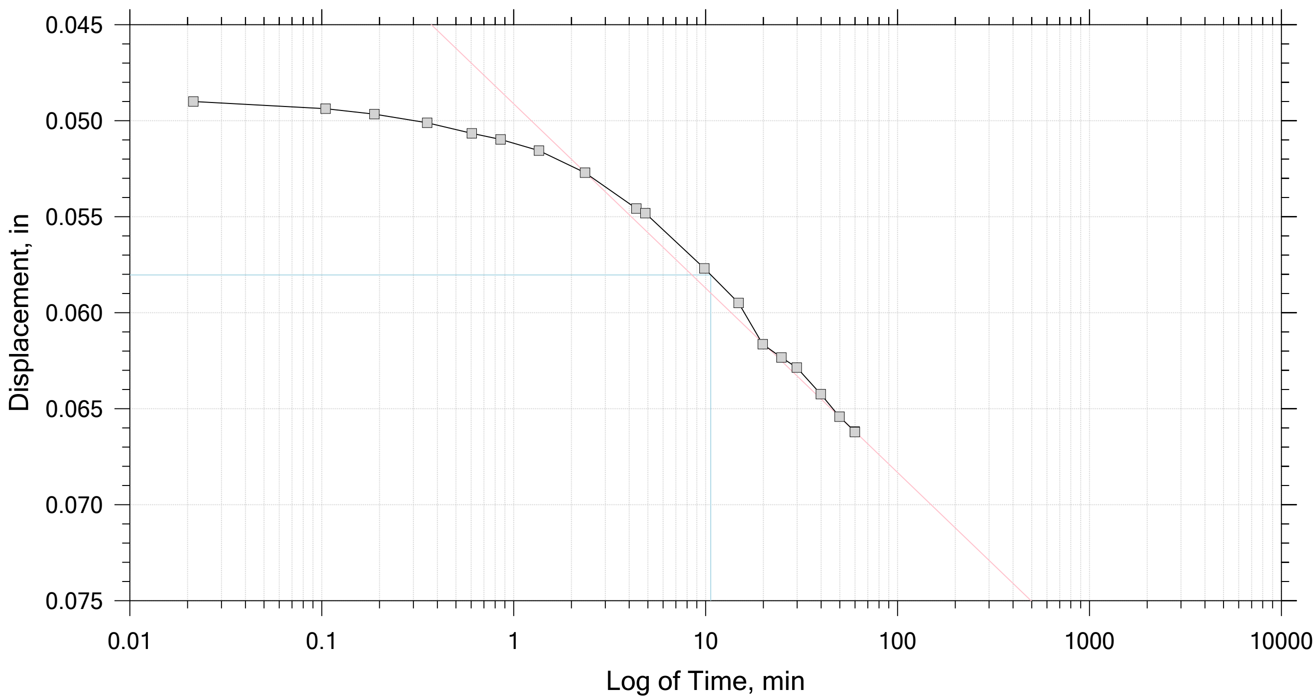
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

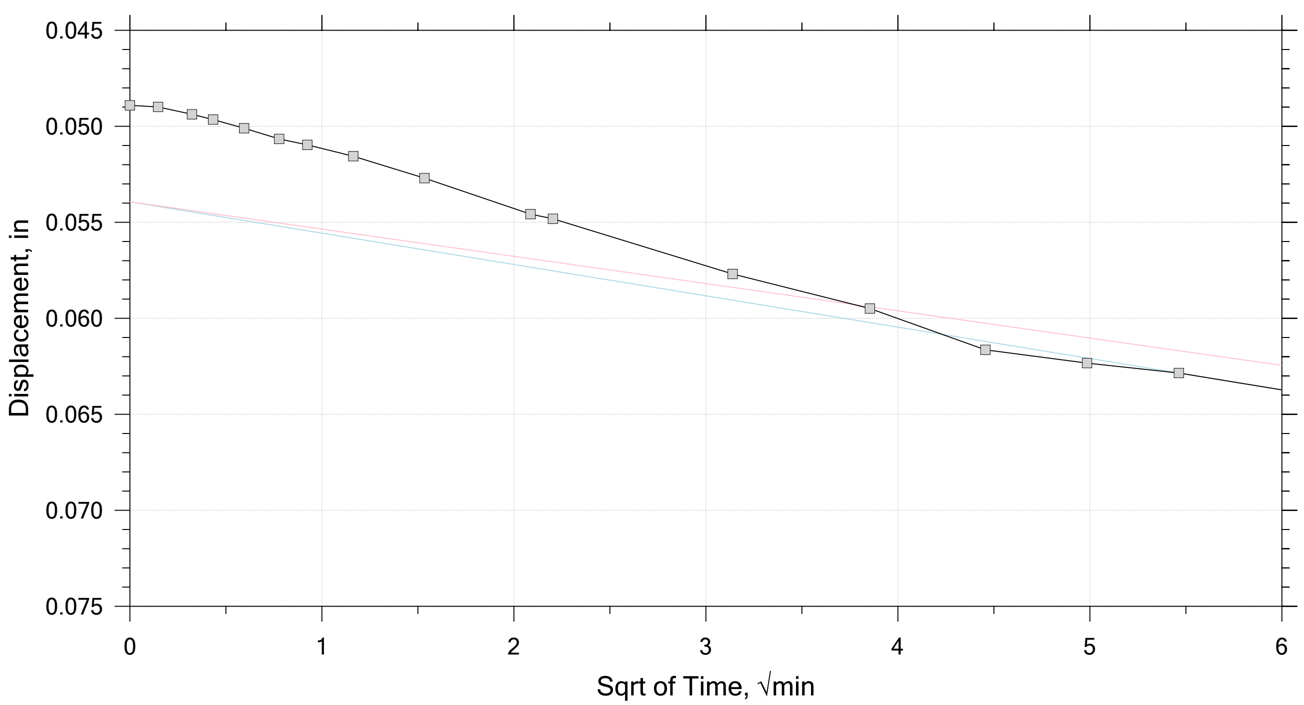
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 8 of 26

Constant Load Step

Stress: 3.42e+03 psf

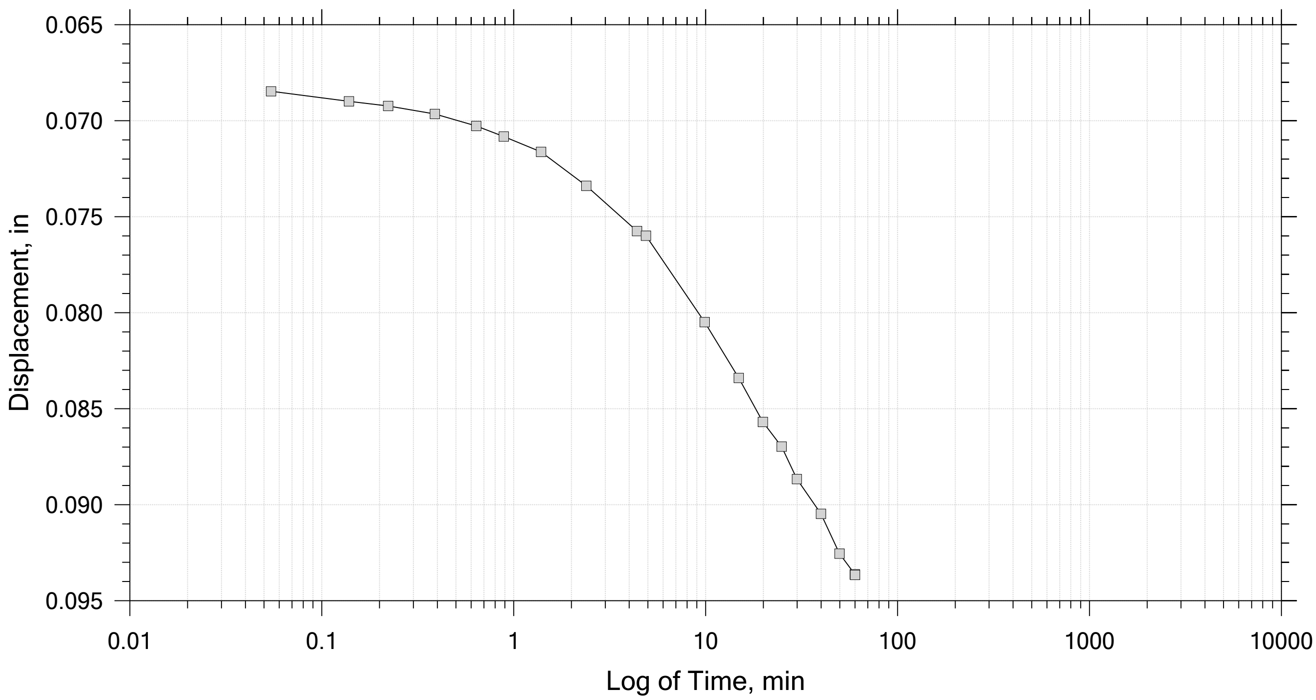


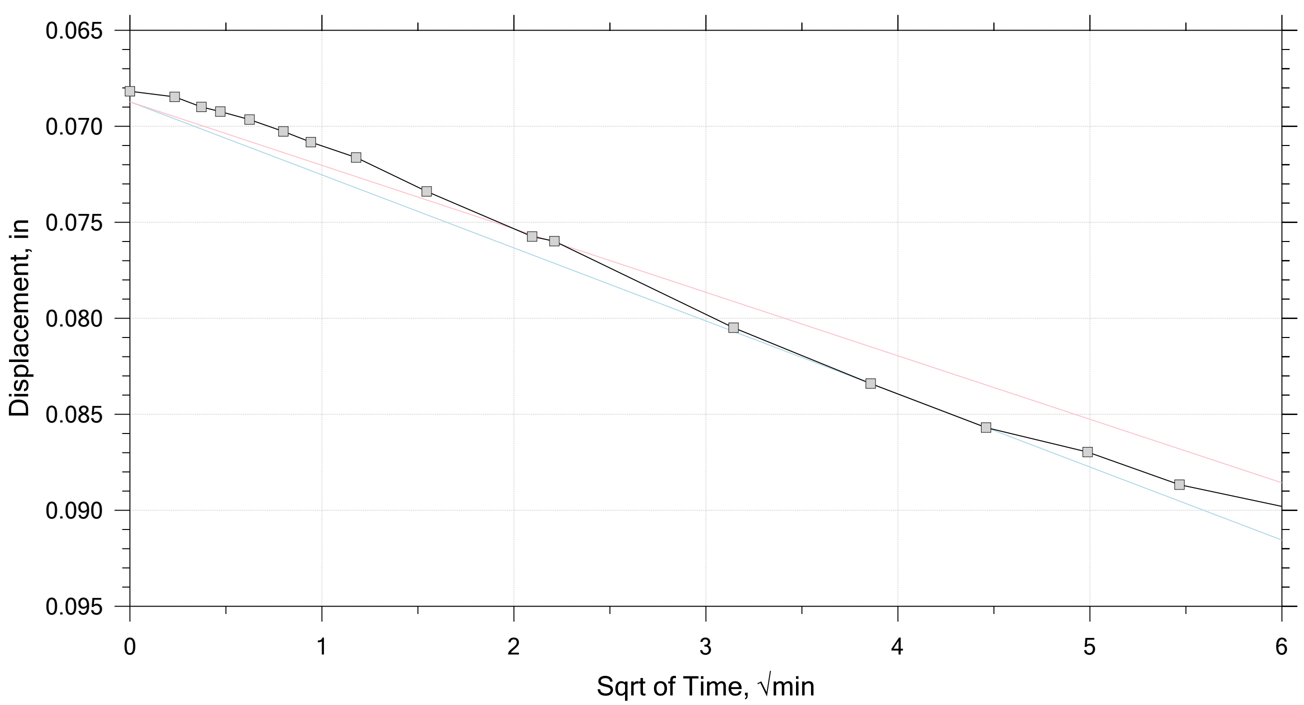


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 9 of 26
Constant Load Step
Stress: 5.13e+03 psf

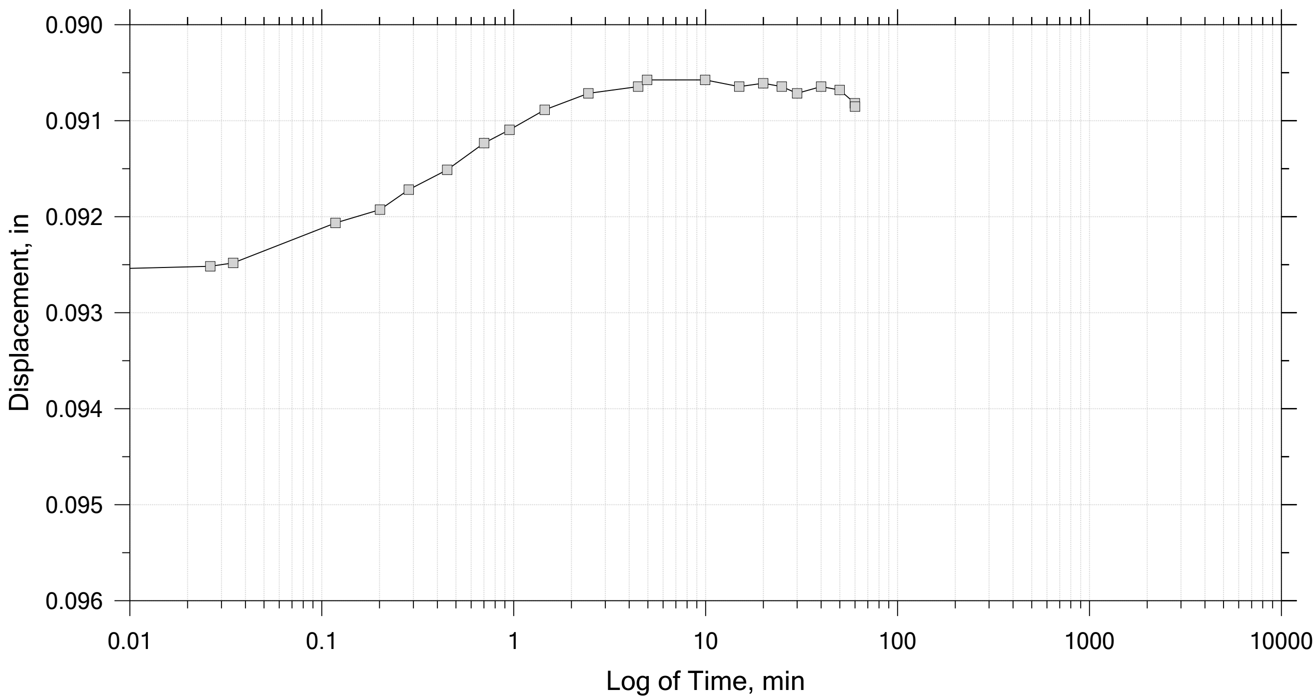


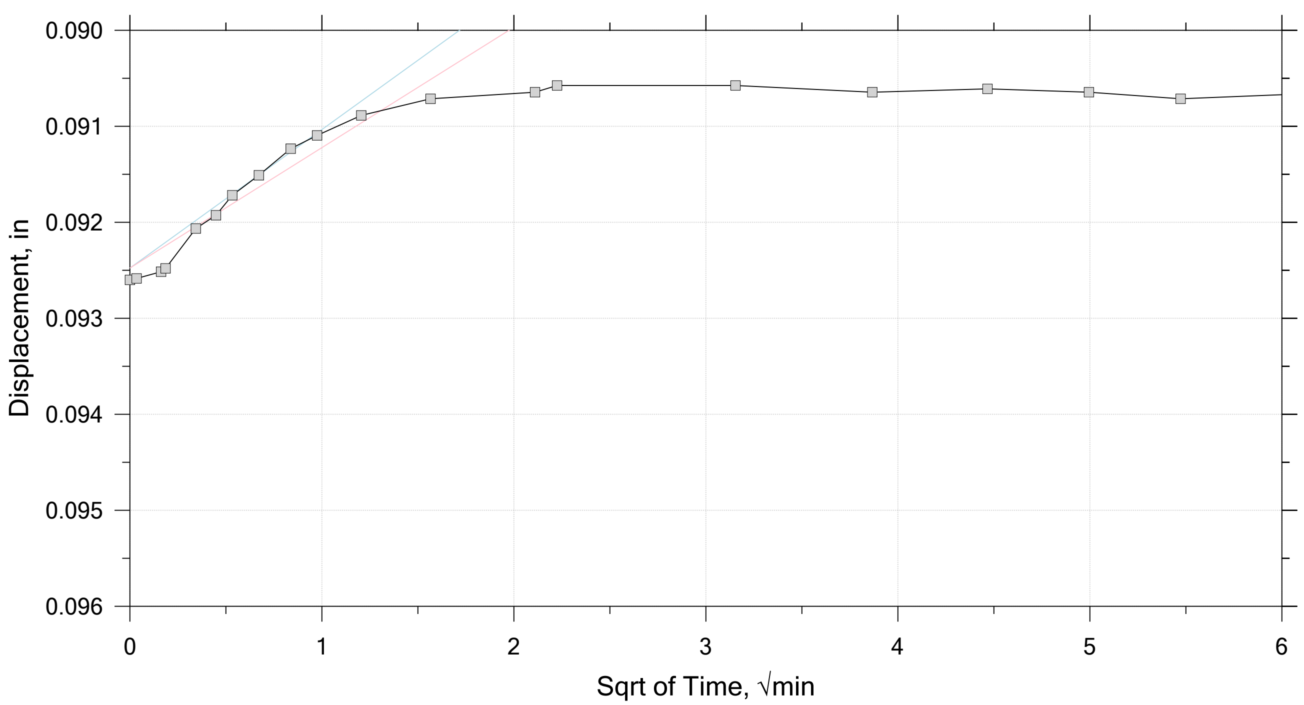


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 10 of 26
Constant Load Step
Stress: 2.28e+03 psf





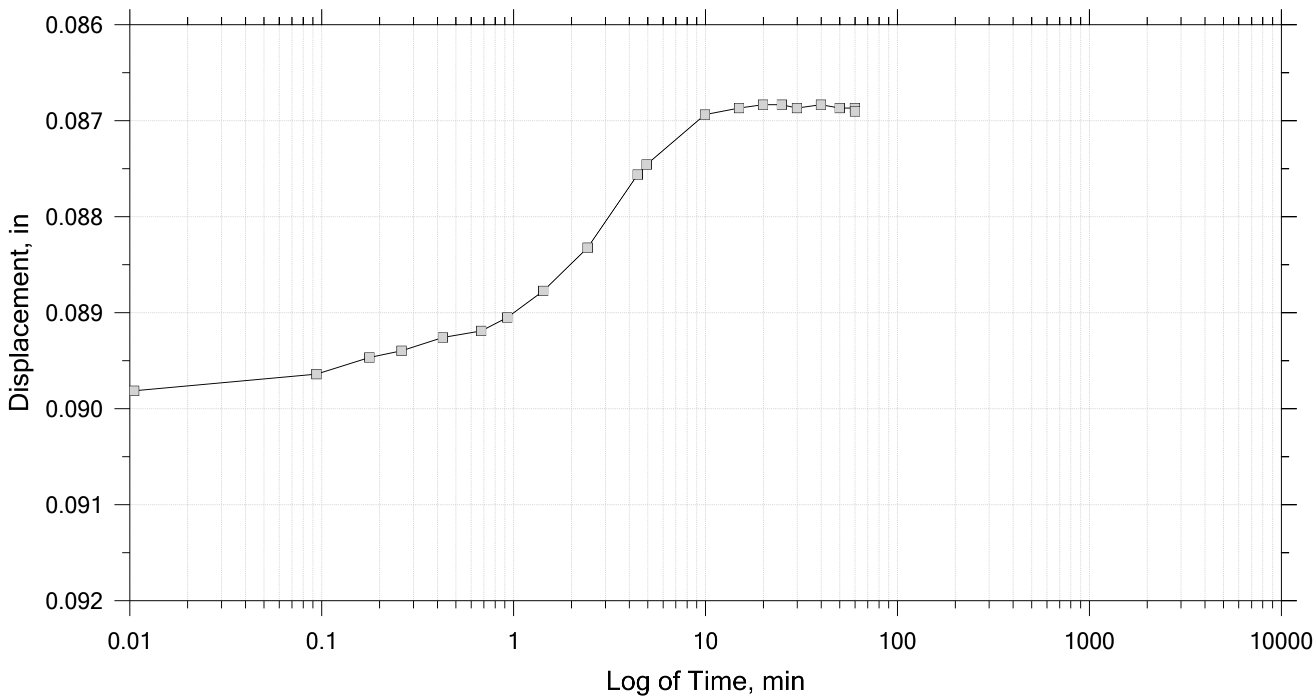
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

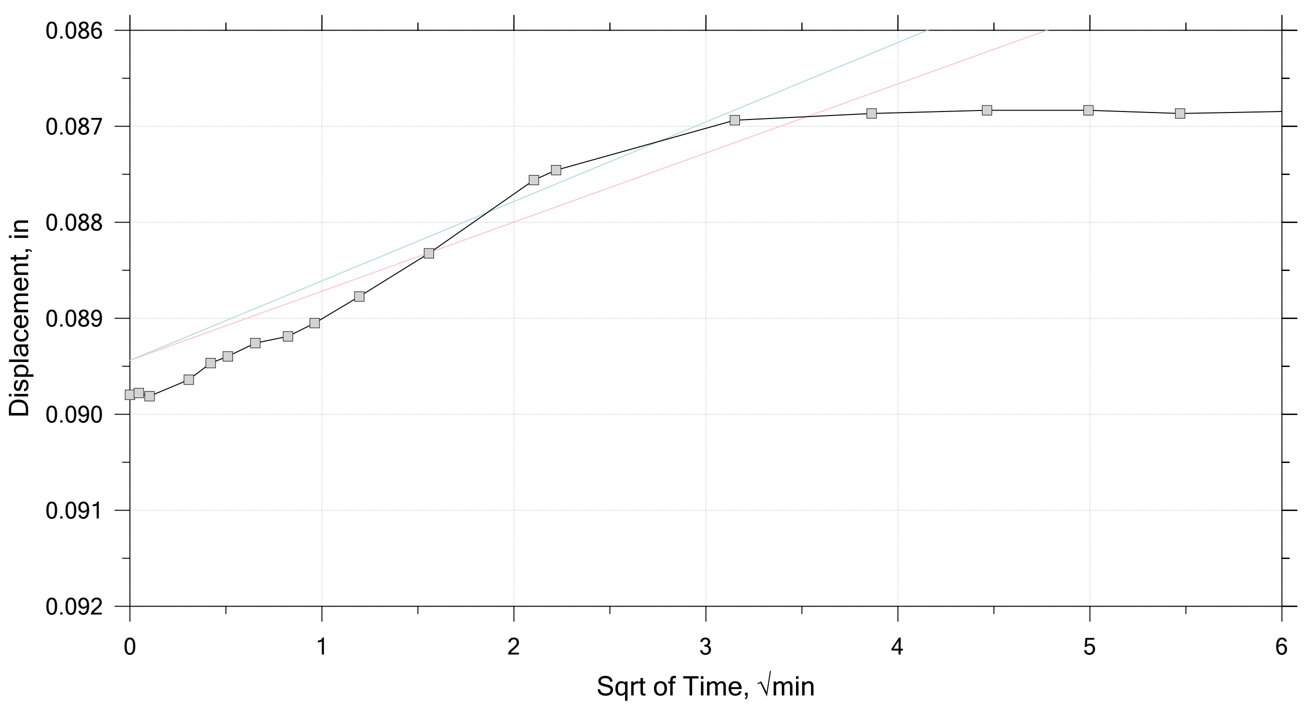
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 11 of 26

Constant Load Step

Stress: 1.01e+03 psf





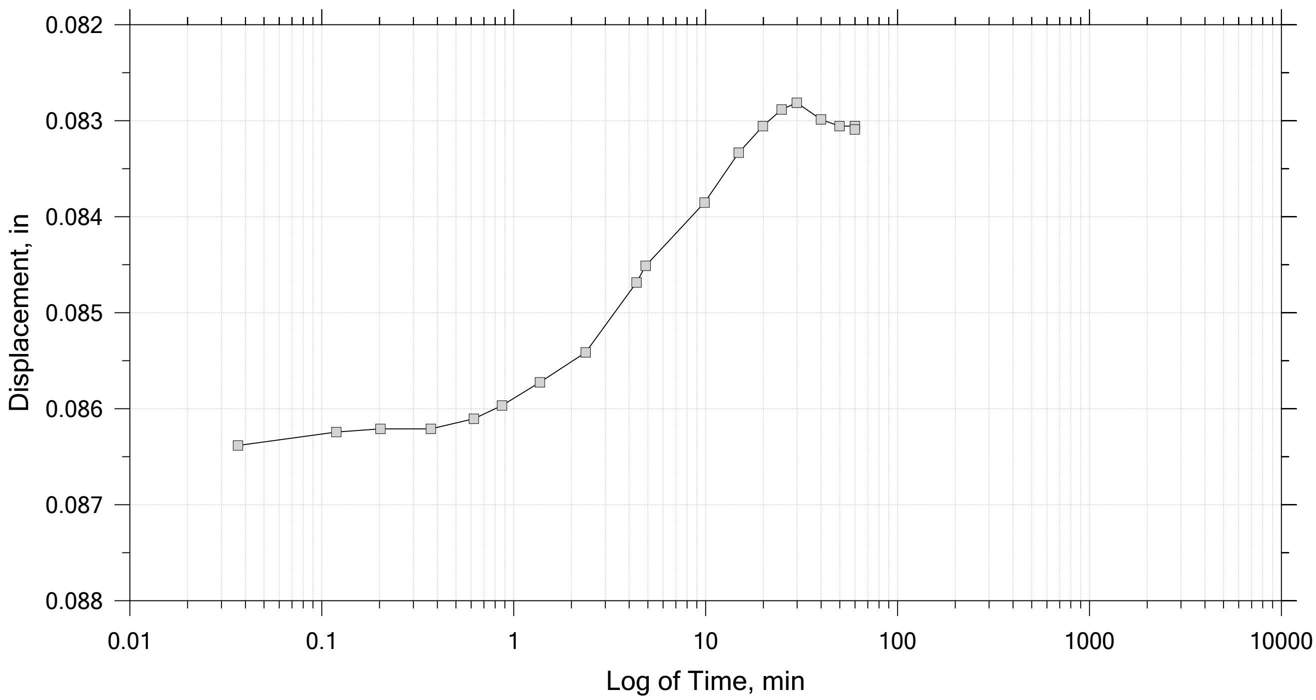
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

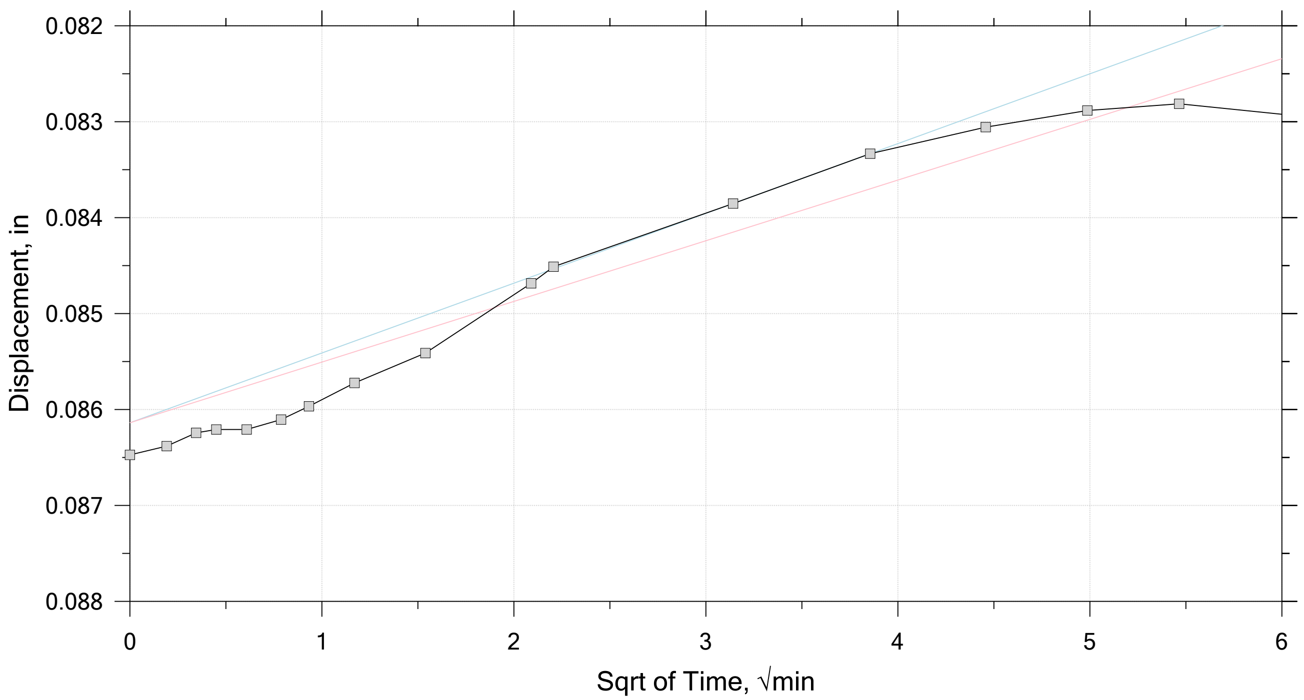
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 12 of 26

Constant Load Step

Stress: 450 psf





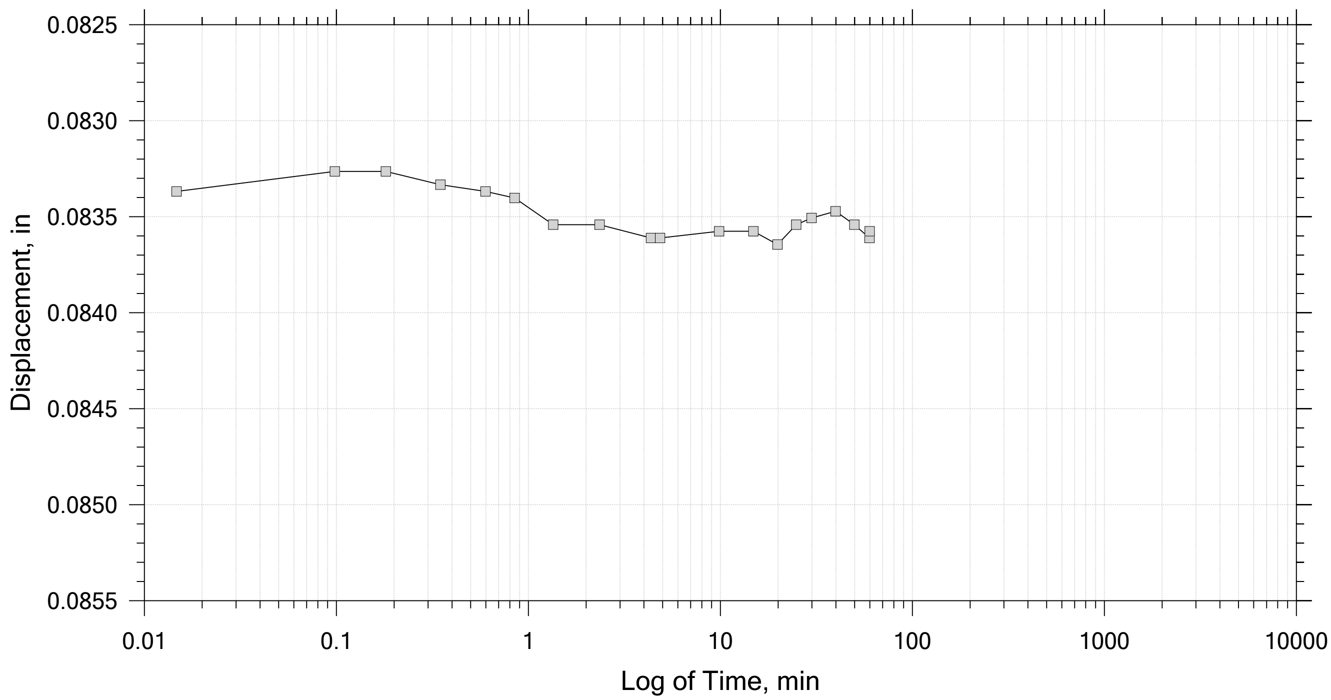
Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
Description: Gray Silty Clay		
Remarks:		

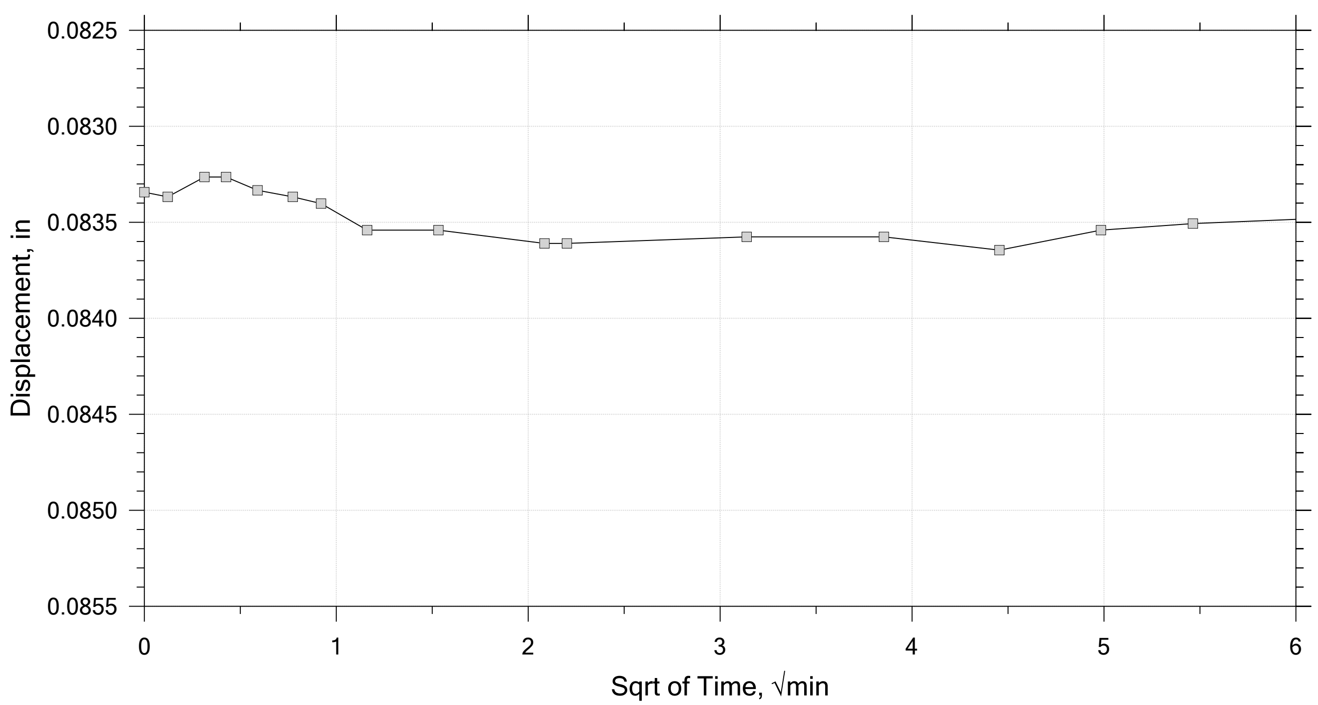
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 13 of 26

Constant Load Step

Stress: 675 psf

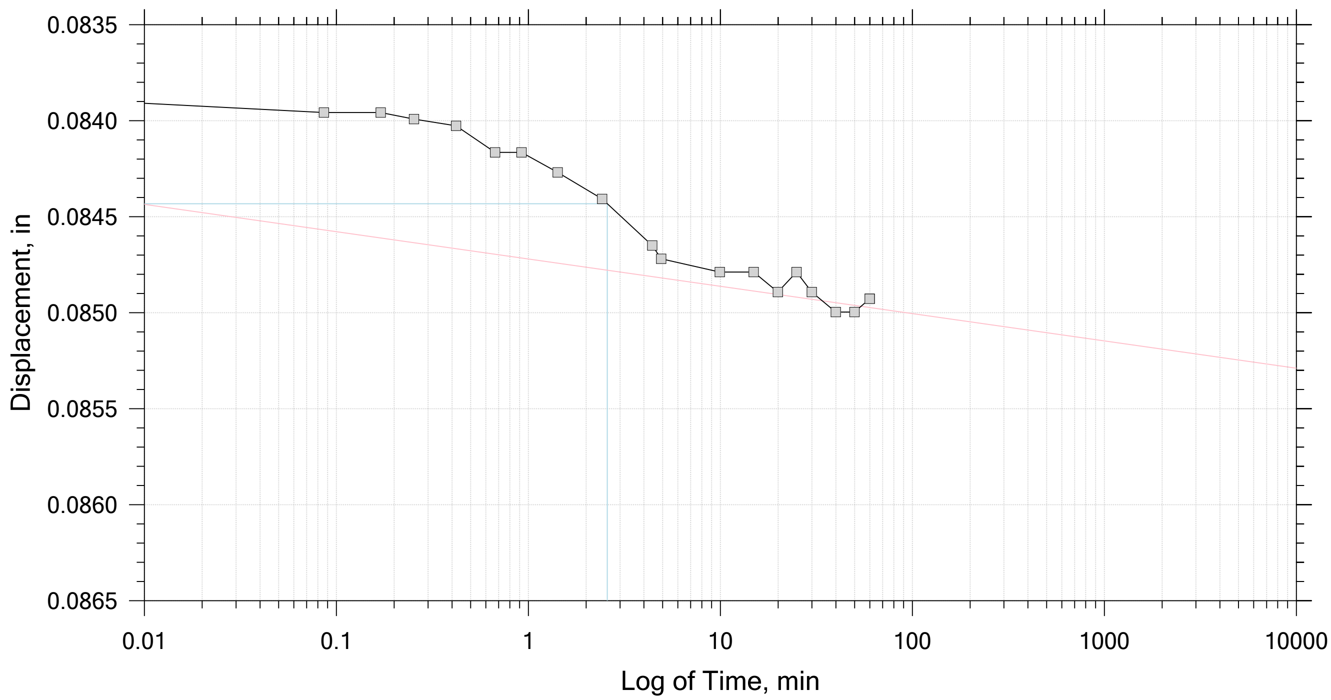


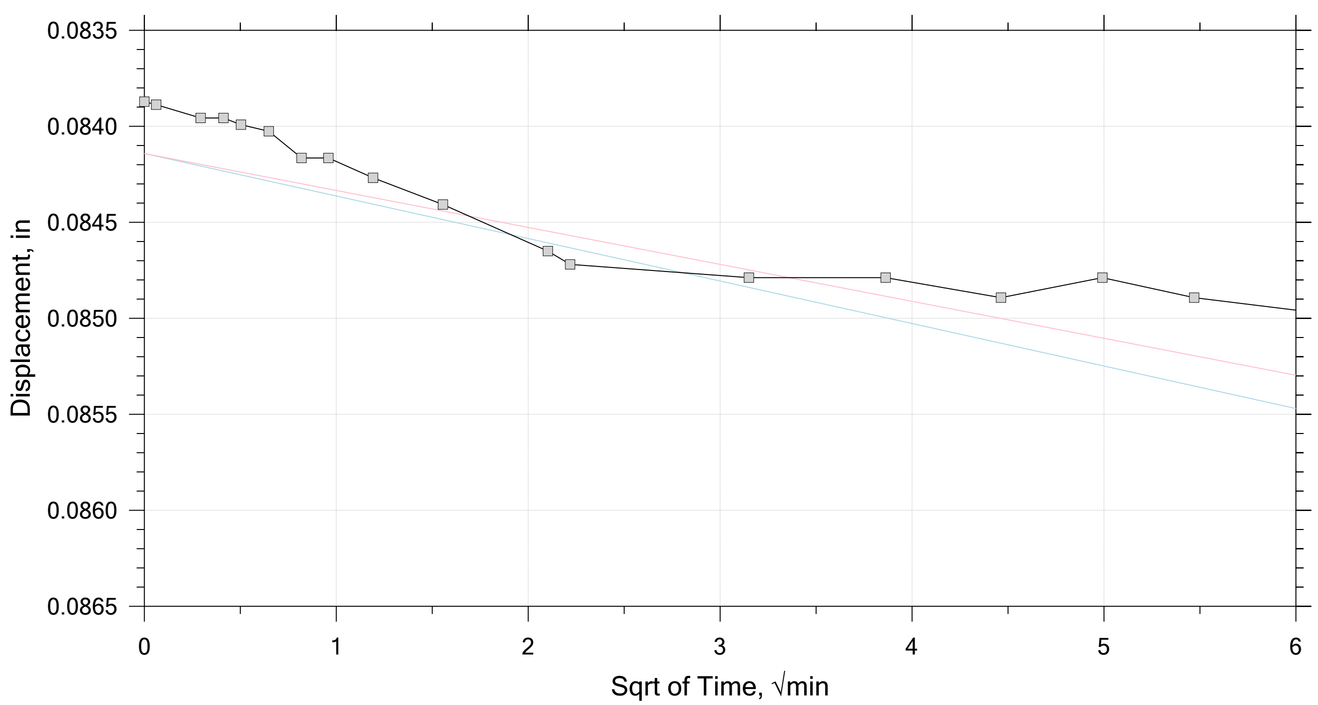


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 14 of 26
Constant Load Step
Stress: 1.01e+03 psf





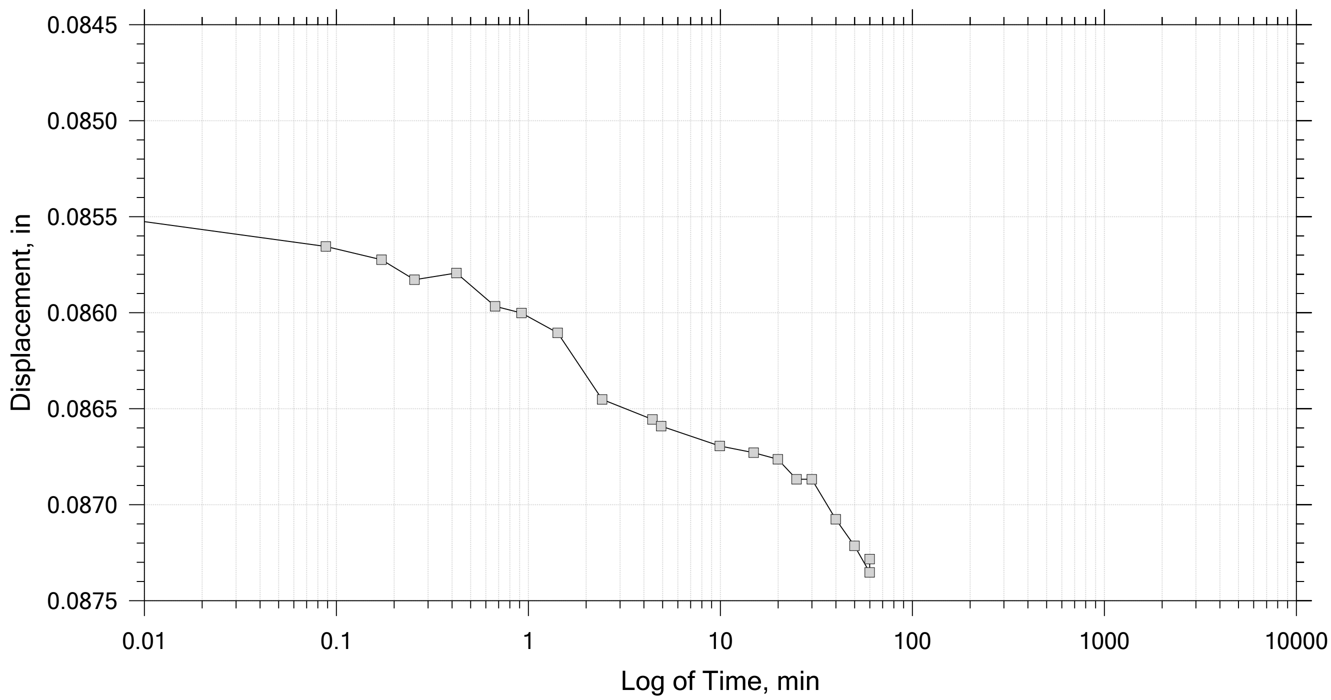
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

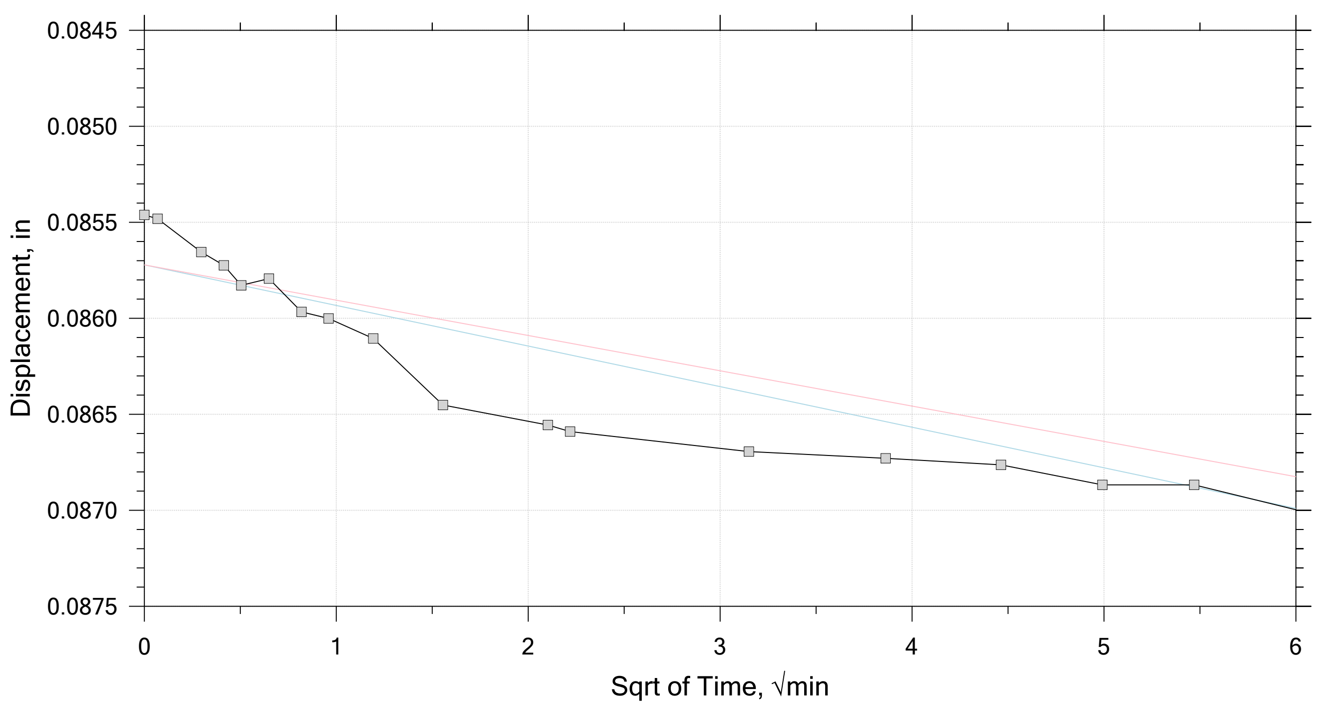
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 15 of 26

Constant Load Step

Stress: 1.52e+03 psf

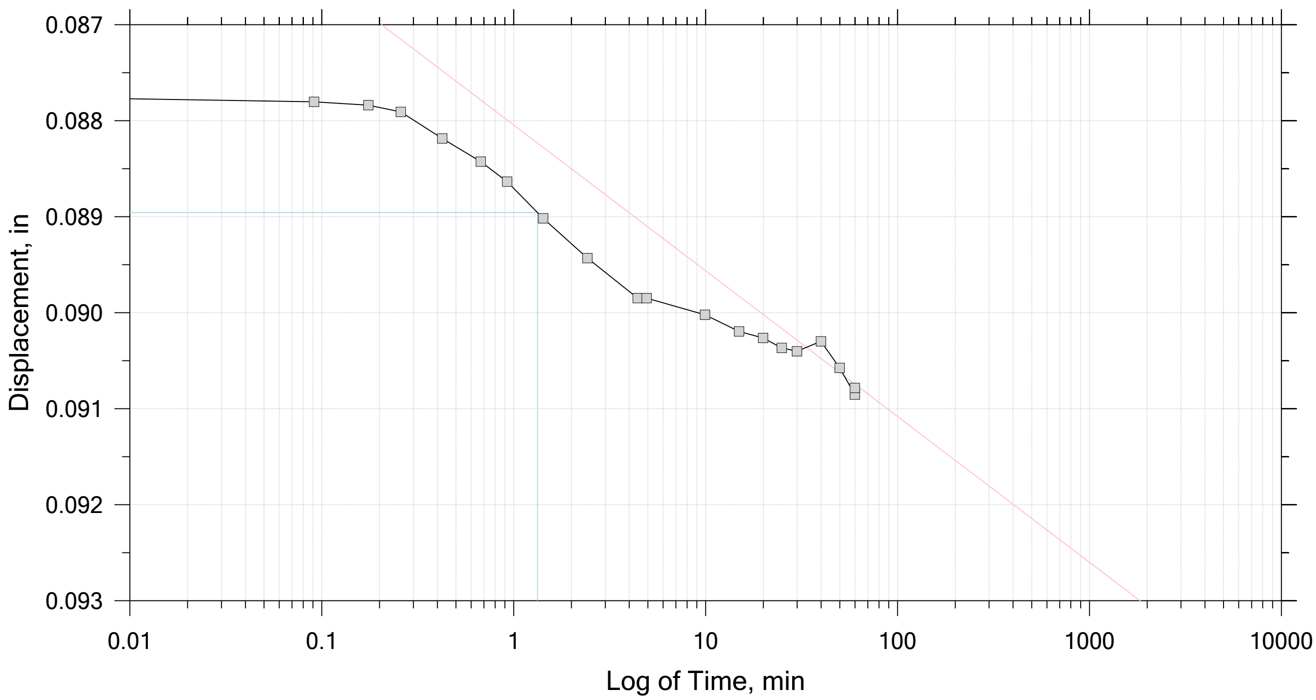


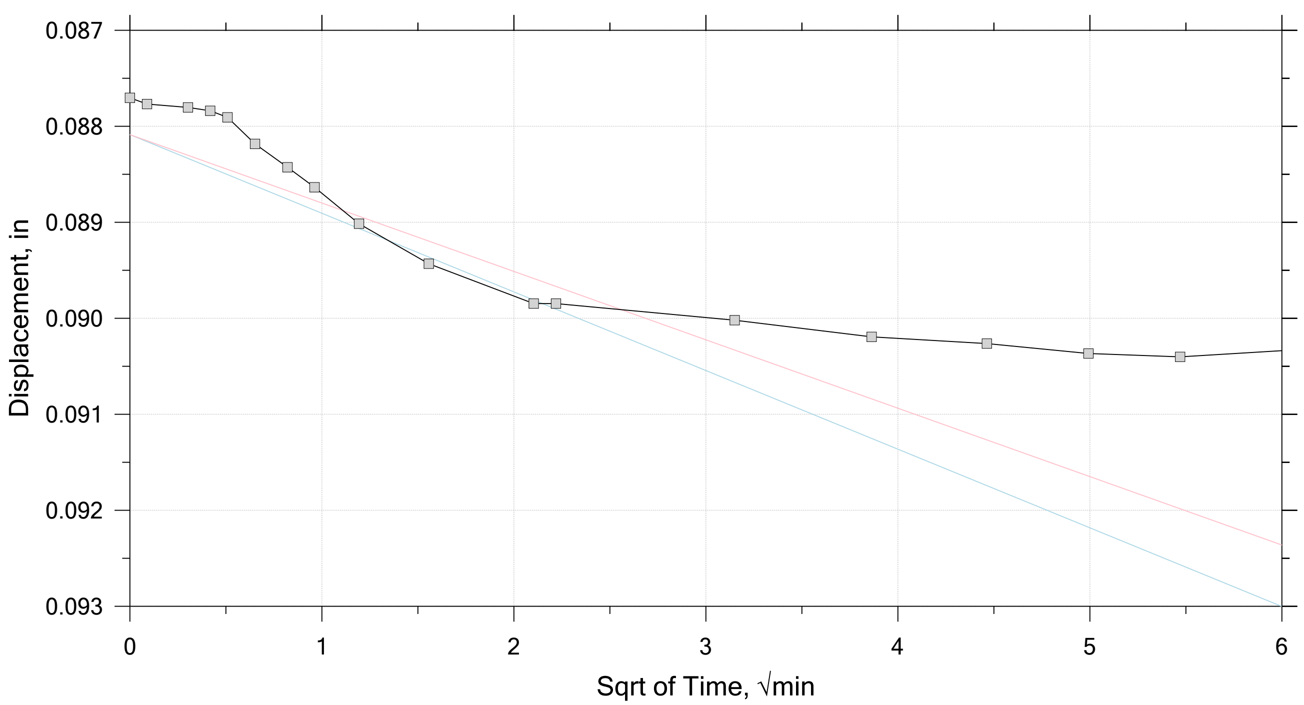


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 16 of 26
Constant Load Step
Stress: 2.28e+03 psf

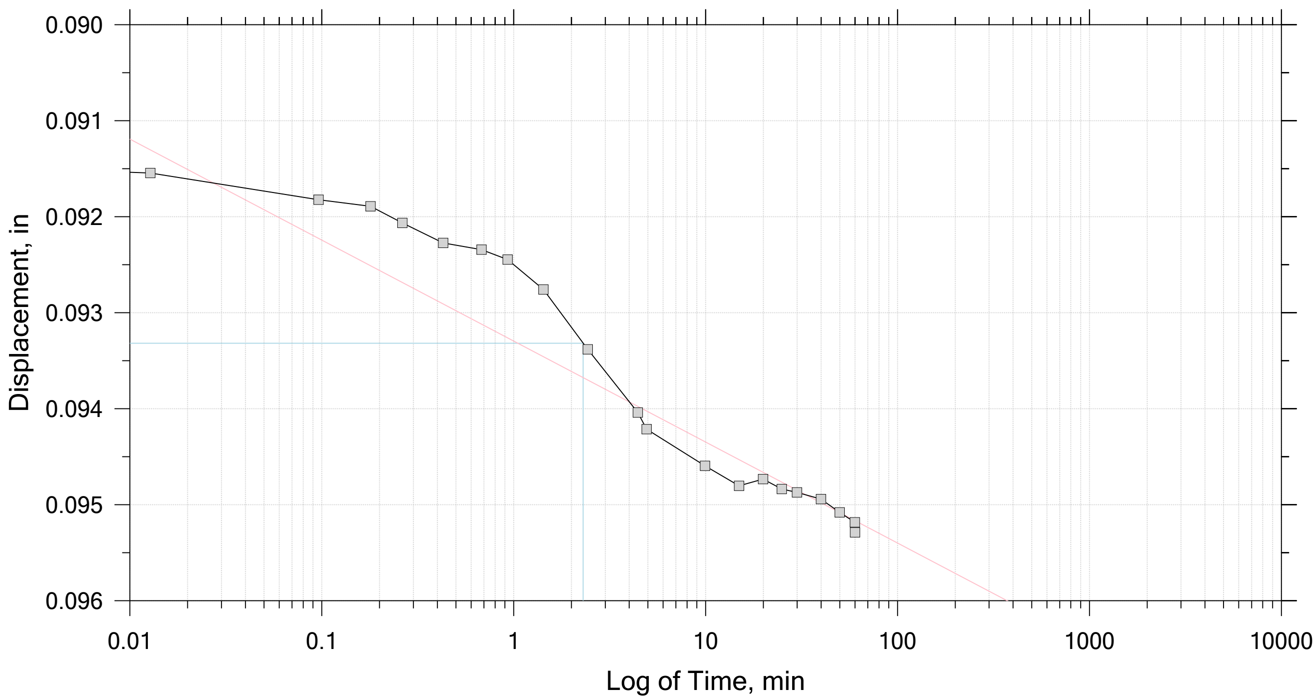


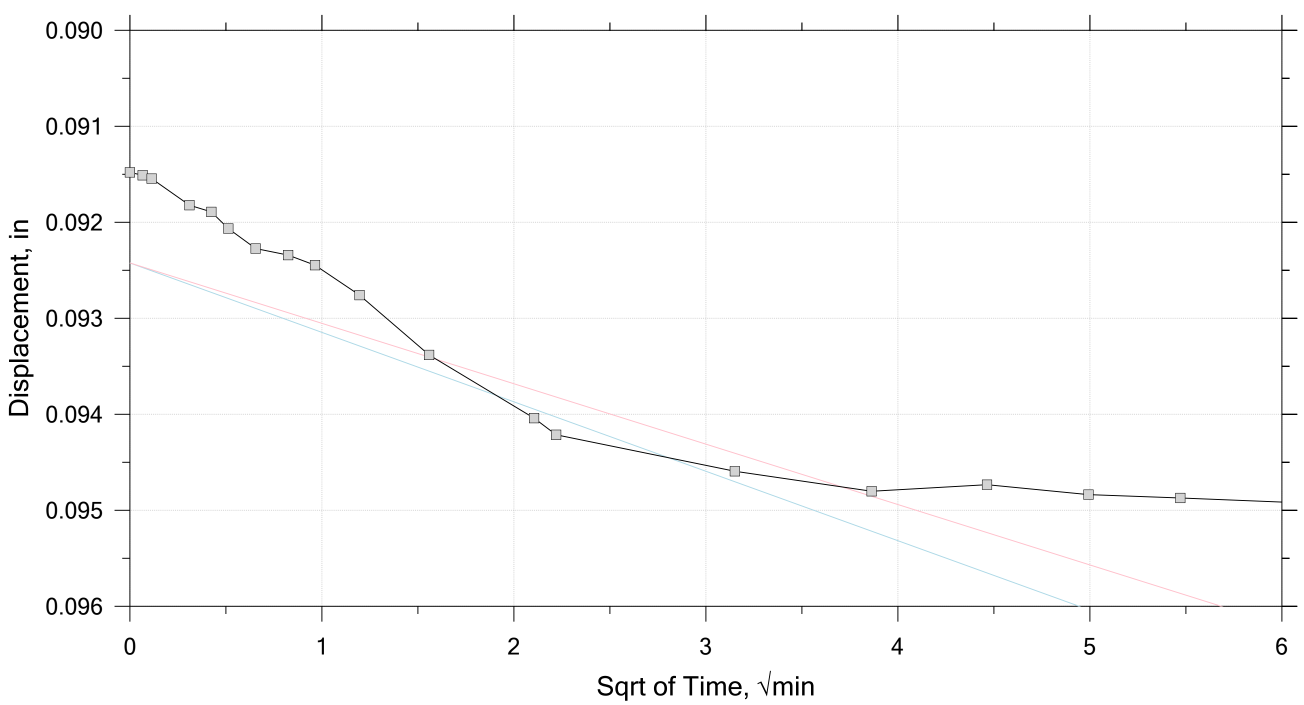


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 17 of 26
Constant Load Step
Stress: 3.42e+03 psf





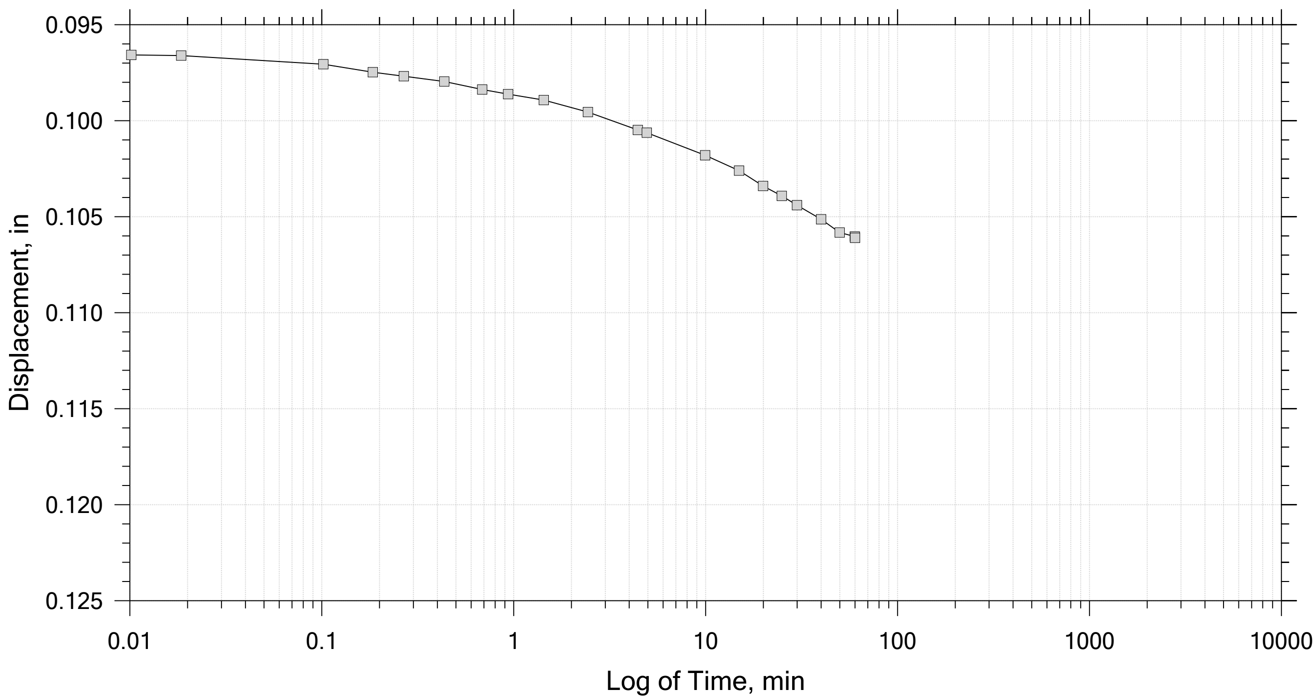
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

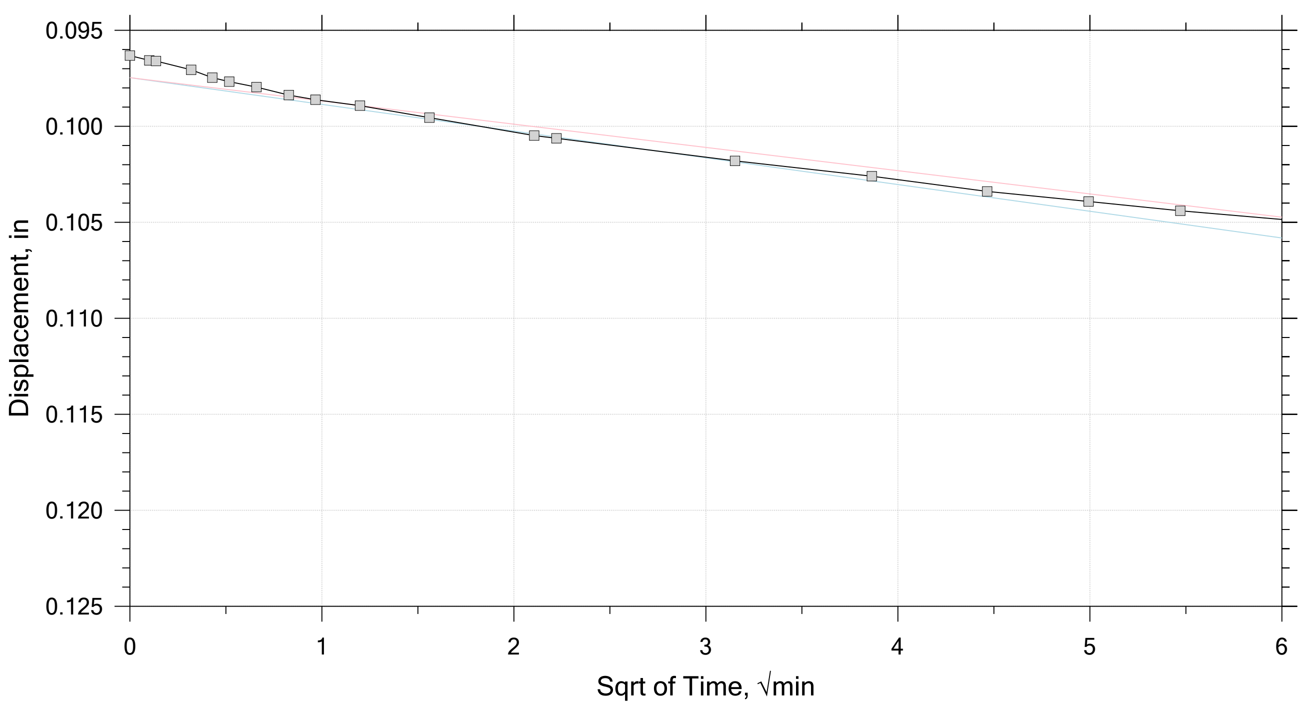
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 18 of 26

Constant Load Step

Stress: 5.13e+03 psf





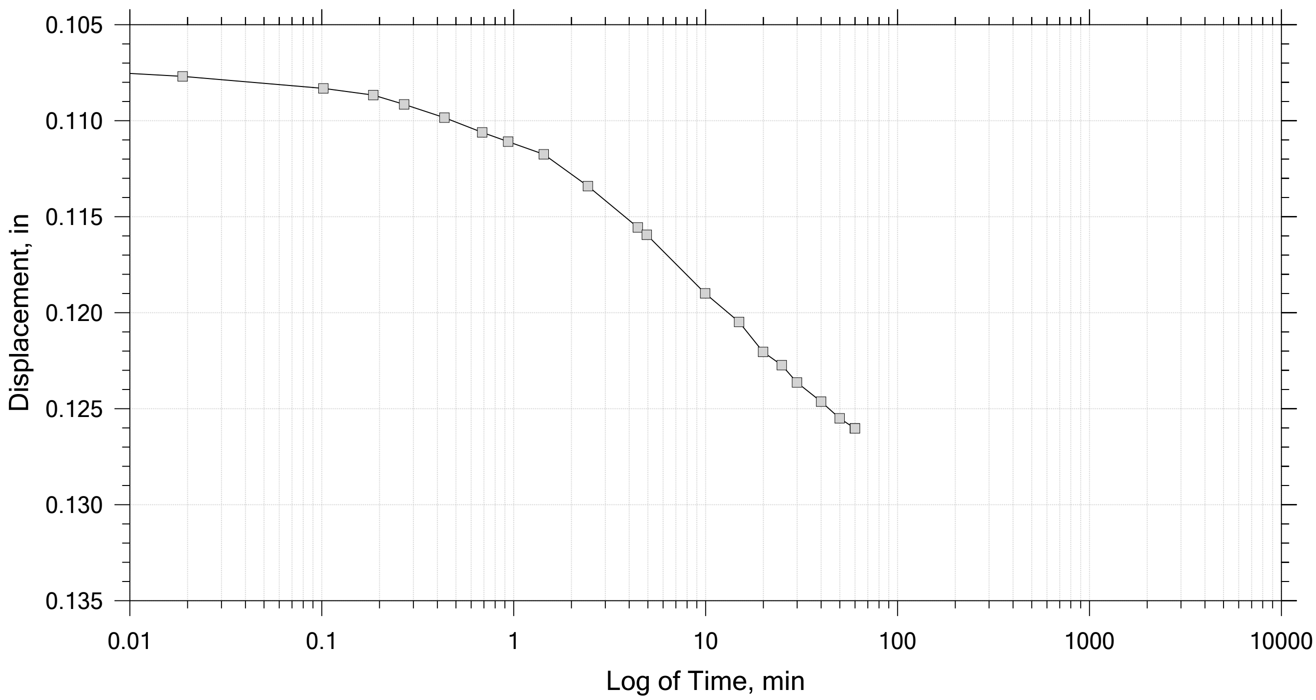
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

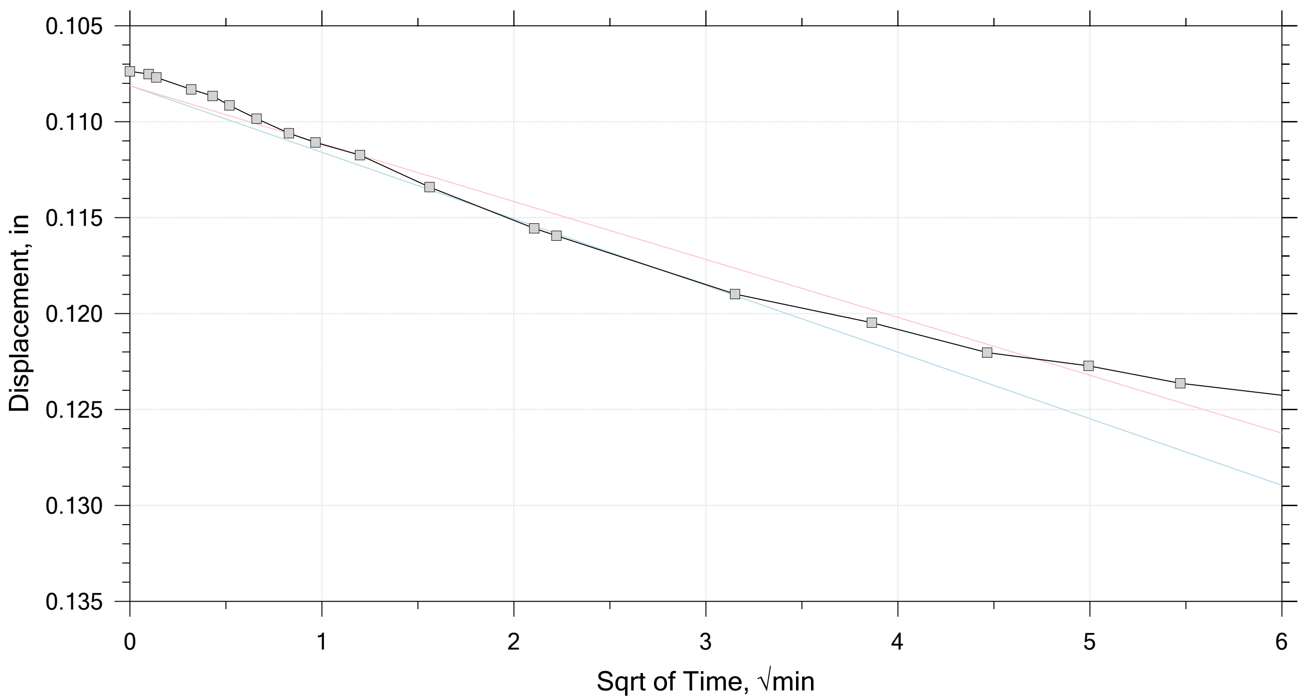
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 19 of 26

Constant Load Step

Stress: 7.69e+03 psf





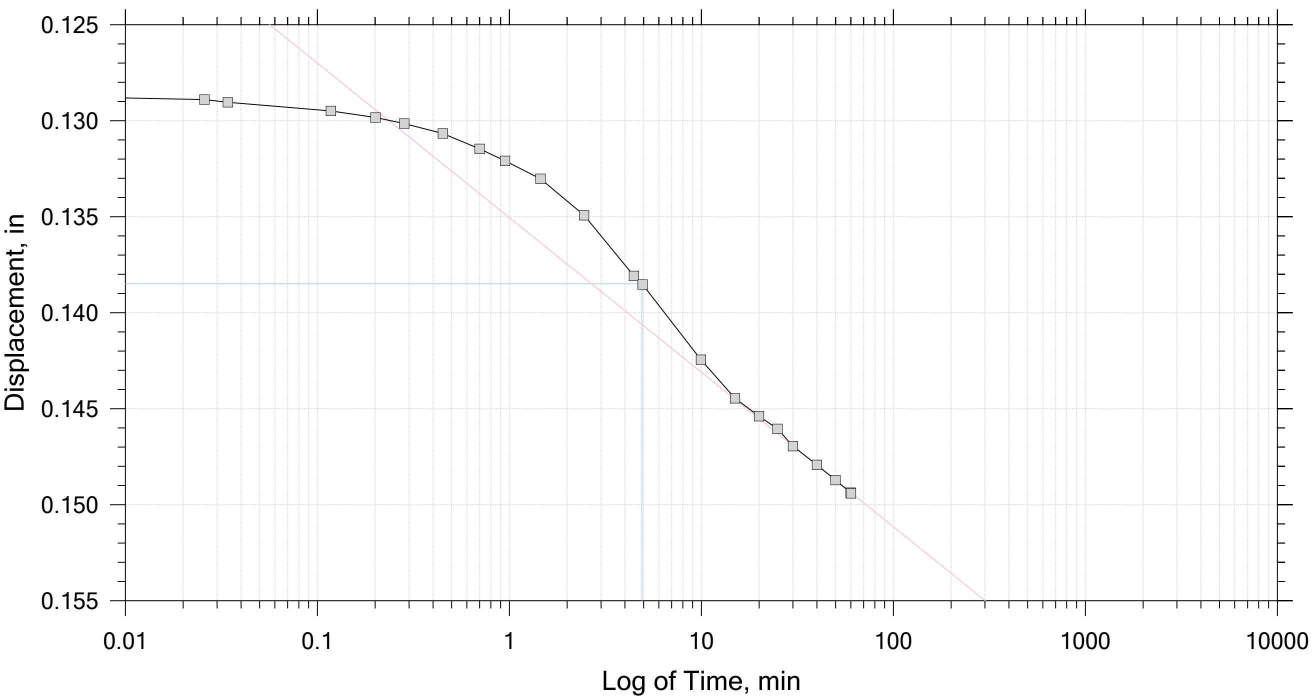
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

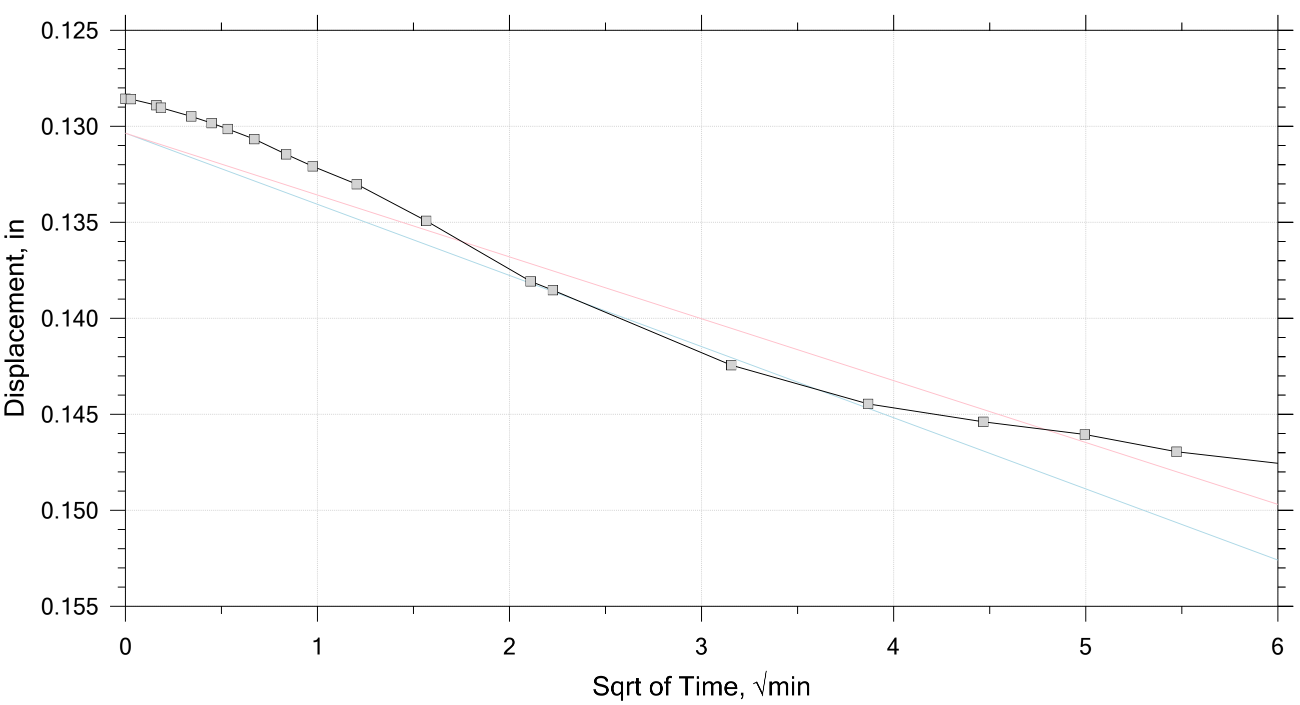
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 20 of 26

Constant Load Step

Stress: 1.15e+04 psf

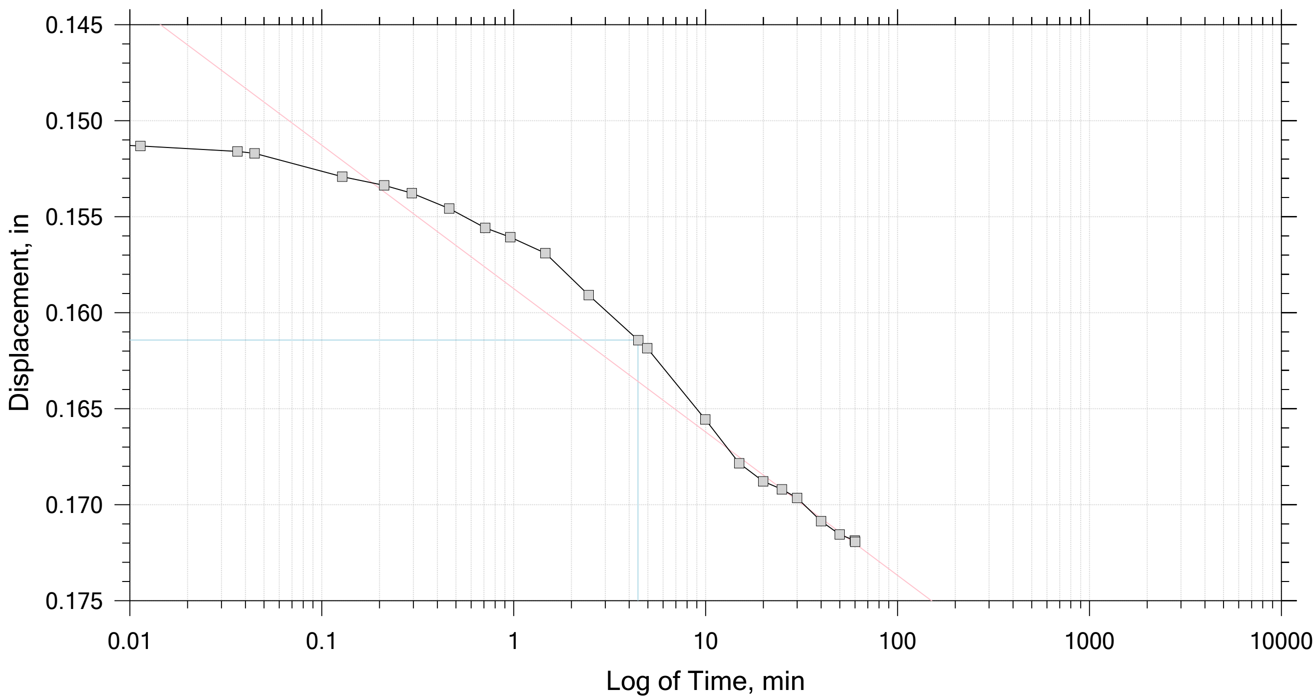


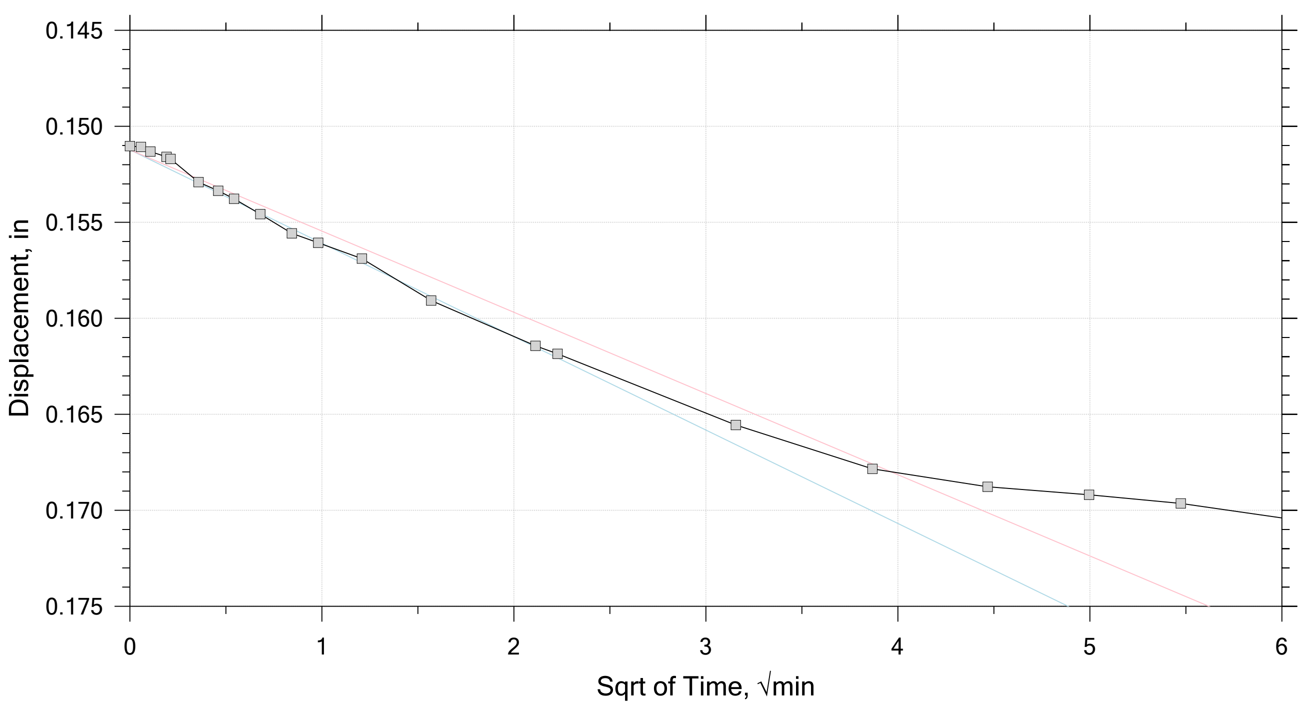


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 21 of 26
Constant Load Step
Stress: 1.73e+04 psf

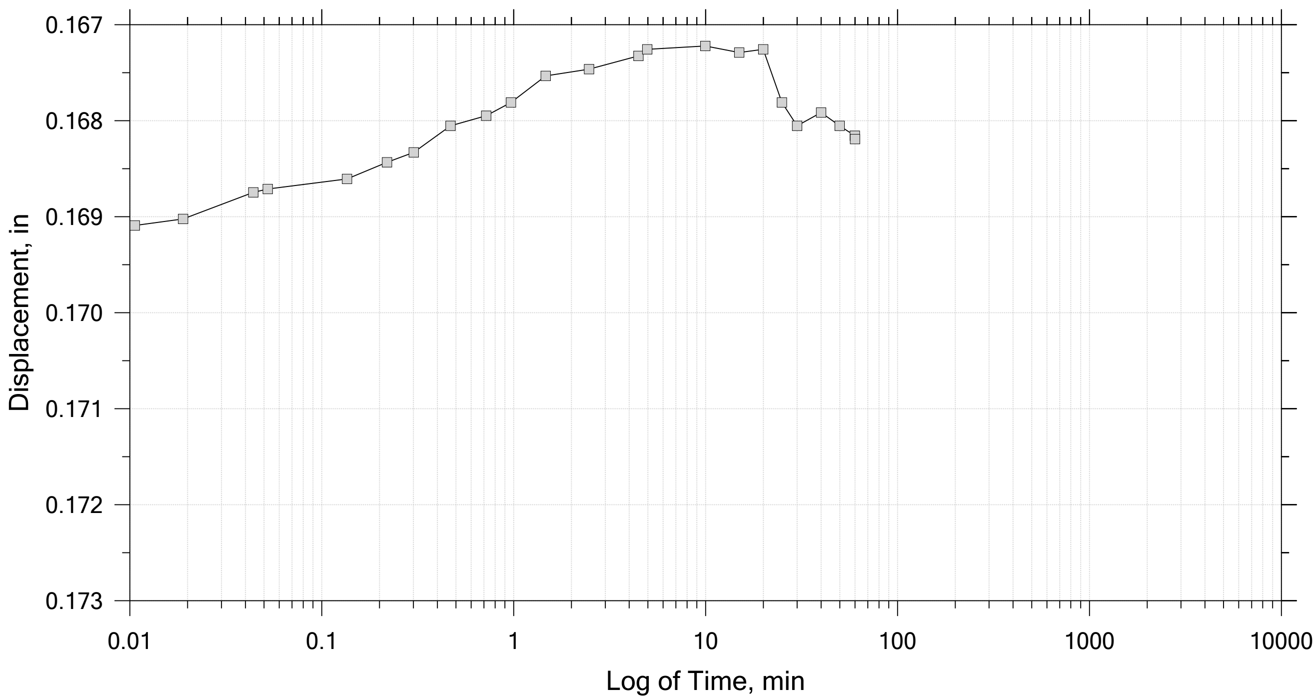


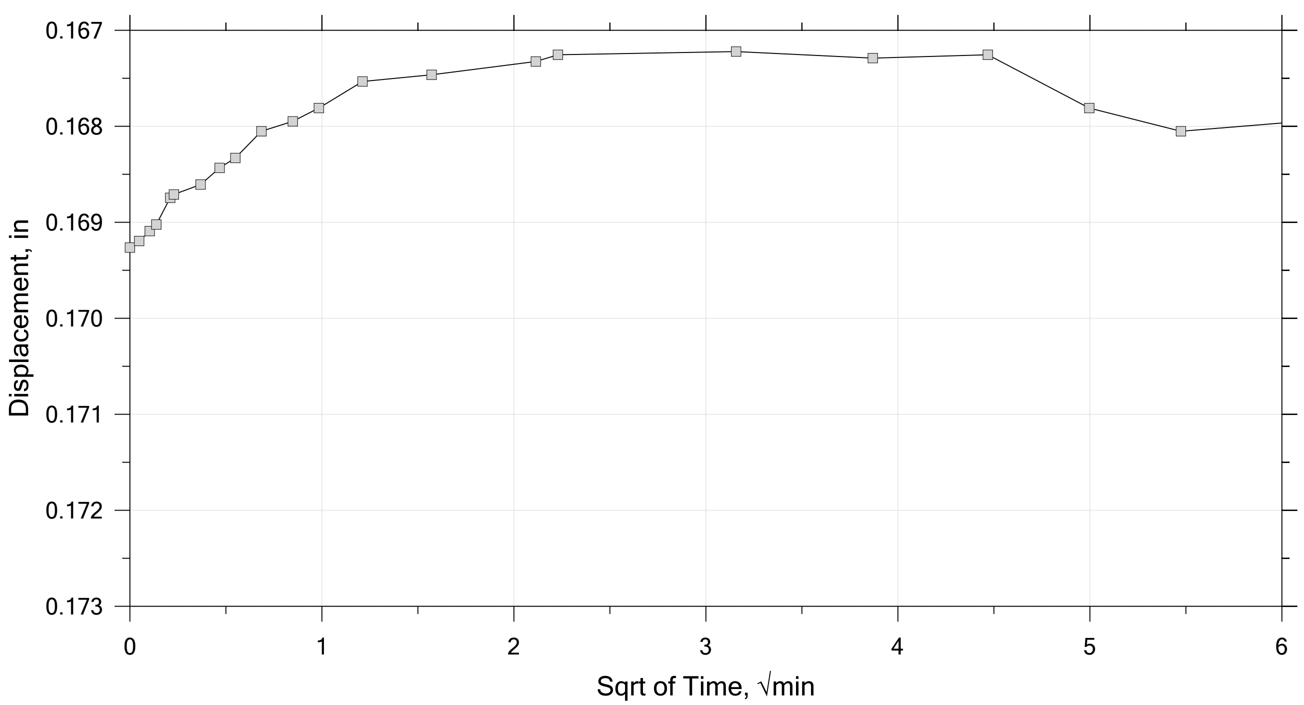


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 22 of 26
Constant Load Step
Stress: 7.69e+03 psf

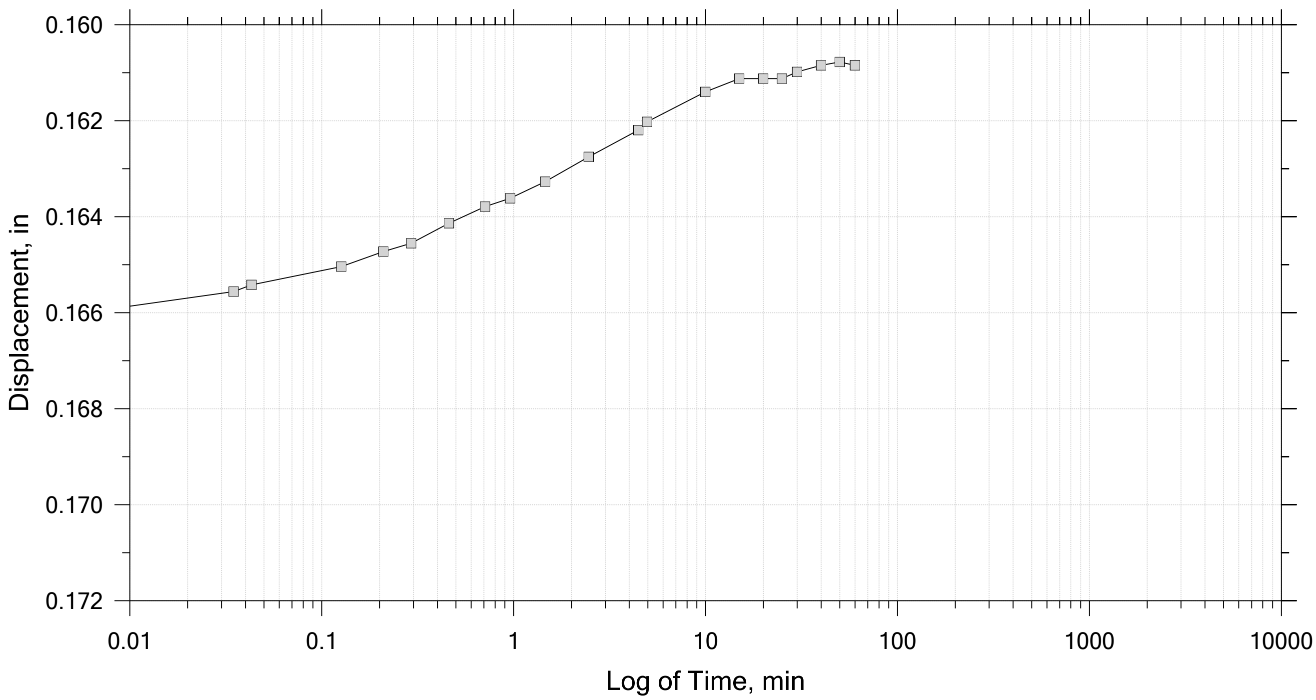


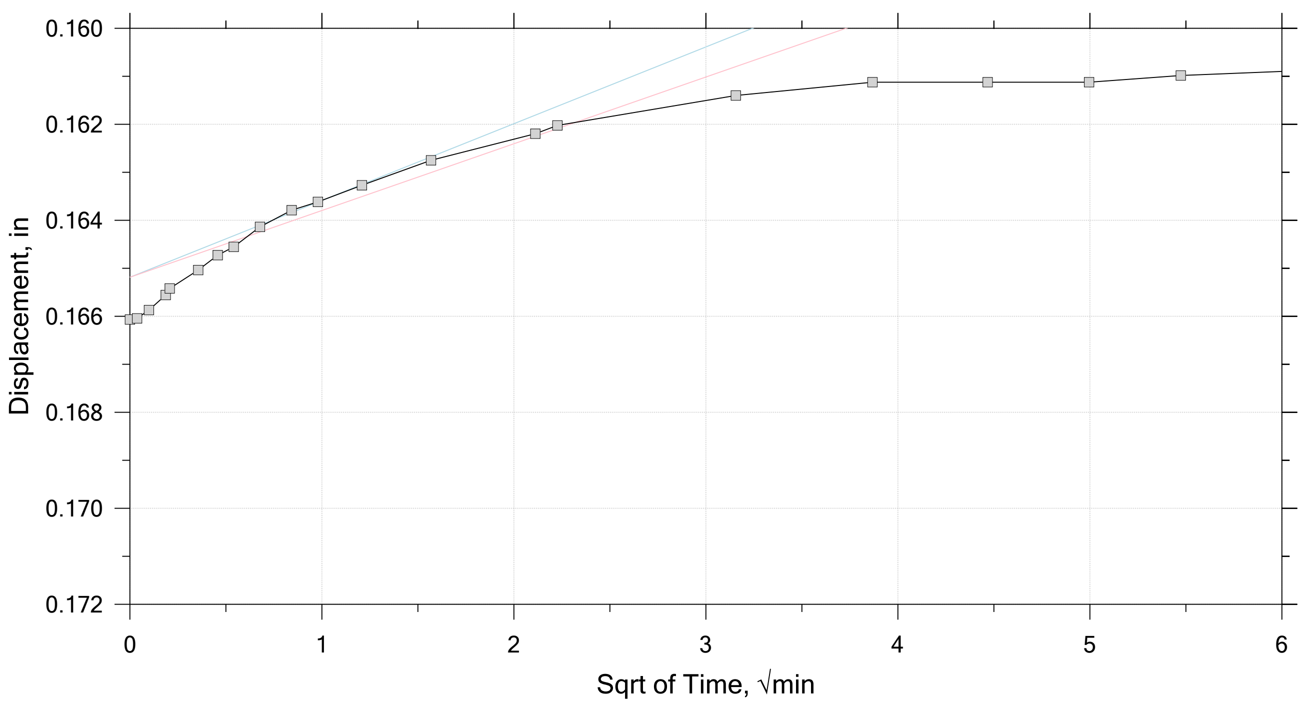


	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 23 of 26
Constant Load Step
Stress: 3.42e+03 psf





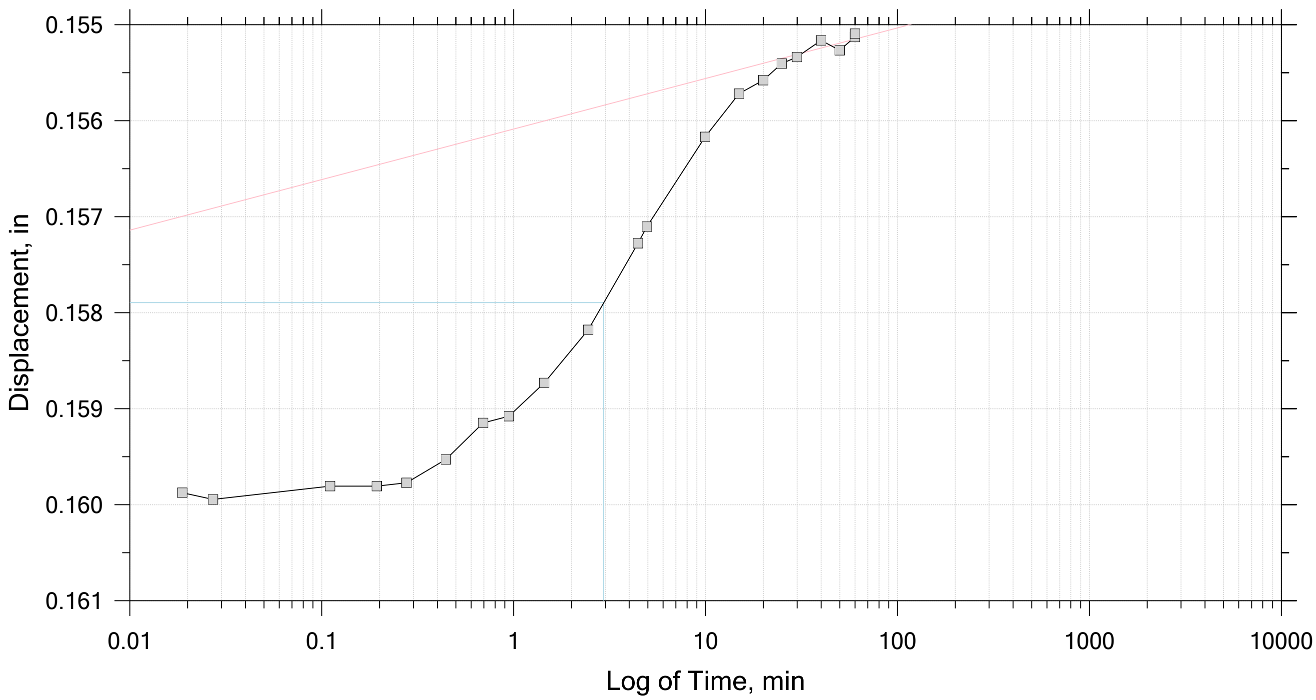
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

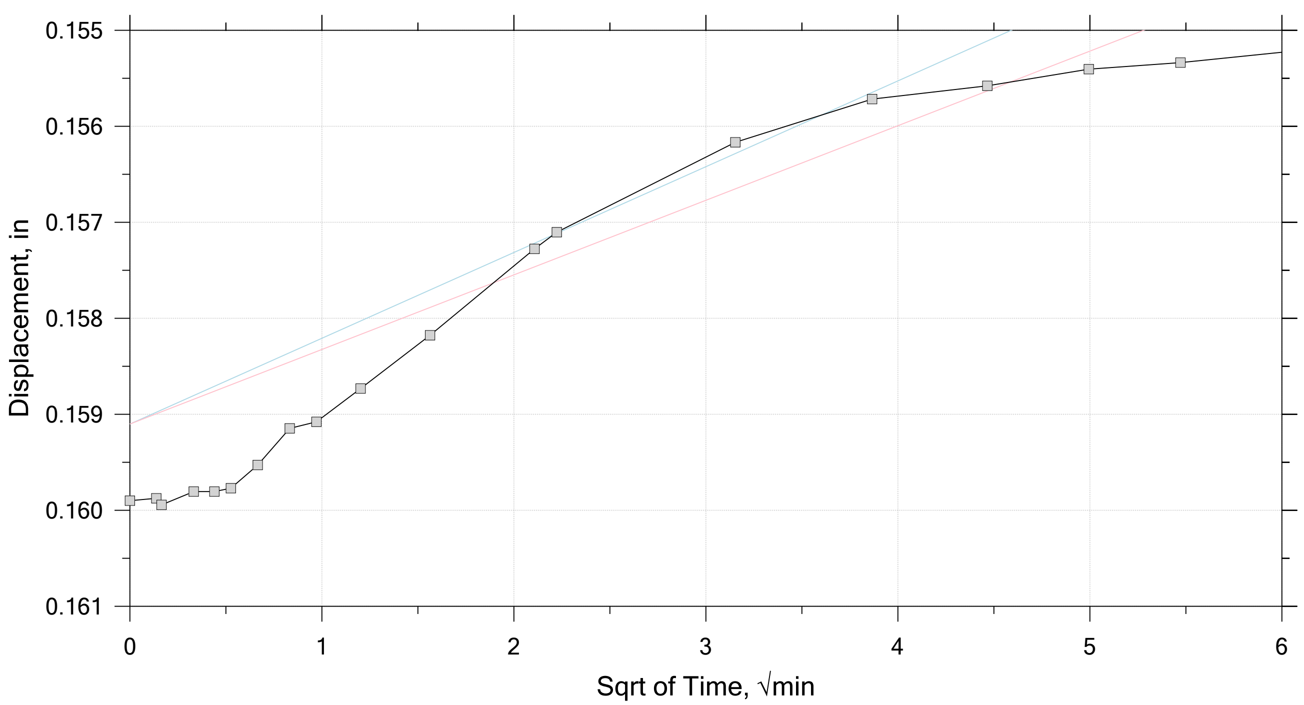
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 24 of 26

Constant Load Step

Stress: 1.52e+03 psf





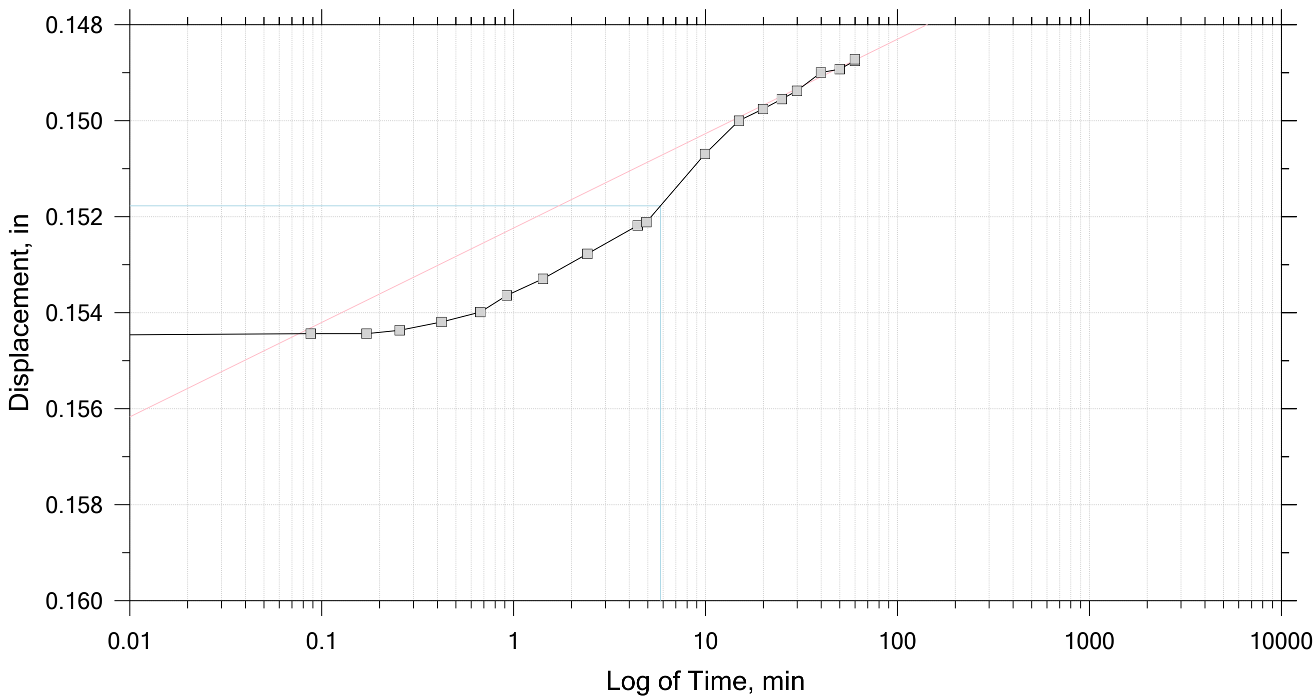
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

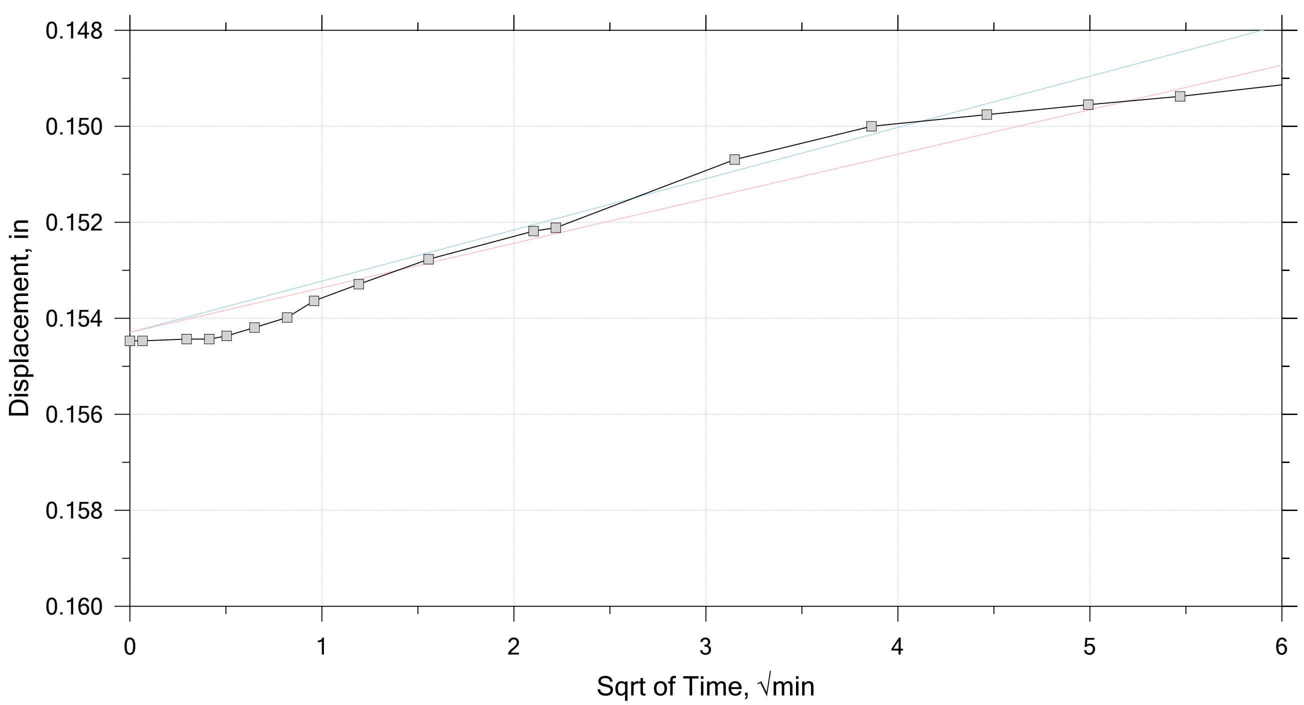
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 25 of 26

Constant Load Step

Stress: 675 psf





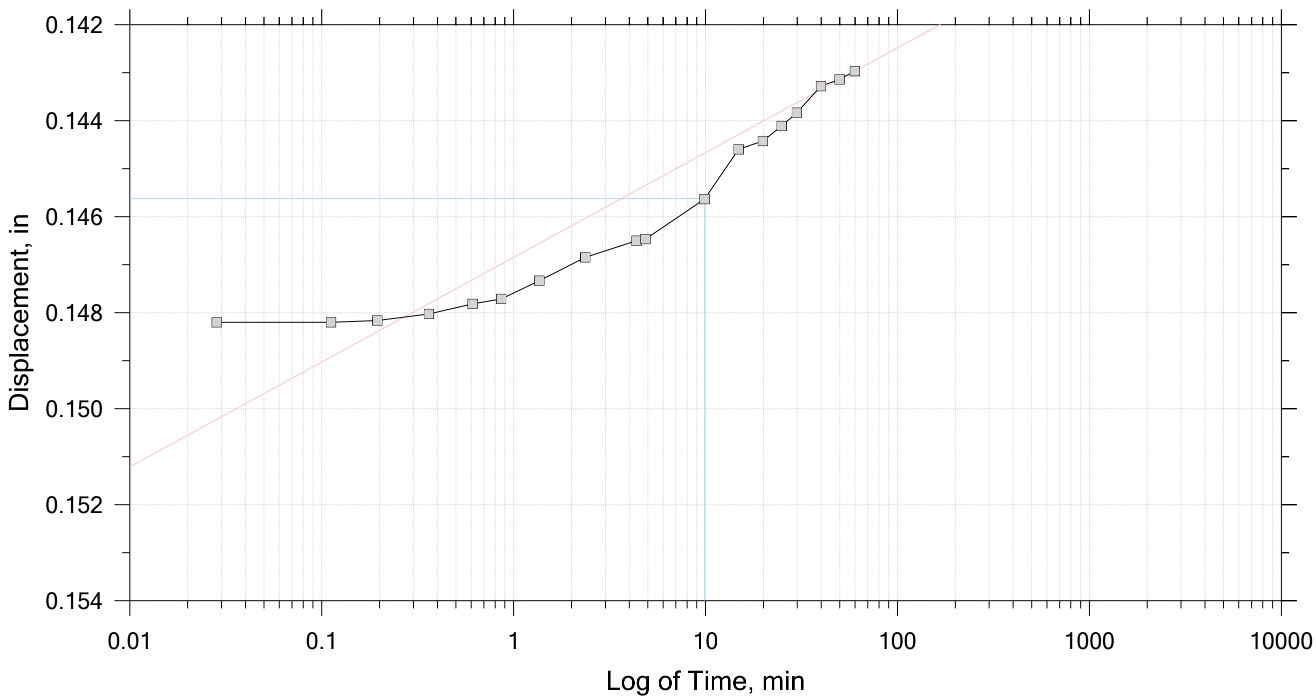
	Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
	Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
	Description: Gray Silty Clay		
	Remarks:		

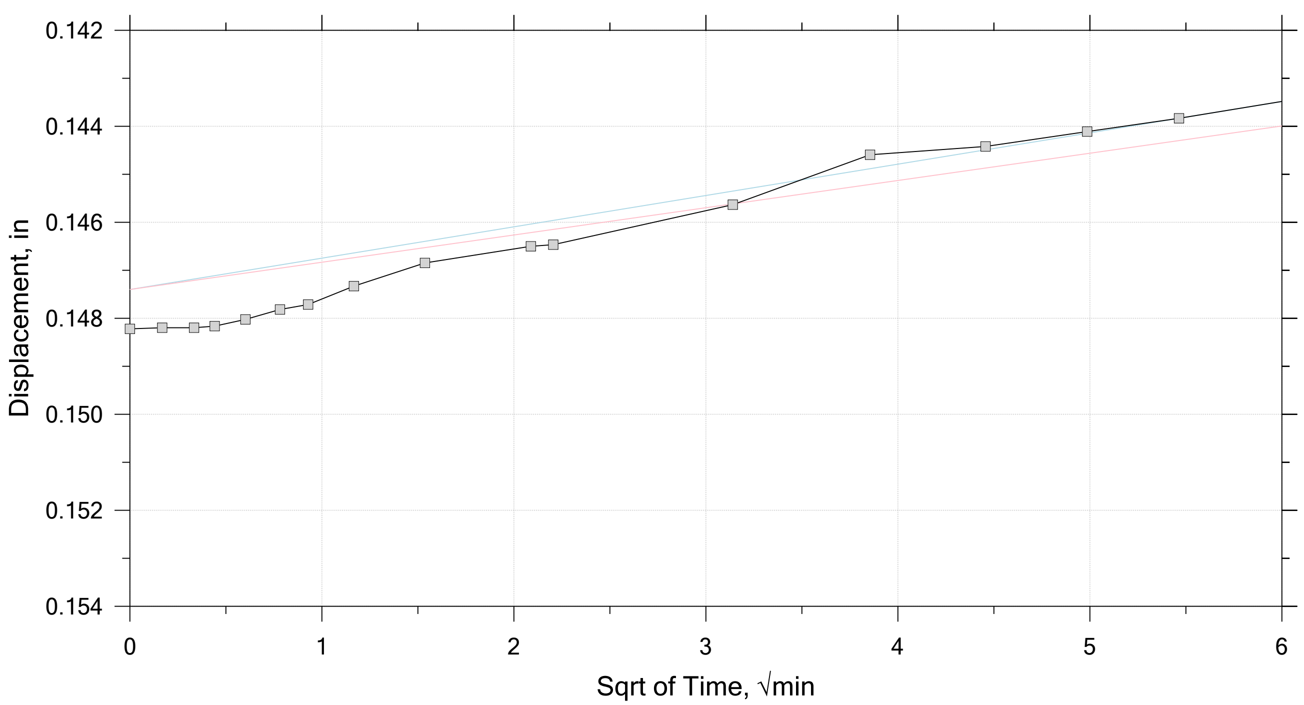
One-Dimensional Consolidation by ASTM D2435 - Method B

Time Curve 26 of 26

Constant Load Step

Stress: 300 psf





Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
Description: Gray Silty Clay		
Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Specimen Diameter, in: 2.50	Specific Gravity: 2.81 (Implied)	Liquid Limit: 28
Specimen Height, in: 1.00	Initial Void Ratio: 0.976	Plastic Limit: 19
Final Height, in: 0.86	Final Void Ratio: 0.695	Plasticity Index: 9

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	216	---	"ring"	323
Mass Container, gm	36.77	111.11	111.11	60.68
Mass Container + Wet Soil, gm	198.54	265.16	254.74	204.23
Mass Container + Dry Soil, gm	160.38	226.26	226.26	175.77
Mass Dry Soil, gm	123.61	115.15	115.15	115.09
Water Content, %	30.87	33.78	24.73	24.73
Void Ratio	---	0.98	0.69	---
Degree of Saturation, %	---	97.25	100.00	---
Dry Unit Weight, pcf	---	88.782	103.51	---

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: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
Description: Gray Silty Clay		
Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method B

Sqrt of Time Coefficients

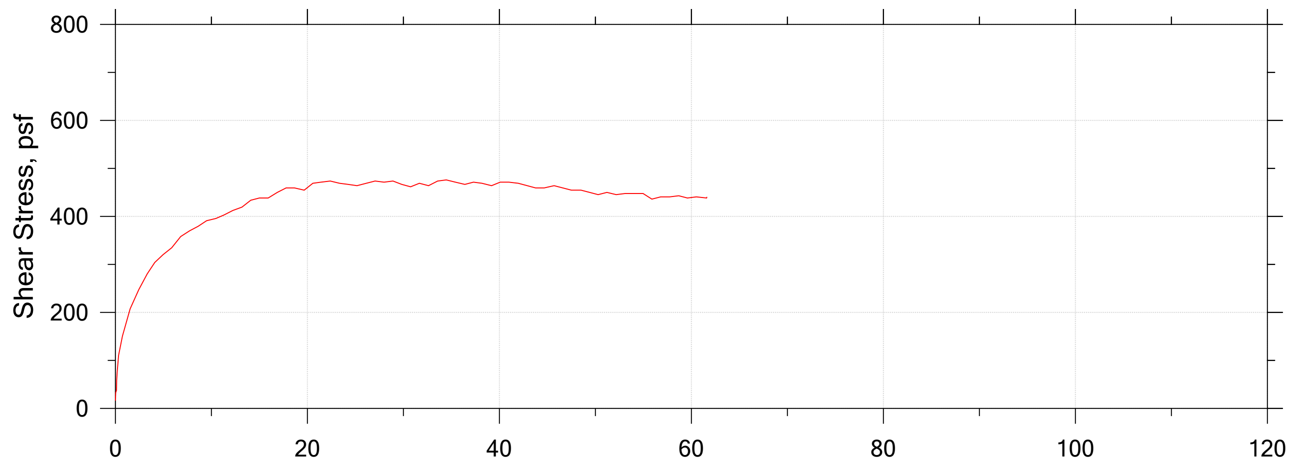
Step	Applied Stress psf	EOP Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv ft²/day	Mv ft²/ton	k cm/s
1	200.	0.008247	0.960	0.821	49.788	4.27e-02	8.21e+04	3.85e-08
2	300.	0.01195	0.953	1.19	0.000	0.00e+00	7.38e+04	0.00e+00
3	450.	0.01504	0.946	1.50	27.264	7.64e-02	4.09e+04	3.44e-08
4	675.	0.01968	0.937	1.96	43.840	4.72e-02	4.11e+04	2.13e-08
5	1.01e+03	0.02595	0.925	2.58	33.000	6.20e-02	3.69e+04	2.52e-08
6	1.52e+03	0.03430	0.909	3.41	40.070	5.03e-02	3.28e+04	1.82e-08
7	2.28e+03	0.04740	0.883	4.72	29.452	6.69e-02	3.43e+04	2.53e-08
8	3.42e+03	0.06622	0.846	6.59	45.537	4.19e-02	3.29e+04	1.52e-08
9	5.13e+03	0.09366	0.792	9.32	53.747	3.38e-02	3.20e+04	1.19e-08
10	2.28e+03	0.09067	0.798	9.02	1.707	1.03e+00	2.09e+03	2.38e-08
11	1.01e+03	0.08685	0.805	8.64	12.431	1.43e-01	6.00e+03	9.45e-09
12	450.	0.08309	0.813	8.27	26.979	6.65e-02	1.33e+04	9.74e-09
13	675.	0.08358	0.812	8.32	0.000	0.00e+00	4.29e+03	0.00e+00
14	1.01e+03	0.08484	0.809	8.44	9.920	1.81e-01	7.46e+03	1.49e-08
15	1.52e+03	0.08728	0.804	8.68	54.953	3.26e-02	9.60e+03	3.44e-09
16	2.28e+03	0.09019	0.799	8.97	6.555	2.72e-01	7.62e+03	2.28e-08
17	3.42e+03	0.09488	0.789	9.44	13.767	1.28e-01	8.20e+03	1.16e-08
18	5.13e+03	0.1061	0.767	10.6	40.408	4.29e-02	1.31e+04	6.18e-09
19	7.69e+03	0.1255	0.729	12.5	22.258	7.53e-02	1.51e+04	1.25e-08
20	1.15e+04	0.1488	0.683	14.8	22.941	6.96e-02	1.21e+04	9.25e-09
21	1.73e+04	0.1703	0.641	16.9	15.704	9.65e-02	7.41e+03	7.87e-09
22	7.69e+03	0.1682	0.645	16.7	0.000	0.00e+00	4.36e+02	0.00e+00
23	3.42e+03	0.1613	0.659	16.0	5.375	2.78e-01	3.22e+03	9.87e-09
24	1.52e+03	0.1552	0.671	15.4	21.009	7.23e-02	6.34e+03	5.05e-09
25	675.	0.1487	0.684	14.8	26.949	5.72e-02	1.54e+04	9.69e-09
26	300.	0.1430	0.695	14.2	57.463	2.72e-02	3.05e+04	9.15e-09

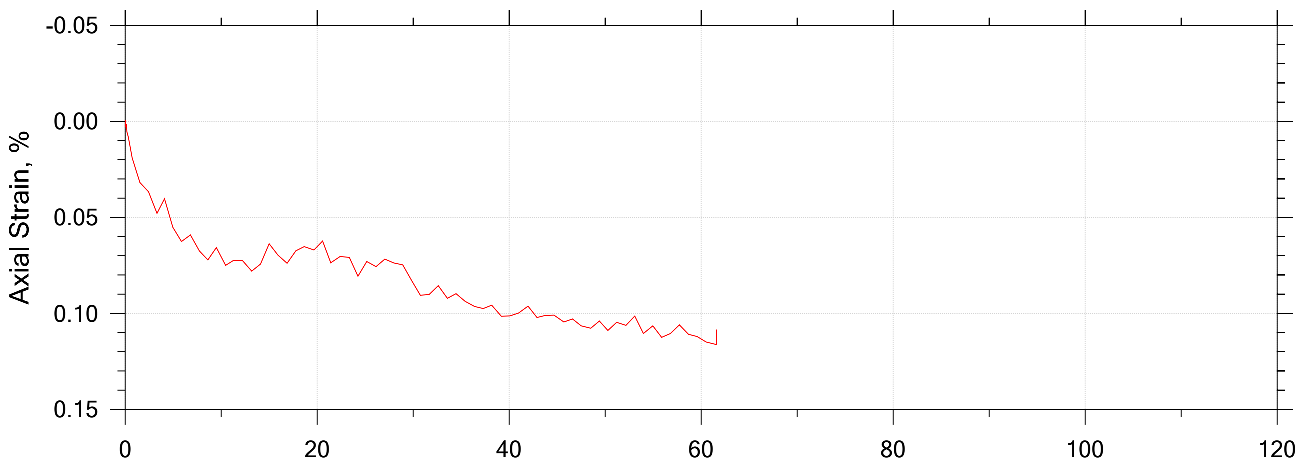
Project Name: Woolwich Bridge 3039	Location: Woolwich, ME	Project Number: 166-11
Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
Sample Number: 3U	Test Date: 12/7/19	Depth: 71.07
Test Number: ICON312	Preparation: Shelby Tube	Elevation: -68.07
Description: Gray Silty Clay		
Remarks:		
Displacement at End of Primary		

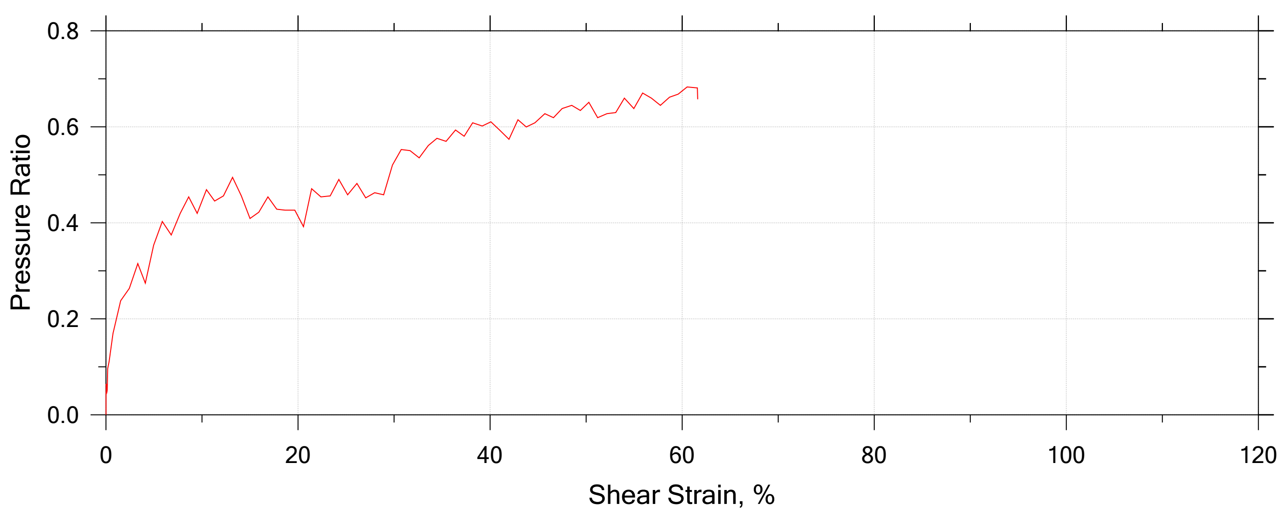
CK_O DIRECT SIMPLE SHEAR

Ck_o DSS: BB-WS46-103 1U

Direct Simple Shear Test by ASTM D6528

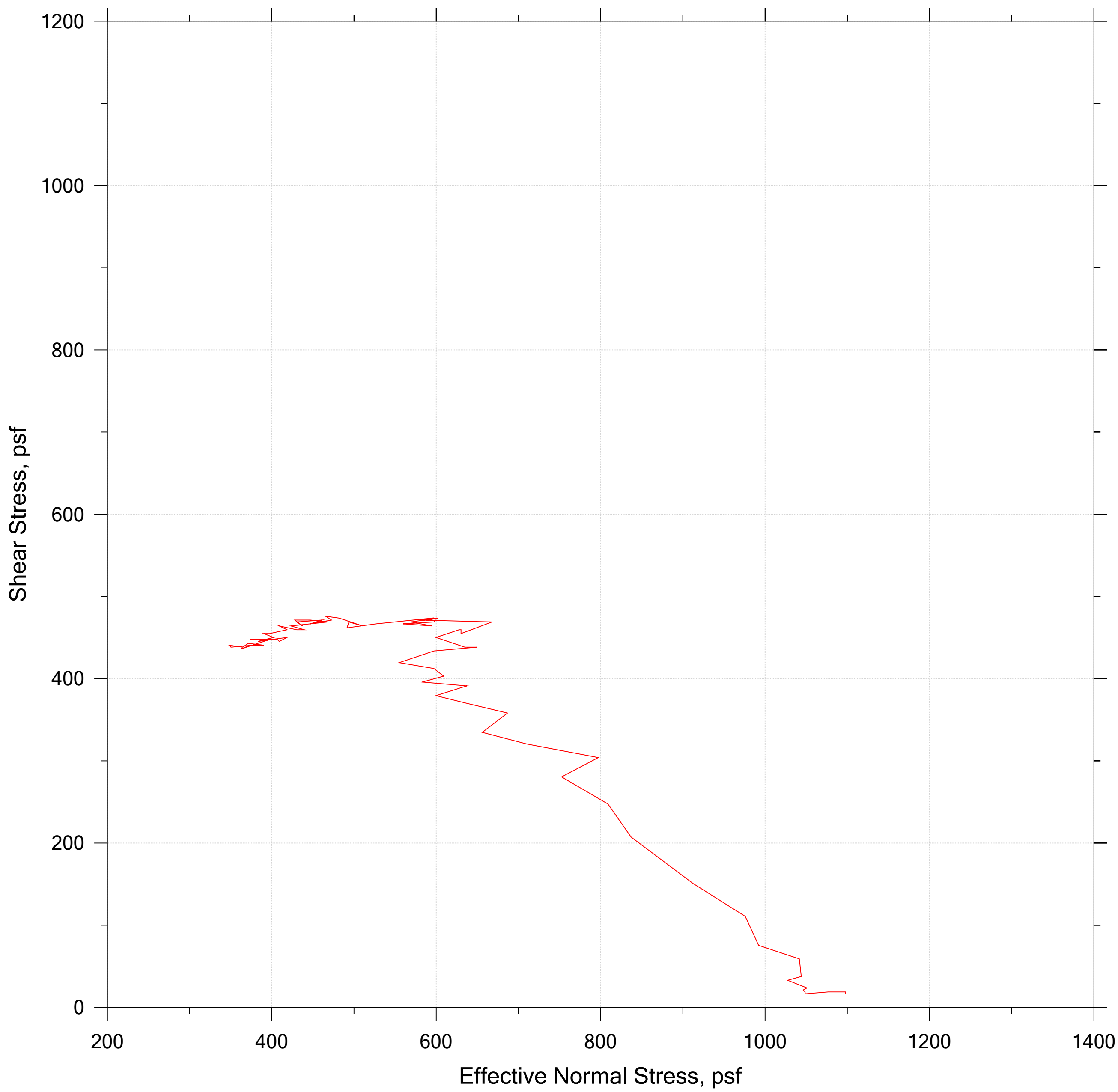






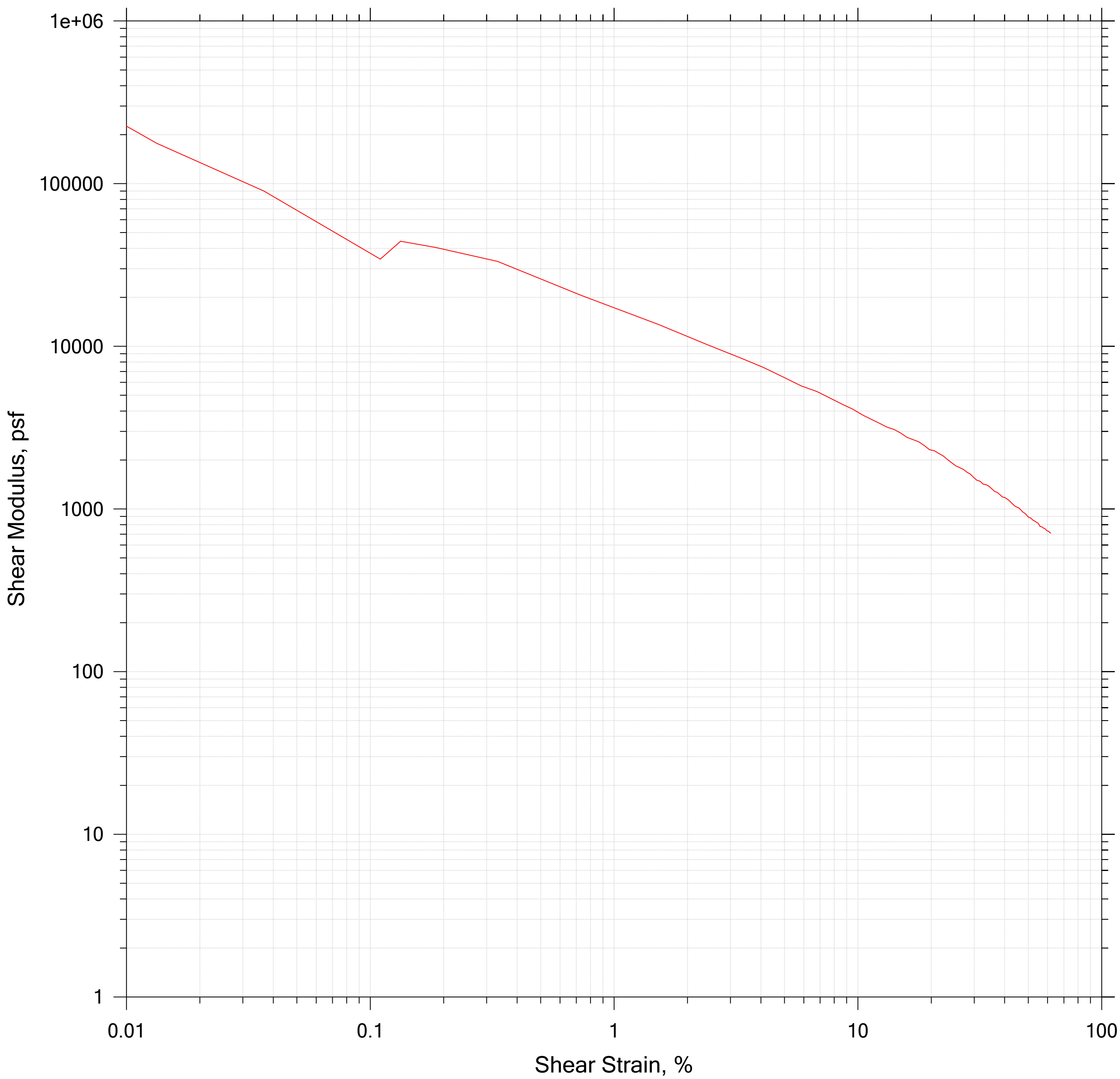
Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
Sample Number: 1U	Test Date: 12/3/19	Depth: 17.63
Test Number: DSS 109	Preparation: wet	Elevation: -14.63
Description: Brown Organic Silt		
Remarks: Sample consolidated to 1,100 psf then held for 2 hours before shearing. CkoDSS test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



	Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/3/19	Depth: 17.63
	Test Number: DSS 109	Preparation: wet	Elevation: -14.63
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1,100 psf then held for 2 hours before shearing. CkoDSS test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



	Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
	Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/3/19	Depth: 17.63
	Test Number: DSS 109	Preparation: wet	Elevation: -14.63
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1,100 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: 2.50 (Estimated)	Liquid Limit: 0
Specimen Height, in: 1.00	Initial Void Ratio: 1.95	Plastic Limit: 0
Final Height, in: 0.96	Final Void Ratio: 1.83	Plasticity Index: 0

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	220	---		302
Mass Container, gm	36.7	0	0	60.04
Mass Container + Wet Soil, gm	135.07	121.51	120.29	180.18
Mass Container + Dry Soil, gm	91.83	68.345	68.345	128.3
Mass Dry Soil, gm	55.13	68.345	68.345	68.26
Water Content, %	78.43	77.79	76.00	76.00
Void Ratio	---	1.95	1.83	---
Degree of Saturation, %	---	99.88	103.63	---
Dry Unit Weight, pcf	---	52.957	55.081	---

Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
Sample Number: 1U	Test Date: 12/3/19	Depth: 17.63
Test Number: DSS 109	Preparation: wet	Elevation: -14.63
Description: Brown Organic Silt		
Remarks: Sample consolidated to 1,100 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	16.496	0.00000	0.00000	1098.1	0.00000
0.00021667	0.00000	16.496	0.00000	0.00000	1098.1	0.00000
0.017150	0.0033288	18.852	5.6634e+05	0.0017363	1098.1	0.00000
0.034133	0.0033288	18.852	5.6634e+05	0.0030232	1076.9	0.019272
0.084267	0.00000	16.496	0.00000	0.0030028	1048.7	0.044968
0.10020	0.00000	18.852	0.00000	0.0012665	1048.7	0.044968
0.16755	0.0066576	21.209	3.1857e+05	-0.00032684	1046.3	0.047109
0.25037	0.013315	23.565	1.7698e+05	-0.00061282	1051.0	0.042827
0.50012	0.036617	32.992	90100.	0.0025534	1027.5	0.064240
1.0005	0.10985	37.705	34324.	0.0015525	1044.0	0.049251
2.0004	0.13315	58.914	44245.	0.0016955	1041.6	0.051392
4.0000	0.18641	75.410	40453.	0.0054676	992.26	0.096360
8.0009	0.33288	110.76	33272.	0.0082636	975.80	0.11135
15.001	0.73234	150.82	20594.	0.019048	912.31	0.16916
30.000	1.5246	207.38	13602.	0.031830	837.07	0.23769
45.000	2.4334	247.44	10169.	0.036623	808.86	0.26338
60.001	3.3122	280.43	8466.6	0.047946	752.42	0.31478
75.000	4.0978	303.99	7418.5	0.040357	797.10	0.27409
90.000	4.9699	320.49	6448.6	0.055136	710.10	0.35332
105.00	5.8554	334.63	5714.9	0.062587	656.02	0.40257
120.00	6.7974	358.20	5269.6	0.059130	686.59	0.37473
135.00	7.7228	369.98	4790.7	0.067518	637.21	0.41970
150.00	8.6150	379.40	4404.0	0.072173	599.59	0.45396
165.00	9.5004	391.19	4117.6	0.065782	637.21	0.41970
180.00	10.462	395.90	3784.0	0.074969	583.13	0.46895
195.00	11.321	402.97	3559.4	0.072312	608.99	0.44540
210.00	12.230	412.40	3372.0	0.072573	597.24	0.45610
225.00	13.182	419.47	3182.1	0.078026	554.91	0.49465
240.00	14.091	433.61	3077.2	0.074309	597.24	0.45610
255.00	15.003	438.32	2921.5	0.063785	648.97	0.40899
270.00	15.922	438.32	2753.0	0.069654	634.86	0.42184
285.00	16.867	450.10	2668.5	0.073909	599.59	0.45396
300.00	17.786	459.53	2583.7	0.067380	627.80	0.42827
315.00	18.651	459.53	2463.8	0.065244	630.16	0.42612
330.00	19.670	454.81	2312.2	0.066980	630.16	0.42612
345.00	20.559	468.95	2281.0	0.062326	667.78	0.39186
360.00	21.414	471.31	2200.9	0.073632	580.78	0.47109
375.00	22.386	473.67	2115.9	0.070437	599.59	0.45396
390.00	23.348	468.95	2008.5	0.070836	597.24	0.45610
405.00	24.254	466.60	1923.8	0.080700	559.62	0.49036
420.00	25.166	464.24	1844.7	0.072972	594.89	0.45824
435.00	26.128	468.95	1794.8	0.075629	569.02	0.48180
450.00	27.047	473.67	1751.3	0.071774	601.94	0.45182
465.00	27.979	471.31	1684.5	0.073771	590.18	0.46253
480.00	28.907	473.67	1638.6	0.074708	594.89	0.45824
495.00	29.829	466.60	1564.2	0.082819	526.70	0.52034
510.00	30.745	461.88	1502.3	0.090547	491.43	0.55246
525.00	31.660	468.95	1481.2	0.090148	493.78	0.55032
540.00	32.616	464.24	1423.4	0.085615	510.24	0.53533
555.00	33.564	473.67	1411.2	0.092145	482.02	0.56103

Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
Sample Number: 1U	Test Date: 12/3/19	Depth: 17.63
Test Number: DSS 109	Preparation: wet	Elevation: -14.63
Description: Brown Organic Silt		
Remarks: Sample consolidated to 1,100 psf then held for 2 hours before shearing. CkoDSS test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Shear Phase

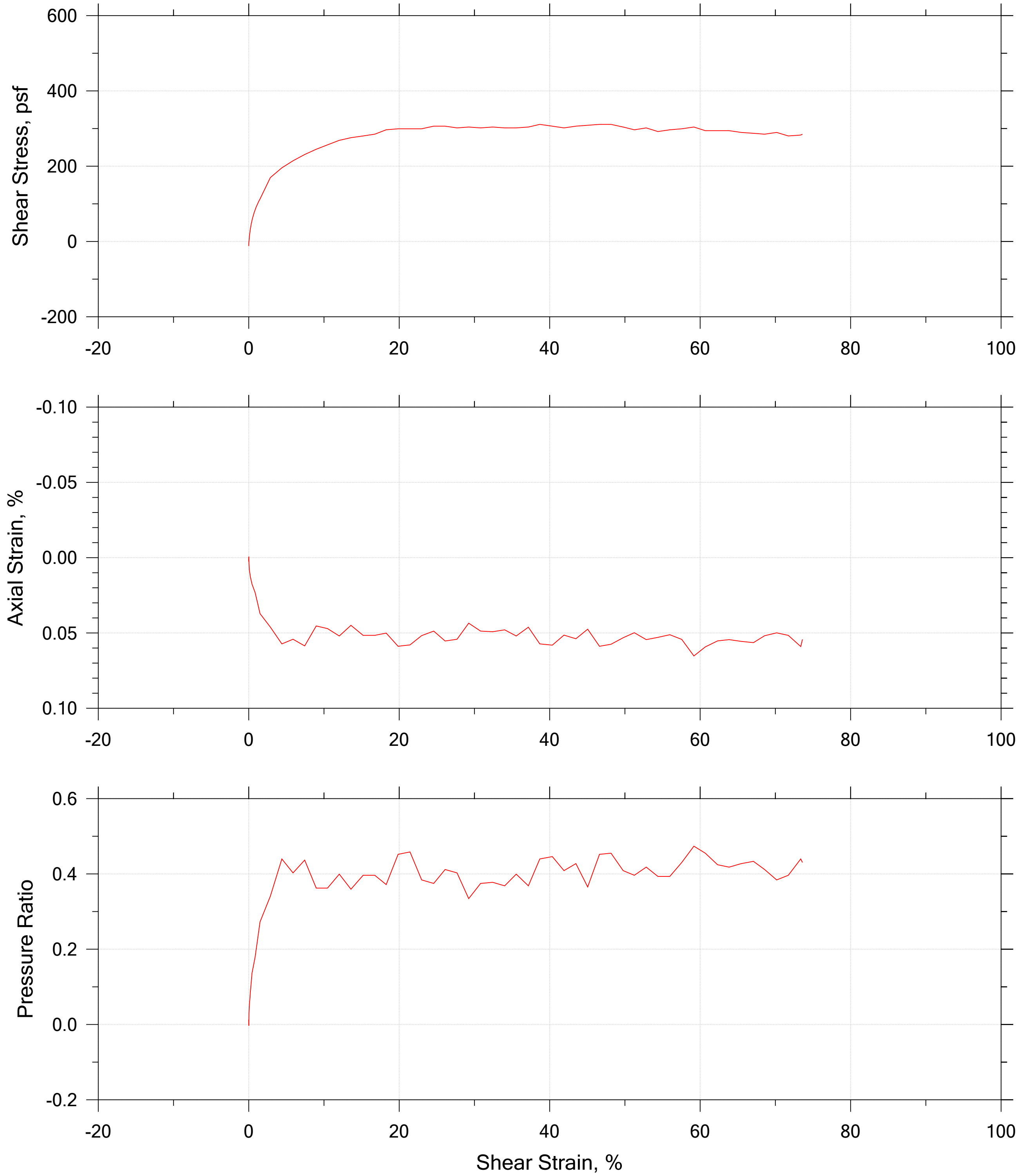
Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
570.00	34.470	476.02	1381.0	0.089732	465.56	0.57602
585.00	35.412	471.31	1330.9	0.093743	472.62	0.56959
600.00	36.404	466.60	1281.7	0.096400	446.75	0.59315
615.00	37.296	471.31	1263.7	0.097476	460.86	0.58030
630.00	38.185	468.95	1228.1	0.095723	430.29	0.60814
645.00	39.190	464.24	1184.6	0.10147	437.35	0.60171
660.00	40.089	471.31	1175.7	0.10133	427.94	0.61028
675.00	40.978	471.31	1150.2	0.099873	446.75	0.59315
690.00	41.970	468.95	1117.4	0.096278	467.91	0.57388
705.00	42.905	464.24	1082.0	0.10213	423.24	0.61456
720.00	43.771	459.53	1049.9	0.10107	439.70	0.59957
735.00	44.663	459.53	1028.9	0.10093	430.29	0.60814
750.00	45.705	464.24	1015.7	0.10453	409.13	0.62741
765.00	46.597	459.53	986.18	0.10293	418.54	0.61884
780.00	47.492	454.81	957.66	0.10652	397.37	0.63812
795.00	48.494	454.81	937.87	0.10772	390.32	0.64454
810.00	49.406	450.10	911.02	0.10399	402.08	0.63383
825.00	50.288	445.39	885.67	0.10892	383.27	0.65096
840.00	51.207	450.10	878.98	0.10467	418.54	0.61884
855.00	52.169	445.39	853.74	0.10626	409.13	0.62741
870.00	53.085	447.74	843.46	0.10145	406.78	0.62955
885.00	53.987	447.74	829.36	0.11052	373.86	0.65953
900.00	54.962	447.74	814.64	0.10652	397.37	0.63812
915.00	55.884	435.96	780.12	0.11252	362.10	0.67024
930.00	56.799	440.67	775.84	0.11052	373.86	0.65953
945.00	57.732	440.67	763.32	0.10599	390.32	0.64454
960.00	58.687	443.03	754.91	0.11092	371.51	0.66167
975.00	59.589	438.32	735.57	0.11212	364.46	0.66809
990.00	60.524	440.67	728.09	0.11491	348.00	0.68308
1005.0	61.583	438.32	711.75	0.11625	350.35	0.68094
1006.1	61.620	440.67	715.15	0.10838	376.21	0.65739

Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
Boring Number: BB-WS46-103	Tester: SJR	Checker: SJR
Sample Number: 1U	Test Date: 12/3/19	Depth: 17.63
Test Number: DSS 109	Preparation: wet	Elevation: -14.63
Description: Brown Organic Silt		
Remarks: Sample consolidated to 1,100 psf then held for 2 hours before shearing. CkoDSS test - Constant volume control.		

Ck_o DSS: BB-WS46-104 1U

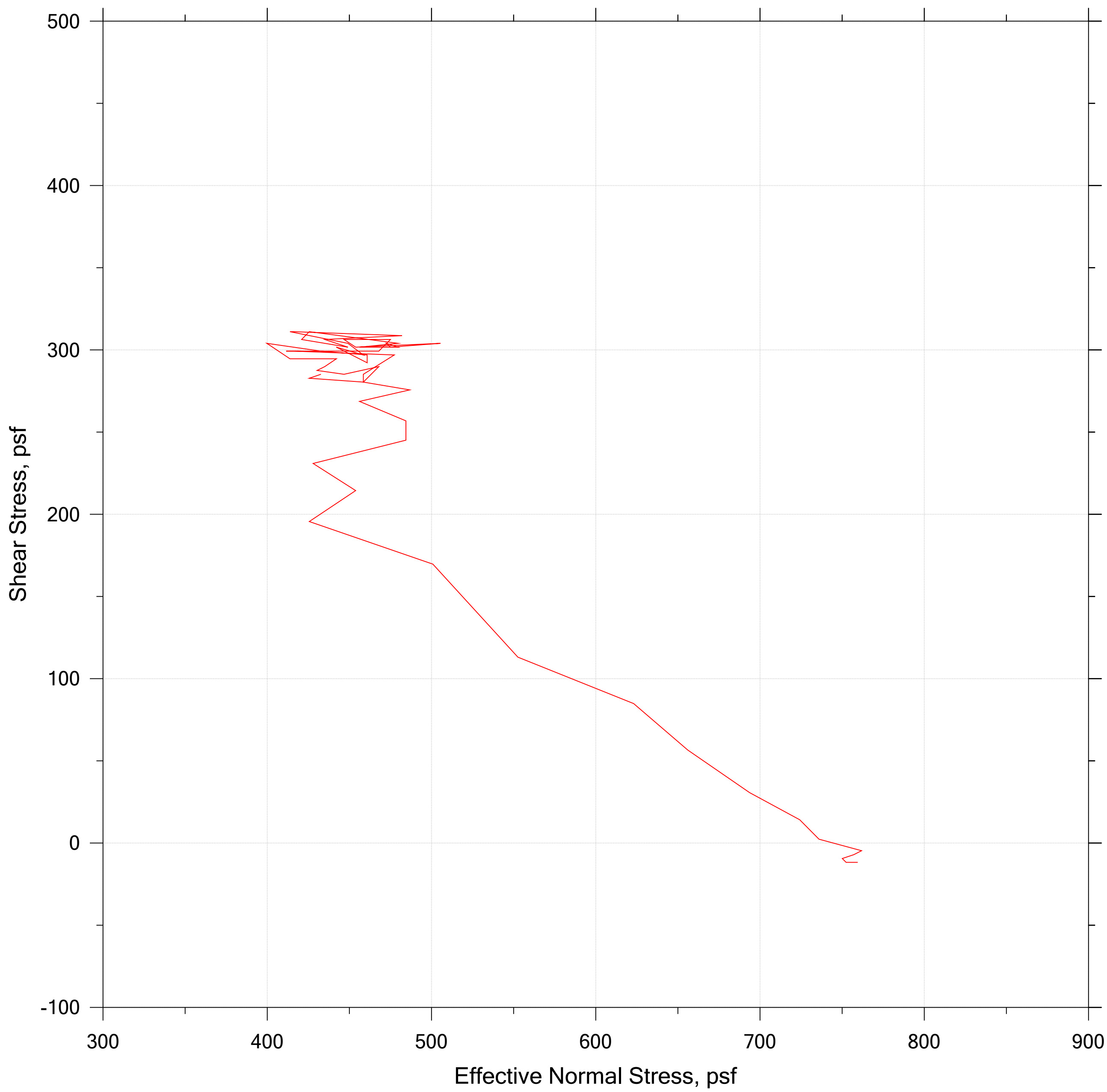
760 PSF Consolidation Stress

Direct Simple Shear Test by ASTM D6528



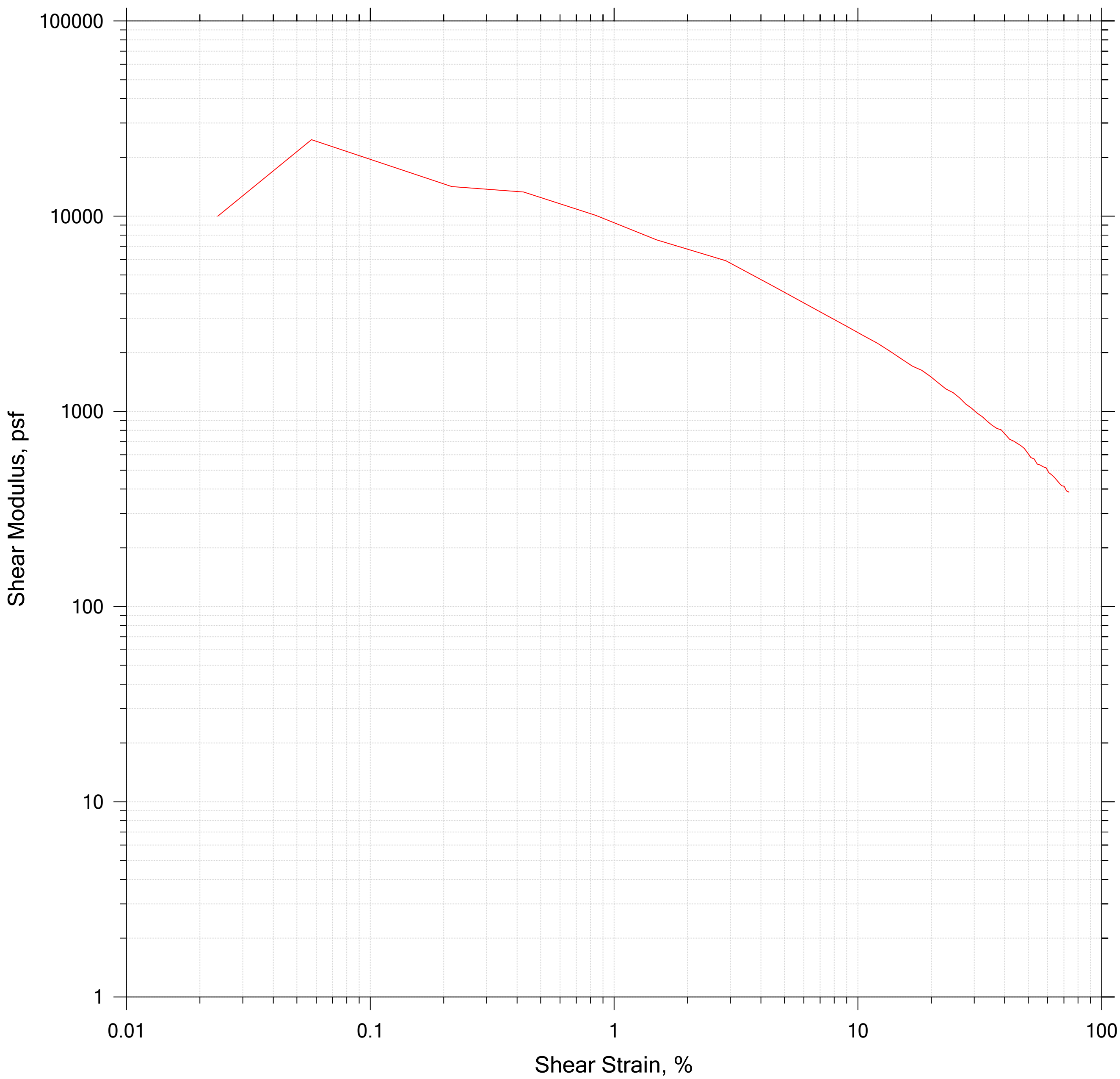
	Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
	Boring Number: BB-WS46-104	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/7/19	Depth: 11.45
	Test Number: DSS 111	Preparation: wet	Elevation: -8.45
	Description:		
	Remarks: Sample consolidated to 760 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



	Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
	Boring Number: BB-WS46-104	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/7/19	Depth: 11.45
	Test Number: DSS 111	Preparation: wet	Elevation: -8.45
	Description:		
	Remarks: Sample consolidated to 760 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528



	Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
	Boring Number: BB-WS46-104	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/7/19	Depth: 11.45
	Test Number: DSS 111	Preparation: wet	Elevation: -8.45
	Description:		
	Remarks: Sample consolidated to 760 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: 67
Specimen Height, in: 1.00	Initial Void Ratio: 1.85	Plastic Limit: 56
Final Height, in: 0.95	Final Void Ratio: 1.7	Plasticity Index: 11

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	211	---		305
Mass Container, gm	36.99	0	0	60.73
Mass Container + Wet Soil, gm	138.46	116.47	118.79	179.51
Mass Container + Dry Soil, gm	95.83	65.125	65.125	125.85
Mass Dry Soil, gm	58.84	65.125	65.125	65.12
Water Content, %	72.45	78.84	82.40	82.40
Void Ratio	---	1.85	1.70	---
Degree of Saturation, %	---	98.26	111.52	---
Dry Unit Weight, pcf	---	50.462	53.189	---

Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
Boring Number: BB-WS46-104	Tester: SJR	Checker: SJR
Sample Number: 1U	Test Date: 12/7/19	Depth: 11.45
Test Number: DSS 111	Preparation: wet	Elevation: -8.45
Description:		
Remarks: Sample consolidated to 760 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	-11.783	0.00000	0.00000	759.48	0.00000
0.00020000	0.00000	-11.783	0.00000	0.00000	759.48	0.00000
0.017617	0.00000	-11.783	0.00000	0.0025705	754.78	0.0061920
0.034283	-0.0033752	-11.783	0.00000	0.0012150	752.42	0.0092879
0.084067	0.00000	-9.4262	0.00000	0.0016200	750.07	0.012384
0.10072	0.0033752	-9.4262	-2.7928e+05	-0.00014051	750.07	0.012384
0.16742	0.0067503	-7.0696	-1.0473e+05	0.00040500	757.13	0.0030960
0.25088	0.010126	-4.7131	-46547.	-0.00066948	761.83	-0.0030960
0.50017	0.023626	2.3565	9974.3	0.0037855	735.96	0.030960
1.0008	0.057378	14.139	24642.	0.0075710	724.21	0.046440
2.0004	0.21601	30.635	14182.	0.012836	693.64	0.086687
4.0003	0.42527	56.557	13299.	0.017555	656.02	0.13622
8.0009	0.84042	84.836	10094.	0.023225	623.10	0.17957
15.001	1.4952	113.11	7565.2	0.037136	552.56	0.27245
30.001	2.8723	169.67	5907.2	0.046046	500.83	0.34056
45.000	4.4046	195.59	4440.7	0.057245	425.59	0.43963
60.000	5.8897	214.45	3641.1	0.054146	453.81	0.40248
75.001	7.4254	230.94	3110.2	0.058601	427.94	0.43653
90.000	8.9611	245.08	2735.0	0.045360	484.37	0.36223
105.00	10.473	256.86	2452.6	0.047120	484.37	0.36223
120.00	12.036	268.65	2232.1	0.051980	456.16	0.39938
135.00	13.588	275.72	2029.1	0.044955	486.72	0.35913
150.00	15.202	280.43	1844.7	0.051575	458.51	0.39628
165.00	16.741	285.14	1703.3	0.051575	458.51	0.39628
180.00	18.273	296.93	1624.9	0.050096	477.32	0.37152
195.00	19.853	299.28	1507.5	0.058865	416.18	0.45201
210.00	21.439	299.28	1396.0	0.057914	411.48	0.45820
225.00	22.988	299.28	1301.9	0.051716	467.91	0.38390
240.00	24.578	306.35	1246.4	0.048740	474.97	0.37461
255.00	26.104	306.35	1173.6	0.055361	446.75	0.41176
270.00	27.680	301.64	1089.7	0.054146	453.81	0.40248
285.00	29.232	303.99	1039.9	0.043475	505.53	0.33437
300.00	30.815	301.64	978.86	0.048740	474.97	0.37461
315.00	32.415	303.99	937.82	0.049145	472.62	0.37771
330.00	34.022	301.64	886.61	0.047930	479.67	0.36842
345.00	35.551	301.64	848.48	0.051980	456.16	0.39938
360.00	37.164	303.99	817.98	0.046170	479.67	0.36842
375.00	38.686	311.06	804.07	0.057245	425.59	0.43963
390.00	40.350	306.35	759.23	0.058055	420.89	0.44582
405.00	41.899	301.64	719.91	0.051435	449.10	0.40867
420.00	43.489	306.35	704.43	0.053865	435.00	0.42724
435.00	45.052	308.71	685.23	0.047525	482.02	0.36533
450.00	46.621	311.06	667.22	0.058865	416.18	0.45201
465.00	48.143	311.06	646.12	0.057510	413.83	0.45511
480.00	49.770	303.99	610.80	0.053195	449.10	0.40867
495.00	51.245	296.93	579.42	0.049815	458.51	0.39628
510.00	52.842	301.64	570.83	0.054410	442.05	0.41796
525.00	54.391	292.21	537.25	0.052931	460.86	0.39319
540.00	55.964	296.93	530.57	0.051170	460.86	0.39319
555.00	57.557	299.28	519.98	0.054270	432.64	0.43034

Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
Boring Number: BB-WS46-104	Tester: SJR	Checker: SJR
Sample Number: 1U	Test Date: 12/7/19	Depth: 11.45
Test Number: DSS 111	Preparation: wet	Elevation: -8.45
Description:		
Remarks: Sample consolidated to 760 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Direct Simple Shear Test by ASTM D6528

Shear Phase

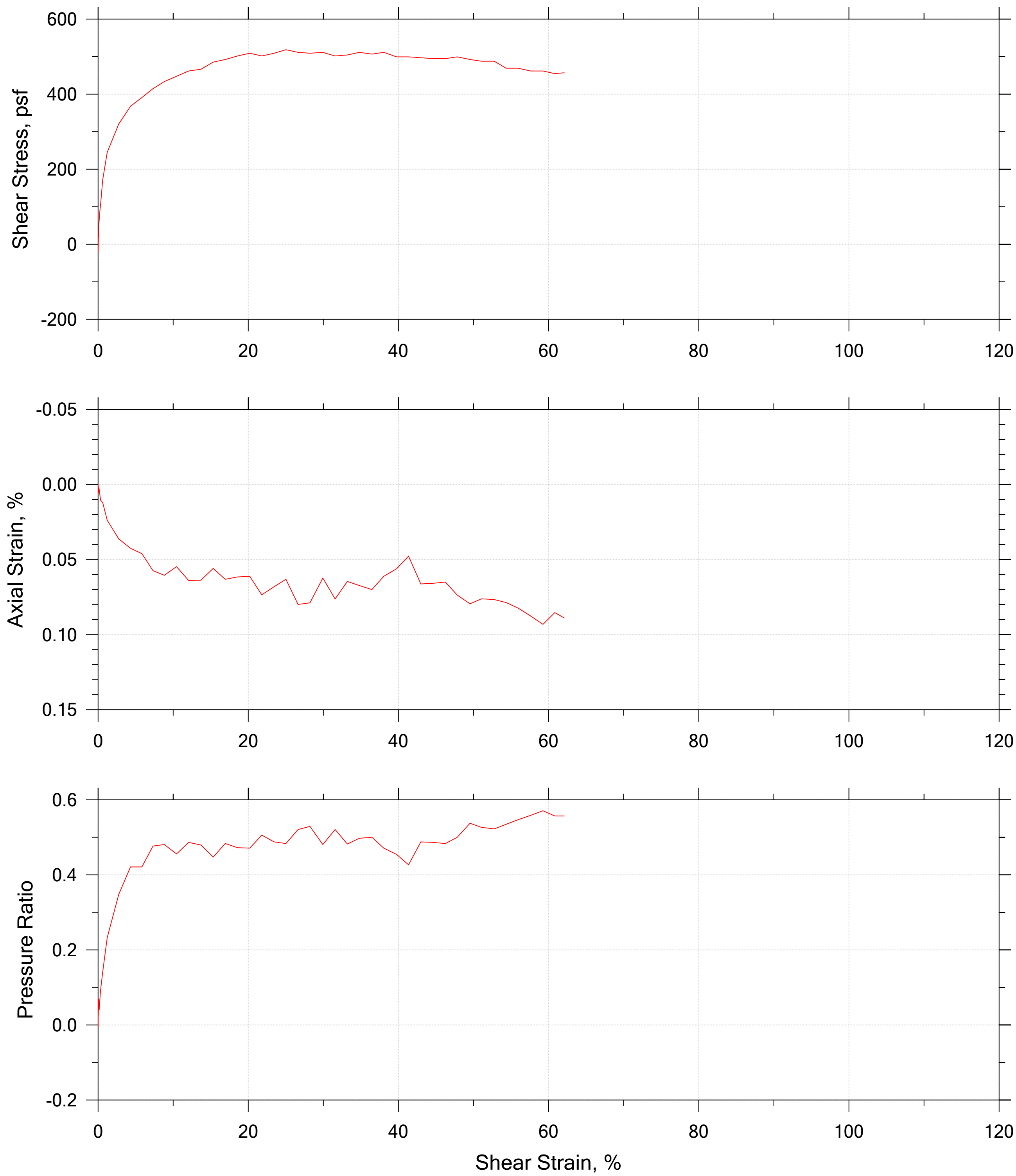
Elapsed Time min	Shear Strain %	Shear Stress psf	Shear Modulus psf	Normal Strain %	Normal Stress psf	Pressure Ratio
570.00	59.173	303.99	513.74	0.065221	399.73	0.47368
585.00	60.682	294.57	485.43	0.059270	413.83	0.45511
600.00	62.319	294.57	472.68	0.055220	437.35	0.42415
615.00	63.845	294.57	461.38	0.054410	442.05	0.41796
630.00	65.468	289.86	442.74	0.055625	435.00	0.42724
645.00	67.081	287.50	428.58	0.056435	430.29	0.43344
660.00	68.567	285.14	415.86	0.051840	446.75	0.41176
675.00	70.163	289.86	413.12	0.049955	467.91	0.38390
690.00	71.722	280.43	390.99	0.051575	458.51	0.39628
705.00	73.363	282.79	385.46	0.059006	425.59	0.43963
707.60	73.596	285.14	387.45	0.054270	432.64	0.43034

Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
Boring Number: BB-WS46-104	Tester: SJR	Checker: SJR
Sample Number: 1U	Test Date: 12/7/19	Depth: 11.45
Test Number: DSS 111	Preparation: wet	Elevation: -8.45
Description:		
Remarks: Sample consolidated to 760 psf then held for 2 hours before shearing. CKoDSS Test - Constant volume control.		

Ck$_O$ DSS: BB-WS46-104 1U

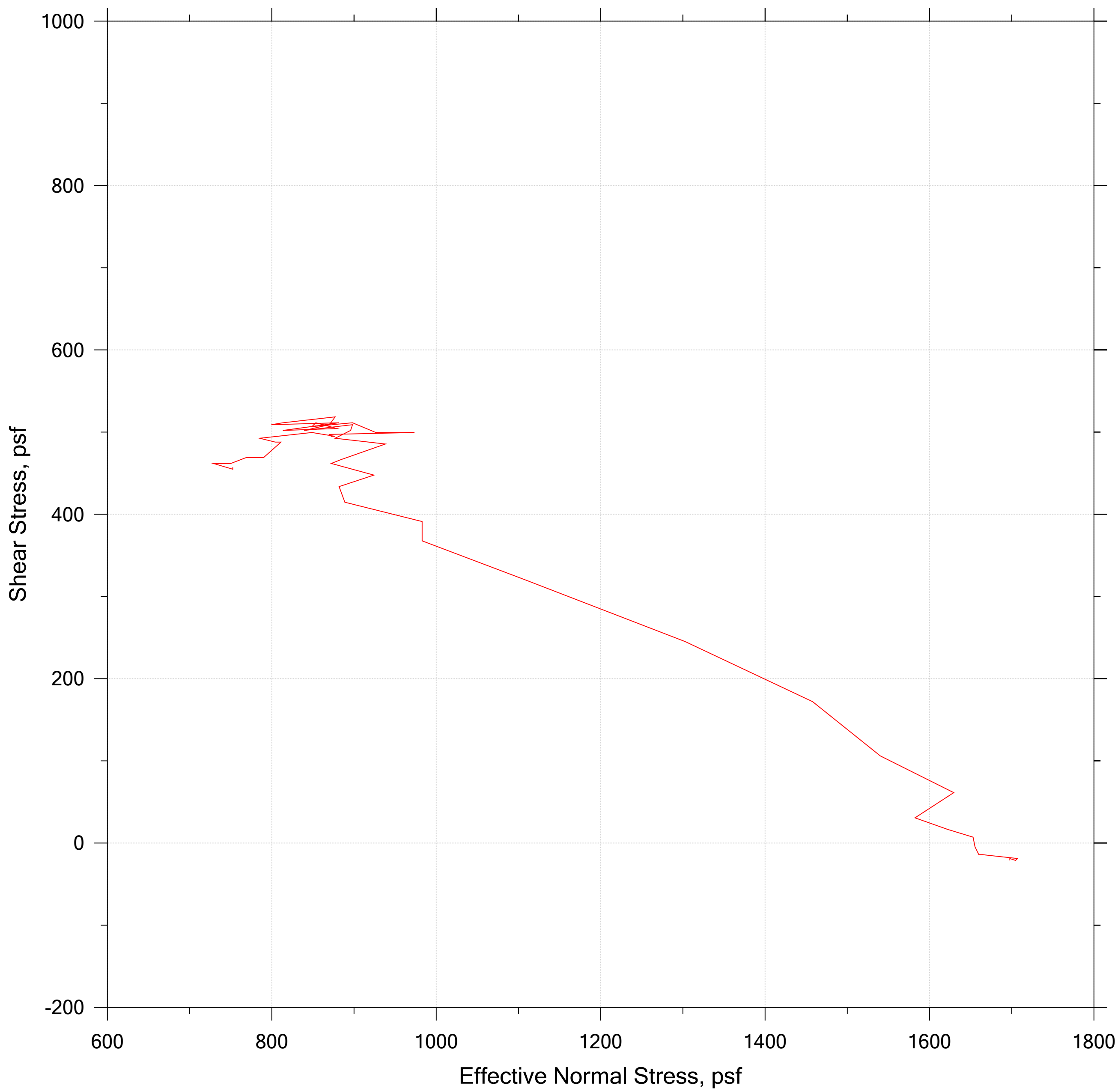
1700 PSF Consolidation Stress

Direct Simple Shear Test by ASTM D6528



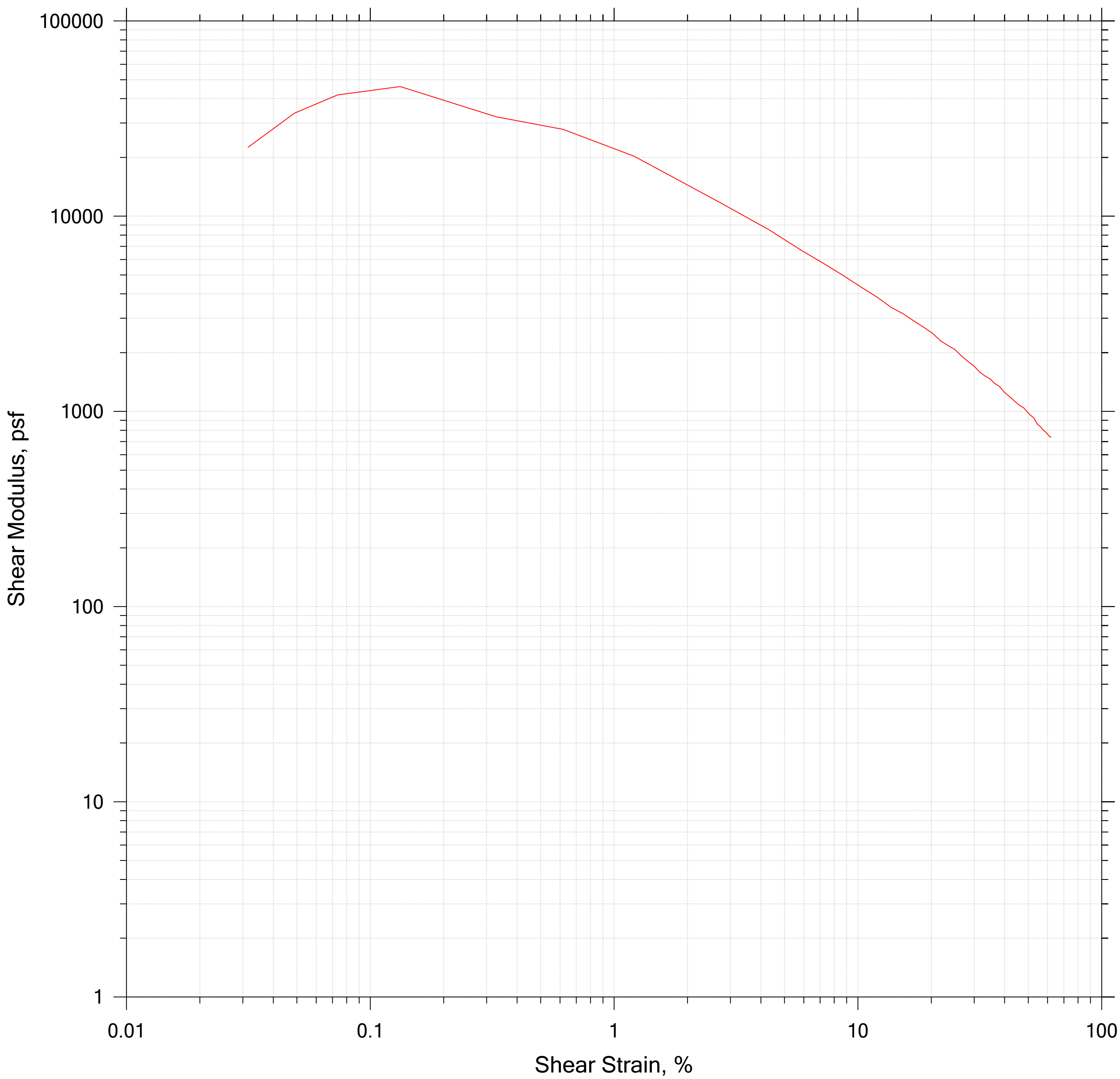
	Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
	Boring Number: BB-WS46-104	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/3/19	Depth: 11.83
	Test Number: DSS 110	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1,700 psf then held for 2 hours before shearing. CkoDSS - constant volume control.		

Direct Simple Shear Test by ASTM D6528



	Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
	Boring Number: BB-WS46-104	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/3/19	Depth: 11.83
	Test Number: DSS 110	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1,700 psf then held for 2 hours before shearing. CkoDSS - constant volume control.		

Direct Simple Shear Test by ASTM D6528



	Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
	Boring Number: BB-WS46-104	Tester: SJR	Checker: SJR
	Sample Number: 1U	Test Date: 12/3/19	Depth: 11.83
	Test Number: DSS 110	Preparation: wet	Elevation:
	Description: Brown Organic Silt		
	Remarks: Sample consolidated to 1,700 psf then held for 2 hours before shearing. CkoDSS - constant volume control.		

Direct Simple Shear Test by ASTM D6528

Specimen Dimension, in: 2.50	Specific Gravity: 2.64 (Estimated)	Liquid Limit: 0
Specimen Height, in: 1.00	Initial Void Ratio: 1.92	Plastic Limit: 0
Final Height, in: 0.92	Final Void Ratio: 1.68	Plasticity Index: 0

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID	219	---		311
Mass Container, gm	36.98	0	0	59.59
Mass Container + Wet Soil, gm	169.63	122.19	119.47	179.33
Mass Container + Dry Soil, gm	113.21	72.746	72.746	132.5
Mass Dry Soil, gm	76.23	72.746	72.746	72.91
Water Content, %	74.01	67.97	64.23	64.23
Void Ratio	---	1.92	1.68	---
Degree of Saturation, %	---	93.27	100.97	---
Dry Unit Weight, pcf	---	56.366	61.509	---

Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
Boring Number: BB-WS46-104	Tester: SJR	Checker: SJR
Sample Number: 1U	Test Date: 12/3/19	Depth: 11.83
Test Number: DSS 110	Preparation: wet	Elevation:
Description: Brown Organic Silt		
Remarks: Sample consolidated to 1,700 psf then held for 2 hours before shearing. CkoDSS - 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	-21.209	0.00000	0.00000	1697.7	0.00000
0.00026667	0.00000	-18.852	0.00000	0.00000	1697.7	0.00000
0.017417	0.0069862	-21.209	-3.0359e+05	0.0021521	1704.7	-0.0041551
0.034067	0.010479	-18.852	-1.7990e+05	0.0034768	1707.1	-0.0055402
0.084067	0.017465	-14.139	-80956.	0.0025336	1664.7	0.019391
0.10073	0.013972	-14.139	-1.0120e+05	0.0010117	1660.0	0.022161
0.16733	0.034931	-4.7131	-13493.	0.0013118	1655.3	0.024931
0.25065	0.031438	7.0696	22488.	0.0014619	1653.0	0.026316
0.50013	0.048903	16.496	33732.	0.0052345	1622.4	0.044321
1.0001	0.073355	30.635	41763.	0.0041413	1582.4	0.067867
2.0000	0.13274	61.270	46159.	0.0029624	1629.5	0.040166
4.0000	0.32835	106.04	32296.	0.010486	1540.1	0.092798
8.0003	0.61827	172.03	27824.	0.012094	1457.8	0.14127
15.001	1.2086	245.08	20278.	0.023819	1302.6	0.23269
30.000	2.7421	320.49	11688.	0.036273	1107.5	0.34765
45.001	4.3070	367.62	8535.5	0.042465	982.85	0.42105
60.000	5.8334	391.19	6705.9	0.046109	982.85	0.42105
75.001	7.3075	414.75	5675.7	0.057409	888.80	0.47645
90.001	8.8060	433.61	4923.9	0.060488	881.75	0.48061
105.00	10.455	447.74	4282.7	0.054766	924.07	0.45568
120.00	12.065	461.88	3828.3	0.063987	872.34	0.48615
135.00	13.693	466.60	3407.6	0.063713	884.10	0.47922
150.00	15.338	485.45	3165.0	0.055895	938.18	0.44737
165.00	16.931	492.52	2909.0	0.063148	877.04	0.48338
180.00	18.562	501.94	2704.1	0.061617	895.85	0.47230
195.00	20.193	509.01	2520.7	0.061198	898.21	0.47091
210.00	21.800	501.94	2302.5	0.073499	839.42	0.50554
225.00	23.442	509.01	2171.4	0.068050	869.99	0.48753
240.00	25.014	518.44	2072.6	0.063148	877.04	0.48338
255.00	26.628	511.37	1920.4	0.079931	813.56	0.52078
270.00	28.214	509.01	1804.1	0.078802	799.45	0.52909
285.00	29.929	511.37	1708.6	0.062310	881.75	0.48061
300.00	31.563	501.94	1590.3	0.076287	813.56	0.52078
315.00	33.198	504.30	1519.1	0.064551	879.40	0.48199
330.00	34.791	511.37	1469.8	0.067340	853.53	0.49723
345.00	36.471	506.66	1389.2	0.070000	848.83	0.50000
360.00	38.050	511.37	1343.9	0.061198	898.21	0.47091
375.00	39.751	499.59	1256.8	0.056168	926.42	0.45429
390.00	41.355	499.59	1208.1	0.047786	973.45	0.42659
405.00	42.975	497.23	1157.0	0.066228	869.99	0.48753
420.00	44.596	494.88	1109.7	0.065809	872.34	0.48615
435.00	46.252	494.88	1070.0	0.064970	877.04	0.48338
450.00	47.841	499.59	1044.3	0.073644	848.83	0.50000
465.00	49.528	492.52	994.42	0.079495	785.34	0.53740
480.00	51.065	487.81	955.26	0.076142	804.15	0.52632
495.00	52.766	487.81	924.46	0.076707	811.21	0.52216
510.00	54.345	468.95	862.91	0.078657	790.05	0.53463
525.00	55.973	468.95	837.82	0.082429	768.88	0.54709
540.00	57.597	461.88	801.92	0.087604	750.07	0.55817
555.00	59.246	461.88	779.60	0.093199	728.91	0.57064

Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
Boring Number: BB-WS46-104	Tester: SJR	Checker: SJR
Sample Number: 1U	Test Date: 12/3/19	Depth: 11.83
Test Number: DSS 110	Preparation: wet	Elevation:
Description: Brown Organic Silt		
Remarks: Sample consolidated to 1,700 psf then held for 2 hours before shearing. CkoDSS - 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	60.828	454.81	747.70	0.085363	752.42	0.55679
581.29	62.114	457.17	736.02	0.089007	752.42	0.55679

Project Name: Woolwich Bridge No 3039	Location: Woolwich,Maine	Project Number: 166-12
Boring Number: BB-WS46-104	Tester: SJR	Checker: SJR
Sample Number: 1U	Test Date: 12/3/19	Depth: 11.83
Test Number: DSS 110	Preparation: wet	Elevation:
Description: Brown Organic Silt		
Remarks: Sample consolidated to 1,700 psf then held for 2 hours before shearing. CkoDSS - constant volume control.		

APPENDIX G – ROCK CORE PHOTOGRAPHS

Station 46 Bridge No. 3039
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
BB-WS46-101	R1	30.3 - 35.3	60	100	26	43	SCHIST	1
BB-WS46-101	R2	35.3 - 40.3	60	100	10	17	SCHIST	2
BB-WS46-102	R1	71.5 - 73.5	24	100	9	38	SCHIST	3
BB-WS46-102	R2	73.5 - 78.0	50	93	39	73	SCHIST	3-4
BB-WS46-102	R3	78.0 - 81.5	42	100	34	80	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.

Station 46 Bridge No. 3039
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
BB-WS46-103	R1	126.5 - 131.3	58	100	47	81	SCHIST	1
BB-WS46-103	R2	131.3 - 136.6	63	100	52	81	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.

Station 46 Bridge No. 3039
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
BB-WS46-104	R1	100.7 - 105.7	54	90	32	53	SCHIST	1
BB-WS46-104	R2	105.7 - 110.7	60	100	52	87	SCHIST	2
BB-WS46-105	R1	22.5 - 27.5	60	100	59	99	SCHIST	3
BB-WS46-105	R2	27.5 - 32.5	60	100	58	97	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.

Station 46 Bridge No. 3039
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)			Penetration (in.)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
BB-WS46-201	R-1	19	-	24	60	55	92%	38	62%	SCHIST	1
BB-WS46-201	R-2	24	-	28.9	59	59	100%	43	73%	SCHIST	2
BB-WS46-205	R-1	83	-	88	60	58	97%	44	73%	SCHIST	3
BB-WS46-205	R-2	88	-	93	60	60	100%	50	83%	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.

Station 46 Bridge No. 3039
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)			Penetration (in.)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
BB-WS46-207	R-1	25	-	30	60	57	95%	49	65%	SCHIST	1
BB-WS46-207	R-2	30	-	35	60	60	100%	53	88%	SCHIST	2
BB-WS46-202	R-1	12.5	-	17.5	60	54	90%	33	55%	SCHIST	3
BB-WS46-202	R-2	17.5	-	18.4	11	5	45%	0	0%	SCHIST	3
BB-WS46-202	R-3	18.4	-	23.4	60	60	100%	33	55%	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.

Station 46 Bridge No. 3039
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)	Penetration (in.)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
BB-WS46-204	R-1	30 - 35	60	58	97%	35	58%	SCHIST	1
BB-WS46-204	R-2	35 - 40	60	59	98%	50	83%	SCHIST	2
BB-WS46-203	R-1	11 - 16	60	60	100%	50	83%	SCHIST	3
BB-WS46-203	R-2	16 - 21	60	60	100%	50	83%	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.

Station 46 Bridge No. 3039
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)			Penetration (in.)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
BB-WS46-301A	R-1	27	-	32	60	57	95%	36	60%	SCHIST	1
BB-WS46-301A	R-2	32	-	35.5	42	36	86%	15	36%	SCHIST	2
BB-WS46-301A	R-3	25.5	-	37.5	24	23	96%	17	71%	SCHIST	2
BB-WS46-303	R-1	83	-	88	60	50	83%	35	58%	SCHIST	3
BB-WS46-303	R-2	88	-	93	60	58	97%	52	87%	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.

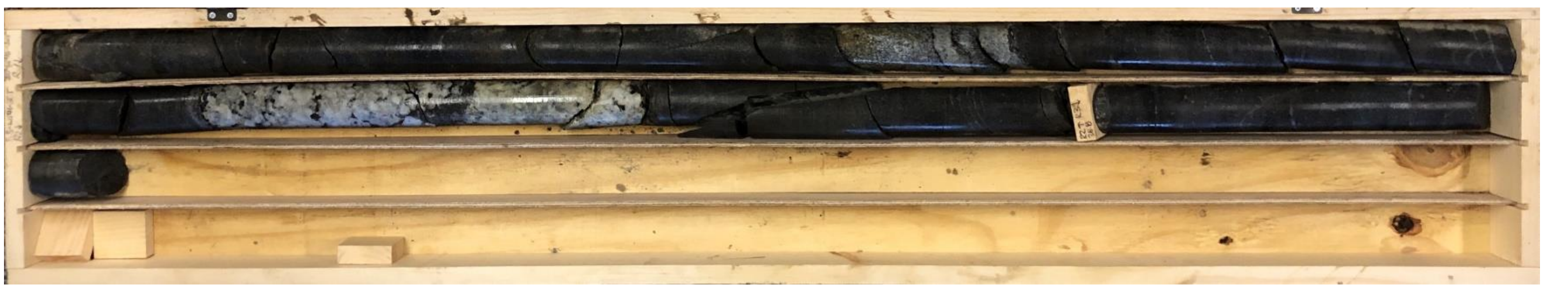
Station 46 Bridge No. 3039
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)			Penetration (in.)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
BB-WS46-304	R-1	114.7	-	119.7	60	57	95%	36.5	61%	SCHIST	1
BB-WS46-304	R-2	119.7	-	124.7	60	60	100%	39.5	66%	SCHIST	2
BB-WS46-206	R-1	128.2	-	131.2	36	36	100%	5	14%	SCHIST	3
BB-WS46-206	R-2	131.2	-	125.9	56.4	56.4	100%	32.5	58%	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.

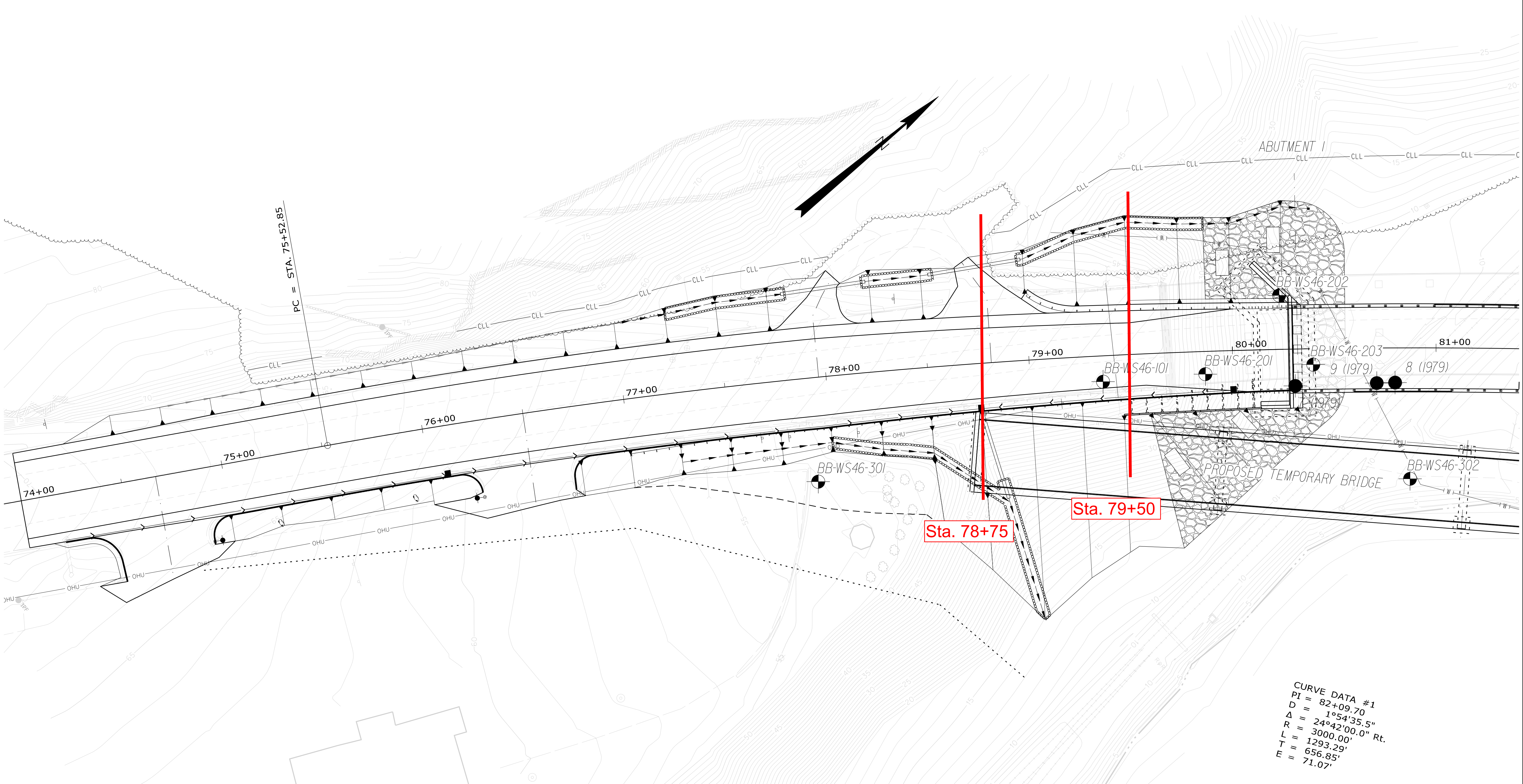
Station 46 Bridge No. 3039
Woolwich, ME
Rock Core Photographs

Boring No.	Run	Depth (ft)			Penetration (in.)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
BB-WS46-305	R-1	30	-	35	60	60	100%	41.5	69%	SCHIST	1
BB-WS46-305	R-2	35	-	38.8	45.6	43.2	95%	26	57%	SCHIST	2
BB-WS46-305	R-3	38.8	-	40	14.4	14.4	100%	14.4	100%	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.

APPENDIX H – CALCULATIONS



NOTES

1) Base map developed from electronic files (3DTopo_21dec09.dgn, Contours.dgn, Alignments.dgn, Topo-BathBridges.dgn, Topo_HNTB.dgn, and Bridge_Combined.dgn) provided by HNTB on April 27, 2021.

2) The as-drilled locations of the BB-WS46-100, -200, AND -300 series test borings and CPT-WS46-101 AND SCPT-WS46-200 series Cone Penetration Tests were surveyed and provided by MaineDOT in an electronic file (001_Borings_28 OCTOBER 19.dgn and 20 MAY BORINGS ONLY.dgn).

3) Borings CB-15-78 and CB-16-78 were drilled in 1978, and probe borings 4 through 9 were drilled in 1979 and were included in Geotechnical Report entitled "Soils Report 79-12, Woolwich-Sagadahoc County, Station 46 Bridge 26-1 (48)" dated March 1979.

BORING LOCATION PLAN LEGEND

BB-WS46-105	Locations and designations of 100 series borings performed by New England Boring Contractors of Hermon, Maine between October 7 and October 22, 2019.
BB-WS46-207	Locations and designations of 200 series borings performed by New England Boring Contractors of Hermon, Maine between March 22 and April 7, 2021.
BB-WS46-305	Locations and designations of 300 series borings performed by New England Boring Contractors of Hermon, Maine between March 22 and May 19, 2021.
CB-16-78, 9 (1979)	Locations and designation of historic explorations provided in 1979 Geotechnical Report.
CPT-WS46-101	Location and designation of 100 series Cone Penetrometer Test (CPT) performed by Summit Geoengineering Services, Inc. of Rockland, Maine on October 14, 2019.
SCPT-WS46-203	Location and designation of 200 series Cone Penetrometer Test (CPT) performed by Summit Geoengineering Services, Inc. of Rockland, Maine on March 24, 2021. (S indicates seismic testing was performed)

PLAN

25 0 25 50

Scale in Feet

PREPARED BY:

GZA

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2392900

WIN 23929.00

BRIDGE PLANS

Bridge No. 3039

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

SIGNATURE

P.E. NUMBER

DATE

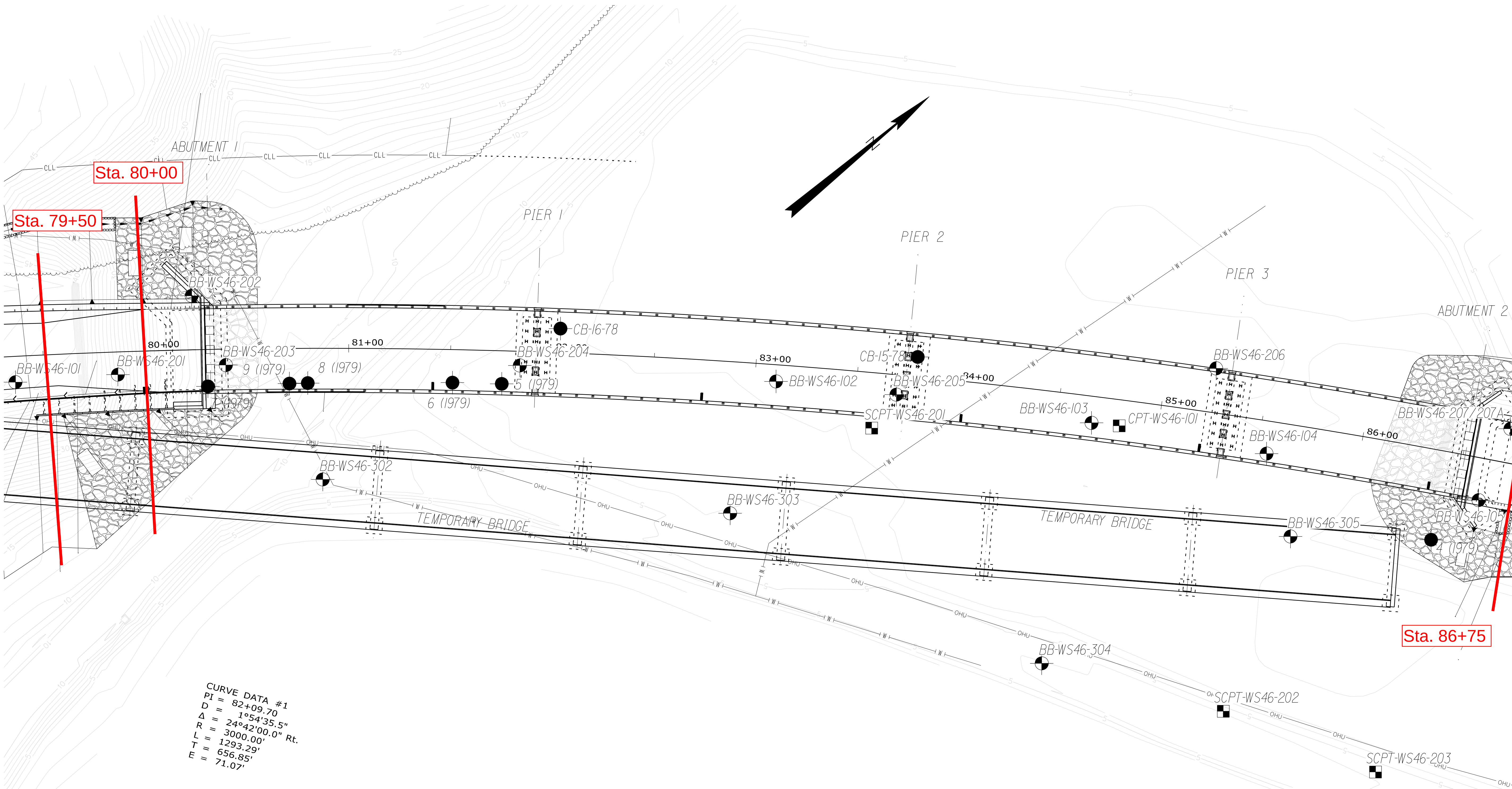
STATION 46 BRIDGE
KENNEBEC RIVER ESTUARY
WOOLWICH SAGADAHOC COUNTY

BORING LOCATION PLAN 1

SHEET NUMBER

14

Filename: ...\BLP\Woolwich - 001_BLP.dgn Division: HIGHWAY Username: common Date:8/6/2021



NOTES

1) Base map developed from electronic files (3DTopo_21dec09.dgn, Contours.dgn, Alignments.dgn, Topo-BathBridges.dgn, Topo_HNTB.dgn, and Bridge_Combined.dgn) provided by HNTB on April 27, 2021.

2) The as-drilled locations of the BB-WS46-100, -200, AND -300 series test borings were surveyed and provided by MaineDOT in an electronic file (001_Borings_28 OCTOBER 19.dgn and 20 MAY BORINGS ONLY.dgn).

3) Borings CB-15-78 and CB-16-78 were drilled in 1978, and probe borings 4 through 9 were drilled in 1979 and were included in Geotechnical Report entitled "Soils Report 79-12, Woolwich-Sagadahoc County, Station 46 Bridge 26-1 (48)" dated March 1979.

BORING LOCATION PLAN LEGEND

BB-WS46-105	Locations and designations of 100 series borings performed by New England Boring Contractors of Hermon, Maine between October 7 and October 22, 2019.
BB-WS46-207	Locations and designations of 200 series borings performed by New England Boring Contractors of Hermon, Maine between March 22 and April 7, 2021.
BB-WS46-305	Locations and designations of 300 series borings performed by New England Boring Contractors of Hermon, Maine between March 22 and May 19, 2021.
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SCPT-WS46-203	Location and designation of 200 series Cone Penetrometer Test (CPT) performed by Summit Geoengineering Services, Inc. of Rockland, Maine on March 24, 2021. (S) indicates seismic testing was performed)

PLAN

25 0 25 50

Scale in Feet

PREPARED BY:

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2392900

WIN 23929.00

BRIDGE PLANS

Bridge No. 3039

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

STATION 46 BRIDGE
KENNEBEC RIVER ESTUARY
WOOLWICH SAGADAHOC COUNTY

BORING LOCATION PLAN 2

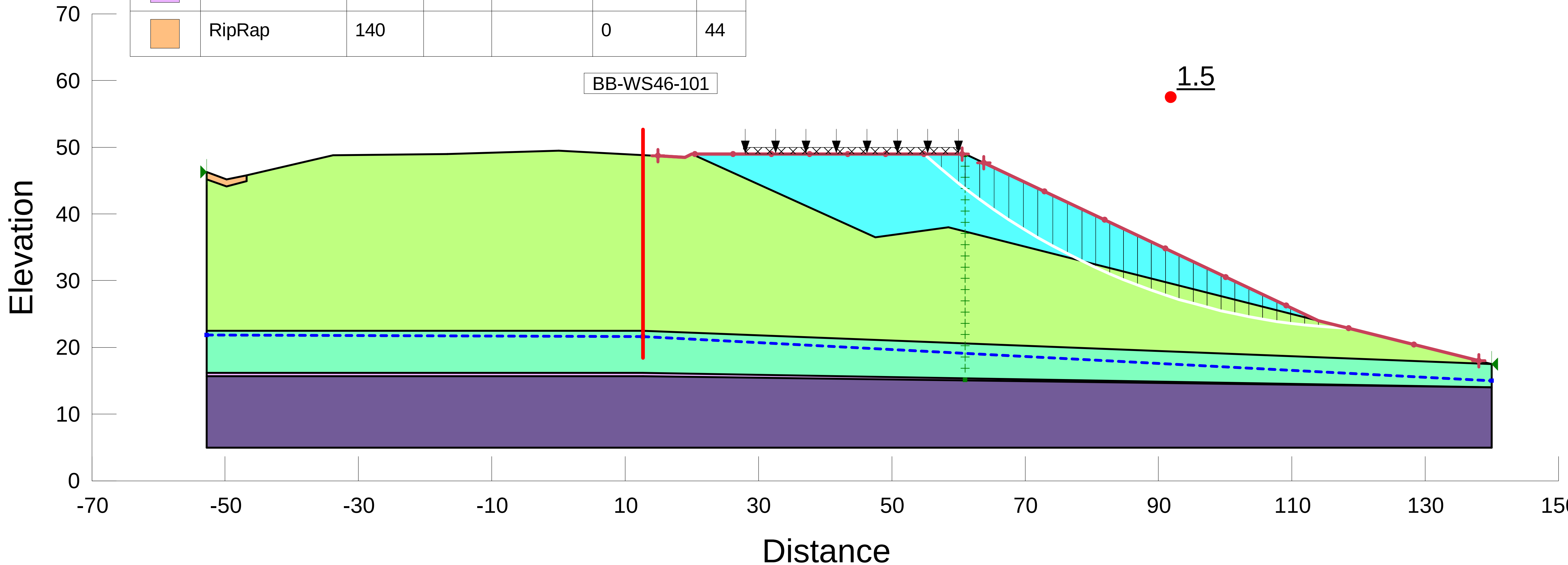
SHEET NUMBER

XX2

78+75 Temp Road

File Name: Sta. 46_X_Section_78+75 ENT.gsz
Date: 08/17/2021
Directory: P:\09 Jobs\0026000s\09.0026035.00 - MEDOT - Woolwich - Station 46 Bridge 3039\09.0026035.01 - Final Design\Work\Calcs\Stability\
Method: Morgenstern-Price

Color	Name	Unit Weight (pcf)	C-Top of Layer (psf)	C-Rate of Change ((lbf/ft²)/ft)	Cohesion' (psf)	Phi' (°)
	2 - Existing Fill	125			0	31
	4A - Marine Clay (crust)	114	1,500	-45		
	Bedrock					
	Gravel Subbase for Preload	135			0	36
	Marine Sand	120			0	30
	RipRap	140			0	44



Sta. 79+50

File Name: Sta. 46_X_Section_79+50 ENT.gsz
Date: 07/08/2021
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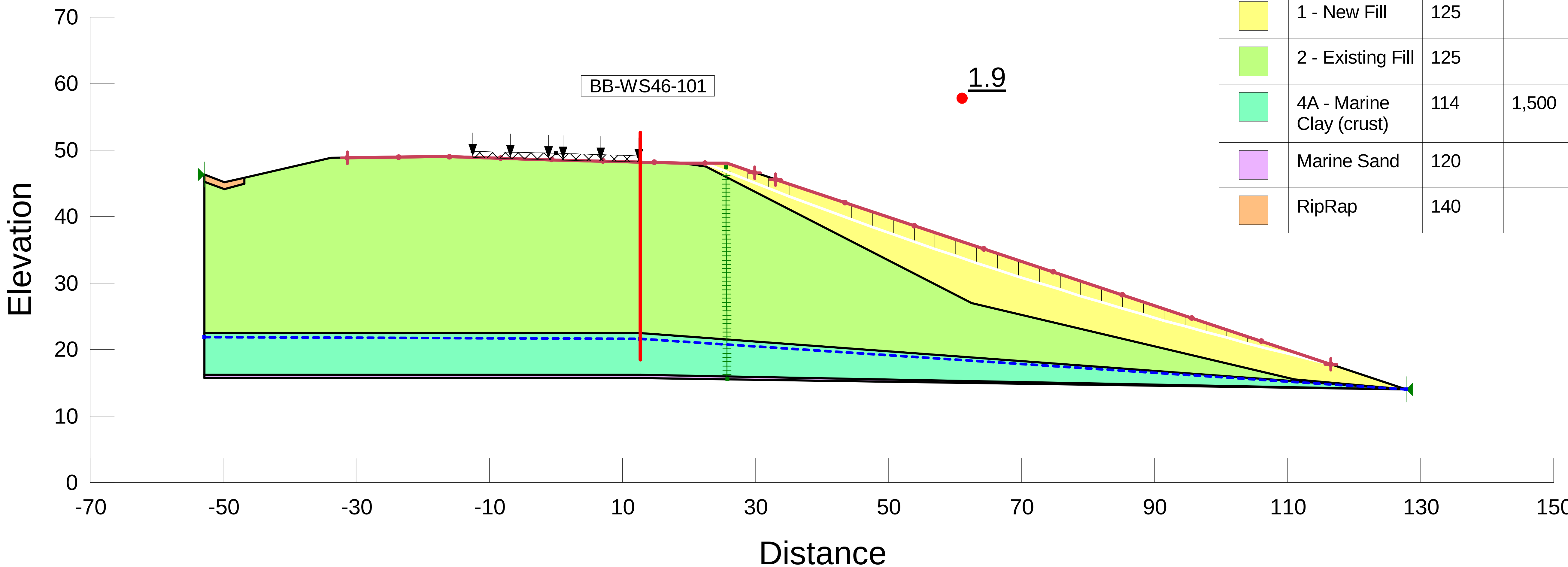
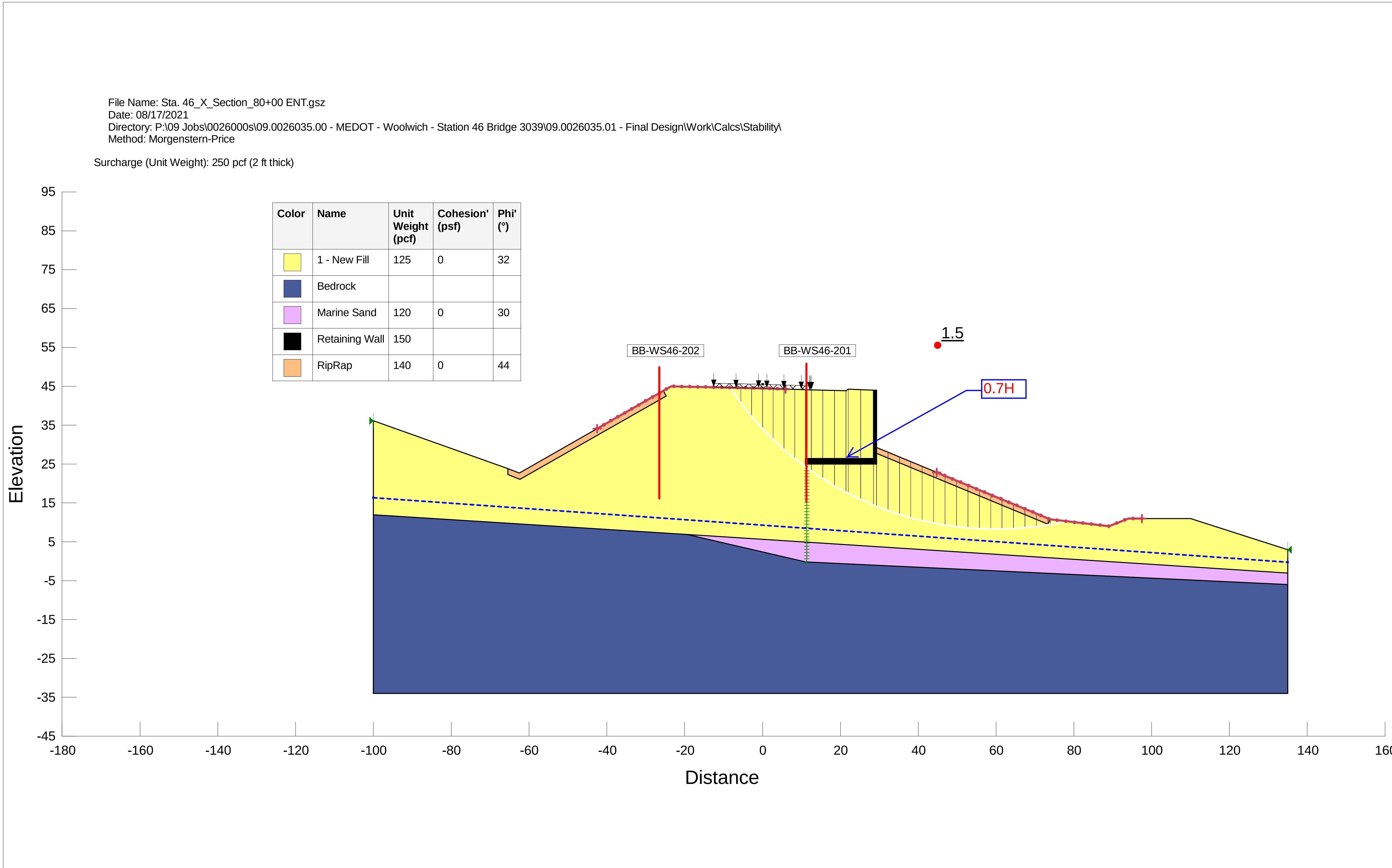
Method: Morgenstern-Price

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
	4A - Marine Clay (crust)	114	1,500	-45		
	Marine Sand	120			0	30
	RipRap	140			0	44

Station 80+00



Sta. 80+00

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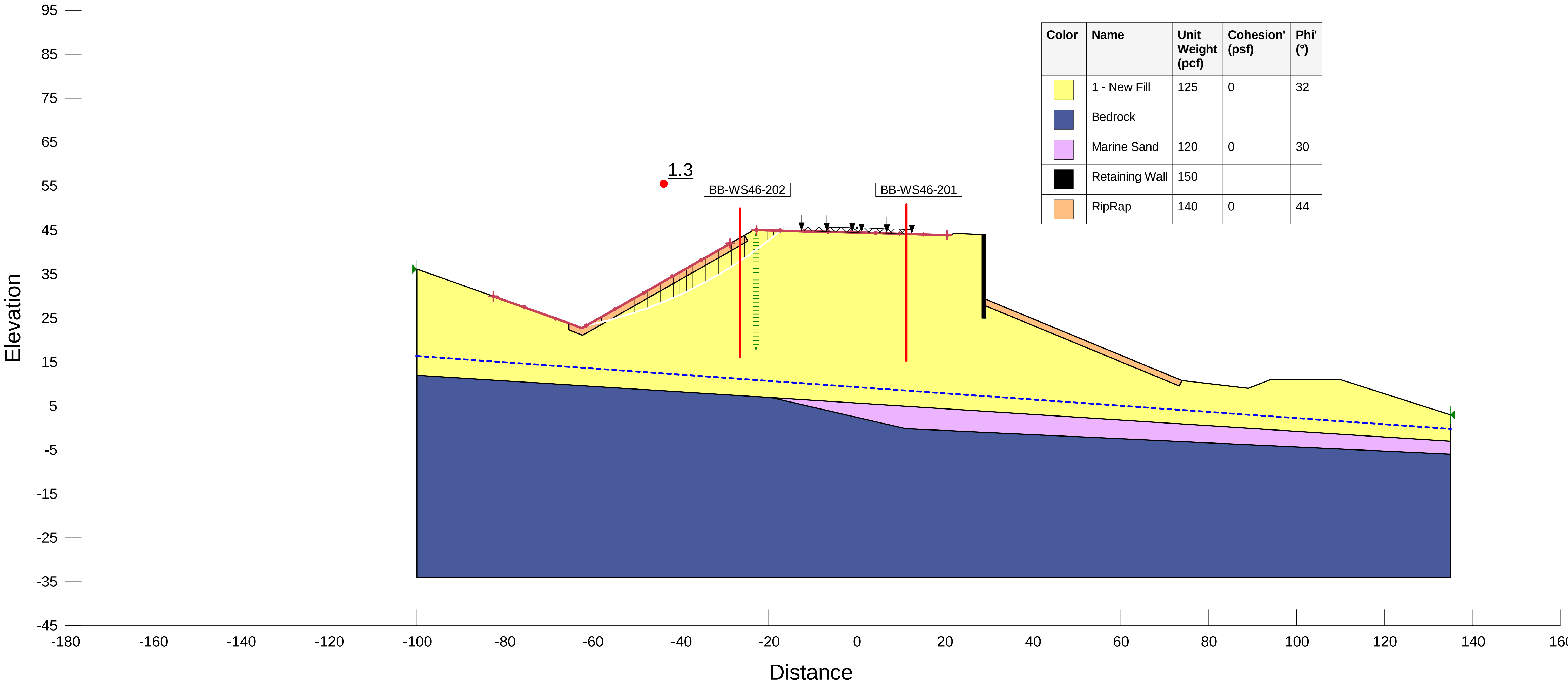
Method: Morgenstern-Price

Surcharge (Unit Weight): 250 pcf (2 ft thick)



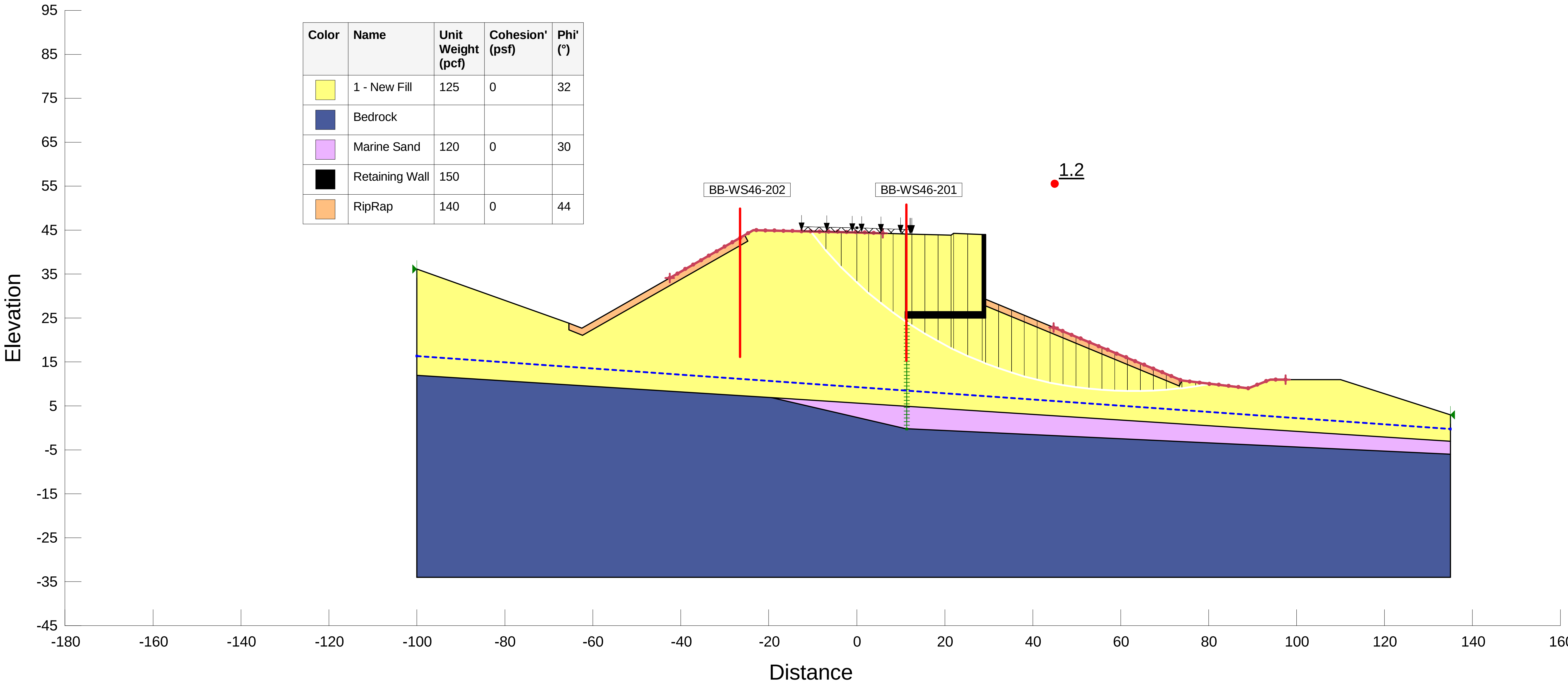
Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	1 - New Fill	125	0	32
	Bedrock			
	Marine Sand	120	0	30
	Retaining Wall	150		
	RipRap	140	0	44

Sta. 80+00 seismic

File Name: Sta. 46_X_Section_80+00 ENT.gsz
Date: 08/17/2021
Directory: P:\09 Jobs\0026000s\09.0026035.00 - MEDOT - Woolwich - Station 46 Bridge 3039\09.0026035.01 - Final Design\Work\Calcs\Stability\
Method: Morgenstern-Price

Surcharge (Unit Weight): 250 pcf (2 ft thick)

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	1 - New Fill	125	0	32
	Bedrock			
	Marine Sand	120	0	30
	Retaining Wall	150		
	RipRap	140	0	44

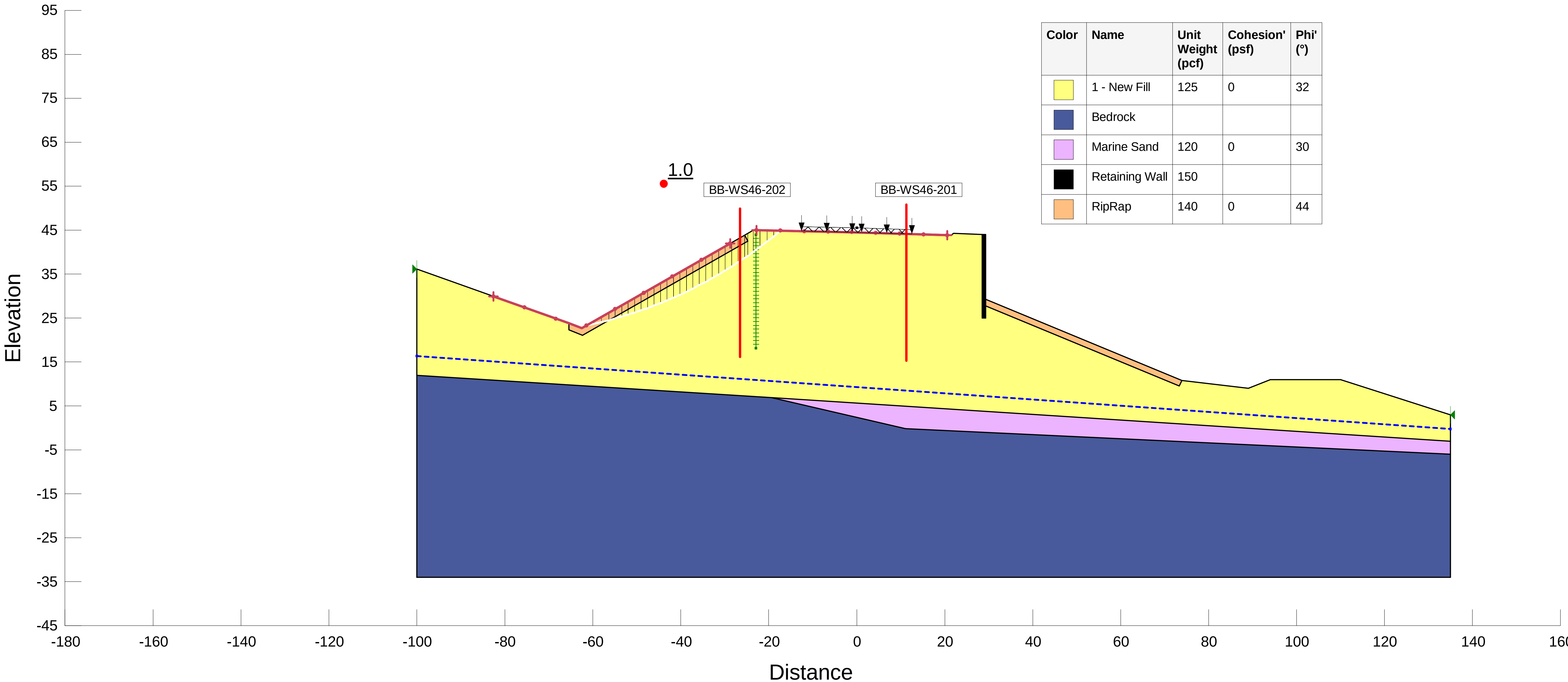


Sta. 80+00 seismic

File Name: Sta. 46_X_Section_80+00 ENT.gsz
Date: 08/17/2021
Directory: P:\09 Jobs\0026000s\09.0026035.00 - MEDOT - Woolwich - Station 46 Bridge 3039\09.0026035.01 - Final Design\Work\Calcs\Stability\
Method: Morgenstern-Price

Surcharge (Unit Weight): 250 pcf (2 ft thick)

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	1 - New Fill	125	0	32
	Bedrock			
	Marine Sand	120	0	30
	Retaining Wall	150		
	RipRap	140	0	44



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Date: 08/17/2021
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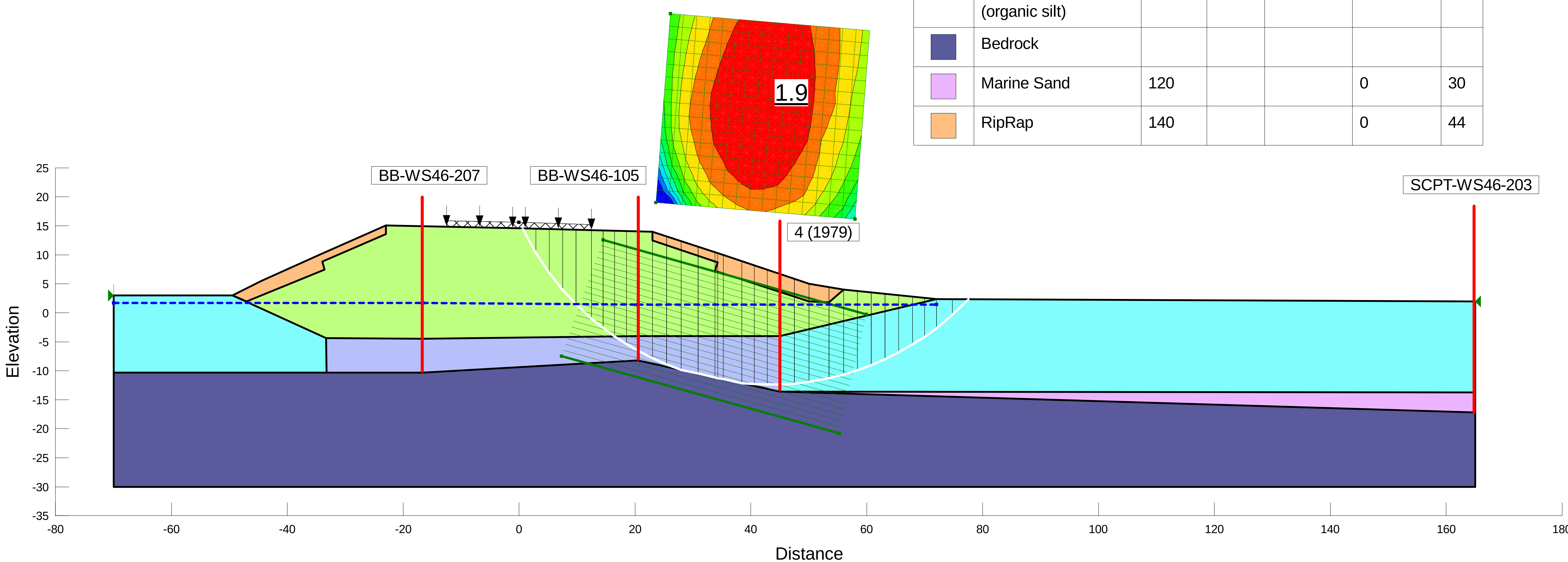
Method: Morgenstern-Price

Sta. 86+75

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' (°)
	2 - Existing Fill	125			0	32
	3A - Wetland Deposit (organic silt)	90	500	7.5		
	3B - Wetland Deposit Outside Embankment (organic silt)	90	400	10		
	Bedrock					
	Marine Sand	120			0	30
	RipRap	140			0	44



Sta. 86+75

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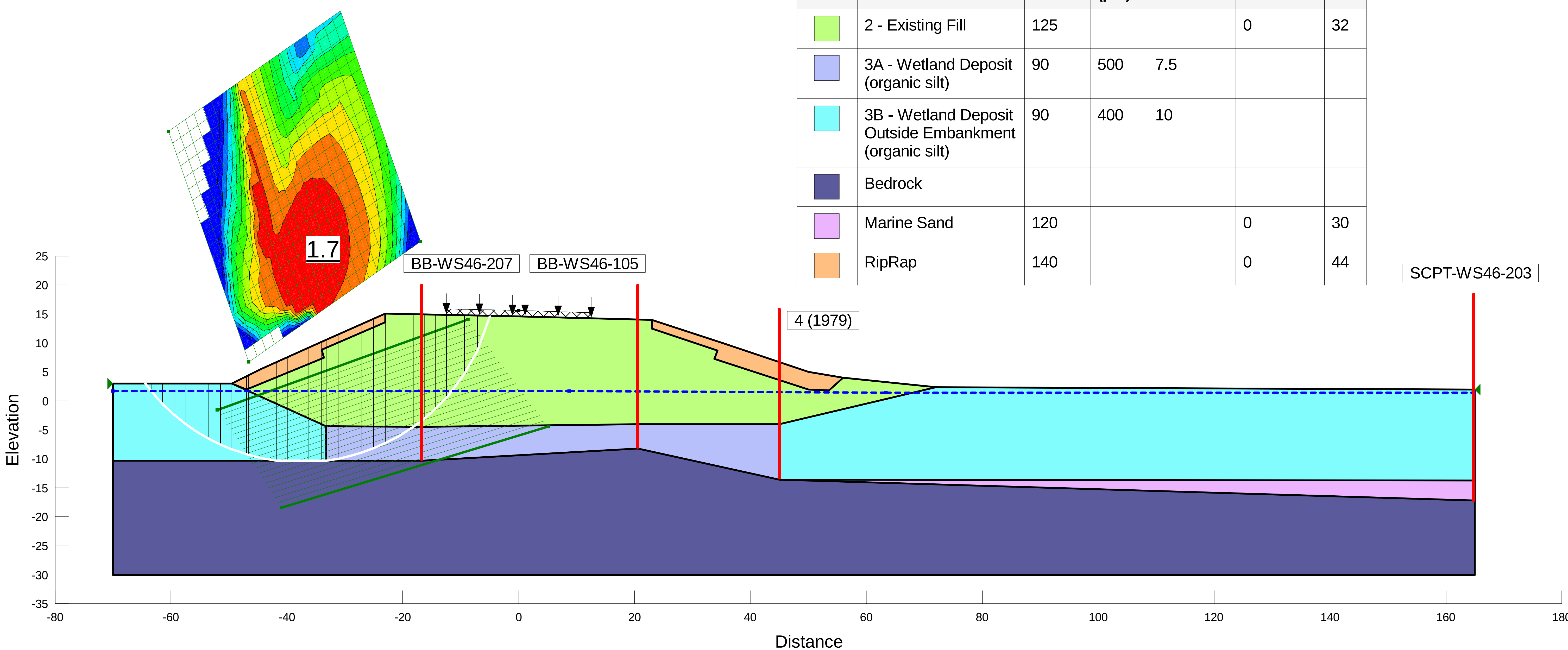
Directory: P:\09 Jobs\0026000s\09.0026035.00 - MEDOT - Woolwich - Station 46 Bridge 3039\09.0026035.01 - Final Design\Work\Calcs\Stability\
Method: Morgenstern-Price

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' (°)
	2 - Existing Fill	125			0	32
	3A - Wetland Deposit (organic silt)	90	500	7.5		
	3B - Wetland Deposit Outside Embankment (organic silt)	90	400	10		
	Bedrock					
	Marine Sand	120			0	30
	RipRap	140			0	44

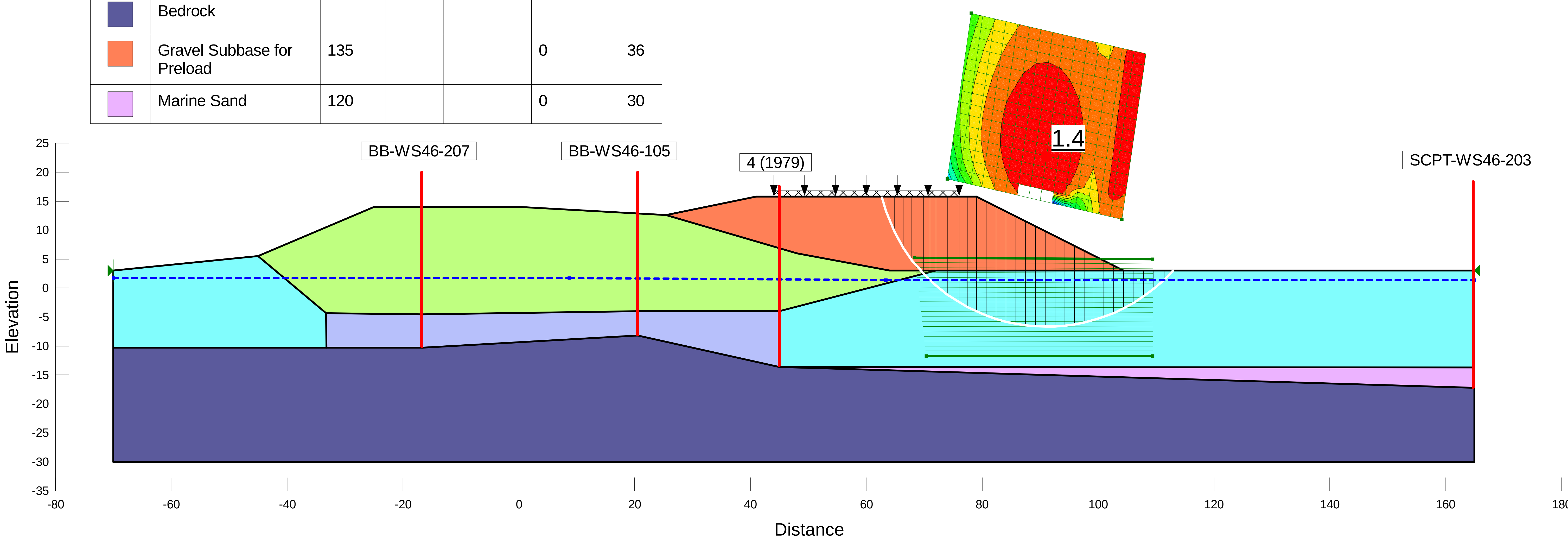


Sta. 86+75

File Name: Sta. 46_X_Section_86+75 ENT.gsz
Date: 08/17/2021
Directory: P:\09 Jobs\0026000s\09.0026035.00 - MEDOT - Woolwich - Station 46 Bridge 3039\09.0026035.01 - Final Design\Work\Calcs\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' (°)
	2 - Existing Fill	125			0	32
	3A - Wetland Deposit (organic silt)	90	500	7.5		
	3B - Wetland Deposit Outside Embankment (organic silt)	90	400	10		
	Bedrock					
	Gravel Subbase for Preload	135			0	36
	Marine Sand	120			0	30



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GeoEnvironmental, Inc
707 Sable Oaks Drive
Suite 150
South Portland, Maine 04106
207-879-9190
Fax 207-879-0099

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Objective

Evaluate nominal and factored bearing resistance of a spread footing foundation on rock for the proposed Abutments using Unconfined Compressive Strength (UCS) and Rock Quality Designation (RQD) data.

Methodology

Use data from test borings and evaluate the nominal bearing resistance as follows:

1. Use Bedrock Properties From Test Borings BB-WS46-101, -105, -203, and -207.
2. Calculate Rock Mass Rating (RMR)
3. Determine Rock Property Constants s and m
4. Calculate Nominal and Factored Bearing Resistance of Bedrock (q_n and q_r)

References

1. American Association of State Highway and Transportation Officials, AASHTO LRFD Bridge Design Specifications: Customary U.S. Units, 6th Edition 2012. (AASHTO LRFD)
2. Wyllie, Duncan C., "Foundations on Rock", Second edition, 1992.

Evaluation

1. Rock Mass Properties

A. Unconfined Compressive Strength

Unconfined compressive strength (UCS) is estimated to be average unconfined compressive strength from lab testing as shown in the below testing.

Boring	Run	LAB						Rock Type
		Depth of Sample (ft)	Depth of Sample into Rock (ft)	Elev Top of Sample (ft)	UCS (psi)	Modulus (ksi)	Unit Wt (pcf)	
BB-WS46-101	R1	33	2.7	13.0	3,083	836	169.2	SCHIST
BB-WS46-105	R1	24	1.9	-10.1	4,336	1310	171.8	SCHIST
BB-WS46-203	R1	12	0.6	1.0	8,745	2340	161.4	GRANITE
BB-WS46-207	R1	28	0.2	-12.5	4,521	1550	170.8	SCHIST

$$\sigma_u := \frac{(3.08\cdot\text{ksi} + 4.34\cdot\text{ksi} + 4.52\cdot\text{ksi})}{3} = 4\cdot\text{ksi}$$

Average of lower bound values for design.

B. Rock Quality Designation

Select representative RQD based on data collected across the site (BB-WS46-101 through -207).

Boring	Run	Depth of Core Run below GS (ft)			Depth (ft) Below Top of Rock			Rec (%)	RQD %	Joint Spacing (in)	Joint Aperture (in)	Rock Type
		Top		Bottom	Top		Bottom					
BB-WS46-101	R1	30.3	-	35.3	0.0	-	5.0	100%	43%	2.5-24	0.02-0.1	SCHIST
BB-WS46-101	R2	35.3	-	40.3	5.0	-	10.0	100%	17%	2.5-24	0.01-0.1	SCHIST
BB-WS46-105	R1	22.5	-	27.5	0.5	-	5.5	100%	99%	2.5-24	>0.4	SCHIST
BB-WS46-105	R2	27.5	-	32.5	5.5	-	10.5	100%	97%	2.5-24	0.004-0.02	SCHIST
BB-WS46-201	R1	19.0	-	24.0	0.5	-	5.5	92%	63%	<0.75-24	0.004-0.1	SCHIST
BB-WS46-201	R2	24.0	-	28.9	5.5	-	10.4	100%	73%	2.5-24	0.004-0.1	SCHIST
BB-WS46-202	R1	12.5	-	17.5	0.6	-	5.6	90%	55%	<0.75-8	0.02->0.4	GRANITE/SCHIST
BB-WS46-202	R2	17.5	-	18.4	5.6	-	6.5	56%	0%	0.75	0.02-0.1	SCHIST
BB-WS46-202	R3	18.4	-	23.4	6.5	-	11.5	100%	55%	2.5-24	0.02->0.4	GRANITE/SCHIST
BB-WS46-203	R1	11.0	-	16.0	0.3	-	5.3	100%	83%	2.5-24	0.02-0.1	SCHIST
BB-WS46-203	R2	16.0	-	21.0	5.3	-	10.3	100%	83%	<0.75-24	0.02-0.1	SCHIST
BB-WS46-207	R1	25.0	-	30.0	0.2	-	5.2	95%	65%	0.75-24	0.02-0.1	SCHIST
BB-WS46-207	R2	30.0	-	35.0	5.2	-	10.2	100%	88%	0.75-24	0.02-0.1	SCHIST
								Avg RQD	66%			
								St. Dev RQD	25%			

Average RQD for abutment borings 66%

2. Calculation of Rock Mass Rating (RMR)

From AASHTO LRFD Tables 10.4.6.4-1 and 10.4.6.4-2, determine the RMR (see sheets 10 and 11 for reference tables)

Parameter 1- Uniaxial Compressive Strength

$\sigma_{u.r} := \sigma_u = 4 \cdot ksi$ $\quad\quad$ $\sigma_{u.r} = 573 \cdot ksf$ $\quad$ Selected in Section 1, see Sheet 1.

From AASHTO LRFD Table 10.4.6.4-1 $\quad$ Relative Rating $\quad$ $RR_1 := 4$

Parameter 2- Drill Core Quality

Average RQD=68% from table in Section 1. Use RQD 50 to 75% as design basis.

From AASHTO LRFD Table 10.4.6.4-1

Relative Rating $\quad$ $RR_2 := 13$ $\quad$ for RQD = 50 to 75%

Parameter 3- Spacing of Joints

From boring logs, generally very close to moderately spaced = < 0.75 in to 2 feet. On average spacing generally 2 to 12 inches.

From AASHTO LRFD Table 10.4.6.4-1

Relative Rating $RR_3 := 10$

Parameter 4- Condition of Joints

From boring logs, aperture 0.02-0.1 inches and hard joint walls.

From AASHTO LRFD Table 10.4.6.4-1

Relative Rating $RR_4 := 20$

Parameter 5- Ground Water Conditions

Hydrostatic Conditions- water moist only.

From AASHTO LRFD Table 10.4.6.4-1

Relative Rating $RR_5 := 7$

Parameter 6- Adjustment for joint orientation

The joint sets are generally high angle to low angle and generally rough and tight to open. Considering rock will remain embedded below foundation bearing level, joint orientation is considered favorable.

From AASHTO LRFD Table 10.4.6.4-2

Relative Rating $RR_6 := -2$

Total RMR Rating

$$RMR := RR_1 + RR_2 + RR_3 + RR_4 + RR_5 + RR_6 \qquad RMR = 52$$

From AASHTO LRFD Table 10.4.6.4-3 RMR= 47-52 is indicative of fair to good Rock Quality

3. Determine Rock Property Constants s and m

From AASHTO LRFD Table 10.4.6.4-4 for fair Quality Rock Mass

Categorized as rock type B, Slate, using s and m values interpolated from the logarithmic trend of plotted values from AASHTO Table 10.4.6.4-4 (plot specific to this project on sheet 14-15, plot showing trendlines through all RMR data on sheet 16-17).

$m := .326$ $\quad s := 0.000333$ for RMR=52

4. Calculate Nominal and Factored Bearing Resistance of Bedrock q_n and q_R

From Wyllie "Foundations on Rock"

Eq. 5.4 Pg.138

$$q_n := C_{f1} \cdot \sqrt{s} \cdot \sigma_{u.r} \cdot \left[1 + \sqrt{m \cdot \left(s^{-\frac{1}{2}} \right) + 1} \right]$$

Where

$C_{f1} := 1.0$

From Wyllie Table 5.4 Pg. 138 Correction factor for foundation shape for rectangular foundation:

For L/B>6, use factor C_{fl}=1.0,

For L/B=1, use factor C_{fl}=1.12

Assume long strip, lowest $C_{fl.}$

$\sigma_u = 4 \cdot ksi$

Nominal Bearing Resistance

$$q_n := C_{f1} \cdot \sqrt{s} \cdot \sigma_u \cdot \left[1 + \sqrt{m \cdot \left(s^{-\frac{1}{2}} \right) + 1} \right] = 56 \cdot ksf$$

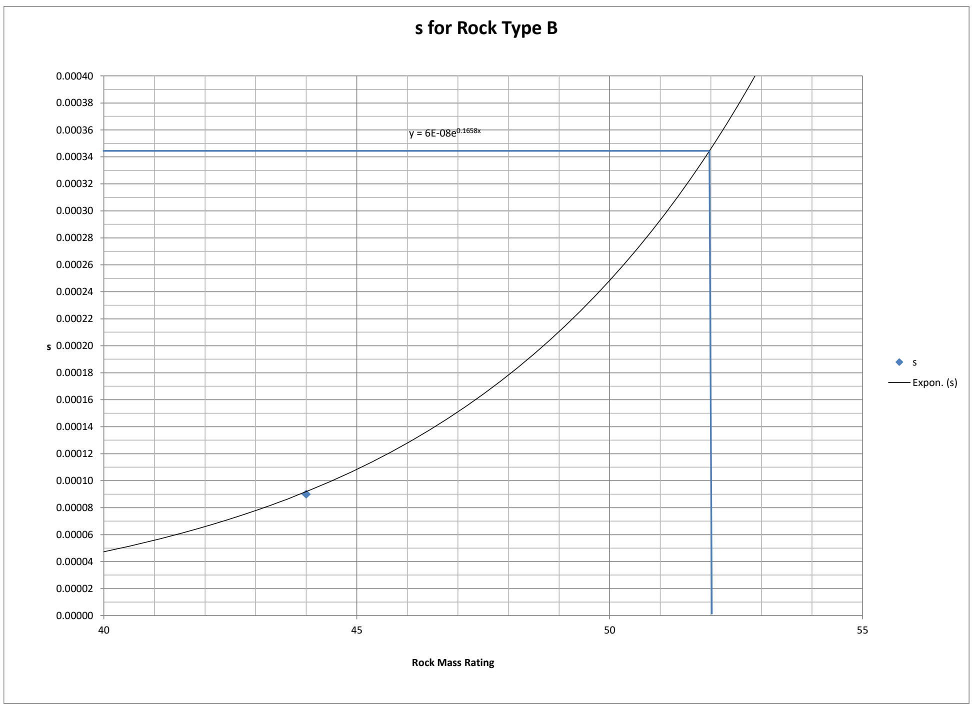
$q_n = 56 \cdot ksf$

Factored Bearing Resistance

Bearing Resistance Factor is specified in Table 10.5.5.2.2-1

$\phi_b := 0.45$ Footing on rock (Strength Limit State)

$q_R := \phi_b \cdot q_n$ $\quad q_R = 25 \cdot ksf$


s for Rock Type B
y = 6E-08e^0.1658x
0.00040
0.00038
0.00036
0.00034
0.00032
0.00030
0.00028
0.00026
0.00024
0.00022
0.00020
0.00018
0.00016
0.00014
0.00012
0.00010
0.00008
0.00006
0.00004
0.00002
0.00000
s
40
45
50
55
Rock Mass Rating
s
Expon. (s)

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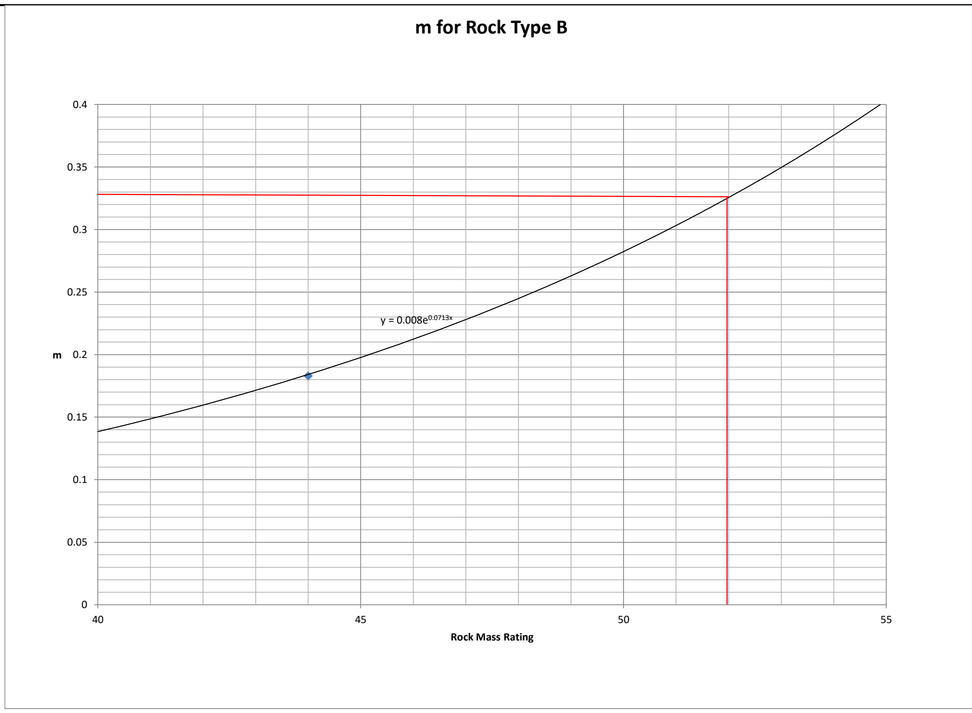

Reference:I:\Mathcad\units.xmcd

Table 10.4.6.4-1 Geomechanics Classification of Rock Masses.

	Parameter		Ranges of Values						
1	Strength of intact rock material	Point load strength index	>175 ksf	85–175 ksf	45–85 ksf	20–45 ksf	For this low range, uniaxial compressive test is preferred		
		Uniaxial compressive strength	>4320 ksf	2160–4320 ksf	1080–2160 ksf	520–1080 ksf	215–520 ksf	70–215 ksf	20–70 ksf
	Relative Rating		15	12	7	4	2	1	0

	Parameter	Ranges of Values				
2	Drill core quality RQD	90% to 100%	75% to 90%	50% to 75%	25% to 50%	<25%
	Relative Rating	20	17	13	8	3
3	Spacing of joints	>10 ft.	3–10 ft.	1–3 ft.	2 in.–1 ft.	<2 in.
	Relative Rating	30	25	20	10	5
4	Condition of joints	• Very rough surfaces • Not continuous • No separation • Hard joint wall rock	• Slightly rough surfaces • Separation <0.05 in. • Hard joint wall rock	• Slightly rough surfaces • Separation <0.05 in. • Soft joint wall rock	• Slicken-sided surfaces or • Gouge <0.2 in. thick or • Joints open 0.05–0.2 in. • Continuous joints	• Soft gouge >0.2 in. thick or • Joints open >0.2 in. • Continuous joints
	Relative Rating	25	20	12	6	0

	Parameter		Ranges of Values			
5	Ground water conditions (use one of the three evaluation criteria as appropriate to the method of exploration)	Inflow per 30 ft. tunnel length	None	<400 gal./hr.	400–2000 gal./hr.	>2000 gal./hr.
		Ratio = joint water pressure/ major principal stress	0	0.0–0.2	0.2–0.5	>0.5
		General Conditions	Completely Dry	Moist only (interstitial water)	Water under moderate pressure	Severe water problems
	Relative Rating		10	7	4	0

Table 10.4.6.4-2 Geomechanics Rating Adjustment for Joint Orientations.

Strike and Dip Orientations of Joints		Very Favorable	Favorable	Fair	Unfavorable	Very Unfavorable
Ratings	Tunnels	0	–2	–5	–10	–12
	Foundations	0	–2	–7	–15	–25
	Slopes	0	–5	–25	–50	–60

Table 10.4.6.4-3 Geomechanics Rock Mass Classes Determined From Total Ratings.

RMR Rating	100–81	80–61	60–41	40–21	<20
Class No.	I	II	III	IV	V
Description	Very good rock	Good rock	Fair rock	Poor rock	Very poor rock

Table 10.5.5.2.2-1—Resistance Factors for Geotechnical Resistance of Shallow Foundations at the Strength Limit State

Method/Soil/Condition			Resistance Factor
Bearing Resistance	φ_b	Theoretical method (Munfakh et al., 2001), in clay	0.50
		Theoretical method (Munfakh et al., 2001), in sand, using *CPT*	0.50
		Theoretical method (Munfakh et al., 2001), in sand, using *SPT*	0.45
		Semi-empirical methods (Meyerhof, 1957), all soils	0.45
		Footings on rock	0.45
		Plate Load Test	0.55
Sliding	φ_τ	Precast concrete placed on sand	0.90
		Cast-in-Place Concrete on sand	0.80
		Cast-in-Place or precast Concrete on Clay	0.85
		Soil on soil	0.90
	φ_{ep}	Passive earth pressure component of sliding resistance	0.50

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707 Sable Oaks Drive
Suite 150
South Portland, Maine 04106
207-879-9190
Fax 207-879-0099

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JOB: 09.0026035.01 Station 46 Bridge, Woolwich
SUBJECT: Abutment Footing Bearing Resistance on Rock

CALCULATED BY: E. Tome 5/4/2021
REVIEWED BY: CLS 5/5/2021

Table 10.4.6.4-4 Approximate relationship between rock-mass quality and material constants used in defining nonlinear strength (*Hoek and Brown, 1988*)

Rock Type:

A = Carbonate rocks with well developed crystal cleavage—*dolomite, limestone and marble*
B = Lithified argrillaceous rocks—*mudstone, siltstone, shale and slate (normal to cleavage)*
C = Arenaceous rocks with strong crystals and poorly developed crystal cleavage—*sandstone and quartzite*
D = Fine grained polyminerallic igneous crystalline rocks—*andesite, dolerite, diabase and rhyolite*
E = Coarse grained polyminerallic igneous & metamorphic crystalline rocks—*amphibolite, gabbro gneiss, granite, norite, quartz-diorite*

Rock Quality	Constants	A	B	C	D	E
INTACT ROCK SAMPLES Laboratory size specimens free from discontinuities CSIR rating: *RMR* = 100	*m* *s*	7.00 1.00	10.00 1.00	15.00 1.00	17.00 1.00	25.00 1.00
VERY GOOD QUALITY ROCK MASS Tightly interlocking undisturbed rock with unweathered joints at 3–10 ft. CSIR rating: *RMR* = 85	*m* *s*	2.40 0.082	3.43 0.082	5.14 0.082	5.82 0.082	8.567 0.082
GOOD QUALITY ROCK MASS Fresh to slightly weathered rock, slightly disturbed with joints at 3–10 ft. CSIR rating: *RMR* = 65	*m* *s*	0.575 0.00293	0.821 0.00293	1.231 0.00293	1.395 0.00293	2.052 0.00293
FAIR QUALITY ROCK MASS Several sets of moderately weathered joints spaced at 1–3 ft. CSIR rating: *RMR* = 44	*m* *s*	0.128 0.00009	0.183 0.00009	0.275 0.00009	0.311 0.00009	0.458 0.00009
POOR QUALITY ROCK MASS Numerous weathered joints at 2 to 12 in.; some gouge. Clean compacted waste rock. CSIR rating: *RMR* = 23	*m* *s*	0.029 3×10^{-6}	0.041 3×10^{-6}	0.061 3×10^{-6}	0.069 3×10^{-6}	0.102 3×10^{-6}
VERY POOR QUALITY ROCK MASS Numerous heavily weathered joints spaced <2 in. with gouge. Waste rock with fines. CSIR rating: *RMR* = 3	*m* *s*	0.007 1×10^{-7}	0.010 1×10^{-7}	0.015 1×10^{-7}	0.017 1×10^{-7}	0.025 1×10^{-7}

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Suite 150
South Portland, Maine 04106
207-879-9190
Fax 207-879-0099

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JOB: 09.0026035.01 Station 46 Br.
SUBJECT: Footings bearing on existing fills
SHEET: 1 OF 8
CALCULATED BY B. Cardali 6/10/2021
CHECKED BY C. Snow 8/17/2021
REMARK:

Objective

Calculate soil bearing resistance for T-wall (PCMG) foundation bearing on soils with a friction angle equal to 32 degrees for existing fill soils, in the vicinity of the proposed retaining wall adjacent to Abutment 1, at the site using the Theoretical method (Munfakh et al., 2001) in Sand using SPT data. Evaluate strength and service limit bearing resistance for a range of effective footing widths.

References

1. American Association of State Highway and Transportation Officials, AASHTO LRFD Bridge Design Specifications: Customary U.S. Units, 5th edition, 2010 (AASHTO LRFD), Articles 10.5.5.2.2 and 10.6.3.1.
2. Terzaghi, Peck & Mesri, Soil Mechanics in Engineering Practice, Third Edition, 1996.

Soil Properties and Geotechnical Inputs

$\phi_f := 32\text{deg}$ — The recommended internal friction angle to be used for design is based on the correlation of the SPT N-value presented by Peck, Hanson and Thornburn (PHT, 1974) as mentioned in Kulhawy and Mayne (1990) and recommended in NCHRP Report 651 (below). The average calculated friction angle for the fill at borings BB-WS46-101, -201-202, and -203 was used for design.

$\phi_b := 0.45$ — Bearing resistance factor as specified in Table 10.5.5.2.2-1 (Theoretical Method, SPT Data, Strength Limit)

$c := 0\text{ksf}$ — Cohesion, taken as undrained shear strength from correlated N values and Pocket Penetrometer data

$\gamma := 125\text{pcf}$ — Unit weight of soil above or below the bearing depth of the footing

$N_c := 35.5$ — Cohesion term bearing capacity factor as specified in Table 10.6.3.1.2a-1

$N_q := 23.2$ — Surcharge term bearing capacity factor as specified in Table 10.6.3.1.2a-1

$N_\gamma := 30.2$ — Total unit weight term bearing capacity factor as specified in Table 10.6.3.1.2a-1

$C_{wq}, C_{w\gamma}:=$ — Correction factors to account for the location of the groundwater table as specified in Table 10.6.3.1.2a-2

Depth to water table at or above depth of footing (D_f) $\quad C_{wq} := .5 \quad C_{w\gamma} := .5$

$d_q:=$ — Correction factor to account for the shearing resistance along the failure surface passing through cohesionless material above the bearing elevation as specified in Table 10.6.3.1.2a-4

$s_c, s_\gamma, s_q:=$ — Footing shape correction factors as specified in Table 10.6.3.1.2a-2

$S_c := 2\text{in}$ — Allowable settlement

$q_s=$ — Service limit bearing resistance for allowable settlement, Resistance Factor = 1.0

$N_{60} := 12$ — Average N_{60} values from SPT below footing

Load inclination factors are omitted considering modest embedment of footing per C10.6.3.1.2a.

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707 Sable Oaks Drive
Suite 150
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Footing Dimensions

$$B_1 := \begin{pmatrix} 6 \\ 8 \\ 12 \\ 16 \\ 20 \end{pmatrix} ft$$ Range of effective footing widths considered (includes eccentricity)

$L_1 := 67.5ft$ Length of footing

$D_f := 6ft$ Footing embedment depth

Strength Limit Design

$q_n = cN_{cm} + \gamma D_f N_{qm} C_{wq} + 0.5\gamma B N_{\gamma m} C_{w\gamma}$ Nominal Bearing Resistance Formula

$q.D = \varphi_b \times q_n$ Factored Bearing Resistance Formula

Correction Factors

$$d_{qtable} := \frac{D_f}{B_1} \qquad d_{qtable} = \begin{pmatrix} 1 \\ 0.75 \\ 0.5 \\ 0.38 \\ 0.3 \end{pmatrix}$$ Using Table 10.6.3.1.2a-4

$d_q := 1$ dq assumed soil above footing less competent than soil below footing.

$$s_c := 1 + \left(\frac{B_1}{L_1}\right)\left(\frac{N_q}{N_c}\right) \qquad s_c = \begin{pmatrix} 1.06 \\ 1.08 \\ 1.12 \\ 1.15 \\ 1.19 \end{pmatrix}$$

$$s_q := 1 + \left(\frac{B_1}{L_1}\tan(\phi_f)\right) \qquad s_q = \begin{pmatrix} 1.06 \\ 1.07 \\ 1.11 \\ 1.15 \\ 1.19 \end{pmatrix}$$

$$s_\gamma := 1 - 0.4\left(\frac{B_1}{L_1}\right) \qquad s_\gamma = \begin{pmatrix} 0.96 \\ 0.95 \\ 0.93 \\ 0.91 \\ 0.88 \end{pmatrix}$$

Bearing Capacity Factors

$N_{cm} := N_c \cdot s_c$ $\qquad N_{cm} = \begin{pmatrix} 37.56 \\ 38.25 \\ 39.62 \\ 41 \\ 42.37 \end{pmatrix}$

$N_{qm} := N_q \cdot s_q \cdot d_q$ $\qquad N_{qm} = \begin{pmatrix} 24.5 \\ 24.9 \\ 25.8 \\ 26.6 \\ 27.5 \end{pmatrix}$

$N_{\gamma m} := N_\gamma \cdot s_\gamma$ $\qquad N_{\gamma m} = \begin{pmatrix} 29.1 \\ 28.8 \\ 28.1 \\ 27.3 \\ 26.6 \end{pmatrix}$

Nominal Bearing Resistance

$q_n := \overrightarrow{\left(c \cdot N_{cm} + \gamma \cdot D_f \cdot N_{qm} \cdot C_{wq} + 0.5 \cdot \gamma \cdot B_1 \cdot N_{\gamma m} \cdot C_{w\gamma}\right)}$ $\qquad q_n = \begin{pmatrix} 14.6 \\ 16.5 \\ 20.2 \\ 23.7 \\ 26.9 \end{pmatrix} \cdot ksf$

Factored Bearing Resistance - Strength Limit State

$q_D := \phi_b \cdot q_n$ $\qquad q_D = \begin{pmatrix} 6.6 \\ 7.4 \\ 9.1 \\ 10.6 \\ 12.1 \end{pmatrix} \cdot ksf$ $\qquad$ for $B_1 = \begin{pmatrix} 6 \\ 8 \\ 12 \\ 16 \\ 20 \end{pmatrix} \cdot ft$

Service Limit Design

Evaluate service limit bearing resistance for the specified allowable settlement using the semi-empirical SPT Method by Burland and Burbidge (1985) provided in Terzaghi, Peck & Mesri, 96.

$$S_{cm} := S_c \cdot \frac{1}{1mm} \qquad S_{cm} = 50.8$$

Allowable settlement in millimeters and unitless

$$B_{1m} := B_1 \cdot \frac{1}{1m} \qquad B_{1m} = \begin{pmatrix} 1.8 \\ 2.4 \\ 3.7 \\ 4.9 \\ 6.1 \end{pmatrix}$$

Effective footing width in meters and unitless

$$S_{cmr} := S_{cm} \cdot \left[\frac{\left[1.25 \cdot \left(\frac{L_1}{B_1} \right) \right]}{\left(\frac{L_1}{B_1} \right) + 0.25} \right]^2 = \begin{pmatrix} 75.96 \\ 74.87 \\ 72.76 \\ 70.74 \\ 68.8 \end{pmatrix}$$

Correction formula for rectangular footings (Terzaghi EQ 50.14)

$$EQ_1 := S_{cm} \cdot \left(\frac{S_{cm}}{S_{cmr}} \right) = \begin{pmatrix} 33.97 \\ 34.47 \\ 35.47 \\ 36.48 \\ 37.51 \end{pmatrix}$$

$$EQ_2 := \frac{N_{60}^{\ 1.4}}{1.7 \cdot B_{1m}^{\ 0.75}} = \begin{pmatrix} 12.13 \\ 9.77 \\ 7.21 \\ 5.81 \\ 4.92 \end{pmatrix}$$

$$q_{snc} := \overrightarrow{\left(EQ_1 \cdot EQ_2 \right)}$$

$q_{snc} =$

	0
0	412.0
1	336.9
2	255.8
3	212.0
4	184.4

Formula results are in kPa (Terzaghi EQ 50.28). Results represent normally consolidated soil.

$q_s := q_{snc}$

$$q_s = \begin{pmatrix} 412 \\ 337 \\ 256 \\ 212 \\ 184 \end{pmatrix}$$

Assumes sand is normally consolidated at current effective stress (likely conservative)

$q_{sm} := q_s \cdot 1\text{kPa}$

$$q_{sm} = \begin{pmatrix} 412 \\ 337 \\ 256 \\ 212 \\ 184 \end{pmatrix} \cdot \text{kPa}$$

Service limit bearing resistance for allowable settlement (metric units)

$q_{se} := q_{sm}$

$$q_{se} = \begin{pmatrix} 8.6 \\ 7 \\ 5.3 \\ 4.4 \\ 3.9 \end{pmatrix} \cdot \text{ksf}$$

Service limit bearing resistance for allowable settlement (English units)

for

$$B_1 = \begin{pmatrix} 6 \\ 8 \\ 12 \\ 16 \\ 20 \end{pmatrix} \cdot \text{ft}$$

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Fax 207-879-0099

Engineers and Scientists

JOB: 09.0026035.01 Station 46 Br.
SUBJECT: Footings bearing on existing fills
SHEET: 6 OF 8
CALCULATED BY B. Cardali 6/10/2021
CHECKED BY C. Snow 8/17/2021
REMARK:

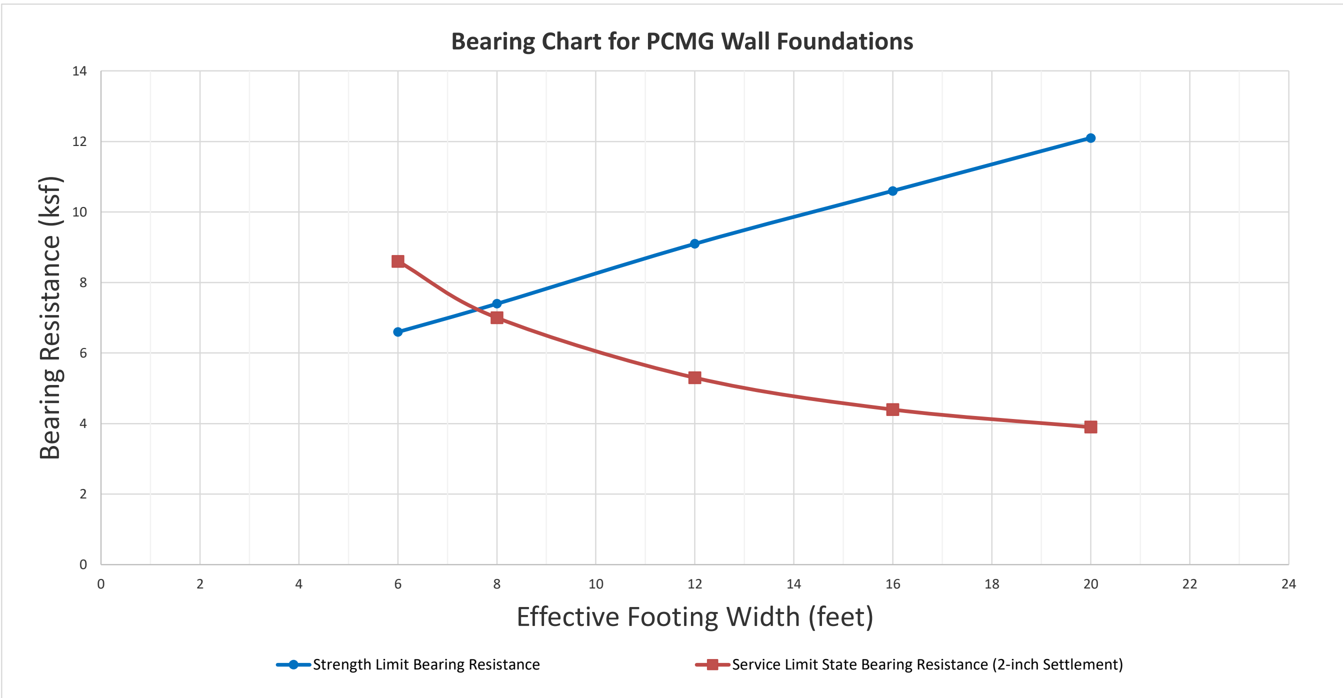

Table 10.6.3.1.2a-1—Bearing Capacity Factors N_c (Prandtl, 1921), N_q (Reissner, 1924), and N_γ (Vesic, 1975)

ϕ_f	N_c	N_q	N_γ	ϕ_f	N_c	N_q	N_γ
0	5.14	1.0	0.0	23	18.1	8.7	8.2
1	5.4	1.1	0.1	24	19.3	9.6	9.4
2	5.6	1.2	0.2	25	20.7	10.7	10.9
3	5.9	1.3	0.2	26	22.3	11.9	12.5
4	6.2	1.4	0.3	27	23.9	13.2	14.5
5	6.5	1.6	0.5	28	25.8	14.7	16.7
6	6.8	1.7	0.6	29	27.9	16.4	19.3
7	7.2	1.9	0.7	30	30.1	18.4	22.4
8	7.5	2.1	0.9	31	32.7	20.6	26.0
9	7.9	2.3	1.0	32	35.5	23.2	30.2
10	8.4	2.5	1.2	33	38.6	26.1	35.2
11	8.8	2.7	1.4	34	42.2	29.4	41.1
12	9.3	3.0	1.7	35	46.1	33.3	48.0
13	9.8	3.3	2.0	36	50.6	37.8	56.3
14	10.4	3.6	2.3	37	55.6	42.9	66.2
15	11.0	3.9	2.7	38	61.4	48.9	78.0
16	11.6	4.3	3.1	39	67.9	56.0	92.3
17	12.3	4.8	3.5	40	75.3	64.2	109.4
18	13.1	5.3	4.1	41	83.9	73.9	130.2
19	13.9	5.8	4.7	42	93.7	85.4	155.6
20	14.8	6.4	5.4	43	105.1	99.0	186.5

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21	15.8	7.1	6.2	44	118.4	115.3	224.6
22	16.9	7.8	7.1	45	133.9	134.9	271.8

Table 10.6.3.1.2a-2—Coefficients C_{wq} and $C_{w\gamma}$ for Various Groundwater Depths

D_w	C_{wq}	$C_{w\gamma}$
0.0	0.5	0.5
D_f	1.0	0.5
$>1.5B + D_f$	1.0	1.0

Where the position of groundwater is at a depth less than 1.5 times the footing width below the footing base, the bearing resistance is affected. The highest anticipated groundwater level should be used in design.

Table 10.6.3.1.2a-3—Shape Correction Factors s_c, s_γ, s_q

Factor	Friction Angle	Cohesion Term (s_c)	Unit Weight Term (s_γ)	Surcharge Term (s_q)
Shape Factors s_c, s_γ, s_q	$\phi_f = 0$	$1+\left(\frac{B}{5L}\right)$	1.0	1.0
	$\phi_f > 0$	$1+\left(\frac{B}{L}\right)\left(\frac{N_q}{N_c}\right)$	$1-0.4\left(\frac{B}{L}\right)$	$1+\left(\frac{B}{L}\tan\phi_f\right)$

Table 10.6.3.1.2a-4—Depth Correction Factor d_q

Friction Angle, ϕ_f (degrees)	D_f/B	d_q
32	1	1.20
	2	1.30
	4	1.35
	8	1.40
37	1	1.20
	2	1.25
	4	1.30
	8	1.35
42	1	1.15
	2	1.20
	4	1.25
	8	1.30

The depth correction factor should be used only when the soils above the footing bearing elevation are as competent as the soils beneath the footing level; otherwise, the depth correction factor should be taken as 1.0.

Linear interpolations may be made for friction angles in between those values shown in Table 10.6.3.1.2a-4.

Objective

Calculate soil bearing resistance for foundation bearing on soils with a friction angle equal to 32 degrees for existing fill soils, in the vicinity of the proposed retaining wall adjacent to Abutment 1, at the site using the Theoretical method (Munfakh et al., 2001) in Sand using SPT data. Evaluate strength and service limit bearing resistance for a range of effective footing widths.

References

1. American Association of State Highway and Transportation Officials, AASHTO LRFD Bridge Design Specifications: Customary U.S. Units, 5th edition, 2010 (AASHTO LRFD), Articles 10.5.5.2.2 and 10.6.3.1.
2. Terzaghi, Peck & Mesri, Soil Mechanics in Engineering Practice, Third Edition, 1996.

Soil Properties and Geotechnical Inputs

$\phi_f := 32\text{deg}$ The recommended internal friction angle to be used for design is based on the correlation of the SPT N-value presented by Peck, Hanson and Thornburn (PHT, 1974) as mentioned in Kulhawy and Mayne (1990) and recommended in NCHRP Report 651 (below). The average calculated friction angle for the fill at borings BB-WS46-101, -201-202, and -203 was used for design.

$\phi_b := 0.65$ Bearing resistance factor as specified in Table 11.5.7-1

$c := 0\text{ksf}$ Cohesion, taken as undrained shear strength from correlated N values and Pocket Penetrometer data

$\gamma := 125\text{pcf}$ Unit weight of soil above or below the bearing depth of the footing

$N_c := 35.5$ Cohesion term bearing capacity factor as specified in Table 10.6.3.1.2a-1

$N_q := 23.2$ Surcharge term bearing capacity factor as specified in Table 10.6.3.1.2a-1

$N_\gamma := 30.2$ Total unit weight term bearing capacity factor as specified in Table 10.6.3.1.2a-1

$C_{wq}, C_{w\gamma}:=$ Correction factors to account for the location of the groundwater table as specified in Table 10.6.3.1.2a-2

Depth to water table at or above depth of footing (D_f) $C_{wq} := .5$ $C_{w\gamma} := .5$

$d_q:=$ Correction factor to account for the shearing resistance along the failure surface passing through cohesionless material above the bearing elevation as specified in Table 10.6.3.1.2a-4

$s_c, s_\gamma, s_q:=$ Footing shape correction factors as specified in Table 10.6.3.1.2a-2

$S_c := 2\text{in}$ Allowable settlement

$q_s=$ Service limit bearing resistance for allowable settlement, Resistance Factor = 1.0

$N_{60} := 12$ Average N_{60} values from SPT below footing

Load inclination factors are omitted considering modest embedment of footing per C10.6.3.1.2a.

Footing Dimensions

$$B_1 := \begin{pmatrix} 6 \\ 8 \\ 12 \\ 16 \\ 20 \end{pmatrix} ft$$ Range of effective footing widths considered (includes eccentricity)

$L_1 := 67.5ft$ Length of footing

$D_f := 6ft$ Footing embedment depth

Strength Limit Design

$q_n = cN_{cm} + \gamma D_f N_{qm} C_{wq} + 0.5\gamma B N_{\gamma m} C_{w\gamma}$ Nominal Bearing Resistance Formula

$q.D = \varphi_b \times q_n$ Factored Bearing Resistance Formula

Correction Factors

$$d_{qtable} := \frac{D_f}{B_1} \qquad d_{qtable} = \begin{pmatrix} 1 \\ 0.75 \\ 0.5 \\ 0.38 \\ 0.3 \end{pmatrix}$$ Using Table 10.6.3.1.2a-4

$d_q := 1$ dq assumed soil above footing less competent than soil below footing.

$$s_c := 1 + \left(\frac{B_1}{L_1}\right)\left(\frac{N_q}{N_c}\right) \qquad s_c = \begin{pmatrix} 1.06 \\ 1.08 \\ 1.12 \\ 1.15 \\ 1.19 \end{pmatrix}$$

$$s_q := 1 + \left(\frac{B_1}{L_1}\tan(\phi_f)\right) \qquad s_q = \begin{pmatrix} 1.06 \\ 1.07 \\ 1.11 \\ 1.15 \\ 1.19 \end{pmatrix}$$

$$s_\gamma := 1 - 0.4\left(\frac{B_1}{L_1}\right) \qquad s_\gamma = \begin{pmatrix} 0.96 \\ 0.95 \\ 0.93 \\ 0.91 \\ 0.88 \end{pmatrix}$$

Bearing Capacity Factors

$$N_{cm} := N_c \cdot s_c \qquad N_{cm} = \begin{pmatrix} 37.56 \\ 38.25 \\ 39.62 \\ 41 \\ 42.37 \end{pmatrix}$$

$$N_{qm} := N_q \cdot s_q \cdot d_q \qquad N_{qm} = \begin{pmatrix} 24.5 \\ 24.9 \\ 25.8 \\ 26.6 \\ 27.5 \end{pmatrix}$$

$$N_{\gamma m} := N_\gamma \cdot s_\gamma \qquad N_{\gamma m} = \begin{pmatrix} 29.1 \\ 28.8 \\ 28.1 \\ 27.3 \\ 26.6 \end{pmatrix}$$

Nominal Bearing Resistance

$$q_n := \overrightarrow{\left(c \cdot N_{cm} + \gamma \cdot D_f \cdot N_{qm} \cdot C_{wq} + 0.5 \cdot \gamma \cdot B_1 \cdot N_{\gamma m} \cdot C_{w\gamma}\right)} \qquad q_n = \begin{pmatrix} 14.6 \\ 16.5 \\ 20.2 \\ 23.7 \\ 26.9 \end{pmatrix} \cdot ksf$$

Factored Bearing Resistance - Strength Limit State

$$q_D := \phi_b \cdot q_n \qquad q_D = \begin{pmatrix} 9.5 \\ 10.7 \\ 13.1 \\ 15.4 \\ 17.5 \end{pmatrix} \cdot ksf \qquad \text{for} \quad B_1 = \begin{pmatrix} 6 \\ 8 \\ 12 \\ 16 \\ 20 \end{pmatrix} \cdot ft$$

Service Limit Design

Evaluate service limit bearing resistance for the specified allowable settlement using the semi-empirical SPT Method by Burland and Burbidge (1985) provided in Terzaghi, Peck & Mesri, 96.

$$S_{cm} := S_c \cdot \frac{1}{1mm} \qquad S_{cm} = 50.8$$

Allowable settlement in millimeters and unitless

$$B_{1m} := B_1 \cdot \frac{1}{1m} \qquad B_{1m} = \begin{pmatrix} 1.8 \\ 2.4 \\ 3.7 \\ 4.9 \\ 6.1 \end{pmatrix}$$

Effective footing width in meters and unitless

$$S_{cmr} := S_{cm} \cdot \left[\frac{\left[1.25 \cdot \left(\frac{L_1}{B_1} \right) \right]}{\left(\frac{L_1}{B_1} \right) + 0.25} \right]^2 = \begin{pmatrix} 75.96 \\ 74.87 \\ 72.76 \\ 70.74 \\ 68.8 \end{pmatrix}$$

Correction formula for rectangular footings (Terzaghi EQ 50.14)

$$EQ_1 := S_{cm} \cdot \left(\frac{S_{cm}}{S_{cmr}} \right) = \begin{pmatrix} 33.97 \\ 34.47 \\ 35.47 \\ 36.48 \\ 37.51 \end{pmatrix}$$

$$EQ_2 := \frac{{N_{60}}^{1.4}}{1.7 \cdot {B_{1m}}^{0.75}} = \begin{pmatrix} 12.13 \\ 9.77 \\ 7.21 \\ 5.81 \\ 4.92 \end{pmatrix}$$

$$q_{snc} := \overrightarrow{\left(EQ_1 \cdot EQ_2 \right)}$$

$q_{snc} =$

	0
0	412.0
1	336.9
2	255.8
3	212.0
4	184.4

Formula results are in kPa (Terzaghi EQ 50.28). Results represent normally consolidated soil.

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Suite 150
South Portland, Maine 04106
207-879-9190
Fax 207-879-0099

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$q_s := q_{snc}$

$$q_s = \begin{pmatrix} 412 \\ 337 \\ 256 \\ 212 \\ 184 \end{pmatrix}$$

Assumes sand is normally consolidated at current effective stress (likely conservative)

$q_{sm} := q_s \cdot 1\text{kPa}$

$$q_{sm} = \begin{pmatrix} 412 \\ 337 \\ 256 \\ 212 \\ 184 \end{pmatrix} \cdot \text{kPa}$$

Service limit bearing resistance for allowable settlement (metric units)

$q_{se} := q_{sm}$

$$q_{se} = \begin{pmatrix} 8.6 \\ 7 \\ 5.3 \\ 4.4 \\ 3.9 \end{pmatrix} \cdot \text{ksf}$$

Service limit bearing resistance for allowable settlement (English units)

for

$$B_1 = \begin{pmatrix} 6 \\ 8 \\ 12 \\ 16 \\ 20 \end{pmatrix} \cdot \text{ft}$$

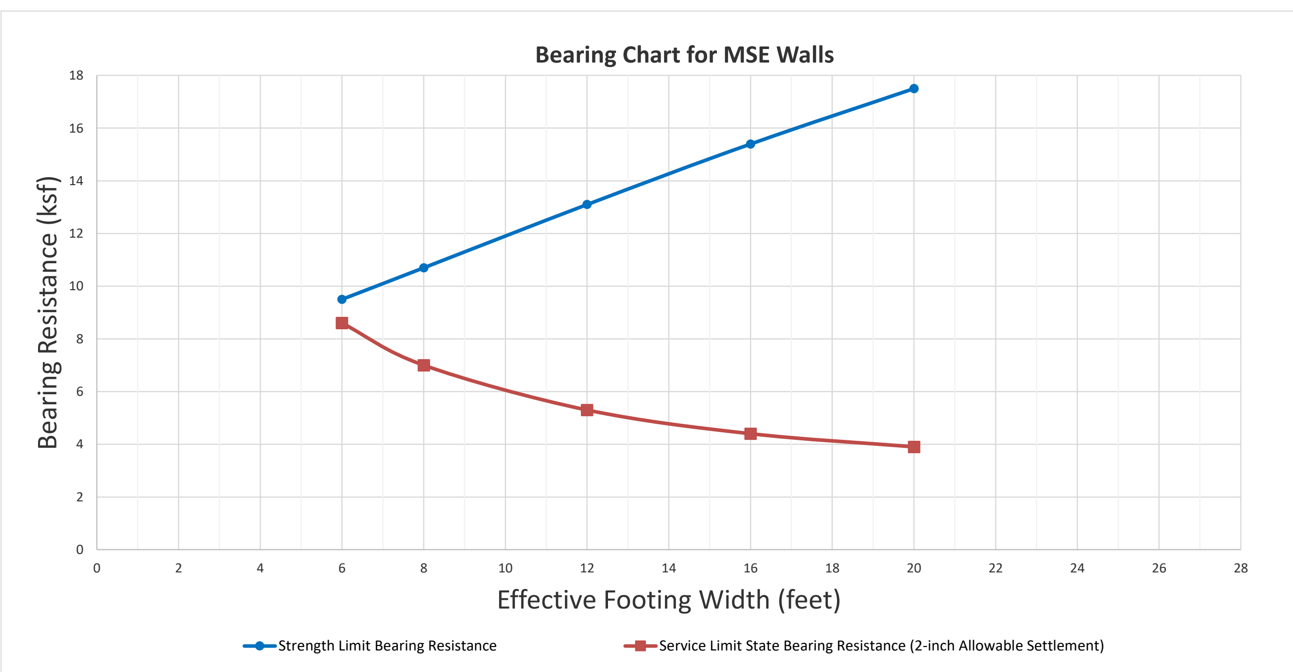

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Table 10.6.3.1.2a-1—Bearing Capacity Factors N_c (Prandtl, 1921), N_q (Reissner, 1924), and N_γ (Vesic, 1975)

ϕ_f	N_c	N_q	N_γ	ϕ_f	N_c	N_q	N_γ
0	5.14	1.0	0.0	23	18.1	8.7	8.2
1	5.4	1.1	0.1	24	19.3	9.6	9.4
2	5.6	1.2	0.2	25	20.7	10.7	10.9
3	5.9	1.3	0.2	26	22.3	11.9	12.5
4	6.2	1.4	0.3	27	23.9	13.2	14.5
5	6.5	1.6	0.5	28	25.8	14.7	16.7
6	6.8	1.7	0.6	29	27.9	16.4	19.3
7	7.2	1.9	0.7	30	30.1	18.4	22.4
8	7.5	2.1	0.9	31	32.7	20.6	26.0
9	7.9	2.3	1.0	32	35.5	23.2	30.2
10	8.4	2.5	1.2	33	38.6	26.1	35.2
11	8.8	2.7	1.4	34	42.2	29.4	41.1
12	9.3	3.0	1.7	35	46.1	33.3	48.0
13	9.8	3.3	2.0	36	50.6	37.8	56.3
14	10.4	3.6	2.3	37	55.6	42.9	66.2
15	11.0	3.9	2.7	38	61.4	48.9	78.0
16	11.6	4.3	3.1	39	67.9	56.0	92.3
17	12.3	4.8	3.5	40	75.3	64.2	109.4
18	13.1	5.3	4.1	41	83.9	73.9	130.2
19	13.9	5.8	4.7	42	93.7	85.4	155.6
20	14.8	6.4	5.4	43	105.1	99.0	186.5
21	15.8	7.1	6.2	44	118.4	115.3	224.6
22	16.9	7.8	7.1	45	133.9	134.9	271.8

Table 10.6.3.1.2a-2—Coefficients C_{wq} and $C_{w\gamma}$ for Various Groundwater Depths

D_w	C_{wq}	$C_{w\gamma}$
0.0	0.5	0.5
D_f	1.0	0.5
$>1.5B + D_f$	1.0	1.0

Where the position of groundwater is at a depth less than 1.5 times the footing width below the footing base, the bearing resistance is affected. The highest anticipated groundwater level should be used in design.

Table 10.6.3.1.2a-3—Shape Correction Factors s_c, s_γ, s_q

Factor	Friction Angle	Cohesion Term (s_c)	Unit Weight Term (s_γ)	Surcharge Term (s_q)
Shape Factors s_c, s_γ, s_q	$\phi_f = 0$	$1+\left(\frac{B}{5L}\right)$	1.0	1.0
	$\phi_f > 0$	$1+\left(\frac{B}{L}\right)\left(\frac{N_q}{N_c}\right)$	$1-0.4\left(\frac{B}{L}\right)$	$1+\left(\frac{B}{L}\tan\phi_f\right)$

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GeoEnvironmental, Inc
707 Sable Oaks Drive
Suite 150
South Portland, Maine 04106
207-879-9190
Fax 207-879-0099

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Table 10.6.3.1.2a-4—Depth Correction Factor d_q

Friction Angle, ϕ_f (degrees)	D_f/B	d_q
32	1	1.20
	2	1.30
	4	1.35
	8	1.40
37	1	1.20
	2	1.25
	4	1.30
	8	1.35
42	1	1.15
	2	1.20
	4	1.25
	8	1.30

The depth correction factor should be used only when the soils above the footing bearing elevation are as competent as the soils beneath the footing level; otherwise, the depth correction factor should be taken as 1.0.

Linear interpolations may be made for friction angles in between those values shown in Table 10.6.3.1.2a-4.

Group Input Parameters **GZA FILE NO.** 09.0026035.01

Maine Department of Transportation - Station 46 Bridge **CALCULATED BY** BMC 5/13/2021

Woolwich, Maine **CHECKED BY** CLS 5/13/2021

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 2016 LPile Technical Manual.

Given Information: SPT measurements, In-situ vanes, and subsurface conditions in borings BB-WS46-204 (Pier 1), BB-WS46-205 (Pier 2), and BB-WS46-206 performed by New England Borings Contractors between March 25, 2021 and April 16, 2021.

Pier 1

Stratum	Soil Model	Top of Layer Elevation (NAVD88 ft)	k (pci) / E50	ϕ' (deg)/ Su (psf)	γ_e (pcf)
Wetland Deposit (CH)**	Soft Clay	4	E_{50}=0.01	400	48
Marine Clay Crust (CL)	Stiff Clay w/o free water	-16	E_{50}=0.007	900	53
Marine Clay (CL)	Soft Clay	-20	E_{50}=0.008	500	53
Top of Rock	--	-26	--	--	--

Pier 2

Stratum	Soil Model	Top of Layer Elevation (NAVD88 ft)	k (pci) / E50	ϕ' (deg)/ Su (psf)	γ_e (pcf)
Wetland Deposit (CH)**	Soft Clay	2	E_{50}=0.01	400	48
Marine Clay Crust (CL)	Stiff Clay w/o free water	-28	E_{50}=0.007	900	53
Marine Clay (CL)	Soft Clay	-36	E_{50}=0.008	550	53
Marine Sand	Reese Sand	-75	45	31	63
Top of Rock	--	-81	--	--	--

Pier 3

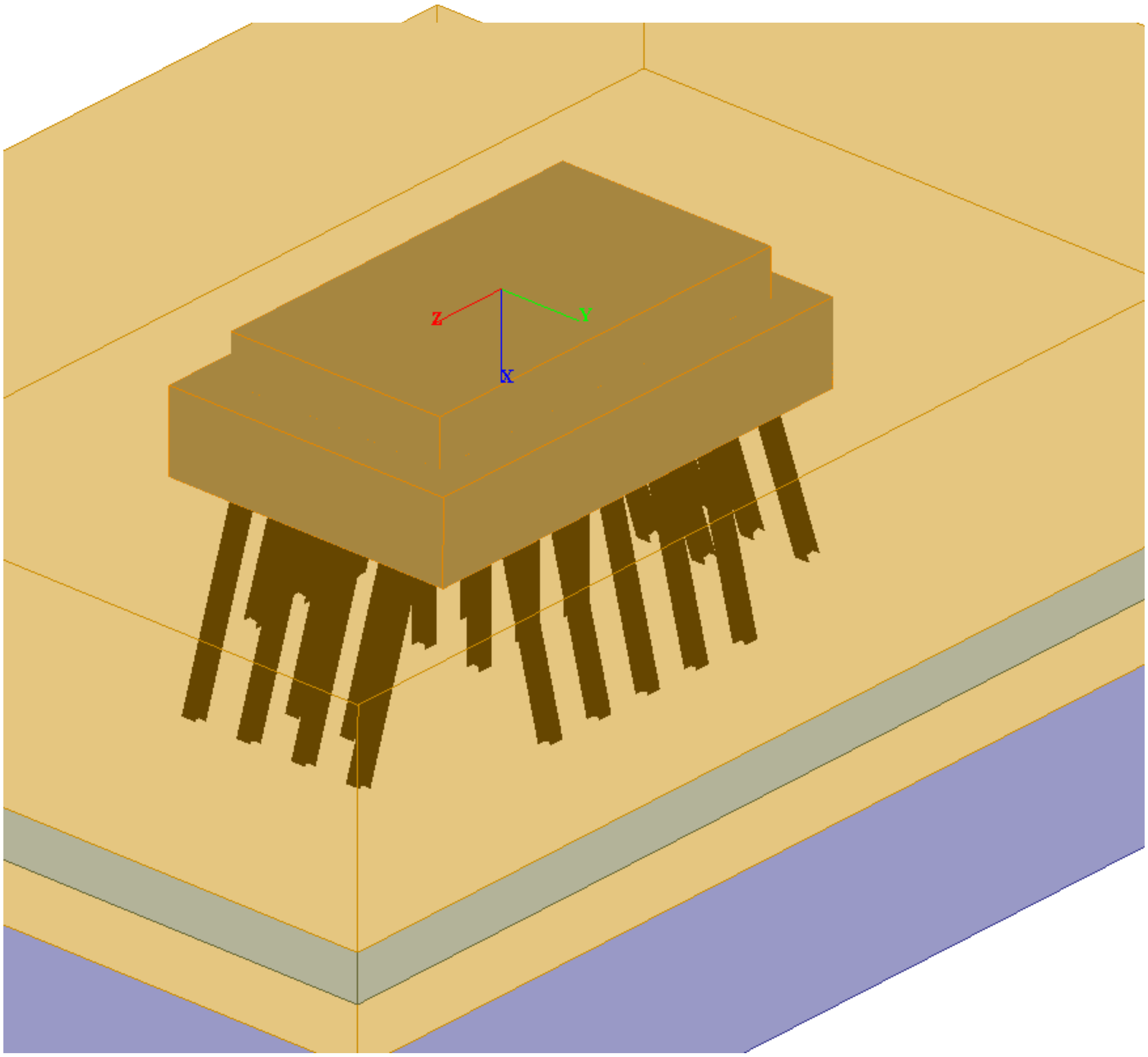
Stratum	Soil Model	Top of Layer Elevation (NAVD88 ft)	k (pci) / E50	ϕ' (deg)/ Su (psf)	γ_e (pcf)
Wetland Deposit (CH)**	Soft Clay	2	E_{50}=0.01	400	48
Marine Clay Crust (CL)	Stiff Clay w/o free water	-29	E_{50}=0.007	900	53
Marine Clay (CL)	Soft Clay	-36	E_{50}=0.008	550	53
Glacial Till	Reese Sand	-103	65	33	67
Top of Rock	--	-125	--	--	--

Notes: 1. Pile tip elevations are assumed to be at the top of Rock.

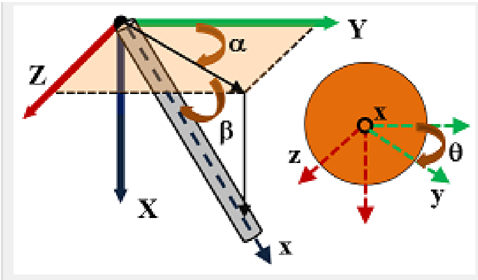
2. ** indicates the top of layer is the approximate ground water elevation based on the boring logs.

3. pci = pounds per cubic inch, deg = degrees, psi =pounds per square inch, γe = effective unit weight pcf = pounds per square foot.

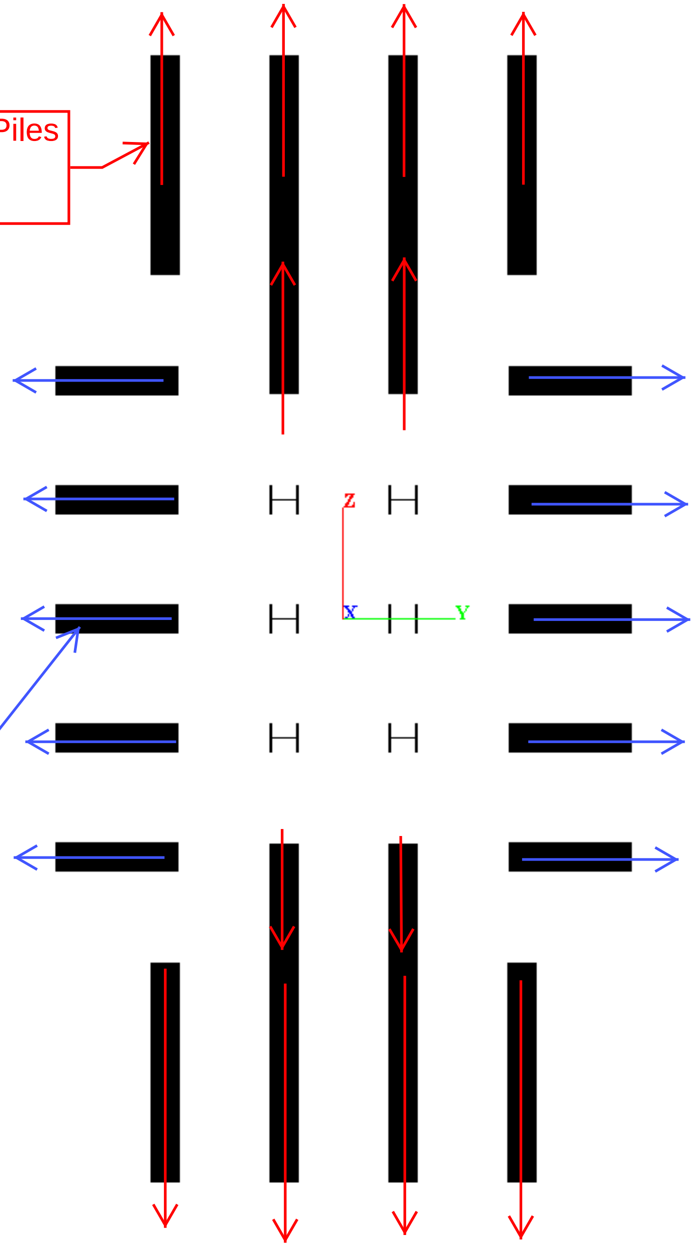
Pier 1 14x117
4 Rows
4 on 12 Battered transverse Piles
2 on 12 battered longitudinal piles
Group Inputs/Results



Pier 1 - 28 14x117 HP

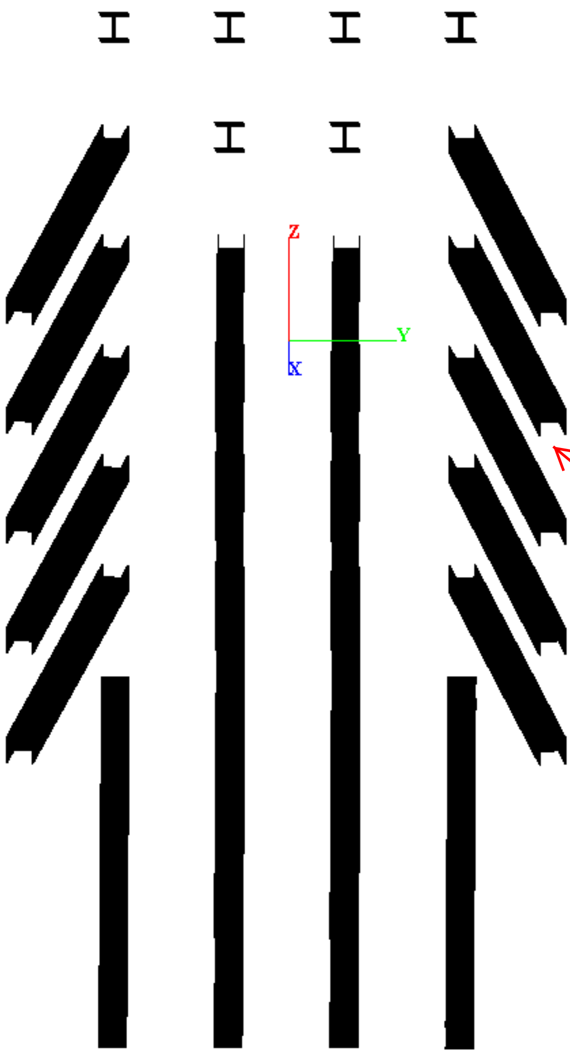


Lateral/Z-Direction Piles
4H:12V
β = 71.57



To the right: Top down view without pile cap (Piles only)
Below is skewed view to show pile orientation

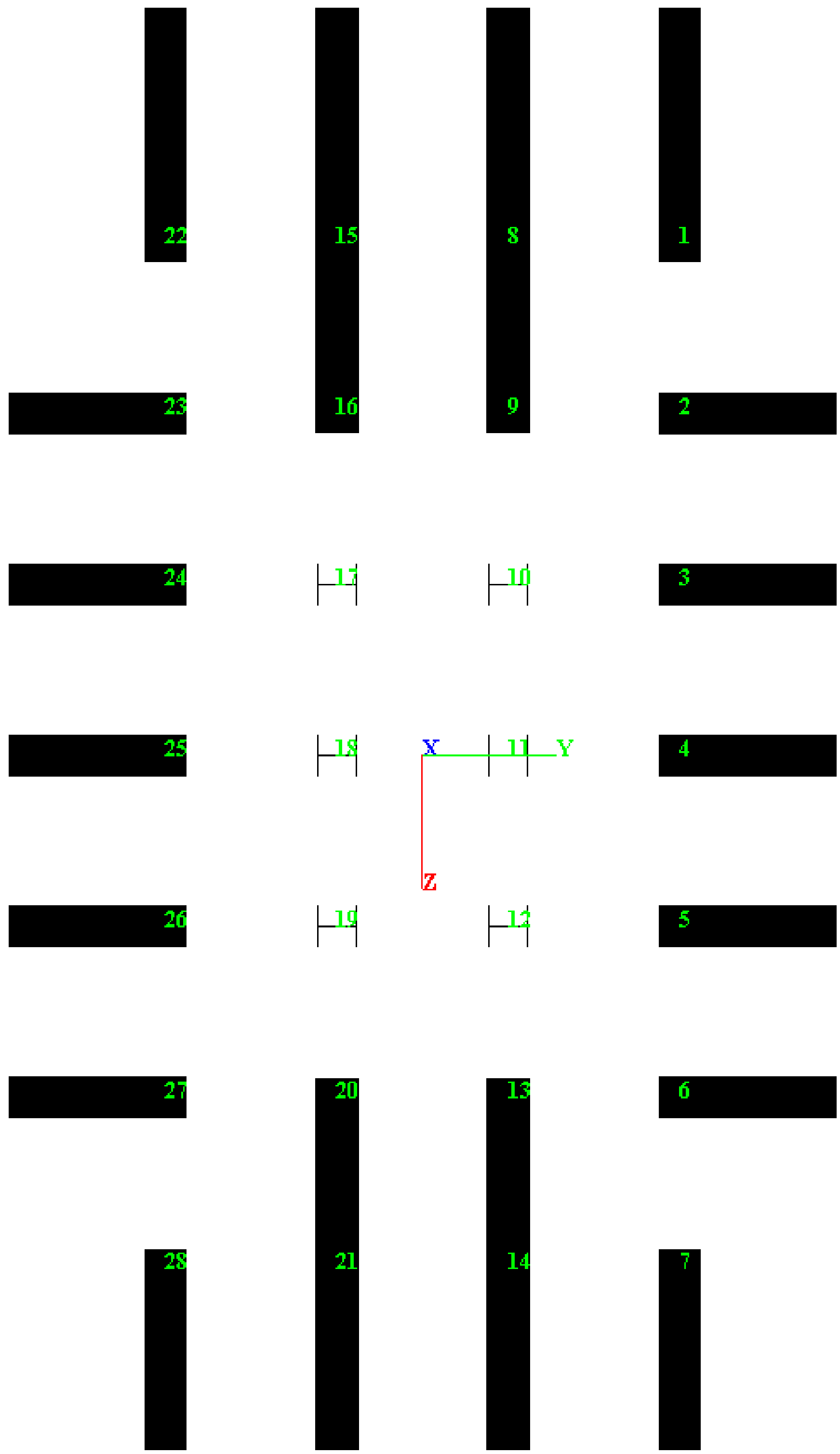
Lateral/Z-Direction Piles
2H:12V
β = 80.54



Skewed view to show the pile orientation

Group Numbering Plan

Pier 1



Group Output Summary

Maine Department of Transportation - Station 46 Bridge

GZA GeoEnvironmental, Inc.

GZA FILE NO.	09.0026035.01
CALCULATED BY	B.Cardali, 6/17/21
CHECKED BY	C.Snow, 6/17/21

PIER 1 - 14x117					
LOAD CASE	**Maximum Stress (ksi)**	**Maximum Axial Pile Demand (kip)**	**Resistance Factor**	**Required Nominal Resistance (kip)**	**Controlling Required Nominal Resistance (kip)**
Strength I	11.7	286	0.65	440	440 (Strength I)
Strength III	5.8	159	0.65	245	
Strength IV	5.8	176	0.65	271	
Strength V	10.5	264	0.65	406	
Service I	8.1	203	1.0	203	
Service IV	4.4	121	1.0	121	
Extreme Event I	9.4	294	1.0	294	

Group Input Basis (Plans&HNTB Loading)

Design for Expansion Pier 1

Calc. for	Station 46	Job No.	75298
Made by	KEB (Ind. Checker)	Date	05/28/21
Chkd by	YP (Original Design)	Date	

Note: Reduced Loads include reduction for actual transverse seismic force at Pier 1, previous loads included Pier 2 conservatively.

Resulted in approximately 17% reduction in transverse force for Extreme Event.

PIER FOOTING DESIGN LOADS:

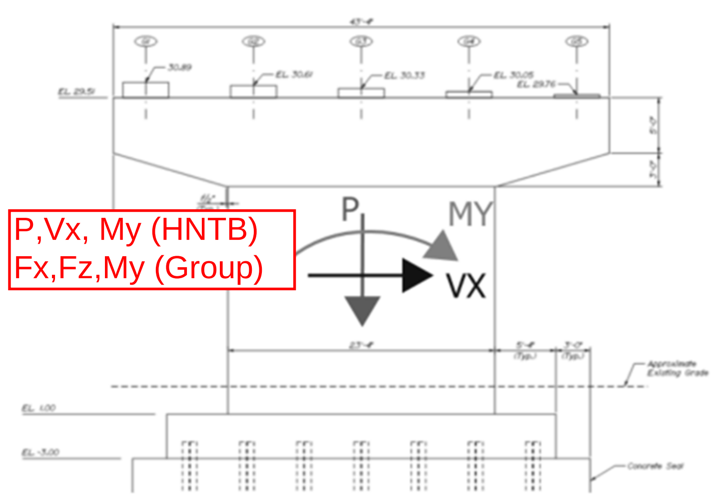
Unfactored Force Summary:

	P Compress	Vx Strong	Vy Weak	Mx Weak	My Strong	Torsion
Units	kip	kip	kip	kip-ft	kip-ft	kip-ft
DC*	2542	0	0	463	0	0
DW	355	0	0	0	0	0
WS	-158	103	0	0	5361	0
WL	0	18	25	755	798	0
EQ1	0	198	0	0	6448	0
EQ2	0	662	0	0	21494	0
LL 1a	457	6	0	1852	7063	0
LL 2a	762	11	0	1852	7961	0
LL 3a	762	11	0	1852	339	0
LL 4a	971	14	0	1852	4643	0
LL 5a	971	14	0	1852	432	0
LL 1b	386	6	0	1852	6003	0
LL 2b	644	11	0	1852	6783	0
LL 3b	644	11	0	1852	339	0
LL 4b	821	14	0	1852	3992	0
LL 5b	821	14	0	1852	432	0
LL 1 b/o	0	6	0	0	206	0
LL 2 b/o	0	11	0	0	342	0
LL 3 b/o	0	11	0	0	339	0
LL 4 b/o	0	14	0	0	434	0
LL 5 b/o	0	14	0	0	432	0

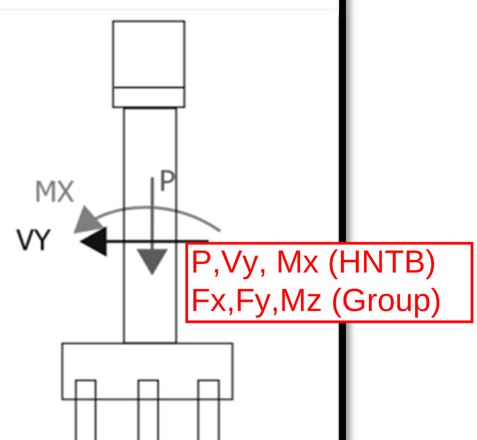
A-Cases not applicable for pile design. B-Cases w/out impact used in factored tables below.

*Vertical reactions and self weight

Diagrams - Indicating Directionality



Pier Elevation - Load Nomenclature



Pier Section - Load Nomenclature

HNTB

Calculations for Station 46

Made by BRG

Checked by

Job No. 75298-DS-601

Sheet No.

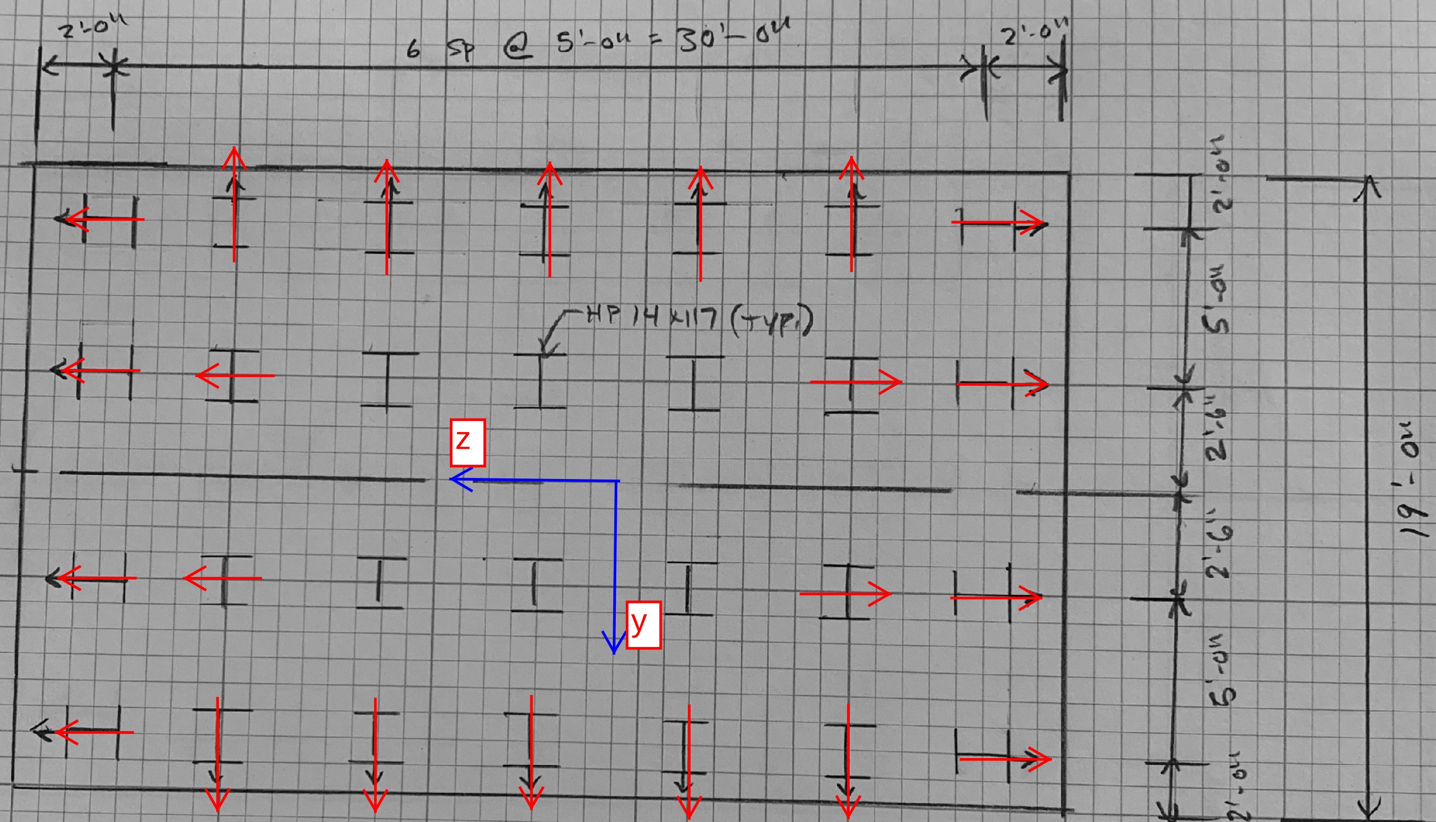
Date 5/25/21

Date

(1/8" grid, 64 squares per inch)

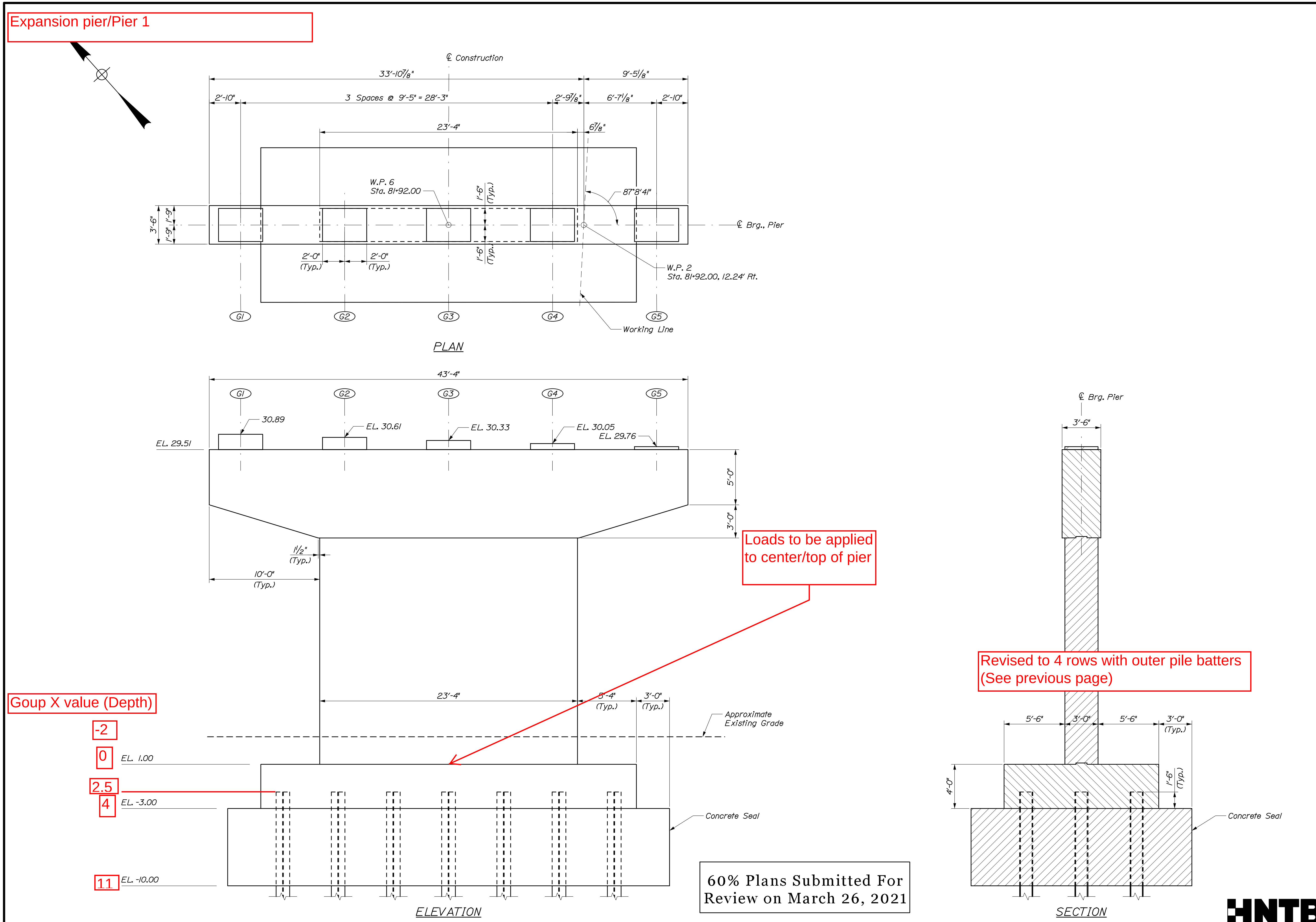
Pier 1

28 total pile



2 on 12 batter longitudinally

4 on 12 batter transversely



Date:4/29/2021

Username:

Division:

Filename: 113_Pier No. 1 Plan and Elevation.dgn

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2392900

WIN 23929.00

BRIDGE PLANS

BRIDGE NO.3039

	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	Y. Peng	P. Bishop	05\21
CHECKED-REVIEWED	K. Brayley	T. Cole	05\21
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

STATION 46 BRIDGE
KENNEBEC RIVER ESTUARY
WOOLWICH SAGADAHOC COUNTY

PIER NO. 1
PLAN AND ELEVATION

SHEET NUMBER
113
OF 157

Calc. for	Station 46	P,Vx, My (HNTB) Fx,Fz,My (Group)	75298
Made by	KEB		04/30/21
Chkd by		Date	

HNTB

Strength I Load Combinations

Units	Fx kip	Fz kip	Fy kip	Mz kip-ft	My kip-ft	Mx	Description of Case
1	4386	11	0	3819	10505	0	Max Live w/ CE & BR, Live 1, Max Dead
2	4837	19	0	3819	11870	0	Max Live w/ CE & BR, Live 2, Max Dead
3	4837	19	0	3819	594	0	Max Live w/ CE & BR, Live 3, Max Dead
4	5147	24	0	3819	6987	0	Max Live w/ CE & BR, Live 4, Max Dead
5	5147	24	0	3819	757	0	Max Live w/ CE & BR, Live 5, Max Dead
8	3195	11	0	3657	10505	0	Max Live w/ CE & BR, Live 1, Min Dead
9	3646	19	0	3657	11870	0	Max Live w/ CE & BR, Live 2, Min Dead
10	3646	19	0	3657	594	0	Max Live w/ CE & BR, Live 3, Min Dead
11	3956	24	0	3657	6987	0	Max Live w/ CE & BR, Live 4, Min Dead
12	3956	24	0	3657	757	0	Max Live w/ CE & BR, Live 5, Min Dead
15	3710	11	0	579	361	0	Min Live w/ CE & BR, Live 1, Max Dead
16	3710	19	0	579	599	0	Min Live w/ CE & BR, Live 2, Max Dead
17	3710	19	0	579	593	0	Min Live w/ CE & BR, Live 3, Max Dead
18	3710	24	0	579	760	0	Min Live w/ CE & BR, Live 4, Max Dead
19	3710	24	0	579	757	0	Min Live w/ CE & BR, Live 5, Max Dead
22	2518	11	0	417	361	0	Min Live w/ CE & BR, Live 1, Min Dead
23	2518	19	0	417	599	0	Min Live w/ CE & BR, Live 2, Min Dead
24	2518	19	0	417	593	0	Min Live w/ CE & BR, Live 3, Min Dead
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Min Live w/ CE & BR, Live 4, Min Dead
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Min Live w/ CE & BR, Live 5, Min Dead
	Fx	Fz	Fy	Mz	My	Mx	
Envelope	5147	24	0	45,828 kip-in	142,440 kip-in	0	Maximum
	2518	11	0	417	361	0	Minimum

Strength III Load Combinations

Units	Fx kip	Fz kip	Fy kip	Mz kip-ft	My kip-ft	Mx	Description of Case
27	3552	103	0	6,948 kip-in	64,332 kip-in	0	Wind, Max Dead
28	2361	103	0	417	5361	0	Wind, Min Dead

Strength IV Load Combinations

	Fx	Fz	Fy	Mz	My	Mx	
31	4345.5	0.0	0.0	8,328 kip-in	0.0	0.0	Max Dead

Strength V Load Combinations

Units	Fx kip	Fz kip	Fy kip	Mz kip-ft	My kip-ft	Mx	Description of Case
29	4166	70	25	3834	11149	0	Max Live, Live 1, Max Dead, WS V, WL
30	4513	76	25	3834	12202	0	Max Live, Live 2, Max Dead, WS V, WL
31	4513	76	25	3834	3503	0	Max Live, Live 3, Max Dead, WS V, WL
32	4753	80	25	3834	8435	0	Max Live, Live 4, Max Dead, WS V, WL
33	4753	80	25	3834	3629	0	Max Live, Live 5, Max Dead, WS V, WL
34	2974	70	25	3672	11149	0	Max Live, Live 1, Min Dead, WS V, WL
35	3322	76	25	3672	12202	0	Max Live, Live 2, Min Dead, WS V, WL
36	3322	76	25	3672	3503	0	Max Live, Live 3, Min Dead, WS V, WL
37	3561	80	25	3672	8435	0	Max Live, Live 4, Min Dead, WS V, WL
38	3561	80	25	3672	3629	0	Max Live, Live 5, Min Dead, WS V, WL
39	3644	70	25	1334	3324	0	Min Live, Live 1, Max Dead, WS V, WL
40	3644	76	25	1334	3507	0	Min Live, Live 2, Max Dead, WS V, WL
41	3644	76	25	1334	3503	0	Min Live, Live 3, Max Dead, WS V, WL
42	3644	80	25	1334	3631	0	Min Live, Live 4, Max Dead, WS V, WL
43	3644	80	25	1334	3629	0	Min Live, Live 5, Max Dead, WS V, WL
44	2452	70	25	1172	3324	0	Min Live, Live 1, Min Dead, WS V, WL
45	2452	76	25	1172	3507	0	Min Live, Live 2, Min Dead, WS V, WL
46	2452	76	25	1172	3503	0	Min Live, Live 3, Min Dead, WS V, WL
47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Min Live, Live 4, Min Dead, WS V, WL
48	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Min Live, Live 5, Min Dead, WS V, WL
	Fx	Fz	Fy	Mz	My	Mx	
Envelope	4753	80	25	46,008 kip-in	146,424 kip-in	0	Maximum
	2452	70	25	1172	3324	0	Minimum

P,Vx, My (HNTB)
Fx,Fz,My (Group)

Calc. for	Station 46		75298
Made by	KEB	Date	04/30/21
Chkd by		Date	

HNTB

Service I Load Combinations

Units	Fx	Fz	Fy	Mz	My	Mx	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
49	3233	58	25	3070	8521	0	Max Live, Live 1, Dead, WS
50	3490	62	25	3070	9301	0	Max Live, Live 2, Dead, WS
51	3490	62	25	3070	2857	0	Max Live, Live 3, Dead, WS
52	3668	65	25	3070	6511	0	Max Live, Live 4, Dead, WS
53	3668	65	25	3070	2951	0	Max Live, Live 5, Dead, WS
54	2846	58	25	1218	2725	0	Min Live, Live 1, Dead, WS
55	2846	62	25	1218	2861	0	Min Live, Live 2, Dead, WS
56	2846	62	25	1218	2857	0	Min Live, Live 3, Dead, WS
57	2846	65	25	1218	2952	0	Min Live, Live 4, Dead, WS
58	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Min Live, Live 5, Dead, WS
Envelope	3668	65	25	36,840 kip-in	111,612 kip-in	0	Maximum
	2846	58	25	1218	2725	0	Minimum

Service IV Load Combinations

Units	Fx	Fz	Fy	Mz	My	Mx	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
59	2808	58	0	5,556 kip-in	36,180 kip-in	0	Only Service IV Case

Extreme Event I Load Combinations

Units	Fx	Fz	Fy	Mz	My	Mx	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
60	2897	198	0	463	6448	0	Seismic LC1, No Live, Max Dead
61	2897	662	0	463	21494	0	Seismic LC2, No Live, Max Dead
62	3090	202	0	1389	9450	0	Seismic LC1, Live 1, Max Dead
63	3219	204	0	1389	9840	0	Seismic LC1, Live 2, Max Dead
64	3219	204	0	1389	6618	0	Seismic LC1, Live 3, Max Dead
65	3308	205	0	1389	8445	0	Seismic LC1, Live 4, Max Dead
66	3308	205	0	1389	6664	0	Seismic LC1, Live 5, Max Dead
67	3090	665	0	1389	24495	0	Seismic LC2, Live 1, Max Dead
68	3219	667	0	1389	24885	0	Seismic LC2, Live 2, Max Dead
69	3219	667	0	1389	21663	0	Seismic LC2, Live 3, Max Dead
70	[illegible]	[illegible]	0	1389	23490	0	Seismic LC2, Live 4, Max Dead
71	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Seismic LC2, Live 5, Max Dead
Envelope	3308	668	0	16,668 kip-in	298,620 kip-in	0	Maximum
	2897	198	0	463	6448	0	Minimum

Pier 1 14x117

4 Rows

4 on 12 Battered lateral Piles

2 on 12 battered longitudinal piles

Input Summary

```
=========================================================================

                 GROUP for Windows, Version 2016.10.13

                  Serial Number : 364300562

                  Analysis of A Group of Piles
               Subjected to Axial and Lateral Loading

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                      All Rights Reserved

=========================================================================


This program is licensed to :

GZA GeoEnvironmental, Inc.
Portland, ME

Path to file locations      : P:\09 Jobs\0026000s\09.0026035.00 - MEDOT - Woolwich - Station 46 Bridge 3039\09.0026035.01 - Final Design\Work\Calcs\Group\Pier 1\14x117\
Name of input data file     : Pier1_14x117_4Rows_BatteredSides.gp10r
Name of output echo file    : Pier1_14x117_4Rows_BatteredSides.gp10e
Name of output results file : Pier1_14x117_4Rows_BatteredSides.gp10o
Name of output summary file : Pier1_14x117_4Rows_BatteredSides.gp10t
Name of plot output file    : Pier1_14x117_4Rows_BatteredSides.gp10p
Name of runtime file        : Pier1_14x117_4Rows_BatteredSides.gp10r


-------------------------------------------------------------------------
                     Time and Date of Analysis
-------------------------------------------------------------------------

          Date:  June 01, 2021     Time:  13:20:23




           *****     INPUT INFORMATION     *****


Woolwich - Pier 1 (Expansion)

ANALYSIS TYPE = 3D ANALYSIS




ADJUST DEPTH FOR BATTER PILES

GENERATE LOAD-DISP (AND T-R) CURVES BASED ON SOIL PROFILE

EXTEND INTERPOLATION FOR L-DP (AND T-R) CURVES

UNITS SYSTEM  = ENGL


* TABLE B *  PILE CAP OPTIONS

LENGTH,YY    ( FT ) =    25.00
WIDTH, ZZ    ( FT ) =    40.00
THICKNESS,XX ( FT ) =    7.000

* PILE CAP DIMENSIONS ARE NOT CONSIDERED
  FOR THE PILE GROUP ANALYSIS



* TABLE C *  LOAD AND CONTROL PARAMETERS


** LOAD CASES **


NUMBER OF LOAD CASES :    7


LOAD CASE    :     1
CASE NAME    : Strength I Load Combination
LOAD TYPE    : Dead, DL
SCALE FACTOR :       1.0000

* CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
       KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   5.15E+03      0.00      24.0      0.00  1.42E+05  4.58E+04      0.00      0.00      0.00


* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
              5147.00           0.00000           24.0000
```

MOMENT X,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	1.42440E+05	45828.0

* THE LOADING IS STATIC *

* CONTROL PARAMETERS *

```
TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
PRINT RESULTS AT PILE CAP AND PILE HEADS
```

```
LOAD CASE    :     2
CASE NAME    : Strength III Load Combination
LOAD TYPE    : Dead, DL
SCALE FACTOR :       1.0000
```

* CONCENTRATED LOADS *

NL	VERT.LOAD KIP	HR.LOAD Y KIP	HR.LOAD Z KIP	MOMENT X KIP-IN	MOMENT Y KIP-IN	MOMENT Z KIP-IN	COORD X FT	COORD Y FT	COORD Z FT
1	3.55E+03	0.00	1.03E+02	0.00	6.43E+04	6.95E+03	0.00	0.00	0.00

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VER.LOAD X,KIP	HOR.LOAD Y,KIP	HOR.LOAD Z,KIP
3552.00	0.00000	103.000

MOMENT X,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	64332.0	6948.00

* THE LOADING IS STATIC *

* CONTROL PARAMETERS *

```
TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
PRINT RESULTS AT PILE CAP AND PILE HEADS
```

```
LOAD CASE    :     3
CASE NAME    : Strength IV Load Combination
LOAD TYPE    : Live, LL
SCALE FACTOR :       1.0000
```

* CONCENTRATED LOADS *

NL	VERT.LOAD KIP	HR.LOAD Y KIP	HR.LOAD Z KIP	MOMENT X KIP-IN	MOMENT Y KIP-IN	MOMENT Z KIP-IN	COORD X FT	COORD Y FT	COORD Z FT
1	4.35E+03	0.00	0.00	0.00	0.00	8.33E+03	0.00	0.00	0.00

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VER.LOAD X,KIP	HOR.LOAD Y,KIP	HOR.LOAD Z,KIP
4345.50	0.00000	0.00000

MOMENT X,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	0.00000	8328.00

* THE LOADING IS STATIC *

* CONTROL PARAMETERS *

```
TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
PRINT RESULTS AT PILE CAP AND PILE HEADS
```

```
LOAD CASE    :     4
CASE NAME    : Strength V Load Combination
LOAD TYPE    : Dead, DL
SCALE FACTOR :       1.0000
```

* CONCENTRATED LOADS *

NL	VERT.LOAD KIP	HR.LOAD Y KIP	HR.LOAD Z KIP	MOMENT X KIP-IN	MOMENT Y KIP-IN	MOMENT Z KIP-IN	COORD X FT	COORD Y FT	COORD Z FT
1	4.75E+03	25.0	80.0	0.00	1.46E+05	4.60E+04	0.00	0.00	0.00

```
 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
              4753.00           25.0000           80.0000

       MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
              0.00000       1.46424E+05           46008.0


 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     5
 CASE NAME    : Service I Load Combination
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000

 * CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
       KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   3.67E+03      25.0      65.0      0.00  1.12E+05  3.68E+04      0.00      0.00      0.00


 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
              3668.00           25.0000           65.0000

       MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
              0.00000       1.11612E+05           36840.0


 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *

     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     6
 CASE NAME    : Service IV Load Combination
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000

 * CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
       KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   2.81E+03      0.00      58.0      0.00  3.62E+04  5.56E+03      0.00      0.00      0.00


 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
              2808.00           0.00000           58.0000

       MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
              0.00000           36180.0           5556.00


 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     7
 CASE NAME    : Extreme Event I - A
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000
```

* CONCENTRATED LOADS *

NL	VERT.LOAD KIP	HR.LOAD Y KIP	HR.LOAD Z KIP	MOMENT X KIP-IN	MOMENT Y KIP-IN	MOMENT Z KIP-IN	COORD X FT	COORD Y FT	COORD Z FT
1	3.31E+03	0.00	6.68E+02	0.00	2.99E+05	1.67E+04	0.00	0.00	0.00

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VER.LOAD X,KIP	HOR.LOAD Y,KIP	HOR.LOAD Z,KIP
3308.00	0.00000	668.000

MOMENT X,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	2.98620E+05	16668.0

* THE LOADING IS STATIC *

* CONTROL PARAMETERS *

TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT = 1.00000E-04
TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS = 1.00000E-03 IN
MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS = 100
MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS = 100
FACTOR TO APPLY THE LOAD IN INCREMENTS = 1.0000
MINIMUM FACTOR FOR LOAD INCREMENTS = 1.0000
PRINT RESULTS AT PILE CAP AND PILE HEADS

* TABLE D * ARRANGEMENT OF PILE GROUPS

GROUP	CONN.Z-Z	CONN.Y-Y	PILE PROP	P-Y CURVE	L-S CURVE	T-R CURVE	R-F-L SET
1	FIX	FIX	3	0	1 G	1 G	0
2	FIX	FIX	2	0	2 G	2 G	0
3	FIX	FIX	2	0	2 G	2 G	0
4	FIX	FIX	2	0	2 G	2 G	0
5	FIX	FIX	2	0	2 G	2 G	0
6	FIX	FIX	2	0	2 G	2 G	0
7	FIX	FIX	3	0	3 G	3 G	0
8	FIX	FIX	3	0	1 G	1 G	0
9	FIX	FIX	3	0	3 G	3 G	0
10	FIX	FIX	1	0	4 G	4 G	0
11	FIX	FIX	1	0	4 G	4 G	0
12	FIX	FIX	1	0	4 G	4 G	0
13	FIX	FIX	3	0	3 G	3 G	0
14	FIX	FIX	3	0	3 G	3 G	0
15	FIX	FIX	3	0	1 G	1 G	0
16	FIX	FIX	3	0	1 G	1 G	0
17	FIX	FIX	1	0	4 G	4 G	0
18	FIX	FIX	1	0	4 G	4 G	0
19	FIX	FIX	1	0	4 G	4 G	0
20	FIX	FIX	3	0	3 G	3 G	0
21	FIX	FIX	3	0	3 G	3 G	0
22	FIX	FIX	3	0	1 G	1 G	0
23	FIX	FIX	2	0	5 G	5 G	0
24	FIX	FIX	2	0	5 G	5 G	0
25	FIX	FIX	2	0	5 G	5 G	0
26	FIX	FIX	2	0	5 G	5 G	0
27	FIX	FIX	2	0	5 G	5 G	0
28	FIX	FIX	3	0	3 G	3 G	0

GROUP	CorX,FT	CorY,FT	CorZ,FT	ALPHA,DEG	BETA,DEG	THETA,DEG	GROUND,FT	SPz,KIP-IN	SPy,KIP-IN
1	2.500	7.500	-15.00	-90.00	71.57	90.00	-4.500	0.000	0.000
2	2.500	7.500	-10.00	0.000	80.54	90.00	-4.500	0.000	0.000
3	2.500	7.500	-5.000	0.000	80.54	90.00	-4.500	0.000	0.000
4	2.500	7.500	0.000	0.000	80.54	90.00	-4.500	0.000	0.000
5	2.500	7.500	5.000	0.000	80.54	90.00	-4.500	0.000	0.000
6	2.500	7.500	10.00	0.000	80.54	90.00	-4.500	0.000	0.000
7	2.500	7.500	15.00	-90.00	108.4	90.00	-4.500	0.000	0.000
8	2.500	2.500	-15.00	-90.00	71.57	90.00	-4.500	0.000	0.000
9	2.500	2.500	-10.00	90.00	108.4	90.00	-4.500	0.000	0.000
10	2.500	2.500	-5.000	0.000	90.00	90.00	-4.500	0.000	0.000
11	2.500	2.500	0.000	0.000	90.00	90.00	-4.500	0.000	0.000
12	2.500	2.500	5.000	0.000	90.00	90.00	-4.500	0.000	0.000
13	2.500	2.500	10.00	-90.00	108.4	90.00	-4.500	0.000	0.000
14	2.500	2.500	15.00	-90.00	108.4	90.00	-4.500	0.000	0.000
15	2.500	-2.500	-15.00	-90.00	71.57	90.00	-4.500	0.000	0.000
16	2.500	-2.500	-10.00	-90.00	71.57	90.00	-4.500	0.000	0.000
17	2.500	-2.500	-5.000	0.000	90.00	90.00	-4.500	0.000	0.000
18	2.500	-2.500	0.000	0.000	90.00	90.00	-4.500	0.000	0.000
19	2.500	-2.500	5.000	0.000	90.00	90.00	-4.500	0.000	0.000
20	2.500	-2.500	10.00	-90.00	108.4	90.00	-4.500	0.000	0.000
21	2.500	-2.500	15.00	-90.00	108.4	90.00	-4.500	0.000	0.000
22	2.500	-7.500	-15.00	-90.00	71.57	90.00	-4.500	0.000	0.000
23	2.500	-7.500	-10.00	0.000	99.46	90.00	-4.500	0.000	0.000
24	2.500	-7.500	-5.000	0.000	99.46	90.00	-4.500	0.000	0.000
25	2.500	-7.500	0.000	0.000	99.46	90.00	-4.500	0.000	0.000
26	2.500	-7.500	5.000	0.000	99.46	90.00	-4.500	0.000	0.000
27	2.500	-7.500	10.00	0.000	99.46	90.00	-4.500	0.000	0.000
28	2.500	-7.500	15.00	-90.00	108.4	90.00	-4.500	0.000	0.000

* TABLE E * PILE GEOMETRY AND PROPERTIES
PILE TYPE = 1 - DRIVEN PILE

= 2 - DRILLED SHAFT

PROP	SECTS	INC	PILE TYPE	LENGTH, FT
1	1	100	1	23.700
2	1	100	1	24.500
3	1	100	1	25.500

* PILE SECTIONS *

PROP	SECT	FROM,FT	TO,FT	CROSS SECT
1	1	0.00000	23.7000	1
2	1	0.00000	24.5000	1
3	1	0.00000	25.5000	1

* PILE CROSS SECTIONS *

```
CROSS SECTION       :     1
SECTION NAME        : HP
TYPE                :  ELASTIC
CROSS SECTION TYPE  : AISC SECTION (HP)
AISC SECTION NAME   : HP14X117
EQUIVALENT DIAMETER :       14.2500 IN
EXTERNAL WIDTH      :       14.9000 IN
EXTERNAL DEPTH      :       14.2000 IN
FLANGE THICKNESS    :       0.80500 IN
WEB THICKNESS       :       0.80500 IN
YOUNG MODULUS       :       29000.0 KIP/IN**2
SHEAR MODULUS       :       11153.8 KIP/IN**2
```

* PILE CROSS SECTIONS PROPERTIES *

ELASTIC SECTIONS

SECT	DIAM,IN	AREA,IN**2	Iz,IN**4	Iy,IN**4	GJ,KIP-IN**2	Mn,KIP-IN	Vn,KIP
1	14.250	34.400	443.00	1220.0	8.9455E+04	0.0000	0.0000

* TABLE F *   SOIL DATA

SOILS INFORMATION

GROUND SURFACE   =   -2.00000 FT

4 LAYER(S) OF SOIL

LAYER 1

THE SOIL IS A SOFT CLAY

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	-2.00000	17.0000
EFFECTIVE UNIT WEIGHT	(KIP/FT**3)	0.0480000	0.0480000
UNDRAINED COHESION, C	(KIP/FT**2)	0.40000	0.40000
STRAIN AT 50% STRESS		1.00000E-02	1.00000E-02
ULTIMATE UNIT SIDE FRICTION	(KIP/FT**2)	0.40000 (P)	0.45299 (P)
ULTIMATE UNIT TIP RESISTANCE	(KIP/FT**2)	0.00000	0.00000

LAYER 2

THE SOIL IS A STIFF CLAY WITHOUT FREE WATER

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	17.0000	21.0000
EFFECTIVE UNIT WEIGHT	(KIP/FT**3)	0.0530000	0.0530000
UNDRAINED COHESION, C	(KIP/FT**2)	0.90000	0.90000
STRAIN AT 50% STRESS		7.00000E-03	7.00000E-03
ULTIMATE UNIT SIDE FRICTION	(KIP/FT**2)	0.45299 (P)	0.39313 (P)
ULTIMATE UNIT TIP RESISTANCE	(KIP/FT**2)	0.00000	0.00000

LAYER 3

THE SOIL IS A SOFT CLAY

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	21.0000	26.0000
EFFECTIVE UNIT WEIGHT	(KIP/FT**3)	0.0530000	0.0530000
UNDRAINED COHESION, C	(KIP/FT**2)	0.55000	0.55000
STRAIN AT 50% STRESS		8.00000E-03	8.00000E-03
ULTIMATE UNIT SIDE FRICTION	(KIP/FT**2)	0.39313 (P)	0.00000
ULTIMATE UNIT TIP RESISTANCE	(KIP/FT**2)	0.00000	0.00000

LAYER 4

THE LAYER IS A VUGGY LIMESTONE

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	26.0000	40.0000
EFFECTIVE UNIT WEIGHT	(KIP/FT**3)	0.10800	0.10800
UNIAXIAL COMPRESSIVE STRENGTH	(KIP/IN**2)	5.20000	5.20000
ULTIMATE UNIT SIDE FRICTION	(KIP/FT**2)	1.00000	1.00000
ULTIMATE UNIT TIP RESISTANCE	(KIP/FT**2)	5000.00	5000.00

Notes : Program estimated values for listed parameters
if zero input values were entered:
(P) ULTIMATE UNIT SIDE FRICTION for Driven Piles

* TABLE H *   AXIAL LOAD VS DISPLACEMENT

AXIAL LOAD-DISPLACEMENT CURVES GENERATED INTERNALLY

NUM OF CURVES 5

CURVE 1 NUM OF POINTS 19

DISPLACEMENT, IN	AXIAL LOAD,KIP
-2.00552	-30.9089
-1.00552	-30.9089
-0.50552	-30.9089
-0.10584	-32.6960
-0.0552608	-29.6853
-0.0110858	-6.18343
-5.54208E-03	-3.08177
-1.10842E-03	-0.61635
-1.10842E-04	-0.0616354
0.00000	0.00000
1.88083E-03	6.38877
0.0188125	63.9844
0.0940355	316.586
0.15741	517.872
0.38156	1149.85
0.45369	1225.74
0.85358	1225.35
1.35358	1225.35
2.35358	1225.35

CURVE 2 NUM OF POINTS 19

DISPLACEMENT, IN	AXIAL LOAD,KIP
-2.00507	-29.7740
-1.00507	-29.7740
-0.50507	-29.7740
-0.10536	-31.4995
-0.0548237	-28.5522
-0.0109946	-5.93656
-5.49663E-03	-2.95971
-1.09933E-03	-0.59194
-1.09933E-04	-0.0591943
0.00000	0.00000
1.73217E-03	6.32034
0.0173242	63.2710
0.0866406	314.247
0.14535	515.569
0.35511	1148.66
0.42552	1224.68
0.82539	1224.22
1.32539	1224.22
2.32539	1224.22

CURVE 3 NUM OF POINTS 19

DISPLACEMENT, IN	AXIAL LOAD,KIP
-2.00552	-30.9089
-1.00552	-30.9089
-0.50552	-30.9089
-0.10584	-32.6960
-0.0552608	-29.6853
-0.0110858	-6.18343
-5.54208E-03	-3.08177
-1.10842E-03	-0.61635
-1.10842E-04	-0.0616354
0.00000	0.00000
1.88083E-03	6.38877
0.0188125	63.9844
0.0940355	316.586
0.15741	517.872
0.38156	1149.85
0.45369	1225.74
0.85358	1225.35
1.35358	1225.35
2.35358	1225.35

CURVE 4 NUM OF POINTS 19

DISPLACEMENT, IN	AXIAL LOAD,KIP
-2.00444	-27.6842
-1.00444	-27.6842
-0.50444	-27.6842
-0.10470	-29.2923
-0.0542276	-26.5074
-0.0108709	-5.50125
-5.43493E-03	-2.74362
-1.08699E-03	-0.54872
-1.08699E-04	-0.0548723
0.00000	0.00000
1.63959E-03	6.27686
0.0163975	62.8208
0.0820227	312.615
0.13778	513.752
0.33832	1146.60
0.40761	1222.57
0.80750	1222.13
1.30750	1222.13
2.30750	1222.13

CURVE 5 NUM OF POINTS 19

DISPLACEMENT, IN	AXIAL LOAD,KIP
-2.00507	-29.7740
-1.00507	-29.7740
-0.50507	-29.7740
-0.10536	-31.4995
-0.0548237	-28.5522
-0.0109946	-5.93656
-5.49663E-03	-2.95971
-1.09933E-03	-0.59194
-1.09933E-04	-0.0591943
0.00000	0.00000
1.73217E-03	6.32034
0.0173242	63.2710
0.0866406	314.247
0.14535	515.569
0.35511	1148.66
0.42552	1224.68
0.82539	1224.22
1.32539	1224.22
2.32539	1224.22

* TABLE I *   TORS. MOM. VS ANGLE ROT.

TORQUE-ROTATION CURVES GENERATED INTERNALLY

NUM OF CURVES 5

CURVE 1   NUM OF POINTS 19

ROT. ANGLE,Rad.	TORS.MOMEN,KIP-IN
-0.78397	-228.787
-0.64362	-228.787
-0.57344	-228.787
-0.52463	-231.000
-0.51515	-230.344
-0.36932	-187.500
-0.31403	-169.855
-0.20285	-129.762
-0.0820348	-75.0334
0.00000	0.00000
0.0820348	75.0334
0.20285	129.762
0.31403	169.855
0.36932	187.500
0.51515	230.344
0.52463	231.000
0.57344	228.787
0.64362	228.787
0.78397	228.787

CURVE 2   NUM OF POINTS 19

ROT. ANGLE,Rad.	TORS.MOMEN,KIP-IN
-0.69847	-203.311
-0.55812	-203.311
-0.48795	-203.311
-0.43753	-205.107
-0.42728	-204.181
-0.31256	-169.384
-0.26397	-152.817
-0.15868	-111.466
-0.0583237	-61.2586
0.00000	0.00000
0.0583237	61.2586
0.15868	111.466
0.26397	152.817
0.31256	169.384
0.42728	204.181
0.43753	205.107
0.48795	203.311
0.55812	203.311
0.69847	203.311

CURVE 3   NUM OF POINTS 19

ROT. ANGLE,Rad.	TORS.MOMEN,KIP-IN
-0.78397	-228.787
-0.64362	-228.787
-0.57344	-228.787
-0.52463	-231.000
-0.51515	-230.344
-0.36932	-187.500
-0.31403	-169.855
-0.20285	-129.762
-0.0820348	-75.0334
0.00000	0.00000
0.0820348	75.0334
0.20285	129.762
0.31403	169.855
0.36932	187.500
0.51515	230.344
0.52463	231.000
0.57344	228.787
0.64362	228.787

0.78397	228.787

CURVE 4 NUM OF POINTS 19

ROT. ANGLE,Rad.	TORS.MOMEN,KIP-IN
-0.63669	-184.188
-0.49634	-184.188
-0.42617	-184.188
-0.37453	-185.667
-0.36616	-185.341
-0.26875	-154.451
-0.22211	-137.339
-0.12445	-96.1278
-0.0411172	-49.6017
0.00000	0.00000
0.0411172	49.6017
0.12445	96.1278
0.22211	137.339
0.26875	154.451
0.36616	185.341
0.37453	185.667
0.42617	184.188
0.49634	184.188
0.63669	184.188

CURVE 5 NUM OF POINTS 19

ROT. ANGLE,Rad.	TORS.MOMEN,KIP-IN
-0.69847	-203.311
-0.55812	-203.311
-0.48795	-203.311
-0.43753	-205.107
-0.42728	-204.181
-0.31256	-169.384
-0.26397	-152.817
-0.15868	-111.466
-0.0583237	-61.2586
0.00000	0.00000
0.0583237	61.2586
0.15868	111.466
0.26397	152.817
0.31256	169.384
0.42728	204.181
0.43753	205.107
0.48795	203.311
0.55812	203.311
0.69847	203.311

* TABLE J * MOMENT CURVATURE SETS

USER DEFINED MOMENT CURVATURE

NUM OF SETS : 1

CURVE SET 1 NUM OF CURVES 1

CURVE 1 AXIAL LOAD 0.000E+00KIPS

POINT	MOMENT KIPS-IN	CURVATURE RADIAN/IN
1	0.00000	0.00000

Pier 1 14x117

4 Rows

4 on 12 Battered lateral Piles

2 on 12 battered longitudinal piles

Summary Output (All Load Cases)

```
=========================================================================
                 GROUP for Windows, Version 2016.10.13

                  Serial Number : 364300562

                  Analysis of A Group of Piles
               Subjected to Axial and Lateral Loading

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                      All Rights Reserved

=========================================================================


-------------------------------------------------------------------------
                     Time and Date of Analysis
-------------------------------------------------------------------------

          Date:  June 16, 2021     Time:  08:33:36



            *****     COMPUTATION RESULTS     *****



Woolwich - Pier 1 (Expansion)



            *****     LOAD CASES RESULTS      *****



LOAD CASE :     1
CASE NAME : Strength I Load Combination
LOAD TYPE : Dead, DL

  REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
  ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

       GROUP NO     P-FACTOR     Y-FACTOR

           1          1.0000       1.0000
           2          0.8079       1.0000
           3          0.8079       1.0000
           4          0.8079       1.0000
           5          0.8079       1.0000
           6          0.8079       1.0000
           7          0.8079       1.0000
           8          0.9990       1.0000
           9          0.7850       1.0000
          10          0.7850       1.0000
          11          0.7850       1.0000
          12          0.7850       1.0000
          13          0.7850       1.0000
          14          0.7851       1.0000
          15          0.9990       1.0000
          16          0.7850       1.0000
          17          0.7850       1.0000
          18          0.7850       1.0000
          19          0.7850       1.0000
          20          0.7850       1.0000
          21          0.7851       1.0000
          22          0.9990       1.0000
          23          0.8065       1.0000
          24          0.8065       1.0000
          25          0.8065       1.0000
          26          0.8065       1.0000
          27          0.8065       1.0000
          28          0.8066       1.0000


* TABLE L *   COMPUTATION ON PILE CAP


* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *


      VERT. LOAD,KIPS    HOR. LOAD Y,KIPS   HOR. LOAD Z,KIPS
            5147.00            0.00000            24.0000

     MOMENT X ,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
            0.00000         1.42440E+05           45828.0


* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *


       VERTICAL ,IN      HORIZONTAL Y,IN     HORIZONTAL Z,IN
          0.0542919        1.57763E-03         -0.0206320

     ANGLE ROT. X,RAD    ANGLE ROT. Y,RAD    ANGLE ROT. Z,RAD
       -4.32574E-06        1.41308E-04        1.04986E-04


* TABLE M *   COMPUTATION ON INDIVIDUAL PILE
```

THE GLOBAL STRUCTURAL COORDINATE SYSTEM

----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.019408	3.9486E-03	-0.025261	-4.3257E-06	1.4131E-04	1.0499E-04
2	0.027886	4.2081E-03	-0.025261	-4.3257E-06	1.4131E-04	1.0499E-04
3	0.036365	4.4677E-03	-0.025261	-4.3257E-06	1.4131E-04	1.0499E-04
4	0.044843	4.7272E-03	-0.025261	-4.3257E-06	1.4131E-04	1.0499E-04
5	0.053322	4.9868E-03	-0.025261	-4.3257E-06	1.4131E-04	1.0499E-04
6	0.061800	5.2463E-03	-0.025261	-4.3257E-06	1.4131E-04	1.0499E-04
7	0.070278	5.5059E-03	-0.025261	-4.3257E-06	1.4131E-04	1.0499E-04
8	0.025707	3.9486E-03	-0.025001	-4.3257E-06	1.4131E-04	1.0499E-04
9	0.034185	4.2081E-03	-0.025001	-4.3257E-06	1.4131E-04	1.0499E-04
10	0.042664	4.4677E-03	-0.025001	-4.3257E-06	1.4131E-04	1.0499E-04
11	0.051142	4.7272E-03	-0.025001	-4.3257E-06	1.4131E-04	1.0499E-04
12	0.059621	4.9868E-03	-0.025001	-4.3257E-06	1.4131E-04	1.0499E-04
13	0.068099	5.2463E-03	-0.025001	-4.3257E-06	1.4131E-04	1.0499E-04
14	0.076578	5.5059E-03	-0.025001	-4.3257E-06	1.4131E-04	1.0499E-04
15	0.032006	3.9486E-03	-0.024741	-4.3257E-06	1.4131E-04	1.0499E-04
16	0.040484	4.2081E-03	-0.024741	-4.3257E-06	1.4131E-04	1.0499E-04
17	0.048963	4.4677E-03	-0.024741	-4.3257E-06	1.4131E-04	1.0499E-04
18	0.057441	4.7272E-03	-0.024741	-4.3257E-06	1.4131E-04	1.0499E-04
19	0.065920	4.9868E-03	-0.024741	-4.3257E-06	1.4131E-04	1.0499E-04
20	0.074398	5.2463E-03	-0.024741	-4.3257E-06	1.4131E-04	1.0499E-04
21	0.082877	5.5059E-03	-0.024741	-4.3257E-06	1.4131E-04	1.0499E-04
22	0.038305	3.9486E-03	-0.024482	-4.3257E-06	1.4131E-04	1.0499E-04
23	0.046784	4.2081E-03	-0.024482	-4.3257E-06	1.4131E-04	1.0499E-04
24	0.055262	4.4677E-03	-0.024482	-4.3257E-06	1.4131E-04	1.0499E-04
25	0.063741	4.7272E-03	-0.024482	-4.3257E-06	1.4131E-04	1.0499E-04
26	0.072219	4.9868E-03	-0.024482	-4.3257E-06	1.4131E-04	1.0499E-04
27	0.080698	5.2463E-03	-0.024482	-4.3257E-06	1.4131E-04	1.0499E-04
28	0.089176	5.5059E-03	-0.024482	-4.3257E-06	1.4131E-04	1.0499E-04
MINIMUM	0.019408	3.9486E-03	-0.025261	-4.3257E-06	1.4131E-04	1.0499E-04
Pile N.	1	1	1	1	1	1
MAXIMUM	0.089176	5.5059E-03	-0.024482	-4.3257E-06	1.4131E-04	1.0499E-04
Pile N.	28	7	22	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	82.835	1.3942	-34.387	21.590	352.01	64.896
2	101.07	17.940	-4.6694	-34.198	205.36	95.844
3	131.13	22.694	-4.6736	-34.262	205.75	83.220
4	161.20	27.446	-4.6735	-34.306	206.01	70.471
5	191.26	32.197	-4.6689	-34.329	206.15	57.619
6	221.32	36.947	-4.6597	-34.330	206.15	44.689
7	190.35	1.0531	54.711	-19.422	509.11	58.367
8	101.73	1.4478	-40.295	21.988	331.35	66.090
9	127.73	1.3753	-47.705	21.525	284.36	64.702
10	162.80	2.1026	-4.4735	-5.2184E-03	202.08	147.11
11	195.07	2.1539	-4.4607	-5.2184E-03	201.78	149.71
12	227.34	2.2048	-4.4478	-5.2184E-03	201.48	152.30
13	183.96	1.0157	52.820	-18.944	497.96	56.933
14	209.65	1.0202	61.161	-19.089	513.77	57.368
15	120.63	1.5113	-46.187	22.449	310.21	67.473
16	146.62	1.4435	-53.623	22.032	264.21	66.223
17	186.78	2.1078	-4.4471	-5.2184E-03	200.92	147.26
18	219.05	2.1592	-4.4343	-5.2184E-03	200.62	149.86
19	251.32	2.2102	-4.4214	-5.2184E-03	200.32	152.45
20	203.30	1.0011	59.122	-18.796	508.30	56.487
21	228.99	1.0062	67.467	-18.945	523.99	56.936
22	139.53	1.5865	-52.056	22.980	288.35	69.069
23	163.47	-23.635	-4.2576	31.778	190.89	221.01
24	193.23	-28.309	-4.1921	31.470	189.04	236.04
25	222.99	-32.994	-4.1257	31.159	187.18	250.69
26	252.75	-37.691	-4.0590	30.849	185.31	264.99
27	282.51	-42.397	-3.9925	30.540	183.46	278.97
28	248.38	1.0092	73.628	-18.975	539.72	57.026
MINIMUM	82.835	-42.397	-53.623	-34.330	183.46	44.689
Pile N.	1	27	16	6	27	6
MAXIMUM	282.51	36.947	73.628	31.778	539.72	278.97
Pile N.	27	6	28	23	28	27

THE PILE COORDINATE SYSTEM (LOCAL AXES)

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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.026398	3.9486E-03	-0.017829	-3.7295E-05	1.4131E-04	9.8234E-05
2	0.028199	-0.025261	4.3243E-04	1.8958E-05	1.0499E-04	-1.4010E-04
3	0.036604	-0.025261	1.5699E-03	1.8958E-05	1.0499E-04	-1.4010E-04
4	0.045010	-0.025261	2.7074E-03	1.8958E-05	1.0499E-04	-1.4010E-04
5	0.053416	-0.025261	3.8449E-03	1.8958E-05	1.0499E-04	-1.4010E-04
6	0.061822	-0.025261	4.9824E-03	1.8958E-05	1.0499E-04	-1.4010E-04
7	0.058688	5.5059E-03	-0.046183	2.9087E-05	1.4131E-04	1.0097E-04
8	0.032292	3.9486E-03	-0.015592	-3.7295E-05	1.4131E-04	9.8234E-05
9	0.040336	-4.2081E-03	0.012911	-3.7295E-05	-1.4131E-04	-9.8234E-05
10	0.042664	-0.025001	-4.4677E-03	-4.3257E-06	1.0499E-04	-1.4131E-04
11	0.051142	-0.025001	-4.7272E-03	-4.3257E-06	1.0499E-04	-1.4131E-04
12	0.059621	-0.025001	-4.9868E-03	-4.3257E-06	1.0499E-04	-1.4131E-04
13	0.056703	5.2463E-03	-0.045248	2.9087E-05	1.4131E-04	1.0097E-04
14	0.064746	5.5059E-03	-0.047928	2.9087E-05	1.4131E-04	1.0097E-04
15	0.038186	3.9486E-03	-0.013354	-3.7295E-05	1.4131E-04	9.8234E-05
16	0.046230	4.2081E-03	-0.010674	-3.7295E-05	1.4131E-04	9.8234E-05
17	0.048963	-0.024741	-4.4677E-03	-4.3257E-06	1.0499E-04	-1.4131E-04

18	0.057441	-0.024741	-4.7272E-03	-4.3257E-06	1.0499E-04	-1.4131E-04
19	0.065920	-0.024741	-4.9868E-03	-4.3257E-06	1.0499E-04	-1.4131E-04
20	0.062761	5.2463E-03	-0.046993	2.9087E-05	1.4131E-04	1.0097E-04
21	0.070804	5.5059E-03	-0.049674	2.9087E-05	1.4131E-04	1.0097E-04
22	0.044081	3.9486E-03	-0.011116	-3.7295E-05	1.4131E-04	9.8234E-05
23	0.045456	-0.024482	-0.011840	-2.7492E-05	1.0499E-04	-1.3867E-04
24	0.053776	-0.024482	-0.013490	-2.7492E-05	1.0499E-04	-1.3867E-04
25	0.062097	-0.024482	-0.015139	-2.7492E-05	1.0499E-04	-1.3867E-04
26	0.070417	-0.024482	-0.016789	-2.7492E-05	1.0499E-04	-1.3867E-04
27	0.078738	-0.024482	-0.018438	-2.7492E-05	1.0499E-04	-1.3867E-04
28	0.076862	5.5059E-03	-0.051419	2.9087E-05	1.4131E-04	1.0097E-04
MINIMUM	0.026398	-0.025261	-0.051419	-3.7295E-05	-1.4131E-04	-1.4131E-04
Pile N.	1	2	28	1	9	10
MAXIMUM	0.078738	5.5059E-03	0.012911	2.9087E-05	1.4131E-04	1.0097E-04
Pile N.	27	7	9	7	1	7

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	89.458	1.3942	-6.4353	-0.034112	352.01	68.393
2	102.64	-4.6694	-1.0843	0.019912	95.844	-208.19
3	133.08	-4.6736	-0.8324	0.019912	83.220	-208.58
4	163.51	-4.6735	-0.5786	0.019912	70.471	-208.85
5	193.95	-4.6689	-0.3237	0.019912	57.619	-208.99
6	224.39	-4.6597	-0.068269	0.019912	44.689	-208.99
7	197.89	1.0531	-8.2747	0.026605	509.11	61.514
8	109.25	1.4478	-6.0666	-0.034112	331.35	69.651
9	136.26	-1.3753	4.8769	-0.034112	-284.36	-68.189
10	162.80	-4.4735	-2.1026	-5.2184E-03	147.11	-202.08
11	195.07	-4.4607	-2.1539	-5.2184E-03	149.71	-201.78
12	227.34	-4.4478	-2.2048	-5.2184E-03	152.30	-201.48
13	191.22	1.0157	-8.0459	0.026605	497.96	60.003
14	218.23	1.0202	-8.2548	0.026605	513.77	60.461
15	129.04	1.5113	-5.6823	-0.034112	310.21	71.109
16	156.05	1.4435	-4.5186	-0.034112	264.21	69.792
17	186.78	-4.4471	-2.1078	-5.2184E-03	147.26	-200.92
18	219.05	-4.4343	-2.1592	-5.2184E-03	149.86	-200.62
19	251.32	-4.4214	-2.2102	-5.2184E-03	152.45	-200.32
20	211.56	1.0011	-8.1827	0.026605	508.30	59.532
21	238.57	1.0062	-8.3881	0.026605	523.99	60.006
22	148.84	1.5865	-5.2732	-0.034112	288.35	72.792
23	165.13	-4.2576	-3.5536	-0.028876	221.01	-193.52
24	195.25	-4.1921	-3.8349	-0.028876	236.04	-191.64
25	225.38	-4.1257	-4.1047	-0.028876	250.69	-189.75
26	255.51	-4.0590	-4.3637	-0.028876	264.99	-187.86
27	285.63	-3.9925	-4.6122	-0.028876	278.97	-185.99
28	258.92	1.0092	-8.6728	0.026605	539.72	60.100
MINIMUM	89.458	-4.6736	-8.6728	-0.034112	-284.36	-208.99
Pile N.	1	3	28	1	9	5
MAXIMUM	285.63	1.5865	4.8769	0.026605	539.72	72.792
Pile N.	27	22	9	7	28	22

Controlling Axial pile demand

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	4.9321
2	6.3787
3	7.2583
4	8.1375
5	9.0161
6	9.8943
7	8.8861
8	5.4119
9	5.9513
10	8.0944
11	9.0318
12	9.9693
13	8.6228
14	9.4981
15	5.8937
16	6.4446
17	8.7735
18	9.7110
19	10.648
20	9.2692
21	10.144
22	6.3776
23	8.1697
24	9.0525
25	9.9367
26	10.822
27	11.710
28	10.824
MINIMUM	4.9321
Pile N.	1
MAXIMUM	11.710
Pile N.	27

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-2.5990E-05	-0.018928	-68.393	-72.944	-0.1797	-6.3770	-0.011099	-0.055285	2.6005	1.2847E+07	3.5380E+07
x(FT)	15.045	1.2750	0.0000	10.965	13.770	0.0000	15.300	6.3750	25.500	0.0000	0.0000
2	-0.025902	-2.0781E-03	-49.053	-12.933	-4.6190	-1.0856	-0.046389	-0.014293	2.9838	1.2847E+07	3.5380E+07
x(FT)	0.7350	4.6550	9.3100	12.495	0.0000	0.0000	4.9000	12.005	24.500	0.0000	0.0000
3	-0.025901	-1.3638E-03	-49.433	-9.5727	-4.6240	-0.8522	-0.046496	-0.013215	3.8686	1.2847E+07	3.5380E+07

x(FT)	0.7350	5.6350	9.3100	12.985	0.0000	1.4700	4.9000	12.005	24.500	0.0000	0.0000
4	-0.025900	-7.8718E-04	-49.777	-6.4286	-4.6247	-0.6468	-0.046549	-0.012041	4.7533	1.2847E+07	3.5380E+07
x(FT)	0.7350	6.8600	9.3100	13.475	0.0000	3.1850	4.9000	12.005	24.500	0.0000	0.0000
5	-0.025900	-3.8578E-04	-50.079	-4.0735	-4.6210	-0.4840	-0.046545	-0.010720	5.6381	1.2847E+07	3.5380E+07
x(FT)	0.7350	8.5750	9.3100	14.700	0.0000	5.3900	4.9000	12.005	24.500	0.0000	0.0000
6	-0.025900	-1.6908E-04	-50.334	-2.5644	-4.6129	-0.3811	-0.046486	-9.3000E-03	6.5228	1.2847E+07	3.5380E+07
x(FT)	0.7350	10.535	9.3100	15.680	0.0000	7.8400	4.9000	14.700	24.500	0.0000	0.0000
7	-2.9751E-05	-0.046901	-61.514	-131.57	-0.1898	-8.2121	-8.3392E-03	-0.1467	5.7525	1.2847E+07	3.5380E+07
x(FT)	17.850	1.0200	0.0000	13.260	16.065	0.0000	16.575	16.320	25.500	0.0000	0.0000
8	-2.6826E-05	-0.016774	-69.651	-66.202	-0.1811	-6.0114	-0.011914	-0.052389	3.1759	1.2847E+07	3.5380E+07
x(FT)	14.790	1.5300	0.0000	10.965	13.515	0.0000	15.300	6.1200	25.500	0.0000	0.0000
9	-5.2674E-03	-1.1230E-04	-10.436	-284.36	-1.3629	-0.9665	-0.013673	-0.021983	3.9611	1.2847E+07	3.5380E+07
x(FT)	2.0400	17.850	9.6900	0.0000	0.0000	15.810	4.5900	17.595	25.500	0.0000	0.0000
10	-0.025669	-6.0083E-03	-46.670	-27.652	-4.4281	-2.0948	-0.044253	-0.022655	4.7326	1.2847E+07	3.5380E+07
x(FT)	0.9480	2.6070	9.2430	12.087	0.0000	0.0000	4.7400	14.694	23.700	0.0000	0.0000
11	-0.025670	-6.2386E-03	-46.640	-28.444	-4.4161	-2.1458	-0.044174	-0.023202	5.6707	1.2847E+07	3.5380E+07
x(FT)	0.9480	2.6070	9.2430	12.087	0.0000	0.0000	4.7400	14.694	23.700	0.0000	0.0000
12	-0.025671	-6.4689E-03	-46.609	-29.235	-4.4040	-2.1965	-0.044093	-0.023758	6.6089	1.2847E+07	3.5380E+07
x(FT)	0.9480	2.6070	9.2430	12.087	0.0000	0.0000	4.7400	14.694	23.700	0.0000	0.0000
13	-3.0201E-05	-0.045987	-60.003	-128.61	-0.1851	-7.9854	-8.1866E-03	-0.1373	5.5587	1.2847E+07	3.5380E+07
x(FT)	18.105	1.0200	0.0000	13.260	16.320	0.0000	16.575	16.320	25.500	0.0000	0.0000
14	-3.3120E-05	-0.048640	-60.461	-134.44	-0.1910	-8.1937	-8.5460E-03	-0.1440	6.3439	1.2847E+07	3.5380E+07
x(FT)	18.105	0.7650	0.0000	13.260	16.320	0.0000	16.575	25.500	25.500	0.0000	0.0000
15	-2.8578E-05	-0.014626	-71.109	-59.349	-0.1826	-5.6305	-0.012472	-0.049362	3.7512	1.2847E+07	3.5380E+07
x(FT)	14.535	1.5300	0.0000	10.965	13.260	0.0000	15.300	6.1200	25.500	0.0000	0.0000
16	-2.6604E-05	-0.012191	-69.792	-48.295	-0.1822	-4.4822	-9.7912E-03	-0.038187	4.5364	1.2847E+07	3.5380E+07
x(FT)	15.045	2.0400	0.0000	11.475	13.770	0.0000	15.300	6.8850	25.500	0.0000	0.0000
17	-0.025415	-6.0067E-03	-46.357	-27.671	-4.4024	-2.1001	-0.044072	-0.022501	5.4296	1.2847E+07	3.5380E+07
x(FT)	0.9480	2.6070	9.2430	12.087	0.0000	0.0000	4.7400	14.694	23.700	0.0000	0.0000
18	-0.025416	-6.2369E-03	-46.326	-28.464	-4.3904	-2.1512	-0.043992	-0.023047	6.3677	1.2847E+07	3.5380E+07
x(FT)	0.9480	2.6070	9.2430	12.087	0.0000	0.0000	4.7400	14.694	23.700	0.0000	0.0000
19	-0.025417	-6.4672E-03	-46.294	-29.255	-4.3783	-2.2020	-0.043910	-0.023601	7.3059	1.2847E+07	3.5380E+07
x(FT)	0.9480	2.6070	9.2430	12.087	0.0000	0.0000	4.7400	14.694	23.700	0.0000	0.0000
20	-3.1771E-05	-0.047712	-59.532	-132.42	-0.1860	-8.1218	-8.1214E-03	-0.1379	6.1501	1.2847E+07	3.5380E+07
x(FT)	18.105	1.0200	0.0000	13.260	16.320	0.0000	16.575	25.500	25.500	0.0000	0.0000
21	-3.4673E-05	-0.050374	-60.006	-138.26	-0.1915	-8.3268	-8.4440E-03	-0.1558	6.9353	1.2847E+07	3.5380E+07
x(FT)	18.105	0.7650	0.0000	13.515	16.320	0.0000	16.575	25.500	25.500	0.0000	0.0000
22	-3.1753E-05	-0.012504	-72.792	-52.360	-0.1842	-5.2253	-0.012583	-0.046096	4.3266	1.2847E+07	3.5380E+07
x(FT)	14.535	1.7850	0.0000	10.965	13.005	0.0000	15.300	5.8650	25.500	0.0000	0.0000
23	-0.025153	-0.012817	-43.550	-49.250	-4.2125	-3.5316	-0.041848	-0.045802	4.8002	1.2847E+07	3.5380E+07
x(FT)	0.9800	1.7150	9.3100	12.005	0.0000	0.0000	4.6550	14.700	24.500	0.0000	0.0000
24	-0.025162	-0.014398	-43.030	-53.857	-4.1486	-3.8105	-0.041111	-0.051621	5.6760	1.2847E+07	3.5380E+07
x(FT)	0.9800	1.4700	9.5550	12.005	0.0000	0.0000	4.4100	14.700	24.500	0.0000	0.0000
25	-0.025171	-0.015989	-42.519	-58.399	-4.0837	-4.0781	-0.040360	-0.057275	6.5518	1.2847E+07	3.5380E+07
x(FT)	0.9800	1.4700	9.5550	12.005	0.0000	0.0000	4.4100	14.700	24.500	0.0000	0.0000
26	-0.025180	-0.017584	-42.018	-62.878	-4.0185	-4.3350	-0.039605	-0.062673	7.4275	1.2847E+07	3.5380E+07
x(FT)	0.9800	1.2250	9.5550	12.005	0.0000	0.0000	4.4100	14.700	24.500	0.0000	0.0000
27	-0.025188	-0.019194	-41.527	-67.296	-3.9536	-4.5816	-0.038852	-0.067767	8.3033	1.2847E+07	3.5380E+07
x(FT)	0.9800	1.2250	9.5550	12.005	0.0000	0.0000	4.4100	14.700	24.500	0.0000	0.0000
28	-3.4343E-05	-0.052101	-60.100	-142.95	-0.1912	-8.6095	-8.2984E-03	-0.1609	7.5267	1.2847E+07	3.5380E+07
x(FT)	18.105	0.7650	0.0000	13.260	16.320	0.0000	16.575	25.500	25.500	0.0000	0.0000

Min.	-0.025902	-0.052101	-72.792	-284.36	-4.6247	-8.6095	-0.046549	-0.1609	2.6005	1.2847E+07	3.5380E+07
Pile N.	2	28	22	9	4	28	4	28	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	5.0073E-03	1.3219E-04	10.309	352.01	1.3817	1.2284	0.014156	0.027600	4.9321	1.2847E+07	3.5380E+07
x(FT)	2.0400	17.340	9.6900	0.0000	0.0000	15.555	4.5900	17.085	0.0000	0.0000	0.0000
2	1.6273E-04	4.3243E-04	208.19	95.844	0.8856	0.2807	0.033737	0.011826	6.3787	1.2847E+07	3.5380E+07
x(FT)	14.210	0.0000	0.0000	0.0000	12.985	15.925	14.700	18.375	0.0000	0.0000	0.0000
3	1.7360E-04	1.5699E-03	208.58	83.220	0.9012	0.2189	0.034645	0.010459	7.2583	1.2847E+07	3.5380E+07
x(FT)	14.210	0.0000	0.0000	0.0000	12.740	16.170	14.700	18.375	0.0000	0.0000	0.0000
4	1.8411E-04	2.7074E-03	208.85	70.471	0.9171	0.1612	0.035470	9.2424E-03	8.1375	1.2847E+07	3.5380E+07
x(FT)	14.210	0.0000	0.0000	0.0000	12.740	16.415	14.700	18.620	0.0000	0.0000	0.0000
5	1.9430E-04	3.8449E-03	208.99	57.619	0.9324	0.1129	0.036223	8.9453E-03	9.0161	1.2847E+07	3.5380E+07
x(FT)	14.210	0.0000	0.0000	0.0000	12.740	16.905	14.700	18.620	0.0000	0.0000	0.0000
6	2.0514E-04	4.9824E-03	208.99	44.689	0.9487	0.081194	0.036916	0.010777	9.8943	1.2847E+07	3.5380E+07
x(FT)	13.965	0.0000	0.0000	0.0000	12.495	17.640	14.700	18.620	0.0000	0.0000	0.0000
7	6.7381E-03	5.0797E-04	9.9329	509.11	1.0465	2.7353	9.2140E-03	0.066238	8.8861	1.2847E+07	3.5380E+07
x(FT)	2.2950	19.380	11.475	0.0000	0.0000	16.830	5.6100	19.380	0.0000	0.0000	0.0000
8	4.9868E-03	1.1099E-04	10.456	331.35	1.4343	1.1127	0.014889	0.025573	5.4119	1.2847E+07	3.5380E+07
x(FT)	2.0400	17.340	9.4350	0.0000	0.0000	15.555	4.3350	17.085	0.0000	0.0000	0.0000
9	2.5295E-05	0.014308	68.189	54.917	0.1810	4.8372	9.4829E-03	0.040974	5.9513	1.2847E+07	3.5380E+07
x(FT)	15.300	1.7850	0.0000	11.475	14.025	0.0000	15.300	6.8850	0.0000	0.0000	0.0000
10	1.2505E-04	3.3161E-05	202.08	147.11	0.8226	0.5659	0.028946	0.019514	8.0944	1.2847E+07	3.5380E+07
x(FT)	14.694	17.301	0.0000	0.0000	13.272	15.879	15.168	18.012	0.0000	0.0000	0.0000
11	1.2484E-04	3.4489E-05	201.78	149.71	0.8222	0.5809	0.028909	0.019890	9.0318	1.2847E+07	3.5380E+07
x(FT)	14.694	17.301	0.0000	0.0000	13.272	15.879	15.168	18.012	0.0000	0.0000	0.0000
12	1.2464E-04	3.5860E-05	201.48	152.30	0.8217	0.5958	0.028873	0.020268	9.9693	1.2847E+07	3.5380E+07
x(FT)	14.694	17.301	0.0000	0.0000	13.272	15.879	15.168	18.012	0.0000	0.0000	0.0000
13	6.5139E-03	5.1511E-04	9.5706	497.96	1.0095	2.6733	8.8444E-03	0.064714	8.6228	1.2847E+07	3.5380E+07
x(FT)	2.2950	19.380	11.475	0.0000	0.0000	16.830	5.8650	19.380	0.0000	0.0000	0.0000
14	6.7605E-03	5.7458E-04	9.7774	513.77	1.0142	2.7817	8.8456E-03	0.066801	9.4981	1.2847E+07	3.5380E+07
x(FT)	2.2950	19.380	11.475	0.0000	0.0000	16.830	5.8650	19.380	0.0000	0.0000	0.0000
15	4.9633E-03	9.0970E-05	10.617	310.21	1.4965	0.9960	0.015772	0.023675	5.8937	1.2847E+07	3.5380E+07
x(FT)	2.0400	17.340	9.4350	0.0000	0.0000	15.555	4.0800	16.830	0.0000	0.0000	0.0000
16	5.2413E-03	8.9603E-05	10.613	264.21	1.4297	0.8511	0.014569	0.019847	6.4446	1.2847E+07	3.5380E+07
x(FT)	2.0400	17.850	9.6900	0.0000	0.0000	15.810	4.3350	17.340	0.0000	0.0000	0.0000
17	1.2492E-04	3.3029E-05	200.92	147.26	0.8178	0.5659	0.028947	0.019475	8.7735	1.2847E+07	3.5380E+07
x(FT)	14.694	17.301	0.0000	0.0000	13.272	15.879	15.168	18.012	0.0000	0.0000	0.0000
18	1.2472E-04	3.4373E-05	200.62	149.86	0.8174	0.5809	0.028912	0.019853	9.7110	1.2847E+07	3.5380E+07
x(FT)	14.694	17.301	0.0000	0.0000	13.272	15.879	15.168	18.012	0.0000	0.0000	0.0000
19	1.2451E-04	3.5744E-05	200.32	152.45	0.8169	0.5959	0.028876	0.020230	10.648	1.2847E+07	3.5380E+07
x(FT)	14.694	17.301	0.0000	0.0000	13.272	15.879	15.168	18.012	0.0000	0.0000	0.0000
20	6.5237E-03	5.5358E-04	9.5124	508.30	0.9953	2.7426	8.6888E-03	0.066052	9.2692	1.2847E+07	3.5380E+07
x(FT)	2.2950	19.380	11.730	0.0000	0.0000	16.830	5.8650	19.380	0.0000	0.0000	0.0000
21	6.7701E-03	6.1516E-04	9.7293	523.99	1.0005	2.8556	8.6970E-03	0.070839	10.144	1.2847E+07	3.5380E+07
x(FT)	2.2950	19.380	11.730	0.0000	0.0000	16.830	5.8650	24.990	0.0000	0.0000	0.0000

22	4.9414E-03	7.2529E-05	10.809	288.35	1.5701	0.8792	0.016838	0.021722	6.3776	1.2847E+07	3.5380E+07
x(FT)	1.7850	17.340	9.1800	0.0000	0.0000	15.300	3.8250	16.830	0.0000	0.0000	0.0000
23	9.0393E-05	7.5735E-05	193.52	221.01	0.7527	1.0020	0.026386	0.029243	8.1697	1.2847E+07	3.5380E+07
x(FT)	15.190	17.640	0.0000	0.0000	13.965	15.925	15.435	17.885	0.0000	0.0000	0.0000
24	8.6130E-05	8.9273E-05	191.64	236.04	0.7426	1.0988	0.026110	0.031447	9.0525	1.2847E+07	3.5380E+07
x(FT)	15.190	17.640	0.0000	0.0000	13.965	15.925	15.680	17.885	0.0000	0.0000	0.0000
25	8.3578E-05	1.0393E-04	189.75	250.69	0.7323	1.1945	0.025860	0.033596	9.9367	1.2847E+07	3.5380E+07
x(FT)	15.435	17.640	0.0000	0.0000	14.210	15.925	15.680	17.885	0.0000	0.0000	0.0000
26	8.1212E-05	1.2030E-04	187.86	264.99	0.7231	1.2888	0.025595	0.035763	10.822	1.2847E+07	3.5380E+07
x(FT)	15.435	17.885	0.0000	0.0000	14.210	15.925	15.680	18.130	0.0000	0.0000	0.0000
27	8.0358E-05	1.3792E-04	185.99	278.97	0.7136	1.3815	0.025306	0.037893	11.710	1.2847E+07	3.5380E+07
x(FT)	15.680	17.885	0.0000	0.0000	14.210	15.925	15.680	18.130	0.0000	0.0000	0.0000
28	6.7677E-03	6.2494E-04	9.7644	539.72	1.0037	2.9384	8.7468E-03	0.072014	10.824	1.2847E+07	3.5380E+07
x(FT)	2.2950	19.380	11.730	0.0000	0.0000	16.830	5.8650	24.990	0.0000	0.0000	0.0000
Max.	6.7701E-03	0.014308	208.99	539.72	1.5701	4.8372	0.036916	0.072014	11.710	1.2847E+07	3.5380E+07
Pile N.	21	9	5	28	22	9	6	28	27	1	1

LOAD CASE : 2
CASE NAME : Strength III Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8066	1.0000
2	0.8065	1.0000
3	0.8065	1.0000
4	0.8065	1.0000
5	0.8065	1.0000
6	0.8065	1.0000
7	0.9993	1.0000
8	0.7851	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.9993	1.0000
15	0.7851	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	0.9993	1.0000
22	0.8074	1.0000
23	0.8074	1.0000
24	0.8074	1.0000
25	0.8074	1.0000
26	0.8074	1.0000
27	0.8074	1.0000
28	1.0000	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
3552.00	0.00000	103.000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	64332.0	6948.00

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.0372790	-2.43785E-04	3.95411E-03

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
-1.79153E-07	4.86125E-05	1.53990E-05

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
1	0.027143	1.8594E-04	2.4796E-03	-1.7915E-07	4.8613E-05	1.5399E-05
2	0.030059	1.9669E-04	2.4796E-03	-1.7915E-07	4.8613E-05	1.5399E-05
3	0.032976	2.0744E-04	2.4796E-03	-1.7915E-07	4.8613E-05	1.5399E-05
4	0.035893	2.1819E-04	2.4796E-03	-1.7915E-07	4.8613E-05	1.5399E-05
5	0.038810	2.2893E-04	2.4796E-03	-1.7915E-07	4.8613E-05	1.5399E-05
6	0.041726	2.3968E-04	2.4796E-03	-1.7915E-07	4.8613E-05	1.5399E-05
7	0.044643	2.5043E-04	2.4796E-03	-1.7915E-07	4.8613E-05	1.5399E-05
8	0.028067	1.8594E-04	2.4904E-03	-1.7915E-07	4.8613E-05	1.5399E-05
9	0.030984	1.9669E-04	2.4904E-03	-1.7915E-07	4.8613E-05	1.5399E-05

10	0.033900	2.0744E-04	2.4904E-03	-1.7915E-07	4.8613E-05	1.5399E-05
11	0.036817	2.1819E-04	2.4904E-03	-1.7915E-07	4.8613E-05	1.5399E-05
12	0.039734	2.2893E-04	2.4904E-03	-1.7915E-07	4.8613E-05	1.5399E-05
13	0.042651	2.3968E-04	2.4904E-03	-1.7915E-07	4.8613E-05	1.5399E-05
14	0.045567	2.5043E-04	2.4904E-03	-1.7915E-07	4.8613E-05	1.5399E-05
15	0.028991	1.8594E-04	2.5011E-03	-1.7915E-07	4.8613E-05	1.5399E-05
16	0.031907	1.9669E-04	2.5011E-03	-1.7915E-07	4.8613E-05	1.5399E-05
17	0.034824	2.0744E-04	2.5011E-03	-1.7915E-07	4.8613E-05	1.5399E-05
18	0.037741	2.1819E-04	2.5011E-03	-1.7915E-07	4.8613E-05	1.5399E-05
19	0.040658	2.2893E-04	2.5011E-03	-1.7915E-07	4.8613E-05	1.5399E-05
20	0.043574	2.3968E-04	2.5011E-03	-1.7915E-07	4.8613E-05	1.5399E-05
21	0.046491	2.5043E-04	2.5011E-03	-1.7915E-07	4.8613E-05	1.5399E-05
22	0.029915	1.8594E-04	2.5119E-03	-1.7915E-07	4.8613E-05	1.5399E-05
23	0.032831	1.9669E-04	2.5119E-03	-1.7915E-07	4.8613E-05	1.5399E-05
24	0.035748	2.0744E-04	2.5119E-03	-1.7915E-07	4.8613E-05	1.5399E-05
25	0.038665	2.1819E-04	2.5119E-03	-1.7915E-07	4.8613E-05	1.5399E-05
26	0.041582	2.2893E-04	2.5119E-03	-1.7915E-07	4.8613E-05	1.5399E-05
27	0.044498	2.3968E-04	2.5119E-03	-1.7915E-07	4.8613E-05	1.5399E-05
28	0.047415	2.5043E-04	2.5119E-03	-1.7915E-07	4.8613E-05	1.5399E-05

MINIMUM	0.027143	1.8594E-04	2.4796E-03	-1.7915E-07	4.8613E-05	1.5399E-05
Pile N.	1	1	1	1	1	1
MAXIMUM	0.047415	2.5043E-04	2.5119E-03	-1.7915E-07	4.8613E-05	1.5399E-05
Pile N.	28	7	22	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	81.241	0.1560	-23.966	2.6026	-103.84	7.8245
2	106.87	15.861	0.3424	-0.1511	0.9568	-64.881
3	117.17	17.448	0.3225	-0.2007	1.2542	-70.881
4	127.47	19.042	0.3049	-0.2444	1.5167	-76.715
5	137.77	20.641	0.2891	-0.2833	1.7502	-82.405
6	148.07	22.244	0.2750	-0.3182	1.9593	-87.966
7	139.65	0.1728	41.685	-2.7527	214.92	8.2742
8	84.023	0.1525	-24.891	2.5728	-105.63	7.7353
9	92.892	0.1505	-27.668	2.5606	-115.05	7.6985
10	129.44	0.5314	0.6366	-2.1612E-04	-3.5362	26.423
11	140.55	0.5386	0.6355	-2.1612E-04	-3.5252	26.657
12	151.65	0.5457	0.6343	-2.1612E-04	-3.5141	26.890
13	133.41	0.1532	40.380	-2.5870	191.52	7.7769
14	142.47	0.1715	42.569	-2.7428	217.79	8.2443
15	86.823	0.1510	-25.764	2.5601	-108.74	7.6972
16	95.691	0.1491	-28.544	2.5489	-118.13	7.6633
17	132.96	0.5306	0.6400	-2.1612E-04	-3.6514	26.403
18	144.06	0.5377	0.6389	-2.1612E-04	-3.6405	26.637
19	155.16	0.5448	0.6377	-2.1612E-04	-3.6294	26.869
20	136.23	0.1520	41.270	-2.5775	194.18	7.7483
21	145.29	0.1703	43.453	-2.7331	220.65	8.2153
22	89.640	0.1516	-26.583	2.5647	-113.34	7.7110
23	116.50	-16.868	0.3007	0.2425	1.5075	105.77
24	126.78	-18.467	0.2855	0.2789	1.7261	111.42
25	137.07	-20.069	0.2719	0.3117	1.9227	116.96
26	147.36	-21.675	0.2595	0.3413	2.1005	122.40
27	157.64	-23.284	0.2482	0.3683	2.2622	127.75
28	148.11	0.1692	44.336	-2.7241	223.54	8.1883

MINIMUM	81.241	-23.284	-28.544	-2.7527	-118.13	-87.966
Pile N.	1	27	16	7	16	6
MAXIMUM	157.64	22.244	44.336	2.6026	223.54	127.75
Pile N.	27	6	28	1	28	27

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.024967	1.8594E-04	0.010934	-5.0383E-06	4.8613E-05	1.4553E-05
2	0.029683	2.4796E-03	4.7466E-03	7.8132E-06	1.5399E-05	-4.7981E-05
3	0.032562	2.4796E-03	5.2153E-03	7.8132E-06	1.5399E-05	-4.7981E-05
4	0.035441	2.4796E-03	5.6841E-03	7.8132E-06	1.5399E-05	-4.7981E-05
5	0.038320	2.4796E-03	6.1529E-03	7.8132E-06	1.5399E-05	-4.7981E-05
6	0.041198	2.4796E-03	6.6217E-03	7.8132E-06	1.5399E-05	-4.7981E-05
7	0.043138	2.5043E-04	-0.011761	4.6984E-06	4.8613E-05	1.4666E-05
8	0.025840	1.8594E-04	0.011236	-5.0383E-06	4.8613E-05	1.4553E-05
9	0.028607	-1.9669E-04	-0.012158	-5.0383E-06	-4.8613E-05	-1.4553E-05
10	0.033900	2.4904E-03	-2.0744E-04	-1.7915E-07	1.5399E-05	-4.8613E-05
11	0.036817	2.4904E-03	-2.1819E-04	-1.7915E-07	1.5399E-05	-4.8613E-05
12	0.039734	2.4904E-03	-2.2893E-04	-1.7915E-07	1.5399E-05	-4.8613E-05
13	0.041250	2.3968E-04	-0.011121	4.6984E-06	4.8613E-05	1.4666E-05
14	0.044017	2.5043E-04	-0.012043	4.6984E-06	4.8613E-05	1.4666E-05
15	0.026713	1.8594E-04	0.011538	-5.0383E-06	4.8613E-05	1.4553E-05
16	0.029480	1.9669E-04	0.012460	-5.0383E-06	4.8613E-05	1.4553E-05
17	0.034824	2.5011E-03	-2.0744E-04	-1.7915E-07	1.5399E-05	-4.8613E-05
18	0.037741	2.5011E-03	-2.1819E-04	-1.7915E-07	1.5399E-05	-4.8613E-05
19	0.040658	2.5011E-03	-2.2893E-04	-1.7915E-07	1.5399E-05	-4.8613E-05
20	0.042130	2.3968E-04	-0.011403	4.6984E-06	4.8613E-05	1.4666E-05
21	0.044897	2.5043E-04	-0.012325	4.6984E-06	4.8613E-05	1.4666E-05
22	0.027586	1.8594E-04	0.011840	-5.0383E-06	4.8613E-05	1.4553E-05
23	0.032353	2.5119E-03	-5.5902E-03	-8.1666E-06	1.5399E-05	-4.7922E-05
24	0.035228	2.5119E-03	-6.0801E-03	-8.1666E-06	1.5399E-05	-4.7922E-05
25	0.038103	2.5119E-03	-6.5701E-03	-8.1666E-06	1.5399E-05	-4.7922E-05
26	0.040979	2.5119E-03	-7.0601E-03	-8.1666E-06	1.5399E-05	-4.7922E-05
27	0.043854	2.5119E-03	-7.5501E-03	-8.1666E-06	1.5399E-05	-4.7922E-05
28	0.045777	2.5043E-04	-0.012607	4.6984E-06	4.8613E-05	1.4666E-05

MINIMUM	0.024967	-1.9669E-04	-0.012607	-8.1666E-06	-4.8613E-05	-4.8613E-05
Pile N.	1	9	28	23	9	10
MAXIMUM	0.045777	2.5119E-03	0.012460	7.8132E-06	4.8613E-05	1.4666E-05
Pile N.	28	23	16	2	1	7

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	84.651	0.1560	2.9467	-4.6083E-03	-103.84	8.2460
2	108.02	0.3424	1.9194	8.2063E-03	-64.881	-0.9686
3	118.44	0.3225	2.0466	8.2063E-03	-70.881	-1.2701
4	128.87	0.3049	2.1678	8.2063E-03	-76.715	-1.5362
5	139.29	0.2891	2.2839	8.2063E-03	-82.405	-1.7730
6	149.71	0.2750	2.3956	8.2063E-03	-87.966	-1.9850
7	145.67	0.1728	-4.6037	4.2974E-03	214.92	8.7201
8	87.583	0.1525	2.9495	-4.6083E-03	-105.63	8.1520
9	96.875	-0.1505	-3.1181	-4.6083E-03	115.05	-8.1132
10	129.44	0.6366	-0.5314	-2.1612E-04	26.423	3.5362
11	140.55	0.6355	-0.5386	-2.1612E-04	26.657	3.5252
12	151.65	0.6343	-0.5457	-2.1612E-04	26.890	3.5141
13	139.33	0.1532	-3.8671	4.2974E-03	191.52	8.1959
14	148.62	0.1715	-4.6566	4.2974E-03	217.79	8.6886
15	90.515	0.1510	3.0055	-4.6083E-03	-108.74	8.1118
16	99.807	0.1491	3.1723	-4.6083E-03	-118.13	8.0761
17	132.96	0.6400	-0.5306	-2.1612E-04	26.403	3.6514
18	144.06	0.6389	-0.5377	-2.1612E-04	26.637	3.6405
19	155.16	0.6377	-0.5448	-2.1612E-04	26.869	3.6294
20	142.29	0.1520	-3.9137	4.2974E-03	194.18	8.1657
21	151.58	0.1703	-4.7091	4.2974E-03	220.65	8.6580
22	93.447	0.1516	3.1199	-4.6083E-03	-113.34	8.1264
23	117.68	0.3007	-2.5082	-8.5776E-03	105.77	-1.5269
24	128.10	0.2855	-2.6224	-8.5776E-03	111.42	-1.7485
25	138.51	0.2719	-2.7326	-8.5776E-03	116.96	-1.9478
26	148.92	0.2595	-2.8392	-8.5776E-03	122.40	-2.1281
27	159.33	0.2482	-2.9426	-8.5776E-03	127.75	-2.2920
28	154.53	0.1692	-4.7630	4.2974E-03	223.54	8.6295
MINIMUM	84.651	-0.1505	-4.7630	-8.5776E-03	-118.13	-8.1132
Pile N.	1	9	28	23	16	9
MAXIMUM	159.33	0.6400	3.1723	8.2063E-03	223.54	8.7201
Pile N.	27	17	16	2	28	7

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	3.0816
2	3.5193
3	3.8576
4	4.1948
5	4.5312
6	4.8669
7	5.4975
8	3.1767
9	3.5006
10	3.9273
11	4.2513
12	4.5753
13	5.1766
14	5.6000
15	3.2796
16	3.6034
17	4.0301
18	4.3541
19	4.6780
20	5.2778
21	5.7025
22	3.3912
23	4.0393
24	4.3750
25	4.7102
26	5.0447
27	5.3786
28	5.8051
MINIMUM	3.0816
Pile N.	1
MAXIMUM	5.8051
Pile N.	28

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-3.8293E-06	-8.6235E-05	-8.2460	-103.84	-0.020657	-0.6535	-8.3996E-04	-0.021327	2.4608	1.2847E+07	3.5380E+07
x(FT)	14.280	14.790	0.0000	0.0000	12.495	12.750	13.260	15.300	25.500	0.0000	0.0000
2	-6.4118E-05	-3.8141E-05	-0.4637	-64.881	-0.1165	-0.3481	-2.0817E-03	-0.016290	3.1401	1.2847E+07	3.5380E+07
x(FT)	9.5550	13.720	13.475	0.0000	7.3500	12.005	11.270	14.700	24.500	0.0000	0.0000
3	-6.4474E-05	-3.8831E-05	-0.4649	-70.881	-0.1131	-0.3747	-1.9995E-03	-0.017218	3.4431	1.2847E+07	3.5380E+07
x(FT)	9.5550	13.965	13.475	0.0000	7.3500	12.250	11.515	14.700	24.500	0.0000	0.0000
4	-6.4717E-05	-3.9707E-05	-0.4672	-76.715	-0.1101	-0.4011	-1.9319E-03	-0.017988	3.7461	1.2847E+07	3.5380E+07
x(FT)	9.5550	13.965	13.720	0.0000	7.3500	12.495	11.760	14.700	24.500	0.0000	0.0000
5	-6.4878E-05	-4.0905E-05	-0.4695	-82.405	-0.1075	-0.4274	-1.8774E-03	-0.018613	4.0491	1.2847E+07	3.5380E+07
x(FT)	9.5550	14.210	13.720	0.0000	7.3500	12.495	12.005	14.700	24.500	0.0000	0.0000
6	-6.5028E-05	-4.2220E-05	-0.4708	-87.966	-0.1052	-0.4539	-1.8376E-03	-0.019108	4.3521	1.2847E+07	3.5380E+07
x(FT)	9.8000	14.455	13.720	0.0000	7.5950	12.740	12.495	14.700	24.500	0.0000	0.0000
7	-2.7163E-06	-0.011966	-8.7201	-49.906	-0.020336	-4.5523	-1.1176E-03	-0.043427	4.2346	1.2847E+07	3.5380E+07
x(FT)	14.280	0.7650	0.0000	9.9450	13.005	0.0000	15.300	4.5900	25.500	0.0000	0.0000
8	-3.8290E-06	-8.7923E-05	-8.1520	-105.63	-0.020482	-0.6625	-8.8017E-04	-0.021269	2.5460	1.2847E+07	3.5380E+07
x(FT)	14.280	14.790	0.0000	0.0000	12.750	13.005	13.260	15.300	25.500	0.0000	0.0000
9	-3.9954E-04	-0.012158	-1.0325	-46.336	-0.1499	-3.0767	-1.6524E-03	-0.031937	2.8161	1.2847E+07	3.5380E+07
x(FT)	2.5500	0.0000	9.4350	8.6700	0.0000	0.0000	5.6100	4.0800	25.500	0.0000	0.0000
10	-7.4367E-05	-3.9866E-04	-3.5362	-3.1916	-0.1777	-0.5296	-3.4518E-03	-7.2493E-03	3.7629	1.2847E+07	3.5380E+07
x(FT)	8.5320	2.3700	0.0000	8.5320	6.3990	0.0000	9.0060	5.2140	23.700	0.0000	0.0000
11	-7.4538E-05	-4.0744E-04	-3.5252	-3.2482	-0.1775	-0.5367	-3.4422E-03	-7.3278E-03	4.0856	1.2847E+07	3.5380E+07

x(FT)	8.5320	2.3700	0.0000	8.5320	6.3990	0.0000	9.0060	5.2140	23.700	0.0000	0.0000
12	-7.4706E-05	-4.1622E-04	-3.5141	-3.3047	-0.1772	-0.5438	-3.4326E-03	-7.4057E-03	4.4084	1.2847E+07	3.5380E+07
x(FT)	8.5320	2.3700	0.0000	8.5320	6.3990	0.0000	9.0060	5.2140	23.700	0.0000	0.0000
13	-2.4085E-06	-0.011352	-8.1959	-44.579	-0.019325	-3.8276	-1.0386E-03	-0.034904	4.0503	1.2847E+07	3.5380E+07
x(FT)	15.045	0.7650	0.0000	10.200	13.770	0.0000	15.300	5.3550	25.500	0.0000	0.0000
14	-2.6681E-06	-0.012245	-8.6886	-50.831	-0.020329	-4.6049	-1.0951E-03	-0.043832	4.3205	1.2847E+07	3.5380E+07
x(FT)	14.535	0.7650	0.0000	9.9450	13.005	0.0000	15.300	4.5900	25.500	0.0000	0.0000
15	-3.7237E-06	-8.9556E-05	-8.1118	-108.74	-0.020535	-0.6772	-1.0311E-03	-0.021490	2.6312	1.2847E+07	3.5380E+07
x(FT)	14.280	15.045	0.0000	0.0000	12.750	13.005	13.260	15.300	25.500	0.0000	0.0000
16	-3.6935E-06	-9.6697E-05	-8.0761	-118.13	-0.020672	-0.7150	-1.0676E-03	-0.022522	2.9014	1.2847E+07	3.5380E+07
x(FT)	14.535	15.045	0.0000	0.0000	13.005	13.260	13.260	15.300	25.500	0.0000	0.0000
17	-7.4372E-05	-3.9880E-04	-3.6514	-3.1930	-0.1781	-0.5288	-3.4603E-03	-7.2333E-03	3.8651	1.2847E+07	3.5380E+07
x(FT)	8.5320	2.3700	0.0000	8.5320	6.6360	0.0000	9.0060	5.2140	23.700	0.0000	0.0000
18	-7.4542E-05	-4.0758E-04	-3.6405	-3.2495	-0.1778	-0.5359	-3.4505E-03	-7.3120E-03	4.1879	1.2847E+07	3.5380E+07
x(FT)	8.5320	2.3700	0.0000	8.5320	6.6360	0.0000	9.0060	5.2140	23.700	0.0000	0.0000
19	-7.4710E-05	-4.1636E-04	-3.6294	-3.3061	-0.1775	-0.5429	-3.4409E-03	-7.3900E-03	4.5106	1.2847E+07	3.5380E+07
x(FT)	8.5320	2.3700	0.0000	8.5320	6.6360	0.0000	9.0060	5.2140	23.700	0.0000	0.0000
20	-2.4169E-06	-0.011631	-8.1657	-45.459	-0.019326	-3.8739	-1.0176E-03	-0.035258	4.1362	1.2847E+07	3.5380E+07
x(FT)	15.045	0.7650	0.0000	10.455	13.770	0.0000	15.300	5.3550	25.500	0.0000	0.0000
21	-2.6349E-06	-0.012524	-8.6580	-51.752	-0.020324	-4.6570	-1.0931E-03	-0.044232	4.4064	1.2847E+07	3.5380E+07
x(FT)	14.535	0.7650	0.0000	9.9450	13.005	0.0000	14.535	4.5900	25.500	0.0000	0.0000
22	-3.4407E-06	-9.0003E-05	-8.1264	-113.34	-0.020964	-0.7024	-1.4837E-03	-0.021927	2.7165	1.2847E+07	3.5380E+07
x(FT)	14.280	15.045	0.0000	0.0000	12.750	13.005	13.260	15.300	25.500	0.0000	0.0000
23	-7.0543E-05	-5.6308E-03	-0.5172	-25.785	-0.1039	-2.4786	-2.9833E-03	-0.025909	3.4211	1.2847E+07	3.5380E+07
x(FT)	9.8000	0.4900	14.210	9.0650	7.5950	0.0000	14.700	3.9200	24.500	0.0000	0.0000
24	-7.0341E-05	-6.1181E-03	-0.5209	-27.512	-0.1019	-2.5918	-3.0534E-03	-0.026817	3.7237	1.2847E+07	3.5380E+07
x(FT)	9.8000	0.4900	14.455	9.0650	7.5950	0.0000	14.700	3.9200	24.500	0.0000	0.0000
25	-7.0134E-05	-6.6055E-03	-0.5241	-29.200	-0.1000	-2.7011	-3.1053E-03	-0.027690	4.0263	1.2847E+07	3.5380E+07
x(FT)	9.8000	0.4900	14.455	9.0650	7.5950	0.0000	14.700	4.1650	24.500	0.0000	0.0000
26	-6.9927E-05	-7.0929E-03	-0.5266	-30.890	-0.098351	-2.8068	-3.1420E-03	-0.028527	4.3290	1.2847E+07	3.5380E+07
x(FT)	9.8000	0.4900	14.455	9.3100	7.5950	0.0000	14.700	4.1650	24.500	0.0000	0.0000
27	-6.9762E-05	-7.5803E-03	-0.5285	-32.551	-0.096823	-2.9094	-3.1665E-03	-0.029329	4.6316	1.2847E+07	3.5380E+07
x(FT)	10.045	0.4900	14.455	9.3100	7.5950	0.0000	14.700	4.1650	24.500	0.0000	0.0000
28	-2.5971E-06	-0.012802	-8.6295	-52.679	-0.020346	-4.7105	-1.1632E-03	-0.044652	4.4923	1.2847E+07	3.5380E+07
x(FT)	14.535	0.7650	0.0000	9.9450	13.260	0.0000	14.535	4.5900	25.500	0.0000	0.0000
Min.	-3.9954E-04	-0.012802	-8.7201	-118.13	-0.1781	-4.7105	-3.4603E-03	-0.044652	2.4608	1.2847E+07	3.5380E+07
Pile N.	9	28	7	16	17	28	17	28	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	3.8591E-04	0.010934	1.0342	43.147	0.1554	2.9056	1.7476E-03	0.031136	3.0816	1.2847E+07	3.5380E+07
x(FT)	2.5500	0.0000	9.4350	8.4150	0.0000	0.0000	5.3550	3.5700	0.0000	0.0000	0.0000
2	2.4796E-03	4.7465E-03	7.8692	22.625	0.3279	1.8918	9.9137E-03	0.022420	3.5193	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6750	7.8400	0.0000	0.0000	0.0000	3.1850	0.0000	0.0000	0.0000
3	2.4796E-03	5.2153E-03	7.7541	24.291	0.3086	2.0178	9.4275E-03	0.023443	3.8576	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6750	8.0850	0.0000	0.0000	0.0000	3.1850	0.0000	0.0000	0.0000
4	2.4796E-03	5.6841E-03	7.6534	25.938	0.2916	2.1379	8.9900E-03	0.024403	4.1948	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6750	8.0850	0.0000	0.0000	0.0000	3.4300	0.0000	0.0000	0.0000
5	2.4796E-03	6.1529E-03	7.5644	27.559	0.2764	2.2530	8.5950E-03	0.025311	4.5312	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6750	8.3300	0.0000	0.0000	0.0000	3.4300	0.0000	0.0000	0.0000
6	2.4796E-03	6.6217E-03	7.4852	29.159	0.2628	2.3638	8.2372E-03	0.026169	4.8669	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6750	8.3300	0.0000	0.0000	0.0000	3.4300	0.0000	0.0000	0.0000
7	4.4174E-04	6.2313E-05	1.0946	214.92	0.1718	0.8198	1.8848E-03	0.026286	5.4975	1.2847E+07	3.5380E+07
x(FT)	2.5500	16.065	9.4350	0.0000	0.0000	14.535	4.5900	15.300	0.0000	0.0000	0.0000
8	3.8811E-04	0.011236	1.0257	43.652	0.1519	2.9090	1.6935E-03	0.030781	3.1767	1.2847E+07	3.5380E+07
x(FT)	2.5500	0.0000	9.4350	8.6700	0.0000	0.0000	5.3550	3.8250	0.0000	0.0000	0.0000
9	3.1164E-06	9.2380E-05	8.1132	115.05	0.022110	0.7067	2.2782E-03	0.021773	3.5006	1.2847E+07	3.5380E+07
x(FT)	14.535	15.045	0.0000	0.0000	13.005	13.005	13.260	15.300	0.0000	0.0000	0.0000
10	2.4904E-03	5.8212E-06	9.8689	26.423	0.6138	0.053853	0.016142	2.6755E-03	3.9273	1.2847E+07	3.5380E+07
x(FT)	0.0000	13.272	3.7920	0.0000	0.0000	11.613	0.2370	14.694	0.0000	0.0000	0.0000
11	2.4904E-03	5.9339E-06	9.8620	26.657	0.6126	0.054766	0.016136	2.7226E-03	4.2513	1.2847E+07	3.5380E+07
x(FT)	0.0000	13.272	3.7920	0.0000	0.0000	11.613	0.2370	14.694	0.0000	0.0000	0.0000
12	2.4904E-03	6.0460E-06	9.8551	26.890	0.6115	0.055679	0.016131	2.7697E-03	4.5753	1.2847E+07	3.5380E+07
x(FT)	0.0000	13.272	3.7920	0.0000	0.0000	11.613	0.2370	14.694	0.0000	0.0000	0.0000
13	4.4345E-04	6.7570E-05	1.0314	191.52	0.1524	0.7522	1.6046E-03	0.017871	5.1766	1.2847E+07	3.5380E+07
x(FT)	2.5500	16.830	9.9450	0.0000	0.0000	14.790	5.1000	16.065	0.0000	0.0000	0.0000
14	4.4245E-04	6.4515E-05	1.0924	217.79	0.1706	0.8350	1.8660E-03	0.026154	5.6000	1.2847E+07	3.5380E+07
x(FT)	2.5500	16.320	9.4350	0.0000	0.0000	14.535	4.5900	15.300	0.0000	0.0000	0.0000
15	3.8905E-04	0.011538	1.0214	44.545	0.1504	2.9648	1.6708E-03	0.031164	3.2796	1.2847E+07	3.5380E+07
x(FT)	2.5500	0.0000	9.4350	8.6700	0.0000	0.0000	5.3550	3.8250	0.0000	0.0000	0.0000
16	4.0040E-04	0.012460	1.0272	47.224	0.1486	3.1306	1.6320E-03	0.032306	3.6034	1.2847E+07	3.5380E+07
x(FT)	2.5500	0.0000	9.6900	8.9250	0.0000	0.0000	5.6100	4.0800	0.0000	0.0000	0.0000
17	2.5011E-03	5.8285E-06	9.8809	26.403	0.6171	0.053883	0.016167	2.6742E-03	4.0301	1.2847E+07	3.5380E+07
x(FT)	0.0000	13.272	3.7920	0.0000	0.0000	11.613	0.2370	14.694	0.0000	0.0000	0.0000
18	2.5011E-03	5.9413E-06	9.8740	26.637	0.6160	0.054796	0.016161	2.7213E-03	4.3541	1.2847E+07	3.5380E+07
x(FT)	0.0000	13.272	3.7920	0.0000	0.0000	11.613	0.2370	14.694	0.0000	0.0000	0.0000
19	2.5011E-03	6.0536E-06	9.8671	26.869	0.6149	0.055708	0.016156	2.7684E-03	4.6780	1.2847E+07	3.5380E+07
x(FT)	0.0000	13.272	3.7920	0.0000	0.0000	11.613	0.2370	14.694	0.0000	0.0000	0.0000
20	4.4415E-04	7.0305E-05	1.0296	194.18	0.1513	0.7686	1.5886E-03	0.018083	5.2778	1.2847E+07	3.5380E+07
x(FT)	2.5500	16.830	9.9450	0.0000	0.0000	15.045	5.1000	16.065	0.0000	0.0000	0.0000
21	4.4314E-04	6.6843E-05	1.0902	220.65	0.1694	0.8502	1.8480E-03	0.026026	5.7025	1.2847E+07	3.5380E+07
x(FT)	2.5500	16.320	9.4350	0.0000	0.0000	14.535	4.8450	15.300	0.0000	0.0000	0.0000
22	3.8872E-04	0.011840	1.0225	45.850	0.1510	3.0776	1.6797E-03	0.032343	3.3912	1.2847E+07	3.5380E+07
x(FT)	2.5500	0.0000	9.4350	8.6700	0.0000	0.0000	5.3550	3.8250	0.0000	0.0000	0.0000
23	2.5119E-03	2.5400E-05	7.4941	105.77	0.2872	0.4213	9.1893E-03	0.017346	4.0393	1.2847E+07	3.5380E+07
x(FT)	0.0000	15.190	3.6750	0.0000	0.0000	13.720	0.0000	14.700	0.0000	0.0000	0.0000
24	2.5119E-03	2.7667E-05	7.4155	111.42	0.2726	0.4506	8.7653E-03	0.017454	4.3750	1.2847E+07	3.5380E+07
x(FT)	0.0000	15.190	3.6750	0.0000	0.0000	13.720	0.0000	14.700	0.0000	0.0000	0.0000
25	2.5119E-03	3.0330E-05	7.3450	116.96	0.2595	0.4789	8.3828E-03	0.017394	4.7102	1.2847E+07	3.5380E+07
x(FT)	0.0000	15.435	3.6750	0.0000	0.0000	13.720	0.0000	14.700	0.0000	0.0000	0.0000
26	2.5119E-03	3.3066E-05	7.2814	122.40	0.2476	0.5073	8.0363E-03	0.017189	5.0447	1.2847E+07	3.5380E+07
x(FT)	0.0000	15.435	3.6750	0.0000	0.0000	13.965	0.0000	14.700	0.0000	0.0000	0.0000
27	2.5119E-03	3.6152E-05	7.2237	127.75	0.2368	0.5353	7.7212E-03	0.017032	5.3786	1.2847E+07	3.5380E+07
x(FT)	0.0000	15.680	3.6750	0.0000	0.0000	13.965	0.0000	14.945	0.0000	0.0000	0.0000
28	4.4378E-04	6.9159E-05	1.0881	223.54	0.1682	0.8655	1.8318E-03	0.025938	5.8051	1.2847E+07	3.5380E+07
x(FT)	2.5500	16.320	9.4350	0.0000	0.0000	14.535	4.8450	15.300	0.0000	0.0000	0.0000
Max.	2.5119E-03	0.012460	9.8809	223.54	0.6171	3.1306	0.016167	0.032343	5.8051	1.2847E+07	3.5380E+07

Pile N.	23	16	17	28	17	16	17	22	28	1	1

LOAD CASE : 3
CASE NAME : Strength IV Load Combination
LOAD TYPE : Live, LL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8066	1.0000
2	0.7850	1.0000
3	0.7850	1.0000
4	0.7850	1.0000
5	0.7850	1.0000
6	0.7850	1.0000
7	0.8066	1.0000
8	0.8066	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.8066	1.0000
15	0.8066	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	0.8066	1.0000
22	1.0000	1.0000
23	1.0000	1.0000
24	1.0000	1.0000
25	1.0000	1.0000
26	1.0000	1.0000
27	1.0000	1.0000
28	1.0000	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
4345.50	0.00000	0.00000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	0.00000	8328.00

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.0456661	-5.89772E-04	9.81679E-13

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
-8.52820E-16	-1.30267E-15	1.80559E-05

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.044041	-4.8094E-05	9.4400E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
2	0.044041	-4.8094E-05	9.4401E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
3	0.044041	-4.8094E-05	9.4401E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
4	0.044041	-4.8094E-05	9.4401E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
5	0.044041	-4.8094E-05	9.4401E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
6	0.044041	-4.8094E-05	9.4401E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
7	0.044041	-4.8094E-05	9.4400E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
8	0.045124	-4.8094E-05	9.9517E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
9	0.045124	-4.8094E-05	9.9518E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
10	0.045124	-4.8094E-05	9.9517E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
11	0.045124	-4.8094E-05	9.9517E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
12	0.045124	-4.8094E-05	9.9517E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
13	0.045124	-4.8094E-05	9.9517E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
14	0.045124	-4.8094E-05	9.9517E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
15	0.046208	-4.8094E-05	1.0463E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
16	0.046208	-4.8094E-05	1.0463E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
17	0.046208	-4.8094E-05	1.0463E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
18	0.046208	-4.8094E-05	1.0463E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
19	0.046208	-4.8094E-05	1.0463E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
20	0.046208	-4.8094E-05	1.0463E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
21	0.046208	-4.8094E-05	1.0463E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
22	0.047291	-4.8094E-05	1.0975E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
23	0.047291	-4.8094E-05	1.0975E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
24	0.047291	-4.8094E-05	1.0975E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
25	0.047291	-4.8094E-05	1.0975E-12	-8.5282E-16	-1.3027E-15	1.8056E-05

26	0.047291	-4.8094E-05	1.0975E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
27	0.047291	-4.8094E-05	1.0975E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
28	0.047291	-4.8094E-05	1.0975E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
MINIMUM	0.044041	-4.8094E-05	9.4400E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
Pile N.	1	1	1	2	1	1
MAXIMUM	0.047291	-4.8094E-05	1.0975E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
Pile N.	22	1	22	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	135.13	0.1098	-40.870	2.2789	-177.38	6.8550
2	156.07	23.477	2.6222E-10	1.4059E-09	-8.4442E-09	-92.276
3	156.07	23.477	2.6222E-10	1.4059E-09	-8.4442E-09	-92.276
4	156.07	23.477	2.6222E-10	1.4059E-09	-8.4442E-09	-92.276
5	156.07	23.477	2.6222E-10	1.4059E-09	-8.4442E-09	-92.276
6	156.07	23.477	2.6222E-10	1.4059E-09	-8.4442E-09	-92.276
7	135.13	0.1098	40.870	-2.2789	177.38	6.8550
8	138.42	0.1091	-41.909	2.2716	-180.61	6.8333
9	138.40	0.1079	-41.973	2.2599	-178.73	6.7982
10	172.17	0.5779	4.4802E-09	-1.0259E-12	-3.1415E-08	27.016
11	172.17	0.5779	4.4802E-09	-1.0259E-12	-3.1415E-08	27.016
12	172.17	0.5779	4.4802E-09	-1.0259E-12	-3.1415E-08	27.016
13	138.40	0.1079	41.973	-2.2599	178.73	6.7982
14	138.42	0.1091	41.909	-2.2716	180.61	6.8333
15	141.71	0.1084	-42.948	2.2645	-183.83	6.8121
16	141.69	0.1072	-43.013	2.2529	-181.92	6.7772
17	176.29	0.5779	4.7081E-09	-1.0259E-12	-3.2978E-08	27.015
18	176.29	0.5779	4.7081E-09	-1.0259E-12	-3.2978E-08	27.015
19	176.29	0.5779	4.7081E-09	-1.0259E-12	-3.2978E-08	27.015
20	141.69	0.1072	43.013	-2.2529	181.92	6.7772
21	141.71	0.1084	42.948	-2.2645	183.83	6.8121
22	145.19	0.1174	-43.417	2.3521	-203.31	7.0747
23	167.74	-24.437	3.3418E-10	-1.7207E-09	-1.0323E-08	143.50
24	167.74	-24.437	3.3418E-10	-1.7207E-09	-1.0323E-08	143.50
25	167.74	-24.437	3.3418E-10	-1.7207E-09	-1.0323E-08	143.50
26	167.74	-24.437	3.3418E-10	-1.7207E-09	-1.0323E-08	143.50
27	167.74	-24.437	3.3418E-10	-1.7207E-09	-1.0323E-08	143.50
28	145.19	0.1174	43.417	-2.3521	203.31	7.0747
MINIMUM	135.13	-24.437	-43.417	-2.3521	-203.31	-92.276
Pile N.	1	23	22	28	22	2
MAXIMUM	176.29	23.477	43.417	2.3521	203.31	143.50
Pile N.	17	2	28	22	28	23

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.041782	-4.8094E-05	0.013923	-5.7083E-06	-1.3027E-15	1.7130E-05
2	0.043434	9.4400E-13	7.2860E-03	-1.0553E-15	1.8056E-05	1.1448E-15
3	0.043434	9.4400E-13	7.2860E-03	-1.0553E-15	1.8056E-05	1.1448E-15
4	0.043434	9.4400E-13	7.2860E-03	-1.0553E-15	1.8056E-05	1.1448E-15
5	0.043434	9.4400E-13	7.2860E-03	-1.0553E-15	1.8056E-05	1.1448E-15
6	0.043434	9.4400E-13	7.2860E-03	-1.0553E-15	1.8056E-05	1.1448E-15
7	0.041782	-4.8094E-05	-0.013923	5.7083E-06	-1.3027E-15	1.7130E-05
8	0.042810	-4.8094E-05	0.014266	-5.7083E-06	-1.3027E-15	1.7130E-05
9	0.042810	4.8094E-05	-0.014266	-5.7083E-06	1.3027E-15	-1.7130E-05
10	0.045124	9.9517E-13	4.8094E-05	-8.5282E-16	1.8056E-05	1.3027E-15
11	0.045124	9.9517E-13	4.8094E-05	-8.5282E-16	1.8056E-05	1.3027E-15
12	0.045124	9.9517E-13	4.8094E-05	-8.5282E-16	1.8056E-05	1.3027E-15
13	0.042810	-4.8094E-05	-0.014266	5.7083E-06	-1.3027E-15	1.7130E-05
14	0.042810	-4.8094E-05	-0.014266	5.7083E-06	-1.3027E-15	1.7130E-05
15	0.043838	-4.8094E-05	0.014608	-5.7083E-06	-1.3027E-15	1.7130E-05
16	0.043838	-4.8094E-05	0.014608	-5.7083E-06	-1.3027E-15	1.7130E-05
17	0.046208	1.0463E-12	4.8094E-05	-8.5282E-16	1.8056E-05	1.3027E-15
18	0.046208	1.0463E-12	4.8094E-05	-8.5282E-16	1.8056E-05	1.3027E-15
19	0.046208	1.0463E-12	4.8094E-05	-8.5282E-16	1.8056E-05	1.3027E-15
20	0.043838	-4.8094E-05	-0.014608	5.7083E-06	-1.3027E-15	1.7130E-05
21	0.043838	-4.8094E-05	-0.014608	5.7083E-06	-1.3027E-15	1.7130E-05
22	0.044866	-4.8094E-05	0.014951	-5.7083E-06	-1.3027E-15	1.7130E-05
23	0.046656	1.0975E-12	-7.7253E-03	-6.2712E-16	1.8056E-05	1.4251E-15
24	0.046656	1.0975E-12	-7.7253E-03	-6.2712E-16	1.8056E-05	1.4251E-15
25	0.046656	1.0975E-12	-7.7253E-03	-6.2712E-16	1.8056E-05	1.4251E-15
26	0.046656	1.0975E-12	-7.7253E-03	-6.2712E-16	1.8056E-05	1.4251E-15
27	0.046656	1.0975E-12	-7.7253E-03	-6.2712E-16	1.8056E-05	1.4251E-15
28	0.044866	-4.8094E-05	-0.014951	5.7083E-06	-1.3027E-15	1.7130E-05
MINIMUM	0.041782	-4.8094E-05	-0.014951	-5.7083E-06	-1.3027E-15	-1.7130E-05
Pile N.	1	1	28	1	1	9
MAXIMUM	0.046656	4.8094E-05	0.014951	5.7083E-06	1.8056E-05	1.7130E-05
Pile N.	23	9	22	7	2	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	141.12	0.1098	3.9460	-5.2211E-03	-177.38	7.2239
2	157.81	2.6222E-10	2.4940	-1.1059E-12	-92.276	8.5605E-09
3	157.81	2.6222E-10	2.4940	-1.1059E-12	-92.276	8.5605E-09
4	157.81	2.6222E-10	2.4940	-1.1059E-12	-92.276	8.5605E-09
5	157.81	2.6222E-10	2.4940	-1.1059E-12	-92.276	8.5605E-09
6	157.81	2.6222E-10	2.4940	-1.1059E-12	-92.276	8.5605E-09
7	141.12	0.1098	-3.9460	5.2211E-03	177.38	7.2239
8	144.57	0.1091	4.0015	-5.2211E-03	-180.61	7.2010
9	144.57	-0.1079	-3.9334	-5.2211E-03	178.73	-7.1640
10	172.17	4.4802E-09	-0.5779	-1.0259E-12	27.016	3.1415E-08
11	172.17	4.4802E-09	-0.5779	-1.0259E-12	27.016	3.1415E-08

12	172.17	4.4802E-09	-0.5779	-1.0259E-12	27.016	3.1415E-08
13	144.57	0.1079	-3.9334	5.2211E-03	178.73	7.1640
14	144.57	0.1091	-4.0015	5.2211E-03	180.61	7.2010
15	148.02	0.1084	4.0566	-5.2211E-03	-183.83	7.1786
16	148.02	0.1072	3.9876	-5.2211E-03	-181.92	7.1418
17	176.29	4.7081E-09	-0.5779	-1.0259E-12	27.015	3.2978E-08
18	176.29	4.7081E-09	-0.5779	-1.0259E-12	27.015	3.2978E-08
19	176.29	4.7081E-09	-0.5779	-1.0259E-12	27.015	3.2978E-08
20	148.02	0.1072	-3.9876	5.2211E-03	181.92	7.1418
21	148.02	0.1084	-4.0566	5.2211E-03	183.83	7.1786
22	151.47	0.1174	4.7123	-5.2211E-03	-203.31	7.4555
23	169.47	3.3418E-10	-3.4645	-6.5484E-13	143.50	1.0465E-08
24	169.47	3.3418E-10	-3.4645	-6.5484E-13	143.50	1.0465E-08
25	169.47	3.3418E-10	-3.4645	-6.5484E-13	143.50	1.0465E-08
26	169.47	3.3418E-10	-3.4645	-6.5484E-13	143.50	1.0465E-08
27	169.47	3.3418E-10	-3.4645	-6.5484E-13	143.50	1.0465E-08
28	151.47	0.1174	-4.7123	5.2211E-03	203.31	7.4555
MINIMUM	141.12	-0.1079	-4.7123	-5.2211E-03	-203.31	-7.1640
Pile N.	1	9	28	1	22	9
MAXIMUM	176.29	0.1174	4.7123	5.2211E-03	203.31	7.4555
Pile N.	17	22	22	7	28	22

PILE GROUP	STRESS,KIP/IN**2
1	5.1447
2	5.1264
3	5.1264
4	5.1264
5	5.1264
6	5.1264
7	5.1447
8	5.2637
9	5.2528
10	5.1626
11	5.1626
12	5.1626
13	5.2528
14	5.2637
15	5.3827
16	5.3716
17	5.2825
18	5.2825
19	5.2825
20	5.3716
21	5.3827
22	5.5966
23	5.7646
24	5.7646
25	5.7646
26	5.7646
27	5.7646
28	5.5966
MINIMUM	5.1264
Pile N.	2
MAXIMUM	5.7646
Pile N.	23

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
1	-4.8094E-05	-9.6476E-05	-7.2239	-177.38	-0.015083	-0.8703	-6.0649E-04	-0.022786	4.1023	1.2847E+07	3.5380E+07
x(FT)	0.0000	16.065	0.0000	0.0000	13.770	14.280	15.300	15.300	25.500	0.0000	0.0000
2	-7.8658E-15	-4.0780E-05	-8.5605E-09	-92.276	-3.7769E-11	-0.5008	-3.0131E-12	-0.018371	4.5875	1.2847E+07	3.5380E+07
x(FT)	12.495	14.700	0.0000	0.0000	11.025	12.985	13.475	14.700	24.500	0.0000	0.0000
3	-7.8658E-15	-4.0780E-05	-8.5605E-09	-92.276	-3.7769E-11	-0.5008	-3.0131E-12	-0.018371	4.5875	1.2847E+07	3.5380E+07
x(FT)	12.495	14.700	0.0000	0.0000	11.025	12.985	13.475	14.700	24.500	0.0000	0.0000
4	-7.8658E-15	-4.0780E-05	-8.5605E-09	-92.276	-3.7769E-11	-0.5008	-3.0131E-12	-0.018371	4.5875	1.2847E+07	3.5380E+07
x(FT)	12.495	14.700	0.0000	0.0000	11.025	12.985	13.475	14.700	24.500	0.0000	0.0000
5	-7.8658E-15	-4.0780E-05	-8.5605E-09	-92.276	-3.7769E-11	-0.5008	-3.0131E-12	-0.018371	4.5875	1.2847E+07	3.5380E+07
x(FT)	12.495	14.700	0.0000	0.0000	11.025	12.985	13.475	14.700	24.500	0.0000	0.0000
6	-7.8658E-15	-4.0780E-05	-8.5605E-09	-92.276	-3.7769E-11	-0.5008	-3.0131E-12	-0.018371	4.5875	1.2847E+07	3.5380E+07
x(FT)	12.495	14.700	0.0000	0.0000	11.025	12.985	13.475	14.700	24.500	0.0000	0.0000
7	-4.8094E-05	-0.013923	-7.2239	-52.137	-0.015083	-3.9020	-6.0649E-04	-0.036889	4.1023	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	0.0000	9.6900	13.770	0.0000	15.300	5.1000	25.500	0.0000	0.0000
8	-4.8094E-05	-1.0019E-04	-7.2010	-180.61	-0.015021	-0.8938	-6.0389E-04	-0.023071	4.2026	1.2847E+07	3.5380E+07
x(FT)	0.0000	16.065	0.0000	0.0000	13.770	14.280	15.300	15.555	25.500	0.0000	0.0000
9	-2.8097E-04	-0.014266	-0.7298	-52.786	-0.1082	-3.8903	-1.1839E-03	-0.036464	4.2026	1.2847E+07	3.5380E+07
x(FT)	3.8250	0.0000	10.710	9.9450	0.0000	0.0000	6.6300	5.1000	25.500	0.0000	0.0000
10	-3.1170E-14	-2.2816E-04	-3.1415E-08	-2.0066	-8.4942E-11	-0.5843	-1.7035E-12	-7.4148E-03	5.0048	1.2847E+07	3.5380E+07
x(FT)	9.0060	3.0810	0.0000	8.7690	6.8730	0.0000	9.4800	2.8440	23.700	0.0000	0.0000
11	-3.1170E-14	-2.2816E-04	-3.1415E-08	-2.0066	-8.4942E-11	-0.5843	-1.7035E-12	-7.4148E-03	5.0048	1.2847E+07	3.5380E+07
x(FT)	9.0060	3.0810	0.0000	8.7690	6.8730	0.0000	9.4800	2.8440	23.700	0.0000	0.0000
12	-3.1170E-14	-2.2816E-04	-3.1415E-08	-2.0066	-8.4942E-11	-0.5843	-1.7035E-12	-7.4148E-03	5.0048	1.2847E+07	3.5380E+07
x(FT)	9.0060	3.0810	0.0000	8.7690	6.8730	0.0000	9.4800	2.8440	23.700	0.0000	0.0000
13	-4.8094E-05	-0.014266	-7.1640	-52.786	-0.014902	-3.8903	-6.0133E-04	-0.036464	4.2026	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	0.0000	9.9450	14.025	0.0000	15.300	5.1000	25.500	0.0000	0.0000
14	-4.8094E-05	-0.014266	-7.2010	-53.184	-0.015021	-3.9572	-6.0389E-04	-0.037294	4.2026	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	0.0000	9.9450	13.770	0.0000	15.300	5.1000	25.500	0.0000	0.0000
15	-4.8094E-05	-1.0399E-04	-7.1786	-183.83	-0.014955	-0.9175	-6.0143E-04	-0.023385	4.3029	1.2847E+07	3.5380E+07
x(FT)	0.0000	16.065	0.0000	0.0000	13.770	14.280	15.300	15.555	25.500	0.0000	0.0000
16	-4.8094E-05	-1.0572E-04	-7.1418	-181.92	-0.014934	-0.9190	-5.9880E-04	-0.022883	4.3029	1.2847E+07	3.5380E+07
x(FT)	0.0000	16.320	0.0000	0.0000	14.025	14.280	15.300	15.555	25.500	0.0000	0.0000
17	-3.2788E-14	-2.2816E-04	-3.2978E-08	-2.0067	-8.9330E-11	-0.5843	-1.7910E-12	-7.4149E-03	5.1247	1.2847E+07	3.5380E+07
x(FT)	9.0060	3.0810	0.0000	8.7690	6.8730	0.0000	9.4800	2.8440	23.700	0.0000	0.0000
18	-3.2788E-14	-2.2816E-04	-3.2978E-08	-2.0067	-8.9330E-11	-0.5843	-1.7910E-12	-7.4149E-03	5.1247	1.2847E+07	3.5380E+07
x(FT)	9.0060	3.0810	0.0000	8.7690	6.8730	0.0000	9.4800	2.8440	23.700	0.0000	0.0000
19	-3.2788E-14	-2.2816E-04	-3.2978E-08	-2.0067	-8.9330E-11	-0.5843	-1.7910E-12	-7.4149E-03	5.1247	1.2847E+07	3.5380E+07

x(FT)	9.0060	3.0810	0.0000	8.7690	6.8730	0.0000	9.4800	2.8440	23.700	0.0000	0.0000
20	-4.8094E-05	-0.014608	-7.1418	-53.820	-0.014934	-3.9442	-5.9880E-04	-0.036853	4.3029	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	0.0000	9.9450	14.025	0.0000	15.300	5.3550	25.500	0.0000	0.0000
21	-4.8094E-05	-0.014608	-7.1786	-54.230	-0.014955	-4.0120	-6.0143E-04	-0.037693	4.3029	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	0.0000	9.9450	13.770	0.0000	15.300	5.1000	25.500	0.0000	0.0000
22	-4.8094E-05	-9.3354E-05	-7.4555	-203.31	-0.015739	-0.9349	-9.8960E-04	-0.028424	4.4033	1.2847E+07	3.5380E+07
x(FT)	0.0000	15.810	0.0000	0.0000	13.770	13.770	14.025	15.300	25.500	0.0000	0.0000
23	-1.1843E-14	-7.7638E-03	-1.0465E-08	-35.616	-4.3120E-11	-3.4214	-2.9056E-12	-0.035866	4.9266	1.2847E+07	3.5380E+07
x(FT)	12.250	0.4900	0.0000	9.0650	10.535	0.0000	14.700	3.6750	24.500	0.0000	0.0000
24	-1.1843E-14	-7.7638E-03	-1.0465E-08	-35.616	-4.3120E-11	-3.4214	-2.9056E-12	-0.035866	4.9266	1.2847E+07	3.5380E+07
x(FT)	12.250	0.4900	0.0000	9.0650	10.535	0.0000	14.700	3.6750	24.500	0.0000	0.0000
25	-1.1843E-14	-7.7638E-03	-1.0465E-08	-35.616	-4.3120E-11	-3.4214	-2.9056E-12	-0.035866	4.9266	1.2847E+07	3.5380E+07
x(FT)	12.250	0.4900	0.0000	9.0650	10.535	0.0000	14.700	3.6750	24.500	0.0000	0.0000
26	-1.1843E-14	-7.7638E-03	-1.0465E-08	-35.616	-4.3120E-11	-3.4214	-2.9056E-12	-0.035866	4.9266	1.2847E+07	3.5380E+07
x(FT)	12.250	0.4900	0.0000	9.0650	10.535	0.0000	14.700	3.6750	24.500	0.0000	0.0000
27	-1.1843E-14	-7.7638E-03	-1.0465E-08	-35.616	-4.3120E-11	-3.4214	-2.9056E-12	-0.035866	4.9266	1.2847E+07	3.5380E+07
x(FT)	12.250	0.4900	0.0000	9.0650	10.535	0.0000	14.700	3.6750	24.500	0.0000	0.0000
28	-4.8094E-05	-0.014951	-7.4555	-58.921	-0.015739	-4.6564	-9.8960E-04	-0.045594	4.4033	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	0.0000	9.4350	13.770	0.0000	14.025	4.5900	25.500	0.0000	0.0000
Min.	-2.8097E-04	-0.014951	-7.4555	-203.31	-0.1082	-4.6564	-1.1839E-03	-0.045594	4.1023	1.2847E+07	3.5380E+07
Pile N.	9	28	22	22	9	28	9	28	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	2.7836E-04	0.013923	0.7310	52.137	0.1101	3.9020	1.2122E-03	0.036889	5.1447	1.2847E+07	3.5380E+07
x(FT)	3.8250	0.0000	10.710	9.6900	0.0000	0.0000	6.6300	5.1000	0.0000	0.0000	0.0000
2	9.4449E-13	7.2860E-03	2.1898E-09	31.166	2.5798E-10	2.4607	3.4347E-12	0.026745	5.1264	1.2847E+07	3.5380E+07
x(FT)	0.2450	0.0000	7.3500	8.5750	0.0000	0.0000	2.2050	3.4300	0.0000	0.0000	0.0000
3	9.4449E-13	7.2860E-03	2.1898E-09	31.166	2.5798E-10	2.4607	3.4347E-12	0.026745	5.1264	1.2847E+07	3.5380E+07
x(FT)	0.2450	0.0000	7.3500	8.5750	0.0000	0.0000	2.2050	3.4300	0.0000	0.0000	0.0000
4	9.4449E-13	7.2860E-03	2.1898E-09	31.166	2.5798E-10	2.4607	3.4347E-12	0.026745	5.1264	1.2847E+07	3.5380E+07
x(FT)	0.2450	0.0000	7.3500	8.5750	0.0000	0.0000	2.2050	3.4300	0.0000	0.0000	0.0000
5	9.4449E-13	7.2860E-03	2.1898E-09	31.166	2.5798E-10	2.4607	3.4347E-12	0.026745	5.1264	1.2847E+07	3.5380E+07
x(FT)	0.2450	0.0000	7.3500	8.5750	0.0000	0.0000	2.2050	3.4300	0.0000	0.0000	0.0000
6	9.4449E-13	7.2860E-03	2.1898E-09	31.166	2.5798E-10	2.4607	3.4347E-12	0.026745	5.1264	1.2847E+07	3.5380E+07
x(FT)	0.2450	0.0000	7.3500	8.5750	0.0000	0.0000	2.2050	3.4300	0.0000	0.0000	0.0000
7	2.7836E-04	9.6476E-05	0.7310	177.38	0.1101	0.8703	1.2122E-03	0.022786	5.1447	1.2847E+07	3.5380E+07
x(FT)	3.8250	16.065	10.710	0.0000	0.0000	14.280	6.6300	15.300	0.0000	0.0000	0.0000
8	2.7935E-04	0.014266	0.7307	53.184	0.1094	3.9572	1.2016E-03	0.037294	5.2637	1.2847E+07	3.5380E+07
x(FT)	3.8250	0.0000	10.710	9.9450	0.0000	0.0000	6.6300	5.1000	0.0000	0.0000	0.0000
9	4.8094E-05	1.0187E-04	7.1640	178.73	0.014902	0.8953	6.0133E-04	0.022578	5.2528	1.2847E+07	3.5380E+07
x(FT)	0.0000	16.065	0.0000	0.0000	14.025	14.280	15.300	15.555	0.0000	0.0000	0.0000
10	9.9517E-13	4.8094E-05	4.3797E-09	27.016	4.3533E-09	0.036183	1.0462E-09	4.3314E-03	5.1626	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	4.5030	0.0000	0.0000	12.087	0.2370	0.0000	0.0000	0.0000	0.0000
11	9.9517E-13	4.8094E-05	4.3797E-09	27.016	4.3533E-09	0.036183	1.0462E-09	4.3314E-03	5.1626	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	4.5030	0.0000	0.0000	12.087	0.2370	0.0000	0.0000	0.0000	0.0000
12	9.9517E-13	4.8094E-05	4.3797E-09	27.016	4.3533E-09	0.036183	1.0462E-09	4.3314E-03	5.1626	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	4.5030	0.0000	0.0000	12.087	0.2370	0.0000	0.0000	0.0000	0.0000
13	2.8097E-04	1.0187E-04	0.7298	178.73	0.1082	0.8953	1.1839E-03	0.022578	5.2528	1.2847E+07	3.5380E+07
x(FT)	3.8250	16.065	10.710	0.0000	0.0000	14.280	6.6300	15.555	0.0000	0.0000	0.0000
14	2.7935E-04	1.0019E-04	0.7307	180.61	0.1094	0.8938	1.2016E-03	0.023071	5.2637	1.2847E+07	3.5380E+07
x(FT)	3.8250	16.065	10.710	0.0000	0.0000	14.280	6.6300	15.555	0.0000	0.0000	0.0000
15	2.8031E-04	0.014608	0.7304	54.230	0.1087	4.0120	1.1914E-03	0.037693	5.3827	1.2847E+07	3.5380E+07
x(FT)	3.8250	0.0000	10.710	9.9450	0.0000	0.0000	6.6300	5.1000	0.0000	0.0000	0.0000
16	2.8194E-04	0.014608	0.7294	53.820	0.1075	3.9442	1.1739E-03	0.036853	5.3716	1.2847E+07	3.5380E+07
x(FT)	3.8250	0.0000	10.710	9.9450	0.0000	0.0000	6.8850	5.3550	0.0000	0.0000	0.0000
17	1.0463E-12	4.8094E-05	4.6054E-09	27.015	4.5748E-09	0.036188	1.0998E-09	4.3314E-03	5.2825	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	4.5030	0.0000	0.0000	12.087	0.2370	0.0000	0.0000	0.0000	0.0000
18	1.0463E-12	4.8094E-05	4.6054E-09	27.015	4.5748E-09	0.036188	1.0998E-09	4.3314E-03	5.2825	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	4.5030	0.0000	0.0000	12.087	0.2370	0.0000	0.0000	0.0000	0.0000
19	1.0463E-12	4.8094E-05	4.6054E-09	27.015	4.5748E-09	0.036188	1.0998E-09	4.3314E-03	5.2825	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	4.5030	0.0000	0.0000	12.087	0.2370	0.0000	0.0000	0.0000	0.0000
20	2.8194E-04	1.0572E-04	0.7294	181.92	0.1075	0.9190	1.1739E-03	0.022883	5.3716	1.2847E+07	3.5380E+07
x(FT)	3.8250	16.320	10.710	0.0000	0.0000	14.280	6.8850	15.555	0.0000	0.0000	0.0000
21	2.8031E-04	1.0399E-04	0.7304	183.83	0.1087	0.9175	1.1914E-03	0.023385	5.3827	1.2847E+07	3.5380E+07
x(FT)	3.8250	16.065	10.710	0.0000	0.0000	14.280	6.6300	15.555	0.0000	0.0000	0.0000
22	2.6847E-04	0.014951	0.7383	58.921	0.1177	4.6564	1.3287E-03	0.045594	5.5966	1.2847E+07	3.5380E+07
x(FT)	3.5700	0.0000	10.200	9.4350	0.0000	0.0000	6.3750	4.5900	0.0000	0.0000	0.0000
23	1.0982E-12	3.1196E-05	2.5951E-09	143.50	3.2812E-10	0.5969	4.5899E-12	0.030886	5.7646	1.2847E+07	3.5380E+07
x(FT)	0.2450	15.190	7.1050	0.0000	0.0000	13.720	1.7150	14.700	0.0000	0.0000	0.0000
24	1.0982E-12	3.1196E-05	2.5951E-09	143.50	3.2812E-10	0.5969	4.5899E-12	0.030886	5.7646	1.2847E+07	3.5380E+07
x(FT)	0.2450	15.190	7.1050	0.0000	0.0000	13.720	1.7150	14.700	0.0000	0.0000	0.0000
25	1.0982E-12	3.1196E-05	2.5951E-09	143.50	3.2812E-10	0.5969	4.5899E-12	0.030886	5.7646	1.2847E+07	3.5380E+07
x(FT)	0.2450	15.190	7.1050	0.0000	0.0000	13.720	1.7150	14.700	0.0000	0.0000	0.0000
26	1.0982E-12	3.1196E-05	2.5951E-09	143.50	3.2812E-10	0.5969	4.5899E-12	0.030886	5.7646	1.2847E+07	3.5380E+07
x(FT)	0.2450	15.190	7.1050	0.0000	0.0000	13.720	1.7150	14.700	0.0000	0.0000	0.0000
27	1.0982E-12	3.1196E-05	2.5951E-09	143.50	3.2812E-10	0.5969	4.5899E-12	0.030886	5.7646	1.2847E+07	3.5380E+07
x(FT)	0.2450	15.190	7.1050	0.0000	0.0000	13.720	1.7150	14.700	0.0000	0.0000	0.0000
28	2.6847E-04	9.3354E-05	0.7383	203.31	0.1177	0.9349	1.3287E-03	0.028424	5.5966	1.2847E+07	3.5380E+07
x(FT)	3.5700	15.810	10.200	0.0000	0.0000	13.770	6.3750	15.300	0.0000	0.0000	0.0000
Max.	2.8194E-04	0.014951	7.1640	203.31	0.1177	4.6564	1.3287E-03	0.045594	5.7646	1.2847E+07	3.5380E+07
Pile N.	16	22	9	28	22	22	22	22	23	1	1

LOAD CASE : 4
CASE NAME : Strength V Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	1.0000	1.0000
2	0.8367	1.0000

3	0.8367	1.0000
4	0.8367	1.0000
5	0.8367	1.0000
6	0.8367	1.0000
7	0.8367	1.0000
8	0.9749	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.7881	1.0000
15	0.9749	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	0.7881	1.0000
22	0.9749	1.0000
23	0.8036	1.0000
24	0.8036	1.0000
25	0.8036	1.0000
26	0.8036	1.0000
27	0.8036	1.0000
28	0.8066	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
4753.00	25.0000	80.0000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	1.46424E+05	46008.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.0500984	4.53474E-03	-0.0111624

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
-6.86281E-06	1.33045E-04	1.04917E-04

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.016708	6.4469E-03	-0.015771	-6.8628E-06	1.3305E-04	1.0492E-04
2	0.024691	6.8587E-03	-0.015771	-6.8628E-06	1.3305E-04	1.0492E-04
3	0.032673	7.2705E-03	-0.015771	-6.8628E-06	1.3305E-04	1.0492E-04
4	0.040656	7.6822E-03	-0.015771	-6.8628E-06	1.3305E-04	1.0492E-04
5	0.048639	8.0940E-03	-0.015771	-6.8628E-06	1.3305E-04	1.0492E-04
6	0.056621	8.5058E-03	-0.015771	-6.8628E-06	1.3305E-04	1.0492E-04
7	0.064604	8.9175E-03	-0.015771	-6.8628E-06	1.3305E-04	1.0492E-04
8	0.023003	6.4469E-03	-0.015360	-6.8628E-06	1.3305E-04	1.0492E-04
9	0.030985	6.8587E-03	-0.015360	-6.8628E-06	1.3305E-04	1.0492E-04
10	0.038968	7.2705E-03	-0.015360	-6.8628E-06	1.3305E-04	1.0492E-04
11	0.046951	7.6822E-03	-0.015360	-6.8628E-06	1.3305E-04	1.0492E-04
12	0.054934	8.0940E-03	-0.015360	-6.8628E-06	1.3305E-04	1.0492E-04
13	0.062916	8.5058E-03	-0.015360	-6.8628E-06	1.3305E-04	1.0492E-04
14	0.070899	8.9175E-03	-0.015360	-6.8628E-06	1.3305E-04	1.0492E-04
15	0.029298	6.4469E-03	-0.014948	-6.8628E-06	1.3305E-04	1.0492E-04
16	0.037281	6.8587E-03	-0.014948	-6.8628E-06	1.3305E-04	1.0492E-04
17	0.045263	7.2705E-03	-0.014948	-6.8628E-06	1.3305E-04	1.0492E-04
18	0.053246	7.6822E-03	-0.014948	-6.8628E-06	1.3305E-04	1.0492E-04
19	0.061229	8.0940E-03	-0.014948	-6.8628E-06	1.3305E-04	1.0492E-04
20	0.069211	8.5058E-03	-0.014948	-6.8628E-06	1.3305E-04	1.0492E-04
21	0.077194	8.9175E-03	-0.014948	-6.8628E-06	1.3305E-04	1.0492E-04
22	0.035593	6.4469E-03	-0.014536	-6.8628E-06	1.3305E-04	1.0492E-04
23	0.043576	6.8587E-03	-0.014536	-6.8628E-06	1.3305E-04	1.0492E-04
24	0.051558	7.2705E-03	-0.014536	-6.8628E-06	1.3305E-04	1.0492E-04
25	0.059541	7.6822E-03	-0.014536	-6.8628E-06	1.3305E-04	1.0492E-04
26	0.067524	8.0940E-03	-0.014536	-6.8628E-06	1.3305E-04	1.0492E-04
27	0.075506	8.5058E-03	-0.014536	-6.8628E-06	1.3305E-04	1.0492E-04
28	0.083489	8.9175E-03	-0.014536	-6.8628E-06	1.3305E-04	1.0492E-04
MINIMUM	0.016708	6.4469E-03	-0.015771	-6.8628E-06	1.3305E-04	1.0492E-04
Pile N.	1	1	1	1	1	1
MAXIMUM	0.083489	8.9175E-03	-0.014536	-6.8628E-06	1.3305E-04	1.0492E-04
Pile N.	28	7	22	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	65.633	2.1654	-26.937	28.939	264.26	86.956
2	91.210	17.270	-3.8399	-26.993	162.10	138.82
3	119.61	21.766	-3.8605	-27.105	162.77	127.99

4	148.02	26.258	-3.8776	-27.204	163.36	117.00
5	176.42	30.746	-3.8907	-27.288	163.86	105.85
6	204.82	35.231	-3.8995	-27.356	164.27	94.552
7	182.51	1.6108	52.930	-26.341	445.13	79.122
8	84.431	2.2589	-32.578	29.567	236.88	88.842
9	108.89	2.1843	-39.630	29.333	195.98	88.139
10	148.73	2.9851	-3.4270	-8.2790E-03	152.24	185.21
11	179.12	3.0675	-3.4055	-8.2790E-03	151.68	189.31
12	209.50	3.1485	-3.3839	-8.2790E-03	151.11	193.38
13	177.70	1.5145	51.735	-25.251	428.64	75.853
14	201.88	1.5130	59.628	-25.364	440.35	76.192
15	103.23	2.4029	-38.217	30.541	209.75	91.764
16	127.69	2.3132	-45.262	30.284	168.96	90.994
17	172.69	3.0010	-3.3781	-8.2790E-03	150.14	185.65
18	203.08	3.0835	-3.3565	-8.2790E-03	149.57	189.75
19	233.47	3.1646	-3.3347	-8.2790E-03	148.99	193.82
20	197.16	1.4773	58.157	-24.839	434.04	74.616
21	221.36	1.4885	65.974	-25.136	450.35	75.506
22	122.06	2.5552	-43.763	31.586	180.33	94.899
23	150.73	-20.758	-3.0652	22.974	138.06	251.05
24	178.66	-25.135	-2.9888	22.638	136.05	266.04
25	206.58	-29.526	-2.9155	22.315	134.11	280.58
26	234.50	-33.929	-2.8457	22.006	132.25	294.72
27	262.42	-38.345	-2.7793	21.711	130.48	308.51
28	240.89	1.4871	72.211	-25.128	464.51	75.484
MINIMUM	65.633	-38.345	-45.262	-27.356	130.48	74.616
Pile N.	1	27	16	6	27	20
MAXIMUM	262.42	35.231	72.211	31.586	464.51	308.51
Pile N.	27	6	28	22	28	27

THE PILE COORDINATE SYSTEM (LOCAL AXES)

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.020837	6.4469E-03	-9.6804E-03	-3.9680E-05	1.3305E-04	9.7366E-05
2	0.025482	-0.015771	-2.7073E-03	1.5098E-05	1.0492E-04	-1.3236E-04
3	0.033424	-0.015771	-1.8015E-03	1.5098E-05	1.0492E-04	-1.3236E-04
4	0.041366	-0.015771	-8.9561E-04	1.5098E-05	1.0492E-04	-1.3236E-04
5	0.049307	-0.015771	1.0249E-05	1.5098E-05	1.0492E-04	-1.3236E-04
6	0.057249	-0.015771	9.1611E-04	1.5098E-05	1.0492E-04	-1.3236E-04
7	0.056304	8.9175E-03	-0.035387	2.6658E-05	1.3305E-04	1.0171E-04
8	0.026679	6.4469E-03	-7.2996E-03	-3.9680E-05	1.3305E-04	9.7366E-05
9	0.034252	-6.8587E-03	4.7759E-03	-3.9680E-05	-1.3305E-04	-9.7366E-05
10	0.038968	-0.015360	-7.2705E-03	-6.8628E-06	1.0492E-04	-1.3305E-04
11	0.046951	-0.015360	-7.6822E-03	-6.8628E-06	1.0492E-04	-1.3305E-04
12	0.054934	-0.015360	-8.0940E-03	-6.8628E-06	1.0492E-04	-1.3305E-04
13	0.054834	8.5058E-03	-0.034463	2.6658E-05	1.3305E-04	1.0171E-04
14	0.062407	8.9175E-03	-0.036986	2.6658E-05	1.3305E-04	1.0171E-04
15	0.032521	6.4469E-03	-4.9188E-03	-3.9680E-05	1.3305E-04	9.7366E-05
16	0.040094	6.8587E-03	-2.3951E-03	-3.9680E-05	1.3305E-04	9.7366E-05
17	0.045263	-0.014948	-7.2705E-03	-6.8628E-06	1.0492E-04	-1.3305E-04
18	0.053246	-0.014948	-7.6822E-03	-6.8628E-06	1.0492E-04	-1.3305E-04
19	0.061229	-0.014948	-8.0940E-03	-6.8628E-06	1.0492E-04	-1.3305E-04
20	0.060936	8.5058E-03	-0.036062	2.6658E-05	1.3305E-04	1.0171E-04
21	0.068509	8.9175E-03	-0.038586	2.6658E-05	1.3305E-04	1.0171E-04
22	0.038363	6.4469E-03	-2.5380E-03	-3.9680E-05	1.3305E-04	9.7366E-05
23	0.041856	-0.014536	-0.013928	-2.8637E-05	1.0492E-04	-1.3011E-04
24	0.049662	-0.014536	-0.015646	-2.8637E-05	1.0492E-04	-1.3011E-04
25	0.057468	-0.014536	-0.017364	-2.8637E-05	1.0492E-04	-1.3011E-04
26	0.065275	-0.014536	-0.019082	-2.8637E-05	1.0492E-04	-1.3011E-04
27	0.073081	-0.014536	-0.020800	-2.8637E-05	1.0492E-04	-1.3011E-04
28	0.074611	8.9175E-03	-0.040185	2.6658E-05	1.3305E-04	1.0171E-04
MINIMUM	0.020837	-0.015771	-0.040185	-3.9680E-05	-1.3305E-04	-1.3305E-04
Pile N.	1	2	28	1	9	10
MAXIMUM	0.074611	8.9175E-03	4.7759E-03	2.6658E-05	1.3305E-04	1.0171E-04
Pile N.	28	7	9	7	1	7

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	70.783	2.1654	-4.8062	-0.036293	264.26	91.645
2	92.808	-3.8399	-2.0443	0.015857	138.82	-164.33
3	121.56	-3.8605	-1.8109	0.015857	127.99	-165.01
4	150.32	-3.8776	-1.5732	0.015857	117.00	-165.61
5	179.07	-3.8907	-1.3316	0.015857	105.85	-166.12
6	207.83	-3.8995	-1.0868	0.015857	94.552	-166.53
7	189.88	1.6108	-7.4844	0.024383	445.13	83.392
8	90.400	2.2589	-4.2146	-0.036293	236.88	93.633
9	115.83	-2.1843	3.1731	-0.036293	-195.98	-92.892
10	148.73	-3.4270	-2.9851	-8.2790E-03	185.21	-152.24
11	179.12	-3.4055	-3.0675	-8.2790E-03	189.31	-151.68
12	209.50	-3.3839	-3.1485	-8.2790E-03	193.38	-151.11
13	184.94	1.5145	-7.0987	0.024383	428.64	79.945
14	210.38	1.5130	-7.2535	0.024383	440.35	80.303
15	110.02	2.4029	-3.6208	-0.036293	209.75	96.713
16	135.45	2.3132	-2.5719	-0.036293	168.96	95.901
17	172.69	-3.3781	-3.0010	-8.2790E-03	185.65	-150.14
18	203.08	-3.3565	-3.0835	-8.2790E-03	189.75	-149.57
19	233.47	-3.3347	-3.1646	-8.2790E-03	193.82	-148.99
20	205.44	1.4773	-7.1576	0.024383	434.04	78.642
21	230.87	1.4885	-7.3929	0.024383	450.35	79.580
22	129.64	2.5552	-2.9299	-0.036293	180.33	100.02
23	152.09	-3.0652	-4.2981	-0.030078	251.05	-139.96
24	180.36	-2.9888	-4.5710	-0.030078	266.04	-137.92
25	208.62	-2.9155	-4.8292	-0.030078	280.58	-135.95
26	236.89	-2.8457	-5.0743	-0.030078	294.72	-134.07
27	265.15	-2.7793	-5.3079	-0.030078	308.51	-132.28

28	251.36	1.4871	-7.6477	0.024383	464.51	79.556
MINIMUM	70.783	-3.8995	-7.6477	-0.036293	-195.98	-166.53
Pile N.	1	6	28	1	9	6
MAXIMUM	265.15	2.5552	3.1731	0.024383	464.51	100.02
Pile N.	27	22	9	7	28	22

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	4.1917
2	5.4625
3	6.2910
4	7.1196
5	7.9480
6	8.7763
7	8.4451
8	4.6728
9	5.2493
10	7.0005
11	7.8853
12	8.7701
13	8.1905
14	8.9934
15	5.1781
16	5.7685
17	7.6672
18	8.5520
19	9.4370
20	8.8049
21	9.6363
22	5.6912
23	7.1078
24	7.9512
25	8.7971
26	9.6454
27	10.496
28	10.306
MINIMUM	4.1917
Pile N.	1
MAXIMUM	10.496
Pile N.	27

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-5.9456E-05	-0.011027	-91.645	-47.198	-0.2531	-4.7632	-0.015277	-0.042473	2.0576	1.2847E+07	3.5380E+07
x(FT)	14.025	1.7850	0.0000	10.710	12.495	0.0000	15.300	6.1200	25.500	0.0000	0.0000
2	-0.016517	-4.3731E-03	-34.304	-21.523	-3.7953	-2.0369	-0.040566	-0.018777	2.6979	1.2847E+07	3.5380E+07
x(FT)	0.9800	2.9400	8.8200	11.515	0.0000	0.0000	4.4100	8.0850	24.500	0.0000	0.0000
3	-0.016514	-3.6274E-03	-34.608	-18.603	-3.8162	-1.8063	-0.040903	-0.016978	3.5338	1.2847E+07	3.5380E+07
x(FT)	0.9800	3.1850	8.8200	11.515	0.0000	0.0000	4.4100	8.8200	24.500	0.0000	0.0000
4	-0.016511	-2.9198E-03	-34.912	-15.724	-3.8337	-1.5712	-0.041191	-0.015288	4.3697	1.2847E+07	3.5380E+07
x(FT)	0.9800	3.6750	8.5750	11.760	0.0000	0.0000	4.4100	9.5550	24.500	0.0000	0.0000
5	-0.016509	-2.2566E-03	-35.216	-12.881	-3.8473	-1.3324	-0.041425	-0.013724	5.2056	1.2847E+07	3.5380E+07
x(FT)	0.9800	4.1650	8.5750	12.005	0.0000	0.0000	4.4100	10.045	24.500	0.0000	0.0000
6	-0.016506	-1.6545E-03	-35.503	-10.127	-3.8567	-1.0956	-0.041601	-0.012287	6.0415	1.2847E+07	3.5380E+07
x(FT)	0.9800	4.9000	8.5750	12.250	0.0000	0.7350	4.4100	10.535	24.500	0.0000	0.0000
7	-3.0619E-05	-0.036132	-83.392	-111.37	-0.2653	-7.4256	-0.011356	-0.1355	5.5199	1.2847E+07	3.5380E+07
x(FT)	16.830	1.0200	0.0000	12.495	15.300	0.0000	16.065	15.810	25.500	0.0000	0.0000
8	-6.6474E-05	-8.8261E-03	-93.633	-39.293	-0.2565	-4.1793	-0.014816	-0.037494	2.6279	1.2847E+07	3.5380E+07
x(FT)	13.770	2.0400	0.0000	10.965	12.240	0.0000	15.300	6.3750	25.500	0.0000	0.0000
9	-7.5957E-03	-4.1767E-05	-15.946	-195.98	-2.1552	-0.5117	-0.023509	-0.013286	3.3672	1.2847E+07	3.5380E+07
x(FT)	1.2750	17.595	8.9250	0.0000	0.0000	15.810	3.3150	17.595	25.500	0.0000	0.0000
10	-0.016172	-8.4661E-03	-31.128	-36.247	-3.3901	-2.9676	-0.034875	-0.030545	4.3236	1.2847E+07	3.5380E+07
x(FT)	1.1850	2.1330	9.2430	11.613	0.0000	0.0000	4.2660	14.694	23.700	0.0000	0.0000
11	-0.016176	-8.8466E-03	-31.023	-37.482	-3.3694	-3.0493	-0.034646	-0.031914	5.2069	1.2847E+07	3.5380E+07
x(FT)	1.1850	1.8960	9.2430	11.613	0.0000	0.0000	4.2660	14.694	23.700	0.0000	0.0000
12	-0.016179	-9.2328E-03	-30.917	-38.713	-3.3486	-3.1297	-0.034416	-0.033300	6.0902	1.2847E+07	3.5380E+07
x(FT)	1.1850	1.8960	9.2430	11.613	0.0000	0.0000	4.2660	14.694	23.700	0.0000	0.0000
13	-3.2014E-05	-0.035240	-79.945	-107.26	-0.2545	-7.0440	-0.010902	-0.1319	5.3763	1.2847E+07	3.5380E+07
x(FT)	17.085	1.0200	0.0000	12.750	15.555	0.0000	16.065	15.810	25.500	0.0000	0.0000
14	-2.8643E-05	-0.037740	-80.303	-110.13	-0.2575	-7.1977	-0.012849	-0.1203	6.1156	1.2847E+07	3.5380E+07
x(FT)	17.340	1.0200	0.0000	12.750	15.810	0.0000	16.575	16.320	25.500	0.0000	0.0000
15	-7.7772E-05	-6.6763E-03	-96.713	-31.498	-0.2636	-3.5942	-0.014455	-0.032726	3.1982	1.2847E+07	3.5380E+07
x(FT)	13.515	2.5500	0.0000	10.965	11.985	0.0000	15.300	6.3750	25.500	0.0000	0.0000
16	-8.0437E-05	-4.6337E-03	-95.901	-22.305	-0.2650	-2.5613	-0.012963	-0.023445	3.9375	1.2847E+07	3.5380E+07
x(FT)	13.770	3.3150	0.0000	11.730	12.240	0.0000	15.300	6.8850	25.500	0.0000	0.0000
17	-0.015775	-8.4630E-03	-30.513	-36.278	-3.3421	-2.9833	-0.034448	-0.030417	5.0202	1.2847E+07	3.5380E+07
x(FT)	1.1850	2.1330	9.2430	11.613	0.0000	0.0000	4.2660	14.694	23.700	0.0000	0.0000
18	-0.015779	-8.8441E-03	-30.408	-37.515	-3.3212	-3.0652	-0.034215	-0.031796	5.9035	1.2847E+07	3.5380E+07
x(FT)	1.1850	1.8960	9.2430	11.613	0.0000	0.0000	4.2660	14.694	23.700	0.0000	0.0000
19	-0.015782	-9.2302E-03	-30.303	-38.747	-3.3002	-3.1457	-0.033981	-0.033190	6.7868	1.2847E+07	3.5380E+07
x(FT)	1.1850	1.8960	9.2430	11.613	0.0000	0.0000	4.2660	14.694	23.700	0.0000	0.0000
20	-2.7247E-05	-0.036828	-78.642	-108.02	-0.2503	-7.1023	-0.012500	-0.1214	5.9720	1.2847E+07	3.5380E+07
x(FT)	17.340	1.0200	0.0000	12.750	15.810	0.0000	16.320	16.320	25.500	0.0000	0.0000
21	-3.0341E-05	-0.039319	-79.580	-113.65	-0.2562	-7.3367	-0.013267	-0.1213	6.7113	1.2847E+07	3.5380E+07
x(FT)	17.595	1.0200	0.0000	13.005	15.810	0.0000	16.575	16.320	25.500	0.0000	0.0000
22	-9.1324E-05	-4.6349E-03	-100.02	-23.581	-0.2730	-2.9151	-0.013996	-0.027325	3.7685	1.2847E+07	3.5380E+07
x(FT)	13.260	3.0600	0.0000	11.220	11.730	0.0000	15.300	6.8850	25.500	0.0000	0.0000
23	-0.015389	-0.014779	-27.853	-55.530	-3.0324	-4.2659	-0.030610	-0.054502	4.4213	1.2847E+07	3.5380E+07
x(FT)	1.2250	1.4700	9.3100	11.515	0.0000	0.0000	4.1650	14.700	24.500	0.0000	0.0000
24	-0.015403	-0.016440	-27.420	-60.239	-2.9578	-4.5365	-0.029668	-0.060257	5.2430	1.2847E+07	3.5380E+07
x(FT)	1.2250	1.2250	9.5550	11.760	0.0000	0.0000	4.1650	14.700	24.500	0.0000	0.0000
25	-0.015417	-0.018117	-27.008	-64.889	-2.8862	-4.7927	-0.028769	-0.065605	6.0646	1.2847E+07	3.5380E+07
x(FT)	1.2250	1.2250	9.5550	11.760	0.0000	0.0000	4.1650	14.700	24.500	0.0000	0.0000
26	-0.015430	-0.019795	-26.608	-69.460	-2.8180	-5.0361	-0.027918	-0.070578	6.8863	1.2847E+07	3.5380E+07
x(FT)	1.2250	1.2250	9.8000	11.760	0.0000	0.0000	4.4100	14.700	24.500	0.0000	0.0000
27	-0.015442	-0.021475	-26.266	-73.956	-2.7531	-5.2681	-0.027119	-0.075220	7.7079	1.2847E+07	3.5380E+07

x(FT)	1.2250	1.2250	9.8000	11.760	0.0000	0.0000	4.4100	14.700	24.500	0.0000	0.0000
28	-3.0452E-05	-0.040891	-79.556	-117.99	-0.2571	-7.5896	-0.012614	-0.1308	7.3070	1.2847E+07	3.5380E+07
x(FT)	17.595	1.0200	0.0000	12.750	15.810	0.0000	16.575	16.320	25.500	0.0000	0.0000
Min.	-0.016517	-0.040891	-100.02	-195.98	-3.8567	-7.5896	-0.041601	-0.1355	2.0576	1.2847E+07	3.5380E+07
Pile N.	2	28	22	9	6	28	6	7	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	7.1947E-03	6.2602E-05	15.442	264.26	2.1370	0.7812	0.023659	0.019641	4.1917	1.2847E+07	3.5380E+07
x(FT)	1.2750	17.085	8.6700	0.0000	0.0000	15.300	3.3150	16.830	0.0000	0.0000	0.0000
2	1.6229E-04	3.5705E-05	164.33	138.82	0.5721	0.3697	0.023091	0.010240	5.4625	1.2847E+07	3.5380E+07
x(FT)	13.965	17.395	0.0000	0.0000	12.250	15.435	14.700	18.130	0.0000	0.0000	0.0000
3	1.6927E-04	3.0650E-05	165.01	127.99	0.5800	0.3235	0.023478	9.1863E-03	6.2910	1.2847E+07	3.5380E+07
x(FT)	13.965	17.395	0.0000	0.0000	12.250	15.435	14.700	18.375	0.0000	0.0000	0.0000
4	1.7710E-04	2.5841E-05	165.61	117.00	0.5878	0.2779	0.023840	8.1673E-03	7.1196	1.2847E+07	3.5380E+07
x(FT)	13.720	17.395	0.0000	0.0000	12.005	15.680	14.700	18.620	0.0000	0.0000	0.0000
5	1.8478E-04	2.1244E-05	166.12	105.85	0.5970	0.2337	0.024174	7.1943E-03	7.9480	1.2847E+07	3.5380E+07
x(FT)	13.720	17.395	0.0000	0.0000	12.005	15.680	14.700	18.620	0.0000	0.0000	0.0000
6	1.9204E-04	9.1611E-04	166.53	94.552	0.6060	0.1908	0.024480	6.1934E-03	8.7763	1.2847E+07	3.5380E+07
x(FT)	13.720	0.0000	0.0000	0.0000	12.005	15.925	14.700	18.620	0.0000	0.0000	0.0000
7	9.8116E-03	3.1628E-04	15.347	445.13	1.5969	2.3369	0.014851	0.054235	8.4451	1.2847E+07	3.5380E+07
x(FT)	1.5300	18.615	10.455	0.0000	0.0000	16.320	4.8450	18.615	0.0000	0.0000	0.0000
8	7.1804E-03	4.8522E-05	15.735	236.88	2.2279	0.6533	0.025080	0.017079	4.6728	1.2847E+07	3.5380E+07
x(FT)	1.2750	17.085	8.6700	0.0000	0.0000	15.300	3.0600	16.830	0.0000	0.0000	0.0000
9	6.6951E-05	6.6604E-03	92.892	29.712	0.2572	3.1529	0.012942	0.028049	5.2493	1.2847E+07	3.5380E+07
x(FT)	14.280	2.5500	0.0000	11.475	12.495	0.0000	15.300	6.8850	0.0000	0.0000	0.0000
10	6.6359E-05	4.1446E-05	152.24	185.21	0.5448	0.7489	0.023443	0.022641	7.0005	1.2847E+07	3.5380E+07
x(FT)	14.457	17.064	0.0000	0.0000	13.272	15.642	15.168	17.301	0.0000	0.0000	0.0000
11	6.5108E-05	4.3931E-05	151.68	189.31	0.5432	0.7743	0.023314	0.023227	7.8853	1.2847E+07	3.5380E+07
x(FT)	14.694	17.301	0.0000	0.0000	13.272	15.642	15.168	17.301	0.0000	0.0000	0.0000
12	6.4136E-05	4.6568E-05	151.11	193.38	0.5415	0.7997	0.023182	0.023809	8.7701	1.2847E+07	3.5380E+07
x(FT)	14.694	17.301	0.0000	0.0000	13.272	15.642	15.168	17.301	0.0000	0.0000	0.0000
13	9.4379E-03	3.3228E-04	14.517	428.64	1.5019	2.2568	0.013785	0.052880	8.1905	1.2847E+07	3.5380E+07
x(FT)	1.5300	18.615	10.710	0.0000	0.0000	16.320	5.1000	18.870	0.0000	0.0000	0.0000
14	9.8447E-03	3.4070E-04	14.567	440.35	1.5006	2.3288	0.013705	0.057455	8.9934	1.2847E+07	3.5380E+07
x(FT)	1.5300	18.870	10.710	0.0000	0.0000	16.830	4.8450	19.380	0.0000	0.0000	0.0000
15	7.1582E-03	3.5424E-05	16.204	209.75	2.3680	0.5279	0.027354	0.014415	5.1781	1.2847E+07	3.5380E+07
x(FT)	1.2750	17.085	8.4150	0.0000	0.0000	15.300	2.8050	16.830	0.0000	0.0000	0.0000
16	7.5736E-03	2.8393E-05	16.485	168.96	2.2814	0.3911	0.025488	0.010733	5.7685	1.2847E+07	3.5380E+07
x(FT)	1.2750	17.595	8.6700	0.0000	0.0000	15.810	3.0600	17.595	0.0000	0.0000	0.0000
17	6.5171E-05	4.1208E-05	150.14	185.65	0.5349	0.7495	0.023284	0.022615	7.6672	1.2847E+07	3.5380E+07
x(FT)	14.457	17.064	0.0000	0.0000	13.272	15.642	15.168	17.301	0.0000	0.0000	0.0000
18	6.3755E-05	4.3654E-05	149.57	189.75	0.5334	0.7750	0.023161	0.023204	8.5520	1.2847E+07	3.5380E+07
x(FT)	14.457	17.064	0.0000	0.0000	13.272	15.642	15.168	17.301	0.0000	0.0000	0.0000
19	6.2744E-05	4.6282E-05	148.99	193.82	0.5318	0.8004	0.023033	0.023788	9.4370	1.2847E+07	3.5380E+07
x(FT)	14.694	17.301	0.0000	0.0000	13.272	15.642	15.168	17.301	0.0000	0.0000	0.0000
20	9.4562E-03	3.2813E-04	14.098	434.04	1.4653	2.2921	0.013385	0.056568	8.8049	1.2847E+07	3.5380E+07
x(FT)	1.7850	18.870	10.710	0.0000	0.0000	16.830	4.8450	19.380	0.0000	0.0000	0.0000
21	9.8524E-03	3.6877E-04	14.448	450.35	1.4766	2.3922	0.013428	0.058882	9.6363	1.2847E+07	3.5380E+07
x(FT)	1.7850	19.125	10.710	0.0000	0.0000	16.830	4.8450	19.380	0.0000	0.0000	0.0000
22	7.1344E-03	2.4612E-05	16.751	180.33	2.5166	0.4007	0.029857	0.011399	5.6912	1.2847E+07	3.5380E+07
x(FT)	1.2750	17.085	8.1600	0.0000	0.0000	15.300	2.5500	17.085	0.0000	0.0000	0.0000
23	4.4398E-05	8.5426E-05	139.96	251.05	0.4869	1.1628	0.021544	0.031447	7.1078	1.2847E+07	3.5380E+07
x(FT)	15.190	17.395	0.0000	0.0000	13.965	15.680	15.435	17.395	0.0000	0.0000	0.0000
24	4.2663E-05	1.0144E-04	137.92	266.04	0.4795	1.2651	0.021085	0.033664	7.9512	1.2847E+07	3.5380E+07
x(FT)	15.435	17.640	0.0000	0.0000	14.210	15.680	15.435	17.640	0.0000	0.0000	0.0000
25	4.1724E-05	1.1931E-04	135.95	280.58	0.4725	1.3645	0.020508	0.035927	8.7971	1.2847E+07	3.5380E+07
x(FT)	15.680	17.640	0.0000	0.0000	14.210	15.680	15.435	17.640	0.0000	0.0000	0.0000
26	4.1943E-05	1.3846E-04	134.07	294.72	0.4659	1.4606	0.020170	0.038097	9.6454	1.2847E+07	3.5380E+07
x(FT)	15.680	17.640	0.0000	0.0000	14.455	15.680	15.680	17.640	0.0000	0.0000	0.0000
27	4.2553E-05	1.5956E-04	132.28	308.51	0.4594	1.5604	0.019962	0.040327	10.496	1.2847E+07	3.5380E+07
x(FT)	15.925	17.885	0.0000	0.0000	14.455	15.925	15.680	17.885	0.0000	0.0000	0.0000
28	9.8525E-03	3.8254E-04	14.474	464.51	1.4755	2.4806	0.013435	0.060831	10.306	1.2847E+07	3.5380E+07
x(FT)	1.7850	19.125	10.710	0.0000	0.0000	16.830	4.8450	19.380	0.0000	0.0000	0.0000
Max.	9.8525E-03	6.6604E-03	166.53	464.51	2.5166	3.1529	0.029857	0.060831	10.496	1.2847E+07	3.5380E+07
Pile N.	28	9	6	28	22	9	22	28	27	1	1

LOAD CASE : 5
CASE NAME : Service I Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	1.0000	1.0000
2	0.8456	1.0000
3	0.8456	1.0000
4	0.8456	1.0000
5	0.8456	1.0000
6	0.8456	1.0000
7	0.8456	1.0000
8	0.9672	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.7890	1.0000
15	0.9672	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000

19	0.7850	1.0000
20	0.7850	1.0000
21	0.7890	1.0000
22	0.9672	1.0000
23	0.8027	1.0000
24	0.8027	1.0000
25	0.8027	1.0000
26	0.8027	1.0000
27	0.8027	1.0000
28	0.8066	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
3668.00	25.0000	65.0000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	1.11612E+05	36840.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.0385961	2.91761E-03	-6.13432E-03

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
-5.61193E-06	9.79141E-05	8.24314E-05

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.013553	4.3804E-03	-9.5768E-03	-5.6119E-06	9.7914E-05	8.2431E-05
2	0.019428	4.7171E-03	-9.5768E-03	-5.6119E-06	9.7914E-05	8.2431E-05
3	0.025302	5.0538E-03	-9.5768E-03	-5.6119E-06	9.7914E-05	8.2431E-05
4	0.031177	5.3906E-03	-9.5768E-03	-5.6119E-06	9.7914E-05	8.2431E-05
5	0.037052	5.7273E-03	-9.5768E-03	-5.6119E-06	9.7914E-05	8.2431E-05
6	0.042927	6.0640E-03	-9.5768E-03	-5.6119E-06	9.7914E-05	8.2431E-05
7	0.048802	6.4007E-03	-9.5768E-03	-5.6119E-06	9.7914E-05	8.2431E-05
8	0.018499	4.3804E-03	-9.2401E-03	-5.6119E-06	9.7914E-05	8.2431E-05
9	0.024373	4.7171E-03	-9.2401E-03	-5.6119E-06	9.7914E-05	8.2431E-05
10	0.030248	5.0538E-03	-9.2401E-03	-5.6119E-06	9.7914E-05	8.2431E-05
11	0.036123	5.3906E-03	-9.2401E-03	-5.6119E-06	9.7914E-05	8.2431E-05
12	0.041998	5.7273E-03	-9.2401E-03	-5.6119E-06	9.7914E-05	8.2431E-05
13	0.047873	6.0640E-03	-9.2401E-03	-5.6119E-06	9.7914E-05	8.2431E-05
14	0.053748	6.4007E-03	-9.2401E-03	-5.6119E-06	9.7914E-05	8.2431E-05
15	0.023445	4.3804E-03	-8.9034E-03	-5.6119E-06	9.7914E-05	8.2431E-05
16	0.029319	4.7171E-03	-8.9034E-03	-5.6119E-06	9.7914E-05	8.2431E-05
17	0.035194	5.0538E-03	-8.9034E-03	-5.6119E-06	9.7914E-05	8.2431E-05
18	0.041069	5.3906E-03	-8.9034E-03	-5.6119E-06	9.7914E-05	8.2431E-05
19	0.046944	5.7273E-03	-8.9034E-03	-5.6119E-06	9.7914E-05	8.2431E-05
20	0.052819	6.0640E-03	-8.9034E-03	-5.6119E-06	9.7914E-05	8.2431E-05
21	0.058694	6.4007E-03	-8.9034E-03	-5.6119E-06	9.7914E-05	8.2431E-05
22	0.028390	4.3804E-03	-8.5667E-03	-5.6119E-06	9.7914E-05	8.2431E-05
23	0.034265	4.7171E-03	-8.5667E-03	-5.6119E-06	9.7914E-05	8.2431E-05
24	0.040140	5.0538E-03	-8.5667E-03	-5.6119E-06	9.7914E-05	8.2431E-05
25	0.046015	5.3906E-03	-8.5667E-03	-5.6119E-06	9.7914E-05	8.2431E-05
26	0.051890	5.7273E-03	-8.5667E-03	-5.6119E-06	9.7914E-05	8.2431E-05
27	0.057765	6.0640E-03	-8.5667E-03	-5.6119E-06	9.7914E-05	8.2431E-05
28	0.063639	6.4007E-03	-8.5667E-03	-5.6119E-06	9.7914E-05	8.2431E-05
MINIMUM	0.013553	4.3804E-03	-9.5768E-03	-5.6119E-06	9.7914E-05	8.2431E-05
Pile N.	1	1	1	1	1	1
MAXIMUM	0.063639	6.4007E-03	-8.5667E-03	-5.6119E-06	9.7914E-05	8.2431E-05
Pile N.	28	7	22	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	50.185	1.9042	-20.295	23.546	179.70	70.749
2	71.479	13.569	-2.9568	-19.486	117.01	107.40
3	92.406	16.855	-2.9753	-19.574	117.54	98.906
4	113.33	20.136	-2.9904	-19.650	118.00	90.275
5	134.26	23.414	-3.0016	-19.714	118.38	81.515
6	155.19	26.690	-3.0086	-19.764	118.68	72.642
7	140.57	1.3966	40.340	-21.566	344.53	64.776
8	65.113	2.0026	-24.609	24.161	154.07	72.595
9	83.149	1.9442	-29.687	24.119	121.62	72.467
10	115.54	2.5802	-2.6285	-6.7700E-03	110.03	149.91
11	137.90	2.6630	-2.6098	-6.7700E-03	109.58	153.74
12	160.27	2.7441	-2.5909	-6.7700E-03	109.13	157.54
13	137.99	1.2986	39.857	-20.529	330.49	61.664
14	155.82	1.3127	45.566	-20.832	344.40	62.574
15	79.936	2.1405	-28.836	25.066	127.69	75.311
16	97.973	2.0267	-33.912	24.805	95.039	74.528
17	134.37	2.5956	-2.5773	-6.7700E-03	107.99	150.27
18	156.73	2.6784	-2.5583	-6.7700E-03	107.54	154.11
19	179.09	2.7597	-2.5393	-6.7700E-03	107.08	157.90

20	153.32	1.2747	44.821	-20.322	339.49	61.044
21	171.15	1.2900	50.533	-20.633	353.26	61.978
22	94.798	2.2365	-32.948	25.815	98.354	77.559
23	119.11	-15.989	-2.2762	16.300	97.963	207.89
24	139.65	-19.163	-2.2154	16.061	96.530	220.72
25	160.18	-22.349	-2.1583	15.835	95.173	233.20
26	180.72	-25.546	-2.1048	15.621	93.890	245.38
27	201.25	-28.752	-2.0546	15.420	92.679	257.29
28	186.51	1.2862	55.416	-20.604	365.14	61.890
MINIMUM	50.185	-28.752	-33.912	-21.566	92.679	61.044
Pile N.	1	27	16	7	27	20
MAXIMUM	201.25	26.690	55.416	25.815	365.14	257.29
Pile N.	27	6	28	22	28	27

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.015885	4.3804E-03	-4.8010E-03	-3.1384E-05	9.7914E-05	7.6429E-05
2	0.019939	-9.5768E-03	-1.4599E-03	1.0558E-05	8.2431E-05	-9.7505E-05
3	0.025789	-9.5768E-03	-8.2643E-04	1.0558E-05	8.2431E-05	-9.7505E-05
4	0.031639	-9.5768E-03	-1.9298E-04	1.0558E-05	8.2431E-05	-9.7505E-05
5	0.037490	-9.5768E-03	4.4046E-04	1.0558E-05	8.2431E-05	-9.7505E-05
6	0.043340	-9.5768E-03	1.0739E-03	1.0558E-05	8.2431E-05	-9.7505E-05
7	0.043271	6.4007E-03	-0.024514	2.0736E-05	9.7914E-05	7.9978E-05
8	0.020471	4.3804E-03	-2.9179E-03	-3.1384E-05	9.7914E-05	7.6429E-05
9	0.026045	-4.7171E-03	1.0606E-03	-3.1384E-05	-9.7914E-05	-7.6429E-05
10	0.030248	-9.2401E-03	-5.0538E-03	-5.6119E-06	8.2431E-05	-9.7914E-05
11	0.036123	-9.2401E-03	-5.3906E-03	-5.6119E-06	8.2431E-05	-9.7914E-05
12	0.041998	-9.2401E-03	-5.7273E-03	-5.6119E-06	8.2431E-05	-9.7914E-05
13	0.042496	6.0640E-03	-0.023901	2.0736E-05	9.7914E-05	7.9978E-05
14	0.048070	6.4007E-03	-0.025758	2.0736E-05	9.7914E-05	7.9978E-05
15	0.025057	4.3804E-03	-1.0349E-03	-3.1384E-05	9.7914E-05	7.6429E-05
16	0.030630	4.7171E-03	8.2244E-04	-3.1384E-05	9.7914E-05	7.6429E-05
17	0.035194	-8.9034E-03	-5.0538E-03	-5.6119E-06	8.2431E-05	-9.7914E-05
18	0.041069	-8.9034E-03	-5.3906E-03	-5.6119E-06	8.2431E-05	-9.7914E-05
19	0.046944	-8.9034E-03	-5.7273E-03	-5.6119E-06	8.2431E-05	-9.7914E-05
20	0.047295	6.0640E-03	-0.025145	2.0736E-05	9.7914E-05	7.9978E-05
21	0.052868	6.4007E-03	-0.027002	2.0736E-05	9.7914E-05	7.9978E-05
22	0.029642	4.3804E-03	8.4820E-04	-3.1384E-05	9.7914E-05	7.6429E-05
23	0.033024	-8.5667E-03	-0.010285	-2.1629E-05	8.2431E-05	-9.5660E-05
24	0.038763	-8.5667E-03	-0.011583	-2.1629E-05	8.2431E-05	-9.5660E-05
25	0.044503	-8.5667E-03	-0.012880	-2.1629E-05	8.2431E-05	-9.5660E-05
26	0.050243	-8.5667E-03	-0.014178	-2.1629E-05	8.2431E-05	-9.5660E-05
27	0.055982	-8.5667E-03	-0.015476	-2.1629E-05	8.2431E-05	-9.5660E-05
28	0.057667	6.4007E-03	-0.028247	2.0736E-05	9.7914E-05	7.9978E-05

MINIMUM	0.015885	-9.5768E-03	-0.028247	-3.1384E-05	-9.7914E-05	-9.7914E-05
Pile N.	1	2	28	1	9	10
MAXIMUM	0.057667	6.4007E-03	1.0739E-03	2.0736E-05	9.7914E-05	7.9978E-05
Pile N.	28	7	6	7	1	7

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	54.027	1.9042	-3.3881	-0.028706	179.70	74.565
2	72.737	-2.9568	-1.6364	0.011089	107.40	-118.62
3	93.920	-2.9753	-1.4377	0.011089	98.906	-119.16
4	115.10	-2.9904	-1.2350	0.011089	90.275	-119.62
5	136.28	-3.0016	-1.0288	0.011089	81.515	-120.01
6	157.47	-3.0086	-0.8198	0.011089	72.642	-120.31
7	146.12	1.3966	-6.1705	0.018967	344.53	68.272
8	69.554	2.0026	-2.7611	-0.028706	154.07	76.510
9	88.270	-1.9442	1.8775	-0.028706	-121.62	-76.376
10	115.54	-2.6285	-2.5802	-6.7700E-03	149.91	-110.03
11	137.90	-2.6098	-2.6630	-6.7700E-03	153.74	-109.58
12	160.27	-2.5909	-2.7441	-6.7700E-03	157.54	-109.13
13	143.52	1.2986	-5.8133	0.018967	330.49	64.991
14	162.23	1.3127	-6.0326	0.018967	344.40	65.951
15	84.953	2.1405	-2.0856	-0.028706	127.69	79.373
16	103.67	2.0267	-1.1991	-0.028706	95.039	78.548
17	134.37	-2.5773	-2.5956	-6.7700E-03	150.27	-107.99
18	156.73	-2.5583	-2.6784	-6.7700E-03	154.11	-107.54
19	179.09	-2.5393	-2.7597	-6.7700E-03	157.90	-107.08
20	159.63	1.2747	-5.9509	0.018967	339.49	64.338
21	178.35	1.2900	-6.1663	0.018967	353.26	65.323
22	100.35	2.2365	-1.2877	-0.028706	98.354	81.743
23	120.12	-2.2762	-3.8045	-0.022717	207.89	-99.309
24	140.90	-2.2154	-4.0498	-0.022717	220.72	-97.857
25	161.68	-2.1583	-4.2827	-0.022717	233.20	-96.481
26	182.46	-2.1048	-4.5046	-0.022717	245.38	-95.181
27	203.24	-2.0546	-4.7170	-0.022717	257.29	-93.953
28	194.46	1.2862	-6.3891	0.018967	365.14	65.230
MINIMUM	54.027	-3.0086	-6.3891	-0.028706	-121.62	-120.31
Pile N.	1	6	28	1	9	6
MAXIMUM	203.24	2.2365	1.8775	0.018967	365.14	81.743
Pile N.	27	22	9	7	28	22

PILE GROUP	STRESS,KIP/IN**2
**********	***************
1	3.1642
2	4.1228
3	4.7319
4	5.3409
5	5.9498
6	6.5585
7	6.5398

8	3.5463
9	3.9849
10	5.3331
11	5.9868
12	6.6406
13	6.3669
14	6.9899
15	3.9480
16	4.3935
17	5.8520
18	6.5058
19	7.1598
20	6.8769
21	7.4997
22	4.3519
23	5.4981
24	6.1302
25	6.7646
26	7.4010
27	8.0392
28	8.0295
MINIMUM	3.1642
Pile N.	1
MAXIMUM	8.0392
Pile N.	27

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-5.8833E-05	-5.8970E-03	-74.565	-28.532	-0.1973	-3.3565	-0.011750	-0.031290	1.5706	1.2847E+07	3.5380E+07
x(FT)	13.260	2.0400	0.0000	10.455	11.730	0.0000	15.300	5.3550	25.500	0.0000	0.0000
2	-0.010142	-2.8059E-03	-23.169	-15.060	-2.9180	-1.6307	-0.033131	-0.015626	2.1145	1.2847E+07	3.5380E+07
x(FT)	0.9800	3.1850	8.3300	11.270	0.0000	0.0000	3.4300	6.8600	24.500	0.0000	0.0000
3	-0.010139	-2.3059E-03	-23.370	-12.930	-2.9366	-1.4347	-0.033432	-0.013868	2.7302	1.2847E+07	3.5380E+07
x(FT)	0.9800	3.4300	8.3300	11.270	0.0000	0.0000	3.4300	7.3500	24.500	0.0000	0.0000
4	-0.010137	-1.8337E-03	-23.564	-10.833	-2.9519	-1.2346	-0.033682	-0.012188	3.3460	1.2847E+07	3.5380E+07
x(FT)	0.9800	3.9200	8.3300	11.515	0.0000	0.0000	3.4300	8.0850	24.500	0.0000	0.0000
5	-0.010135	-1.3991E-03	-23.748	-8.7970	-2.9634	-1.0324	-0.033879	-0.010651	3.9618	1.2847E+07	3.5380E+07
x(FT)	0.9800	4.4100	8.3300	11.760	0.0000	0.4900	3.6750	9.0650	24.500	0.0000	0.0000
6	-0.010134	-1.0126E-03	-23.921	-6.8585	-2.9709	-0.8428	-0.034019	-9.3231E-03	4.5775	1.2847E+07	3.5380E+07
x(FT)	0.9800	5.1450	8.3300	12.250	0.0000	1.2250	3.6750	9.8000	24.500	0.0000	0.0000
7	-1.6897E-05	-0.025032	-68.272	-83.801	-0.2174	-6.1169	-0.013851	-0.090693	4.2476	1.2847E+07	3.5380E+07
x(FT)	16.065	1.0200	0.0000	11.730	14.790	0.0000	15.555	15.300	25.500	0.0000	0.0000
8	-6.6075E-05	-4.2272E-03	-76.510	-21.682	-0.2021	-2.7399	-0.010994	-0.025770	2.0219	1.2847E+07	3.5380E+07
x(FT)	13.005	2.5500	0.0000	10.455	11.475	0.0000	15.300	5.8650	25.500	0.0000	0.0000
9	-5.2737E-03	-1.4876E-05	-12.571	-121.62	-1.9149	-0.2535	-0.022686	-7.2990E-03	2.5660	1.2847E+07	3.5380E+07
x(FT)	1.2750	17.085	8.1600	0.0000	0.0000	15.555	2.5500	17.340	25.500	0.0000	0.0000
10	-9.8574E-03	-5.9698E-03	-21.063	-26.903	-2.5973	-2.5631	-0.028548	-0.023686	3.3588	1.2847E+07	3.5380E+07
x(FT)	1.1850	2.1330	8.5320	10.902	0.0000	0.0000	3.7920	6.6360	23.700	0.0000	0.0000
11	-9.8602E-03	-6.2819E-03	-20.981	-28.025	-2.5792	-2.6450	-0.028308	-0.024400	4.0088	1.2847E+07	3.5380E+07
x(FT)	1.1850	1.8960	8.5320	10.902	0.0000	0.0000	3.7920	6.6360	23.700	0.0000	0.0000
12	-9.8631E-03	-6.5950E-03	-20.909	-29.143	-2.5610	-2.7254	-0.028067	-0.025098	4.6589	1.2847E+07	3.5380E+07
x(FT)	1.1850	1.8960	8.7690	10.902	0.0000	0.0000	3.7920	6.6360	23.700	0.0000	0.0000
13	-1.6859E-05	-0.024446	-64.991	-80.270	-0.2038	-5.7639	-0.011085	-0.093157	4.1720	1.2847E+07	3.5380E+07
x(FT)	16.320	1.0200	0.0000	11.730	15.045	0.0000	15.810	15.555	25.500	0.0000	0.0000
14	-1.8281E-05	-0.026275	-65.951	-84.962	-0.2092	-5.9820	-0.011295	-0.1007	4.7160	1.2847E+07	3.5380E+07
x(FT)	16.320	1.0200	0.0000	11.985	15.045	0.0000	15.810	15.555	25.500	0.0000	0.0000
15	-7.6286E-05	-2.6621E-03	-79.373	-15.023	-0.2117	-2.0775	-0.010265	-0.020284	2.4696	1.2847E+07	3.5380E+07
x(FT)	12.750	3.3150	0.0000	10.965	10.965	0.0000	15.300	6.6300	25.500	0.0000	0.0000
16	-8.1879E-05	-1.4303E-03	-78.548	-8.7387	-0.2164	-1.2150	-9.9528E-03	-0.012637	3.0136	1.2847E+07	3.5380E+07
x(FT)	13.005	4.5900	0.0000	11.985	11.220	0.7650	15.300	7.1400	25.500	0.0000	0.0000
17	-9.5349E-03	-5.9675E-03	-20.466	-26.910	-2.5469	-2.5783	-0.028036	-0.023824	3.9060	1.2847E+07	3.5380E+07
x(FT)	1.1850	2.1330	8.5320	10.902	0.0000	0.0000	3.7920	6.6360	23.700	0.0000	0.0000
18	-9.5377E-03	-6.2800E-03	-20.385	-28.032	-2.5285	-2.6603	-0.027792	-0.024537	4.5561	1.2847E+07	3.5380E+07
x(FT)	1.1850	1.8960	8.5320	10.902	0.0000	0.0000	3.7920	6.6360	23.700	0.0000	0.0000
19	-9.5406E-03	-6.5931E-03	-20.315	-29.151	-2.5101	-2.7407	-0.027546	-0.025233	5.2062	1.2847E+07	3.5380E+07
x(FT)	1.1850	1.8960	8.7690	10.902	0.0000	0.0000	3.7920	6.6360	23.700	0.0000	0.0000
20	-1.7407E-05	-0.025672	-64.338	-83.348	-0.2021	-5.9009	-0.010908	-0.099736	4.6404	1.2847E+07	3.5380E+07
x(FT)	16.320	1.0200	0.0000	11.985	15.045	0.0000	15.810	15.555	25.500	0.0000	0.0000
21	-1.9042E-05	-0.027502	-65.323	-88.022	-0.2073	-6.1150	-0.011088	-0.1064	5.1845	1.2847E+07	3.5380E+07
x(FT)	16.575	1.0200	0.0000	11.985	15.045	0.0000	15.810	15.555	25.500	0.0000	0.0000
22	-8.6212E-05	-1.3339E-03	-81.743	-8.7264	-0.2249	-1.3095	-9.4905E-03	-0.014213	2.9172	1.2847E+07	3.5380E+07
x(FT)	12.495	4.5900	0.0000	11.475	10.710	0.7650	15.300	6.8850	25.500	0.0000	0.0000
23	-9.2246E-03	-0.010918	-18.633	-43.821	-2.2503	-3.7729	-0.024040	-0.033938	3.4917	1.2847E+07	3.5380E+07
x(FT)	1.2250	1.4700	8.8200	10.780	0.0000	0.0000	3.9200	6.6150	24.500	0.0000	0.0000
24	-9.2345E-03	-0.012177	-18.407	-47.847	-2.1911	-4.0161	-0.023214	-0.035941	4.0958	1.2847E+07	3.5380E+07
x(FT)	1.2250	1.2250	9.0650	10.780	0.0000	0.0000	3.9200	6.6150	24.500	0.0000	0.0000
25	-9.2439E-03	-0.013440	-18.187	-51.827	-2.1354	-4.2471	-0.022452	-0.037825	4.7000	1.2847E+07	3.5380E+07
x(FT)	1.2250	1.2250	9.0650	11.025	0.0000	0.0000	4.1650	6.6150	24.500	0.0000	0.0000
26	-9.2527E-03	-0.014703	-17.973	-55.784	-2.0832	-4.4674	-0.021742	-0.039607	5.3041	1.2847E+07	3.5380E+07
x(FT)	1.2250	1.2250	9.3100	11.025	0.0000	0.0000	4.1650	6.6150	24.500	0.0000	0.0000
27	-9.2611E-03	-0.015975	-17.796	-59.698	-2.0342	-4.6783	-0.021082	-0.041298	5.9082	1.2847E+07	3.5380E+07
x(FT)	1.2250	0.9800	9.3100	11.025	0.0000	0.0000	4.4100	6.6150	24.500	0.0000	0.0000
28	-1.9294E-05	-0.028731	-65.230	-91.691	-0.2077	-6.3361	-0.010850	-0.1135	5.6529	1.2847E+07	3.5380E+07
x(FT)	16.575	0.7650	0.0000	11.985	15.045	0.0000	15.810	15.555	25.500	0.0000	0.0000
Min.	-0.010142	-0.028731	-81.743	-121.62	-2.9709	-6.3361	-0.034019	-0.1135	1.5706	1.2847E+07	3.5380E+07
Pile N.	2	28	22	9	6	28	6	28	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	4.9519E-03	2.7718E-05	11.942	179.70	1.8754	0.4803	0.022494	0.014364	3.1642	1.2847E+07	3.5380E+07
x(FT)	1.2750	16.320	8.1600	0.0000	0.0000	14.790	2.5500	16.320	0.0000	0.0000	0.0000

2	1.1570E-04	1.9751E-05	118.62	107.40	0.3899	0.2619	0.018106	7.0206E-03	4.1228	1.2847E+07	3.5380E+07
x(FT)	13.230	16.660	0.0000	0.0000	11.760	15.190	14.700	17.395	0.0000	0.0000	0.0000
3	1.2030E-04	1.6929E-05	119.16	98.906	0.3953	0.2284	0.018175	6.1898E-03	4.7319	1.2847E+07	3.5380E+07
x(FT)	13.230	16.905	0.0000	0.0000	11.515	15.190	14.700	17.395	0.0000	0.0000	0.0000
4	1.2455E-04	1.4254E-05	119.62	90.275	0.4012	0.1951	0.018225	5.4043E-03	5.3409	1.2847E+07	3.5380E+07
x(FT)	13.230	16.905	0.0000	0.0000	11.515	15.190	14.700	17.640	0.0000	0.0000	0.0000
5	1.2842E-04	4.4046E-04	120.01	81.515	0.4071	0.1634	0.018254	4.6681E-03	5.9498	1.2847E+07	3.5380E+07
x(FT)	13.230	0.0000	0.0000	0.0000	11.515	15.435	14.700	17.885	0.0000	0.0000	0.0000
6	1.3186E-04	1.0739E-03	120.31	72.642	0.4129	0.1333	0.018263	4.0237E-03	6.5585	1.2847E+07	3.5380E+07
x(FT)	13.230	0.0000	0.0000	0.0000	11.515	15.680	14.700	18.375	0.0000	0.0000	0.0000
7	7.0782E-03	1.4996E-04	12.326	344.53	1.3832	1.6868	0.013539	0.040026	6.5398	1.2847E+07	3.5380E+07
x(FT)	1.5300	17.850	9.9450	0.0000	0.0000	16.065	4.3350	17.850	0.0000	0.0000	0.0000
8	4.9382E-03	2.0315E-05	12.222	154.07	1.9707	0.3690	0.024150	0.011056	3.5463	1.2847E+07	3.5380E+07
x(FT)	1.2750	16.320	8.1600	0.0000	0.0000	15.045	2.2950	16.575	0.0000	0.0000	0.0000
9	7.0149E-05	2.7674E-03	76.376	14.652	0.2051	1.8712	0.010355	0.017875	3.9849	1.2847E+07	3.5380E+07
x(FT)	13.260	3.3150	0.0000	11.220	11.730	0.0000	15.300	6.8850	0.0000	0.0000	0.0000
10	8.6155E-05	4.1006E-05	110.03	149.91	0.3513	0.4546	0.016266	0.011903	5.3331	1.2847E+07	3.5380E+07
x(FT)	13.746	17.064	0.0000	0.0000	12.324	15.168	14.694	17.301	0.0000	0.0000	0.0000
11	8.4795E-05	4.3300E-05	109.58	153.74	0.3504	0.4730	0.016211	0.012316	5.9868	1.2847E+07	3.5380E+07
x(FT)	13.983	17.064	0.0000	0.0000	12.324	15.168	14.694	17.301	0.0000	0.0000	0.0000
12	8.3645E-05	4.5682E-05	109.13	157.54	0.3496	0.4914	0.016155	0.012731	6.6406	1.2847E+07	3.5380E+07
x(FT)	13.983	17.064	0.0000	0.0000	12.324	15.168	14.694	17.301	0.0000	0.0000	0.0000
13	6.7772E-03	1.6014E-04	11.546	330.49	1.2866	1.6548	0.012391	0.038905	6.3669	1.2847E+07	3.5380E+07
x(FT)	1.5300	17.850	10.200	0.0000	0.0000	16.065	4.5900	18.105	0.0000	0.0000	0.0000
14	7.1023E-03	1.8115E-04	11.893	344.40	1.3008	1.7538	0.012462	0.041017	6.9899	1.2847E+07	3.5380E+07
x(FT)	1.5300	18.105	10.200	0.0000	0.0000	16.065	4.5900	18.105	0.0000	0.0000	0.0000
15	4.9178E-03	1.3637E-05	12.702	127.69	2.1052	0.2615	0.026588	7.7880E-03	3.9480	1.2847E+07	3.5380E+07
x(FT)	1.2750	16.320	7.9050	0.0000	0.0000	15.045	2.2950	16.830	0.0000	0.0000	0.0000
16	5.2575E-03	8.2244E-04	13.089	95.039	1.9974	0.1616	0.024136	4.8220E-03	4.3935	1.2847E+07	3.5380E+07
x(FT)	1.2750	0.0000	8.1600	0.0000	0.0000	15.810	2.8050	17.850	0.0000	0.0000	0.0000
17	8.3236E-05	4.0671E-05	107.99	150.27	0.3420	0.4555	0.015974	0.011913	5.8520	1.2847E+07	3.5380E+07
x(FT)	13.746	17.064	0.0000	0.0000	12.324	15.168	14.694	17.301	0.0000	0.0000	0.0000
18	8.1819E-05	4.2985E-05	107.54	154.11	0.3412	0.4739	0.015922	0.012337	6.5058	1.2847E+07	3.5380E+07
x(FT)	13.983	17.064	0.0000	0.0000	12.324	15.168	14.694	17.064	0.0000	0.0000	0.0000
19	8.0681E-05	4.5370E-05	107.08	157.90	0.3403	0.4924	0.015868	0.012758	7.1598	1.2847E+07	3.5380E+07
x(FT)	13.983	17.064	0.0000	0.0000	12.324	15.168	14.694	17.064	0.0000	0.0000	0.0000
20	6.7840E-03	1.7517E-04	11.447	339.49	1.2633	1.7236	0.012099	0.040341	6.8769	1.2847E+07	3.5380E+07
x(FT)	1.5300	18.105	10.200	0.0000	0.0000	16.065	4.5900	18.105	0.0000	0.0000	0.0000
21	7.1088E-03	1.9711E-04	11.794	353.26	1.2786	1.8205	0.012185	0.042391	7.4997	1.2847E+07	3.5380E+07
x(FT)	1.5300	18.105	10.200	0.0000	0.0000	16.065	4.5900	18.105	0.0000	0.0000	0.0000
22	4.9004E-03	8.4820E-04	13.246	98.354	2.2012	0.1581	0.028356	4.6997E-03	4.3519	1.2847E+07	3.5380E+07
x(FT)	1.2750	0.0000	7.6500	0.0000	0.0000	15.300	2.2950	17.340	0.0000	0.0000	0.0000
23	5.8906E-05	7.8733E-05	99.309	207.89	0.3140	0.7403	0.014306	0.017934	5.4981	1.2847E+07	3.5380E+07
x(FT)	14.455	17.150	0.0000	0.0000	12.985	15.190	14.700	17.150	0.0000	0.0000	0.0000
24	5.6005E-05	9.1018E-05	97.857	220.72	0.3115	0.8103	0.013910	0.019378	6.1302	1.2847E+07	3.5380E+07
x(FT)	14.455	17.150	0.0000	0.0000	12.985	15.190	14.700	17.150	0.0000	0.0000	0.0000
25	5.3645E-05	1.0427E-04	96.481	233.20	0.3093	0.8799	0.013496	0.020793	6.7646	1.2847E+07	3.5380E+07
x(FT)	14.700	17.395	0.0000	0.0000	13.230	15.190	14.700	17.150	0.0000	0.0000	0.0000
26	5.1989E-05	1.1855E-04	95.181	245.38	0.3073	0.9490	0.013066	0.022227	7.4010	1.2847E+07	3.5380E+07
x(FT)	14.700	17.395	0.0000	0.0000	13.230	15.190	14.700	17.395	0.0000	0.0000	0.0000
27	5.0868E-05	1.3357E-04	93.953	257.29	0.3056	1.0175	0.012620	0.023663	8.0392	1.2847E+07	3.5380E+07
x(FT)	14.945	17.395	0.0000	0.0000	13.475	15.190	14.700	17.395	0.0000	0.0000	0.0000
28	7.1097E-03	2.0680E-04	11.796	365.14	1.2750	1.8935	0.012153	0.043900	8.0295	1.2847E+07	3.5380E+07
x(FT)	1.5300	18.105	10.200	0.0000	0.0000	16.065	4.5900	18.105	0.0000	0.0000	0.0000
Max.	7.1097E-03	2.7674E-03	120.31	365.14	2.2012	1.8935	0.028356	0.043900	8.0392	1.2847E+07	3.5380E+07
Pile N.	28	9	6	28	22	28	22	28	27	1	1

LOAD CASE : 6
CASE NAME : Service IV Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8066	1.0000
2	0.8063	1.0000
3	0.8063	1.0000
4	0.8063	1.0000
5	0.8063	1.0000
6	0.8063	1.0000
7	0.9977	1.0000
8	0.7853	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.9977	1.0000
15	0.7853	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	0.9977	1.0000
22	0.8095	1.0000
23	0.8095	1.0000
24	0.8095	1.0000
25	0.8095	1.0000
26	0.8095	1.0000
27	0.8095	1.0000
28	1.0000	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
2808.00	0.00000	58.0000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	36180.0	5556.00

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.0294163	-2.56145E-04	2.20937E-03

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
-7.71327E-08	2.73091E-05	1.22475E-05

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.023398	9.7396E-05	1.3832E-03	-7.7133E-08	2.7309E-05	1.2247E-05
2	0.025037	1.0202E-04	1.3832E-03	-7.7133E-08	2.7309E-05	1.2247E-05
3	0.026675	1.0665E-04	1.3832E-03	-7.7133E-08	2.7309E-05	1.2247E-05
4	0.028314	1.1128E-04	1.3832E-03	-7.7133E-08	2.7309E-05	1.2247E-05
5	0.029952	1.1591E-04	1.3832E-03	-7.7133E-08	2.7309E-05	1.2247E-05
6	0.031591	1.2054E-04	1.3832E-03	-7.7133E-08	2.7309E-05	1.2247E-05
7	0.033230	1.2516E-04	1.3832E-03	-7.7133E-08	2.7309E-05	1.2247E-05
8	0.024133	9.7396E-05	1.3878E-03	-7.7133E-08	2.7309E-05	1.2247E-05
9	0.025772	1.0202E-04	1.3878E-03	-7.7133E-08	2.7309E-05	1.2247E-05
10	0.027410	1.0665E-04	1.3878E-03	-7.7133E-08	2.7309E-05	1.2247E-05
11	0.029049	1.1128E-04	1.3878E-03	-7.7133E-08	2.7309E-05	1.2247E-05
12	0.030687	1.1591E-04	1.3878E-03	-7.7133E-08	2.7309E-05	1.2247E-05
13	0.032326	1.2054E-04	1.3878E-03	-7.7133E-08	2.7309E-05	1.2247E-05
14	0.033965	1.2516E-04	1.3878E-03	-7.7133E-08	2.7309E-05	1.2247E-05
15	0.024868	9.7396E-05	1.3924E-03	-7.7133E-08	2.7309E-05	1.2247E-05
16	0.026507	1.0202E-04	1.3924E-03	-7.7133E-08	2.7309E-05	1.2247E-05
17	0.028145	1.0665E-04	1.3924E-03	-7.7133E-08	2.7309E-05	1.2247E-05
18	0.029784	1.1128E-04	1.3924E-03	-7.7133E-08	2.7309E-05	1.2247E-05
19	0.031422	1.1591E-04	1.3924E-03	-7.7133E-08	2.7309E-05	1.2247E-05
20	0.033061	1.2054E-04	1.3924E-03	-7.7133E-08	2.7309E-05	1.2247E-05
21	0.034699	1.2516E-04	1.3924E-03	-7.7133E-08	2.7309E-05	1.2247E-05
22	0.025603	9.7396E-05	1.3970E-03	-7.7133E-08	2.7309E-05	1.2247E-05
23	0.027241	1.0202E-04	1.3970E-03	-7.7133E-08	2.7309E-05	1.2247E-05
24	0.028880	1.0665E-04	1.3970E-03	-7.7133E-08	2.7309E-05	1.2247E-05
25	0.030519	1.1128E-04	1.3970E-03	-7.7133E-08	2.7309E-05	1.2247E-05
26	0.032157	1.1591E-04	1.3970E-03	-7.7133E-08	2.7309E-05	1.2247E-05
27	0.033796	1.2054E-04	1.3970E-03	-7.7133E-08	2.7309E-05	1.2247E-05
28	0.035434	1.2516E-04	1.3970E-03	-7.7133E-08	2.7309E-05	1.2247E-05
MINIMUM	0.023398	9.7396E-05	1.3832E-03	-7.7133E-08	2.7309E-05	1.2247E-05
Pile N.	1	1	1	1	1	1
MAXIMUM	0.035434	1.2516E-04	1.3970E-03	-7.7133E-08	2.7309E-05	1.2247E-05
Pile N.	28	7	22	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	70.959	0.1193	-20.769	2.0018	-99.908	6.0185
2	89.093	13.038	0.2165	-0.039985	0.2682	-58.871
3	94.881	13.925	0.2075	-0.061395	0.3967	-62.395
4	100.67	14.815	0.1993	-0.080947	0.5140	-65.853
5	106.46	15.707	0.1919	-0.098885	0.6217	-69.252
6	112.24	16.601	0.1850	-0.1154	0.7208	-72.596
7	103.82	0.1310	30.520	-2.0991	168.04	6.3101
8	73.175	0.1167	-21.509	1.9805	-101.25	5.9545
9	78.159	0.1156	-23.063	1.9730	-106.71	5.9321
10	104.74	0.4418	0.4904	-9.3049E-05	-3.5971	21.020
11	110.98	0.4456	0.4899	-9.3049E-05	-3.5900	21.134
12	117.21	0.4495	0.4893	-9.3049E-05	-3.5829	21.248
13	100.91	0.1165	30.172	-1.9798	151.00	5.9521
14	106.06	0.1300	31.216	-2.0914	170.54	6.2871
15	75.406	0.1157	-22.203	1.9717	-103.78	5.9281
16	80.390	0.1146	-23.758	1.9645	-109.26	5.9067
17	107.54	0.4413	0.4923	-9.3049E-05	-3.6544	21.009
18	113.77	0.4451	0.4917	-9.3049E-05	-3.6474	21.123
19	120.01	0.4490	0.4911	-9.3049E-05	-3.6403	21.237
20	103.14	0.1156	30.874	-1.9725	153.29	5.9303
21	108.30	0.1290	31.913	-2.0840	173.02	6.2646
22	77.656	0.1164	-22.842	1.9769	-107.72	5.9437
23	96.817	-13.852	0.1929	0.092969	0.5871	91.014
24	102.60	-14.745	0.1860	0.1090	0.6835	94.346
25	108.38	-15.640	0.1796	0.1239	0.7727	97.632
26	114.16	-16.536	0.1736	0.1377	0.8556	100.87
27	119.94	-17.434	0.1681	0.1506	0.9329	104.08
28	110.54	0.1283	32.604	-2.0779	175.64	6.2463
MINIMUM	70.959	-17.434	-23.758	-2.0991	-109.26	-72.596
Pile N.	1	27	16	7	16	6
MAXIMUM	120.01	16.601	32.604	2.0018	175.64	104.08
Pile N.	19	6	28	1	28	27

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
1	0.021761	9.7396E-05	8.7095E-03	-3.9452E-06	2.7309E-05	1.1595E-05
2	0.024713	1.3832E-03	4.0144E-03	4.4124E-06	1.2247E-05	-2.6950E-05
3	0.026330	1.3832E-03	4.2791E-03	4.4124E-06	1.2247E-05	-2.6950E-05
4	0.027947	1.3832E-03	4.5439E-03	4.4124E-06	1.2247E-05	-2.6950E-05
5	0.029564	1.3832E-03	4.8086E-03	4.4124E-06	1.2247E-05	-2.6950E-05
6	0.031181	1.3832E-03	5.0734E-03	4.4124E-06	1.2247E-05	-2.6950E-05
7	0.031963	1.2516E-04	-9.1932E-03	3.7988E-06	2.7309E-05	1.1644E-05
8	0.022457	9.7396E-05	8.9462E-03	-3.9452E-06	2.7309E-05	1.1595E-05
9	0.024011	-1.0202E-04	-9.4642E-03	-3.9452E-06	-2.7309E-05	-1.1595E-05
10	0.027410	1.3878E-03	-1.0665E-04	-7.7133E-08	1.2247E-05	-2.7309E-05
11	0.029049	1.3878E-03	-1.1128E-04	-7.7133E-08	1.2247E-05	-2.7309E-05
12	0.030687	1.3878E-03	-1.1591E-04	-7.7133E-08	1.2247E-05	-2.7309E-05
13	0.031107	1.2054E-04	-8.9031E-03	3.7988E-06	2.7309E-05	1.1644E-05
14	0.032661	1.2516E-04	-9.4211E-03	3.7988E-06	2.7309E-05	1.1644E-05
15	0.023152	9.7396E-05	9.1829E-03	-3.9452E-06	2.7309E-05	1.1595E-05
16	0.024707	1.0202E-04	9.7009E-03	-3.9452E-06	2.7309E-05	1.1595E-05
17	0.028145	1.3924E-03	-1.0665E-04	-7.7133E-08	1.2247E-05	-2.7309E-05
18	0.029784	1.3924E-03	-1.1128E-04	-7.7133E-08	1.2247E-05	-2.7309E-05
19	0.031422	1.3924E-03	-1.1591E-04	-7.7133E-08	1.2247E-05	-2.7309E-05
20	0.031805	1.2054E-04	-9.1310E-03	3.7988E-06	2.7309E-05	1.1644E-05
21	0.033360	1.2516E-04	-9.6490E-03	3.7988E-06	2.7309E-05	1.1644E-05
22	0.023848	9.7396E-05	9.4196E-03	-3.9452E-06	2.7309E-05	1.1595E-05
23	0.026854	1.3970E-03	-4.5780E-03	-4.5646E-06	1.2247E-05	-2.6925E-05
24	0.028470	1.3970E-03	-4.8519E-03	-4.5646E-06	1.2247E-05	-2.6925E-05
25	0.030085	1.3970E-03	-5.1258E-03	-4.5646E-06	1.2247E-05	-2.6925E-05
26	0.031701	1.3970E-03	-5.3996E-03	-4.5646E-06	1.2247E-05	-2.6925E-05
27	0.033316	1.3970E-03	-5.6735E-03	-4.5646E-06	1.2247E-05	-2.6925E-05
28	0.034058	1.2516E-04	-9.8770E-03	3.7988E-06	2.7309E-05	1.1644E-05
MINIMUM	0.021761	-1.0202E-04	-9.8770E-03	-4.5646E-06	-2.7309E-05	-2.7309E-05
Pile N.	1	9	28	23	9	10
MAXIMUM	0.034058	1.3970E-03	9.7009E-03	4.4124E-06	2.7309E-05	1.1644E-05
Pile N.	28	23	16	2	1	7

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
1	73.886	0.1193	2.7293	-3.6085E-03	-99.908	6.3427
2	90.025	0.2165	1.7829	4.6345E-03	-58.871	-0.2711
3	95.879	0.2075	1.8587	4.6345E-03	-62.395	-0.4014
4	101.73	0.1993	1.9321	4.6345E-03	-65.853	-0.5203
5	107.59	0.1919	2.0034	4.6345E-03	-69.252	-0.6294
6	113.44	0.1850	2.0729	4.6345E-03	-72.596	-0.7300
7	108.14	0.1310	-3.8674	3.4746E-03	168.04	6.6500
8	76.222	0.1167	2.7282	-3.6085E-03	-101.25	6.2752
9	81.442	-0.1156	-2.8300	-3.6085E-03	106.71	-6.2516
10	104.74	0.4904	-0.4418	-9.3049E-05	21.020	3.5971
11	110.98	0.4899	-0.4456	-9.3049E-05	21.134	3.5900
12	117.21	0.4893	-0.4495	-9.3049E-05	21.248	3.5829
13	105.27	0.1165	-3.2764	3.4746E-03	151.00	6.2728
14	110.49	0.1300	-3.9155	3.4746E-03	170.54	6.6258
15	78.558	0.1157	2.7754	-3.6085E-03	-103.78	6.2474
16	83.778	0.1146	2.8760	-3.6085E-03	-109.26	6.2249
17	107.54	0.4923	-0.4413	-9.3049E-05	21.009	3.6544
18	113.77	0.4917	-0.4451	-9.3049E-05	21.123	3.6474
19	120.01	0.4911	-0.4490	-9.3049E-05	21.237	3.6403
20	107.61	0.1156	-3.3183	3.4746E-03	153.29	6.2498
21	112.83	0.1290	-3.9630	3.4746E-03	173.02	6.6022
22	80.894	0.1164	2.8801	-3.6085E-03	-107.72	6.2639
23	97.777	0.1929	-2.2493	-4.7943E-03	91.014	-0.5944
24	103.63	0.1860	-2.3184	-4.7943E-03	94.346	-0.6921
25	109.48	0.1796	-2.3858	-4.7943E-03	97.632	-0.7826
26	115.32	0.1736	-2.4517	-4.7943E-03	100.87	-0.8666
27	121.17	0.1681	-2.5162	-4.7943E-03	104.08	-0.9450
28	115.18	0.1283	-4.0161	3.4746E-03	175.64	6.5829
MINIMUM	73.886	-0.1156	-4.0161	-4.7943E-03	-109.26	-6.2516
Pile N.	1	9	28	23	16	9
MAXIMUM	121.17	0.4923	2.8801	4.6345E-03	175.64	6.6500
Pile N.	27	17	22	2	28	7

PILE GROUP	STRESS,KIP/IN**2
1	2.7402
2	2.9608
3	3.1516
4	3.3421
5	3.5322
6	3.7219
7	4.1309
8	2.8156
9	2.9988
10	3.1805
11	3.3623
12	3.5442
13	3.9477
14	4.2135
15	2.8980
16	3.0813
17	3.2621
18	3.4440
19	3.6258
20	4.0292
21	4.2961
22	2.9887
23	3.3740

24	3.5635
25	3.7527
26	3.9417
27	4.1305
28	4.3795
MINIMUM	2.7402
Pile N.	1
MAXIMUM	4.3795
Pile N.	28

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-2.1708E-06	-5.9541E-05	-6.3427	-99.908	-0.015076	-0.5623	-1.0491E-03	-0.018613	2.1478	1.2847E+07	3.5380E+07
x(FT)	14.025	14.790	0.0000	0.0000	12.750	13.005	13.515	15.300	25.500	0.0000	0.0000
2	-3.5867E-05	-3.1538E-05	-0.2807	-58.871	-0.068487	-0.3122	-1.2187E-03	-0.015099	2.6170	1.2847E+07	3.5380E+07
x(FT)	9.3100	13.475	13.230	0.0000	7.1050	11.760	11.025	14.700	24.500	0.0000	0.0000
3	-3.5969E-05	-3.1921E-05	-0.2805	-62.395	-0.067076	-0.3277	-1.1833E-03	-0.015801	2.7872	1.2847E+07	3.5380E+07
x(FT)	9.3100	13.475	13.230	0.0000	7.3500	12.005	11.025	14.700	24.500	0.0000	0.0000
4	-3.6038E-05	-3.2548E-05	-0.2800	-65.853	-0.065814	-0.3430	-1.1516E-03	-0.016437	2.9574	1.2847E+07	3.5380E+07
x(FT)	9.3100	13.720	13.475	0.0000	7.3500	12.005	11.270	14.700	24.500	0.0000	0.0000
5	-3.6080E-05	-3.2986E-05	-0.2809	-69.252	-0.064657	-0.3585	-1.1234E-03	-0.017013	3.1276	1.2847E+07	3.5380E+07
x(FT)	9.3100	13.720	13.475	0.0000	7.3500	12.250	11.270	14.700	24.500	0.0000	0.0000
6	-3.6194E-05	-3.3721E-05	-0.2813	-72.596	-0.063592	-0.3736	-1.0979E-03	-0.017530	3.2978	1.2847E+07	3.5380E+07
x(FT)	9.5550	13.965	13.475	0.0000	7.3500	12.250	11.515	14.700	24.500	0.0000	0.0000
7	-1.9396E-06	-9.2745E-03	-6.6500	-40.656	-0.014646	-3.8197	-1.0189E-03	-0.038374	3.1437	1.2847E+07	3.5380E+07
x(FT)	14.025	0.5100	0.0000	9.4350	12.750	0.0000	14.535	4.0800	25.500	0.0000	0.0000
8	-2.1154E-06	-6.0275E-05	-6.2752	-101.25	-0.015082	-0.5690	-1.1722E-03	-0.018464	2.2157	1.2847E+07	3.5380E+07
x(FT)	14.280	15.045	0.0000	0.0000	12.750	13.005	13.515	15.300	25.500	0.0000	0.0000
9	-2.7113E-04	-9.4642E-03	-0.7392	-37.951	-0.1153	-2.7919	-1.2996E-03	-0.029287	2.3675	1.2847E+07	3.5380E+07
x(FT)	2.8050	0.0000	9.4350	8.6700	0.0000	0.0000	5.3550	3.8250	25.500	0.0000	0.0000
10	-4.2697E-05	-2.6065E-04	-3.5971	-2.2927	-0.1162	-0.4404	-2.3550E-03	-6.1539E-03	3.0448	1.2847E+07	3.5380E+07
x(FT)	8.0580	2.3700	0.0000	8.2950	6.1620	0.0000	8.5320	4.7400	23.700	0.0000	0.0000
11	-4.2745E-05	-2.6435E-04	-3.5900	-2.3185	-0.1161	-0.4442	-2.3499E-03	-6.1975E-03	3.2261	1.2847E+07	3.5380E+07
x(FT)	8.0580	2.3700	0.0000	8.2950	6.1620	0.0000	8.5320	4.5030	23.700	0.0000	0.0000
12	-4.2792E-05	-2.6804E-04	-3.5829	-2.3444	-0.1159	-0.4480	-2.3449E-03	-6.2425E-03	3.4074	1.2847E+07	3.5380E+07
x(FT)	8.0580	2.3700	0.0000	8.2950	6.1620	0.0000	8.5320	4.5030	23.700	0.0000	0.0000
13	-1.6454E-06	-8.9929E-03	-6.2728	-36.817	-0.014088	-3.2393	-8.5347E-04	-0.030934	3.0601	1.2847E+07	3.5380E+07
x(FT)	14.535	0.5100	0.0000	9.6900	13.260	0.0000	14.535	4.5900	25.500	0.0000	0.0000
14	-1.9445E-06	-9.5011E-03	-6.6258	-41.438	-0.014615	-3.8674	-9.4251E-04	-0.038748	3.2119	1.2847E+07	3.5380E+07
x(FT)	14.025	0.5100	0.0000	9.4350	12.750	0.0000	14.535	4.0800	25.500	0.0000	0.0000
15	-1.9497E-06	-6.0415E-05	-6.2474	-103.78	-0.015267	-0.5860	-1.4876E-03	-0.022298	2.2837	1.2847E+07	3.5380E+07
x(FT)	14.280	15.045	0.0000	0.0000	12.750	13.260	13.515	13.515	25.500	0.0000	0.0000
16	-1.9653E-06	-6.4369E-05	-6.2249	-109.26	-0.015363	-0.6096	-1.4721E-03	-0.019082	2.4354	1.2847E+07	3.5380E+07
x(FT)	14.535	15.045	0.0000	0.0000	13.005	13.260	13.515	15.300	25.500	0.0000	0.0000
17	-4.2706E-05	-2.6072E-04	-3.6544	-2.2934	-0.1164	-0.4399	-2.3593E-03	-6.1448E-03	3.1261	1.2847E+07	3.5380E+07
x(FT)	8.0580	2.3700	0.0000	8.2950	6.1620	0.0000	8.5320	4.7400	23.700	0.0000	0.0000
18	-4.2753E-05	-2.6442E-04	-3.6474	-2.3193	-0.1162	-0.4437	-2.3542E-03	-6.1875E-03	3.3074	1.2847E+07	3.5380E+07
x(FT)	8.0580	2.3700	0.0000	8.2950	6.1620	0.0000	8.5320	4.7400	23.700	0.0000	0.0000
19	-4.2800E-05	-2.6811E-04	-3.6403	-2.3451	-0.1161	-0.4475	-2.3491E-03	-6.2321E-03	3.4887	1.2847E+07	3.5380E+07
x(FT)	8.0580	2.3700	0.0000	8.2950	6.1620	0.0000	8.5320	4.5030	23.700	0.0000	0.0000
20	-1.6752E-06	-9.2197E-03	-6.2498	-37.541	-0.014043	-3.2809	-7.7850E-04	-0.031251	3.1283	1.2847E+07	3.5380E+07
x(FT)	14.790	0.5100	0.0000	9.6900	13.260	0.0000	14.535	4.5900	25.500	0.0000	0.0000
21	-1.9443E-06	-9.7278E-03	-6.6022	-42.216	-0.014584	-3.9146	-8.7626E-04	-0.039117	3.2801	1.2847E+07	3.5380E+07
x(FT)	14.025	0.5100	0.0000	9.4350	12.750	0.0000	14.535	4.0800	25.500	0.0000	0.0000
22	-1.3946E-06	-5.5174E-05	-6.2639	-107.72	-0.016361	-0.6288	-2.6840E-03	-0.044760	2.3516	1.2847E+07	3.5380E+07
x(FT)	14.535	15.045	0.0000	0.0000	13.005	13.260	13.515	2.6950	25.500	0.0000	0.0000
23	-3.9593E-05	-4.6072E-03	-0.2932	-22.089	-0.061864	-2.2206	-1.5378E-03	-0.023952	2.8423	1.2847E+07	3.5380E+07
x(FT)	9.5550	0.4900	13.965	8.8200	7.3500	0.0000	14.700	3.4300	24.500	0.0000	0.0000
24	-3.9496E-05	-4.8794E-03	-0.2940	-23.101	-0.060949	-2.2890	-1.5611E-03	-0.024508	3.0124	1.2847E+07	3.5380E+07
x(FT)	9.5550	0.4900	13.965	8.8200	7.3500	0.0000	14.700	3.4300	24.500	0.0000	0.0000
25	-3.9397E-05	-5.1518E-03	-0.2947	-24.096	-0.060098	-2.3559	-1.5792E-03	-0.025052	3.1824	1.2847E+07	3.5380E+07
x(FT)	9.5550	0.4900	13.965	8.8200	7.3500	0.0000	14.700	3.6750	24.500	0.0000	0.0000
26	-3.9296E-05	-5.4241E-03	-0.2960	-25.075	-0.059304	-2.4212	-1.5932E-03	-0.025580	3.3525	1.2847E+07	3.5380E+07
x(FT)	9.5550	0.4900	14.210	8.8200	7.3500	0.0000	14.700	3.6750	24.500	0.0000	0.0000
27	-3.9251E-05	-5.6968E-03	-0.2972	-26.048	-0.058561	-2.4851	-1.6036E-03	-0.026091	3.5225	1.2847E+07	3.5380E+07
x(FT)	9.8000	0.2450	14.210	9.0650	7.3500	0.0000	14.700	3.6750	24.500	0.0000	0.0000
28	-1.9437E-06	-9.9543E-03	-6.5829	-43.020	-0.014560	-3.9671	-8.2057E-04	-0.039559	3.3483	1.2847E+07	3.5380E+07
x(FT)	14.025	0.5100	0.0000	9.4350	12.750	0.0000	14.535	4.0800	25.500	0.0000	0.0000
Min.	-2.7113E-04	-9.9543E-03	-6.6500	-109.26	-0.1164	-3.9671	-2.6840E-03	-0.044760	2.1478	1.2847E+07	3.5380E+07
Pile N.	9	28	7	16	17	28	22	22	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	2.6421E-04	8.7095E-03	0.7390	35.905	0.1189	2.6910	1.3626E-03	0.028913	2.7402	1.2847E+07	3.5380E+07
x(FT)	2.8050	0.0000	9.1800	8.6700	0.0000	0.0000	5.1000	3.5700	0.0000	0.0000	0.0000
2	1.3832E-03	4.0144E-03	4.5434	19.900	0.2070	1.7556	6.4538E-03	0.021311	2.9608	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6750	7.5950	0.0000	0.0000	0.0000	2.6950	0.0000	0.0000	0.0000
3	1.3832E-03	4.2791E-03	4.4946	20.893	0.1984	1.8307	6.2112E-03	0.021916	3.1516	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6750	7.8400	0.0000	0.0000	0.0000	2.9400	0.0000	0.0000	0.0000
4	1.3832E-03	4.5439E-03	4.4501	21.859	0.1905	1.9034	5.9890E-03	0.022500	3.3421	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6750	7.8400	0.0000	0.0000	0.0000	2.9400	0.0000	0.0000	0.0000
5	1.3832E-03	4.8086E-03	4.4094	22.813	0.1834	1.9742	5.7847E-03	0.023060	3.5322	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6750	8.0850	0.0000	0.0000	0.0000	2.9400	0.0000	0.0000	0.0000
6	1.3832E-03	5.0734E-03	4.3721	23.771	0.1767	2.0430	5.5961E-03	0.023598	3.7219	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6750	8.0850	0.0000	0.0000	0.0000	2.9400	0.0000	0.0000	0.0000
7	2.8516E-04	4.5506E-05	0.7706	168.04	0.1304	0.6637	1.4839E-03	0.025856	4.1309	1.2847E+07	3.5380E+07
x(FT)	2.5500	15.555	9.1800	0.0000	0.0000	14.025	4.5900	15.300	0.0000	0.0000	0.0000
8	2.6600E-04	8.9462E-03	0.7342	36.342	0.1164	2.6907	1.3225E-03	0.028561	2.8156	1.2847E+07	3.5380E+07
x(FT)	2.8050	0.0000	9.4350	8.6700	0.0000	0.0000	5.3550	3.5700	0.0000	0.0000	0.0000
9	1.3868E-06	5.6176E-05	6.2516	106.71	0.016650	0.6225	2.7734E-03	0.041167	2.9988	1.2847E+07	3.5380E+07
x(FT)	14.790	15.300	0.0000	0.0000	13.260	13.260	13.515	13.515	0.0000	0.0000	0.0000

10	1.3878E-03	4.4489E-06	6.1401	21.020	0.4716	0.040060	0.013275	2.1836E-03	3.1805	1.2847E+07	3.5380E+07
x(FT)	0.0000	12.798	3.5550	0.0000	0.0000	11.139	0.2370	14.694	0.0000	0.0000	0.0000
11	1.3878E-03	4.5044E-06	6.1362	21.134	0.4711	0.040489	0.013271	2.2075E-03	3.3623	1.2847E+07	3.5380E+07
x(FT)	0.0000	12.798	3.5550	0.0000	0.0000	11.139	0.2370	14.694	0.0000	0.0000	0.0000
12	1.3878E-03	4.5599E-06	6.1323	21.248	0.4705	0.040918	0.013268	2.2315E-03	3.5442	1.2847E+07	3.5380E+07
x(FT)	0.0000	12.798	3.5550	0.0000	0.0000	11.139	0.2370	14.694	0.0000	0.0000	0.0000
13	2.9042E-04	4.7984E-05	0.7334	151.00	0.1161	0.6026	1.2661E-03	0.018448	3.9477	1.2847E+07	3.5380E+07
x(FT)	2.8050	16.065	9.6900	0.0000	0.0000	14.280	5.1000	15.300	0.0000	0.0000	0.0000
14	2.8570E-04	4.7225E-05	0.7686	170.54	0.1294	0.6756	1.4686E-03	0.026079	4.2135	1.2847E+07	3.5380E+07
x(FT)	2.5500	15.555	9.1800	0.0000	0.0000	14.025	4.5900	15.300	0.0000	0.0000	0.0000
15	2.6675E-04	9.1829E-03	0.7322	37.083	0.1154	2.7375	1.3064E-03	0.028896	2.8980	1.2847E+07	3.5380E+07
x(FT)	2.8050	0.0000	9.4350	8.6700	0.0000	0.0000	5.3550	3.8250	0.0000	0.0000	0.0000
16	2.7184E-04	9.7009E-03	0.7348	38.661	0.1143	2.8375	1.2843E-03	0.029606	3.0813	1.2847E+07	3.5380E+07
x(FT)	2.8050	0.0000	9.4350	8.6700	0.0000	0.0000	5.3550	3.8250	0.0000	0.0000	0.0000
17	1.3924E-03	4.4517E-06	6.1464	21.009	0.4735	0.040076	0.013291	2.1835E-03	3.2621	1.2847E+07	3.5380E+07
x(FT)	0.0000	12.798	3.5550	0.0000	0.0000	11.139	0.2370	14.694	0.0000	0.0000	0.0000
18	1.3924E-03	4.5073E-06	6.1425	21.123	0.4729	0.040505	0.013287	2.2073E-03	3.4440	1.2847E+07	3.5380E+07
x(FT)	0.0000	12.798	3.5550	0.0000	0.0000	11.139	0.2370	14.694	0.0000	0.0000	0.0000
19	1.3924E-03	4.5628E-06	6.1386	21.237	0.4723	0.040934	0.013284	2.2312E-03	3.6258	1.2847E+07	3.5380E+07
x(FT)	0.0000	12.798	3.5550	0.0000	0.0000	11.139	0.2370	14.694	0.0000	0.0000	0.0000
20	2.9103E-04	4.9823E-05	0.7318	153.29	0.1152	0.6139	1.2533E-03	0.018445	4.0292	1.2847E+07	3.5380E+07
x(FT)	2.8050	16.065	9.6900	0.0000	0.0000	14.280	5.1000	15.300	0.0000	0.0000	0.0000
21	2.8623E-04	4.8908E-05	0.7667	173.02	0.1285	0.6874	1.4538E-03	0.026267	4.2961	1.2847E+07	3.5380E+07
x(FT)	2.5500	15.555	9.1800	0.0000	0.0000	14.025	4.8450	15.300	0.0000	0.0000	0.0000
22	2.6632E-04	9.4196E-03	0.7349	38.214	0.1160	2.8408	1.3162E-03	0.030033	2.9887	1.2847E+07	3.5380E+07
x(FT)	2.8050	0.0000	9.4350	8.6700	0.0000	0.0000	5.3550	3.8250	0.0000	0.0000	0.0000
23	1.3970E-03	2.0083E-05	4.3442	91.014	0.1840	0.3625	6.0418E-03	0.020697	3.3740	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.700	3.6750	0.0000	0.0000	13.230	0.0000	14.700	0.0000	0.0000	0.0000
24	1.3970E-03	2.1019E-05	4.3099	94.346	0.1774	0.3793	5.8305E-03	0.020857	3.5635	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.700	3.6750	0.0000	0.0000	13.475	0.0000	14.700	0.0000	0.0000	0.0000
25	1.3970E-03	2.2214E-05	4.2781	97.632	0.1713	0.3962	5.6359E-03	0.020934	3.7527	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.945	3.6750	0.0000	0.0000	13.475	0.0000	14.700	0.0000	0.0000	0.0000
26	1.3970E-03	2.3399E-05	4.2485	100.87	0.1656	0.4128	5.4562E-03	0.020940	3.9417	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.945	3.6750	0.0000	0.0000	13.475	0.0000	14.700	0.0000	0.0000	0.0000
27	1.3970E-03	2.4651E-05	4.2210	104.08	0.1603	0.4291	5.2896E-03	0.020886	4.1305	1.2847E+07	3.5380E+07
x(FT)	0.0000	15.190	3.6750	0.0000	0.0000	13.475	0.0000	14.700	0.0000	0.0000	0.0000
28	2.8666E-04	5.0536E-05	0.7650	175.64	0.1277	0.6998	1.4423E-03	0.026500	4.3795	1.2847E+07	3.5380E+07
x(FT)	2.5500	15.555	9.1800	0.0000	0.0000	14.025	4.8450	15.300	0.0000	0.0000	0.0000
Max.	1.3970E-03	9.7009E-03	6.2516	175.64	0.4735	2.8408	0.013291	0.041167	4.3795	1.2847E+07	3.5380E+07
Pile N.	23	16	9	28	17	22	17	9	28	1	1

LOAD CASE : 7
CASE NAME : Extreme Event I - A
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8067	1.0000
2	0.8067	1.0000
3	0.8067	1.0000
4	0.8067	1.0000
5	0.8067	1.0000
6	0.8067	1.0000
7	1.0000	1.0000
8	0.7850	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	1.0000	1.0000
15	0.7850	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	1.0000	1.0000
22	0.8066	1.0000
23	0.8066	1.0000
24	0.8066	1.0000
25	0.8066	1.0000
26	0.8066	1.0000
27	0.8066	1.0000
28	1.0000	1.0000

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
3308.00	0.00000	668.000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	2.98620E+05	16668.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.0315352	8.33459E-04	0.0567932

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
8.64451E-06	2.22993E-04	4.36047E-05

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	-0.012528	3.6976E-03	0.050881	8.6445E-06	2.2299E-04	4.3605E-05
2	8.5162E-04	3.1789E-03	0.050881	8.6445E-06	2.2299E-04	4.3605E-05
3	0.014231	2.6603E-03	0.050881	8.6445E-06	2.2299E-04	4.3605E-05
4	0.027611	2.1416E-03	0.050881	8.6445E-06	2.2299E-04	4.3605E-05
5	0.040990	1.6229E-03	0.050881	8.6445E-06	2.2299E-04	4.3605E-05
6	0.054370	1.1043E-03	0.050881	8.6445E-06	2.2299E-04	4.3605E-05
7	0.067749	5.8559E-04	0.050881	8.6445E-06	2.2299E-04	4.3605E-05
8	-9.9117E-03	3.6976E-03	0.050363	8.6445E-06	2.2299E-04	4.3605E-05
9	3.4679E-03	3.1789E-03	0.050363	8.6445E-06	2.2299E-04	4.3605E-05
10	0.016848	2.6603E-03	0.050363	8.6445E-06	2.2299E-04	4.3605E-05
11	0.030227	2.1416E-03	0.050363	8.6445E-06	2.2299E-04	4.3605E-05
12	0.043607	1.6229E-03	0.050363	8.6445E-06	2.2299E-04	4.3605E-05
13	0.056986	1.1043E-03	0.050363	8.6445E-06	2.2299E-04	4.3605E-05
14	0.070366	5.8559E-04	0.050363	8.6445E-06	2.2299E-04	4.3605E-05
15	-7.2954E-03	3.6976E-03	0.049844	8.6445E-06	2.2299E-04	4.3605E-05
16	6.0842E-03	3.1789E-03	0.049844	8.6445E-06	2.2299E-04	4.3605E-05
17	0.019464	2.6603E-03	0.049844	8.6445E-06	2.2299E-04	4.3605E-05
18	0.032843	2.1416E-03	0.049844	8.6445E-06	2.2299E-04	4.3605E-05
19	0.046223	1.6229E-03	0.049844	8.6445E-06	2.2299E-04	4.3605E-05
20	0.059602	1.1043E-03	0.049844	8.6445E-06	2.2299E-04	4.3605E-05
21	0.072982	5.8559E-04	0.049844	8.6445E-06	2.2299E-04	4.3605E-05
22	-4.6791E-03	3.6976E-03	0.049325	8.6445E-06	2.2299E-04	4.3605E-05
23	8.7005E-03	3.1789E-03	0.049325	8.6445E-06	2.2299E-04	4.3605E-05
24	0.022080	2.6603E-03	0.049325	8.6445E-06	2.2299E-04	4.3605E-05
25	0.035460	2.1416E-03	0.049325	8.6445E-06	2.2299E-04	4.3605E-05
26	0.048839	1.6229E-03	0.049325	8.6445E-06	2.2299E-04	4.3605E-05
27	0.062219	1.1043E-03	0.049325	8.6445E-06	2.2299E-04	4.3605E-05
28	0.075598	5.8559E-04	0.049325	8.6445E-06	2.2299E-04	4.3605E-05
MINIMUM	-0.012528	5.8559E-04	0.049325	8.6445E-06	2.2299E-04	4.3605E-05
Pile N.	1	7	22	1	1	1
MAXIMUM	0.075598	3.6976E-03	0.050881	8.6445E-06	2.2299E-04	4.3605E-05
Pile N.	28	1	1	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	-12.512	0.6901	10.428	11.482	-234.08	34.473
2	4.7347	1.8329	5.1870	30.637	-183.58	71.905
3	52.060	9.1977	5.1971	30.871	-184.99	44.040
4	99.067	16.498	5.1981	31.084	-186.26	15.425
5	145.98	23.779	5.1632	30.988	-185.68	-13.536
6	192.90	31.080	5.1068	30.741	-184.21	-41.550
7	255.33	0.3776	89.917	-6.6755	-120.91	20.096
8	-11.203	0.6764	9.9014	11.355	-232.60	34.091
9	-4.6648	0.5883	8.1622	10.264	-261.72	30.816
10	64.534	0.9589	5.0256	0.010428	-180.59	68.193
11	115.46	0.8621	5.0134	0.010428	-181.03	62.917
12	166.39	0.7651	5.0008	0.010428	-181.46	57.612
13	222.39	0.4027	78.583	-7.1842	-127.22	21.622
14	262.79	0.3856	92.166	-6.7504	-107.86	20.321
15	-9.8574	0.6740	9.4876	11.331	-234.90	34.019
16	-3.2905	0.5864	7.7377	10.245	-263.98	30.760
17	74.492	0.9628	4.9860	0.010428	-178.61	68.340
18	125.42	0.8656	4.9739	0.010428	-179.06	63.048
19	176.35	0.7681	4.9615	0.010428	-179.49	57.727
20	229.83	0.4106	80.866	-7.2588	-115.47	21.846
21	270.25	0.3945	94.409	-6.8325	-94.569	20.567
22	-8.4731	0.6827	9.1889	11.410	-241.15	34.257
23	29.252	-3.5169	5.0349	-29.325	-175.81	88.355
24	77.033	-11.164	4.9907	-29.176	-174.92	105.17
25	124.52	-18.771	4.9426	-29.009	-173.92	121.68
26	172.01	-26.385	4.8910	-28.826	-172.82	137.88
27	219.50	-34.007	4.8363	-28.629	-171.64	153.75
28	277.71	0.4043	96.645	-6.9226	-80.994	20.837
MINIMUM	-12.512	-34.007	4.8363	-29.325	-263.98	-41.550
Pile N.	1	27	27	23	16	6
MAXIMUM	277.71	31.080	96.645	31.084	-80.994	153.75
Pile N.	28	6	28	4	28	27

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	-0.027971	3.6976E-03	0.044311	-5.5843E-06	2.2299E-04	4.4101E-05
2	1.3625E-03	0.050881	-2.9957E-03	4.5178E-05	4.3605E-05	-2.1854E-04
3	0.014475	0.050881	-2.8507E-04	4.5178E-05	4.3605E-05	-2.1854E-04
4	0.027587	0.050881	2.4256E-03	4.5178E-05	4.3605E-05	-2.1854E-04
5	0.040700	0.050881	5.1363E-03	4.5178E-05	4.3605E-05	-2.1854E-04
6	0.053812	0.050881	7.8469E-03	4.5178E-05	4.3605E-05	-2.1854E-04
7	0.080361	5.8559E-04	0.026853	2.1987E-05	2.2299E-04	3.8635E-05
8	-0.025325	3.6976E-03	0.044646	-5.5843E-06	2.2299E-04	4.4101E-05
9	-0.012632	-3.1789E-03	-0.048876	-5.5843E-06	-2.2299E-04	-4.4101E-05

10	0.016848	0.050363	-2.6603E-03	8.6445E-06	4.3605E-05	-2.2299E-04
11	0.030227	0.050363	-2.1416E-03	8.6445E-06	4.3605E-05	-2.2299E-04
12	0.043607	0.050363	-1.6229E-03	8.6445E-06	4.3605E-05	-2.2299E-04
13	0.069985	1.1043E-03	0.029764	2.1987E-05	2.2299E-04	3.8635E-05
14	0.082679	5.8559E-04	0.025534	2.1987E-05	2.2299E-04	3.8635E-05
15	-0.022679	3.6976E-03	0.044981	-5.5843E-06	2.2299E-04	4.4101E-05
16	-9.9859E-03	3.1789E-03	0.049211	-5.5843E-06	2.2299E-04	4.4101E-05
17	0.019464	0.049844	-2.6603E-03	8.6445E-06	4.3605E-05	-2.2299E-04
18	0.032843	0.049844	-2.1416E-03	8.6445E-06	4.3605E-05	-2.2299E-04
19	0.046223	0.049844	-1.6229E-03	8.6445E-06	4.3605E-05	-2.2299E-04
20	0.072303	1.1043E-03	0.028445	2.1987E-05	2.2299E-04	3.8635E-05
21	0.084997	5.8559E-04	0.024215	2.1987E-05	2.2299E-04	3.8635E-05
22	-0.020033	3.6976E-03	0.045316	-5.5843E-06	2.2299E-04	4.4101E-05
23	8.0596E-03	0.049325	-4.5657E-03	-2.8124E-05	4.3605E-05	-2.2138E-04
24	0.021343	0.049325	-6.2531E-03	-2.8124E-05	4.3605E-05	-2.2138E-04
25	0.034625	0.049325	-7.9406E-03	-2.8124E-05	4.3605E-05	-2.2138E-04
26	0.047908	0.049325	-9.6280E-03	-2.8124E-05	4.3605E-05	-2.2138E-04
27	0.061191	0.049325	-0.011315	-2.8124E-05	4.3605E-05	-2.2138E-04
28	0.087315	5.8559E-04	0.022895	2.1987E-05	2.2299E-04	3.8635E-05
MINIMUM	-0.027971	-3.1789E-03	-0.048876	-2.8124E-05	-2.2299E-04	-2.2299E-04
Pile N.	1	9	9	23	9	10
MAXIMUM	0.087315	0.050881	0.049211	4.5178E-05	2.2299E-04	4.4101E-05
Pile N.	28	2	16	2	1	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	-15.167	0.6901	5.9374	-5.1077E-03	-234.08	36.335
2	4.9716	5.1870	-1.0298	0.047451	71.905	186.12
3	52.864	5.1971	-0.5161	0.047451	44.040	187.54
4	100.43	5.1981	9.2642E-03	0.047451	15.425	188.84
5	147.91	5.1632	0.5380	0.047451	-13.536	188.25
6	195.38	5.1068	1.0478	0.047451	-41.550	186.75
7	270.67	0.3776	4.5821	0.020110	-120.91	21.175
8	-13.759	0.6764	5.8516	-5.1077E-03	-232.60	35.932
9	-7.0060	-0.5883	-6.2688	-5.1077E-03	261.72	-32.481
10	64.534	5.0256	-0.9589	0.010428	68.193	180.59
11	115.46	5.0134	-0.8621	0.010428	62.917	181.03
12	166.39	5.0008	-0.7651	0.010428	57.612	181.46
13	235.82	0.4027	4.2453	0.020110	-127.22	22.785
14	278.45	0.3856	4.3586	0.020110	-107.86	21.413
15	-12.351	0.6740	5.8846	-5.1077E-03	-234.90	35.857
16	-5.5680	0.5864	6.3006	-5.1077E-03	-263.98	32.422
17	74.492	4.9860	-0.9628	0.010428	68.340	178.61
18	125.42	4.9739	-0.8656	0.010428	63.048	179.06
19	176.35	4.9615	-0.7681	0.010428	57.727	179.49
20	243.61	0.4106	4.0579	0.020110	-115.47	23.021
21	286.23	0.3945	4.1291	0.020110	-94.569	21.672
22	-10.944	0.6827	6.0389	-5.1077E-03	-241.15	36.107
23	29.432	5.0349	-1.3387	-0.029539	88.355	178.24
24	77.820	4.9907	-1.6487	-0.029539	105.17	177.34
25	125.91	4.9426	-1.9511	-0.029539	121.68	176.32
26	174.01	4.8910	-2.2457	-0.029539	137.88	175.21
27	222.10	4.8363	-2.5323	-0.029539	153.75	174.01
28	294.02	0.4043	3.8923	0.020110	-80.994	21.957
MINIMUM	-15.167	-0.5883	-6.2688	-0.029539	-263.98	-32.481
Pile N.	1	9	9	23	16	9
MAXIMUM	294.02	5.1981	6.3006	0.047451	261.72	188.84
Pile N.	28	4	16	2	9	4

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	1.9276
2	3.1673
3	4.5641
4	5.9580
5	7.3284
6	8.6932
7	8.6522
8	1.8762
9	1.8190
10	4.8077
11	6.2911
12	7.7748
13	7.6838
14	8.8124
15	1.8472
16	1.7894
17	5.0658
18	6.5492
19	8.0328
20	7.8510
21	8.9738
22	1.8415
23	3.7684
24	5.1798
25	6.5838
26	7.9891
27	9.3956
28	9.1374
MINIMUM	1.7894
Pile N.	16
MAXIMUM	9.3956
Pile N.	27

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL.	DISPL.	MOMENT	MOMENT	SHEAR	SHEAR	SOIL REACT	SOIL REACT	TOTAL	FLEX. RIG.	FLEX. RIG.

	y-DIR IN	z-DIR IN	z-DIR KIP-IN	y-DIR KIP-IN	y-DIR KIP	z-DIR KIP	y-DIR KIP/IN	z-DIR KIP/IN	STRESS KIP/IN**2	z-DIR KIP-IN**2	y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-2.3040E-05	-2.5650E-04	-36.335	-234.08	-0.1257	-1.9605	-3.7101E-03	-0.039799	0.4409	1.2847E+07	3.5380E+07
x(FT)	16.065	17.085	0.0000	0.0000	14.535	15.045	15.555	17.595	25.500	0.0000	0.0000
2	-3.9323E-04	-3.5251E-03	-186.12	-16.596	-1.3104	-1.0259	-0.044153	-0.016731	0.1445	1.2847E+07	3.5380E+07
x(FT)	13.965	2.2050	0.0000	11.515	12.495	0.0000	14.700	11.515	24.500	0.0000	0.0000
3	-4.4803E-04	-1.2067E-03	-187.54	-7.1900	-1.3696	-0.5158	-0.046407	-0.013318	1.5367	1.2847E+07	3.5380E+07
x(FT)	13.965	3.9200	0.0000	11.760	12.250	0.0000	14.700	11.515	24.500	0.0000	0.0000
4	-5.3352E-04	-4.3932E-05	-188.84	-0.7641	-1.4601	-0.1362	-0.049669	-4.9920E-03	2.9195	1.2847E+07	3.5380E+07
x(FT)	13.720	12.250	0.0000	16.905	12.005	9.8000	14.700	11.270	24.500	0.0000	0.0000
5	-5.0549E-04	-3.4825E-05	-188.25	-13.536	-1.4227	-0.2538	-0.048252	-6.5335E-03	4.2996	1.2847E+07	3.5380E+07
x(FT)	13.720	14.945	0.0000	0.0000	12.005	13.230	14.700	18.375	24.500	0.0000	0.0000
6	-4.4792E-04	-4.1518E-05	-186.75	-41.550	-1.3613	-0.4040	-0.046079	-0.011397	5.6798	1.2847E+07	3.5380E+07
x(FT)	13.965	15.680	0.0000	0.0000	12.250	14.210	14.700	18.375	24.500	0.0000	0.0000
7	-2.0699E-05	-3.2537E-04	-21.175	-120.91	-0.059844	-1.4146	-2.2154E-03	-0.040442	7.8682	1.2847E+07	3.5380E+07
x(FT)	14.025	14.280	0.0000	0.0000	12.240	12.240	15.300	15.300	25.500	0.0000	0.0000
8	-2.3130E-05	-2.6380E-04	-35.932	-232.60	-0.1254	-1.9462	-3.5360E-03	-0.039574	0.4000	1.2847E+07	3.5380E+07
x(FT)	16.065	17.340	0.0000	0.0000	14.535	15.045	15.555	17.850	25.500	0.0000	0.0000
9	-3.6150E-03	-0.048876	-5.9735	-131.21	-0.5839	-6.2022	-5.4315E-03	-0.093315	0.2037	1.2847E+07	3.5380E+07
x(FT)	1.7850	0.0000	10.710	10.455	0.0000	0.0000	6.1200	14.535	25.500	0.0000	0.0000
10	-3.9998E-04	-3.2215E-03	-180.59	-15.376	-1.2959	-0.9557	-0.043266	-0.016169	1.8760	1.2847E+07	3.5380E+07
x(FT)	13.983	2.3700	0.0000	11.613	12.324	0.0000	14.694	11.613	23.700	0.0000	0.0000
11	-4.1624E-04	-2.7558E-03	-181.03	-13.621	-1.3112	-0.8598	-0.043896	-0.015473	3.3564	1.2847E+07	3.5380E+07
x(FT)	13.983	2.6070	0.0000	11.613	12.324	0.0000	14.694	11.613	23.700	0.0000	0.0000
12	-4.3270E-04	-2.3013E-03	-181.46	-11.838	-1.3262	-0.7635	-0.044522	-0.014827	4.8369	1.2847E+07	3.5380E+07
x(FT)	13.983	2.8440	0.0000	11.613	12.324	0.0000	14.694	11.376	23.700	0.0000	0.0000
13	-2.7192E-05	-3.4907E-04	-22.785	-127.22	-0.073116	-1.4599	-2.5471E-03	-0.035786	6.8554	1.2847E+07	3.5380E+07
x(FT)	14.535	15.045	0.0000	0.0000	12.750	13.005	15.300	15.300	25.500	0.0000	0.0000
14	-2.1287E-05	-3.2073E-04	-21.413	-107.86	-0.060405	-1.3573	-2.2276E-03	-0.039191	8.0945	1.2847E+07	3.5380E+07
x(FT)	14.025	14.280	0.0000	0.0000	12.240	11.985	15.300	15.300	25.500	0.0000	0.0000
15	-2.3016E-05	-2.6622E-04	-35.857	-234.90	-0.1250	-1.9475	-3.4910E-03	-0.039746	0.3590	1.2847E+07	3.5380E+07
x(FT)	16.065	17.340	0.0000	0.0000	14.535	15.045	15.555	17.850	25.500	0.0000	0.0000
16	-2.0517E-05	-3.1468E-04	-32.422	-263.98	-0.1112	-2.1041	-2.8352E-03	-0.043517	0.1619	1.2847E+07	3.5380E+07
x(FT)	16.320	17.595	0.0000	0.0000	14.790	15.555	16.065	18.360	25.500	0.0000	0.0000
17	-3.9971E-04	-3.2202E-03	-178.61	-15.399	-1.2861	-0.9597	-0.043269	-0.016093	2.1655	1.2847E+07	3.5380E+07
x(FT)	13.983	2.3700	0.0000	11.613	12.324	0.0000	14.694	11.613	23.700	0.0000	0.0000
18	-4.1565E-04	-2.7545E-03	-179.06	-13.641	-1.3009	-0.8632	-0.043887	-0.015373	3.6459	1.2847E+07	3.5380E+07
x(FT)	13.983	2.6070	0.0000	11.613	12.324	0.0000	14.694	11.376	23.700	0.0000	0.0000
19	-4.3177E-04	-2.2999E-03	-179.49	-11.856	-1.3154	-0.7665	-0.044500	-0.014919	5.1264	1.2847E+07	3.5380E+07
x(FT)	13.983	2.8440	0.0000	11.613	12.324	0.0000	14.694	11.376	23.700	0.0000	0.0000
20	-2.7399E-05	-3.3657E-04	-23.021	-115.47	-0.072769	-1.3876	-2.5640E-03	-0.034906	7.0817	1.2847E+07	3.5380E+07
x(FT)	14.535	15.045	0.0000	0.0000	12.750	12.750	15.300	15.300	25.500	0.0000	0.0000
21	-2.2217E-05	-3.1840E-04	-21.672	-94.569	-0.061678	-1.3078	-2.2522E-03	-0.037952	8.3208	1.2847E+07	3.5380E+07
x(FT)	13.770	14.025	0.0000	0.0000	11.985	11.730	15.300	15.300	25.500	0.0000	0.0000
22	-2.2885E-05	-2.6544E-04	-36.107	-241.15	-0.1254	-1.9949	-3.6119E-03	-0.040564	0.3181	1.2847E+07	3.5380E+07
x(FT)	16.065	17.085	0.0000	0.0000	14.535	15.045	15.555	17.850	25.500	0.0000	0.0000
23	-3.6906E-04	-4.9871E-03	-178.24	-21.931	-1.2522	-1.3327	-0.043095	-0.018335	0.8556	1.2847E+07	3.5380E+07
x(FT)	13.965	1.7150	0.0000	11.515	12.495	0.0000	14.700	11.515	24.500	0.0000	0.0000
24	-3.5081E-04	-6.6005E-03	-177.34	-27.408	-1.2325	-1.6407	-0.042224	-0.019877	2.2622	1.2847E+07	3.5380E+07
x(FT)	13.965	1.4700	0.0000	11.515	12.495	0.0000	14.700	11.515	24.500	0.0000	0.0000
25	-3.3553E-04	-8.2375E-03	-176.32	-32.729	-1.2132	-1.9412	-0.041346	-0.021308	3.6603	1.2847E+07	3.5380E+07
x(FT)	14.210	1.2250	0.0000	11.270	12.495	0.0000	14.700	11.515	24.500	0.0000	0.0000
26	-3.2128E-04	-9.8872E-03	-175.21	-37.901	-1.1945	-2.2340	-0.040442	-0.022694	5.0584	1.2847E+07	3.5380E+07
x(FT)	14.210	0.9800	0.0000	11.270	12.495	0.0000	14.700	11.270	24.500	0.0000	0.0000
27	-3.0742E-04	-0.011546	-174.01	-42.929	-1.1790	-2.5188	-0.039491	-0.024101	6.4564	1.2847E+07	3.5380E+07
x(FT)	14.210	0.9800	0.0000	11.270	12.740	0.0000	14.700	11.270	24.500	0.0000	0.0000
28	-2.3206E-05	-3.1691E-04	-21.957	-80.994	-0.062609	-1.2638	-2.2669E-03	-0.036560	8.5470	1.2847E+07	3.5380E+07
x(FT)	13.770	13.770	0.0000	0.0000	11.985	11.475	15.300	15.300	25.500	0.0000	0.0000
Min.	-3.6150E-03	-0.048876	-188.84	-263.98	-1.4601	-6.2022	-0.049669	-0.093315	0.1445	1.2847E+07	3.5380E+07
Pile N.	9	9	4	16	4	9	4	9	2	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	4.0831E-03	0.044311	6.9548	123.93	0.6845	5.8711	6.5232E-03	0.064742	1.9276	1.2847E+07	3.5380E+07
x(FT)	1.5300	0.0000	10.200	10.200	0.0000	0.0000	5.8650	14.280	0.0000	0.0000	0.0000
2	0.050881	1.7243E-05	79.031	71.905	5.1205	0.2787	0.053716	0.012740	3.1673	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.150	8.5750	0.0000	0.0000	15.680	4.4100	18.620	0.0000	0.0000	0.0000
3	0.050881	6.2289E-06	80.183	44.040	5.1316	0.1261	0.053850	8.7051E-03	4.5641	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.395	8.5750	0.0000	0.0000	15.925	4.4100	18.620	0.0000	0.0000	0.0000
4	0.050881	2.4256E-03	81.381	15.467	5.1337	0.023235	0.076825	2.1605E-03	5.9580	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.5750	0.4900	0.0000	18.375	11.270	0.0000	0.0000	0.0000	0.0000
5	0.050881	5.1363E-03	81.080	16.518	5.1000	0.5314	0.053676	0.013209	7.3284	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.5750	9.0650	0.0000	0.0000	4.4100	11.270	0.0000	0.0000	0.0000
6	0.050881	7.8469E-03	80.129	25.821	5.0448	1.0379	0.053414	0.017207	8.6932	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.5750	10.045	0.0000	0.0000	4.4100	11.515	0.0000	0.0000	0.0000
7	1.1283E-03	0.026853	2.9690	99.232	0.3767	4.5140	4.1366E-03	0.051007	8.6522	1.2847E+07	3.5380E+07
x(FT)	2.5500	0.0000	9.6900	7.9050	0.0000	0.0000	6.1200	3.8250	0.0000	0.0000	0.0000
8	4.0874E-03	0.044646	6.8750	123.25	0.6710	5.7870	6.3537E-03	0.074346	1.8762	1.2847E+07	3.5380E+07
x(FT)	1.5300	0.0000	10.455	10.200	0.0000	0.0000	5.8650	14.280	0.0000	0.0000	0.0000
9	2.0520E-05	3.1078E-04	32.481	261.72	0.1114	2.0927	2.8546E-03	0.043246	1.8190	1.2847E+07	3.5380E+07
x(FT)	16.320	17.595	0.0000	0.0000	14.790	15.555	16.065	18.105	0.0000	0.0000	0.0000
10	0.050363	1.6474E-05	78.029	68.193	4.9644	0.2584	0.052305	0.012700	4.8077	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.064	8.5320	0.0000	0.0000	15.642	4.5030	18.486	0.0000	0.0000	0.0000
11	0.050363	1.4243E-05	78.440	62.917	4.9532	0.2291	0.052330	0.011868	6.2911	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.064	8.5320	0.0000	0.0000	15.642	4.5030	18.486	0.0000	0.0000	0.0000
12	0.050363	1.2021E-05	78.849	57.612	4.9416	0.1997	0.052348	0.011001	7.7748	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.064	8.5320	0.0000	0.0000	15.642	4.5030	18.486	0.0000	0.0000	0.0000
13	1.5986E-03	0.029764	3.6651	98.660	0.4013	4.1901	4.3344E-03	0.062693	7.6838	1.2847E+07	3.5380E+07
x(FT)	2.2950	0.0000	10.200	8.6700	0.0000	0.0000	12.240	12.240	0.0000	0.0000	0.0000
14	1.1225E-03	0.025534	3.0074	96.293	0.3848	4.2916	4.2644E-03	0.049689	8.8124	1.2847E+07	3.5380E+07
x(FT)	2.5500	0.0000	9.6900	7.6500	0.0000	0.0000	6.1200	3.5700	0.0000	0.0000	0.0000
15	4.0882E-03	0.044981	6.8587	123.85	0.6687	5.8198	6.3233E-03	0.071441	1.8472	1.2847E+07	3.5380E+07
x(FT)	1.5300	0.0000	10.455	10.200	0.0000	0.0000	5.8650	14.280	0.0000	0.0000	0.0000
16	3.6158E-03	0.049211	5.9617	131.83	0.5821	6.2338	5.4083E-03	0.093954	1.7894	1.2847E+07	3.5380E+07
x(FT)	1.7850	0.0000	10.710	10.455	0.0000	0.0000	6.1200	14.535	0.0000	0.0000	0.0000
17	0.049844	1.6362E-05	77.472	68.340	4.9252	0.2586	0.052053	0.012668	5.0658	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.064	8.5320	0.0000	0.0000	15.642	4.5030	18.486	0.0000	0.0000	0.0000

18	0.049844	1.4144E-05	77.880	63.048	4.9141	0.2293	0.052079	0.011856	6.5492	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.064	8.5320	0.0000	0.0000	15.642	4.5030	18.486	0.0000	0.0000	0.0000
19	0.049844	1.1936E-05	78.286	57.727	4.9027	0.1998	0.052099	0.011015	8.0328	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.064	8.5320	0.0000	0.0000	15.642	4.5030	18.486	0.0000	0.0000	0.0000
20	1.5936E-03	0.028445	3.7015	95.671	0.4091	4.0035	4.2730E-03	0.042275	7.8510	1.2847E+07	3.5380E+07
x(FT)	2.2950	0.0000	9.9450	8.4150	0.0000	0.0000	6.3750	4.8450	0.0000	0.0000	0.0000
21	1.1160E-03	0.024215	3.0494	93.451	0.3936	4.0631	4.4045E-03	0.048349	8.9738	1.2847E+07	3.5380E+07
x(FT)	2.5500	0.0000	9.4350	7.6500	0.0000	0.0000	6.1200	3.3150	0.0000	0.0000	0.0000
22	4.0856E-03	0.045316	6.9011	125.86	0.6772	5.9722	6.4297E-03	0.075816	1.8415	1.2847E+07	3.5380E+07
x(FT)	1.5300	0.0000	10.455	10.200	0.0000	0.0000	5.8650	14.280	0.0000	0.0000	0.0000
23	0.049325	2.3456E-05	76.695	88.355	4.9697	0.3673	0.052735	0.014614	3.7684	1.2847E+07	3.5380E+07
x(FT)	0.0000	16.905	8.5750	0.0000	0.0000	15.435	4.4100	18.375	0.0000	0.0000	0.0000
24	0.049325	3.0990E-05	76.209	105.17	4.9266	0.4604	0.052480	0.017116	5.1798	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.150	8.5750	0.0000	0.0000	15.680	4.4100	18.375	0.0000	0.0000	0.0000
25	0.049325	3.9049E-05	75.686	121.68	4.8797	0.5529	0.052167	0.019512	6.5838	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.150	8.3300	0.0000	0.0000	15.680	4.1650	18.375	0.0000	0.0000	0.0000
26	0.049325	4.7776E-05	75.134	137.88	4.8293	0.6446	0.051811	0.021844	7.9891	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.395	8.5750	0.0000	0.0000	15.680	4.1650	18.375	0.0000	0.0000	0.0000
27	0.049325	5.7631E-05	74.566	153.75	4.7759	0.7353	0.051406	0.024131	9.3956	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.395	8.5750	0.0000	0.0000	15.680	4.1650	18.375	0.0000	0.0000	0.0000
28	1.1090E-03	0.022895	3.1023	90.757	0.4033	3.8274	4.5608E-03	0.046988	9.1374	1.2847E+07	3.5380E+07
x(FT)	2.5500	0.0000	9.4350	7.3950	0.0000	0.0000	5.8650	3.0600	0.0000	0.0000	0.0000
Max.	0.050881	0.049211	81.381	261.72	5.1337	6.2338	0.076825	0.093954	9.3956	1.2847E+07	3.5380E+07
Pile N.	2	16	4	9	4	16	4	16	27	1	1

***** SUMMARY FOR LOAD CASES AND COMBINATIONS *****

***** LOAD CASES RESULTS *****

LOAD CASE : 1

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
5147.00	0.00000	24.0000	0.00000	1.42440E+05	45828.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
0.0542919	1.57763E-03	-0.0206320	-4.32574E-06	1.41308E-04	1.04986E-04

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.019408	3.9486E-03	-0.025261	-4.3257E-06	1.4131E-04	1.0499E-04
Pile N.	1	1	1	1	1	1
MAXIMUM	0.089176	5.5059E-03	-0.024482	-4.3257E-06	1.4131E-04	1.0499E-04
Pile N.	28	7	22	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	82.835	-42.397	-53.623	-34.330	183.46	44.689
Pile N.	1	27	16	6	27	6
MAXIMUM	282.51	36.947	73.628	31.778	539.72	278.97
Pile N.	27	6	28	23	28	27

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.026398	-0.025261	-0.051419	-3.7295E-05	-1.4131E-04	-1.4131E-04
Pile N.	1	2	28	1	9	10
MAXIMUM	0.078738	5.5059E-03	0.012911	2.9087E-05	1.4131E-04	1.0097E-04
Pile N.	27	7	9	7	1	7

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	89.458	-4.6736	-8.6728	-0.034112	-284.36	-208.99
Pile N.	1	3	28	1	9	5
MAXIMUM	285.63	1.5865	4.8769	0.026605	539.72	72.792
Pile N.	27	22	9	7	28	22

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-0.025902	-0.052101	-72.792	-284.36	-4.6247	-8.6095	-0.046549	-0.1609	2.6005
Pile N.	2	28	22	9	4	28	4	28	1
Max.	6.7701E-03	0.014308	208.99	539.72	1.5701	4.8372	0.036916	0.072014	11.710
Pile N.	21	9	5	28	22	9	6	28	27

LOAD CASE : 2

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
3552.00	0.00000	103.000	0.00000	64332.0	6948.00

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
0.0372790	-2.43785E-04	3.95411E-03	-1.79153E-07	4.86125E-05	1.53990E-05

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.027143	1.8594E-04	2.4796E-03	-1.7915E-07	4.8613E-05	1.5399E-05
Pile N.	1	1	1	1	1	1
MAXIMUM	0.047415	2.5043E-04	2.5119E-03	-1.7915E-07	4.8613E-05	1.5399E-05
Pile N.	28	7	22	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	81.241	-23.284	-28.544	-2.7527	-118.13	-87.966
Pile N.	1	27	16	7	16	6
MAXIMUM	157.64	22.244	44.336	2.6026	223.54	127.75
Pile N.	27	6	28	1	28	27

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.024967	-1.9669E-04	-0.012607	-8.1666E-06	-4.8613E-05	-4.8613E-05
Pile N.	1	9	28	23	9	10
MAXIMUM	0.045777	2.5119E-03	0.012460	7.8132E-06	4.8613E-05	1.4666E-05
Pile N.	28	23	16	2	1	7

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	84.651	-0.1505	-4.7630	-8.5776E-03	-118.13	-8.1132
Pile N.	1	9	28	23	16	9
MAXIMUM	159.33	0.6400	3.1723	8.2063E-03	223.54	8.7201
Pile N.	27	17	16	2	28	7

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-3.9954E-04	-0.012802	-8.7201	-118.13	-0.1781	-4.7105	-3.4603E-03	-0.044652	2.4608
Pile N.	9	28	7	16	17	28	17	28	1
Max.	2.5119E-03	0.012460	9.8809	223.54	0.6171	3.1306	0.016167	0.032343	5.8051
Pile N.	23	16	17	28	17	16	17	22	28

LOAD CASE :   3

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
4345.50	0.00000	0.00000	0.00000	0.00000	8328.00

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
0.0456661	-5.89772E-04	9.81679E-13	-8.52820E-16	-1.30267E-15	1.80559E-05

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.044041	-4.8094E-05	9.4400E-13	-8.5282E-16	-1.3027E-15	1.8056E-05
Pile N.	1	1	1	2	1	1
MAXIMUM	0.047291	-4.8094E-05	1.0975E-12	-8.5282E-16	-1.3027E-15	1.8056E-05
Pile N.	22	1	22	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	135.13	-24.437	-43.417	-2.3521	-203.31	-92.276
Pile N.	1	23	22	28	22	2
MAXIMUM	176.29	23.477	43.417	2.3521	203.31	143.50
Pile N.	17	2	28	22	28	23

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.041782	-4.8094E-05	-0.014951	-5.7083E-06	-1.3027E-15	-1.7130E-05
Pile N.	1	1	28	1	1	9
MAXIMUM	0.046656	4.8094E-05	0.014951	5.7083E-06	1.8056E-05	1.7130E-05
Pile N.	23	9	22	7	2	1

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	141.12	-0.1079	-4.7123	-5.2211E-03	-203.31	-7.1640
Pile N.	1	9	28	1	22	9
MAXIMUM	176.29	0.1174	4.7123	5.2211E-03	203.31	7.4555
Pile N.	17	22	22	7	28	22

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-2.8097E-04	-0.014951	-7.4555	-203.31	-0.1082	-4.6564	-1.1839E-03	-0.045594	4.1023
Pile N.	9	28	22	22	9	28	9	28	1
Max.	2.8194E-04	0.014951	7.1640	203.31	0.1177	4.6564	1.3287E-03	0.045594	5.7646
Pile N.	16	22	9	28	22	22	22	22	23

LOAD CASE :   4

```
 * TABLE L *   COMPUTATION ON PILE CAP

 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *
      LOAD X,KIP     LOAD Y,KIP     LOAD Z,KIP    MOM X,KIP-IN   MOM Y,KIP-IN   MOM Z,KIP-IN
          4753.00        25.0000        80.0000        0.00000    1.46424E+05        46008.0

 * DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *
       DISP X,IN      DISP Y,IN      DISP Z,IN      ROT X,RAD      ROT Y,RAD      ROT Z,RAD
       0.0500984    4.53474E-03     -0.0111624   -6.86281E-06    1.33045E-04    1.04917E-04

 * TABLE M *   COMPUTATION ON INDIVIDUAL PILE

   * PILE TOP DISPLACEMENTS, GLOBAL *
             DISP. X,IN   DISP. Y,IN   DISP. Z,IN    ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM      0.016708   6.4469E-03    -0.015771  -6.8628E-06   1.3305E-04   1.0492E-04
   Pile N.         1            1            1            1            1            1
   MAXIMUM      0.083489   8.9175E-03    -0.014536  -6.8628E-06   1.3305E-04   1.0492E-04
   Pile N.        28            7           22            1            1            1

   * PILE TOP REACTIONS, GLOBAL *
             FOR. X,KIP   FOR. Y,KIP   FOR. Z,KIP MOM X,KIP-IN MOM Y,KIP-IN MOM Z,KIP-IN
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM        65.633      -38.345      -45.262      -27.356       130.48       74.616
   Pile N.         1           27           16            6           27           20
   MAXIMUM        262.42       35.231       72.211       31.586       464.51       308.51
   Pile N.        27            6           28           22           28           27

   * PILE TOP DISPLACEMENTS, LOCAL *
             DISP. x,IN   DISP. y,IN   DISP. z,IN    ROT. x,RAD   ROT. y,RAD   ROT. z,RAD
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM      0.020837    -0.015771    -0.040185  -3.9680E-05  -1.3305E-04  -1.3305E-04
   Pile N.         1            2           28            1            9           10
   MAXIMUM      0.074611   8.9175E-03   4.7759E-03   2.6658E-05   1.3305E-04   1.0171E-04
   Pile N.        28            7            9            7            1            7

   * PILE TOP REACTIONS, LOCAL *
             AXIAL,KIP    LAT. y,KIP   LAT. z,KIP MOM x,KIP-IN MOM y,KIP-IN MOM z,KIP-IN
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM        70.783      -3.8995      -7.6477    -0.036293      -195.98      -166.53
   Pile N.         1            6           28            1            9            6
   MAXIMUM        265.15       2.5552       3.1731     0.024383       464.51       100.02
   Pile N.        27           22            9            7           28           22

   * EFFECTS FOR LATERALLY LOADED PILE *

 PILE     DISPL.      DISPL.      MOMENT      MOMENT       SHEAR       SHEAR    SOIL REACT  SOIL REACT     TOTAL
          y-DIR       z-DIR       z-DIR       y-DIR        y-DIR       z-DIR       y-DIR       z-DIR       STRESS
            IN          IN        KIP-IN      KIP-IN        KIP         KIP        KIP/IN      KIP/IN     KIP/IN**2
******  **********  **********  **********  **********  **********  **********  **********  **********  **********
  Min.   -0.016517   -0.040891     -100.02     -195.98     -3.8567     -7.5896   -0.041601     -0.1355      2.0576
Pile N.       2          28          22           9           6          28           6           7           1

  Max.  9.8525E-03  6.6604E-03      166.53      464.51      2.5166      3.1529    0.029857    0.060831      10.496
Pile N.      28           9           6          28          22           9          22          28          27

 LOAD CASE :     5

 * TABLE L *   COMPUTATION ON PILE CAP

 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *
      LOAD X,KIP     LOAD Y,KIP     LOAD Z,KIP    MOM X,KIP-IN   MOM Y,KIP-IN   MOM Z,KIP-IN
          3668.00        25.0000        65.0000        0.00000    1.11612E+05        36840.0

 * DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *
       DISP X,IN      DISP Y,IN      DISP Z,IN      ROT X,RAD      ROT Y,RAD      ROT Z,RAD
       0.0385961    2.91761E-03   -6.13432E-03   -5.61193E-06    9.79141E-05    8.24314E-05

 * TABLE M *   COMPUTATION ON INDIVIDUAL PILE

   * PILE TOP DISPLACEMENTS, GLOBAL *
             DISP. X,IN   DISP. Y,IN   DISP. Z,IN    ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM      0.013553   4.3804E-03  -9.5768E-03  -5.6119E-06   9.7914E-05   8.2431E-05
   Pile N.         1            1            1            1            1            1
   MAXIMUM      0.063639   6.4007E-03  -8.5667E-03  -5.6119E-06   9.7914E-05   8.2431E-05
   Pile N.        28            7           22            1            1            1

   * PILE TOP REACTIONS, GLOBAL *
             FOR. X,KIP   FOR. Y,KIP   FOR. Z,KIP MOM X,KIP-IN MOM Y,KIP-IN MOM Z,KIP-IN
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM        50.185      -28.752      -33.912      -21.566       92.679       61.044
   Pile N.         1           27           16            7           27           20
   MAXIMUM        201.25       26.690       55.416       25.815       365.14       257.29
   Pile N.        27            6           28           22           28           27

   * PILE TOP DISPLACEMENTS, LOCAL *
             DISP. x,IN   DISP. y,IN   DISP. z,IN    ROT. x,RAD   ROT. y,RAD   ROT. z,RAD
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM      0.015885  -9.5768E-03    -0.028247  -3.1384E-05  -9.7914E-05  -9.7914E-05
   Pile N.         1            2           28            1            9           10
   MAXIMUM      0.057667   6.4007E-03   1.0739E-03   2.0736E-05   9.7914E-05   7.9978E-05
   Pile N.        28            7            6            7            1            7

   * PILE TOP REACTIONS, LOCAL *
             AXIAL,KIP    LAT. y,KIP   LAT. z,KIP MOM x,KIP-IN MOM y,KIP-IN MOM z,KIP-IN
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM        54.027      -3.0086      -6.3891    -0.028706      -121.62      -120.31
   Pile N.         1            6           28            1            9            6
   MAXIMUM        203.24       2.2365       1.8775     0.018967       365.14       81.743
   Pile N.        27           22            9            7           28           22

   * EFFECTS FOR LATERALLY LOADED PILE *

 PILE     DISPL.      DISPL.      MOMENT      MOMENT       SHEAR       SHEAR    SOIL REACT  SOIL REACT     TOTAL
```

	y-DIR IN	z-DIR IN	z-DIR KIP-IN	y-DIR KIP-IN	y-DIR KIP	z-DIR KIP	y-DIR KIP/IN	z-DIR KIP/IN	STRESS KIP/IN**2
Min.	-0.010142	-0.028731	-81.743	-121.62	-2.9709	-6.3361	-0.034019	-0.1135	1.5706
Pile N.	2	28	22	9	6	28	6	28	1
Max.	7.1097E-03	2.7674E-03	120.31	365.14	2.2012	1.8935	0.028356	0.043900	8.0392
Pile N.	28	9	6	28	22	28	22	28	27

LOAD CASE : 6

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
2808.00	0.00000	58.0000	0.00000	36180.0	5556.00

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
0.0294163	-2.56145E-04	2.20937E-03	-7.71327E-08	2.73091E-05	1.22475E-05

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
MINIMUM	0.023398	9.7396E-05	1.3832E-03	-7.7133E-08	2.7309E-05	1.2247E-05
Pile N.	1	1	1	1	1	1
MAXIMUM	0.035434	1.2516E-04	1.3970E-03	-7.7133E-08	2.7309E-05	1.2247E-05
Pile N.	28	7	22	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
MINIMUM	70.959	-17.434	-23.758	-2.0991	-109.26	-72.596
Pile N.	1	27	16	7	16	6
MAXIMUM	120.01	16.601	32.604	2.0018	175.64	104.08
Pile N.	19	6	28	1	28	27

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
MINIMUM	0.021761	-1.0202E-04	-9.8770E-03	-4.5646E-06	-2.7309E-05	-2.7309E-05
Pile N.	1	9	28	23	9	10
MAXIMUM	0.034058	1.3970E-03	9.7009E-03	4.4124E-06	2.7309E-05	1.1644E-05
Pile N.	28	23	16	2	1	7

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
MINIMUM	73.886	-0.1156	-4.0161	-4.7943E-03	-109.26	-6.2516
Pile N.	1	9	28	23	16	9
MAXIMUM	121.17	0.4923	2.8801	4.6345E-03	175.64	6.6500
Pile N.	27	17	22	2	28	7

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2
Min.	-2.7113E-04	-9.9543E-03	-6.6500	-109.26	-0.1164	-3.9671	-2.6840E-03	-0.044760	2.1478
Pile N.	9	28	7	16	17	28	22	22	1
Max.	1.3970E-03	9.7009E-03	6.2516	175.64	0.4735	2.8408	0.013291	0.041167	4.3795
Pile N.	23	16	9	28	17	22	17	9	28

LOAD CASE : 7

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
3308.00	0.00000	668.000	0.00000	2.98620E+05	16668.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
0.0315352	8.33459E-04	0.0567932	8.64451E-06	2.22993E-04	4.36047E-05

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
MINIMUM	-0.012528	5.8559E-04	0.049325	8.6445E-06	2.2299E-04	4.3605E-05
Pile N.	1	7	22	1	1	1
MAXIMUM	0.075598	3.6976E-03	0.050881	8.6445E-06	2.2299E-04	4.3605E-05
Pile N.	28	1	1	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
MINIMUM	-12.512	-34.007	4.8363	-29.325	-263.98	-41.550
Pile N.	1	27	27	23	16	6
MAXIMUM	277.71	31.080	96.645	31.084	-80.994	153.75
Pile N.	28	6	28	4	28	27

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
MINIMUM	-0.027971	-3.1789E-03	-0.048876	-2.8124E-05	-2.2299E-04	-2.2299E-04
Pile N.	1	9	9	23	9	10
MAXIMUM	0.087315	0.050881	0.049211	4.5178E-05	2.2299E-04	4.4101E-05
Pile N.	28	2	16	2	1	1

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	-15.167	-0.5883	-6.2688	-0.029539	-263.98	-32.481
Pile N.	1	9	9	23	16	9
MAXIMUM	294.02	5.1981	6.3006	0.047451	261.72	188.84
Pile N.	28	4	16	2	9	4

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-3.6150E-03	-0.048876	-188.84	-263.98	-1.4601	-6.2022	-0.049669	-0.093315	0.1445
Pile N.	9	9	4	16	4	9	4	9	2
Max.	0.050881	0.049211	81.381	261.72	5.1337	6.2338	0.076825	0.093954	9.3956
Pile N.	2	16	4	9	4	16	4	16	27

Pier 1 14x117

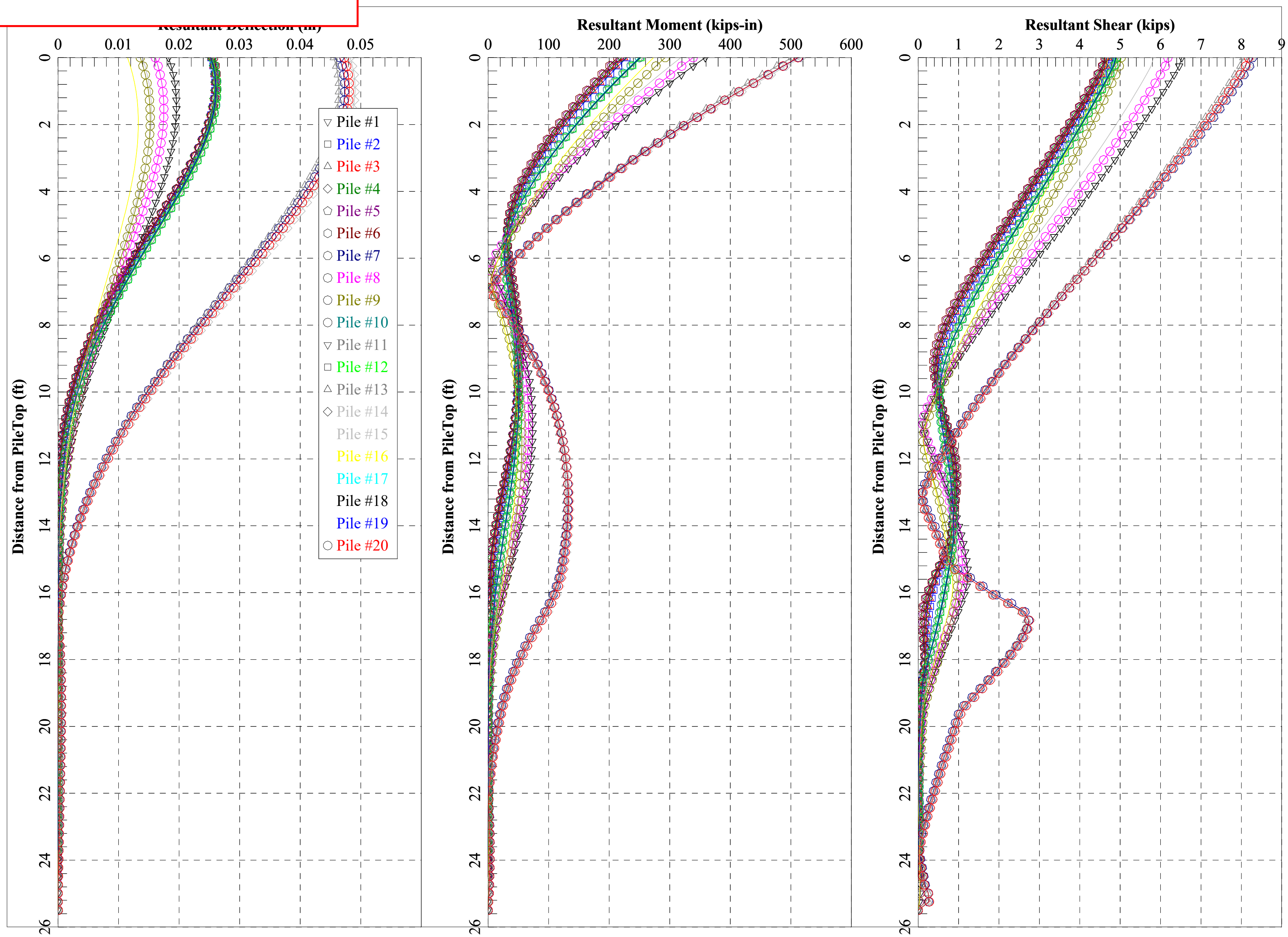
4 Rows

4 on 12 Battered lateral Piles

2 on 12 battered longitudinal piles

Graph Outputs (Strength I & Extreme I)

Pier 1 14x117
4 Rows
4 on 12 Battered lateral Piles
2 on 12 battered longitudinal piles
Strength I



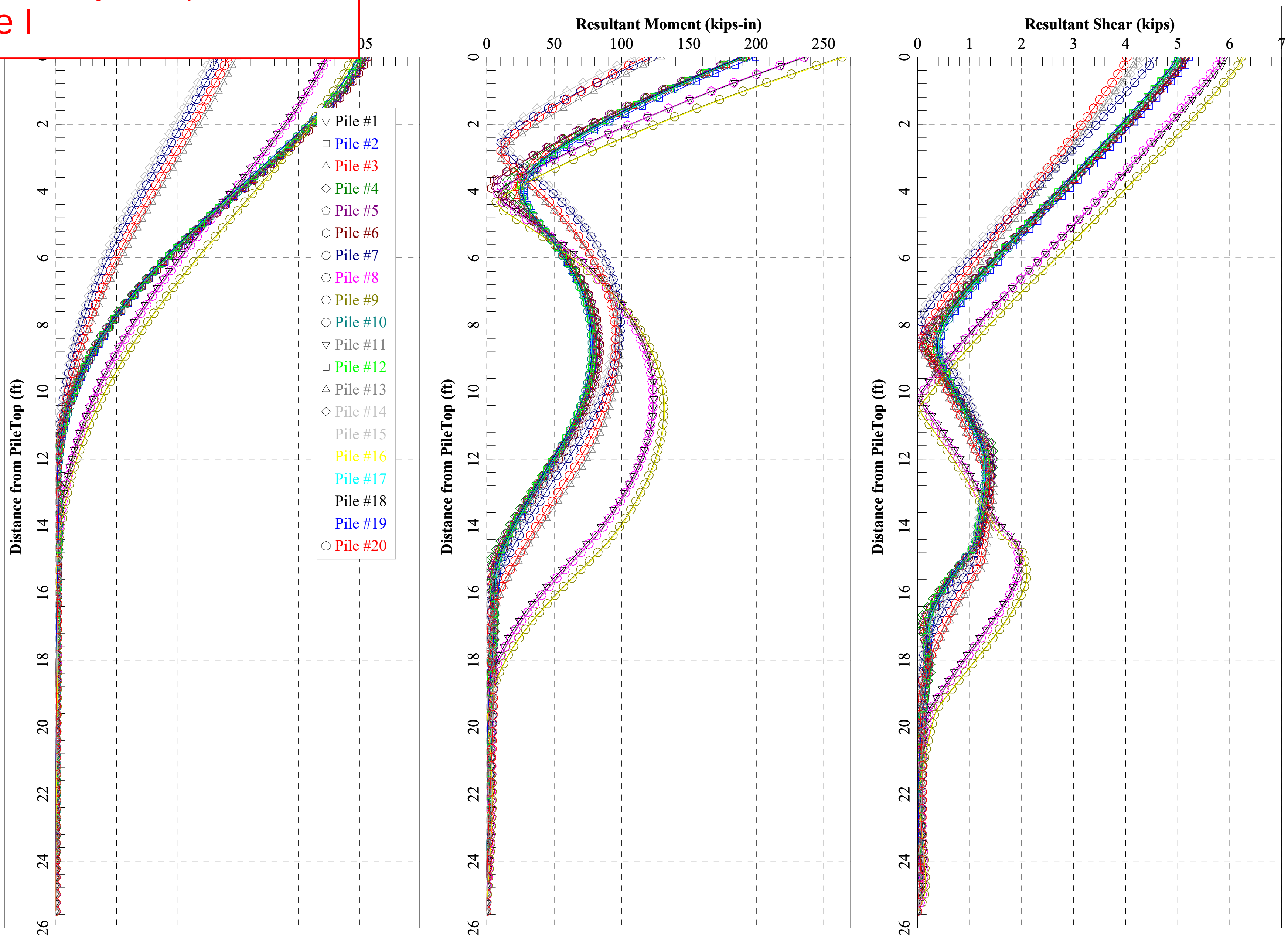
Pier 1 14x117

4 Rows

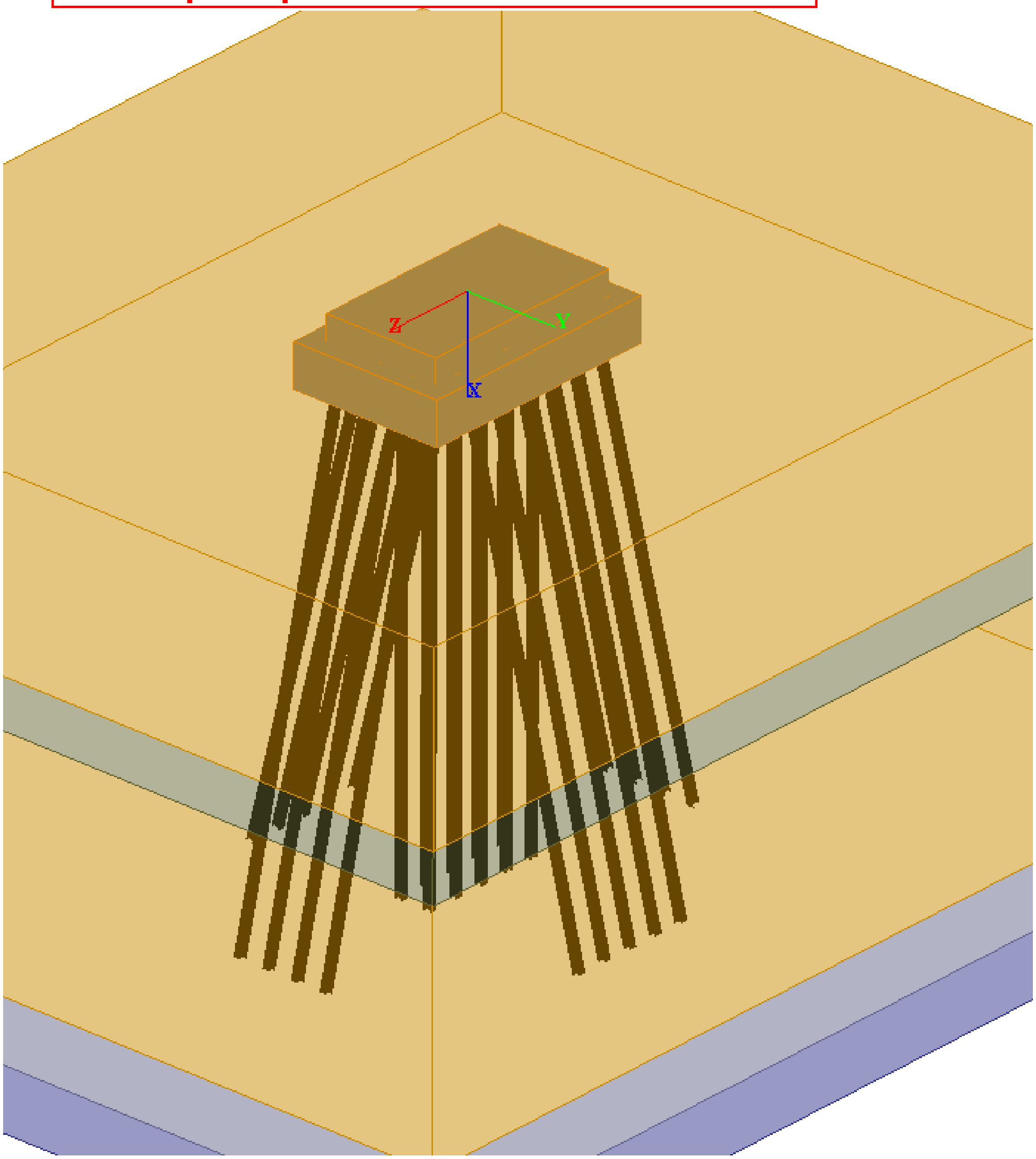
4 on 12 Battered lateral Piles

2 on 12 battered longitudinal piles

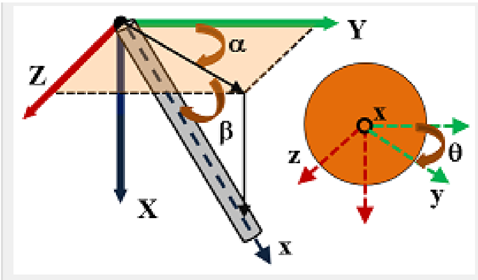
Extreme I



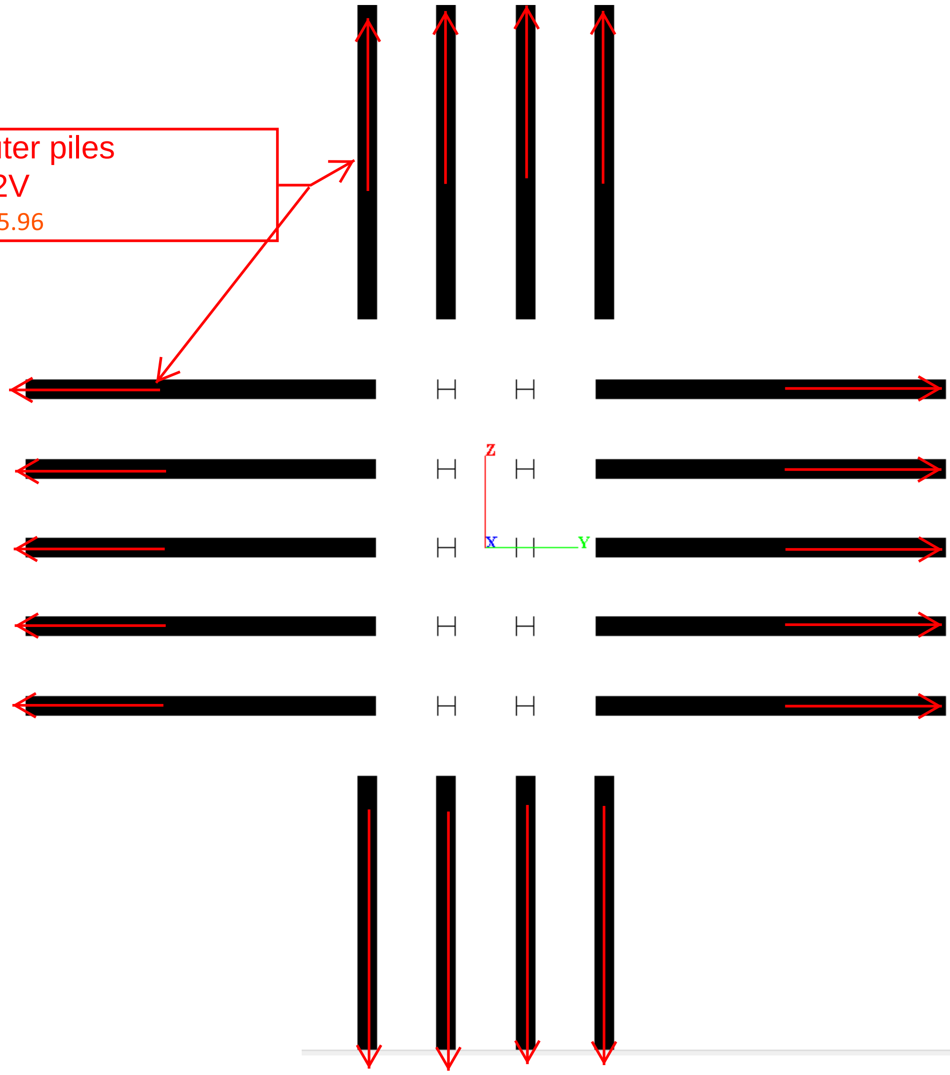
Pier 2 14x117
4 Rows - Battered Outer Piles
Group Inputs/Results



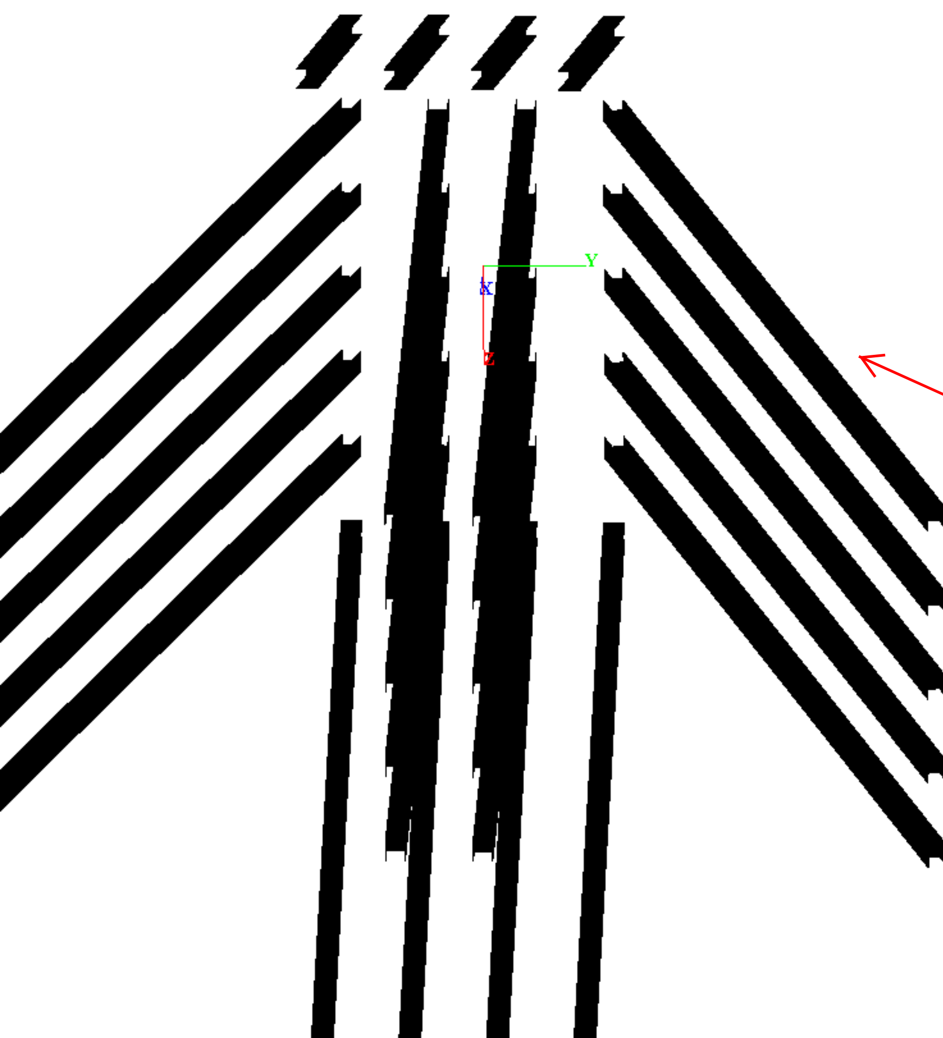
Pier 2 - 28 14x117 HP



All outer piles
3H:12V
β = 75.96

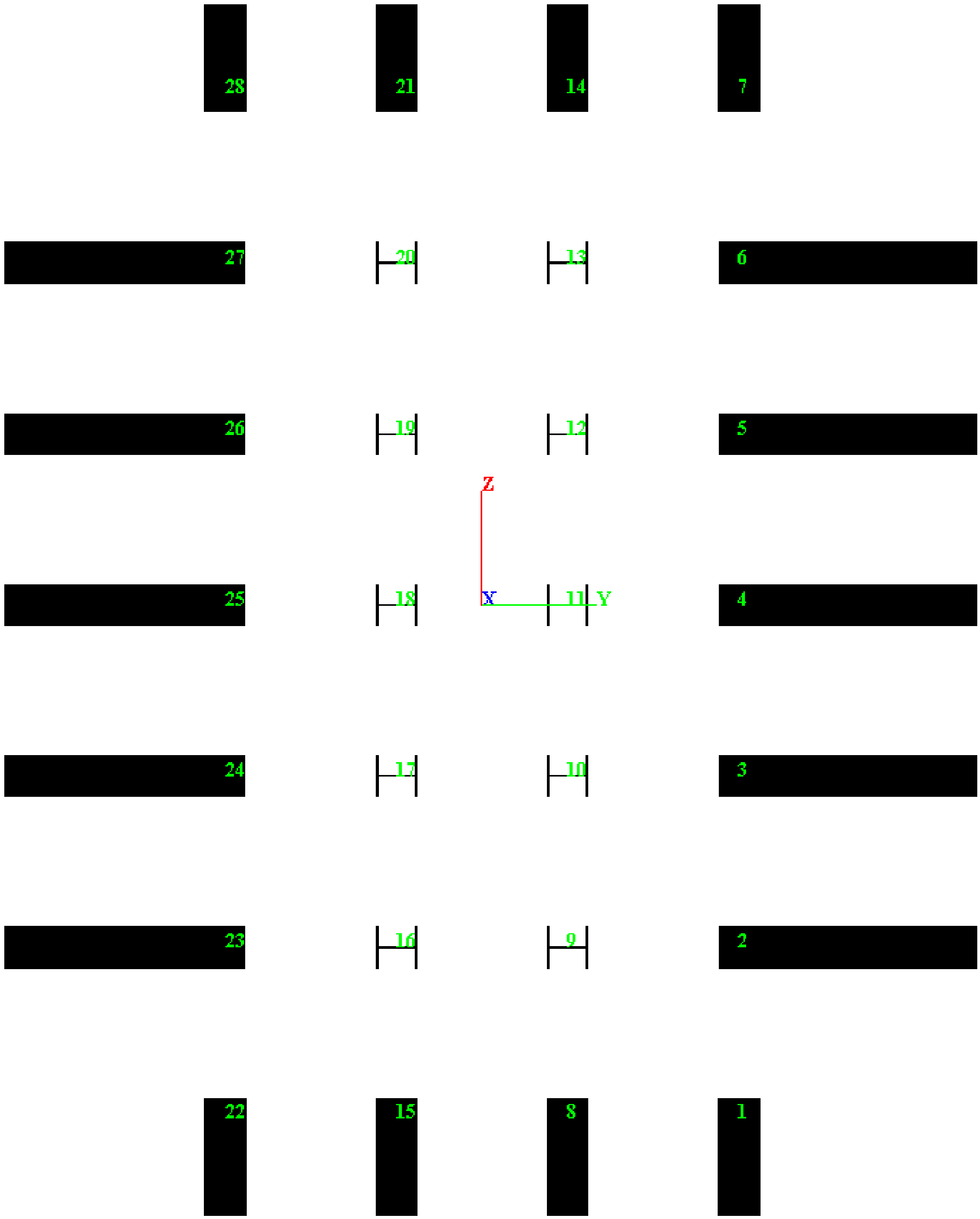


To the right: Top down view without pile cap (Piles only)
Below is skewed view to show pile orientation



Skewed view to show the pile orientation

Pier 2 - Group Numbering Plan



Group Output Summary
Maine Department of Transportation - Station 46 Bridge
GZA GeoEnvironmental, Inc.

GZA FILE NO.	09.0026035.01
CALCULATED BY	B.Cardali, 6/17/21
CHECKED BY	C.Snow, 6/17/21

PIER 2 - 14x117					
LOAD CASE	**Maximum Stress (ksi)**	**Maximum Axial Pile Demand (kip)**	**Resistance Factor**	**Required Nominal Resistance (kip)**	**Controlling Required Nominal Resistance (kip)**
Strength I	12.6	269	0.65	414	524 (Extreme Event I - A)
Strength III	10.9	189	0.65	291	
Strength IV	6.4	161	0.65	248	
Strength V	13.4	270	0.65	415	
Service I	10.3	206	1.0	206	
Service IV	7	139	1.0	139	
Extreme Event I - A	55.9	524	1.0	524	
Extreme Event I - B	56.2	524	1.0	524	
Extreme Event I - C	25	399	1.0	399	
Extreme Event I - D	25.4	398	1.0	398	

Group Input Basis (Plans&HNTB Loading)

Notional Design for Fixed Pier

Calc. for	Station 46	Job No.	75298
Made by	KEB (Ind. Checker)	Date	04/30/21
Chkd by	YP (Original Design)	Date	05/07/21

HNTB

PIER FOOTING DESIGN LOADS:

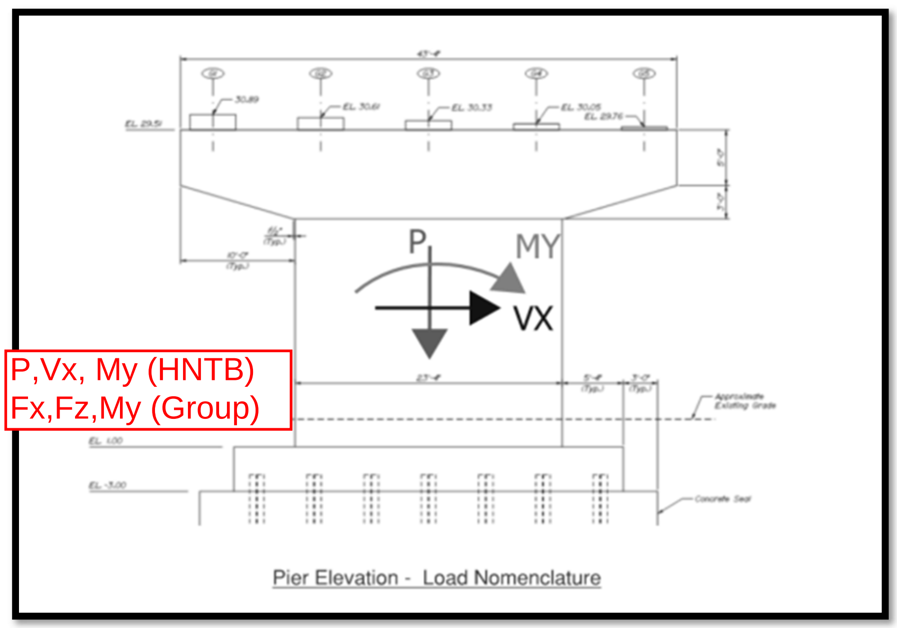
Unfactored Force Summary:

	P Compress	Vx Strong	Vy Weak	Mx Weak	My Strong	Torsion
Units	kip	kip	kip	kip-ft	kip-ft	kip-ft
DC*	2542	0	0	185	0	0
DW	355	0	0	0	0	0
WS	-158	103	166	5057	5361	0
WL	0	18	25	755	798	0
EQ1	0	239	961	31239	7769	0
EQ2	0	797	288	9372	25896	0
LL 1a	457	6	29	1668	7063	438
LL 2a	762	11	49	2278	7961	486
LL 3a	762	11	49	2264	339	243
LL 4a	971	14	62	2691	4643	534
LL 5a	971	14	62	2683	432	327
LL 1b	386	6	29	1668	6003	438
LL 2b	644	11	49	2278	6783	486
LL 3b	644	11	49	2264	339	243
LL 4b	821	14	62	2691	3992	534
LL 5b	821	14	62	2683	432	327
LL 1 b/o	0	6	29	927	206	438
LL 2 b/o	0	11	49	1538	342	486
LL 3 b/o	0	11	49	1523	339	243
LL 4 b/o	0	14	62	1950	434	534
LL 5 b/o	0	14	62	1942	432	327

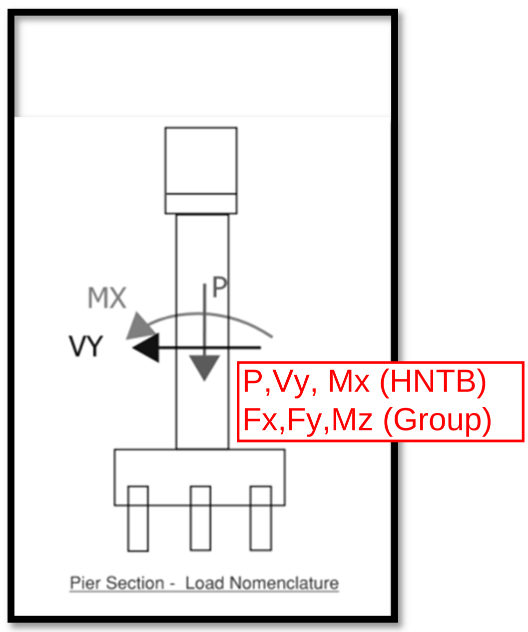
*Vertical reactions and self weight

Diagrams - Indicating Directionality

A-Cases not applicable for pile design. B-Cases w/out impact used in factored tables below.



Pier Elevation - Load Nomenclature



Pier Section - Load Nomenclature

Calc. for	Station 46	Job No.	75298
Made by	KEB	Date	04/30/21
Chkd by		Date	

HNTB

Strength I Load Combinations

Units	Fx	Fz	Fy	Mz	My	Mx	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
1	4386	11	51	3150	10505	766	Max Live w/ CE & BR, Live 1, Max Dead
2	4837	19	85	4219	11870	851	Max Live w/ CE & BR, Live 2, Max Dead
3	4837	19	85	4193	594	425	Max Live w/ CE & BR, Live 3, Max Dead
4	5147	24	108	4940	6987	934	Max Live w/ CE & BR, Live 4, Max Dead
5	5147	24	108	4926	757	573	Max Live w/ CE & BR, Live 5, Max Dead
8	3195	11	51	3085	10505	766	Max Live w/ CE & BR, Live 1, Min Dead
9	3646	19	85	4154	11870	851	Max Live w/ CE & BR, Live 2, Min Dead
10	3646	19	85	4128	594	425	Max Live w/ CE & BR, Live 3, Min Dead
11	3956	24	108	4875	6987	934	Max Live w/ CE & BR, Live 4, Min Dead
12	3956	24	108	4861	757	573	Max Live w/ CE & BR, Live 5, Min Dead
15	3710	11	51	1854	361	766	Min Live w/ CE & BR, Live 1, Max Dead
16	3710	19	85	2922	599	851	Min Live w/ CE & BR, Live 2, Max Dead
17	3710	19	85	2897	593	425	Min Live w/ CE & BR, Live 3, Max Dead
18	3710	24	108	3644	760	934	Min Live w/ CE & BR, Live 4, Max Dead
19	3710	24	108	3630	757	573	Min Live w/ CE & BR, Live 5, Max Dead
22	2518	11	51	1789	361	766	Min Live w/ CE & BR, Live 1, Min Dead
23	2518	19	85	2857	599	851	Min Live w/ CE & BR, Live 2, Min Dead
24	2518	19	85	2832	593	425	Min Live w/ CE & BR, Live 3, Min Dead
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Min Live w/ CE & BR, Live 4, Min Dead
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Min Live w/ CE & BR, Live 5, Min Dead
Envelope	5147	24	108	59,280 kip-in	142,440 kip-in	11,208 kip-in	Maximum
	2518	11	51	1789	361	425	Minimum

Strength III Load Combinations

Units	Fx	Fz	Fy	Mz	My	Mx	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
27	3552	103	166	63,468 kip-in	64,332 kip-in	0	Wind, Max Dead
28	2361	103	166	5224	5361	0	Wind, Min Dead

Strength IV Load Combinations

	Fx	Fz	Fy	Mz	My	Mx	
31	4345.5	0.0	0.0	3,333.6 kip-in	0.0	0.0	Max Dead

Strength V Load Combinations

Units	Fx	Fz	Fy	Mz	My	Mx	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
29	4166	70	134	5358	11149	591	Max Live, Live 1, Max Dead, WS V, WL
30	4513	76	160	6183	12202	656	Max Live, Live 2, Max Dead, WS V, WL
31	4513	76	160	6163	3503	328	Max Live, Live 3, Max Dead, WS V, WL
32	4753	80	178	6740	8435	721	Max Live, Live 4, Max Dead, WS V, WL
33	4753	80	178	6729	3629	442	Max Live, Live 5, Max Dead, WS V, WL
34	2974	70	134	5294	11149	591	Max Live, Live 1, Min Dead, WS V, WL
35	3322	76	160	6118	12202	656	Max Live, Live 2, Min Dead, WS V, WL
36	3322	76	160	6099	3503	328	Max Live, Live 3, Min Dead, WS V, WL
37	3561	80	178	6675	8435	721	Max Live, Live 4, Min Dead, WS V, WL
38	3561	80	178	6664	3629	442	Max Live, Live 5, Min Dead, WS V, WL
39	3644	70	134	4358	3324	591	Min Live, Live 1, Max Dead, WS V, WL
40	3644	76	160	5183	3507	656	Min Live, Live 2, Max Dead, WS V, WL
41	3644	76	160	5163	3503	328	Min Live, Live 3, Max Dead, WS V, WL
42	3644	80	178	5740	3631	721	Min Live, Live 4, Max Dead, WS V, WL
43	3644	80	178	5729	3629	442	Min Live, Live 5, Max Dead, WS V, WL
44	2452	70	134	4294	3324	591	Min Live, Live 1, Min Dead, WS V, WL
45	2452	76	160	5118	3507	656	Min Live, Live 2, Min Dead, WS V, WL
46	2452	76	160	5099	3503	328	Min Live, Live 3, Min Dead, WS V, WL
47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Min Live, Live 4, Min Dead, WS V, WL
48	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Min Live, Live 5, Min Dead, WS V, WL
Envelope	4753	80	178	80,880 kip-in	146,424 kip-in	8,652 kip-in	Maximum
	2452	70	134	4294	3324	328	Minimum

Calc. for	Station 46	Job No.	75298
Made by	KEB	Date	04/30/21
Chkd by		Date	

HNTB

Service I Load Combina[illegible]

Units	Fx	Fz	Fy	Mz	My	Mx	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
49	3233	58	107	4232	8521	438	Max Live, Live 1, Dead, WS
50	3490	62	127	4842	9301	486	Max Live, Live 2, Dead, WS
51	3490	62	127	4828	2857	243	Max Live, Live 3, Dead, WS
52	3668	65	140	5255	6511	534	Max Live, Live 4, Dead, WS
53	3668	65	140	5247	2951	327	Max Live, Live 5, Dead, WS
54	2846	58	107	3491	2725	438	Min Live, Live 1, Dead, WS
55	2846	62	127	4101	2861	486	Min Live, Live 2, Dead, WS
56	2846	62	127	4087	2857	243	Min Live, Live 3, Dead, WS
57	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Min Live, Live 4, Dead, WS
58	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Min Live, Live 5, Dead, WS
Envelope	3668	65	140	63,060 kip-in	111,612 kip-in	6,408 kip-in	Maximum
	2846	58	107	3491	2725	243	Minimum

Service IV Load Combin[illegible]ns

Units	Fx	Fz	Fy	Mz	My	Mx	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
59	2808	58	93	36,360 kip-in	36,180 kip-in	0	Only Service IV Case

Extreme Event I Load C[illegible]nations

Units	Fx	Fz	Fy	Mz	My	Mx	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
60	2897	239	961	31424	7769	0	Seismic LC1, No Live, Max Dead
61	2897	797	288	9557	25896	0	Seismic LC2, No Live, Max Dead
62	3090	242	976	32258	10771	219	Seismic LC1, Live 1, Max Dead
63	3219	244	985	390,756 kip-in	133,932 kip-in	2,916 kip-in	Seismic LC1, Live 2, Max Dead
64	3219	244	985	32556	7939	122	Seismic LC1, Live 3, Max Dead
65	3308	246	992	393,240 kip-in	117,180 kip-in	3,204 kip-in	Seismic LC1, Live 4, Max Dead
66	3308	246	992	32766	7985	164	Seismic LC1, Live 5, Max Dead
67	3090	800	303	10391	28898	219	Seismic LC2, Live 1, Max Dead
68	3219	802	312	128,352 kip-in	351,456 kip-in	2,916 kip-in	Seismic LC2, Live 2, Max Dead
69	3219	802	312	10689	26066	122	Seismic LC2, Live 3, Max Dead
70	3308	804	319	130,836 kip-in	334,704 kip-in	3,204 kip-in	Seismic LC2, Live 4, Max Dead
71	3308	804	319	10899	26112	164	Seismic LC2, Live 5, Max Dead
Envelope	3308	804	992	32770	29288	267	Maximum
	2897	239	288	9557	7769	0	Minimum

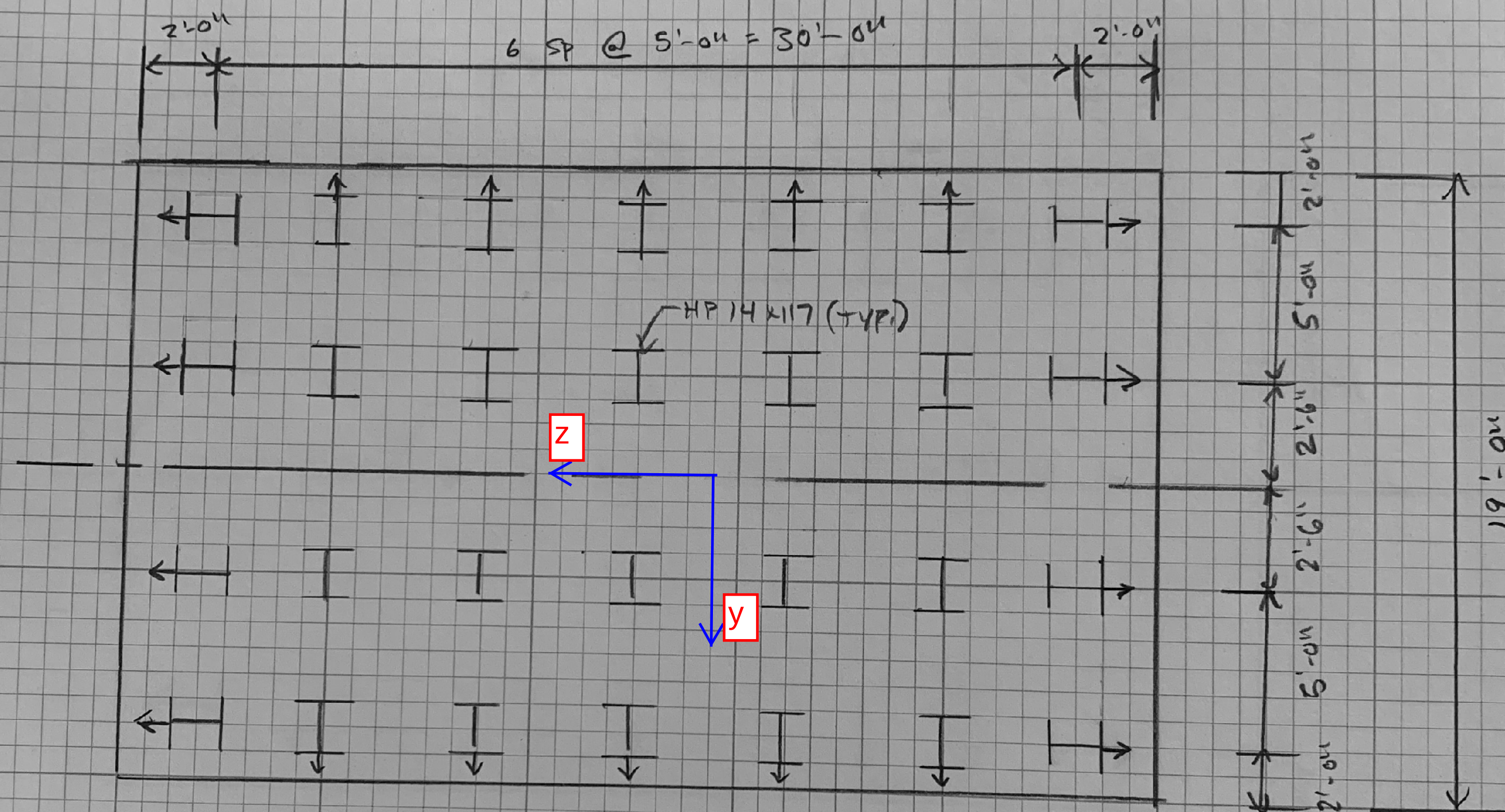
Call Extreme Event I - A (63) through Extreme Event I - D (70)

HNTB

Calculations for Station 46
Job No. 75298-DS-001 Sheet No.
Made by BRG Date 5/25/21
Checked by Date
(1/8" grid, 64 squares per inch)

OPTION 1 - PIER 2 (FIXED)

28 total pile



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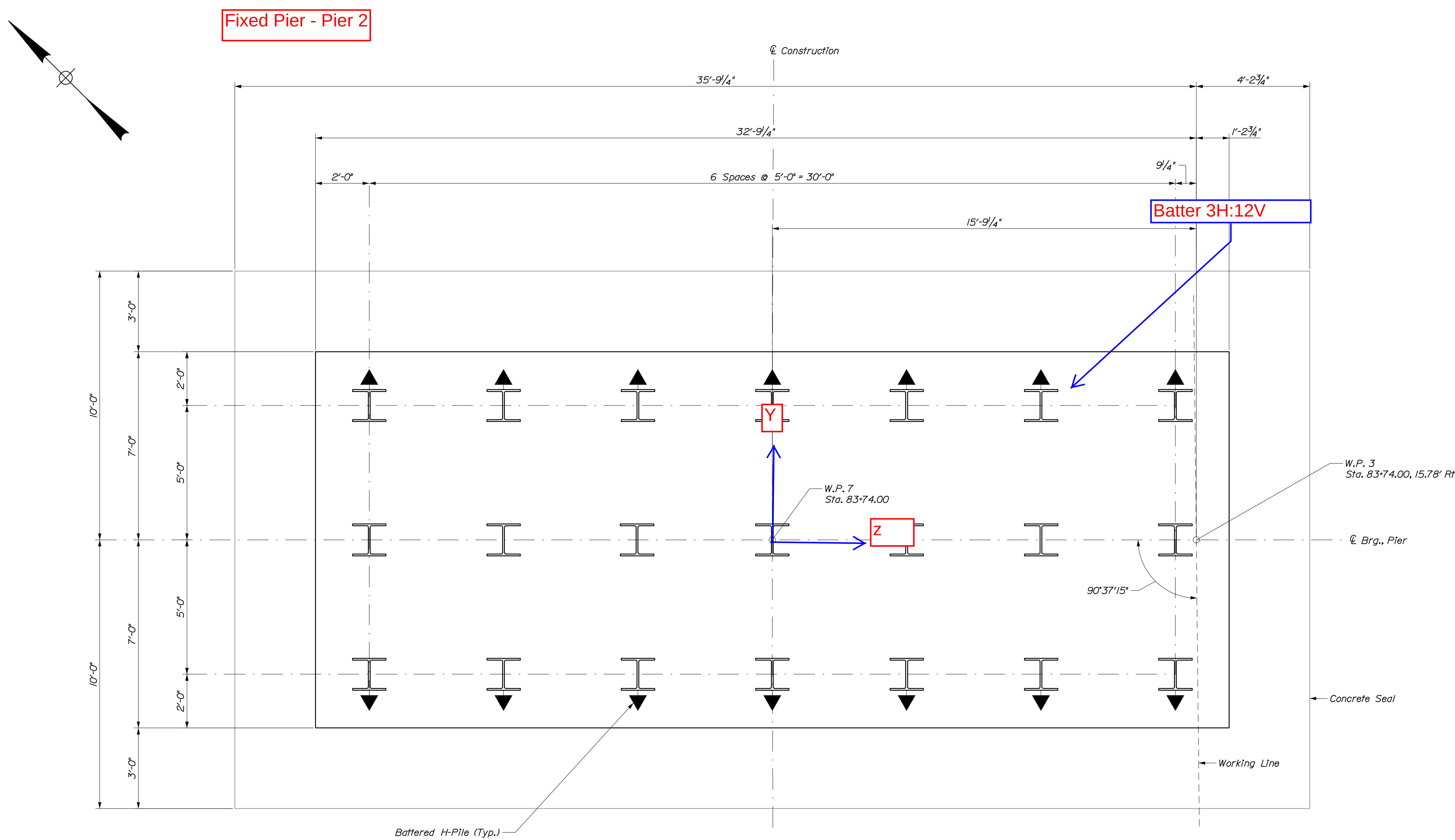
Division:
Username:
Date:4/29/2021



PIER NO. 2 SEAL & FOOTING PLAN

60% Plans Submitted For Review on March 26, 2021

HNTB

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2392900

WIN
23929.00

BRIDGE PLANS

BRIDGE NO.3039

	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	Y. Peng	P. Bishop	05\21
CHECKED-REVIEWED	K. Brayley	T. Cole	05\21
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE
P.E. NUMBER
DATE

STATION 46 BRIDGE
KENNEBEC RIVER ESTUARY
WOOLWICH SAGADAHOC COUNTY

PIER NO. 2
SEAL AND FOOTING PLAN

SHEET NUMBER
115
OF 157

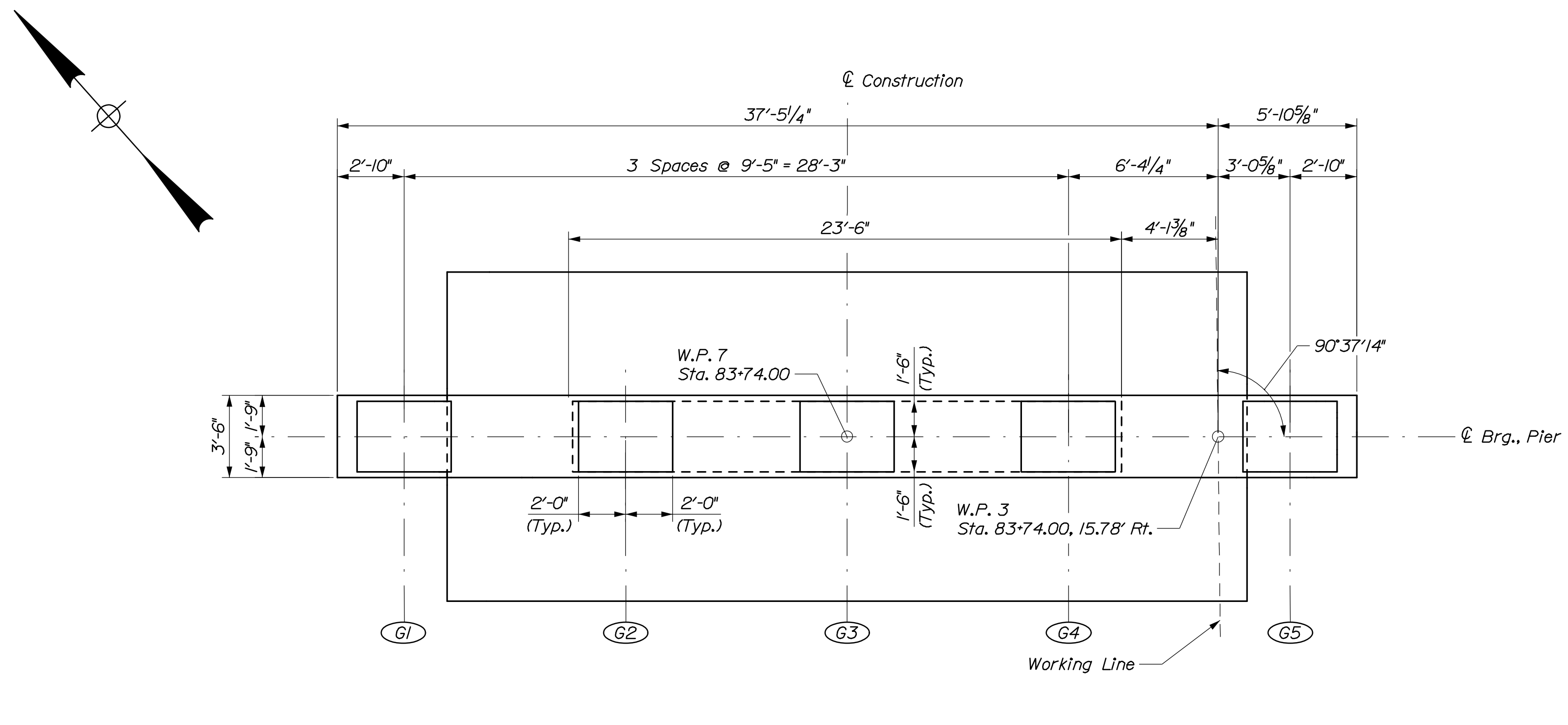
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2392900

WIN 23929.00

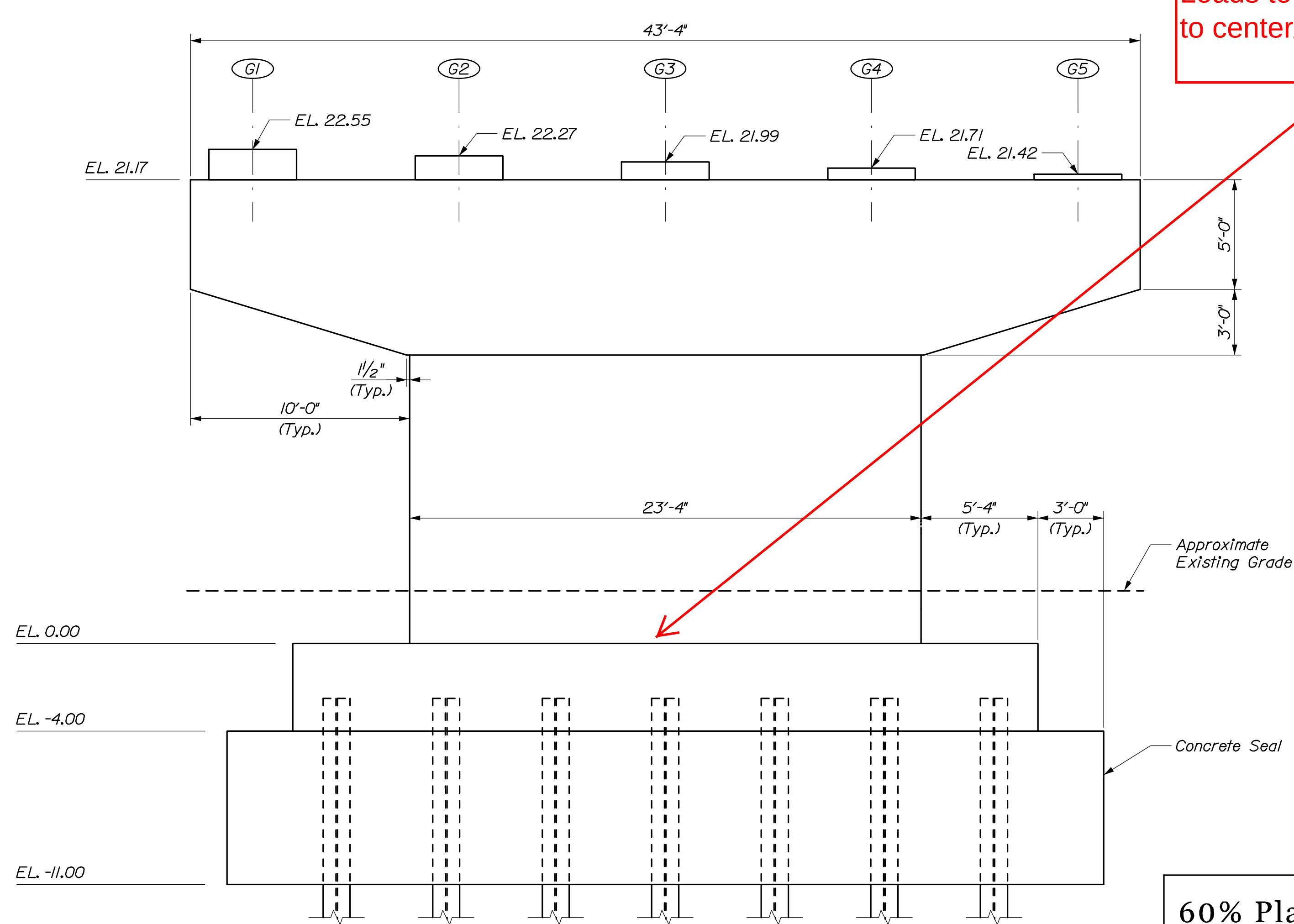
BRIDGE NO.3039

BRIDGE PLANS



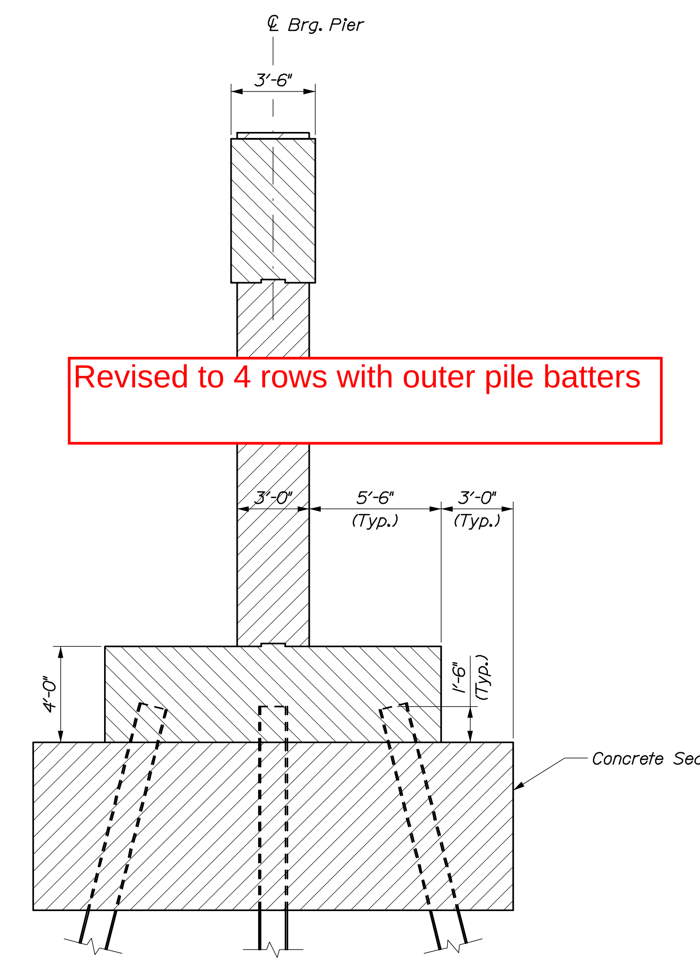
PLAN

Loads to be applied to center/top of pier



ELEVATION

Revised to 4 rows with outer pile batters



SECTION

60% Plans Submitted For Review on March 26, 2021

HNTB

PROJ. MANAGER			
DESIGN-DETAILED	Y. Peng	P. Bishop	05\21
CHECKED-REVIEWED	K. Brayley	T. Cote	05\21
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

BY DATE

SIGNATURE

P.E. NUMBER

DATE

STATION 46 BRIDGE
KENNEBEC RIVER ESTUARY
WOOLWICH SAGADAHOC COUNTY

PIER NO. 2
PLAN AND ELEVATION

SHEET NUMBER
117
OF 157

Filename: 117_Pier No. 2 Plan and Elevation.dgn
Division:
Username:
Date:4/29/2021

Pier 2 14x117

4 Rows - Battered

Outer Piles

Input Summary

```
=========================================================================

                  GROUP for Windows, Version 2016.10.13

                   Serial Number : 364300562

                   Analysis of A Group of Piles
                Subjected to Axial and Lateral Loading

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=========================================================================


This program is licensed to :

GZA GeoEnvironmental, Inc.
Portland, ME

Path to file locations      : P:\09 Jobs\0026000s\09.0026035.00 - MEDOT - Woolwich - Station 46 Bridge 3039\09.0026035.01 - Final
Design\Work\Calcs\Group\Pier 2\14x117\4Rows_BatteredSides\
Name of input data file     : Pier2_14x117_4Rows_BatteredSides.gp10r
Name of output echo file    : Pier2_14x117_4Rows_BatteredSides.gp10e
Name of output results file : Pier2_14x117_4Rows_BatteredSides.gp10o
Name of output summary file : Pier2_14x117_4Rows_BatteredSides.gp10t
Name of plot output file    : Pier2_14x117_4Rows_BatteredSides.gp10p
Name of runtime file        : Pier2_14x117_4Rows_BatteredSides.gp10r


-------------------------------------------------------------------------
                     Time and Date of Analysis
-------------------------------------------------------------------------

          Date:  May 27, 2021     Time:  09:53:45




           *****     INPUT INFORMATION     *****


Woolwich - Pier 1 (Expansion)

ANALYSIS TYPE = 3D ANALYSIS



ADJUST DEPTH FOR BATTER PILES

GENERATE LOAD-DISP (AND T-R) CURVES BASED ON SOIL PROFILE

EXTEND INTERPOLATION FOR L-DP (AND T-R) CURVES

UNITS SYSTEM  = ENGL


* TABLE B *  PILE CAP OPTIONS

LENGTH,YY    ( FT ) =    25.00
WIDTH, ZZ    ( FT ) =    40.00
THICKNESS,XX ( FT ) =    7.000

* PILE CAP DIMENSIONS ARE NOT CONSIDERED
  FOR THE PILE GROUP ANALYSIS



* TABLE C *  LOAD AND CONTROL PARAMETERS


** LOAD CASES **


NUMBER OF LOAD CASES :   10


LOAD CASE    :     1
CASE NAME    : Strength I Load Combination
LOAD TYPE    : Dead, DL
SCALE FACTOR :       1.0000

* CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
       KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
1   5.15E+03  1.08E+02      24.0  1.12E+04  1.42E+05  5.93E+04      0.00      0.00      0.00


* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
              5147.00           108.000           24.0000
```

```
       MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
              11208.0       1.42440E+05           59280.0


 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     2
 CASE NAME    : Strength III Load Combination
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000

 * CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
       KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   3.55E+03  1.66E+02  1.03E+02      0.00  6.43E+04  6.35E+04      0.00      0.00      0.00


 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
              3552.00           166.000           103.000

       MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
              0.00000           64332.0           63468.0


 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
```

```
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     3
 CASE NAME    : Strength IV Load Combination
 LOAD TYPE    : Live, LL
 SCALE FACTOR :       1.0000

 * CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
       KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   4.34E+03      0.00      0.00      0.00      0.00  3.33E+03      0.00      0.00      0.00


 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
              4345.00           0.00000           0.00000

       MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
              0.00000           0.00000           3333.60


 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     4
 CASE NAME    : Strength V Load Combination
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000

 * CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
       KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   4.75E+03  1.78E+02      80.0  8.65E+03  1.46E+05  8.09E+04      0.00      0.00      0.00
```

```
 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
              4753.00           178.000           80.0000

       MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
              8652.00       1.46424E+05           80880.0


 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     5
 CASE NAME    : Service I Load Combination
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000

 * CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
      KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   3.67E+03  1.40E+02      65.0  6.41E+03  1.12E+05  6.31E+04      0.00      0.00      0.00


 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
              3668.00           140.000           65.0000

       MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
              6408.00       1.11612E+05           63060.0


 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
```

```
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     6
 CASE NAME    : Service IV Load Combination
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000

 * CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
      KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   2.81E+03      93.0      58.0      0.00  3.62E+04  3.64E+04      0.00      0.00      0.00


 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
              2808.00           93.0000           58.0000

       MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
              0.00000           36180.0           36360.0


 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     7
 CASE NAME    : Extreme Event I - A
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000
```

```
 * CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
      KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   3.22E+03  9.85E+02  2.44E+02  2.92E+03  1.34E+05  3.91E+05      0.00      0.00      0.00


 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

        VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
               3219.00           985.000           244.000

        MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
               2916.00       1.33932E+05       3.90756E+05


 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =       100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =       100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     8
 CASE NAME    : Extreme Event I - B
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000

 * CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
      KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   3.31E+03  9.92E+02  2.46E+02  3.20E+03  1.17E+05  3.93E+05      0.00      0.00      0.00


 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

        VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
               3308.00           992.000           246.000

        MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
               3204.00       1.17180E+05       3.93240E+05
```

```
 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =       100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =       100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     9
 CASE NAME    : Extreme Event I - C
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000

 * CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
      KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   3.22E+03  3.12E+02  8.02E+02  2.92E+03  3.51E+05  1.28E+05      0.00      0.00      0.00


 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

        VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
               3219.00           312.000           802.000

        MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
               2916.00       3.51456E+05       1.28352E+05


 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =       100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =       100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS
```

LOAD CASE : 10
CASE NAME : Extreme Event I - D
LOAD TYPE : Dead, DL
SCALE FACTOR : 1.0000

* CONCENTRATED LOADS *

NL	VERT.LOAD KIP	HR.LOAD Y KIP	HR.LOAD Z KIP	MOMENT X KIP-IN	MOMENT Y KIP-IN	MOMENT Z KIP-IN	COORD X FT	COORD Y FT	COORD Z FT
1	3.31E+03	3.19E+02	8.04E+02	3.20E+03	3.35E+05	1.31E+05	0.00	0.00	0.00

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VER.LOAD X,KIP	HOR.LOAD Y,KIP	HOR.LOAD Z,KIP
3308.00	319.000	804.000

MOMENT X,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
3204.00	3.34704E+05	1.30836E+05

* THE LOADING IS STATIC *

* CONTROL PARAMETERS *
TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT = 1.00000E-04
TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS = 1.00000E-03 IN
MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS = 100
MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS = 100
FACTOR TO APPLY THE LOAD IN INCREMENTS = 1.0000
MINIMUM FACTOR FOR LOAD INCREMENTS = 1.0000
PRINT RESULTS AT PILE CAP AND PILE HEADS

* TABLE D * ARRANGEMENT OF PILE GROUPS

GROUP	CONN.Z-Z	CONN.Y-Y	PILE PROP	P-Y CURVE	L-S CURVE	T-R CURVE	R-F-L SET
1	FIX	FIX	2	0	1 G	1 G	0
2	FIX	FIX	2	0	1 G	1 G	0
3	FIX	FIX	2	0	1 G	1 G	0
4	FIX	FIX	2	0	1 G	1 G	0
5	FIX	FIX	2	0	1 G	1 G	0
6	FIX	FIX	2	0	1 G	1 G	0
7	FIX	FIX	2	0	2 G	2 G	0
8	FIX	FIX	2	0	1 G	1 G	0
9	FIX	FIX	1	0	3 G	3 G	0
10	FIX	FIX	1	0	3 G	3 G	0
11	FIX	FIX	1	0	3 G	3 G	0
12	FIX	FIX	1	0	3 G	3 G	0
13	FIX	FIX	1	0	3 G	3 G	0
14	FIX	FIX	2	0	2 G	2 G	0
15	FIX	FIX	2	0	1 G	1 G	0
16	FIX	FIX	1	0	3 G	3 G	0
17	FIX	FIX	1	0	3 G	3 G	0
18	FIX	FIX	1	0	3 G	3 G	0
19	FIX	FIX	1	0	3 G	3 G	0
20	FIX	FIX	1	0	3 G	3 G	0
21	FIX	FIX	2	0	2 G	2 G	0
22	FIX	FIX	2	0	1 G	1 G	0
23	FIX	FIX	2	0	2 G	2 G	0
24	FIX	FIX	2	0	2 G	2 G	0
25	FIX	FIX	2	0	2 G	2 G	0
26	FIX	FIX	2	0	2 G	2 G	0
27	FIX	FIX	2	0	2 G	2 G	0
28	FIX	FIX	2	0	2 G	2 G	0

GROUP	CorX,FT	CorY,FT	CorZ,FT	ALPHA,DEG	BETA,DEG	THETA,DEG	GROUND,FT	SPz,KIP-IN	SPy,KIP-IN
1	2.500	7.500	-15.00	-90.00	75.96	90.00	-4.500	0.000	0.000
2	2.500	7.500	-10.00	0.000	75.96	90.00	-4.500	0.000	0.000
3	2.500	7.500	-5.000	0.000	75.96	90.00	-4.500	0.000	0.000
4	2.500	7.500	0.000	0.000	75.96	90.00	-4.500	0.000	0.000
5	2.500	7.500	5.000	0.000	75.96	90.00	-4.500	0.000	0.000
6	2.500	7.500	10.00	0.000	75.96	90.00	-4.500	0.000	0.000
7	2.500	7.500	15.00	-90.00	104.0	90.00	-4.500	0.000	0.000
8	2.500	2.500	-15.00	-90.00	75.96	90.00	-4.500	0.000	0.000
9	2.500	2.500	-10.00	0.000	90.00	90.00	-4.500	0.000	0.000
10	2.500	2.500	-5.000	0.000	90.00	90.00	-4.500	0.000	0.000
11	2.500	2.500	0.000	0.000	90.00	90.00	-4.500	0.000	0.000
12	2.500	2.500	5.000	0.000	90.00	90.00	-4.500	0.000	0.000
13	2.500	2.500	10.00	0.000	90.00	90.00	-4.500	0.000	0.000
14	2.500	2.500	15.00	-90.00	104.0	90.00	-4.500	0.000	0.000
15	2.500	-2.500	-15.00	-90.00	75.96	90.00	-4.500	0.000	0.000
16	2.500	-2.500	-10.00	0.000	90.00	90.00	-4.500	0.000	0.000
17	2.500	-2.500	-5.000	0.000	90.00	90.00	-4.500	0.000	0.000
18	2.500	-2.500	0.000	0.000	90.00	90.00	-4.500	0.000	0.000
19	2.500	-2.500	5.000	0.000	90.00	90.00	-4.500	0.000	0.000
20	2.500	-2.500	10.00	0.000	90.00	90.00	-4.500	0.000	0.000
21	2.500	-2.500	15.00	-90.00	104.0	90.00	-4.500	0.000	0.000
22	2.500	-7.500	-15.00	-90.00	75.96	90.00	-4.500	0.000	0.000
23	2.500	-7.500	-10.00	0.000	104.0	90.00	-4.500	0.000	0.000
24	2.500	-7.500	-5.000	0.000	104.0	90.00	-4.500	0.000	0.000
25	2.500	-7.500	0.000	0.000	104.0	90.00	-4.500	0.000	0.000
26	2.500	-7.500	5.000	0.000	104.0	90.00	-4.500	0.000	0.000
27	2.500	-7.500	10.00	0.000	104.0	90.00	-4.500	0.000	0.000

```
 28      2.500    -7.500     15.00    -90.00     104.0     90.00    -4.500     0.000     0.000


 * TABLE E *   PILE GEOMETRY AND PROPERTIES
              PILE TYPE = 1 - DRIVEN PILE
                        = 2 - DRILLED SHAFT

   PROP   SECTS   INC     PILE TYPE      LENGTH, FT
     1      1     100         1             83.600
     2      1     100         1             86.600

 * PILE SECTIONS *

   PROP    SECT      FROM,FT         TO,FT    CROSS SECT
     1       1       0.00000       83.6000       1
     2       1       0.00000       86.6000       1

 * PILE CROSS SECTIONS *

  CROSS SECTION       :     1
  SECTION NAME        : HP
  TYPE                :  ELASTIC
  CROSS SECTION TYPE  : AISC SECTION (HP)
  AISC SECTION NAME   : HP14X117
  EQUIVALENT DIAMETER :       14.2500 IN
  EXTERNAL WIDTH      :       14.9000 IN
  EXTERNAL DEPTH      :       14.2000 IN
  FLANGE THICKNESS    :       0.80500 IN
  WEB THICKNESS       :       0.80500 IN
  YOUNG MODULUS       :       29000.0 KIP/IN**2
  SHEAR MODULUS       :       11153.8 KIP/IN**2

 * PILE CROSS SECTIONS PROPERTIES *

          ELASTIC SECTIONS

SECT        DIAM,IN   AREA,IN**2   Iz,IN**4    Iy,IN**4   GJ,KIP-IN**2   Mn,KIP-IN    Vn,KIP
 1          14.250      34.400      443.00      1220.0   8.9455E+04      0.0000      0.0000


 * TABLE F *   SOIL DATA


 SOILS INFORMATION

     GROUND SURFACE         =     -2.00000  FT

     5 LAYER(S) OF SOIL

     LAYER  1
     THE SOIL IS A SOFT CLAY
                                                  TOP OF LAYER    BOTTOM OF LAYER
     X COORDINATE                        (FT)       -2.00000         28.0000
     EFFECTIVE UNIT WEIGHT         (KIP/FT**3)      0.0480000        0.0480000
     UNDRAINED COHESION, C         (KIP/FT**2)       0.40000          0.40000
     STRAIN AT 50% STRESS                         1.00000E-02      1.00000E-02
     ULTIMATE UNIT SIDE FRICTION   (KIP/FT**2)       0.40000 (P)      0.56921 (P)
     ULTIMATE UNIT TIP RESISTANCE  (KIP/FT**2)       0.00000          0.00000

     LAYER  2
     THE SOIL IS A STIFF CLAY WITHOUT FREE WATER
                                                  TOP OF LAYER    BOTTOM OF LAYER
     X COORDINATE                        (FT)       28.0000          36.0000
     EFFECTIVE UNIT WEIGHT         (KIP/FT**3)      0.0530000        0.0530000
     UNDRAINED COHESION, C         (KIP/FT**2)       0.90000          0.90000
     STRAIN AT 50% STRESS                         7.00000E-03      7.00000E-03
     ULTIMATE UNIT SIDE FRICTION   (KIP/FT**2)       0.56921 (P)      0.50626 (P)
     ULTIMATE UNIT TIP RESISTANCE  (KIP/FT**2)       0.00000          0.00000

     LAYER  3
     THE SOIL IS A SOFT CLAY
                                                  TOP OF LAYER    BOTTOM OF LAYER
     X COORDINATE                        (FT)       36.0000          75.0000
     EFFECTIVE UNIT WEIGHT         (KIP/FT**3)      0.0530000        0.0530000
     UNDRAINED COHESION, C         (KIP/FT**2)       0.55000          0.55000
     STRAIN AT 50% STRESS                         8.00000E-03      8.00000E-03
     ULTIMATE UNIT SIDE FRICTION   (KIP/FT**2)       0.50626 (P)      0.73520 (P)
     ULTIMATE UNIT TIP RESISTANCE  (KIP/FT**2)       0.00000          0.00000

     LAYER  4
     THE SOIL IS A SAND
                                                  TOP OF LAYER    BOTTOM OF LAYER
     X COORDINATE                        (FT)       75.0000          85.0000
     EFFECTIVE UNIT WEIGHT         (KIP/FT**3)      0.0630000        0.0630000
     FRICTION ANGLE                  (DEGREES)      31.0000          31.0000
     P-Y SUBGRADE MODULUS          (KIP/IN**3)      0.0450000        0.0450000
     ULTIMATE UNIT SIDE FRICTION   (KIP/FT**2)       1.53486 (P)      0.00000
     ULTIMATE UNIT TIP RESISTANCE  (KIP/FT**2)       0.00000          0.00000

     LAYER  5
     THE LAYER IS A VUGGY LIMESTONE
                                                  TOP OF LAYER    BOTTOM OF LAYER
     X COORDINATE                        (FT)       85.0000          95.0000
     EFFECTIVE UNIT WEIGHT         (KIP/FT**3)       0.10800          0.10800
```

UNIAXIAL COMPRESSIVE STRENGTH (KIP/IN**2)	5.20000	5.20000
ULTIMATE UNIT SIDE FRICTION (KIP/FT**2)	1.00000	1.00000
ULTIMATE UNIT TIP RESISTANCE (KIP/FT**2)	5000.00	5000.00

Notes : Program estimated values for listed parameters
if zero input values were entered:
(P) ULTIMATE UNIT SIDE FRICTION for Driven Piles

* TABLE H * AXIAL LOAD VS DISPLACEMENT

AXIAL LOAD-DISPLACEMENT CURVES GENERATED INTERNALLY

NUM OF CURVES 3

CURVE 1 NUM OF POINTS 19

DISPLACEMENT, IN	AXIAL LOAD,KIP
-2.13027	-196.637
-1.12452	-190.656
-0.62165	-187.666
-0.20171	-168.103
-0.14139	-159.146
-0.0341075	-50.5557
-0.0167161	-24.2174
-3.33821E-03	-4.79457
-3.33821E-04	-0.47946
0.00000	0.00000
0.0104098	16.6993
0.10482	156.566
0.39479	442.784
0.60953	644.119
1.31816	1286.90
1.45166	1367.36
1.86644	1382.68
2.36931	1385.67
3.37506	1391.65

CURVE 2 NUM OF POINTS 19

DISPLACEMENT, IN	AXIAL LOAD,KIP
-2.13027	-196.637
-1.12452	-190.656
-0.62165	-187.666
-0.20171	-168.103
-0.14139	-159.146
-0.0341075	-50.5557
-0.0167161	-24.2174
-3.33821E-03	-4.79457
-3.33821E-04	-0.47946
0.00000	0.00000
0.0104098	16.6993
0.10482	156.566
0.39479	442.784
0.60953	644.119
1.31816	1286.90
1.45166	1367.36
1.86644	1382.68
2.36931	1385.67
3.37506	1391.65

CURVE 3 NUM OF POINTS 19

DISPLACEMENT, IN	AXIAL LOAD,KIP
-2.12082	-188.782
-1.11535	-182.942
-0.61262	-180.022
-0.19366	-161.072
-0.13372	-152.030
-0.0316062	-46.4501
-0.0155215	-22.2880
-3.10152E-03	-4.42491
-3.10152E-04	-0.44249
0.00000	0.00000
9.20251E-03	15.0133
0.0932904	145.204
0.36614	433.726
0.56735	634.837
1.23031	1273.75
1.36061	1356.27
1.77798	1374.74
2.28071	1377.66
3.28618	1383.50

* TABLE I * TORS. MOM. VS ANGLE ROT.

TORQUE-ROTATION CURVES GENERATED INTERNALLY

NUM OF CURVES 3

CURVE 1 NUM OF POINTS 19

ROT. ANGLE,Rad. TORS.MOMEN,KIP-IN

-10.8298	-1395.84
-10.4911	-1377.38
-10.2631	-1362.46
-10.0420	-1346.70
-9.97078	-1340.76
-8.96739	-1250.38
-8.28782	-1187.97
-6.83512	-1051.26
-5.59726	-930.773
0.00000	0.00000
5.59726	930.773
6.83512	1051.26
8.28782	1187.97
8.96739	1250.38
9.97078	1340.76
10.0420	1346.70
10.2631	1362.46
10.4911	1377.38
10.8298	1395.84

CURVE 2 NUM OF POINTS 19

ROT. ANGLE,Rad.	TORS.MOMEN,KIP-IN
-10.8298	-1395.84
-10.4911	-1377.38
-10.2631	-1362.46
-10.0420	-1346.70
-9.97078	-1340.76
-8.96739	-1250.38
-8.28782	-1187.97
-6.83512	-1051.26
-5.59726	-930.773
0.00000	0.00000
5.59726	930.773
6.83512	1051.26
8.28782	1187.97
8.96739	1250.38
9.97078	1340.76
10.0420	1346.70
10.2631	1362.46
10.4911	1377.38
10.8298	1395.84

CURVE 3 NUM OF POINTS 19

ROT. ANGLE,Rad.	TORS.MOMEN,KIP-IN
-10.0251	-1323.16
-9.56774	-1293.38
-9.27818	-1272.43
-8.54052	-1208.59
-8.22975	-1180.23
-6.99004	-1063.95
-6.52637	-1019.35
-5.70058	-938.799
-5.03276	-871.359
0.00000	0.00000
5.03276	871.359
5.70058	938.799
6.52637	1019.35
6.99004	1063.95
8.22975	1180.23
8.54052	1208.59
9.27818	1272.43
9.56774	1293.38
10.0251	1323.16

* TABLE J * MOMENT CURVATURE SETS

USER DEFINED MOMENT CURVATURE

NUM OF SETS : 1

CURVE SET 1 NUM OF CURVES 1

CURVE 1 AXIAL LOAD 0.000E+00KIPS

POINT	MOMENT KIPS-IN	CURVATURE RADIAN/IN
1	0.00000	0.00000

Pier 2 14x117

4 Rows - Battered

Outer Piles

Summary Output (All Load Cases)

```
=========================================================================

                 GROUP for Windows, Version 2016.10.13

                  Serial Number : 364300562

                  Analysis of A Group of Piles
               Subjected to Axial and Lateral Loading

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=========================================================================


-------------------------------------------------------------------------
                     Time and Date of Analysis
-------------------------------------------------------------------------

          Date:  June 15, 2021     Time:  13:42:02



            *****     COMPUTATION RESULTS     *****


Woolwich - Pier 1 (Expansion)



            *****     LOAD CASES RESULTS      *****


LOAD CASE :     1
CASE NAME : Strength I Load Combination
LOAD TYPE : Dead, DL

  REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
  ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

       GROUP NO     P-FACTOR     Y-FACTOR

           1          1.0000       1.0000
           2          1.0000       1.0000
           3          1.0000       1.0000
           4          1.0000       1.0000
           5          1.0000       1.0000
           6          1.0000       1.0000
           7          1.0000       1.0000
           8          0.8066       1.0000
           9          0.7850       1.0000
          10          0.7850       1.0000
          11          0.7850       1.0000
          12          0.7850       1.0000
          13          0.7850       1.0000
          14          0.8066       1.0000
          15          0.8066       1.0000
          16          0.7850       1.0000
          17          0.7850       1.0000
          18          0.7850       1.0000
          19          0.7850       1.0000
          20          0.7850       1.0000
          21          0.8066       1.0000
          22          0.8066       1.0000
          23          0.7850       1.0000
          24          0.7850       1.0000
          25          0.7850       1.0000
          26          0.7850       1.0000
          27          0.7850       1.0000
          28          0.8066       1.0000


* TABLE L *   COMPUTATION ON PILE CAP


* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *


      VERT. LOAD,KIPS    HOR. LOAD Y,KIPS   HOR. LOAD Z,KIPS
            5147.00            108.000            24.0000

     MOMENT X ,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
            11208.0        1.42440E+05           59280.0


* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *


       VERTICAL ,IN      HORIZONTAL Y,IN     HORIZONTAL Z,IN
            0.13959          0.0146657        1.32421E-04

     ANGLE ROT. X,RAD    ANGLE ROT. Y,RAD    ANGLE ROT. Z,RAD
        1.60471E-04        3.27770E-04        3.62898E-04


* TABLE M *   COMPUTATION ON INDIVIDUAL PILE
```

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
1	0.047932	0.054437	4.7417E-03	1.6047E-04	3.2777E-04	3.6290E-04
2	0.067598	0.044809	4.7417E-03	1.6047E-04	3.2777E-04	3.6290E-04
3	0.087264	0.035181	4.7417E-03	1.6047E-04	3.2777E-04	3.6290E-04
4	0.1069	0.025553	4.7417E-03	1.6047E-04	3.2777E-04	3.6290E-04
5	0.1266	0.015924	4.7417E-03	1.6047E-04	3.2777E-04	3.6290E-04
6	0.1463	6.2961E-03	4.7417E-03	1.6047E-04	3.2777E-04	3.6290E-04
7	0.1659	-3.3321E-03	4.7417E-03	1.6047E-04	3.2777E-04	3.6290E-04
8	0.069706	0.054437	-4.8865E-03	1.6047E-04	3.2777E-04	3.6290E-04
9	0.089372	0.044809	-4.8865E-03	1.6047E-04	3.2777E-04	3.6290E-04
10	0.1090	0.035181	-4.8865E-03	1.6047E-04	3.2777E-04	3.6290E-04
11	0.1287	0.025553	-4.8865E-03	1.6047E-04	3.2777E-04	3.6290E-04
12	0.1484	0.015924	-4.8865E-03	1.6047E-04	3.2777E-04	3.6290E-04
13	0.1680	6.2961E-03	-4.8865E-03	1.6047E-04	3.2777E-04	3.6290E-04
14	0.1877	-3.3321E-03	-4.8865E-03	1.6047E-04	3.2777E-04	3.6290E-04
15	0.091480	0.054437	-0.014515	1.6047E-04	3.2777E-04	3.6290E-04
16	0.1111	0.044809	-0.014515	1.6047E-04	3.2777E-04	3.6290E-04
17	0.1308	0.035181	-0.014515	1.6047E-04	3.2777E-04	3.6290E-04
18	0.1505	0.025553	-0.014515	1.6047E-04	3.2777E-04	3.6290E-04
19	0.1701	0.015924	-0.014515	1.6047E-04	3.2777E-04	3.6290E-04
20	0.1898	6.2961E-03	-0.014515	1.6047E-04	3.2777E-04	3.6290E-04
21	0.2095	-3.3321E-03	-0.014515	1.6047E-04	3.2777E-04	3.6290E-04
22	0.1133	0.054437	-0.024143	1.6047E-04	3.2777E-04	3.6290E-04
23	0.1329	0.044809	-0.024143	1.6047E-04	3.2777E-04	3.6290E-04
24	0.1526	0.035181	-0.024143	1.6047E-04	3.2777E-04	3.6290E-04
25	0.1722	0.025553	-0.024143	1.6047E-04	3.2777E-04	3.6290E-04
26	0.1919	0.015924	-0.024143	1.6047E-04	3.2777E-04	3.6290E-04
27	0.2116	6.2961E-03	-0.024143	1.6047E-04	3.2777E-04	3.6290E-04
28	0.2313	-3.3321E-03	-0.024143	1.6047E-04	3.2777E-04	3.6290E-04
MINIMUM	0.047932	-3.3321E-03	-0.024143	1.6047E-04	3.2777E-04	3.6290E-04
Pile N.	1	7	22	1	1	1
MAXIMUM	0.2313	0.054437	4.7417E-03	1.6047E-04	3.2777E-04	3.6290E-04
Pile N.	28	1	1	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
1	66.352	8.4180	-16.869	102.24	134.54	408.78
2	108.88	36.710	-0.8504	-20.015	80.200	593.70
3	133.36	41.077	-0.8934	-20.803	83.348	488.76
4	155.59	43.998	-0.8676	-21.968	88.008	361.50
5	172.90	42.880	-1.2334	-23.969	96.011	156.83
6	189.72	43.757	-1.0599	-22.238	89.087	-14.949
7	209.12	1.1907	42.283	-24.400	617.70	97.741
8	99.895	7.2891	-25.990	93.818	169.23	375.12
9	139.14	9.0840	-1.8973	0.027783	133.72	632.40
10	161.86	8.3969	-2.0315	0.027783	138.34	583.60
11	182.65	7.5455	-2.1965	0.027783	143.48	525.81
12	203.45	6.6454	-2.4494	0.027783	151.25	468.11
13	224.24	5.3614	-2.8084	0.027783	160.48	395.16
14	227.05	1.0183	47.014	-22.438	645.75	89.894
15	133.47	7.2655	-35.003	93.521	202.98	373.93
16	164.09	8.9263	-2.8020	0.027783	173.64	626.79
17	184.88	8.2021	-3.0051	0.027783	180.21	576.87
18	205.68	7.2975	-3.2446	0.027783	187.29	517.85
19	226.47	6.3237	-3.5850	0.027783	197.60	458.90
20	247.27	4.9418	-3.9531	0.027783	207.76	383.83
21	245.28	0.9651	50.564	-21.797	720.60	87.332
22	161.81	7.2282	-42.698	93.111	236.23	372.29
23	167.21	-30.641	-3.2055	49.376	197.40	775.53
24	187.65	-36.056	-3.2665	49.869	199.37	753.34
25	208.08	-41.479	-3.3319	50.393	201.46	730.79
26	228.51	-46.911	-3.4021	50.950	203.69	707.82
27	248.94	-52.354	-3.4777	51.546	206.07	684.38
28	263.47	0.9202	54.260	-21.216	786.28	85.006
MINIMUM	66.352	-52.354	-42.698	-24.400	80.200	-14.949
Pile N.	1	27	22	7	2	6
MAXIMUM	263.47	43.998	54.260	102.24	786.28	775.53
Pile N.	28	4	28	1	28	23

THE PILE COORDINATE SYSTEM (LOCAL AXES)
----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
1	0.045350	0.054437	0.016228	6.7638E-05	3.2777E-04	3.9099E-04
2	0.076449	4.7417E-03	-0.027071	2.3519E-04	3.6290E-04	-2.7905E-04
3	0.093192	4.7417E-03	-0.012960	2.3519E-04	3.6290E-04	-2.7905E-04
4	0.1099	4.7417E-03	1.1519E-03	2.3519E-04	3.6290E-04	-2.7905E-04
5	0.1267	4.7417E-03	0.015264	2.3519E-04	3.6290E-04	-2.7905E-04
6	0.1434	4.7417E-03	0.029375	2.3519E-04	3.6290E-04	-2.7905E-04
7	0.1621	-3.3321E-03	-0.035654	2.4372E-04	3.2777E-04	3.1313E-04
8	0.068809	0.054437	0.012170	6.7638E-05	3.2777E-04	3.9099E-04
9	0.089372	-4.8865E-03	-0.044809	1.6047E-04	3.6290E-04	-3.2777E-04
10	0.1090	-4.8865E-03	-0.035181	1.6047E-04	3.6290E-04	-3.2777E-04
11	0.1287	-4.8865E-03	-0.025553	1.6047E-04	3.6290E-04	-3.2777E-04
12	0.1484	-4.8865E-03	-0.015924	1.6047E-04	3.6290E-04	-3.2777E-04
13	0.1680	-4.8865E-03	-6.2961E-03	1.6047E-04	3.6290E-04	-3.2777E-04
14	0.1809	-3.3321E-03	-0.050277	2.4372E-04	3.2777E-04	3.1313E-04
15	0.092268	0.054437	8.1117E-03	6.7638E-05	3.2777E-04	3.9099E-04
16	0.1111	-0.014515	-0.044809	1.6047E-04	3.6290E-04	-3.2777E-04
17	0.1308	-0.014515	-0.035181	1.6047E-04	3.6290E-04	-3.2777E-04

18	0.1505	-0.014515	-0.025553	1.6047E-04	3.6290E-04	-3.2777E-04
19	0.1701	-0.014515	-0.015924	1.6047E-04	3.6290E-04	-3.2777E-04
20	0.1898	-0.014515	-6.2961E-03	1.6047E-04	3.6290E-04	-3.2777E-04
21	0.1997	-3.3321E-03	-0.064900	2.4372E-04	3.2777E-04	3.1313E-04
22	0.1157	0.054437	4.0534E-03	6.7638E-05	3.2777E-04	3.9099E-04
23	0.1181	-0.024143	-0.075717	7.6160E-05	3.6290E-04	-3.5691E-04
24	0.1395	-0.024143	-0.071147	7.6160E-05	3.6290E-04	-3.5691E-04
25	0.1609	-0.024143	-0.066577	7.6160E-05	3.6290E-04	-3.5691E-04
26	0.1823	-0.024143	-0.062008	7.6160E-05	3.6290E-04	-3.5691E-04
27	0.2037	-0.024143	-0.057438	7.6160E-05	3.6290E-04	-3.5691E-04
28	0.2185	-3.3321E-03	-0.079523	2.4372E-04	3.2777E-04	3.1313E-04
MINIMUM	0.045350	-0.024143	-0.079523	6.7638E-05	3.2777E-04	-3.5691E-04
Pile N.	1	23	28	1	1	23
MAXIMUM	0.2185	0.054437	0.029375	2.4372E-04	3.6290E-04	3.9099E-04
Pile N.	28	1	6	7	2	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	68.462	8.4180	-0.2683	0.011248	134.54	421.37
2	114.54	-0.8504	-9.1987	0.039110	593.70	-82.659
3	139.34	-0.8934	-7.4969	0.039110	488.76	-85.905
4	161.61	-0.8676	-4.9378	0.039110	361.50	-90.709
5	178.14	-1.2334	0.3471	0.039110	156.83	-98.958
6	194.67	-1.0599	3.5760	0.039110	-14.949	-91.820
7	213.13	1.1907	-9.7119	0.040528	617.70	100.74
8	103.22	7.2891	-0.9787	0.011248	169.23	386.67
9	139.14	-1.8973	-9.0840	0.027783	632.40	-133.72
10	161.86	-2.0315	-8.3969	0.027783	583.60	-138.34
11	182.65	-2.1965	-7.5455	0.027783	525.81	-143.48
12	203.45	-2.4494	-6.6454	0.027783	468.11	-151.25
13	224.24	-2.8084	-5.3614	0.027783	395.16	-160.48
14	231.67	1.0183	-9.4724	0.040528	645.75	92.653
15	137.97	7.2655	-1.5782	0.011248	202.98	385.45
16	164.09	-2.8020	-8.9263	0.027783	626.79	-173.64
17	184.88	-3.0051	-8.2021	0.027783	576.87	-180.21
18	205.68	-3.2446	-7.2975	0.027783	517.85	-187.29
19	226.47	-3.5850	-6.3237	0.027783	458.90	-197.60
20	247.27	-3.9531	-4.9418	0.027783	383.83	-207.76
21	250.22	0.9651	-10.451	0.040528	720.60	90.011
22	167.33	7.2282	-2.1681	0.011248	236.23	383.76
23	169.65	-3.2055	-10.841	0.012665	775.53	-203.48
24	190.79	-3.2665	-10.545	0.012665	753.34	-205.51
25	211.93	-3.3319	-10.240	0.012665	730.79	-207.67
26	233.07	-3.4021	-9.9266	0.012665	707.82	-209.97
27	254.20	-3.4777	-9.6026	0.012665	684.38	-212.42
28	268.76	0.9202	-11.278	0.040528	786.28	87.613
MINIMUM	68.462	-3.9531	-11.278	0.011248	-14.949	-212.42
Pile N.	1	20	28	1	6	27
MAXIMUM	268.76	8.4180	3.5760	0.040528	786.28	421.37
Pile N.	28	1	6	7	28	1

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	8.8127
2	7.0429
3	7.2218
4	7.2644
5	7.0148
6	7.1383
7	10.150
8	9.2976
9	8.3185
10	8.7754
11	9.1508
12	9.5736
13	9.9811
14	10.790
15	10.322
16	9.3741
17	9.8187
18	10.247
19	10.741
20	11.212
21	11.724
22	11.189
23	10.520
24	11.049
25	11.580
26	12.113
27	12.648
28	12.616
MINIMUM	7.0148
Pile N.	5
MAXIMUM	12.648
Pile N.	27

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-9.1034E-04	-7.7005E-04	-421.37	-5.1782	-1.4232	-1.0202	-0.021710	-0.021008	1.9902	1.2847E+07	3.5380E+07
x(FT)	15.588	11.258	0.0000	18.186	13.856	7.7940	16.454	12.990	33.774	0.0000	0.0000
2	-2.8800E-03	-0.031347	-6.6218	-107.63	-0.9325	-8.9743	-9.2002E-03	-0.070316	3.3295	1.2847E+07	3.5380E+07
x(FT)	6.0620	2.5980	12.990	12.990	1.7320	0.0000	7.7940	6.9280	41.568	0.0000	0.0000
3	-2.6045E-03	-0.018470	-6.3463	-71.784	-1.0215	-7.3293	-0.010896	-0.059032	4.0506	1.2847E+07	3.5380E+07

x(FT)	5.1960	2.5980	12.124	12.124	1.7320	0.0000	6.9280	6.9280	40.702	0.0000	0.0000
4	-2.2037E-03	-6.9367E-03	-5.7780	-32.888	-1.1913	-4.9779	-0.013819	-0.041840	4.6981	1.2847E+07	3.5380E+07
x(FT)	5.1960	4.3300	12.124	12.990	1.7320	0.0000	6.0620	6.9280	53.692	0.0000	0.0000
5	-1.6645E-03	-1.1757E-03	-5.0174	-8.0707	-1.3769	-1.6724	-0.021613	-0.018788	5.1785	1.2847E+07	3.5380E+07
x(FT)	5.1960	9.5260	10.392	16.454	1.7320	6.0620	6.0620	10.392	52.826	0.0000	0.0000
6	-2.0864E-03	-7.7022E-04	-7.0240	-14.949	-1.1472	-1.4378	-0.015209	-0.017476	5.6589	1.2847E+07	3.5380E+07
x(FT)	5.1960	13.856	10.392	0.0000	1.7320	10.392	8.6600	13.856	53.692	0.0000	0.0000
7	-3.3321E-03	-0.038994	-100.74	-120.41	-0.1505	-9.4725	-4.6537E-03	-0.073917	6.1956	1.2847E+07	3.5380E+07
x(FT)	0.0000	1.7320	0.0000	12.990	16.454	0.0000	0.0000	6.9280	38.104	0.0000	0.0000
8	-8.8351E-04	-1.9512E-03	-386.67	-10.858	-1.2063	-1.2659	-0.017626	-0.020837	3.0005	1.2847E+07	3.5380E+07
x(FT)	16.454	8.6600	0.0000	16.454	14.722	5.1960	17.320	13.856	34.640	0.0000	0.0000
9	-0.011076	-0.048745	-15.619	-123.56	-1.8815	-8.8851	-0.016023	-0.064099	4.0447	1.2847E+07	3.5380E+07
x(FT)	3.3440	1.6720	12.540	14.212	0.0000	0.0000	6.6880	6.6880	38.456	0.0000	0.0000
10	-0.010880	-0.039552	-16.419	-109.90	-2.0133	-8.2158	-0.017469	-0.059864	4.7051	1.2847E+07	3.5380E+07
x(FT)	3.3440	2.5080	12.540	14.212	0.0000	0.0000	6.6880	6.6880	40.128	0.0000	0.0000
11	-0.010672	-0.030569	-16.793	-91.333	-2.1735	-7.3853	-0.019233	-0.054547	5.3097	1.2847E+07	3.5380E+07
x(FT)	3.3440	2.5080	12.540	13.376	0.0000	0.0000	5.8520	6.6880	38.456	0.0000	0.0000
12	-0.010361	-0.021627	-17.946	-74.708	-2.4167	-6.5130	-0.022004	-0.048901	5.9142	1.2847E+07	3.5380E+07
x(FT)	3.3440	3.3440	11.704	13.376	0.0000	0.0000	5.8520	6.6880	41.800	0.0000	0.0000
13	-0.010018	-0.013319	-18.619	-52.243	-2.7493	-5.2797	-0.025672	-0.040431	6.5187	1.2847E+07	3.5380E+07
x(FT)	3.3440	4.1800	10.868	13.376	0.0000	0.0000	5.0160	6.6880	40.964	0.0000	0.0000
14	-3.3321E-03	-0.053439	-92.653	-133.28	-0.1292	-9.2600	-2.9895E-03	-0.067466	6.7346	1.2847E+07	3.5380E+07
x(FT)	0.0000	1.7320	0.0000	13.856	17.320	0.0000	0.0000	6.9280	38.970	0.0000	0.0000
15	-8.4765E-04	-3.6336E-03	-385.45	-18.334	-1.1892	-1.6882	-0.017550	-0.022756	4.0108	1.2847E+07	3.5380E+07
x(FT)	16.454	6.9280	0.0000	15.588	14.722	2.5980	17.320	13.856	34.640	0.0000	0.0000
16	-0.019094	-0.048772	-24.896	-122.97	-2.7466	-8.7356	-0.023613	-0.062715	4.7699	1.2847E+07	3.5380E+07
x(FT)	2.5080	1.6720	12.540	14.212	0.0000	0.0000	5.8520	6.6880	38.456	0.0000	0.0000
17	-0.018919	-0.039617	-26.309	-109.13	-2.9415	-8.0314	-0.025761	-0.058199	5.3744	1.2847E+07	3.5380E+07
x(FT)	2.5080	2.5080	11.704	14.212	0.0000	0.0000	5.8520	6.6880	40.128	0.0000	0.0000
18	-0.018737	-0.030644	-27.324	-90.624	-3.1685	-7.1523	-0.028303	-0.052470	5.9790	1.2847E+07	3.5380E+07
x(FT)	2.5080	2.5080	11.704	14.212	0.0000	0.0000	5.0160	6.6880	39.292	0.0000	0.0000
19	-0.018470	-0.021756	-29.494	-74.434	-3.4905	-6.2155	-0.032080	-0.046342	6.5835	1.2847E+07	3.5380E+07
x(FT)	2.5080	3.3440	10.868	13.376	0.0000	0.0000	5.0160	6.6880	42.636	0.0000	0.0000
20	-0.018214	-0.013525	-30.954	-52.496	-3.8356	-4.8956	-0.036325	-0.037099	7.1880	1.2847E+07	3.5380E+07
x(FT)	2.5080	4.1800	10.868	13.376	0.0000	0.0000	5.0160	6.6880	40.964	0.0000	0.0000
21	-3.3321E-03	-0.067635	-90.011	-157.37	-0.1268	-10.222	-2.5231E-03	-0.073075	7.2737	1.2847E+07	3.5380E+07
x(FT)	0.0000	1.7320	0.0000	13.856	18.186	0.0000	0.0000	6.9280	39.836	0.0000	0.0000
22	-8.2246E-04	-5.9223E-03	-383.76	-26.784	-1.1694	-2.1918	-0.017459	-0.024463	4.8643	1.2847E+07	3.5380E+07
x(FT)	17.320	6.0620	0.0000	14.722	14.722	0.0000	17.320	13.856	34.640	0.0000	0.0000
23	-0.028634	-0.078859	-32.335	-170.49	-3.1386	-10.607	-0.025830	-0.073077	4.9318	1.2847E+07	3.5380E+07
x(FT)	2.5980	1.7320	12.990	14.722	0.0000	0.0000	6.0620	6.9280	41.568	0.0000	0.0000
24	-0.028575	-0.074416	-32.713	-163.70	-3.1985	-10.318	-0.026493	-0.071433	5.5462	1.2847E+07	3.5380E+07
x(FT)	2.5980	1.7320	12.124	14.722	0.0000	0.0000	6.0620	6.9280	40.702	0.0000	0.0000
25	-0.028513	-0.069974	-33.229	-156.80	-3.2624	-10.022	-0.027200	-0.069715	6.1607	1.2847E+07	3.5380E+07
x(FT)	2.5980	1.7320	12.124	14.722	0.0000	0.0000	6.0620	6.9280	39.836	0.0000	0.0000
26	-0.028447	-0.065535	-33.755	-149.76	-3.3309	-9.7171	-0.027956	-0.067916	6.7752	1.2847E+07	3.5380E+07
x(FT)	2.5980	1.7320	12.124	14.722	0.0000	0.0000	6.0620	6.9280	39.836	0.0000	0.0000
27	-0.028376	-0.061098	-34.290	-142.58	-3.4044	-9.4019	-0.028765	-0.066028	7.3896	1.2847E+07	3.5380E+07
x(FT)	2.5980	1.7320	12.124	14.722	0.0000	0.0000	6.0620	6.9280	38.970	0.0000	0.0000
28	-3.3321E-03	-0.081883	-87.613	-176.49	-0.1197	-11.036	-2.2041E-03	-0.077868	7.8128	1.2847E+07	3.5380E+07
x(FT)	0.0000	1.7320	0.0000	14.722	19.052	0.0000	0.0000	6.9280	39.836	0.0000	0.0000
Min.	-0.028634	-0.081883	-421.37	-176.49	-3.8356	-11.036	-0.036325	-0.077868	1.9902	1.2847E+07	3.5380E+07
Pile N.	23	28	1	28	20	28	20	28	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	0.056730	0.016228	91.631	134.54	8.1393	0.099787	0.077037	0.016663	8.8127	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	10.392	0.0000	0.0000	21.650	5.1960	0.0000	0.0000	0.0000	0.0000
2	4.7417E-03	7.0667E-04	82.659	593.70	0.1224	1.6897	7.9000E-03	0.021353	7.0429	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.052	0.0000	0.0000	16.454	16.454	0.0000	19.052	0.0000	0.0000	0.0000
3	4.7417E-03	3.3448E-04	85.905	488.76	0.1181	1.1001	0.012505	0.015497	7.2218	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.186	0.0000	0.0000	15.588	16.454	0.0000	18.186	0.0000	0.0000	0.0000
4	4.7417E-03	1.1519E-03	90.709	361.50	0.1035	0.5116	0.025008	9.1049E-03	7.2644	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	0.0000	0.0000	14.722	16.454	0.0000	18.186	0.0000	0.0000	0.0000
5	4.7417E-03	0.015264	98.958	159.09	0.081225	0.1533	0.011339	0.036917	7.0148	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	0.0000	0.8660	13.856	0.0000	0.0000	0.8660	0.0000	0.0000	0.0000
6	4.7417E-03	0.029375	91.820	120.44	0.1186	3.3353	7.4925E-03	0.050144	7.1383	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	0.0000	6.0620	12.990	0.0000	0.0000	2.5980	0.0000	0.0000	0.0000
7	4.4951E-03	6.7572E-04	8.9959	617.70	1.2236	1.6016	0.011700	0.024976	10.150	1.2847E+07	3.5380E+07
x(FT)	5.1960	19.052	12.990	0.0000	0.0000	16.454	6.9280	26.846	0.0000	0.0000	0.0000
8	0.056875	0.012170	82.703	169.23	7.0681	0.1593	0.063997	0.010203	9.2976	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	10.392	0.0000	0.0000	20.784	6.0620	0.0000	0.0000	0.0000	0.0000
9	1.3152E-04	6.5938E-04	133.72	632.40	0.2254	1.5103	5.3197E-03	0.043715	8.3185	1.2847E+07	3.5380E+07
x(FT)	20.064	20.900	0.0000	0.0000	17.556	18.392	18.392	25.916	0.0000	0.0000	0.0000
10	1.5232E-04	6.5485E-04	138.34	583.60	0.2432	1.3993	4.7344E-03	0.039934	8.7754	1.2847E+07	3.5380E+07
x(FT)	19.228	20.900	0.0000	0.0000	16.720	18.392	17.556	25.916	0.0000	0.0000	0.0000
11	1.3628E-04	5.1105E-04	143.48	525.81	0.2587	1.2266	5.3023E-03	0.032857	9.1508	1.2847E+07	3.5380E+07
x(FT)	18.392	20.064	0.0000	0.0000	15.884	17.556	17.556	25.916	0.0000	0.0000	0.0000
12	1.4033E-04	4.1192E-04	151.25	468.11	0.2835	1.0374	6.0594E-03	0.020292	9.5736	1.2847E+07	3.5380E+07
x(FT)	17.556	20.064	0.0000	0.0000	15.048	16.720	16.720	25.916	0.0000	0.0000	0.0000
13	1.1473E-04	2.3554E-04	160.48	395.16	0.2982	0.7564	7.7633E-03	0.010620	9.9811	1.2847E+07	3.5380E+07
x(FT)	16.720	19.228	0.0000	0.0000	15.048	16.720	16.720	20.064	0.0000	0.0000	0.0000
14	5.1569E-03	7.9843E-04	8.4052	645.75	1.0425	1.6146	8.9221E-03	0.042705	10.790	1.2847E+07	3.5380E+07
x(FT)	5.1960	21.650	13.856	0.0000	0.0000	18.186	6.9280	26.846	0.0000	0.0000	0.0000
15	0.056880	8.1117E-03	82.012	202.98	7.0478	0.2514	0.063850	6.8614E-03	10.322	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	10.392	0.0000	0.0000	19.052	6.0620	0.0000	0.0000	0.0000	0.0000
16	1.9755E-04	6.3843E-04	173.64	626.79	0.3489	1.4873	9.1629E-03	0.043893	9.3741	1.2847E+07	3.5380E+07
x(FT)	19.228	21.736	0.0000	0.0000	16.720	19.228	18.392	25.916	0.0000	0.0000	0.0000
17	2.2380E-04	6.2380E-04	180.21	576.87	0.3756	1.3816	8.4672E-03	0.039872	9.8187	1.2847E+07	3.5380E+07
x(FT)	18.392	20.900	0.0000	0.0000	15.884	18.392	17.556	25.916	0.0000	0.0000	0.0000
18	2.1198E-04	4.7865E-04	187.29	517.85	0.3985	1.1815	9.0781E-03	0.033131	10.247	1.2847E+07	3.5380E+07
x(FT)	18.392	20.900	0.0000	0.0000	15.884	17.556	17.556	25.916	0.0000	0.0000	0.0000
19	2.3441E-04	3.9857E-04	197.60	458.90	0.4439	1.0038	9.2493E-03	0.021048	10.741	1.2847E+07	3.5380E+07
x(FT)	17.556	20.064	0.0000	0.0000	15.048	17.556	16.720	25.916	0.0000	0.0000	0.0000
20	2.2570E-04	2.3235E-04	207.76	383.83	0.4699	0.7375	0.010167	0.011786	11.212	1.2847E+07	3.5380E+07
x(FT)	16.720	20.064	0.0000	0.0000	14.212	17.556	16.720	25.916	0.0000	0.0000	0.0000
21	5.3794E-03	1.0625E-03	8.4024	720.60	0.9873	1.9157	8.1509E-03	0.050102	11.724	1.2847E+07	3.5380E+07
x(FT)	6.0620	21.650	14.722	0.0000	0.0000	19.052	7.7940	26.846	0.0000	0.0000	0.0000

22	0.056888	4.0534E-03	81.142	236.23	7.0136	0.3575	0.063518	7.1282E-03	11.189	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	10.392	0.0000	0.0000	19.052	6.0620	22.516	0.0000	0.0000	0.0000
23	2.9652E-04	1.0037E-03	203.48	775.53	0.4231	1.9531	0.010212	0.053160	10.520	1.2847E+07	3.5380E+07
x(FT)	19.918	22.516	0.0000	0.0000	17.320	19.918	19.052	26.846	0.0000	0.0000	0.0000
24	3.0136E-04	9.5590E-04	205.51	753.34	0.4319	1.8738	0.010397	0.051368	11.049	1.2847E+07	3.5380E+07
x(FT)	19.918	22.516	0.0000	0.0000	17.320	19.918	19.052	26.846	0.0000	0.0000	0.0000
25	3.0493E-04	9.0723E-04	207.67	730.79	0.4403	1.7981	0.010346	0.049593	11.580	1.2847E+07	3.5380E+07
x(FT)	19.918	22.516	0.0000	0.0000	17.320	19.052	19.052	26.846	0.0000	0.0000	0.0000
26	3.0598E-04	8.6324E-04	209.97	707.82	0.4485	1.7455	0.010164	0.048021	12.113	1.2847E+07	3.5380E+07
x(FT)	19.918	21.650	0.0000	0.0000	17.320	19.052	19.052	26.846	0.0000	0.0000	0.0000
27	3.0383E-04	8.2638E-04	212.42	684.38	0.4565	1.6868	9.9221E-03	0.046488	12.648	1.2847E+07	3.5380E+07
x(FT)	19.918	21.650	0.0000	0.0000	17.320	19.052	19.052	26.846	0.0000	0.0000	0.0000
28	5.6297E-03	1.0598E-03	8.1421	786.28	0.9411	2.0756	7.5509E-03	0.054274	12.616	1.2847E+07	3.5380E+07
x(FT)	6.0620	22.516	14.722	0.0000	0.0000	19.918	7.7940	26.846	0.0000	0.0000	0.0000
Max.	0.056888	0.029375	212.42	786.28	8.1393	3.3353	0.077037	0.054274	12.648	1.2847E+07	3.5380E+07
Pile N.	22	6	27	28	1	6	1	28	27	1	1

LOAD CASE : 2
CASE NAME : Strength III Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.9410	1.0000
2	0.9410	1.0000
3	0.9410	1.0000
4	0.9410	1.0000
5	0.9410	1.0000
6	0.9410	1.0000
7	1.0000	1.0000
8	0.7996	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.8747	1.0000
15	0.7996	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	0.8747	1.0000
22	0.8066	1.0000
23	0.7921	1.0000
24	0.7921	1.0000
25	0.7921	1.0000
26	0.7921	1.0000
27	0.7921	1.0000
28	0.8747	1.0000

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
3552.00	166.000	103.000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	64332.0	63468.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.0877237	0.0322738	0.0225306

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
-2.58420E-06	1.14267E-04	3.24889E-04

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
1	0.037915	0.041555	0.018870	-2.5842E-06	1.1427E-04	3.2489E-04
2	0.044771	0.041710	0.018870	-2.5842E-06	1.1427E-04	3.2489E-04
3	0.051628	0.041865	0.018870	-2.5842E-06	1.1427E-04	3.2489E-04
4	0.058484	0.042021	0.018870	-2.5842E-06	1.1427E-04	3.2489E-04
5	0.065340	0.042176	0.018870	-2.5842E-06	1.1427E-04	3.2489E-04
6	0.072196	0.042331	0.018870	-2.5842E-06	1.1427E-04	3.2489E-04
7	0.079052	0.042486	0.018870	-2.5842E-06	1.1427E-04	3.2489E-04
8	0.057409	0.041555	0.019025	-2.5842E-06	1.1427E-04	3.2489E-04
9	0.064265	0.041710	0.019025	-2.5842E-06	1.1427E-04	3.2489E-04

10	0.071121	0.041865	0.019025	-2.5842E-06	1.1427E-04	3.2489E-04
11	0.077977	0.042021	0.019025	-2.5842E-06	1.1427E-04	3.2489E-04
12	0.084833	0.042176	0.019025	-2.5842E-06	1.1427E-04	3.2489E-04
13	0.091689	0.042331	0.019025	-2.5842E-06	1.1427E-04	3.2489E-04
14	0.098545	0.042486	0.019025	-2.5842E-06	1.1427E-04	3.2489E-04
15	0.076902	0.041555	0.019180	-2.5842E-06	1.1427E-04	3.2489E-04
16	0.083758	0.041710	0.019180	-2.5842E-06	1.1427E-04	3.2489E-04
17	0.090614	0.041865	0.019180	-2.5842E-06	1.1427E-04	3.2489E-04
18	0.097470	0.042021	0.019180	-2.5842E-06	1.1427E-04	3.2489E-04
19	0.1043	0.042176	0.019180	-2.5842E-06	1.1427E-04	3.2489E-04
20	0.1112	0.042331	0.019180	-2.5842E-06	1.1427E-04	3.2489E-04
21	0.1180	0.042486	0.019180	-2.5842E-06	1.1427E-04	3.2489E-04
22	0.096396	0.041555	0.019335	-2.5842E-06	1.1427E-04	3.2489E-04
23	0.1032	0.041710	0.019335	-2.5842E-06	1.1427E-04	3.2489E-04
24	0.1101	0.041865	0.019335	-2.5842E-06	1.1427E-04	3.2489E-04
25	0.1170	0.042021	0.019335	-2.5842E-06	1.1427E-04	3.2489E-04
26	0.1238	0.042176	0.019335	-2.5842E-06	1.1427E-04	3.2489E-04
27	0.1307	0.042331	0.019335	-2.5842E-06	1.1427E-04	3.2489E-04
28	0.1375	0.042486	0.019335	-2.5842E-06	1.1427E-04	3.2489E-04
MINIMUM	0.037915	0.041555	0.018870	-2.5842E-06	1.1427E-04	3.2489E-04
Pile N.	1	1	1	1	1	1
MAXIMUM	0.1375	0.042486	0.019335	-2.5842E-06	1.1427E-04	3.2489E-04
Pile N.	28	7	22	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	48.451	6.6292	-8.1816	80.171	-162.61	320.65
2	76.126	27.876	1.9036	13.577	-54.276	559.99
3	85.757	30.209	1.9501	13.899	-55.562	555.12
4	95.413	32.445	1.9860	14.113	-56.418	544.45
5	105.07	34.676	2.0238	14.336	-57.312	533.65
6	114.73	36.904	2.0634	14.570	-58.247	522.71
7	118.37	7.3714	28.214	-85.814	113.43	343.21
8	75.623	5.8126	-14.777	74.197	-185.74	296.76
9	100.26	8.6941	1.4466	-4.4742E-04	-44.409	595.87
10	110.88	8.7040	1.4430	-4.4742E-04	-44.371	596.66
11	121.49	8.7138	1.4395	-4.4742E-04	-44.334	597.46
12	132.11	8.7236	1.4359	-4.4742E-04	-44.297	598.25
13	142.72	8.7334	1.4324	-4.4742E-04	-44.261	599.04
14	145.77	6.6765	34.339	-80.856	152.21	323.39
15	102.90	5.6660	-20.971	73.053	-222.70	292.19
16	130.45	8.6845	1.4580	-4.4742E-04	-45.137	595.58
17	141.06	8.6944	1.4544	-4.4742E-04	-45.099	596.37
18	149.62	8.7047	1.4511	-4.4742E-04	-45.057	597.18
19	156.87	8.7153	1.4479	-4.4742E-04	-45.014	597.99
20	164.12	8.7259	1.4448	-4.4742E-04	-44.971	598.81
21	166.31	6.5883	38.689	-80.113	193.51	320.42
22	130.17	5.5513	-27.171	72.149	-259.32	288.57
23	133.16	-22.660	1.2231	-9.7295	-38.886	715.39
24	142.69	-24.928	1.2065	-9.6333	-38.502	724.16
25	152.23	-27.197	1.1906	-9.5402	-38.130	732.87
26	159.33	-28.859	1.1754	-9.4490	-37.765	741.54
27	165.69	-30.336	1.1608	-9.3602	-37.410	750.16
28	184.63	6.4792	42.522	-79.226	233.26	316.87
MINIMUM	48.451	-30.336	-27.171	-85.814	-259.32	288.57
Pile N.	1	27	22	7	22	22
MAXIMUM	184.63	36.904	42.522	80.171	233.26	750.16
Pile N.	28	6	28	1	28	27

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.032205	0.041555	0.027505	-8.1325E-05	1.1427E-04	3.1456E-04
2	0.053553	0.018870	-0.029603	2.5214E-05	3.2489E-04	-1.1148E-04
3	0.060242	0.018870	-0.028090	2.5214E-05	3.2489E-04	-1.1148E-04
4	0.066931	0.018870	-0.026577	2.5214E-05	3.2489E-04	-1.1148E-04
5	0.073620	0.018870	-0.025064	2.5214E-05	3.2489E-04	-1.1148E-04
6	0.080308	0.018870	-0.023551	2.5214E-05	3.2489E-04	-1.1148E-04
7	0.081268	0.042486	-8.7162E-04	7.6311E-05	1.1427E-04	3.1581E-04
8	0.051078	0.041555	0.032384	-8.1325E-05	1.1427E-04	3.1456E-04
9	0.064265	0.019025	-0.041710	-2.5842E-06	3.2489E-04	-1.1427E-04
10	0.071121	0.019025	-0.041865	-2.5842E-06	3.2489E-04	-1.1427E-04
11	0.077977	0.019025	-0.042021	-2.5842E-06	3.2489E-04	-1.1427E-04
12	0.084833	0.019025	-0.042176	-2.5842E-06	3.2489E-04	-1.1427E-04
13	0.091689	0.019025	-0.042331	-2.5842E-06	3.2489E-04	-1.1427E-04
14	0.1002	0.042486	-5.4503E-03	7.6311E-05	1.1427E-04	3.1581E-04
15	0.069952	0.041555	0.037263	-8.1325E-05	1.1427E-04	3.1456E-04
16	0.083758	0.019180	-0.041710	-2.5842E-06	3.2489E-04	-1.1427E-04
17	0.090614	0.019180	-0.041865	-2.5842E-06	3.2489E-04	-1.1427E-04
18	0.097470	0.019180	-0.042021	-2.5842E-06	3.2489E-04	-1.1427E-04
19	0.1043	0.019180	-0.042176	-2.5842E-06	3.2489E-04	-1.1427E-04
20	0.1112	0.019180	-0.042331	-2.5842E-06	3.2489E-04	-1.1427E-04
21	0.1192	0.042486	-0.010029	7.6311E-05	1.1427E-04	3.1581E-04
22	0.088825	0.041555	0.042143	-8.1325E-05	1.1427E-04	3.1456E-04
23	0.090048	0.019335	-0.065513	-3.0228E-05	3.2489E-04	-1.1023E-04
24	0.096662	0.019335	-0.067327	-3.0228E-05	3.2489E-04	-1.1023E-04
25	0.1033	0.019335	-0.069140	-3.0228E-05	3.2489E-04	-1.1023E-04
26	0.1099	0.019335	-0.070954	-3.0228E-05	3.2489E-04	-1.1023E-04
27	0.1165	0.019335	-0.072768	-3.0228E-05	3.2489E-04	-1.1023E-04
28	0.1381	0.042486	-0.014608	7.6311E-05	1.1427E-04	3.1581E-04
MINIMUM	0.032205	0.018870	-0.072768	-8.1325E-05	1.1427E-04	-1.1427E-04
Pile N.	1	2	27	1	1	9
MAXIMUM	0.1381	0.042486	0.042143	7.6311E-05	3.2489E-04	3.1581E-04
Pile N.	28	7	22	7	2	7

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	48.988	6.6292	3.8169	-0.013524	-162.61	330.52
2	80.615	1.9036	-8.5754	4.1929E-03	559.99	55.948
3	90.524	1.9501	-8.5023	4.1929E-03	555.12	57.274
4	100.43	1.9860	-8.3286	4.1929E-03	544.45	58.156
5	110.34	2.0238	-8.1508	4.1929E-03	533.65	59.078
6	120.25	2.0634	-7.9687	4.1929E-03	522.71	60.042
7	121.67	7.3714	-1.3444	0.012690	113.43	353.78
8	76.949	5.8126	4.0109	-0.013524	-185.74	305.90
9	100.26	1.4466	-8.6941	-4.4742E-04	595.87	44.409
10	110.88	1.4430	-8.7040	-4.4742E-04	596.66	44.371
11	121.49	1.4395	-8.7138	-4.4742E-04	597.46	44.334
12	132.11	1.4359	-8.7236	-4.4742E-04	598.25	44.297
13	142.72	1.4324	-8.7334	-4.4742E-04	599.04	44.261
14	149.75	6.6765	-2.0502	0.012690	152.21	333.34
15	104.91	5.6660	4.6179	-0.013524	-222.70	301.18
16	130.45	1.4580	-8.6845	-4.4742E-04	595.58	45.137
17	141.06	1.4544	-8.6944	-4.4742E-04	596.37	45.099
18	149.62	1.4511	-8.7047	-4.4742E-04	597.18	45.057
19	156.87	1.4479	-8.7153	-4.4742E-04	597.99	45.014
20	164.12	1.4448	-8.7259	-4.4742E-04	598.81	44.971
21	170.73	6.5883	-2.8133	0.012690	193.51	330.28
22	132.87	5.5513	5.2185	-0.013524	-259.32	297.45
23	134.68	1.2231	-10.322	-5.0267E-03	715.39	40.085
24	144.48	1.2065	-10.435	-5.0267E-03	724.16	39.689
25	154.28	1.1906	-10.546	-5.0267E-03	732.87	39.305
26	161.57	1.1754	-10.656	-5.0267E-03	741.54	38.929
27	168.10	1.1608	-10.766	-5.0267E-03	750.16	38.563
28	189.43	6.4792	-3.5389	0.012690	233.26	326.62
MINIMUM	48.988	1.1608	-10.766	-0.013524	-259.32	38.563
Pile N.	1	27	27	1	22	27
MAXIMUM	189.43	7.3714	5.2185	0.012690	750.16	353.78
Pile N.	28	7	22	7	27	7

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	6.8242
2	5.7354
3	6.0019
4	6.2340
5	6.4659
6	6.6975
7	9.2654
8	7.2749
9	6.4672
10	6.7802
11	7.0932
12	7.4062
13	7.7191
14	9.7876
15	8.0653
16	7.3452
17	7.6582
18	7.9116
19	8.1269
20	8.3422
21	10.394
22	8.8806
23	8.1426
24	8.4771
25	8.8113
26	9.0725
27	9.3113
28	10.934
MINIMUM	5.7354
Pile N.	2
MAXIMUM	10.934
Pile N.	28

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-6.6253E-04	-4.2362E-04	-330.52	-162.61	-1.0878	-0.9961	-0.016988	-0.012589	1.4241	1.2847E+07	3.5380E+07
x(FT)	15.588	17.320	0.0000	0.0000	13.856	14.722	15.588	19.052	34.640	0.0000	0.0000
2	-1.7810E-04	-0.033202	-55.948	-104.14	-0.3217	-8.3771	-0.011764	-0.065910	2.3435	1.2847E+07	3.5380E+07
x(FT)	14.722	1.7320	0.0000	12.990	12.990	0.0000	16.454	6.9280	37.238	0.0000	0.0000
3	-1.8386E-04	-0.031716	-57.274	-103.99	-0.3373	-8.3105	-0.010362	-0.065823	2.6315	1.2847E+07	3.5380E+07
x(FT)	14.722	1.7320	0.0000	12.990	12.990	0.0000	15.588	6.9280	42.434	0.0000	0.0000
4	-1.8683E-04	-0.030263	-58.156	-100.49	-0.3413	-8.1434	-0.010449	-0.064765	2.9196	1.2847E+07	3.5380E+07
x(FT)	14.722	1.7320	0.0000	12.990	12.990	0.0000	15.588	6.9280	42.434	0.0000	0.0000
5	-1.8970E-04	-0.028857	-59.078	-96.964	-0.3453	-7.9725	-0.010520	-0.063678	3.2076	1.2847E+07	3.5380E+07
x(FT)	14.722	2.5980	0.0000	12.990	12.990	0.0000	15.588	6.9280	42.434	0.0000	0.0000
6	-1.9245E-04	-0.027472	-60.042	-93.408	-0.3510	-7.7977	-0.010573	-0.062561	3.4957	1.2847E+07	3.5380E+07
x(FT)	14.722	2.5980	0.0000	12.990	12.124	0.0000	15.588	6.9280	41.568	0.0000	0.0000
7	-6.7388E-04	-3.3100E-03	-353.78	-17.589	-1.2415	-1.3408	-0.020110	-0.018840	3.5370	1.2847E+07	3.5380E+07
x(FT)	15.588	4.3300	0.0000	12.990	12.990	0.0000	15.588	12.990	32.908	0.0000	0.0000
8	-6.7617E-04	-5.0462E-04	-305.90	-185.74	-0.9381	-1.0158	-0.014134	-0.012167	2.2369	1.2847E+07	3.5380E+07
x(FT)	16.454	18.186	0.0000	0.0000	14.722	15.588	16.454	19.918	36.372	0.0000	0.0000
9	-1.8093E-04	-0.045081	-44.409	-119.43	-0.2582	-8.5080	-7.3441E-03	-0.062800	2.9147	1.2847E+07	3.5380E+07
x(FT)	15.884	1.6720	0.0000	13.376	14.212	0.0000	17.556	6.6880	40.128	0.0000	0.0000
10	-1.8154E-04	-0.045232	-44.371	-119.74	-0.2584	-8.5185	-7.3441E-03	-0.062872	3.2232	1.2847E+07	3.5380E+07
x(FT)	15.884	1.6720	0.0000	13.376	14.212	0.0000	17.556	6.6880	40.128	0.0000	0.0000
11	-1.8215E-04	-0.045382	-44.334	-120.06	-0.2586	-8.5289	-7.3439E-03	-0.062944	3.5318	1.2847E+07	3.5380E+07

x(FT)	15.884	1.6720	0.0000	13.376	14.212	0.0000	17.556	6.6880	40.128	0.0000	0.0000
12	-1.8276E-04	-0.045533	-44.297	-120.38	-0.2588	-8.5393	-7.3437E-03	-0.063016	3.8404	1.2847E+07	3.5380E+07
x(FT)	15.884	1.6720	0.0000	13.376	13.376	0.0000	17.556	6.6880	40.128	0.0000	0.0000
13	-1.8338E-04	-0.045684	-44.261	-120.69	-0.2591	-8.5497	-7.3434E-03	-0.063087	4.1490	1.2847E+07	3.5380E+07
x(FT)	15.884	1.6720	0.0000	13.376	13.376	0.0000	17.556	6.6880	40.128	0.0000	0.0000
14	-6.5520E-04	-7.1742E-03	-333.34	-29.355	-1.1081	-2.0228	-0.017424	-0.020963	4.3531	1.2847E+07	3.5380E+07
x(FT)	15.588	2.5980	0.0000	12.990	13.856	0.0000	16.454	12.990	33.774	0.0000	0.0000
15	-6.7120E-04	-5.7895E-04	-301.18	-222.70	-0.9111	-1.1382	-0.013606	-0.013352	3.0497	1.2847E+07	3.5380E+07
x(FT)	17.320	18.186	0.0000	0.0000	14.722	15.588	16.454	19.918	38.104	0.0000	0.0000
16	-1.8424E-04	-0.045082	-45.137	-119.53	-0.2618	-8.5012	-7.3768E-03	-0.062786	3.7920	1.2847E+07	3.5380E+07
x(FT)	15.884	1.6720	0.0000	13.376	13.376	0.0000	17.556	6.6880	40.128	0.0000	0.0000
17	-1.8486E-04	-0.045233	-45.099	-119.85	-0.2620	-8.5116	-7.3768E-03	-0.062858	4.1006	1.2847E+07	3.5380E+07
x(FT)	15.884	1.6720	0.0000	13.376	13.376	0.0000	17.556	6.6880	40.128	0.0000	0.0000
18	-1.8532E-04	-0.045383	-45.057	-120.16	-0.2621	-8.5224	-7.3801E-03	-0.062930	4.3495	1.2847E+07	3.5380E+07
x(FT)	15.884	1.6720	0.0000	13.376	13.376	0.0000	17.556	6.6880	40.128	0.0000	0.0000
19	-1.8568E-04	-0.045534	-45.014	-120.46	-0.2622	-8.5333	-7.3856E-03	-0.063002	4.5603	1.2847E+07	3.5380E+07
x(FT)	15.884	1.6720	0.0000	13.376	13.376	0.0000	17.556	6.6880	40.128	0.0000	0.0000
20	-1.8605E-04	-0.045685	-44.971	-120.76	-0.2623	-8.5442	-7.3910E-03	-0.063073	4.7710	1.2847E+07	3.5380E+07
x(FT)	15.884	1.6720	0.0000	13.376	13.376	0.0000	17.556	6.6880	40.128	0.0000	0.0000
21	-6.3567E-04	-0.011310	-330.28	-41.317	-1.0740	-2.7623	-0.017181	-0.023437	4.9630	1.2847E+07	3.5380E+07
x(FT)	16.454	1.7320	0.0000	12.990	13.856	0.0000	16.454	12.990	34.640	0.0000	0.0000
22	-6.6842E-04	-6.6475E-04	-297.45	-259.32	-0.8886	-1.2490	-0.013291	-0.017306	3.8625	1.2847E+07	3.5380E+07
x(FT)	17.320	19.052	0.0000	0.0000	14.722	15.588	16.454	26.846	38.970	0.0000	0.0000
23	-1.7728E-04	-0.068217	-40.085	-155.44	-0.2241	-10.091	-7.3462E-03	-0.071912	3.9152	1.2847E+07	3.5380E+07
x(FT)	17.320	1.7320	0.0000	13.856	14.722	0.0000	18.186	6.9280	39.836	0.0000	0.0000
24	-1.8047E-04	-0.069981	-39.689	-158.19	-0.2222	-10.203	-6.8718E-03	-0.072556	4.2000	1.2847E+07	3.5380E+07
x(FT)	17.320	1.7320	0.0000	13.856	14.722	0.0000	18.186	6.9280	39.836	0.0000	0.0000
25	-1.8306E-04	-0.071745	-39.305	-160.99	-0.2204	-10.312	-6.4405E-03	-0.073191	4.4848	1.2847E+07	3.5380E+07
x(FT)	17.320	1.7320	0.0000	14.722	14.722	0.0000	18.186	6.9280	39.836	0.0000	0.0000
26	-1.8492E-04	-0.073509	-38.929	-163.86	-0.2186	-10.422	-6.0392E-03	-0.073816	4.6968	1.2847E+07	3.5380E+07
x(FT)	17.320	1.7320	0.0000	14.722	14.722	0.0000	18.186	6.9280	40.702	0.0000	0.0000
27	-1.8613E-04	-0.075273	-38.563	-166.69	-0.2168	-10.530	-5.6721E-03	-0.074431	4.8865	1.2847E+07	3.5380E+07
x(FT)	17.320	1.7320	0.0000	14.722	14.722	0.0000	18.186	6.9280	40.702	0.0000	0.0000
28	-6.2535E-04	-0.015668	-326.62	-52.933	-1.0370	-3.4657	-0.016920	-0.026893	5.5067	1.2847E+07	3.5380E+07
x(FT)	16.454	1.7320	0.0000	12.124	13.856	0.0000	16.454	6.9280	34.640	0.0000	0.0000
Min.	-6.7617E-04	-0.075273	-353.78	-259.32	-1.2415	-10.530	-0.020110	-0.074431	1.4241	1.2847E+07	3.5380E+07
Pile N.	8	27	7	22	7	27	7	27	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	0.043435	0.027505	69.882	76.583	6.4081	3.6674	0.061296	0.032248	6.8242	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	10.392	10.392	0.0000	0.0000	5.1960	6.0620	0.0000	0.0000	0.0000
2	0.018870	5.4146E-04	25.469	559.99	1.7748	1.3951	0.025130	0.020464	5.7354	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.918	7.7940	0.0000	0.0000	17.320	0.0000	26.846	0.0000	0.0000	0.0000
3	0.018870	5.9688E-04	26.043	555.12	1.8184	1.4273	0.025753	0.017752	6.0019	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.052	7.7940	0.0000	0.0000	16.454	0.0000	19.918	0.0000	0.0000	0.0000
4	0.018870	5.6618E-04	26.326	544.45	1.8512	1.3860	0.026405	0.017380	6.2340	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.052	7.7940	0.0000	0.0000	16.454	0.0000	19.918	0.0000	0.0000	0.0000
5	0.018870	5.3550E-04	26.619	533.65	1.8857	1.3439	0.027086	0.016993	6.4659	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.052	7.7940	0.0000	0.0000	16.454	0.0000	19.918	0.0000	0.0000	0.0000
6	0.018870	5.0490E-04	26.922	522.71	1.9219	1.3011	0.027796	0.016590	6.6975	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.052	7.7940	0.0000	0.0000	16.454	0.0000	19.918	0.0000	0.0000	0.0000
7	0.044281	6.1210E-05	76.724	113.43	7.1137	0.2530	0.069735	5.1033E-03	9.2654	1.2847E+07	3.5380E+07
x(FT)	0.8660	18.186	9.5260	0.0000	0.0000	15.588	5.1960	21.650	0.0000	0.0000	0.0000
8	0.043539	0.032384	63.847	82.218	5.6358	3.8677	0.051793	0.032410	7.2749	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	10.392	11.258	0.0000	0.0000	6.0620	6.9280	0.0000	0.0000	0.0000
9	0.019025	7.1154E-04	22.003	595.87	1.3596	1.4892	0.017690	0.041694	6.4672	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.900	8.3600	0.0000	0.0000	18.392	0.0000	25.916	0.0000	0.0000	0.0000
10	0.019025	7.1485E-04	22.000	596.66	1.3564	1.4932	0.017654	0.041796	6.7802	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.900	8.3600	0.0000	0.0000	18.392	0.0000	25.916	0.0000	0.0000	0.0000
11	0.019025	7.1817E-04	21.997	597.46	1.3532	1.4972	0.017618	0.041899	7.0932	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.900	8.3600	0.0000	0.0000	18.392	0.0000	25.916	0.0000	0.0000	0.0000
12	0.019025	7.2150E-04	21.995	598.25	1.3500	1.5011	0.017582	0.042001	7.4062	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.900	8.3600	0.0000	0.0000	18.392	0.0000	25.916	0.0000	0.0000	0.0000
13	0.019025	7.2484E-04	21.992	599.04	1.3468	1.5051	0.017546	0.042104	7.7191	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.900	8.3600	0.0000	0.0000	18.392	0.0000	25.916	0.0000	0.0000	0.0000
14	0.044367	1.2065E-04	71.335	152.21	6.4574	0.4039	0.061342	6.8577E-03	9.7876	1.2847E+07	3.5380E+07
x(FT)	0.8660	18.186	10.392	0.0000	0.0000	16.454	5.1960	21.650	0.0000	0.0000	0.0000
15	0.043558	0.037264	62.321	92.965	5.4994	4.4605	0.050318	0.036956	8.0653	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	10.392	11.258	0.0000	0.0000	6.0620	6.9280	0.0000	0.0000	0.0000
16	0.019180	7.1375E-04	22.212	595.58	1.3709	1.4908	0.017818	0.041718	7.3452	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.900	8.3600	0.0000	0.0000	18.392	0.0000	25.916	0.0000	0.0000	0.0000
17	0.019180	7.1707E-04	22.209	596.37	1.3677	1.4948	0.017781	0.041820	7.6582	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.900	8.3600	0.0000	0.0000	18.392	0.0000	25.916	0.0000	0.0000	0.0000
18	0.019180	7.2021E-04	22.203	597.18	1.3647	1.4986	0.017745	0.041921	7.9116	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.900	8.3600	0.0000	0.0000	18.392	0.0000	25.916	0.0000	0.0000	0.0000
19	0.019180	7.2324E-04	22.196	597.99	1.3618	1.5024	0.017709	0.042020	8.1269	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.900	8.3600	0.0000	0.0000	18.392	0.0000	25.916	0.0000	0.0000	0.0000
20	0.019180	7.2626E-04	22.188	598.81	1.3590	1.5061	0.017673	0.042120	8.3422	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.900	8.3600	0.0000	0.0000	18.392	0.0000	25.916	0.0000	0.0000	0.0000
21	0.044379	1.8249E-04	70.138	193.51	6.3748	0.5631	0.060466	8.6693E-03	10.394	1.2847E+07	3.5380E+07
x(FT)	0.8660	18.186	10.392	0.0000	0.0000	16.454	5.1960	20.784	0.0000	0.0000	0.0000
22	0.043574	0.042143	61.096	103.49	5.3932	5.0471	0.049192	0.041464	8.8806	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	10.392	11.258	0.0000	0.0000	6.0620	6.9280	0.0000	0.0000	0.0000
23	0.019335	9.6170E-04	19.986	715.39	1.1530	1.8474	0.013907	0.048562	8.1426	1.2847E+07	3.5380E+07
x(FT)	0.0000	21.650	8.6600	0.0000	0.0000	19.052	0.0000	26.846	0.0000	0.0000	0.0000
24	0.019335	9.7636E-04	19.857	724.16	1.1378	1.8701	0.013676	0.049089	8.4771	1.2847E+07	3.5380E+07
x(FT)	0.0000	21.650	8.6600	0.0000	0.0000	19.052	0.0000	26.846	0.0000	0.0000	0.0000
25	0.019335	9.9049E-04	19.732	732.87	1.1231	1.8921	0.013453	0.049525	8.8113	1.2847E+07	3.5380E+07
x(FT)	0.0000	21.650	8.6600	0.0000	0.0000	19.052	0.0000	26.846	0.0000	0.0000	0.0000
26	0.019335	1.0039E-03	19.608	741.54	1.1091	1.9131	0.013239	0.049976	9.0725	1.2847E+07	3.5380E+07
x(FT)	0.0000	21.650	8.6600	0.0000	0.0000	19.052	0.0000	26.846	0.0000	0.0000	0.0000
27	0.019335	1.0174E-03	19.486	750.16	1.0957	1.9337	0.013033	0.050733	9.3113	1.2847E+07	3.5380E+07
x(FT)	0.0000	21.650	8.6600	0.0000	0.0000	19.052	0.0000	26.846	0.0000	0.0000	0.0000
28	0.044395	2.4617E-04	68.836	233.26	6.2724	0.7119	0.059335	0.010299	10.934	1.2847E+07	3.5380E+07
x(FT)	0.8660	19.052	10.392	0.0000	0.0000	16.454	5.1960	20.784	0.0000	0.0000	0.0000
Max.	0.044395	0.042143	76.724	750.16	7.1137	5.0471	0.069735	0.050733	10.934	1.2847E+07	3.5380E+07

Pile N.	28	22	7	27	7	22	7	27	28	1	1

LOAD CASE : 3
CASE NAME : Strength IV Load Combination
LOAD TYPE : Live, LL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8066	1.0000
2	0.7850	1.0000
3	0.7850	1.0000
4	0.7850	1.0000
5	0.7850	1.0000
6	0.7850	1.0000
7	0.8066	1.0000
8	0.8066	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.8066	1.0000
15	0.8066	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	0.8066	1.0000
22	1.0000	1.0000
23	1.0000	1.0000
24	1.0000	1.0000
25	1.0000	1.0000
26	1.0000	1.0000
27	1.0000	1.0000
28	1.0000	1.0000

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
4345.00	0.00000	0.00000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	0.00000	3333.60

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.10751	-9.66441E-04	1.08403E-14

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
5.09349E-16	-6.71034E-18	1.66913E-05

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.1060	-4.6570E-04	5.6882E-14	5.0935E-16	-6.7103E-18	1.6691E-05
2	0.1060	-4.6570E-04	5.6883E-14	5.0935E-16	-6.7103E-18	1.6691E-05
3	0.1060	-4.6570E-04	5.6883E-14	5.0935E-16	-6.7103E-18	1.6691E-05
4	0.1060	-4.6570E-04	5.6883E-14	5.0935E-16	-6.7103E-18	1.6691E-05
5	0.1060	-4.6570E-04	5.6883E-14	5.0935E-16	-6.7103E-18	1.6691E-05
6	0.1060	-4.6570E-04	5.6883E-14	5.0935E-16	-6.7103E-18	1.6691E-05
7	0.1060	-4.6570E-04	5.6878E-14	5.0935E-16	-6.7103E-18	1.6691E-05
8	0.1070	-4.6570E-04	2.6323E-14	5.0935E-16	-6.7103E-18	1.6691E-05
9	0.1070	-4.6570E-04	2.6322E-14	5.0935E-16	-6.7103E-18	1.6691E-05
10	0.1070	-4.6570E-04	2.6322E-14	5.0935E-16	-6.7103E-18	1.6691E-05
11	0.1070	-4.6570E-04	2.6322E-14	5.0935E-16	-6.7103E-18	1.6691E-05
12	0.1070	-4.6570E-04	2.6322E-14	5.0935E-16	-6.7103E-18	1.6691E-05
13	0.1070	-4.6570E-04	2.6322E-14	5.0935E-16	-6.7103E-18	1.6691E-05
14	0.1070	-4.6570E-04	2.6323E-14	5.0935E-16	-6.7103E-18	1.6691E-05
15	0.1080	-4.6570E-04	-4.2397E-15	5.0935E-16	-6.7103E-18	1.6691E-05
16	0.1080	-4.6570E-04	-4.2389E-15	5.0935E-16	-6.7103E-18	1.6691E-05
17	0.1080	-4.6570E-04	-4.2389E-15	5.0935E-16	-6.7103E-18	1.6691E-05
18	0.1080	-4.6570E-04	-4.2389E-15	5.0935E-16	-6.7103E-18	1.6691E-05
19	0.1080	-4.6570E-04	-4.2389E-15	5.0935E-16	-6.7103E-18	1.6691E-05
20	0.1080	-4.6570E-04	-4.2389E-15	5.0935E-16	-6.7103E-18	1.6691E-05
21	0.1080	-4.6570E-04	-4.2362E-15	5.0935E-16	-6.7103E-18	1.6691E-05
22	0.1090	-4.6570E-04	-3.4799E-14	5.0935E-16	-6.7103E-18	1.6691E-05
23	0.1090	-4.6570E-04	-3.4800E-14	5.0935E-16	-6.7103E-18	1.6691E-05
24	0.1090	-4.6570E-04	-3.4800E-14	5.0935E-16	-6.7103E-18	1.6691E-05
25	0.1090	-4.6570E-04	-3.4800E-14	5.0935E-16	-6.7103E-18	1.6691E-05

26	0.1090	-4.6570E-04	-3.4800E-14	5.0935E-16	-6.7103E-18	1.6691E-05
27	0.1090	-4.6570E-04	-3.4800E-14	5.0935E-16	-6.7103E-18	1.6691E-05
28	0.1090	-4.6570E-04	-3.4802E-14	5.0935E-16	-6.7103E-18	1.6691E-05
MINIMUM	0.1060	-4.6570E-04	-3.4802E-14	5.0935E-16	-6.7103E-18	1.6691E-05
Pile N.	1	1	28	2	1	1
MAXIMUM	0.1090	-4.6570E-04	5.6883E-14	5.0935E-16	-6.7103E-18	1.6691E-05
Pile N.	22	1	2	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	150.37	0.024052	-31.953	0.9245	-272.47	3.6996
2	150.16	32.079	8.9705E-12	9.0866E-11	-3.6303E-10	-259.57
3	150.16	32.079	8.9705E-12	9.0866E-11	-3.6303E-10	-259.57
4	150.16	32.079	8.9705E-12	9.0866E-11	-3.6303E-10	-259.57
5	150.16	32.079	8.9705E-12	9.0866E-11	-3.6303E-10	-259.57
6	150.16	32.079	8.9705E-12	9.0866E-11	-3.6303E-10	-259.57
7	150.37	0.024052	31.953	-0.9245	272.47	3.6996
8	151.77	0.024096	-32.275	0.9240	-274.29	3.6978
9	159.71	-0.1517	3.7681E-11	8.8187E-14	-7.3507E-10	9.3725
10	159.71	-0.1517	3.7681E-11	8.8187E-14	-7.3507E-10	9.3725
11	159.71	-0.1517	3.7681E-11	8.8187E-14	-7.3507E-10	9.3725
12	159.71	-0.1517	3.7681E-11	8.8187E-14	-7.3507E-10	9.3725
13	159.71	-0.1517	3.7681E-11	8.8187E-14	-7.3507E-10	9.3725
14	151.77	0.024096	32.275	-0.9240	274.29	3.6978
15	153.17	0.024139	-32.597	0.9235	-276.10	3.6960
16	160.77	-0.1517	-5.8524E-12	8.8187E-14	1.1138E-10	9.3722
17	160.77	-0.1517	-5.8524E-12	8.8187E-14	1.1138E-10	9.3722
18	160.77	-0.1517	-5.8524E-12	8.8187E-14	1.1138E-10	9.3722
19	160.77	-0.1517	-5.8524E-12	8.8187E-14	1.1138E-10	9.3722
20	160.77	-0.1517	-5.8524E-12	8.8187E-14	1.1138E-10	9.3722
21	153.17	0.024139	32.597	-0.9235	276.10	3.6960
22	154.37	0.022726	-31.862	0.9377	-309.15	3.7525
23	154.49	-31.814	-6.7047E-12	6.5391E-11	2.6115E-10	319.29
24	154.49	-31.814	-6.7047E-12	6.5391E-11	2.6115E-10	319.29
25	154.49	-31.814	-6.7047E-12	6.5391E-11	2.6115E-10	319.29
26	154.49	-31.814	-6.7047E-12	6.5391E-11	2.6115E-10	319.29
27	154.49	-31.814	-6.7047E-12	6.5391E-11	2.6115E-10	319.29
28	154.37	0.022726	31.862	-0.9377	309.15	3.7525
MINIMUM	150.16	-31.814	-32.597	-0.9377	-309.15	-259.57
Pile N.	2	23	15	28	22	2
MAXIMUM	160.77	32.079	32.597	0.9377	309.15	319.29
Pile N.	16	2	21	22	28	23

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.1028	-4.6570E-04	0.025716	-4.0493E-06	-6.7103E-18	1.6193E-05
2	0.1027	5.6881E-14	0.026168	4.9251E-16	1.6691E-05	1.3008E-16
3	0.1027	5.6881E-14	0.026168	4.9251E-16	1.6691E-05	1.3008E-16
4	0.1027	5.6881E-14	0.026168	4.9251E-16	1.6691E-05	1.3008E-16
5	0.1027	5.6881E-14	0.026168	4.9251E-16	1.6691E-05	1.3008E-16
6	0.1027	5.6881E-14	0.026168	4.9251E-16	1.6691E-05	1.3008E-16
7	0.1028	-4.6570E-04	-0.025716	4.0493E-06	-6.7103E-18	1.6193E-05
8	0.1038	-4.6570E-04	0.025959	-4.0493E-06	-6.7103E-18	1.6193E-05
9	0.1070	2.6322E-14	4.6570E-04	5.0935E-16	1.6691E-05	6.7114E-18
10	0.1070	2.6322E-14	4.6570E-04	5.0935E-16	1.6691E-05	6.7114E-18
11	0.1070	2.6322E-14	4.6570E-04	5.0935E-16	1.6691E-05	6.7114E-18
12	0.1070	2.6322E-14	4.6570E-04	5.0935E-16	1.6691E-05	6.7114E-18
13	0.1070	2.6322E-14	4.6570E-04	5.0935E-16	1.6691E-05	6.7114E-18
14	0.1038	-4.6570E-04	-0.025959	4.0493E-06	-6.7103E-18	1.6193E-05
15	0.1048	-4.6570E-04	0.026202	-4.0493E-06	-6.7103E-18	1.6193E-05
16	0.1080	-4.2389E-15	4.6570E-04	5.0935E-16	1.6691E-05	6.7114E-18
17	0.1080	-4.2389E-15	4.6570E-04	5.0935E-16	1.6691E-05	6.7114E-18
18	0.1080	-4.2389E-15	4.6570E-04	5.0935E-16	1.6691E-05	6.7114E-18
19	0.1080	-4.2389E-15	4.6570E-04	5.0935E-16	1.6691E-05	6.7114E-18
20	0.1080	-4.2389E-15	4.6570E-04	5.0935E-16	1.6691E-05	6.7114E-18
21	0.1048	-4.6570E-04	-0.026202	4.0493E-06	-6.7103E-18	1.6193E-05
22	0.1057	-4.6570E-04	0.026445	-4.0493E-06	-6.7103E-18	1.6193E-05
23	0.1059	-3.4798E-14	-0.025993	4.9576E-16	1.6691E-05	-1.1706E-16
24	0.1059	-3.4798E-14	-0.025993	4.9576E-16	1.6691E-05	-1.1706E-16
25	0.1059	-3.4798E-14	-0.025993	4.9576E-16	1.6691E-05	-1.1706E-16
26	0.1059	-3.4798E-14	-0.025993	4.9576E-16	1.6691E-05	-1.1706E-16
27	0.1059	-3.4798E-14	-0.025993	4.9576E-16	1.6691E-05	-1.1706E-16
28	0.1057	-4.6570E-04	-0.026445	4.0493E-06	-6.7103E-18	1.6193E-05
MINIMUM	0.1027	-4.6570E-04	-0.026445	-4.0493E-06	-6.7103E-18	-1.1706E-16
Pile N.	2	1	28	1	1	23
MAXIMUM	0.1080	5.6881E-14	0.026445	4.0493E-06	1.6691E-05	1.6193E-05
Pile N.	16	2	22	7	2	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	153.63	0.024052	5.4809	-6.7336E-04	-272.47	3.8133
2	153.46	8.9702E-12	5.3087	8.1899E-14	-259.57	3.7421E-10
3	153.46	8.9702E-12	5.3087	8.1899E-14	-259.57	3.7421E-10
4	153.46	8.9702E-12	5.3087	8.1899E-14	-259.57	3.7421E-10
5	153.46	8.9702E-12	5.3087	8.1899E-14	-259.57	3.7421E-10
6	153.46	8.9702E-12	5.3087	8.1899E-14	-259.57	3.7421E-10
7	153.63	0.024052	-5.4809	6.7336E-04	272.47	3.8133
8	155.07	0.024096	5.5087	-6.7336E-04	-274.29	3.8115
9	159.71	3.7681E-11	0.1517	8.8187E-14	9.3725	7.3507E-10
10	159.71	3.7681E-11	0.1517	8.8187E-14	9.3725	7.3507E-10
11	159.71	3.7681E-11	0.1517	8.8187E-14	9.3725	7.3507E-10

12	159.71	3.7681E-11	0.1517	8.8187E-14	9.3725	7.3507E-10
13	159.71	3.7681E-11	0.1517	8.8187E-14	9.3725	7.3507E-10
14	155.07	0.024096	-5.5087	6.7336E-04	274.29	3.8115
15	156.51	0.024139	5.5363	-6.7336E-04	-276.10	3.8096
16	160.77	-5.8524E-12	0.1517	8.8187E-14	9.3722	-1.1138E-10
17	160.77	-5.8524E-12	0.1517	8.8187E-14	9.3722	-1.1138E-10
18	160.77	-5.8524E-12	0.1517	8.8187E-14	9.3722	-1.1138E-10
19	160.77	-5.8524E-12	0.1517	8.8187E-14	9.3722	-1.1138E-10
20	160.77	-5.8524E-12	0.1517	8.8187E-14	9.3722	-1.1138E-10
21	156.51	0.024139	-5.5363	6.7336E-04	276.10	3.8096
22	157.49	0.022726	6.5388	-6.7336E-04	-309.15	3.8679
23	157.60	-6.7043E-12	-6.6165	8.2440E-14	319.29	-2.6919E-10
24	157.60	-6.7043E-12	-6.6165	8.2440E-14	319.29	-2.6919E-10
25	157.60	-6.7043E-12	-6.6165	8.2440E-14	319.29	-2.6919E-10
26	157.60	-6.7043E-12	-6.6165	8.2440E-14	319.29	-2.6919E-10
27	157.60	-6.7043E-12	-6.6165	8.2440E-14	319.29	-2.6919E-10
28	157.49	0.022726	-6.5388	6.7336E-04	309.15	3.8679
MINIMUM	153.46	-6.7043E-12	-6.6165	-6.7336E-04	-309.15	-2.6919E-10
Pile N.	2	23	23	1	22	23
MAXIMUM	160.77	0.024139	6.5388	6.7336E-04	319.29	3.8679
Pile N.	16	15	22	7	23	22

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	6.0584
2	5.9770
3	5.9770
4	5.9770
5	5.9770
6	5.9770
7	6.0584
8	6.1108
9	4.6974
10	4.6974
11	4.6974
12	4.6974
13	4.6974
14	6.1108
15	6.1632
16	4.7281
17	4.7281
18	4.7281
19	4.7281
20	4.7281
21	6.1632
22	6.3846
23	6.4460
24	6.4460
25	6.4460
26	6.4460
27	6.4460
28	6.3846
MINIMUM	4.6974
Pile N.	9
MAXIMUM	6.4460
Pile N.	23

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-4.6570E-04	-4.7407E-04	-3.8133	-272.47	-5.5011E-03	-1.1207	-6.5414E-04	-0.013814	4.4659	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.320	0.0000	0.0000	15.588	14.722	0.0000	17.320	40.702	0.0000	0.0000
2	-6.6229E-16	-4.8793E-04	-3.7421E-10	-259.57	-1.4482E-12	-1.1193	-3.1211E-14	-0.013675	4.4610	1.2847E+07	3.5380E+07
x(FT)	15.588	17.320	0.0000	0.0000	12.990	14.722	13.856	17.320	40.702	0.0000	0.0000
3	-6.6229E-16	-4.8793E-04	-3.7421E-10	-259.57	-1.4482E-12	-1.1193	-3.1211E-14	-0.013675	4.4610	1.2847E+07	3.5380E+07
x(FT)	15.588	17.320	0.0000	0.0000	12.990	14.722	13.856	17.320	40.702	0.0000	0.0000
4	-6.6229E-16	-4.8793E-04	-3.7421E-10	-259.57	-1.4482E-12	-1.1193	-3.1211E-14	-0.013675	4.4610	1.2847E+07	3.5380E+07
x(FT)	15.588	17.320	0.0000	0.0000	12.990	14.722	13.856	17.320	40.702	0.0000	0.0000
5	-6.6229E-16	-4.8793E-04	-3.7421E-10	-259.57	-1.4482E-12	-1.1193	-3.1211E-14	-0.013675	4.4610	1.2847E+07	3.5380E+07
x(FT)	15.588	17.320	0.0000	0.0000	12.990	14.722	13.856	17.320	40.702	0.0000	0.0000
6	-6.6229E-16	-4.8793E-04	-3.7421E-10	-259.57	-1.4482E-12	-1.1193	-3.1211E-14	-0.013675	4.4610	1.2847E+07	3.5380E+07
x(FT)	15.588	17.320	0.0000	0.0000	12.990	14.722	13.856	17.320	40.702	0.0000	0.0000
7	-4.6570E-04	-0.025716	-3.8133	-80.980	-5.5011E-03	-5.2993	-6.5414E-04	-0.047175	4.4659	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	0.0000	10.392	15.588	0.0000	0.0000	6.0620	40.702	0.0000	0.0000
8	-4.6570E-04	-4.7895E-04	-3.8115	-274.29	-5.4896E-03	-1.1263	-6.5005E-04	-0.013843	4.5077	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.320	0.0000	0.0000	15.588	14.722	0.0000	17.320	40.702	0.0000	0.0000
9	-1.6332E-15	-4.3180E-05	-7.3507E-10	-0.5146	-5.6541E-12	-0.2043	-1.2979E-13	-3.5506E-03	4.6426	1.2847E+07	3.5380E+07
x(FT)	6.6880	5.8520	0.0000	10.868	5.0160	4.1800	6.6880	5.8520	40.964	0.0000	0.0000
10	-1.6332E-15	-4.3180E-05	-7.3507E-10	-0.5146	-5.6541E-12	-0.2043	-1.2979E-13	-3.5506E-03	4.6426	1.2847E+07	3.5380E+07
x(FT)	6.6880	5.8520	0.0000	10.868	5.0160	4.1800	6.6880	5.8520	40.964	0.0000	0.0000
11	-1.6332E-15	-4.3180E-05	-7.3507E-10	-0.5146	-5.6541E-12	-0.2043	-1.2979E-13	-3.5506E-03	4.6426	1.2847E+07	3.5380E+07
x(FT)	6.6880	5.8520	0.0000	10.868	5.0160	4.1800	6.6880	5.8520	40.964	0.0000	0.0000
12	-1.6332E-15	-4.3180E-05	-7.3507E-10	-0.5146	-5.6541E-12	-0.2043	-1.2979E-13	-3.5506E-03	4.6426	1.2847E+07	3.5380E+07
x(FT)	6.6880	5.8520	0.0000	10.868	5.0160	4.1800	6.6880	5.8520	40.964	0.0000	0.0000
13	-1.6332E-15	-4.3180E-05	-7.3507E-10	-0.5146	-5.6541E-12	-0.2043	-1.2979E-13	-3.5506E-03	4.6426	1.2847E+07	3.5380E+07
x(FT)	6.6880	5.8520	0.0000	10.868	5.0160	4.1800	6.6880	5.8520	40.964	0.0000	0.0000
14	-4.6570E-04	-0.025959	-3.8115	-81.514	-5.4896E-03	-5.3266	-6.5005E-04	-0.047358	4.5077	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	0.0000	11.258	15.588	0.0000	0.0000	6.0620	40.702	0.0000	0.0000
15	-4.6570E-04	-4.8380E-04	-3.8096	-276.10	-5.4786E-03	-1.1318	-6.4603E-04	-0.013889	4.5496	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.320	0.0000	0.0000	15.588	14.722	0.0000	18.186	40.702	0.0000	0.0000
16	-4.2389E-15	-4.3183E-05	-3.8804E-11	-0.5146	-5.4379E-12	-0.2043	-2.4923E-13	-3.5507E-03	4.6734	1.2847E+07	3.5380E+07
x(FT)	0.0000	5.8520	3.3440	10.868	0.0000	4.1800	3.3440	5.8520	40.964	0.0000	0.0000
17	-4.2389E-15	-4.3183E-05	-3.8804E-11	-0.5146	-5.4379E-12	-0.2043	-2.4923E-13	-3.5507E-03	4.6734	1.2847E+07	3.5380E+07
x(FT)	0.0000	5.8520	3.3440	10.868	0.0000	4.1800	3.3440	5.8520	40.964	0.0000	0.0000
18	-4.2389E-15	-4.3183E-05	-3.8804E-11	-0.5146	-5.4379E-12	-0.2043	-2.4923E-13	-3.5507E-03	4.6734	1.2847E+07	3.5380E+07
x(FT)	0.0000	5.8520	3.3440	10.868	0.0000	4.1800	3.3440	5.8520	40.964	0.0000	0.0000
19	-4.2389E-15	-4.3183E-05	-3.8804E-11	-0.5146	-5.4379E-12	-0.2043	-2.4923E-13	-3.5507E-03	4.6734	1.2847E+07	3.5380E+07

x(FT)	0.0000	5.8520	3.3440	10.868	0.0000	4.1800	3.3440	5.8520	40.964	0.0000	0.0000
20	-4.2389E-15	-4.3183E-05	-3.8804E-11	-0.5146	-5.4379E-12	-0.2043	-2.4923E-13	-3.5507E-03	4.6734	1.2847E+07	3.5380E+07
x(FT)	0.0000	5.8520	3.3440	10.868	0.0000	4.1800	3.3440	5.8520	40.964	0.0000	0.0000
21	-4.6570E-04	-0.026202	-3.8096	-82.110	-5.4786E-03	-5.3538	-6.4603E-04	-0.047540	4.5496	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	0.0000	11.258	15.588	0.0000	0.0000	6.0620	40.702	0.0000	0.0000
22	-4.6570E-04	-5.3821E-04	-3.8679	-309.15	-5.4871E-03	-1.2523	-7.9599E-04	-0.016081	4.5781	1.2847E+07	3.5380E+07
x(FT)	0.0000	16.454	0.0000	0.0000	14.722	13.856	0.0000	16.454	54.558	0.0000	0.0000
23	-3.4883E-14	-0.025993	-6.3830E-11	-90.608	-6.4088E-12	-6.3904	-7.3171E-14	-0.059678	4.5813	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	8.6600	10.392	0.0000	0.0000	3.4640	6.0620	54.558	0.0000	0.0000
24	-3.4883E-14	-0.025993	-6.3830E-11	-90.608	-6.4088E-12	-6.3904	-7.3171E-14	-0.059678	4.5813	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	8.6600	10.392	0.0000	0.0000	3.4640	6.0620	54.558	0.0000	0.0000
25	-3.4883E-14	-0.025993	-6.3830E-11	-90.608	-6.4088E-12	-6.3904	-7.3171E-14	-0.059678	4.5813	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	8.6600	10.392	0.0000	0.0000	3.4640	6.0620	54.558	0.0000	0.0000
26	-3.4883E-14	-0.025993	-6.3830E-11	-90.608	-6.4088E-12	-6.3904	-7.3171E-14	-0.059678	4.5813	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	8.6600	10.392	0.0000	0.0000	3.4640	6.0620	54.558	0.0000	0.0000
27	-3.4883E-14	-0.025993	-6.3830E-11	-90.608	-6.4088E-12	-6.3904	-7.3171E-14	-0.059678	4.5813	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	8.6600	10.392	0.0000	0.0000	3.4640	6.0620	54.558	0.0000	0.0000
28	-4.6570E-04	-0.026445	-3.8679	-91.389	-5.4871E-03	-6.3111	-7.9599E-04	-0.059421	4.5781	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	0.0000	10.392	14.722	0.0000	0.0000	6.0620	54.558	0.0000	0.0000
Min.	-4.6570E-04	-0.026445	-3.8679	-309.15	-5.5011E-03	-6.3904	-7.9599E-04	-0.059678	4.4610	1.2847E+07	3.5380E+07
Pile N.	1	28	22	22	1	23	22	23	2	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	8.2378E-05	0.025716	0.2861	80.980	0.038047	5.2993	5.2322E-04	0.047175	6.0584	1.2847E+07	3.5380E+07
x(FT)	6.9280	0.0000	13.856	10.392	3.4640	0.0000	13.856	6.0620	0.0000	0.0000	0.0000
2	5.6881E-14	0.026168	9.2110E-11	81.084	8.5941E-12	5.1308	9.3654E-14	0.045851	5.9770	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6600	10.392	0.0000	0.0000	3.4640	6.0620	0.0000	0.0000	0.0000
3	5.6881E-14	0.026168	9.2110E-11	81.084	8.5941E-12	5.1308	9.3654E-14	0.045851	5.9770	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6600	10.392	0.0000	0.0000	3.4640	6.0620	0.0000	0.0000	0.0000
4	5.6881E-14	0.026168	9.2110E-11	81.084	8.5941E-12	5.1308	9.3654E-14	0.045851	5.9770	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6600	10.392	0.0000	0.0000	3.4640	6.0620	0.0000	0.0000	0.0000
5	5.6881E-14	0.026168	9.2110E-11	81.084	8.5941E-12	5.1308	9.3654E-14	0.045851	5.9770	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6600	10.392	0.0000	0.0000	3.4640	6.0620	0.0000	0.0000	0.0000
6	5.6881E-14	0.026168	9.2110E-11	81.084	8.5941E-12	5.1308	9.3654E-14	0.045851	5.9770	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6600	10.392	0.0000	0.0000	3.4640	6.0620	0.0000	0.0000	0.0000
7	8.2378E-05	4.7407E-04	0.2861	272.47	0.038047	1.1207	5.2322E-04	0.013814	6.0584	1.2847E+07	3.5380E+07
x(FT)	6.9280	17.320	13.856	0.0000	3.4640	14.722	13.856	17.320	0.0000	0.0000	0.0000
8	8.2682E-05	0.025959	0.2862	81.514	0.038000	5.3266	5.1954E-04	0.047358	6.1108	1.2847E+07	3.5380E+07
x(FT)	6.9280	0.0000	13.856	11.258	3.4640	0.0000	13.856	6.0620	0.0000	0.0000	0.0000
9	2.6322E-14	4.6570E-04	2.4266E-10	10.654	3.5109E-11	0.1052	1.6142E-12	9.2321E-03	4.7048	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.3440	1.6720	0.0000	0.0000	3.3440	0.0000	1.6720	0.0000	0.0000
10	2.6322E-14	4.6570E-04	2.4266E-10	10.654	3.5109E-11	0.1052	1.6142E-12	9.2321E-03	4.7048	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.3440	1.6720	0.0000	0.0000	3.3440	0.0000	1.6720	0.0000	0.0000
11	2.6322E-14	4.6570E-04	2.4266E-10	10.654	3.5109E-11	0.1052	1.6142E-12	9.2321E-03	4.7048	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.3440	1.6720	0.0000	0.0000	3.3440	0.0000	1.6720	0.0000	0.0000
12	2.6322E-14	4.6570E-04	2.4266E-10	10.654	3.5109E-11	0.1052	1.6142E-12	9.2321E-03	4.7048	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.3440	1.6720	0.0000	0.0000	3.3440	0.0000	1.6720	0.0000	0.0000
13	2.6322E-14	4.6570E-04	2.4266E-10	10.654	3.5109E-11	0.1052	1.6142E-12	9.2321E-03	4.7048	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.3440	1.6720	0.0000	0.0000	3.3440	0.0000	1.6720	0.0000	0.0000
14	8.2682E-05	4.7895E-04	0.2862	274.29	0.038000	1.1263	5.1954E-04	0.013843	6.1108	1.2847E+07	3.5380E+07
x(FT)	6.9280	17.320	13.856	0.0000	3.4640	14.722	13.856	17.320	0.0000	0.0000	0.0000
15	8.2984E-05	0.026202	0.2863	82.110	0.037953	5.3538	5.1598E-04	0.047540	6.1632	1.2847E+07	3.5380E+07
x(FT)	6.9280	0.0000	13.856	11.258	3.4640	0.0000	13.856	6.0620	0.0000	0.0000	0.0000
16	2.6140E-16	4.6570E-04	1.1138E-10	10.654	9.0435E-13	0.1052	2.0772E-14	9.2321E-03	4.7356	1.2847E+07	3.5380E+07
x(FT)	6.6880	0.0000	0.0000	1.6720	5.0160	0.0000	6.6880	0.0000	1.6720	0.0000	0.0000
17	2.6140E-16	4.6570E-04	1.1138E-10	10.654	9.0435E-13	0.1052	2.0772E-14	9.2321E-03	4.7356	1.2847E+07	3.5380E+07
x(FT)	6.6880	0.0000	0.0000	1.6720	5.0160	0.0000	6.6880	0.0000	1.6720	0.0000	0.0000
18	2.6140E-16	4.6570E-04	1.1138E-10	10.654	9.0435E-13	0.1052	2.0772E-14	9.2321E-03	4.7356	1.2847E+07	3.5380E+07
x(FT)	6.6880	0.0000	0.0000	1.6720	5.0160	0.0000	6.6880	0.0000	1.6720	0.0000	0.0000
19	2.6140E-16	4.6570E-04	1.1138E-10	10.654	9.0435E-13	0.1052	2.0772E-14	9.2321E-03	4.7356	1.2847E+07	3.5380E+07
x(FT)	6.6880	0.0000	0.0000	1.6720	5.0160	0.0000	6.6880	0.0000	1.6720	0.0000	0.0000
20	2.6140E-16	4.6570E-04	1.1138E-10	10.654	9.0435E-13	0.1052	2.0772E-14	9.2321E-03	4.7356	1.2847E+07	3.5380E+07
x(FT)	6.6880	0.0000	0.0000	1.6720	5.0160	0.0000	6.6880	0.0000	1.6720	0.0000	0.0000
21	8.2984E-05	4.8380E-04	0.2863	276.10	0.037953	1.1318	5.1598E-04	0.013889	6.1632	1.2847E+07	3.5380E+07
x(FT)	6.9280	17.320	13.856	0.0000	3.4640	14.722	13.856	18.186	0.0000	0.0000	0.0000
22	7.2108E-05	0.026445	0.2725	91.389	0.040075	6.3111	4.7091E-04	0.059421	6.3846	1.2847E+07	3.5380E+07
x(FT)	6.9280	0.0000	12.990	10.392	4.3300	0.0000	9.5260	6.0620	0.0000	0.0000	0.0000
23	3.6895E-16	5.3687E-04	2.6919E-10	319.29	1.0432E-12	1.2361	4.3617E-14	0.016187	6.4460	1.2847E+07	3.5380E+07
x(FT)	14.722	17.320	0.0000	0.0000	12.990	13.856	13.856	16.454	0.0000	0.0000	0.0000
24	3.6895E-16	5.3687E-04	2.6919E-10	319.29	1.0432E-12	1.2361	4.3617E-14	0.016187	6.4460	1.2847E+07	3.5380E+07
x(FT)	14.722	17.320	0.0000	0.0000	12.990	13.856	13.856	16.454	0.0000	0.0000	0.0000
25	3.6895E-16	5.3687E-04	2.6919E-10	319.29	1.0432E-12	1.2361	4.3617E-14	0.016187	6.4460	1.2847E+07	3.5380E+07
x(FT)	14.722	17.320	0.0000	0.0000	12.990	13.856	13.856	16.454	0.0000	0.0000	0.0000
26	3.6895E-16	5.3687E-04	2.6919E-10	319.29	1.0432E-12	1.2361	4.3617E-14	0.016187	6.4460	1.2847E+07	3.5380E+07
x(FT)	14.722	17.320	0.0000	0.0000	12.990	13.856	13.856	16.454	0.0000	0.0000	0.0000
27	3.6895E-16	5.3687E-04	2.6919E-10	319.29	1.0432E-12	1.2361	4.3617E-14	0.016187	6.4460	1.2847E+07	3.5380E+07
x(FT)	14.722	17.320	0.0000	0.0000	12.990	13.856	13.856	16.454	0.0000	0.0000	0.0000
28	7.2108E-05	5.3821E-04	0.2725	309.15	0.040075	1.2523	4.7091E-04	0.016081	6.3846	1.2847E+07	3.5380E+07
x(FT)	6.9280	16.454	12.990	0.0000	4.3300	13.856	9.5260	16.454	0.0000	0.0000	0.0000
Max.	8.2984E-05	0.026445	0.2863	319.29	0.040075	6.3111	5.2322E-04	0.059421	6.4460	1.2847E+07	3.5380E+07
Pile N.	15	22	15	23	22	22	1	22	23	1	1

LOAD CASE : 4
CASE NAME : Strength V Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.9799	1.0000
2	0.9799	1.0000

3	0.9799	1.0000
4	0.9799	1.0000
5	0.9799	1.0000
6	0.9799	1.0000
7	1.0000	1.0000
8	0.8042	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.8309	1.0000
15	0.8042	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	0.8309	1.0000
22	0.8066	1.0000
23	0.7875	1.0000
24	0.7875	1.0000
25	0.7875	1.0000
26	0.7875	1.0000
27	0.7875	1.0000
28	0.8309	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
4753.00	178.000	80.0000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
8652.00	1.46424E+05	80880.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.12730	0.0357508	0.0128028

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
1.57605E-04	3.21307E-04	4.85547E-04

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.025770	0.078686	0.017348	1.5761E-04	3.2131E-04	4.8555E-04
2	0.045048	0.069230	0.017348	1.5761E-04	3.2131E-04	4.8555E-04
3	0.064327	0.059774	0.017348	1.5761E-04	3.2131E-04	4.8555E-04
4	0.083605	0.050317	0.017348	1.5761E-04	3.2131E-04	4.8555E-04
5	0.1029	0.040861	0.017348	1.5761E-04	3.2131E-04	4.8555E-04
6	0.1222	0.031405	0.017348	1.5761E-04	3.2131E-04	4.8555E-04
7	0.1414	0.021948	0.017348	1.5761E-04	3.2131E-04	4.8555E-04
8	0.054903	0.078686	7.8917E-03	1.5761E-04	3.2131E-04	4.8555E-04
9	0.074181	0.069230	7.8917E-03	1.5761E-04	3.2131E-04	4.8555E-04
10	0.093460	0.059774	7.8917E-03	1.5761E-04	3.2131E-04	4.8555E-04
11	0.1127	0.050317	7.8917E-03	1.5761E-04	3.2131E-04	4.8555E-04
12	0.1320	0.040861	7.8917E-03	1.5761E-04	3.2131E-04	4.8555E-04
13	0.1513	0.031405	7.8917E-03	1.5761E-04	3.2131E-04	4.8555E-04
14	0.1706	0.021948	7.8917E-03	1.5761E-04	3.2131E-04	4.8555E-04
15	0.084035	0.078686	-1.5646E-03	1.5761E-04	3.2131E-04	4.8555E-04
16	0.1033	0.069230	-1.5646E-03	1.5761E-04	3.2131E-04	4.8555E-04
17	0.1226	0.059774	-1.5646E-03	1.5761E-04	3.2131E-04	4.8555E-04
18	0.1419	0.050317	-1.5646E-03	1.5761E-04	3.2131E-04	4.8555E-04
19	0.1611	0.040861	-1.5646E-03	1.5761E-04	3.2131E-04	4.8555E-04
20	0.1804	0.031405	-1.5646E-03	1.5761E-04	3.2131E-04	4.8555E-04
21	0.1997	0.021948	-1.5646E-03	1.5761E-04	3.2131E-04	4.8555E-04
22	0.1132	0.078686	-0.011021	1.5761E-04	3.2131E-04	4.8555E-04
23	0.1325	0.069230	-0.011021	1.5761E-04	3.2131E-04	4.8555E-04
24	0.1517	0.059774	-0.011021	1.5761E-04	3.2131E-04	4.8555E-04
25	0.1710	0.050317	-0.011021	1.5761E-04	3.2131E-04	4.8555E-04
26	0.1903	0.040861	-0.011021	1.5761E-04	3.2131E-04	4.8555E-04
27	0.2096	0.031405	-0.011021	1.5761E-04	3.2131E-04	4.8555E-04
28	0.2288	0.021948	-0.011021	1.5761E-04	3.2131E-04	4.8555E-04
MINIMUM	0.025770	0.021948	-0.011021	1.5761E-04	3.2131E-04	4.8555E-04
Pile N.	1	7	22	1	1	1
MAXIMUM	0.2288	0.078686	0.017348	1.5761E-04	3.2131E-04	4.8555E-04
Pile N.	28	1	1	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	31.281	9.9743	-7.1435	128.41	72.761	513.47
2	85.237	33.851	0.5903	-4.4650	18.013	838.57
3	109.07	38.729	0.7079	-3.9106	15.796	765.19

4	132.97	43.379	0.8811	-3.1218	12.642	680.32
5	154.56	47.249	1.1699	-1.8467	7.5430	590.73
6	170.79	49.107	1.6434	0.4311	-1.5656	480.87
7	188.58	5.5019	40.182	-70.038	461.48	280.26
8	75.083	8.7226	-18.584	118.63	93.711	474.38
9	115.62	11.304	-0.5754	0.027287	73.703	829.93
10	145.38	10.775	-0.5848	0.027287	74.417	789.09
11	165.77	10.165	-0.5918	0.027287	75.128	742.99
12	186.15	9.5195	-0.5980	0.027287	75.962	695.28
13	206.54	8.8181	-0.6017	0.027287	76.909	644.76
14	213.70	4.3239	45.398	-61.335	539.72	245.46
15	118.93	8.7056	-29.825	118.52	109.39	473.91
16	155.80	11.261	-1.3458	0.027287	109.26	828.02
17	176.19	10.733	-1.4017	0.027287	111.44	787.17
18	196.58	10.117	-1.4635	0.027287	113.69	740.72
19	216.96	9.4607	-1.5390	0.027287	116.37	692.38
20	237.35	8.7482	-1.6334	0.027287	119.61	641.32
21	238.90	3.8990	50.281	-57.977	631.60	232.03
22	159.12	8.7062	-40.148	118.54	125.06	474.00
23	161.58	-27.196	-1.9704	35.208	140.74	956.48
24	181.63	-32.458	-1.9984	35.441	141.67	937.24
25	201.68	-37.723	-2.0282	35.688	142.66	917.86
26	221.72	-42.992	-2.0599	35.951	143.71	898.24
27	241.77	-48.267	-2.0934	36.227	144.82	878.21
28	264.06	3.5878	55.332	-55.464	718.30	221.98
MINIMUM	31.281	-48.267	-40.148	-70.038	-1.5656	221.98
Pile N.	1	27	22	7	6	28
MAXIMUM	264.06	49.107	55.332	128.41	718.30	956.48
Pile N.	28	6	28	1	28	23

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.020791	0.078686	0.023082	3.5104E-05	3.2131E-04	5.0928E-04
2	0.060498	0.017348	-0.056233	2.3085E-04	4.8555E-04	-2.7347E-04
3	0.076906	0.017348	-0.042382	2.3085E-04	4.8555E-04	-2.7347E-04
4	0.093314	0.017348	-0.028532	2.3085E-04	4.8555E-04	-2.7347E-04
5	0.1097	0.017348	-0.014681	2.3085E-04	4.8555E-04	-2.7347E-04
6	0.1261	0.017348	-8.3004E-04	2.3085E-04	4.8555E-04	-2.7347E-04
7	0.1414	0.021948	-0.017484	2.7069E-04	3.2131E-04	4.3281E-04
8	0.051348	0.078686	0.020975	3.5104E-05	3.2131E-04	5.0928E-04
9	0.074181	7.8917E-03	-0.069230	1.5761E-04	4.8555E-04	-3.2131E-04
10	0.093460	7.8917E-03	-0.059774	1.5761E-04	4.8555E-04	-3.2131E-04
11	0.1127	7.8917E-03	-0.050317	1.5761E-04	4.8555E-04	-3.2131E-04
12	0.1320	7.8917E-03	-0.040861	1.5761E-04	4.8555E-04	-3.2131E-04
13	0.1513	7.8917E-03	-0.031405	1.5761E-04	4.8555E-04	-3.2131E-04
14	0.1674	0.021948	-0.033725	2.7069E-04	3.2131E-04	4.3281E-04
15	0.081905	0.078686	0.018869	3.5104E-05	3.2131E-04	5.0928E-04
16	0.1033	-1.5646E-03	-0.069230	1.5761E-04	4.8555E-04	-3.2131E-04
17	0.1226	-1.5646E-03	-0.059774	1.5761E-04	4.8555E-04	-3.2131E-04
18	0.1419	-1.5646E-03	-0.050317	1.5761E-04	4.8555E-04	-3.2131E-04
19	0.1611	-1.5646E-03	-0.040861	1.5761E-04	4.8555E-04	-3.2131E-04
20	0.1804	-1.5646E-03	-0.031405	1.5761E-04	4.8555E-04	-3.2131E-04
21	0.1934	0.021948	-0.049966	2.7069E-04	3.2131E-04	4.3281E-04
22	0.1125	0.078686	0.016763	3.5104E-05	3.2131E-04	5.0928E-04
23	0.1117	-0.011021	-0.099293	7.4948E-05	4.8555E-04	-3.4994E-04
24	0.1327	-0.011021	-0.094796	7.4948E-05	4.8555E-04	-3.4994E-04
25	0.1537	-0.011021	-0.090299	7.4948E-05	4.8555E-04	-3.4994E-04
26	0.1747	-0.011021	-0.085803	7.4948E-05	4.8555E-04	-3.4994E-04
27	0.1957	-0.011021	-0.081306	7.4948E-05	4.8555E-04	-3.4994E-04
28	0.2193	0.021948	-0.066208	2.7069E-04	3.2131E-04	4.3281E-04
MINIMUM	0.020791	-0.011021	-0.099293	3.5104E-05	3.2131E-04	-3.4994E-04
Pile N.	1	23	23	1	1	23
MAXIMUM	0.2193	0.078686	0.023082	2.7069E-04	4.8555E-04	5.0928E-04
Pile N.	28	1	1	7	2	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	32.079	9.9743	0.6586	5.8374E-03	72.761	529.29
2	90.903	0.5903	-12.161	0.038387	838.57	-18.558
3	115.21	0.7079	-11.111	0.038387	765.19	-16.273
4	139.52	0.8811	-9.8249	0.038387	680.32	-13.022
5	161.41	1.1699	-8.3411	0.038387	590.73	-7.7657
6	177.60	1.6434	-6.2060	0.038387	480.87	1.6234
7	192.70	5.5019	-6.7681	0.045013	461.48	288.88
8	77.348	8.7226	0.1863	5.8374E-03	93.711	488.99
9	115.62	-0.5754	-11.304	0.027287	829.93	-73.703
10	145.38	-0.5848	-10.775	0.027287	789.09	-74.417
11	165.77	-0.5918	-10.165	0.027287	742.99	-75.128
12	186.15	-0.5980	-9.5195	0.027287	695.28	-75.962
13	206.54	-0.6017	-8.8181	0.027287	644.76	-76.909
14	218.33	4.3239	-7.8011	0.045013	539.72	253.01
15	122.62	8.7056	-0.080802	5.8374E-03	109.39	488.51
16	155.80	-1.3458	-11.261	0.027287	828.02	-109.26
17	176.19	-1.4017	-10.733	0.027287	787.17	-111.44
18	196.58	-1.4635	-10.117	0.027287	740.72	-113.69
19	216.96	-1.5390	-9.4607	0.027287	692.38	-116.37
20	237.35	-1.6334	-8.7482	0.027287	641.32	-119.61
21	243.96	3.8990	-9.1780	0.045013	631.60	239.16
22	164.11	8.7062	-0.3458	5.8374E-03	125.06	488.59
23	163.35	-1.9704	-12.816	0.012463	956.48	-145.08
24	184.08	-1.9984	-12.575	0.012463	937.24	-146.04
25	204.80	-2.0282	-12.330	0.012463	917.86	-147.06
26	225.53	-2.0599	-12.081	0.012463	898.24	-148.14
27	246.25	-2.0934	-11.827	0.012463	878.21	-149.28

28	269.59	3.5878	-10.382	0.045013	718.30	228.80
MINIMUM	32.079	-2.0934	-12.816	5.8374E-03	72.761	-149.28
Pile N.	1	27	23	1	1	27
MAXIMUM	269.59	9.9743	0.6586	0.045013	956.48	529.29
Pile N.	28	1	1	7	23	1

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	9.4559
2	7.5490
3	7.8257
4	8.0345
5	8.1442
6	7.9713
7	10.973
8	10.132
9	8.3507
10	8.9875
11	9.3232
12	9.6518
13	9.9676
14	11.494
15	11.447
16	9.6744
17	10.056
18	10.411
19	10.763
20	11.110
21	12.421
22	12.663
23	10.802
24	11.307
25	11.813
26	12.318
27	12.822
28	13.417
MINIMUM	7.5490
Pile N.	2
MAXIMUM	13.417
Pile N.	28

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-1.2652E-03	-3.9822E-04	-529.29	-3.6212	-1.7298	-0.7428	-0.024553	-0.011735	0.9325	1.2847E+07	3.5380E+07
x(FT)	17.320	15.588	0.0000	21.650	14.722	12.124	17.320	13.856	33.774	0.0000	0.0000
2	-5.4101E-04	-0.061581	-2.2363	-160.86	-0.3024	-11.885	-5.7647E-03	-0.087038	2.6425	1.2847E+07	3.5380E+07
x(FT)	12.990	1.7320	18.186	13.856	9.5260	0.0000	17.320	6.9280	38.104	0.0000	0.0000
3	-4.9547E-04	-0.048363	-2.2650	-139.28	-0.3251	-10.868	-6.4340E-03	-0.080953	3.3492	1.2847E+07	3.5380E+07
x(FT)	12.124	2.5980	17.320	13.856	9.5260	0.0000	17.320	6.9280	39.836	0.0000	0.0000
4	-4.9147E-04	-0.035522	-2.3082	-111.62	-0.3515	-9.6263	-7.4574E-03	-0.073344	4.0558	1.2847E+07	3.5380E+07
x(FT)	12.124	2.5980	17.320	13.856	9.5260	0.0000	16.454	6.9280	38.104	0.0000	0.0000
5	-4.5860E-04	-0.022960	-2.6038	-84.367	-0.3946	-8.2138	-9.0252E-03	-0.064860	4.6920	1.2847E+07	3.5380E+07
x(FT)	12.124	3.4640	16.454	12.990	9.5260	0.0000	16.454	6.9280	41.568	0.0000	0.0000
6	-5.3056E-04	-0.011519	-2.4468	-49.600	-0.4696	-6.2090	-6.4177E-03	-0.053791	5.1628	1.2847E+07	3.5380E+07
x(FT)	11.258	4.3300	16.454	12.990	8.6600	0.0000	12.990	6.9280	54.558	0.0000	0.0000
7	-3.5002E-04	-0.021986	-288.88	-80.134	-0.7048	-6.6319	-0.013999	-0.052259	5.6016	1.2847E+07	3.5380E+07
x(FT)	16.454	2.5980	0.0000	12.990	13.856	0.0000	16.454	6.9280	41.568	0.0000	0.0000
8	-1.2952E-03	-5.1679E-04	-488.99	-3.5151	-1.5024	-0.7129	-0.020339	-0.015781	2.2485	1.2847E+07	3.5380E+07
x(FT)	17.320	14.722	0.0000	21.650	15.588	11.258	18.186	14.722	33.774	0.0000	0.0000
9	-3.5009E-03	-0.074565	-5.5988	-163.94	-0.6628	-11.073	-5.3552E-03	-0.076059	3.3610	1.2847E+07	3.5380E+07
x(FT)	7.5240	1.6720	16.720	15.048	2.5080	0.0000	10.032	6.6880	39.292	0.0000	0.0000
10	-3.3643E-03	-0.065469	-5.7353	-152.66	-0.6808	-10.559	-5.6123E-03	-0.073116	4.2262	1.2847E+07	3.5380E+07
x(FT)	7.5240	2.5080	15.884	15.048	2.5080	0.0000	9.1960	6.6880	39.292	0.0000	0.0000
11	-3.2404E-03	-0.056535	-5.7507	-138.04	-0.6988	-9.9635	-5.8972E-03	-0.069699	4.8189	1.2847E+07	3.5380E+07
x(FT)	7.5240	2.5080	15.884	15.048	2.5080	0.0000	9.1960	6.6880	39.292	0.0000	0.0000
12	-3.0973E-03	-0.047617	-5.7316	-123.16	-0.7198	-9.3346	-6.2309E-03	-0.065989	5.4115	1.2847E+07	3.5380E+07
x(FT)	7.5240	2.5080	15.884	14.212	2.5080	0.0000	9.1960	6.6880	38.456	0.0000	0.0000
13	-2.9461E-03	-0.038729	-5.7049	-107.07	-0.7447	-8.6523	-6.6398E-03	-0.061940	6.0041	1.2847E+07	3.5380E+07
x(FT)	6.6880	2.5080	15.048	14.212	3.3440	0.0000	9.1960	6.6880	37.620	0.0000	0.0000
14	-3.3718E-04	-0.037348	-253.01	-105.67	-0.5601	-7.6303	-0.011414	-0.055897	6.3468	1.2847E+07	3.5380E+07
x(FT)	18.186	1.7320	0.0000	13.856	15.588	0.0000	17.320	6.9280	39.836	0.0000	0.0000
15	-1.2750E-03	-6.9302E-04	-488.51	-4.0520	-1.4996	-0.7692	-0.020347	-0.016988	3.5644	1.2847E+07	3.5380E+07
x(FT)	17.320	12.990	0.0000	20.784	15.588	9.5260	18.186	14.722	33.774	0.0000	0.0000
16	-8.9870E-03	-0.074574	-11.621	-163.98	-1.3469	-11.034	-0.010791	-0.075671	4.5292	1.2847E+07	3.5380E+07
x(FT)	4.1800	1.6720	14.212	15.048	0.0000	0.0000	6.6880	6.6880	39.292	0.0000	0.0000
17	-8.8496E-03	-0.065488	-11.921	-152.68	-1.4033	-10.519	-0.011433	-0.072663	5.1218	1.2847E+07	3.5380E+07
x(FT)	4.1800	2.5080	14.212	15.048	0.0000	0.0000	6.6880	6.6880	39.292	0.0000	0.0000
18	-8.7137E-03	-0.056557	-12.078	-137.89	-1.4654	-9.9175	-0.012159	-0.069169	5.7144	1.2847E+07	3.5380E+07
x(FT)	4.1800	2.5080	13.376	15.048	0.0000	0.0000	6.6880	6.6880	39.292	0.0000	0.0000
19	-8.5552E-03	-0.047646	-12.368	-122.62	-1.5410	-9.2764	-0.013029	-0.065336	6.3070	1.2847E+07	3.5380E+07
x(FT)	4.1800	2.5080	13.376	14.212	0.0000	0.0000	6.6880	6.6880	38.456	0.0000	0.0000
20	-8.3681E-03	-0.038764	-12.574	-106.56	-1.6351	-8.5814	-0.014093	-0.061096	6.8996	1.2847E+07	3.5380E+07
x(FT)	4.1800	2.5080	13.376	14.212	0.0000	0.0000	6.6880	6.6880	37.620	0.0000	0.0000
21	-3.1081E-04	-0.053071	-239.16	-132.21	-0.5072	-8.9732	-0.011811	-0.064799	7.0919	1.2847E+07	3.5380E+07
x(FT)	19.052	1.7320	0.0000	13.856	16.454	0.0000	18.186	6.9280	38.970	0.0000	0.0000
22	-1.2617E-03	-9.8827E-04	-488.59	-5.4341	-1.4991	-0.8544	-0.020438	-0.018163	4.7706	1.2847E+07	3.5380E+07
x(FT)	17.320	12.124	0.0000	19.052	15.588	7.7940	18.186	14.722	33.774	0.0000	0.0000
23	-0.017431	-0.1039	-19.079	-204.57	-1.9482	-12.552	-0.015193	-0.083501	4.7486	1.2847E+07	3.5380E+07
x(FT)	3.4640	1.7320	13.856	15.588	0.0000	0.0000	6.9280	6.9280	41.568	0.0000	0.0000
24	-0.017385	-0.099554	-19.264	-198.76	-1.9765	-12.318	-0.015493	-0.082260	5.3511	1.2847E+07	3.5380E+07
x(FT)	3.4640	1.7320	13.856	15.588	0.0000	0.0000	6.9280	6.9280	41.568	0.0000	0.0000
25	-0.017336	-0.095168	-19.453	-192.94	-2.0066	-12.081	-0.015810	-0.080981	5.9535	1.2847E+07	3.5380E+07
x(FT)	3.4640	1.7320	13.856	15.588	0.0000	0.0000	6.9280	6.9280	41.568	0.0000	0.0000
26	-0.017284	-0.090783	-19.647	-187.02	-2.0384	-11.839	-0.016144	-0.079664	6.5560	1.2847E+07	3.5380E+07
x(FT)	3.4640	1.7320	13.856	15.588	0.0000	0.0000	6.9280	6.9280	41.568	0.0000	0.0000
27	-0.017230	-0.086400	-19.824	-180.82	-2.0720	-11.592	-0.016496	-0.078313	7.1585	1.2847E+07	3.5380E+07

x(FT)	3.4640	1.7320	13.856	15.588	0.0000	0.0000	6.9280	6.9280	41.568	0.0000	0.0000
28	-3.1965E-04	-0.068820	-228.80	-158.76	-0.4759	-10.154	-9.4483E-03	-0.072227	7.8370	1.2847E+07	3.5380E+07
x(FT)	19.918	1.7320	0.0000	13.856	17.320	0.0000	18.186	6.9280	38.970	0.0000	0.0000
Min.	-0.017431	-0.1039	-529.29	-204.57	-2.0720	-12.552	-0.024553	-0.087038	0.9325	1.2847E+07	3.5380E+07
Pile N.	23	23	1	23	27	23	1	2	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	0.081754	0.023081	114.95	86.311	9.6591	0.5638	0.086626	0.018183	9.4559	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	11.258	3.4640	0.0000	0.0000	6.0620	0.0000	0.0000	0.0000	0.0000
2	0.017348	9.2038E-04	31.345	838.57	0.5010	1.9875	0.017049	0.050799	7.5490	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.784	4.3300	0.0000	0.0000	18.186	0.0000	26.846	0.0000	0.0000	0.0000
3	0.017348	8.2182E-04	32.208	765.19	0.6024	1.7901	0.020152	0.040356	7.8257	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.784	4.3300	0.0000	0.0000	18.186	0.0000	26.846	0.0000	0.0000	0.0000
4	0.017348	5.9355E-04	33.336	680.32	0.7512	1.5221	0.024875	0.028380	8.0345	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.918	4.3300	0.0000	0.0000	17.320	0.0000	26.846	0.0000	0.0000	0.0000
5	0.017348	4.1699E-04	35.234	590.73	1.0024	1.2103	0.032149	0.016501	8.1442	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.052	4.3300	0.0000	0.0000	17.320	0.0000	19.918	0.0000	0.0000	0.0000
6	0.017348	2.1021E-04	38.648	480.87	1.4437	0.7141	0.038461	0.010979	7.9713	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.918	4.3300	0.0000	0.0000	16.454	0.0000	19.052	0.0000	0.0000	0.0000
7	0.026546	3.9005E-04	45.920	461.48	5.3370	1.1157	0.050788	0.015269	10.973	1.2847E+07	3.5380E+07
x(FT)	1.7320	19.052	10.392	0.0000	0.0000	16.454	5.1960	19.918	0.0000	0.0000	0.0000
8	0.081923	0.020975	105.98	95.259	8.4723	0.1145	0.072848	0.013623	10.132	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	11.258	1.7320	0.0000	0.0000	6.0620	0.0000	0.0000	0.0000	0.0000
9	7.8917E-03	7.5821E-04	73.703	829.93	0.087048	1.9218	5.5510E-03	0.053950	8.3507	1.2847E+07	3.5380E+07
x(FT)	0.0000	22.572	0.0000	0.0000	20.064	20.064	0.0000	25.916	0.0000	0.0000	0.0000
10	7.8917E-03	7.8925E-04	74.417	789.09	0.091054	1.8167	6.1131E-03	0.052908	8.9875	1.2847E+07	3.5380E+07
x(FT)	0.0000	21.736	0.0000	0.0000	19.228	20.064	0.0000	25.916	0.0000	0.0000	0.0000
11	7.8917E-03	7.5642E-04	75.128	742.99	0.094567	1.7324	6.8408E-03	0.050203	9.3232	1.2847E+07	3.5380E+07
x(FT)	0.0000	21.736	0.0000	0.0000	19.228	19.228	0.0000	25.916	0.0000	0.0000	0.0000
12	7.8917E-03	6.8728E-04	75.962	695.28	0.093394	1.5526	7.8269E-03	0.046054	9.6518	1.2847E+07	3.5380E+07
x(FT)	0.0000	21.736	0.0000	0.0000	18.392	19.228	0.0000	25.916	0.0000	0.0000	0.0000
13	7.8917E-03	5.5983E-04	76.909	644.76	0.095834	1.3620	9.2521E-03	0.040678	9.9676	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.900	0.0000	0.0000	18.392	18.392	0.0000	25.916	0.0000	0.0000	0.0000
14	0.027292	6.0463E-04	38.812	539.72	4.2238	1.3330	0.037158	0.031550	11.494	1.2847E+07	3.5380E+07
x(FT)	2.5980	20.784	11.258	0.0000	0.0000	18.186	6.0620	26.846	0.0000	0.0000	0.0000
15	0.081925	0.018869	106.06	109.39	8.4632	0.075976	0.072922	0.012307	11.447	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	11.258	0.0000	0.0000	24.248	6.0620	0.0000	0.0000	0.0000	0.0000
16	9.6440E-05	7.5443E-04	109.26	828.02	0.1616	1.9211	3.6392E-03	0.054011	9.6744	1.2847E+07	3.5380E+07
x(FT)	20.900	22.572	0.0000	0.0000	18.392	20.064	20.064	25.916	0.0000	0.0000	0.0000
17	1.1126E-04	7.8725E-04	111.44	787.17	0.1709	1.8175	3.4824E-03	0.052979	10.056	1.2847E+07	3.5380E+07
x(FT)	20.900	22.572	0.0000	0.0000	18.392	20.064	19.228	25.916	0.0000	0.0000	0.0000
18	1.0827E-04	7.3961E-04	113.69	740.72	0.1748	1.7129	3.2943E-03	0.050009	10.411	1.2847E+07	3.5380E+07
x(FT)	20.064	21.736	0.0000	0.0000	17.556	19.228	19.228	25.916	0.0000	0.0000	0.0000
19	9.9772E-05	6.7789E-04	116.37	692.38	0.1885	1.5828	4.9247E-03	0.046401	10.763	1.2847E+07	3.5380E+07
x(FT)	20.064	21.736	0.0000	0.0000	17.556	19.228	18.392	25.916	0.0000	0.0000	0.0000
20	9.5692E-05	5.4410E-04	119.61	641.32	0.1907	1.3546	5.2312E-03	0.040979	11.110	1.2847E+07	3.5380E+07
x(FT)	20.064	21.736	0.0000	0.0000	17.556	19.228	18.392	25.916	0.0000	0.0000	0.0000
21	0.027676	7.5238E-04	36.301	631.60	3.8227	1.5873	0.032816	0.042929	12.421	1.2847E+07	3.5380E+07
x(FT)	2.5980	21.650	12.124	0.0000	0.0000	18.186	6.0620	26.846	0.0000	0.0000	0.0000
22	0.081925	0.016763	106.26	125.06	8.4701	0.090095	0.073168	0.011009	12.663	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	11.258	0.0000	0.0000	23.382	6.0620	0.0000	0.0000	0.0000	0.0000
23	1.6899E-04	1.0256E-03	145.08	956.48	0.2470	2.2788	5.6980E-03	0.060368	10.802	1.2847E+07	3.5380E+07
x(FT)	21.650	23.382	0.0000	0.0000	19.052	20.784	20.784	26.846	0.0000	0.0000	0.0000
24	1.7025E-04	1.0150E-03	146.04	937.24	0.2509	2.2375	5.2650E-03	0.059537	11.307	1.2847E+07	3.5380E+07
x(FT)	21.650	23.382	0.0000	0.0000	19.052	20.784	20.784	26.846	0.0000	0.0000	0.0000
25	1.6788E-04	1.0114E-03	147.06	917.86	0.2562	2.1975	5.6576E-03	0.059016	11.813	1.2847E+07	3.5380E+07
x(FT)	21.650	23.382	0.0000	0.0000	19.052	20.784	19.918	26.846	0.0000	0.0000	0.0000
26	1.6153E-04	1.0036E-03	148.14	898.24	0.2629	2.1477	7.5715E-03	0.058497	12.318	1.2847E+07	3.5380E+07
x(FT)	21.650	23.382	0.0000	0.0000	19.052	20.784	19.918	26.846	0.0000	0.0000	0.0000
27	1.6325E-04	9.6876E-04	149.28	878.21	0.2667	2.0652	8.0443E-03	0.057080	12.822	1.2847E+07	3.5380E+07
x(FT)	20.784	23.382	0.0000	0.0000	18.186	20.784	19.918	26.846	0.0000	0.0000	0.0000
28	0.027964	9.6880E-04	34.570	718.30	3.5279	1.8810	0.029616	0.050375	13.417	1.2847E+07	3.5380E+07
x(FT)	2.5980	21.650	12.124	0.0000	0.0000	19.052	6.0620	26.846	0.0000	0.0000	0.0000
Max.	0.081925	0.023081	149.28	956.48	9.6591	2.2788	0.086626	0.060368	13.417	1.2847E+07	3.5380E+07
Pile N.	15	1	27	23	1	23	1	23	28	1	1

LOAD CASE : 5
CASE NAME : Service I Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.9736	1.0000
2	0.9736	1.0000
3	0.9736	1.0000
4	0.9736	1.0000
5	0.9736	1.0000
6	0.9736	1.0000
7	1.0000	1.0000
8	0.8034	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.8383	1.0000
15	0.8034	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000

19	0.7850	1.0000
20	0.7850	1.0000
21	0.8383	1.0000
22	0.8066	1.0000
23	0.7882	1.0000
24	0.7882	1.0000
25	0.7882	1.0000
26	0.7882	1.0000
27	0.7882	1.0000
28	0.8383	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
3668.00	140.000	65.0000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
6408.00	1.11612E+05	63060.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.0921794	0.0229442	9.61269E-03

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
9.32025E-05	2.12679E-04	3.34516E-04

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
1	0.023791	0.049756	0.011621	9.3203E-05	2.1268E-04	3.3452E-04
2	0.036552	0.044164	0.011621	9.3203E-05	2.1268E-04	3.3452E-04
3	0.049312	0.038572	0.011621	9.3203E-05	2.1268E-04	3.3452E-04
4	0.062073	0.032980	0.011621	9.3203E-05	2.1268E-04	3.3452E-04
5	0.074834	0.027388	0.011621	9.3203E-05	2.1268E-04	3.3452E-04
6	0.087594	0.021795	0.011621	9.3203E-05	2.1268E-04	3.3452E-04
7	0.1004	0.016203	0.011621	9.3203E-05	2.1268E-04	3.3452E-04
8	0.043862	0.049756	6.0284E-03	9.3203E-05	2.1268E-04	3.3452E-04
9	0.056622	0.044164	6.0284E-03	9.3203E-05	2.1268E-04	3.3452E-04
10	0.069383	0.038572	6.0284E-03	9.3203E-05	2.1268E-04	3.3452E-04
11	0.082144	0.032980	6.0284E-03	9.3203E-05	2.1268E-04	3.3452E-04
12	0.094905	0.027388	6.0284E-03	9.3203E-05	2.1268E-04	3.3452E-04
13	0.1077	0.021795	6.0284E-03	9.3203E-05	2.1268E-04	3.3452E-04
14	0.1204	0.016203	6.0284E-03	9.3203E-05	2.1268E-04	3.3452E-04
15	0.063933	0.049756	4.3625E-04	9.3203E-05	2.1268E-04	3.3452E-04
16	0.076693	0.044164	4.3625E-04	9.3203E-05	2.1268E-04	3.3452E-04
17	0.089454	0.038572	4.3625E-04	9.3203E-05	2.1268E-04	3.3452E-04
18	0.1022	0.032980	4.3625E-04	9.3203E-05	2.1268E-04	3.3452E-04
19	0.1150	0.027388	4.3625E-04	9.3203E-05	2.1268E-04	3.3452E-04
20	0.1277	0.021795	4.3625E-04	9.3203E-05	2.1268E-04	3.3452E-04
21	0.1405	0.016203	4.3625E-04	9.3203E-05	2.1268E-04	3.3452E-04
22	0.084004	0.049756	-5.1559E-03	9.3203E-05	2.1268E-04	3.3452E-04
23	0.096764	0.044164	-5.1559E-03	9.3203E-05	2.1268E-04	3.3452E-04
24	0.1095	0.038572	-5.1559E-03	9.3203E-05	2.1268E-04	3.3452E-04
25	0.1223	0.032980	-5.1559E-03	9.3203E-05	2.1268E-04	3.3452E-04
26	0.1351	0.027388	-5.1559E-03	9.3203E-05	2.1268E-04	3.3452E-04
27	0.1478	0.021795	-5.1559E-03	9.3203E-05	2.1268E-04	3.3452E-04
28	0.1606	0.016203	-5.1559E-03	9.3203E-05	2.1268E-04	3.3452E-04
MINIMUM	0.023791	0.016203	-5.1559E-03	9.3203E-05	2.1268E-04	3.3452E-04
Pile N.	1	7	22	1	1	1
MAXIMUM	0.1606	0.049756	0.011621	9.3203E-05	2.1268E-04	3.3452E-04
Pile N.	28	1	1	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
1	30.604	7.8198	-6.6096	93.915	24.272	375.55
2	65.311	26.063	0.5756	-2.2411	9.0594	607.22
3	81.349	29.240	0.6825	-1.7647	7.1542	554.94
4	97.442	32.199	0.8349	-1.1112	4.5409	492.34
5	113.57	35.009	1.0858	-0.032380	0.2268	426.14
6	129.86	37.206	1.4331	1.5609	-6.1446	341.59
7	146.54	4.5498	30.998	-54.046	345.53	216.24
8	60.464	6.8790	-14.392	87.113	35.023	348.35
9	88.432	9.0103	-0.3196	0.016137	47.571	616.56
10	108.19	8.6498	-0.3199	0.016137	47.954	590.33
11	127.95	8.1910	-0.3168	0.016137	48.195	557.75
12	146.91	7.7150	-0.3113	0.016137	48.480	525.04
13	160.40	7.2761	-0.3040	0.016137	48.971	494.89
14	166.33	3.6783	35.029	-48.200	407.64	192.87
15	90.377	6.8730	-21.964	87.091	39.835	348.26
16	119.51	8.9923	-0.8889	0.016137	71.984	615.54
17	139.26	8.6253	-0.9216	0.016137	73.273	589.34
18	154.64	8.1636	-0.9550	0.016137	74.473	556.43
19	168.13	7.6783	-0.9947	0.016137	75.887	522.69

20	181.63	7.1602	-1.0430	0.016137	77.568	487.75
21	183.94	3.3299	38.346	-45.586	473.27	182.41
22	120.29	6.8847	-29.533	87.200	44.565	348.70
23	123.29	-20.087	-1.3408	23.202	92.757	724.53
24	142.99	-25.173	-1.3551	23.312	93.194	713.08
25	159.91	-29.563	-1.3703	23.430	93.665	701.56
26	173.02	-33.004	-1.3863	23.557	94.175	689.93
27	186.14	-36.447	-1.4031	23.690	94.707	678.09
28	201.52	3.0808	41.745	-43.740	537.73	175.03
MINIMUM	30.604	-36.447	-29.533	-54.046	-6.1446	175.03
Pile N.	1	27	22	7	6	28
MAXIMUM	201.52	37.206	41.745	93.915	537.73	724.53
Pile N.	28	6	28	1	28	23

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.020261	0.049756	0.017045	9.2649E-06	2.1268E-04	3.4713E-04
2	0.046174	0.011621	-0.033977	1.4201E-04	3.3452E-04	-1.8372E-04
3	0.057197	0.011621	-0.025456	1.4201E-04	3.3452E-04	-1.8372E-04
4	0.068219	0.011621	-0.016936	1.4201E-04	3.3452E-04	-1.8372E-04
5	0.079242	0.011621	-8.4148E-03	1.4201E-04	3.3452E-04	-1.8372E-04
6	0.090265	0.011621	1.0603E-04	1.4201E-04	3.3452E-04	-1.8372E-04
7	0.1002	0.016203	-0.013073	1.7157E-04	2.1268E-04	3.0191E-04
8	0.041089	0.049756	0.016489	9.2649E-06	2.1268E-04	3.4713E-04
9	0.056622	6.0284E-03	-0.044164	9.3203E-05	3.3452E-04	-2.1268E-04
10	0.069383	6.0284E-03	-0.038572	9.3203E-05	3.3452E-04	-2.1268E-04
11	0.082144	6.0284E-03	-0.032980	9.3203E-05	3.3452E-04	-2.1268E-04
12	0.094905	6.0284E-03	-0.027388	9.3203E-05	3.3452E-04	-2.1268E-04
13	0.1077	6.0284E-03	-0.021795	9.3203E-05	3.3452E-04	-2.1268E-04
14	0.1183	0.016203	-0.023367	1.7157E-04	2.1268E-04	3.0191E-04
15	0.061917	0.049756	0.015933	9.2649E-06	2.1268E-04	3.4713E-04
16	0.076693	4.3625E-04	-0.044164	9.3203E-05	3.3452E-04	-2.1268E-04
17	0.089454	4.3625E-04	-0.038572	9.3203E-05	3.3452E-04	-2.1268E-04
18	0.1022	4.3625E-04	-0.032980	9.3203E-05	3.3452E-04	-2.1268E-04
19	0.1150	4.3625E-04	-0.027388	9.3203E-05	3.3452E-04	-2.1268E-04
20	0.1277	4.3625E-04	-0.021795	9.3203E-05	3.3452E-04	-2.1268E-04
21	0.1364	0.016203	-0.033661	1.7157E-04	2.1268E-04	3.0191E-04
22	0.082745	0.049756	0.015377	9.2649E-06	2.1268E-04	3.4713E-04
23	0.083159	-5.1559E-03	-0.066320	3.8823E-05	3.3452E-04	-2.2894E-04
24	0.096896	-5.1559E-03	-0.063990	3.8823E-05	3.3452E-04	-2.2894E-04
25	0.1106	-5.1559E-03	-0.061661	3.8823E-05	3.3452E-04	-2.2894E-04
26	0.1244	-5.1559E-03	-0.059332	3.8823E-05	3.3452E-04	-2.2894E-04
27	0.1381	-5.1559E-03	-0.057002	3.8823E-05	3.3452E-04	-2.2894E-04
28	0.1545	0.016203	-0.043956	1.7157E-04	2.1268E-04	3.0191E-04
MINIMUM	0.020261	-5.1559E-03	-0.066320	9.2649E-06	2.1268E-04	-2.2894E-04
Pile N.	1	23	23	1	1	23
MAXIMUM	0.1545	0.049756	0.017045	1.7157E-04	3.3452E-04	3.4713E-04
Pile N.	28	1	1	7	2	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	31.293	7.8198	1.0124	1.5407E-03	24.272	387.11
2	69.683	0.5756	-9.4399	0.023616	607.22	-9.3324
3	86.013	0.6825	-8.6313	0.023616	554.94	-7.3686
4	102.34	0.8349	-7.5981	0.023616	492.34	-4.6749
5	118.67	1.0858	-6.4108	0.023616	426.14	-0.2279
6	135.00	1.4331	-4.5911	0.023616	341.59	6.3397
7	149.69	4.5498	-5.4792	0.028531	345.53	222.89
8	62.150	6.8790	0.7065	1.5407E-03	35.023	359.08
9	88.432	-0.3196	-9.0103	0.016137	616.56	-47.571
10	108.19	-0.3199	-8.6498	0.016137	590.33	-47.954
11	127.95	-0.3168	-8.1910	0.016137	557.75	-48.195
12	146.91	-0.3113	-7.7150	0.016137	525.04	-48.480
13	160.40	-0.3040	-7.2761	0.016137	494.89	-48.971
14	169.86	3.6783	-6.3697	0.028531	407.64	198.80
15	93.006	6.8730	0.6172	1.5407E-03	39.835	358.98
16	119.51	-0.8889	-8.9923	0.016137	615.54	-71.984
17	139.26	-0.9216	-8.6253	0.016137	589.34	-73.273
18	154.64	-0.9550	-8.1636	0.016137	556.43	-74.473
19	168.13	-0.9947	-7.6783	0.016137	522.69	-75.887
20	181.63	-1.0430	-7.1602	0.016137	487.75	-77.568
21	187.74	3.3299	-7.4222	0.028531	473.27	188.02
22	123.86	6.8847	0.5312	1.5407E-03	44.565	359.44
23	124.48	-1.3408	-10.423	6.4558E-03	724.53	-95.614
24	144.83	-1.3551	-10.268	6.4558E-03	713.08	-96.066
25	162.30	-1.3703	-10.113	6.4558E-03	701.56	-96.551
26	175.86	-1.3863	-9.9572	6.4558E-03	689.93	-97.077
27	189.42	-1.4031	-9.7990	6.4558E-03	678.09	-97.624
28	205.62	3.0808	-8.3901	0.028531	537.73	180.41
MINIMUM	31.293	-1.4031	-10.423	1.5407E-03	24.272	-97.624
Pile N.	1	27	23	1	1	27
MAXIMUM	205.62	7.8198	1.0124	0.028531	724.53	387.11
Pile N.	28	1	1	7	23	1

PILE GROUP	STRESS,KIP/IN**2
**********	***************
1	7.1375
2	5.5751
3	5.7435
4	5.8514
5	5.9385
6	5.9220
7	8.4652

8	7.5855
9	6.2519
10	6.6779
11	7.0677
12	7.4346
13	7.6586
14	8.9242
15	8.4821
16	7.2507
17	7.6864
18	7.9587
19	8.1752
20	8.3897
21	9.5545
22	9.3875
23	8.1207
24	8.6520
25	9.0997
26	9.4335
27	9.7665
28	10.253
MINIMUM	5.5751
Pile N.	2
MAXIMUM	10.253
Pile N.	28

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-9.2566E-04	-2.6637E-04	-387.11	-3.0517	-1.3550	-0.5877	-0.020708	-6.9542E-03	0.9097	1.2847E+07	3.5380E+07
x(FT)	15.588	15.588	0.0000	20.784	13.856	12.124	16.454	12.990	33.774	0.0000	0.0000
2	-2.9167E-04	-0.037514	-1.5088	-115.78	-0.2364	-9.2065	-5.8625E-03	-0.071836	2.0257	1.2847E+07	3.5380E+07
x(FT)	12.124	1.7320	16.454	12.990	9.5260	0.0000	16.454	6.9280	38.104	0.0000	0.0000
3	-2.6287E-04	-0.029313	-1.5260	-99.854	-0.2556	-8.4263	-9.0340E-03	-0.067094	2.5004	1.2847E+07	3.5380E+07
x(FT)	12.124	2.5980	15.588	12.990	9.5260	0.0000	15.588	6.9280	41.568	0.0000	0.0000
4	-2.7335E-04	-0.021528	-1.6281	-79.149	-0.2751	-7.4321	-7.8393E-03	-0.060551	2.9751	1.2847E+07	3.5380E+07
x(FT)	11.258	2.5980	15.588	12.124	9.5260	0.0000	15.588	6.9280	40.702	0.0000	0.0000
5	-3.0837E-04	-0.013853	-1.5394	-56.951	-0.3105	-6.3089	-4.7739E-03	-0.054059	3.4498	1.2847E+07	3.5380E+07
x(FT)	11.258	3.4640	15.588	12.124	8.6600	0.0000	15.588	6.9280	54.558	0.0000	0.0000
6	-3.5690E-04	-7.0703E-03	-6.3397	-32.809	-0.3547	-4.5994	-5.0218E-03	-0.042045	3.9245	1.2847E+07	3.5380E+07
x(FT)	11.258	4.3300	0.0000	12.990	8.6600	0.0000	12.124	6.9280	53.692	0.0000	0.0000
7	-2.3919E-04	-0.015623	-222.89	-61.915	-0.5749	-5.3506	-0.012719	-0.044934	4.3513	1.2847E+07	3.5380E+07
x(FT)	15.588	2.5980	0.0000	12.124	13.856	0.0000	15.588	6.9280	39.836	0.0000	0.0000
8	-9.3104E-04	-2.7848E-04	-359.08	-2.8519	-1.2314	-0.5194	-0.017406	-6.6400E-03	1.8067	1.2847E+07	3.5380E+07
x(FT)	16.454	15.588	0.0000	21.650	13.856	12.124	16.454	13.856	34.640	0.0000	0.0000
9	-1.6615E-03	-0.047619	-3.5307	-123.42	-0.4301	-8.8081	-3.9507E-03	-0.064363	2.5707	1.2847E+07	3.5380E+07
x(FT)	7.5240	1.6720	15.884	14.212	3.3440	0.0000	17.556	6.6880	38.456	0.0000	0.0000
10	-1.5795E-03	-0.042165	-3.6225	-116.99	-0.4405	-8.4586	-3.9718E-03	-0.062176	3.1450	1.2847E+07	3.5380E+07
x(FT)	7.5240	1.6720	15.884	14.212	3.3440	0.0000	10.032	6.6880	40.128	0.0000	0.0000
11	-1.5262E-03	-0.036806	-3.5846	-106.19	-0.4497	-8.0116	-4.1450E-03	-0.059540	3.7194	1.2847E+07	3.5380E+07
x(FT)	7.5240	2.5080	15.048	13.376	3.3440	0.0000	10.032	6.6880	39.292	0.0000	0.0000
12	-1.4603E-03	-0.031580	-3.6212	-96.231	-0.4602	-7.5487	-4.3225E-03	-0.056606	4.2707	1.2847E+07	3.5380E+07
x(FT)	7.5240	2.5080	15.048	13.376	3.3440	0.0000	10.032	6.6880	38.456	0.0000	0.0000
13	-1.3576E-03	-0.026325	-3.6172	-87.379	-0.4749	-7.1245	-4.6230E-03	-0.054181	4.6629	1.2847E+07	3.5380E+07
x(FT)	7.5240	2.5080	15.048	13.376	3.3440	0.0000	9.1960	6.6880	42.636	0.0000	0.0000
14	-2.6217E-04	-0.025495	-198.80	-82.848	-0.4868	-6.2141	-9.0588E-03	-0.048848	4.9379	1.2847E+07	3.5380E+07
x(FT)	17.320	1.7320	0.0000	12.990	14.722	0.0000	16.454	6.9280	42.434	0.0000	0.0000
15	-9.3121E-04	-2.7700E-04	-358.98	-2.7717	-1.2342	-0.5202	-0.017452	-7.1575E-03	2.7037	1.2847E+07	3.5380E+07
x(FT)	16.454	15.588	0.0000	21.650	13.856	12.124	16.454	13.856	34.640	0.0000	0.0000
16	-4.5573E-03	-0.047624	-7.1556	-123.27	-0.8943	-8.7915	-7.6877E-03	-0.064163	3.4741	1.2847E+07	3.5380E+07
x(FT)	5.0160	1.6720	13.376	14.212	0.0000	0.0000	6.6880	6.6880	38.456	0.0000	0.0000
17	-4.4539E-03	-0.042170	-7.3793	-117.35	-0.9278	-8.4350	-8.1035E-03	-0.067075	4.0484	1.2847E+07	3.5380E+07
x(FT)	5.0160	1.6720	13.376	14.212	0.0000	0.0000	6.6880	16.720	40.128	0.0000	0.0000
18	-4.3804E-03	-0.036819	-7.4096	-105.94	-0.9620	-7.9842	-8.5506E-03	-0.059193	4.4954	1.2847E+07	3.5380E+07
x(FT)	4.1800	2.5080	13.376	13.376	0.0000	0.0000	6.6880	6.6880	39.292	0.0000	0.0000
19	-4.2990E-03	-0.031604	-7.4696	-94.756	-1.0025	-7.5107	-9.0736E-03	-0.056285	4.8876	1.2847E+07	3.5380E+07
x(FT)	4.1800	2.5080	12.540	13.376	0.0000	0.0000	6.6880	6.6880	38.456	0.0000	0.0000
20	-4.2042E-03	-0.026402	-7.5805	-83.293	-1.0518	-7.0059	-9.6982E-03	-0.053071	5.2799	1.2847E+07	3.5380E+07
x(FT)	4.1800	2.5080	12.540	13.376	0.0000	0.0000	6.6880	6.6880	36.784	0.0000	0.0000
21	-2.3491E-04	-0.035421	-188.02	-101.94	-0.4368	-7.2361	-9.6572E-03	-0.055656	5.4576	1.2847E+07	3.5380E+07
x(FT)	17.320	1.7320	0.0000	12.990	15.588	0.0000	16.454	6.9280	38.970	0.0000	0.0000
22	-9.3085E-04	-2.7744E-04	-359.44	-2.6891	-1.2411	-0.5215	-0.017581	-7.6287E-03	3.6006	1.2847E+07	3.5380E+07
x(FT)	16.454	14.722	0.0000	21.650	13.856	12.124	16.454	13.856	34.640	0.0000	0.0000
23	-9.3531E-03	-0.069171	-11.983	-156.74	-1.3260	-10.185	-0.010907	-0.071958	3.6185	1.2847E+07	3.5380E+07
x(FT)	3.4640	1.7320	12.990	14.722	0.0000	0.0000	6.9280	6.9280	39.836	0.0000	0.0000
24	-9.3315E-03	-0.066906	-12.079	-153.26	-1.3408	-10.035	-0.011069	-0.071118	4.2101	1.2847E+07	3.5380E+07
x(FT)	3.4640	1.7320	12.990	14.722	0.0000	0.0000	6.9280	6.9280	39.836	0.0000	0.0000
25	-9.3087E-03	-0.064642	-12.174	-149.88	-1.3561	-9.8848	-0.011239	-0.070260	4.7181	1.2847E+07	3.5380E+07
x(FT)	3.4640	1.7320	12.990	13.856	0.0000	0.0000	6.9280	6.9280	39.836	0.0000	0.0000
26	-9.2845E-03	-0.062379	-12.265	-146.44	-1.3722	-9.7332	-0.011414	-0.069390	5.1122	1.2847E+07	3.5380E+07
x(FT)	3.4640	1.7320	12.990	13.856	0.0000	0.0000	6.9280	6.9280	38.970	0.0000	0.0000
27	-9.2593E-03	-0.060117	-12.351	-142.86	-1.3890	-9.5793	-0.011596	-0.068514	5.5064	1.2847E+07	3.5380E+07
x(FT)	3.4640	1.7320	12.990	13.856	0.0000	0.0000	6.9280	6.9280	38.970	0.0000	0.0000
28	-2.5559E-04	-0.045351	-180.41	-122.05	-0.4143	-8.1828	-7.6195E-03	-0.061925	5.9774	1.2847E+07	3.5380E+07
x(FT)	18.186	1.7320	0.0000	12.990	15.588	0.0000	17.320	6.9280	39.836	0.0000	0.0000
Min.	-9.3531E-03	-0.069171	-387.11	-156.74	-1.3890	-10.185	-0.020708	-0.071958	0.9097	1.2847E+07	3.5380E+07
Pile N.	23	23	1	23	27	23	1	23	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	0.051737	0.017045	85.498	56.980	7.5527	0.9191	0.071786	0.017937	7.1375	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	10.392	6.0620	0.0000	0.0000	5.1960	0.0000	0.0000	0.0000	0.0000

2	0.011621	6.4698E-04	22.362	607.22	0.4934	1.5357	0.015771	0.024911	5.5751	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.918	4.3300	0.0000	0.0000	17.320	0.0000	26.846	0.0000	0.0000	0.0000
3	0.011621	5.7681E-04	23.108	554.94	0.5855	1.4513	0.018624	0.018441	5.7435	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.052	4.3300	0.0000	0.0000	16.454	0.0000	19.052	0.0000	0.0000	0.0000
4	0.011621	3.8182E-04	24.033	492.34	0.7158	1.1618	0.022888	0.015861	5.8514	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.052	4.3300	0.0000	0.0000	16.454	0.0000	19.052	0.0000	0.0000	0.0000
5	0.011621	2.6201E-04	25.588	426.14	0.9347	0.8061	0.029073	0.011851	5.9385	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.052	4.3300	0.0000	0.0000	15.588	0.0000	18.186	0.0000	0.0000	0.0000
6	0.011621	1.1204E-04	27.941	341.59	1.2596	0.4988	0.033458	9.0515E-03	5.9220	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.052	4.3300	0.0000	0.0000	16.454	0.0000	18.186	0.0000	0.0000	0.0000
7	0.019111	2.6526E-04	36.159	345.53	4.3945	0.8993	0.044287	0.013068	8.4652	1.2847E+07	3.5380E+07
x(FT)	1.7320	18.186	9.5260	0.0000	0.0000	15.588	4.3300	18.186	0.0000	0.0000	0.0000
8	0.051854	0.016489	79.015	55.279	6.6630	0.6317	0.060831	0.014352	7.5855	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	10.392	5.1960	0.0000	0.0000	6.0620	0.0000	0.0000	0.0000	0.0000
9	6.0284E-03	8.2911E-04	47.571	616.56	0.069351	1.6814	5.7115E-03	0.044644	6.2519	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.900	0.0000	0.0000	18.392	18.392	0.0000	25.916	0.0000	0.0000	0.0000
10	6.0284E-03	8.1686E-04	47.954	590.33	0.067783	1.5730	6.2391E-03	0.042415	6.6779	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.064	0.0000	0.0000	17.556	17.556	0.0000	25.916	0.0000	0.0000	0.0000
11	6.0284E-03	6.9037E-04	48.195	557.75	0.064372	1.3997	6.9057E-03	0.038137	7.0677	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.064	0.0000	0.0000	17.556	17.556	0.0000	25.916	0.0000	0.0000	0.0000
12	6.0284E-03	6.2807E-04	48.480	525.04	0.064448	1.2832	7.7788E-03	0.034054	7.4346	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.064	0.0000	0.0000	17.556	17.556	0.0000	25.916	0.0000	0.0000	0.0000
13	6.0284E-03	5.9066E-04	48.971	494.89	0.073624	1.2859	8.9788E-03	0.024380	7.6586	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.228	0.0000	0.0000	16.720	16.720	0.0000	25.916	0.0000	0.0000	0.0000
14	0.019444	4.7261E-04	31.830	407.64	3.5770	1.1185	0.033512	0.014119	8.9242	1.2847E+07	3.5380E+07
x(FT)	1.7320	19.052	10.392	0.0000	0.0000	16.454	5.1960	19.918	0.0000	0.0000	0.0000
15	0.051855	0.015933	79.136	56.090	6.6610	0.5444	0.060880	0.013898	8.4821	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	10.392	4.3300	0.0000	0.0000	6.0620	0.0000	0.0000	0.0000	0.0000
16	4.3625E-04	7.6895E-04	71.984	615.54	0.1066	1.5572	1.5581E-03	0.043583	7.2507	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.900	0.0000	0.0000	17.556	18.392	19.228	25.916	0.0000	0.0000	0.0000
17	4.3625E-04	8.5772E-04	73.273	589.34	0.1135	1.6521	1.6911E-03	0.042919	7.6864	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.064	0.0000	0.0000	16.720	17.556	18.392	25.916	0.0000	0.0000	0.0000
18	4.3625E-04	7.1221E-04	74.473	556.43	0.1155	1.4663	1.7379E-03	0.038342	7.9587	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.064	0.0000	0.0000	16.720	17.556	18.392	25.916	0.0000	0.0000	0.0000
19	4.3625E-04	5.8396E-04	75.887	522.69	0.1181	1.2920	1.8271E-03	0.033289	8.1752	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.064	0.0000	0.0000	15.884	17.556	17.556	25.916	0.0000	0.0000	0.0000
20	4.3625E-04	4.7172E-04	77.568	487.75	0.1243	1.1396	2.5506E-03	0.027667	8.3897	1.2847E+07	3.5380E+07
x(FT)	0.0000	20.064	0.0000	0.0000	15.884	17.556	16.720	25.916	0.0000	0.0000	0.0000
21	0.019601	5.8691E-04	29.559	473.27	3.2483	1.3151	0.029578	0.025158	9.5545	1.2847E+07	3.5380E+07
x(FT)	2.5980	19.918	11.258	0.0000	0.0000	17.320	5.1960	26.846	0.0000	0.0000	0.0000
22	0.051853	0.015377	79.397	57.238	6.6758	0.4602	0.061134	0.013496	9.3875	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	10.392	4.3300	0.0000	0.0000	6.0620	0.0000	0.0000	0.0000	0.0000
23	1.1538E-04	9.8197E-04	95.614	724.53	0.1664	1.8680	3.0531E-03	0.049144	8.1207	1.2847E+07	3.5380E+07
x(FT)	19.918	21.650	0.0000	0.0000	17.320	19.052	19.052	26.846	0.0000	0.0000	0.0000
24	1.1424E-04	9.7758E-04	96.066	713.08	0.1703	1.8528	2.9293E-03	0.048647	8.6520	1.2847E+07	3.5380E+07
x(FT)	19.918	21.650	0.0000	0.0000	17.320	19.052	19.052	26.846	0.0000	0.0000	0.0000
25	1.1136E-04	9.7259E-04	96.551	701.56	0.1749	1.8367	3.7419E-03	0.048106	9.0997	1.2847E+07	3.5380E+07
x(FT)	19.918	21.650	0.0000	0.0000	17.320	19.052	18.186	26.846	0.0000	0.0000	0.0000
26	1.0791E-04	9.5826E-04	97.077	689.93	0.1794	1.8084	4.6871E-03	0.047419	9.4335	1.2847E+07	3.5380E+07
x(FT)	19.918	21.650	0.0000	0.0000	17.320	19.052	18.186	26.846	0.0000	0.0000	0.0000
27	1.0804E-04	9.2248E-04	97.624	678.09	0.1816	1.7510	5.0047E-03	0.046508	9.7665	1.2847E+07	3.5380E+07
x(FT)	19.918	21.650	0.0000	0.0000	17.320	19.052	18.186	26.846	0.0000	0.0000	0.0000
28	0.019807	7.7142E-04	28.260	537.73	3.0134	1.5482	0.026818	0.033410	10.253	1.2847E+07	3.5380E+07
x(FT)	2.5980	19.918	11.258	0.0000	0.0000	17.320	6.0620	26.846	0.0000	0.0000	0.0000
Max.	0.051855	0.017045	97.624	724.53	7.5527	1.8680	0.071786	0.049144	10.253	1.2847E+07	3.5380E+07
Pile N.	15	1	27	23	1	23	1	23	28	1	1

LOAD CASE : 6
CASE NAME : Service IV Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.9125	1.0000
2	0.9125	1.0000
3	0.9125	1.0000
4	0.9125	1.0000
5	0.9125	1.0000
6	0.9125	1.0000
7	1.0000	1.0000
8	0.7963	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.9044	1.0000
15	0.7963	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	0.9044	1.0000
22	0.8066	1.0000
23	0.7954	1.0000
24	0.7954	1.0000
25	0.7954	1.0000
26	0.7954	1.0000
27	0.7954	1.0000
28	0.9044	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
2808.00	93.0000	58.0000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	36180.0	36360.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.0681469	0.0101480	9.72804E-03

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
-2.24647E-06	6.00021E-05	1.66115E-04

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
1	0.042396	0.014727	7.7258E-03	-2.2465E-06	6.0002E-05	1.6611E-04
2	0.045996	0.014862	7.7258E-03	-2.2465E-06	6.0002E-05	1.6611E-04
3	0.049596	0.014997	7.7258E-03	-2.2465E-06	6.0002E-05	1.6611E-04
4	0.053197	0.015132	7.7258E-03	-2.2465E-06	6.0002E-05	1.6611E-04
5	0.056797	0.015266	7.7258E-03	-2.2465E-06	6.0002E-05	1.6611E-04
6	0.060397	0.015401	7.7258E-03	-2.2465E-06	6.0002E-05	1.6611E-04
7	0.063997	0.015536	7.7258E-03	-2.2465E-06	6.0002E-05	1.6611E-04
8	0.052363	0.014727	7.8606E-03	-2.2465E-06	6.0002E-05	1.6611E-04
9	0.055963	0.014862	7.8606E-03	-2.2465E-06	6.0002E-05	1.6611E-04
10	0.059563	0.014997	7.8606E-03	-2.2465E-06	6.0002E-05	1.6611E-04
11	0.063163	0.015132	7.8606E-03	-2.2465E-06	6.0002E-05	1.6611E-04
12	0.066764	0.015266	7.8606E-03	-2.2465E-06	6.0002E-05	1.6611E-04
13	0.070364	0.015401	7.8606E-03	-2.2465E-06	6.0002E-05	1.6611E-04
14	0.073964	0.015536	7.8606E-03	-2.2465E-06	6.0002E-05	1.6611E-04
15	0.062330	0.014727	7.9954E-03	-2.2465E-06	6.0002E-05	1.6611E-04
16	0.065930	0.014862	7.9954E-03	-2.2465E-06	6.0002E-05	1.6611E-04
17	0.069530	0.014997	7.9954E-03	-2.2465E-06	6.0002E-05	1.6611E-04
18	0.073130	0.015132	7.9954E-03	-2.2465E-06	6.0002E-05	1.6611E-04
19	0.076730	0.015266	7.9954E-03	-2.2465E-06	6.0002E-05	1.6611E-04
20	0.080331	0.015401	7.9954E-03	-2.2465E-06	6.0002E-05	1.6611E-04
21	0.083931	0.015536	7.9954E-03	-2.2465E-06	6.0002E-05	1.6611E-04
22	0.072297	0.014727	8.1302E-03	-2.2465E-06	6.0002E-05	1.6611E-04
23	0.075897	0.014862	8.1302E-03	-2.2465E-06	6.0002E-05	1.6611E-04
24	0.079497	0.014997	8.1302E-03	-2.2465E-06	6.0002E-05	1.6611E-04
25	0.083097	0.015132	8.1302E-03	-2.2465E-06	6.0002E-05	1.6611E-04
26	0.086697	0.015266	8.1302E-03	-2.2465E-06	6.0002E-05	1.6611E-04
27	0.090298	0.015401	8.1302E-03	-2.2465E-06	6.0002E-05	1.6611E-04
28	0.093898	0.015536	8.1302E-03	-2.2465E-06	6.0002E-05	1.6611E-04
MINIMUM	0.042396	0.014727	7.7258E-03	-2.2465E-06	6.0002E-05	1.6611E-04
Pile N.	1	1	1	1	1	1
MAXIMUM	0.093898	0.015536	8.1302E-03	-2.2465E-06	6.0002E-05	1.6611E-04
Pile N.	28	7	22	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
1	58.577	3.5839	-10.744	39.570	-154.57	158.26
2	69.692	21.086	1.5150	8.3461	-33.367	221.40
3	74.807	22.158	1.5575	8.5583	-34.215	212.79
4	79.925	23.220	1.6002	8.7780	-35.094	203.92
5	85.046	24.269	1.6421	9.0029	-35.993	194.75
6	90.170	25.307	1.6824	9.2296	-36.900	185.27
7	93.907	4.2041	20.319	-43.457	163.78	173.81
8	72.428	3.1367	-14.203	36.582	-165.03	146.31
9	87.411	5.2675	0.9302	-3.8895E-04	-22.865	316.89
10	92.985	5.2846	0.9266	-3.8895E-04	-22.801	317.92
11	98.559	5.3016	0.9230	-3.8895E-04	-22.737	318.95
12	104.13	5.3186	0.9194	-3.8895E-04	-22.674	319.97
13	109.71	5.3355	0.9159	-3.8895E-04	-22.611	320.99
14	107.94	3.8626	23.462	-41.469	184.14	165.85
15	86.372	3.0343	-17.289	35.884	-187.30	143.53
16	102.84	5.2626	0.9503	-3.8895E-04	-23.673	316.77
17	108.42	5.2797	0.9466	-3.8895E-04	-23.607	317.80
18	113.99	5.2968	0.9430	-3.8895E-04	-23.542	318.82
19	119.56	5.3138	0.9394	-3.8895E-04	-23.478	319.85
20	125.14	5.3307	0.9358	-3.8895E-04	-23.414	320.87
21	122.00	3.7591	26.477	-40.832	208.33	163.31
22	100.32	2.9624	-20.360	35.385	-209.98	141.53
23	103.62	-18.520	0.6999	-4.6056	-18.406	438.25
24	108.61	-19.676	0.6897	-4.5496	-18.182	444.49
25	113.61	-20.833	0.6798	-4.4956	-17.966	450.68
26	118.60	-21.991	0.6704	-4.4434	-17.757	456.84
27	123.60	-23.150	0.6612	-4.3930	-17.555	462.95
28	136.03	3.5943	29.608	-39.662	228.12	158.63
MINIMUM	58.577	-23.150	-20.360	-43.457	-209.98	141.53
Pile N.	1	27	22	7	22	22
MAXIMUM	136.03	25.307	29.608	39.570	228.12	462.95
Pile N.	28	6	28	1	28	27

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.039255	0.014727	0.017780	-4.2479E-05	6.0002E-05	1.6061E-04
2	0.048228	7.7258E-03	-3.2593E-03	1.2377E-05	1.6611E-04	-5.8755E-05
3	0.051753	7.7258E-03	-2.5166E-03	1.2377E-05	1.6611E-04	-5.8755E-05
4	0.055278	7.7258E-03	-1.7740E-03	1.2377E-05	1.6611E-04	-5.8755E-05
5	0.058804	7.7258E-03	-1.0314E-03	1.2377E-05	1.6611E-04	-5.8755E-05
6	0.062329	7.7258E-03	-2.8875E-04	1.2377E-05	1.6611E-04	-5.8755E-05
7	0.063959	0.015536	-8.0306E-03	3.8120E-05	6.0002E-05	1.6170E-04
8	0.048892	0.014727	0.020329	-4.2479E-05	6.0002E-05	1.6061E-04
9	0.055963	7.8606E-03	-0.014862	-2.2465E-06	1.6611E-04	-6.0002E-05
10	0.059563	7.8606E-03	-0.014997	-2.2465E-06	1.6611E-04	-6.0002E-05
11	0.063163	7.8606E-03	-0.015132	-2.2465E-06	1.6611E-04	-6.0002E-05
12	0.066764	7.8606E-03	-0.015266	-2.2465E-06	1.6611E-04	-6.0002E-05
13	0.070364	7.8606E-03	-0.015401	-2.2465E-06	1.6611E-04	-6.0002E-05
14	0.073661	0.015536	-0.010318	3.8120E-05	6.0002E-05	1.6170E-04
15	0.058528	0.014727	0.022878	-4.2479E-05	6.0002E-05	1.6061E-04
16	0.065930	7.9954E-03	-0.014862	-2.2465E-06	1.6611E-04	-6.0002E-05
17	0.069530	7.9954E-03	-0.014997	-2.2465E-06	1.6611E-04	-6.0002E-05
18	0.073130	7.9954E-03	-0.015132	-2.2465E-06	1.6611E-04	-6.0002E-05
19	0.076730	7.9954E-03	-0.015266	-2.2465E-06	1.6611E-04	-6.0002E-05
20	0.080331	7.9954E-03	-0.015401	-2.2465E-06	1.6611E-04	-6.0002E-05
21	0.083363	0.015536	-0.012605	3.8120E-05	6.0002E-05	1.6170E-04
22	0.068165	0.014727	0.025427	-4.2479E-05	6.0002E-05	1.6061E-04
23	0.070024	8.1302E-03	-0.032830	-1.6736E-05	1.6611E-04	-5.7665E-05
24	0.073484	8.1302E-03	-0.033835	-1.6736E-05	1.6611E-04	-5.7665E-05
25	0.076944	8.1302E-03	-0.034839	-1.6736E-05	1.6611E-04	-5.7665E-05
26	0.080404	8.1302E-03	-0.035843	-1.6736E-05	1.6611E-04	-5.7665E-05
27	0.083864	8.1302E-03	-0.036847	-1.6736E-05	1.6611E-04	-5.7665E-05
28	0.093065	0.015536	-0.014892	3.8120E-05	6.0002E-05	1.6170E-04
MINIMUM	0.039255	7.7258E-03	-0.036847	-4.2479E-05	6.0002E-05	-6.0002E-05
Pile N.	1	2	27	1	1	9
MAXIMUM	0.093065	0.015536	0.025427	3.8120E-05	1.6611E-04	1.6170E-04
Pile N.	28	7	22	7	2	7

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	59.433	3.5839	3.7877	-7.0638E-03	-154.57	163.14
2	72.726	1.5150	-3.5493	2.0582E-03	221.40	34.395
3	77.948	1.5575	-3.3483	2.0582E-03	212.79	35.269
4	83.171	1.6002	-3.1362	2.0582E-03	203.92	36.175
5	88.393	1.6421	-2.9122	2.0582E-03	194.75	37.102
6	93.616	1.6824	-2.6756	2.0582E-03	185.27	38.036
7	96.032	4.2041	-3.0694	6.3390E-03	163.78	179.16
8	73.709	3.1367	3.7926	-7.0638E-03	-165.03	150.82
9	87.411	0.9302	-5.2675	-3.8895E-04	316.89	22.865
10	92.985	0.9266	-5.2846	-3.8895E-04	317.92	22.801
11	98.559	0.9230	-5.3016	-3.8895E-04	318.95	22.737
12	104.13	0.9194	-5.3186	-3.8895E-04	319.97	22.674
13	109.71	0.9159	-5.3355	-3.8895E-04	320.99	22.611
14	110.40	3.8626	-3.4245	6.3390E-03	184.14	170.96
15	87.986	3.0343	4.1816	-7.0638E-03	-187.30	147.94
16	102.84	0.9503	-5.2626	-3.8895E-04	316.77	23.673
17	108.42	0.9466	-5.2797	-3.8895E-04	317.80	23.607
18	113.99	0.9430	-5.2968	-3.8895E-04	318.82	23.542
19	119.56	0.9394	-5.3138	-3.8895E-04	319.85	23.478
20	125.14	0.9358	-5.3307	-3.8895E-04	320.87	23.414
21	124.78	3.7591	-3.9109	6.3390E-03	208.33	168.34
22	102.26	2.9624	4.5858	-7.0638E-03	-209.98	145.89
23	105.02	0.6999	-7.1708	-2.7830E-03	438.25	18.973
24	110.14	0.6897	-7.2613	-2.7830E-03	444.49	18.742
25	115.27	0.6798	-7.3507	-2.7830E-03	450.68	18.520
26	120.39	0.6704	-7.4390	-2.7830E-03	456.84	18.305
27	125.52	0.6612	-7.5262	-2.7830E-03	462.95	18.097
28	139.15	3.5943	-4.2773	6.3390E-03	228.12	163.51
MINIMUM	59.433	0.6612	-7.5262	-7.0638E-03	-209.98	18.097
Pile N.	1	27	27	1	22	27
MAXIMUM	139.15	4.2041	4.5858	6.3390E-03	462.95	179.16
Pile N.	28	7	22	7	27	7

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	4.5025
2	3.5205
3	3.6320
4	3.7432
5	3.8540
6	3.9643
7	5.8277
8	4.7529
9	4.4279
10	4.5957
11	4.7634
12	4.9311
13	5.0988
14	6.1619
15	5.1765
16	4.8784
17	5.0461
18	5.2138
19	5.3815
20	5.5491
21	6.5955
22	5.6202
23	5.6304

24	5.8151
25	5.9997
26	6.1840
27	6.3682
28	6.9932
MINIMUM	3.5205
Pile N.	2
MAXIMUM	6.9932
Pile N.	28

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-2.9065E-04	-3.5796E-04	-163.14	-154.57	-0.5302	-0.8298	-9.5637E-03	-0.010719	1.7277	1.2847E+07	3.5380E+07
x(FT)	14.722	16.454	0.0000	0.0000	12.124	12.990	13.856	16.454	54.558	0.0000	0.0000
2	-1.4245E-04	-5.8338E-03	-34.395	-27.570	-0.2196	-3.4948	-3.8246E-03	-0.033012	2.1141	1.2847E+07	3.5380E+07
x(FT)	12.124	3.4640	0.0000	11.258	10.392	0.0000	13.856	6.0620	52.826	0.0000	0.0000
3	-1.4746E-04	-5.2449E-03	-35.269	-25.228	-0.2248	-3.3059	-3.8474E-03	-0.031539	2.2659	1.2847E+07	3.5380E+07
x(FT)	12.124	3.4640	0.0000	11.258	9.5260	0.0000	13.856	6.0620	52.826	0.0000	0.0000
4	-1.5243E-04	-4.6593E-03	-36.175	-22.879	-0.2309	-3.1066	-3.8682E-03	-0.029990	2.4178	1.2847E+07	3.5380E+07
x(FT)	12.124	3.4640	0.0000	11.258	9.5260	0.0000	13.856	6.0620	52.826	0.0000	0.0000
5	-1.5730E-04	-4.0776E-03	-37.102	-20.524	-0.2373	-2.8959	-3.9217E-03	-0.028352	2.5696	1.2847E+07	3.5380E+07
x(FT)	12.124	3.4640	0.0000	11.258	9.5260	0.0000	12.990	6.0620	51.960	0.0000	0.0000
6	-1.6203E-04	-3.5001E-03	-38.036	-18.167	-0.2439	-2.6728	-4.0218E-03	-0.026678	2.7214	1.2847E+07	3.5380E+07
x(FT)	12.124	3.4640	0.0000	11.258	9.5260	0.0000	12.990	6.9280	51.960	0.0000	0.0000
7	-2.7698E-04	-8.4042E-03	-179.16	-35.968	-0.5702	-2.9778	-0.010929	-0.028324	2.7916	1.2847E+07	3.5380E+07
x(FT)	13.856	0.8660	0.0000	10.392	12.124	0.0000	13.856	6.9280	51.960	0.0000	0.0000
8	-2.4818E-04	-3.4964E-04	-150.82	-165.03	-0.4785	-0.8772	-8.4306E-03	-0.011284	2.1427	1.2847E+07	3.5380E+07
x(FT)	15.588	16.454	0.0000	0.0000	12.990	13.856	14.722	17.320	39.836	0.0000	0.0000
9	-7.9588E-05	-0.016538	-22.865	-59.613	-0.1658	-5.1361	-6.0239E-03	-0.043327	2.5410	1.2847E+07	3.5380E+07
x(FT)	13.376	1.6720	0.0000	11.704	11.704	0.0000	15.048	6.6880	40.128	0.0000	0.0000
10	-7.9411E-05	-0.016668	-22.801	-59.956	-0.1656	-5.1529	-6.0294E-03	-0.043445	2.7031	1.2847E+07	3.5380E+07
x(FT)	13.376	1.6720	0.0000	11.704	11.704	0.0000	15.048	6.6880	40.128	0.0000	0.0000
11	-7.9233E-05	-0.016797	-22.737	-60.298	-0.1653	-5.1696	-6.0348E-03	-0.043562	2.8651	1.2847E+07	3.5380E+07
x(FT)	13.376	1.6720	0.0000	11.704	11.704	0.0000	15.048	6.6880	40.128	0.0000	0.0000
12	-7.9057E-05	-0.016926	-22.674	-60.639	-0.1651	-5.1863	-6.0401E-03	-0.043679	3.0271	1.2847E+07	3.5380E+07
x(FT)	13.376	1.6720	0.0000	11.704	11.704	0.0000	15.048	6.6880	40.128	0.0000	0.0000
13	-7.8880E-05	-0.017056	-22.611	-60.980	-0.1649	-5.2028	-6.0453E-03	-0.043795	3.1892	1.2847E+07	3.5380E+07
x(FT)	13.376	1.6720	0.0000	11.704	11.704	0.0000	15.048	6.6880	40.964	0.0000	0.0000
14	-2.8228E-04	-0.010660	-170.96	-42.478	-0.5337	-3.3228	-9.8925E-03	-0.031043	3.2094	1.2847E+07	3.5380E+07
x(FT)	14.722	0.8660	0.0000	10.392	12.124	0.0000	14.722	6.9280	52.826	0.0000	0.0000
15	-2.5062E-04	-3.9541E-04	-147.94	-187.30	-0.4605	-0.9383	-8.0382E-03	-0.011990	2.5577	1.2847E+07	3.5380E+07
x(FT)	15.588	17.320	0.0000	0.0000	12.990	13.856	14.722	17.320	40.702	0.0000	0.0000
16	-8.0766E-05	-0.016539	-23.673	-59.630	-0.1690	-5.1323	-6.1087E-03	-0.043312	2.9896	1.2847E+07	3.5380E+07
x(FT)	13.376	1.6720	0.0000	11.704	11.704	0.0000	15.048	6.6880	40.128	0.0000	0.0000
17	-8.0580E-05	-0.016668	-23.607	-59.972	-0.1688	-5.1491	-6.1142E-03	-0.043429	3.1517	1.2847E+07	3.5380E+07
x(FT)	13.376	1.6720	0.0000	11.704	11.704	0.0000	15.048	6.6880	40.128	0.0000	0.0000
18	-8.0395E-05	-0.016797	-23.542	-60.315	-0.1686	-5.1658	-6.1197E-03	-0.043547	3.3137	1.2847E+07	3.5380E+07
x(FT)	13.376	1.6720	0.0000	11.704	11.704	0.0000	15.048	6.6880	40.128	0.0000	0.0000
19	-8.0210E-05	-0.016927	-23.478	-60.656	-0.1683	-5.1825	-6.1250E-03	-0.043663	3.4757	1.2847E+07	3.5380E+07
x(FT)	13.376	1.6720	0.0000	11.704	11.704	0.0000	15.048	6.6880	40.128	0.0000	0.0000
20	-8.0026E-05	-0.017056	-23.414	-60.997	-0.1681	-5.1991	-6.1303E-03	-0.043780	3.6378	1.2847E+07	3.5380E+07
x(FT)	13.376	1.6720	0.0000	11.704	11.704	0.0000	15.048	6.6880	40.964	0.0000	0.0000
21	-2.8105E-04	-0.012911	-168.34	-49.680	-0.5182	-3.7927	-9.7477E-03	-0.035206	3.6273	1.2847E+07	3.5380E+07
x(FT)	14.722	0.8660	0.0000	10.392	12.124	0.0000	14.722	6.9280	53.692	0.0000	0.0000
22	-2.4995E-04	-4.4896E-04	-145.89	-209.98	-0.4456	-1.0250	-7.7418E-03	-0.012786	2.9727	1.2847E+07	3.5380E+07
x(FT)	15.588	17.320	0.0000	0.0000	12.990	14.722	14.722	17.320	40.702	0.0000	0.0000
23	-7.7028E-05	-0.033888	-18.973	-97.262	-0.1326	-6.9807	-4.1214E-03	-0.055151	3.0528	1.2847E+07	3.5380E+07
x(FT)	14.722	0.8660	0.0000	12.990	12.990	0.0000	16.454	6.9280	38.970	0.0000	0.0000
24	-7.6113E-05	-0.034883	-18.742	-99.332	-0.1314	-7.0694	-4.2412E-03	-0.055714	3.2018	1.2847E+07	3.5380E+07
x(FT)	14.722	0.8660	0.0000	12.990	12.990	0.0000	16.454	6.9280	38.970	0.0000	0.0000
25	-7.5095E-05	-0.035877	-18.520	-101.39	-0.1303	-7.1571	-4.3634E-03	-0.056267	3.3508	1.2847E+07	3.5380E+07
x(FT)	15.588	0.8660	0.0000	12.990	12.990	0.0000	16.454	6.9280	38.970	0.0000	0.0000
26	-7.4712E-05	-0.036872	-18.305	-103.43	-0.1293	-7.2437	-4.4886E-03	-0.056811	3.4998	1.2847E+07	3.5380E+07
x(FT)	15.588	0.8660	0.0000	12.990	12.990	0.0000	16.454	6.9280	38.970	0.0000	0.0000
27	-7.4175E-05	-0.037867	-18.097	-105.47	-0.1283	-7.3293	-4.6173E-03	-0.057346	3.6488	1.2847E+07	3.5380E+07
x(FT)	15.588	0.8660	0.0000	12.990	12.990	0.0000	16.454	6.9280	38.970	0.0000	0.0000
28	-2.1478E-04	-0.015168	-163.51	-56.195	-0.5169	-4.1447	-0.010857	-0.036964	4.0451	1.2847E+07	3.5380E+07
x(FT)	14.722	0.8660	0.0000	11.258	12.990	0.0000	14.722	6.9280	38.970	0.0000	0.0000
Min.	-2.9065E-04	-0.037867	-179.16	-209.98	-0.5702	-7.3293	-0.010929	-0.057346	1.7277	1.2847E+07	3.5380E+07
Pile N.	1	27	7	22	7	27	7	27	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	0.015710	0.017780	31.809	61.663	3.4572	3.6313	0.037185	0.035749	4.5025	1.2847E+07	3.5380E+07
x(FT)	0.8660	0.0000	8.6600	9.5260	0.0000	0.0000	5.1960	6.0620	0.0000	0.0000	0.0000
2	7.7258E-03	9.3466E-05	15.655	221.40	1.3813	0.4022	0.025917	7.4225E-03	3.5205	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.320	6.0620	0.0000	0.0000	14.722	0.0000	17.320	0.0000	0.0000	0.0000
3	7.7258E-03	8.2542E-05	15.937	212.79	1.4211	0.3692	0.026467	7.0610E-03	3.6320	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.320	6.0620	0.0000	0.0000	15.588	0.0000	17.320	0.0000	0.0000	0.0000
4	7.7258E-03	7.2174E-05	16.235	203.92	1.4616	0.3383	0.026907	6.6484E-03	3.7432	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.320	6.0620	0.0000	0.0000	15.588	0.0000	17.320	0.0000	0.0000	0.0000
5	7.7258E-03	6.2369E-05	16.549	194.75	1.5021	0.3071	0.027481	6.1509E-03	3.8540	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.320	6.0620	0.0000	0.0000	15.588	0.8660	17.320	0.0000	0.0000	0.0000
6	7.7258E-03	5.3131E-05	16.879	185.27	1.5416	0.2757	0.027999	5.5289E-03	3.9643	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.320	6.0620	0.0000	0.0000	15.588	0.8660	17.320	0.0000	0.0000	0.0000
7	0.016463	1.7415E-04	34.991	163.78	4.0293	0.5054	0.045019	7.2436E-03	5.8277	1.2847E+07	3.5380E+07
x(FT)	0.8660	16.454	8.6600	0.0000	0.0000	13.856	4.3300	17.320	0.0000	0.0000	0.0000
8	0.015794	0.020329	29.326	64.379	3.0333	3.6455	0.030900	0.033655	4.7529	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	9.5260	10.392	0.0000	0.0000	5.1960	6.0620	0.0000	0.0000	0.0000
9	7.8606E-03	2.9169E-04	12.330	316.89	0.8594	0.8582	0.014266	0.011578	4.4279	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.392	6.6880	0.0000	0.0000	15.884	0.0000	18.392	0.0000	0.0000	0.0000

10	7.8606E-03	2.9473E-04	12.310	317.92	0.8562	0.8630	0.014199	0.011620	4.5957	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.392	6.6880	0.0000	0.0000	15.884	0.0000	18.392	0.0000	0.0000	0.0000
11	7.8606E-03	2.9778E-04	12.290	318.95	0.8530	0.8678	0.014132	0.011662	4.7634	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.392	6.6880	0.0000	0.0000	15.884	0.0000	18.392	0.0000	0.0000	0.0000
12	7.8606E-03	3.0083E-04	12.270	319.97	0.8498	0.8725	0.014066	0.011703	4.9311	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.392	6.6880	0.0000	0.0000	15.884	0.0000	18.392	0.0000	0.0000	0.0000
13	7.8606E-03	3.0390E-04	12.253	320.99	0.8467	0.8772	0.014001	0.011745	5.0988	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.392	7.5240	0.0000	0.0000	15.884	0.0000	18.392	0.0000	0.0000	0.0000
14	0.016498	2.1791E-04	33.244	184.14	3.7127	0.5790	0.040302	8.0990E-03	6.1619	1.2847E+07	3.5380E+07
x(FT)	0.8660	16.454	8.6600	0.0000	0.0000	13.856	4.3300	17.320	0.0000	0.0000	0.0000
15	0.015833	0.022878	28.574	70.970	2.9373	4.0252	0.029649	0.036679	5.1765	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	9.5260	10.392	0.0000	0.0000	5.1960	6.0620	0.0000	0.0000	0.0000
16	7.9954E-03	2.9188E-04	12.530	316.77	0.8786	0.8581	0.014474	0.011577	4.8784	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.392	7.5240	0.0000	0.0000	15.884	0.0000	18.392	0.0000	0.0000	0.0000
17	7.9954E-03	2.9492E-04	12.513	317.80	0.8753	0.8629	0.014406	0.011619	5.0461	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.392	7.5240	0.0000	0.0000	15.884	0.0000	18.392	0.0000	0.0000	0.0000
18	7.9954E-03	2.9797E-04	12.497	318.82	0.8721	0.8677	0.014340	0.011660	5.2138	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.392	7.5240	0.0000	0.0000	15.884	0.0000	18.392	0.0000	0.0000	0.0000
19	7.9954E-03	3.0103E-04	12.481	319.85	0.8689	0.8724	0.014273	0.011702	5.3815	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.392	7.5240	0.0000	0.0000	15.884	0.0000	18.392	0.0000	0.0000	0.0000
20	7.9954E-03	3.0409E-04	12.465	320.87	0.8657	0.8771	0.014208	0.011743	5.5491	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.392	7.5240	0.0000	0.0000	15.884	0.0000	18.392	0.0000	0.0000	0.0000
21	0.016509	2.6439E-04	32.541	208.33	3.6173	0.6692	0.038954	9.2331E-03	6.5955	1.2847E+07	3.5380E+07
x(FT)	0.8660	17.320	8.6600	0.0000	0.0000	13.856	4.3300	17.320	0.0000	0.0000	0.0000
22	0.015862	0.025426	28.005	77.624	2.8701	4.4191	0.028785	0.039876	5.6202	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	9.5260	10.392	0.0000	0.0000	5.1960	6.0620	0.0000	0.0000	0.0000
23	8.1302E-03	5.6662E-04	10.664	438.25	0.6520	1.2549	9.3821E-03	0.021851	5.6304	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.918	7.7940	0.0000	0.0000	16.454	0.0000	26.846	0.0000	0.0000	0.0000
24	8.1302E-03	5.8764E-04	10.590	444.49	0.6427	1.2717	9.2059E-03	0.023018	5.8151	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.918	7.7940	0.0000	0.0000	16.454	0.0000	26.846	0.0000	0.0000	0.0000
25	8.1302E-03	6.0891E-04	10.519	450.68	0.6337	1.2882	9.0375E-03	0.024098	5.9997	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.918	7.7940	0.0000	0.0000	17.320	0.0000	26.846	0.0000	0.0000	0.0000
26	8.1302E-03	6.3049E-04	10.450	456.84	0.6251	1.3147	8.8764E-03	0.025052	6.1840	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.918	7.7940	0.0000	0.0000	17.320	0.0000	26.846	0.0000	0.0000	0.0000
27	8.1302E-03	6.5243E-04	10.383	462.95	0.6168	1.3414	8.7221E-03	0.025732	6.3682	1.2847E+07	3.5380E+07
x(FT)	0.0000	19.918	7.7940	0.0000	0.0000	17.320	0.0000	26.846	0.0000	0.0000	0.0000
28	0.016529	2.5375E-04	31.527	228.12	3.4604	0.8068	0.036446	0.011467	6.9932	1.2847E+07	3.5380E+07
x(FT)	0.8660	17.320	9.5260	0.0000	0.0000	14.722	4.3300	17.320	0.0000	0.0000	0.0000
Max.	0.016529	0.025426	34.991	462.95	4.0293	4.4191	0.045019	0.039876	6.9932	1.2847E+07	3.5380E+07
Pile N.	28	22	7	27	7	22	7	22	28	1	1

LOAD CASE : 7
CASE NAME : Extreme Event I - A
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.9945	1.0000
2	0.9945	1.0000
3	0.9945	1.0000
4	0.9945	1.0000
5	0.9945	1.0000
6	0.9945	1.0000
7	1.0000	1.0000
8	0.8060	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.8134	1.0000
15	0.8060	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	0.8134	1.0000
22	0.8066	1.0000
23	0.7857	1.0000
24	0.7857	1.0000
25	0.7857	1.0000
26	0.7857	1.0000
27	0.7857	1.0000
28	0.8134	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
3219.00	985.000	244.000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
2916.00	1.33932E+05	3.90756E+05

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.0863987	0.95163	0.17113

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
3.35186E-04	2.84204E-04	3.61248E-03

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
1	-0.2899	1.1203	0.1928	3.3519E-04	2.8420E-04	3.6125E-03
2	-0.2728	1.1002	0.1928	3.3519E-04	2.8420E-04	3.6125E-03
3	-0.2558	1.0801	0.1928	3.3519E-04	2.8420E-04	3.6125E-03
4	-0.2387	1.0600	0.1928	3.3519E-04	2.8420E-04	3.6125E-03
5	-0.2217	1.0399	0.1928	3.3519E-04	2.8420E-04	3.6125E-03
6	-0.2046	1.0198	0.1928	3.3519E-04	2.8420E-04	3.6125E-03
7	-0.1876	0.9997	0.1928	3.3519E-04	2.8420E-04	3.6125E-03
8	-0.073132	1.1203	0.1727	3.3519E-04	2.8420E-04	3.6125E-03
9	-0.056080	1.1002	0.1727	3.3519E-04	2.8420E-04	3.6125E-03
10	-0.039028	1.0801	0.1727	3.3519E-04	2.8420E-04	3.6125E-03
11	-0.021976	1.0600	0.1727	3.3519E-04	2.8420E-04	3.6125E-03
12	-4.9234E-03	1.0399	0.1727	3.3519E-04	2.8420E-04	3.6125E-03
13	0.012129	1.0198	0.1727	3.3519E-04	2.8420E-04	3.6125E-03
14	0.029181	0.9997	0.1727	3.3519E-04	2.8420E-04	3.6125E-03
15	0.1436	1.1203	0.1525	3.3519E-04	2.8420E-04	3.6125E-03
16	0.1607	1.1002	0.1525	3.3519E-04	2.8420E-04	3.6125E-03
17	0.1777	1.0801	0.1525	3.3519E-04	2.8420E-04	3.6125E-03
18	0.1948	1.0600	0.1525	3.3519E-04	2.8420E-04	3.6125E-03
19	0.2118	1.0399	0.1525	3.3519E-04	2.8420E-04	3.6125E-03
20	0.2289	1.0198	0.1525	3.3519E-04	2.8420E-04	3.6125E-03
21	0.2459	0.9997	0.1525	3.3519E-04	2.8420E-04	3.6125E-03
22	0.3604	1.1203	0.1324	3.3519E-04	2.8420E-04	3.6125E-03
23	0.3774	1.1002	0.1324	3.3519E-04	2.8420E-04	3.6125E-03
24	0.3945	1.0801	0.1324	3.3519E-04	2.8420E-04	3.6125E-03
25	0.4115	1.0600	0.1324	3.3519E-04	2.8420E-04	3.6125E-03
26	0.4286	1.0399	0.1324	3.3519E-04	2.8420E-04	3.6125E-03
27	0.4456	1.0198	0.1324	3.3519E-04	2.8420E-04	3.6125E-03
28	0.4627	0.9997	0.1324	3.3519E-04	2.8420E-04	3.6125E-03
MINIMUM	-0.2899	0.9997	0.1324	3.3519E-04	2.8420E-04	3.6125E-03
Pile N.	1	7	22	1	1	1
MAXIMUM	0.4627	1.1203	0.1928	3.3519E-04	2.8420E-04	3.6125E-03
Pile N.	28	1	1	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
1	-167.85	39.505	45.979	731.78	-266.04	2926.7
2	-9.3750	52.275	4.6880	72.578	-289.96	5428.2
3	8.4882	56.204	4.7159	73.039	-291.80	5374.2
4	25.376	59.898	4.7457	73.512	-293.70	5320.6
5	42.266	63.585	4.7764	73.993	-295.62	5266.2
6	59.156	67.271	4.8082	74.484	-297.58	5211.7
7	-150.53	37.135	-28.213	-682.20	-705.36	2728.8
8	-125.27	33.942	35.901	667.30	-338.18	2668.8
9	-71.755	45.130	3.4532	0.058033	-215.45	4908.6
10	-54.124	44.734	3.4688	0.058033	-216.78	4866.2
11	-31.983	44.319	3.4818	0.058033	-218.16	4822.7
12	-7.0452	43.893	3.4934	0.058033	-219.58	4778.5
13	19.544	43.464	3.5042	0.058033	-221.03	4734.3
14	100.91	31.336	30.391	-621.77	-393.26	2487.2
15	149.61	32.557	-31.795	659.42	-448.62	2637.3
16	216.45	44.063	2.8229	0.058033	-185.19	4863.5
17	234.48	43.680	2.8354	0.058033	-186.37	4821.1
18	252.52	43.298	2.8483	0.058033	-187.57	4778.6
19	270.55	42.918	2.8620	0.058033	-188.80	4736.2
20	288.58	42.534	2.8761	0.058033	-190.05	4693.7
21	314.86	30.496	81.084	-618.04	-153.56	2472.3
22	357.08	31.476	-82.653	652.98	-557.88	2611.6
23	154.78	7.7425	2.2498	-32.699	-130.94	4969.5
24	177.90	1.6234	2.2514	-32.906	-131.76	4936.2
25	198.33	-3.8170	2.2545	-33.107	-132.56	4902.9
26	218.77	-9.2561	2.2578	-33.310	-133.38	4869.5
27	239.21	-14.694	2.2613	-33.516	-134.20	4836.1
28	508.05	29.658	126.65	-613.75	90.611	2455.1
MINIMUM	-167.85	-14.694	-82.653	-682.20	-705.36	2455.1
Pile N.	1	27	22	7	7	28
MAXIMUM	508.05	67.271	126.65	731.78	90.611	5428.2
Pile N.	28	6	28	1	28	2

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
1	-0.3280	1.1203	0.1167	-5.5121E-04	2.8420E-04	3.5859E-03
2	2.2359E-03	0.1928	-1.1335	3.9412E-04	3.6125E-03	-1.9440E-04
3	0.013900	0.1928	-1.1099	3.9412E-04	3.6125E-03	-1.9440E-04
4	0.025564	0.1928	-1.0863	3.9412E-04	3.6125E-03	-1.9440E-04
5	0.037228	0.1928	-1.0626	3.9412E-04	3.6125E-03	-1.9440E-04
6	0.048891	0.1928	-1.0390	3.9412E-04	3.6125E-03	-1.9440E-04
7	-0.1352	0.9997	0.2325	1.2016E-03	2.8420E-04	3.4232E-03
8	-0.1128	1.1203	0.1498	-5.5121E-04	2.8420E-04	3.5859E-03
9	-0.056080	0.1727	-1.1002	3.3519E-04	3.6125E-03	-2.8420E-04

10	-0.039028	0.1727	-1.0801	3.3519E-04	3.6125E-03	-2.8420E-04
11	-0.021976	0.1727	-1.0600	3.3519E-04	3.6125E-03	-2.8420E-04
12	-4.9234E-03	0.1727	-1.0399	3.3519E-04	3.6125E-03	-2.8420E-04
13	0.012129	0.1727	-1.0198	3.3519E-04	3.6125E-03	-2.8420E-04
14	0.070197	0.9997	0.1604	1.2016E-03	2.8420E-04	3.4232E-03
15	0.1023	1.1203	0.1828	-5.5121E-04	2.8420E-04	3.5859E-03
16	0.1607	0.1525	-1.1002	3.3519E-04	3.6125E-03	-2.8420E-04
17	0.1777	0.1525	-1.0801	3.3519E-04	3.6125E-03	-2.8420E-04
18	0.1948	0.1525	-1.0600	3.3519E-04	3.6125E-03	-2.8420E-04
19	0.2118	0.1525	-1.0399	3.3519E-04	3.6125E-03	-2.8420E-04
20	0.2289	0.1525	-1.0198	3.3519E-04	3.6125E-03	-2.8420E-04
21	0.2756	0.9997	0.088332	1.2016E-03	2.8420E-04	3.4232E-03
22	0.3175	1.1203	0.2159	-5.5121E-04	2.8420E-04	3.5859E-03
23	0.099228	0.1324	-1.1589	2.5623E-04	3.6125E-03	-3.5703E-04
24	0.1206	0.1324	-1.1435	2.5623E-04	3.6125E-03	-3.5703E-04
25	0.1421	0.1324	-1.1282	2.5623E-04	3.6125E-03	-3.5703E-04
26	0.1635	0.1324	-1.1128	2.5623E-04	3.6125E-03	-3.5703E-04
27	0.1849	0.1324	-1.0974	2.5623E-04	3.6125E-03	-3.5703E-04
28	0.4810	0.9997	0.016238	1.2016E-03	2.8420E-04	3.4232E-03
MINIMUM	-0.3280	0.1324	-1.1589	-5.5121E-04	2.8420E-04	-3.5703E-04
Pile N.	1	23	23	1	1	23
MAXIMUM	0.4810	1.1203	0.2325	1.2016E-03	3.6125E-03	3.5859E-03
Pile N.	28	1	7	7	2	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	-173.99	39.505	3.8863	-0.091661	-266.04	3016.8
2	3.5869	4.6880	-52.987	0.065539	5428.2	298.91
3	21.870	4.7159	-52.466	0.065539	5374.2	300.81
4	39.149	4.7457	-51.952	0.065539	5320.6	302.76
5	56.429	4.7764	-51.432	0.065539	5266.2	304.74
6	73.709	4.8082	-50.911	0.065539	5211.7	306.76
7	-152.88	37.135	9.1474	0.1998	-705.36	2812.8
8	-130.24	33.942	4.4374	-0.091661	-338.18	2751.0
9	-71.755	3.4532	-45.130	0.058033	4908.6	215.45
10	-54.124	3.4688	-44.734	0.058033	4866.2	216.78
11	-31.983	3.4818	-44.319	0.058033	4822.7	218.16
12	-7.0452	3.4934	-43.893	0.058033	4778.5	219.58
13	19.544	3.5042	-43.464	0.058033	4734.3	221.03
14	105.27	31.336	5.0014	0.1998	-393.26	2563.8
15	152.86	32.557	5.4508	-0.091661	-448.62	2718.5
16	216.45	2.8229	-44.063	0.058033	4863.5	185.19
17	234.48	2.8354	-43.680	0.058033	4821.1	186.37
18	252.52	2.8483	-43.298	0.058033	4778.6	187.57
19	270.55	2.8620	-42.918	0.058033	4736.2	188.80
20	288.58	2.8761	-42.534	0.058033	4693.7	190.05
21	325.13	30.496	2.2756	0.1998	-153.56	2548.4
22	366.47	31.476	6.4434	-0.091661	-557.88	2692.0
23	148.28	2.2498	-45.061	0.042608	4969.5	134.96
24	172.19	2.2514	-44.733	0.042608	4936.2	135.81
25	193.34	2.2545	-44.413	0.042608	4902.9	136.64
26	214.48	2.2578	-44.094	0.042608	4869.5	137.47
27	235.63	2.2613	-43.776	0.042608	4836.1	138.32
28	523.60	29.658	-0.3847	0.1998	90.611	2530.7
MINIMUM	-173.99	2.2498	-52.987	-0.091661	-705.36	134.96
Pile N.	1	23	2	1	7	23
MAXIMUM	523.60	39.505	9.1474	0.1998	5428.2	3016.8
Pile N.	28	1	7	7	2	1

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	53.603
2	32.168
3	32.393
4	32.590
5	32.784
6	32.977
7	49.871
8	48.076
9	30.962
10	30.206
11	29.313
12	28.335
13	28.445
14	44.358
15	48.245
16	34.851
17	35.132
18	35.411
19	35.691
20	35.971
21	50.448
22	54.072
23	33.414
24	33.917
25	34.338
26	34.759
27	35.181
28	55.927
MINIMUM	28.335
Pile N.	12
MAXIMUM	55.927
Pile N.	28

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL.	DISPL.	MOMENT	MOMENT	SHEAR	SHEAR	SOIL REACT	SOIL REACT	TOTAL	FLEX. RIG.	FLEX. RIG.

	y-DIR IN	z-DIR IN	z-DIR KIP-IN	y-DIR KIP-IN	y-DIR KIP	z-DIR KIP	y-DIR KIP/IN	z-DIR KIP/IN	STRESS KIP/IN**2	z-DIR KIP-IN**2	y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-4.9882E-03	-3.1621E-04	-3016.8	-266.04	-6.6861	-1.2649	-0.1434	-0.032645	5.0577	1.2847E+07	3.5380E+07
x(FT)	25.980	27.712	0.0000	0.0000	23.382	25.980	26.846	32.042	43.300	0.0000	0.0000
2	-4.9979E-04	-1.1782	-298.91	-1173.7	-0.6994	-52.181	-0.043140	-0.2516	0.1043	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	21.650	25.114	0.0000	29.444	6.9280	54.558	0.0000	0.0000
3	-4.9622E-04	-1.1552	-300.81	-1158.9	-0.7092	-51.680	-0.048773	-0.2499	0.6358	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	21.650	25.114	0.0000	29.444	6.9280	54.558	0.0000	0.0000
4	-5.0662E-04	-1.1322	-302.76	-1144.4	-0.7187	-51.185	-0.052278	-0.2482	1.1381	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	21.650	24.248	0.0000	29.444	6.9280	54.558	0.0000	0.0000
5	-5.5656E-04	-1.1092	-304.74	-1129.0	-0.7273	-50.684	-0.049641	-0.2465	1.6404	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	21.650	24.248	0.0000	29.444	6.9280	53.692	0.0000	0.0000
6	-6.2005E-04	-1.0863	-306.76	-1113.7	-0.7353	-50.182	-0.044302	-0.2448	2.1427	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	21.650	24.248	0.0000	29.444	6.9280	53.692	0.0000	0.0000
7	-4.7171E-03	-5.7596E-04	-2812.8	-705.36	-6.1196	-2.6753	-0.1393	-0.062223	4.4441	1.2847E+07	3.5380E+07
x(FT)	25.114	27.712	0.0000	0.0000	23.382	25.980	26.846	31.176	45.032	0.0000	0.0000
8	-3.0762E-03	-3.2469E-04	-2751.0	-338.18	-6.0410	-1.4751	-0.1055	-0.041969	3.7861	1.2847E+07	3.5380E+07
x(FT)	27.712	29.444	0.0000	0.0000	25.114	27.712	27.712	32.908	45.898	0.0000	0.0000
9	-2.9826E-04	-1.1512	-215.45	-1077.4	-0.5235	-44.469	-0.033810	-0.2203	2.0859	1.2847E+07	3.5380E+07
x(FT)	28.424	2.5080	0.0000	23.408	26.752	0.0000	30.096	25.916	56.012	0.0000	0.0000
10	-2.8858E-04	-1.1316	-216.78	-1065.6	-0.5300	-44.089	-0.036849	-0.2187	1.5734	1.2847E+07	3.5380E+07
x(FT)	28.424	2.5080	0.0000	23.408	26.752	0.0000	30.096	25.916	56.012	0.0000	0.0000
11	-2.8000E-04	-1.1120	-218.16	-1053.7	-0.5371	-43.693	-0.040129	-0.2169	0.9297	1.2847E+07	3.5380E+07
x(FT)	28.424	2.5080	0.0000	23.408	26.752	0.0000	30.096	25.916	56.012	0.0000	0.0000
12	-3.0284E-04	-1.0924	-219.58	-1041.5	-0.5449	-43.288	-0.040121	-0.2155	0.2048	1.2847E+07	3.5380E+07
x(FT)	28.424	2.5080	0.0000	23.408	25.916	0.0000	30.096	25.916	56.012	0.0000	0.0000
13	-3.8420E-04	-1.0728	-221.03	-1029.9	-0.5508	-42.881	-0.033220	-0.2141	0.5681	1.2847E+07	3.5380E+07
x(FT)	28.424	2.5080	0.0000	23.408	25.916	0.0000	30.096	25.916	56.012	0.0000	0.0000
14	-4.3884E-03	-4.0911E-04	-2563.8	-393.26	-5.9908	-1.6611	-0.1159	-0.043578	3.0602	1.2847E+07	3.5380E+07
x(FT)	25.980	28.578	0.0000	0.0000	24.248	26.846	26.846	32.042	45.898	0.0000	0.0000
15	-4.6143E-03	-4.6699E-04	-2718.5	-448.62	-6.4572	-1.8408	-0.1162	-0.049926	4.4435	1.2847E+07	3.5380E+07
x(FT)	26.846	29.444	0.0000	0.0000	24.248	26.846	26.846	32.908	46.764	0.0000	0.0000
16	-5.0384E-04	-1.1516	-185.19	-1099.4	-0.5151	-43.599	-0.026661	-0.2185	6.2922	1.2847E+07	3.5380E+07
x(FT)	27.588	2.5080	0.0000	23.408	25.080	0.0000	30.096	25.916	56.012	0.0000	0.0000
17	-5.3682E-04	-1.1319	-186.37	-1087.1	-0.5214	-43.232	-0.025092	-0.2167	6.8164	1.2847E+07	3.5380E+07
x(FT)	27.588	2.5080	0.0000	23.408	25.080	0.0000	30.096	25.916	56.848	0.0000	0.0000
18	-5.7914E-04	-1.1123	-187.57	-1074.6	-0.5277	-42.864	-0.021748	-0.2148	7.3406	1.2847E+07	3.5380E+07
x(FT)	27.588	2.5080	0.0000	23.408	25.080	0.0000	30.096	25.916	56.848	0.0000	0.0000
19	-5.9504E-04	-1.0927	-188.80	-1062.3	-0.5347	-42.498	-0.022739	-0.2130	7.8648	1.2847E+07	3.5380E+07
x(FT)	26.752	2.5080	0.0000	23.408	24.244	0.0000	30.096	25.916	56.012	0.0000	0.0000
20	-6.4568E-04	-1.0731	-190.05	-1049.7	-0.5422	-42.129	-0.017898	-0.2109	8.3889	1.2847E+07	3.5380E+07
x(FT)	26.752	2.5080	0.0000	23.408	24.244	0.0000	30.096	25.916	55.176	0.0000	0.0000
21	-6.1197E-03	-3.2462E-04	-2548.4	-153.56	-6.4072	-0.8968	-0.1241	-0.031494	9.4514	1.2847E+07	3.5380E+07
x(FT)	25.980	27.712	0.0000	0.0000	23.382	25.114	26.846	32.042	45.032	0.0000	0.0000
22	-5.8695E-03	-6.2512E-04	-2692.0	-557.88	-6.7905	-2.2262	-0.1249	-0.053580	10.653	1.2847E+07	3.5380E+07
x(FT)	25.980	29.444	0.0000	0.0000	24.248	26.846	26.846	32.908	46.764	0.0000	0.0000
23	-4.7617E-04	-1.2088	-134.96	-1107.6	-0.4108	-44.522	-0.022661	-0.2079	4.3105	1.2847E+07	3.5380E+07
x(FT)	27.712	2.5980	0.0000	23.382	25.114	0.0000	30.310	26.846	56.290	0.0000	0.0000
24	-4.6384E-04	-1.1939	-135.81	-1099.7	-0.4177	-44.213	-0.027522	-0.2063	5.0055	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	23.382	25.114	0.0000	30.310	26.846	56.290	0.0000	0.0000
25	-4.7916E-04	-1.1789	-136.64	-1091.1	-0.4237	-43.910	-0.029614	-0.2047	5.6202	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	23.382	24.248	0.0000	30.310	26.846	56.290	0.0000	0.0000
26	-4.9647E-04	-1.1639	-137.47	-1082.4	-0.4296	-43.608	-0.031478	-0.2033	6.2349	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	23.382	24.248	0.0000	30.310	26.846	57.156	0.0000	0.0000
27	-5.2054E-04	-1.1490	-138.32	-1073.5	-0.4353	-43.308	-0.032509	-0.2023	6.8496	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	23.382	24.248	0.0000	30.310	26.846	56.290	0.0000	0.0000
28	-7.7504E-03	-2.9150E-03	-2530.7	-9.1760	-6.7415	-0.4751	-0.1308	-0.010584	15.221	1.2847E+07	3.5380E+07
x(FT)	25.114	13.856	0.0000	24.248	23.382	7.7940	26.846	22.516	43.300	0.0000	0.0000
Min.	-7.7504E-03	-1.2088	-3016.8	-1173.7	-6.7905	-52.181	-0.1434	-0.2516	0.1043	1.2847E+07	3.5380E+07
Pile N.	28	23	1	2	22	2	1	2	2	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	1.1476	0.1167	657.75	121.56	38.482	3.7950	0.2379	0.026917	53.603	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	16.454	17.320	0.0000	0.0000	6.9280	23.382	0.0000	0.0000	0.0000
2	0.1928	7.5033E-03	87.097	5428.2	4.5508	12.536	0.031114	0.1705	32.168	1.2847E+07	3.5380E+07
x(FT)	0.0000	32.908	15.588	0.0000	0.0000	29.444	6.0620	32.908	0.0000	0.0000	0.0000
3	0.1928	7.2349E-03	87.821	5374.2	4.5789	12.417	0.031454	0.1690	32.393	1.2847E+07	3.5380E+07
x(FT)	0.0000	32.908	15.588	0.0000	0.0000	29.444	6.0620	32.908	0.0000	0.0000	0.0000
4	0.1928	6.7887E-03	88.535	5320.6	4.6090	12.312	0.031805	0.1675	32.590	1.2847E+07	3.5380E+07
x(FT)	0.0000	32.908	15.588	0.0000	0.0000	29.444	6.0620	32.908	0.0000	0.0000	0.0000
5	0.1928	6.5863E-03	89.239	5266.2	4.6398	12.157	0.032174	0.1642	32.784	1.2847E+07	3.5380E+07
x(FT)	0.0000	32.908	14.722	0.0000	0.0000	29.444	5.1960	32.908	0.0000	0.0000	0.0000
6	0.1928	6.2931E-03	90.005	5211.7	4.6716	12.018	0.032562	0.1617	32.977	1.2847E+07	3.5380E+07
x(FT)	0.0000	32.908	14.722	0.0000	0.0000	29.444	5.1960	32.908	0.0000	0.0000	0.0000
7	1.0267	0.2325	606.46	259.60	36.187	8.9514	0.2275	0.047621	49.871	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	16.454	18.186	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
8	1.1516	0.1498	594.95	141.68	33.141	4.3432	0.1951	0.022635	48.076	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	17.320	19.052	0.0000	0.0000	6.9280	25.114	0.0000	0.0000	0.0000
9	0.1727	0.011271	68.635	4908.6	3.3512	11.157	0.022254	0.1465	30.962	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
10	0.1727	0.010817	69.184	4866.2	3.3671	11.102	0.022469	0.1461	30.206	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
11	0.1727	0.010404	69.792	4822.7	3.3807	11.030	0.022688	0.1448	29.313	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
12	0.1727	0.010077	70.423	4778.5	3.3932	10.955	0.022911	0.1433	28.335	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
13	0.1727	9.7374E-03	71.050	4734.3	3.4050	10.878	0.023140	0.1411	28.445	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
14	1.0304	0.1604	574.95	163.04	30.810	4.9055	0.1889	0.026019	44.358	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	17.320	18.186	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
15	1.1519	0.1828	622.45	181.29	32.071	5.3541	0.1946	0.028829	48.245	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	17.320	19.052	0.0000	0.0000	6.9280	24.248	0.0000	0.0000	0.0000
16	0.1525	0.011233	63.750	4863.5	2.7536	11.535	0.019366	0.1456	34.851	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
17	0.1525	0.010798	64.224	4821.1	2.7664	11.456	0.019553	0.1448	35.132	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000

18	0.1525	0.010588	64.737	4778.6	2.7797	11.373	0.019752	0.1441	35.411	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.048	0.0000	0.0000	30.096	5.0160	33.440	0.0000	0.0000	0.0000
19	0.1525	9.9691E-03	65.280	4736.2	2.7938	11.311	0.019957	0.1443	35.691	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.048	0.0000	0.0000	30.096	5.0160	33.440	0.0000	0.0000	0.0000
20	0.1525	9.9451E-03	65.805	4693.7	2.8082	11.211	0.020168	0.1430	35.971	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.048	0.0000	0.0000	30.096	5.0160	33.440	0.0000	0.0000	0.0000
21	1.0305	0.088332	597.18	88.614	30.192	2.2264	0.1896	0.019200	50.448	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	17.320	17.320	0.0000	0.0000	6.9280	23.382	0.0000	0.0000	0.0000
22	1.1522	0.2159	642.84	220.89	31.222	6.3477	0.1941	0.033095	54.072	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	17.320	19.052	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
23	0.1324	0.011602	53.900	4969.5	2.1839	11.345	0.015583	0.1481	33.414	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.640	14.722	0.0000	0.0000	30.310	4.3300	33.774	0.0000	0.0000	0.0000
24	0.1324	0.011451	54.362	4936.2	2.1862	11.314	0.015698	0.1480	33.917	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.640	14.722	0.0000	0.0000	30.310	4.3300	33.774	0.0000	0.0000	0.0000
25	0.1324	0.011145	54.777	4902.9	2.1898	11.261	0.015816	0.1471	34.338	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.640	14.722	0.0000	0.0000	30.310	4.3300	33.774	0.0000	0.0000	0.0000
26	0.1324	0.010842	55.196	4869.5	2.1937	11.210	0.015937	0.1461	34.759	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.640	14.722	0.0000	0.0000	30.310	4.3300	33.774	0.0000	0.0000	0.0000
27	0.1324	0.010585	55.615	4836.1	2.1977	11.152	0.016060	0.1451	35.181	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.640	14.722	0.0000	0.0000	30.310	4.3300	33.774	0.0000	0.0000	0.0000
28	1.0307	0.016238	617.59	90.611	29.553	0.1389	0.1898	0.010270	55.927	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	16.454	0.0000	0.0000	30.310	6.9280	32.042	0.0000	0.0000	0.0000
Max.	1.1522	0.2325	657.75	5428.2	38.482	12.536	0.2379	0.1705	55.927	1.2847E+07	3.5380E+07
Pile N.	22	7	1	2	1	2	1	2	28	1	1

LOAD CASE : 8
CASE NAME : Extreme Event I - B
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.9939	1.0000
2	0.9939	1.0000
3	0.9939	1.0000
4	0.9939	1.0000
5	0.9939	1.0000
6	0.9939	1.0000
7	1.0000	1.0000
8	0.8059	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.8141	1.0000
15	0.8059	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	0.8141	1.0000
22	0.8066	1.0000
23	0.7857	1.0000
24	0.7857	1.0000
25	0.7857	1.0000
26	0.7857	1.0000
27	0.7857	1.0000
28	0.8141	1.0000

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
3308.00	992.000	246.000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
3204.00	1.17180E+05	3.93240E+05

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.0895036	0.96225	0.18198

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
3.38937E-04	2.36455E-04	3.64409E-03

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	-0.2810	1.1326	0.2054	3.3894E-04	2.3645E-04	3.6441E-03

2	-0.2668	1.1122	0.2054	3.3894E-04	2.3645E-04	3.6441E-03
3	-0.2526	1.0919	0.2054	3.3894E-04	2.3645E-04	3.6441E-03
4	-0.2385	1.0716	0.2054	3.3894E-04	2.3645E-04	3.6441E-03
5	-0.2243	1.0512	0.2054	3.3894E-04	2.3645E-04	3.6441E-03
6	-0.2101	1.0309	0.2054	3.3894E-04	2.3645E-04	3.6441E-03
7	-0.1959	1.0106	0.2054	3.3894E-04	2.3645E-04	3.6441E-03
8	-0.062381	1.1326	0.1850	3.3894E-04	2.3645E-04	3.6441E-03
9	-0.048194	1.1122	0.1850	3.3894E-04	2.3645E-04	3.6441E-03
10	-0.034007	1.0919	0.1850	3.3894E-04	2.3645E-04	3.6441E-03
11	-0.019819	1.0716	0.1850	3.3894E-04	2.3645E-04	3.6441E-03
12	-5.6320E-03	1.0512	0.1850	3.3894E-04	2.3645E-04	3.6441E-03
13	8.5553E-03	1.0309	0.1850	3.3894E-04	2.3645E-04	3.6441E-03
14	0.022743	1.0106	0.1850	3.3894E-04	2.3645E-04	3.6441E-03
15	0.1563	1.1326	0.1647	3.3894E-04	2.3645E-04	3.6441E-03
16	0.1704	1.1122	0.1647	3.3894E-04	2.3645E-04	3.6441E-03
17	0.1846	1.0919	0.1647	3.3894E-04	2.3645E-04	3.6441E-03
18	0.1988	1.0716	0.1647	3.3894E-04	2.3645E-04	3.6441E-03
19	0.2130	1.0512	0.1647	3.3894E-04	2.3645E-04	3.6441E-03
20	0.2272	1.0309	0.1647	3.3894E-04	2.3645E-04	3.6441E-03
21	0.2414	1.0106	0.1647	3.3894E-04	2.3645E-04	3.6441E-03
22	0.3749	1.1326	0.1444	3.3894E-04	2.3645E-04	3.6441E-03
23	0.3891	1.1122	0.1444	3.3894E-04	2.3645E-04	3.6441E-03
24	0.4033	1.0919	0.1444	3.3894E-04	2.3645E-04	3.6441E-03
25	0.4175	1.0716	0.1444	3.3894E-04	2.3645E-04	3.6441E-03
26	0.4317	1.0512	0.1444	3.3894E-04	2.3645E-04	3.6441E-03
27	0.4459	1.0309	0.1444	3.3894E-04	2.3645E-04	3.6441E-03
28	0.4600	1.0106	0.1444	3.3894E-04	2.3645E-04	3.6441E-03
MINIMUM	-0.2810	1.0106	0.1444	3.3894E-04	2.3645E-04	3.6441E-03
Pile N.	1	7	22	1	1	1
MAXIMUM	0.4600	1.1326	0.2054	3.3894E-04	2.3645E-04	3.6441E-03
Pile N.	28	1	1	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	-167.41	39.696	46.642	736.78	-342.44	2946.7
2	4.1014	55.807	5.0612	80.252	-320.65	5459.1
3	16.911	58.504	5.0943	80.725	-322.55	5406.9
4	29.720	61.202	5.1285	81.211	-324.49	5354.7
5	42.530	63.899	5.1639	81.708	-326.48	5302.4
6	55.341	66.593	5.2003	82.215	-328.50	5249.6
7	-155.64	37.311	-28.737	-686.51	-780.04	2746.1
8	-117.83	34.076	34.701	671.72	-408.50	2686.5
9	-63.601	45.340	3.7817	0.058683	-244.42	4943.1
10	-48.932	44.948	3.8008	0.058683	-245.82	4900.4
11	-28.744	44.537	3.8165	0.058683	-247.27	4856.8
12	-8.0643	44.125	3.8325	0.058683	-248.76	4813.1
13	13.957	43.709	3.8480	0.058683	-250.28	4769.2
14	96.104	31.513	29.839	-626.08	-461.52	2504.5
15	159.89	32.648	-33.723	663.36	-518.45	2653.1
16	226.80	44.252	3.1343	0.058683	-213.48	4896.7
17	241.80	43.881	3.1501	0.058683	-214.73	4854.7
18	256.80	43.508	3.1666	0.058683	-216.01	4812.6
19	271.80	43.135	3.1837	0.058683	-217.31	4770.2
20	286.81	42.759	3.2013	0.058683	-218.63	4727.5
21	313.32	30.665	81.335	-622.43	-220.96	2489.9
22	367.97	31.550	-84.748	656.77	-627.54	2626.7
23	165.58	5.2779	2.5509	-39.324	-157.44	5007.6
24	183.41	0.4903	2.5567	-39.538	-158.30	4973.5
25	201.23	-4.2990	2.5629	-39.756	-159.17	4939.1
26	219.06	-9.0883	2.5692	-39.976	-160.04	4904.6
27	236.88	-13.877	2.5757	-40.198	-160.93	4869.9
28	508.21	29.836	127.31	-618.52	24.350	2474.2
MINIMUM	-167.41	-13.877	-84.748	-686.51	-780.04	2474.2
Pile N.	1	27	22	7	7	28
MAXIMUM	508.21	66.593	127.31	736.78	24.350	5459.1
Pile N.	28	6	28	1	28	2

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	-0.3225	1.1326	0.1311	-5.5524E-04	2.3645E-04	3.6175E-03
2	0.010962	0.2054	-1.1438	3.8618E-04	3.6441E-03	-1.4716E-04
3	0.019792	0.2054	-1.1206	3.8618E-04	3.6441E-03	-1.4716E-04
4	0.028622	0.2054	-1.0974	3.8618E-04	3.6441E-03	-1.4716E-04
5	0.037452	0.2054	-1.0742	3.8618E-04	3.6441E-03	-1.4716E-04
6	0.046282	0.2054	-1.0511	3.8618E-04	3.6441E-03	-1.4716E-04
7	-0.1402	1.0106	0.2468	1.2129E-03	2.3645E-04	3.4530E-03
8	-0.1054	1.1326	0.1644	-5.5524E-04	2.3645E-04	3.6175E-03
9	-0.048194	0.1850	-1.1122	3.3894E-04	3.6441E-03	-2.3645E-04
10	-0.034007	0.1850	-1.0919	3.3894E-04	3.6441E-03	-2.3645E-04
11	-0.019819	0.1850	-1.0716	3.3894E-04	3.6441E-03	-2.3645E-04
12	-5.6320E-03	0.1850	-1.0512	3.3894E-04	3.6441E-03	-2.3645E-04
13	8.5553E-03	0.1850	-1.0309	3.3894E-04	3.6441E-03	-2.3645E-04
14	0.066957	1.0106	0.1740	1.2129E-03	2.3645E-04	3.4530E-03
15	0.1116	1.1326	0.1977	-5.5524E-04	2.3645E-04	3.6175E-03
16	0.1704	0.1647	-1.1122	3.3894E-04	3.6441E-03	-2.3645E-04
17	0.1846	0.1647	-1.0919	3.3894E-04	3.6441E-03	-2.3645E-04
18	0.1988	0.1647	-1.0716	3.3894E-04	3.6441E-03	-2.3645E-04
19	0.2130	0.1647	-1.0512	3.3894E-04	3.6441E-03	-2.3645E-04
20	0.2272	0.1647	-1.0309	3.3894E-04	3.6441E-03	-2.3645E-04
21	0.2741	1.0106	0.1012	1.2129E-03	2.3645E-04	3.4530E-03
22	0.3287	1.1326	0.2310	-5.5524E-04	2.3645E-04	3.6175E-03
23	0.1076	0.1444	-1.1734	2.7145E-04	3.6441E-03	-3.1162E-04
24	0.1263	0.1444	-1.1571	2.7145E-04	3.6441E-03	-3.1162E-04
25	0.1450	0.1444	-1.1408	2.7145E-04	3.6441E-03	-3.1162E-04

26	0.1637	0.1444	-1.1246	2.7145E-04	3.6441E-03	-3.1162E-04
27	0.1824	0.1444	-1.1083	2.7145E-04	3.6441E-03	-3.1162E-04
28	0.4813	1.0106	0.028463	1.2129E-03	2.3645E-04	3.4530E-03
MINIMUM	-0.3225	0.1444	-1.1734	-5.5524E-04	2.3645E-04	-3.1162E-04
Pile N.	1	23	23	1	1	23
MAXIMUM	0.4813	1.1326	0.2468	1.2129E-03	3.6441E-03	3.6175E-03
Pile N.	28	1	7	7	2	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	-173.73	39.696	4.6338	-0.092332	-342.44	3037.4
2	17.518	5.0612	-53.145	0.064217	5459.1	330.54
3	30.599	5.0943	-52.654	0.064217	5406.9	332.49
4	43.680	5.1285	-52.164	0.064217	5354.7	334.50
5	56.762	5.1639	-51.673	0.064217	5302.4	336.55
6	69.843	5.2003	-51.178	0.064217	5249.6	338.63
7	-157.96	37.311	9.8798	0.2017	-780.04	2830.6
8	-122.73	34.076	5.0798	-0.092332	-408.50	2769.2
9	-63.601	3.7817	-45.340	0.058683	4943.1	244.42
10	-48.932	3.8008	-44.948	0.058683	4900.4	245.82
11	-28.744	3.8165	-44.537	0.058683	4856.8	247.27
12	-8.0643	3.8325	-44.125	0.058683	4813.1	248.76
13	13.957	3.8480	-43.709	0.058683	4769.2	250.28
14	100.47	31.513	5.6325	0.2017	-461.52	2581.5
15	163.29	32.648	6.0731	-0.092332	-518.45	2734.7
16	226.80	3.1343	-44.252	0.058683	4896.7	213.48
17	241.80	3.1501	-43.881	0.058683	4854.7	214.73
18	256.80	3.1666	-43.508	0.058683	4812.6	216.01
19	271.80	3.1837	-43.135	0.058683	4770.2	217.31
20	286.81	3.2013	-42.759	0.058683	4727.5	218.63
21	323.69	30.665	2.8931	0.2017	-220.96	2566.5
22	377.53	31.550	7.0524	-0.092332	-627.54	2707.6
23	159.35	2.5509	-45.290	0.045139	5007.6	162.28
24	177.81	2.5567	-44.970	0.045139	4973.5	163.16
25	196.26	2.5629	-44.648	0.045139	4939.1	164.06
26	214.72	2.5692	-44.326	0.045139	4904.6	164.96
27	233.17	2.5757	-44.006	0.045139	4869.9	165.88
28	523.91	29.836	0.2183	0.2017	24.350	2550.3
MINIMUM	-173.73	2.5509	-53.145	-0.092332	-780.04	162.28
Pile N.	1	23	2	1	7	23
MAXIMUM	523.91	39.696	9.8798	0.2017	5459.1	3037.4
Pile N.	28	1	7	7	2	1

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	53.943
2	32.832
3	32.916
4	33.002
5	33.086
6	33.169
7	50.346
8	48.170
9	30.984
10	30.313
11	29.478
12	28.627
13	28.548
14	44.528
15	48.835
16	35.396
17	35.591
18	35.785
19	35.978
20	36.170
21	50.708
22	54.677
23	33.994
24	34.333
25	34.671
26	35.008
27	35.344
28	56.249
MINIMUM	28.548
Pile N.	13
MAXIMUM	56.249
Pile N.	28

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-4.9952E-03	-3.2947E-04	-3037.4	-342.44	-6.7147	-1.4695	-0.1427	-0.038949	5.0502	1.2847E+07	3.5380E+07
x(FT)	25.980	27.712	0.0000	0.0000	23.382	25.980	26.846	31.176	44.166	0.0000	0.0000
2	-5.3692E-04	-1.1890	-330.54	-1182.5	-0.7541	-52.348	-0.042208	-0.2520	0.5092	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	21.650	25.114	0.0000	29.444	6.9280	54.558	0.0000	0.0000
3	-5.2105E-04	-1.1664	-332.49	-1167.5	-0.7639	-51.873	-0.049040	-0.2504	0.8895	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	21.650	25.114	0.0000	29.444	6.9280	54.558	0.0000	0.0000
4	-5.2445E-04	-1.1439	-334.50	-1152.7	-0.7726	-51.399	-0.053341	-0.2488	1.2698	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	21.650	25.114	0.0000	29.444	6.9280	54.558	0.0000	0.0000
5	-5.3699E-04	-1.1214	-336.55	-1137.8	-0.7807	-50.924	-0.056363	-0.2472	1.6500	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	21.650	25.114	0.0000	29.444	6.9280	54.558	0.0000	0.0000
6	-5.8886E-04	-1.0989	-338.63	-1122.5	-0.7886	-50.445	-0.053106	-0.2455	2.0303	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	21.650	24.248	0.0000	29.444	6.9280	53.692	0.0000	0.0000
7	-4.5856E-03	-5.9264E-04	-2830.6	-780.04	-6.1259	-2.8472	-0.1393	-0.064248	4.5919	1.2847E+07	3.5380E+07

x(FT)	25.980	28.578	0.0000	0.0000	23.382	25.980	26.846	31.176	45.032	0.0000	0.0000
8	-3.1461E-03	-3.5701E-04	-2769.2	-408.50	-6.0755	-1.6816	-0.1048	-0.047449	3.5676	1.2847E+07	3.5380E+07
x(FT)	27.712	29.444	0.0000	0.0000	25.114	27.712	27.712	32.908	45.898	0.0000	0.0000
9	-3.3043E-04	-1.1637	-244.42	-1087.3	-0.5709	-44.682	-0.033998	-0.2216	1.8489	1.2847E+07	3.5380E+07
x(FT)	29.260	2.5080	0.0000	23.408	26.752	0.0000	30.096	25.916	56.848	0.0000	0.0000
10	-3.0122E-04	-1.1439	-245.82	-1074.6	-0.5787	-44.305	-0.038519	-0.2198	1.4224	1.2847E+07	3.5380E+07
x(FT)	28.424	2.5080	0.0000	23.408	26.752	0.0000	30.096	25.916	56.012	0.0000	0.0000
11	-2.9256E-04	-1.1241	-247.27	-1062.4	-0.5863	-43.912	-0.041959	-0.2181	0.8356	1.2847E+07	3.5380E+07
x(FT)	28.424	2.5080	0.0000	23.408	26.752	0.0000	30.096	25.916	56.012	0.0000	0.0000
12	-3.0276E-04	-1.1042	-248.76	-1050.3	-0.5923	-43.519	-0.043381	-0.2166	0.2344	1.2847E+07	3.5380E+07
x(FT)	28.424	2.5080	0.0000	23.408	26.752	0.0000	30.096	25.916	56.012	0.0000	0.0000
13	-3.4224E-04	-1.0844	-250.28	-1038.2	-0.5980	-43.121	-0.041517	-0.2151	0.4057	1.2847E+07	3.5380E+07
x(FT)	28.424	2.5080	0.0000	23.408	25.916	0.0000	30.096	25.916	56.012	0.0000	0.0000
14	-4.2817E-03	-4.2708E-04	-2581.5	-461.52	-6.0067	-1.8380	-0.1158	-0.045098	2.9207	1.2847E+07	3.5380E+07
x(FT)	26.846	29.444	0.0000	0.0000	24.248	26.846	26.846	32.042	45.898	0.0000	0.0000
15	-4.5878E-03	-5.0565E-04	-2734.7	-518.45	-6.4856	-2.0348	-0.1160	-0.052655	4.7469	1.2847E+07	3.5380E+07
x(FT)	26.846	29.444	0.0000	0.0000	24.248	27.712	26.846	32.908	46.764	0.0000	0.0000
16	-4.9098E-04	-1.1641	-213.48	-1109.2	-0.5645	-43.794	-0.031566	-0.2195	6.5930	1.2847E+07	3.5380E+07
x(FT)	27.588	2.5080	0.0000	23.408	25.080	0.0000	30.096	25.916	56.848	0.0000	0.0000
17	-5.4910E-04	-1.1443	-214.73	-1096.8	-0.5707	-43.436	-0.027037	-0.2179	7.0291	1.2847E+07	3.5380E+07
x(FT)	27.588	2.5080	0.0000	23.408	25.080	0.0000	30.096	25.916	56.012	0.0000	0.0000
18	-5.8133E-04	-1.1244	-216.01	-1084.2	-0.5773	-43.077	-0.025329	-0.2162	7.4652	1.2847E+07	3.5380E+07
x(FT)	27.588	2.5080	0.0000	23.408	25.080	0.0000	30.096	25.916	56.012	0.0000	0.0000
19	-6.1061E-04	-1.1046	-217.31	-1071.5	-0.5839	-42.716	-0.023685	-0.2143	7.9013	1.2847E+07	3.5380E+07
x(FT)	27.588	2.5080	0.0000	23.408	25.080	0.0000	30.096	25.916	56.012	0.0000	0.0000
20	-6.4301E-04	-1.0847	-218.63	-1058.4	-0.5905	-42.352	-0.020941	-0.2123	8.3374	1.2847E+07	3.5380E+07
x(FT)	27.588	2.5080	0.0000	23.408	25.080	0.0000	30.096	25.916	56.012	0.0000	0.0000
21	-6.0764E-03	-3.3661E-04	-2566.5	-220.96	-6.4381	-1.0768	-0.1247	-0.033537	9.4097	1.2847E+07	3.5380E+07
x(FT)	25.980	27.712	0.0000	0.0000	23.382	25.980	26.846	32.042	45.032	0.0000	0.0000
22	-5.8897E-03	-6.6919E-04	-2707.6	-627.54	-6.8370	-2.4035	-0.1251	-0.056599	10.975	1.2847E+07	3.5380E+07
x(FT)	26.846	29.444	0.0000	0.0000	24.248	26.846	26.846	32.908	46.764	0.0000	0.0000
23	-4.7865E-04	-1.2238	-162.28	-1119.1	-0.4559	-44.757	-0.024160	-0.2094	4.6323	1.2847E+07	3.5380E+07
x(FT)	27.712	2.5980	0.0000	23.382	25.114	0.0000	30.310	26.846	57.156	0.0000	0.0000
24	-4.8472E-04	-1.2079	-163.16	-1110.3	-0.4618	-44.453	-0.025904	-0.2078	5.1688	1.2847E+07	3.5380E+07
x(FT)	27.712	2.5980	0.0000	23.382	25.114	0.0000	30.310	26.846	56.290	0.0000	0.0000
25	-4.5969E-04	-1.1921	-164.06	-1101.1	-0.4685	-44.147	-0.030687	-0.2062	5.7053	1.2847E+07	3.5380E+07
x(FT)	27.712	2.5980	0.0000	23.382	25.114	0.0000	30.310	26.846	56.290	0.0000	0.0000
26	-4.5851E-04	-1.1762	-164.96	-1091.7	-0.4744	-43.840	-0.033224	-0.2047	6.2418	1.2847E+07	3.5380E+07
x(FT)	27.712	2.5980	0.0000	23.382	25.114	0.0000	30.310	26.846	56.290	0.0000	0.0000
27	-4.8254E-04	-1.1604	-165.88	-1082.3	-0.4799	-43.535	-0.034583	-0.2034	6.7783	1.2847E+07	3.5380E+07
x(FT)	26.846	2.5980	0.0000	23.382	25.114	0.0000	30.310	26.846	56.290	0.0000	0.0000
28	-7.9478E-03	-2.7575E-04	-2550.3	-2.4433	-6.8194	-0.2574	-0.1311	-5.0645E-03	15.230	1.2847E+07	3.5380E+07
x(FT)	25.114	23.382	0.0000	30.310	23.382	19.918	26.846	32.042	44.166	0.0000	0.0000
Min.	-7.9478E-03	-1.2238	-3037.4	-1182.5	-6.8370	-52.348	-0.1427	-0.2520	0.2344	1.2847E+07	3.5380E+07
Pile N.	28	23	1	2	22	2	1	2	12	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR	DISPL. z-DIR	MOMENT z-DIR	MOMENT y-DIR	SHEAR y-DIR	SHEAR z-DIR	SOIL REACT y-DIR	SOIL REACT z-DIR	TOTAL STRESS	FLEX. RIG. z-DIR	FLEX. RIG. y-DIR
	IN	IN	KIP-IN	KIP-IN	KIP	KIP	KIP/IN	KIP/IN	KIP/IN**2	KIP-IN**2	KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	1.1601	0.1311	662.36	139.41	38.669	4.5310	0.2386	0.030591	53.943	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	16.454	18.186	0.0000	0.0000	6.9280	23.382	0.0000	0.0000	0.0000
2	0.2054	7.5907E-03	93.133	5459.1	4.9180	12.626	0.033397	0.1716	32.832	1.2847E+07	3.5380E+07
x(FT)	0.0000	32.908	15.588	0.0000	0.0000	29.444	6.0620	33.774	0.0000	0.0000	0.0000
3	0.2054	7.4161E-03	93.831	5406.9	4.9509	12.496	0.033753	0.1697	32.916	1.2847E+07	3.5380E+07
x(FT)	0.0000	32.908	15.588	0.0000	0.0000	29.444	6.0620	32.908	0.0000	0.0000	0.0000
4	0.2054	7.0750E-03	94.528	5354.7	4.9849	12.377	0.034120	0.1681	33.002	1.2847E+07	3.5380E+07
x(FT)	0.0000	32.908	15.588	0.0000	0.0000	29.444	6.0620	32.908	0.0000	0.0000	0.0000
5	0.2054	6.7169E-03	95.228	5302.4	5.0200	12.265	0.034497	0.1670	33.086	1.2847E+07	3.5380E+07
x(FT)	0.0000	32.908	15.588	0.0000	0.0000	29.444	6.0620	32.908	0.0000	0.0000	0.0000
6	0.2054	6.4792E-03	95.906	5249.6	5.0561	12.108	0.034885	0.1636	33.169	1.2847E+07	3.5380E+07
x(FT)	0.0000	32.908	15.588	0.0000	0.0000	29.444	6.0620	32.908	0.0000	0.0000	0.0000
7	1.0380	0.2468	609.23	276.41	36.354	9.6722	0.2280	0.050847	50.346	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	16.454	18.186	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
8	1.1642	0.1644	599.76	158.10	33.281	4.9769	0.1957	0.025311	48.170	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	17.320	19.052	0.0000	0.0000	6.9280	25.114	0.0000	0.0000	0.0000
9	0.1850	0.011483	73.679	4943.1	3.6736	11.233	0.024114	0.1472	30.984	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
10	0.1850	0.011203	74.245	4900.4	3.6929	11.152	0.024348	0.1463	30.313	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
11	0.1850	0.010821	74.885	4856.8	3.7092	11.087	0.024586	0.1454	29.478	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
12	0.1850	0.010380	75.530	4813.1	3.7259	11.021	0.024830	0.1444	28.627	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
13	0.1850	9.9379E-03	76.181	4769.2	3.7422	10.942	0.025080	0.1426	28.548	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
14	1.0416	0.1740	578.13	179.02	30.980	5.5295	0.1895	0.028701	44.528	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	17.320	19.052	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
15	1.1646	0.1977	627.07	198.02	32.173	5.9710	0.1951	0.030379	48.835	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	17.320	19.052	0.0000	0.0000	6.9280	24.248	0.0000	0.0000	0.0000
16	0.1647	0.011537	69.037	4896.7	3.0622	11.609	0.021220	0.1463	35.396	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
17	0.1647	0.011233	69.515	4854.7	3.0783	11.532	0.021426	0.1453	35.591	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
18	0.1647	0.010801	70.011	4812.6	3.0950	11.457	0.021638	0.1448	35.785	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
19	0.1647	0.010408	70.512	4770.2	3.1123	11.373	0.021855	0.1442	35.978	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
20	0.1647	0.010221	71.013	4727.5	3.1302	11.272	0.022077	0.1433	36.170	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.276	15.884	0.0000	0.0000	30.096	5.8520	33.440	0.0000	0.0000	0.0000
21	1.0417	0.1012	601.32	103.90	30.359	2.8393	0.1903	0.023370	50.708	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	17.320	18.186	0.0000	0.0000	6.9280	23.382	0.0000	0.0000	0.0000
22	1.1649	0.2310	647.71	238.01	31.309	6.9538	0.1946	0.035714	54.677	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	17.320	19.052	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
23	0.1444	0.011917	58.622	5007.6	2.4814	11.437	0.017284	0.1489	33.994	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.640	15.588	0.0000	0.0000	30.310	5.1960	33.774	0.0000	0.0000	0.0000
24	0.1444	0.011544	59.038	4973.5	2.4877	11.398	0.017415	0.1486	34.333	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.640	15.588	0.0000	0.0000	30.310	5.1960	33.774	0.0000	0.0000	0.0000
25	0.1444	0.011368	59.474	4939.1	2.4944	11.347	0.017547	0.1480	34.671	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.640	15.588	0.0000	0.0000	30.310	5.1960	33.774	0.0000	0.0000	0.0000

26	0.1444	0.011085	59.898	4904.6	2.5013	11.290	0.017683	0.1472	35.008	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.640	15.588	0.0000	0.0000	30.310	5.1960	33.774	0.0000	0.0000	0.0000
27	0.1444	0.010720	60.319	4869.9	2.5083	11.242	0.017821	0.1469	35.344	1.2847E+07	3.5380E+07
x(FT)	0.0000	34.640	15.588	0.0000	0.0000	30.310	5.1960	33.774	0.0000	0.0000	0.0000
28	1.0419	0.028464	622.93	40.060	29.732	0.1983	0.1906	3.4903E-03	56.249	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	16.454	7.7940	0.0000	0.0000	6.9280	0.0000	0.0000	0.0000	0.0000
Max.	1.1649	0.2468	662.36	5459.1	38.669	12.626	0.2386	0.1716	56.249	1.2847E+07	3.5380E+07
Pile N.	22	7	1	2	1	2	1	2	28	1	1

LOAD CASE : 9
CASE NAME : Extreme Event I - C
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8461	1.0000
2	0.8461	1.0000
3	0.8461	1.0000
4	0.8461	1.0000
5	0.8461	1.0000
6	0.8461	1.0000
7	1.0000	1.0000
8	0.7891	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.9668	1.0000
15	0.7891	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	0.9668	1.0000
22	0.8066	1.0000
23	0.8026	1.0000
24	0.8026	1.0000
25	0.8026	1.0000
26	0.8026	1.0000
27	0.8026	1.0000
28	0.9668	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
3219.00	312.000	802.000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
2916.00	3.51456E+05	1.28352E+05

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.0865305	0.17641	0.36824

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
1.71857E-04	5.78665E-04	9.57894E-04

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	-0.1038	0.2361	0.3663	1.7186E-04	5.7867E-04	9.5789E-04
2	-0.069120	0.2258	0.3663	1.7186E-04	5.7867E-04	9.5789E-04
3	-0.034400	0.2155	0.3663	1.7186E-04	5.7867E-04	9.5789E-04
4	3.2007E-04	0.2051	0.3663	1.7186E-04	5.7867E-04	9.5789E-04
5	0.035040	0.1948	0.3663	1.7186E-04	5.7867E-04	9.5789E-04
6	0.069760	0.1845	0.3663	1.7186E-04	5.7867E-04	9.5789E-04
7	0.1045	0.1742	0.3663	1.7186E-04	5.7867E-04	9.5789E-04
8	-0.046366	0.2361	0.3560	1.7186E-04	5.7867E-04	9.5789E-04
9	-0.011646	0.2258	0.3560	1.7186E-04	5.7867E-04	9.5789E-04
10	0.023074	0.2155	0.3560	1.7186E-04	5.7867E-04	9.5789E-04
11	0.057794	0.2051	0.3560	1.7186E-04	5.7867E-04	9.5789E-04
12	0.092514	0.1948	0.3560	1.7186E-04	5.7867E-04	9.5789E-04
13	0.1272	0.1845	0.3560	1.7186E-04	5.7867E-04	9.5789E-04
14	0.1620	0.1742	0.3560	1.7186E-04	5.7867E-04	9.5789E-04
15	0.011107	0.2361	0.3457	1.7186E-04	5.7867E-04	9.5789E-04
16	0.045827	0.2258	0.3457	1.7186E-04	5.7867E-04	9.5789E-04
17	0.080547	0.2155	0.3457	1.7186E-04	5.7867E-04	9.5789E-04

18	0.1153	0.2051	0.3457	1.7186E-04	5.7867E-04	9.5789E-04
19	0.1500	0.1948	0.3457	1.7186E-04	5.7867E-04	9.5789E-04
20	0.1847	0.1845	0.3457	1.7186E-04	5.7867E-04	9.5789E-04
21	0.2194	0.1742	0.3457	1.7186E-04	5.7867E-04	9.5789E-04
22	0.068581	0.2361	0.3354	1.7186E-04	5.7867E-04	9.5789E-04
23	0.1033	0.2258	0.3354	1.7186E-04	5.7867E-04	9.5789E-04
24	0.1380	0.2155	0.3354	1.7186E-04	5.7867E-04	9.5789E-04
25	0.1727	0.2051	0.3354	1.7186E-04	5.7867E-04	9.5789E-04
26	0.2075	0.1948	0.3354	1.7186E-04	5.7867E-04	9.5789E-04
27	0.2422	0.1845	0.3354	1.7186E-04	5.7867E-04	9.5789E-04
28	0.2769	0.1742	0.3354	1.7186E-04	5.7867E-04	9.5789E-04
MINIMUM	-0.1038	0.1742	0.3354	1.7186E-04	5.7867E-04	9.5789E-04
Pile N.	1	7	22	1	1	1
MAXIMUM	0.2769	0.2361	0.3663	1.7186E-04	5.7867E-04	9.5789E-04
Pile N.	28	1	1	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	-157.09	12.488	57.338	205.86	-1160.4	823.26
2	-21.627	13.192	13.619	183.19	-732.35	1623.9
3	24.230	23.778	13.739	185.45	-741.40	1556.2
4	69.258	34.132	13.860	187.75	-750.56	1487.0
5	114.28	44.486	13.993	190.25	-760.57	1418.3
6	155.67	53.875	14.118	192.56	-769.79	1345.4
7	228.80	10.791	77.959	-175.76	-1315.8	703.12
8	-140.47	11.858	52.394	199.57	-1129.6	798.10
9	-16.714	16.912	12.615	0.029755	-697.01	1548.7
10	36.490	16.432	12.633	0.029755	-702.44	1511.3
11	90.246	15.946	12.650	0.029755	-707.92	1473.3
12	144.00	15.455	12.667	0.029755	-713.44	1434.9
13	181.10	14.995	12.723	0.029755	-719.54	1398.7
14	280.18	10.795	89.153	-176.18	-1203.4	704.79
15	-83.246	11.746	38.168	198.76	-1144.4	794.88
16	71.719	16.949	12.164	0.029755	-677.07	1551.7
17	125.47	16.472	12.183	0.029755	-682.52	1514.3
18	168.44	15.998	12.221	0.029755	-687.90	1476.7
19	205.16	15.522	12.270	0.029755	-693.25	1438.7
20	241.87	15.065	12.329	0.029755	-699.34	1402.5
21	331.47	11.049	100.76	-178.96	-1108.8	715.91
22	-16.679	11.798	21.884	199.68	-1173.6	798.54
23	70.929	0.8662	11.771	-157.11	-628.29	1633.3
24	122.91	-12.248	11.699	-157.44	-629.60	1626.6
25	168.65	-23.799	11.638	-157.75	-630.83	1620.0
26	203.28	-32.557	11.596	-158.03	-631.94	1613.7
27	237.91	-41.315	11.553	-158.30	-633.06	1607.4
28	382.76	11.321	112.31	-181.92	-1010.4	727.77
MINIMUM	-157.09	-41.315	11.553	-181.92	-1315.8	703.12
Pile N.	1	27	27	28	7	7
MAXIMUM	382.76	53.875	112.31	205.86	-628.29	1633.3
Pile N.	28	6	28	1	23	23

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	-0.1896	0.2361	0.3302	-6.5661E-05	5.7867E-04	9.7097E-04
2	-0.012283	0.3663	-0.2358	3.0711E-04	9.5789E-04	-5.1969E-04
3	0.018898	0.3663	-0.2174	3.0711E-04	9.5789E-04	-5.1969E-04
4	0.050080	0.3663	-0.1989	3.0711E-04	9.5789E-04	-5.1969E-04
5	0.081261	0.3663	-0.1805	3.0711E-04	9.5789E-04	-5.1969E-04
6	0.1124	0.3663	-0.1621	3.0711E-04	9.5789E-04	-5.1969E-04
7	0.1902	0.1742	0.3301	3.9911E-04	5.7867E-04	8.8759E-04
8	-0.1313	0.2361	0.3342	-6.5661E-05	5.7867E-04	9.7097E-04
9	-0.011646	0.3560	-0.2258	1.7186E-04	9.5789E-04	-5.7867E-04
10	0.023074	0.3560	-0.2155	1.7186E-04	9.5789E-04	-5.7867E-04
11	0.057794	0.3560	-0.2051	1.7186E-04	9.5789E-04	-5.7867E-04
12	0.092514	0.3560	-0.1948	1.7186E-04	9.5789E-04	-5.7867E-04
13	0.1272	0.3560	-0.1845	1.7186E-04	9.5789E-04	-5.7867E-04
14	0.2435	0.1742	0.3061	3.9911E-04	5.7867E-04	8.8759E-04
15	-0.073096	0.2361	0.3381	-6.5661E-05	5.7867E-04	9.7097E-04
16	0.045827	0.3457	-0.2258	1.7186E-04	9.5789E-04	-5.7867E-04
17	0.080547	0.3457	-0.2155	1.7186E-04	9.5789E-04	-5.7867E-04
18	0.1153	0.3457	-0.2051	1.7186E-04	9.5789E-04	-5.7867E-04
19	0.1500	0.3457	-0.1948	1.7186E-04	9.5789E-04	-5.7867E-04
20	0.1847	0.3457	-0.1845	1.7186E-04	9.5789E-04	-5.7867E-04
21	0.2967	0.1742	0.2822	3.9911E-04	5.7867E-04	8.8759E-04
22	-0.014838	0.2361	0.3420	-6.5661E-05	5.7867E-04	9.7097E-04
23	0.045443	0.3354	-0.2441	2.6339E-05	9.5789E-04	-6.0307E-04
24	0.081627	0.3354	-0.2425	2.6339E-05	9.5789E-04	-6.0307E-04
25	0.1178	0.3354	-0.2409	2.6339E-05	9.5789E-04	-6.0307E-04
26	0.1540	0.3354	-0.2394	2.6339E-05	9.5789E-04	-6.0307E-04
27	0.1902	0.3354	-0.2378	2.6339E-05	9.5789E-04	-6.0307E-04
28	0.3500	0.1742	0.2582	3.9911E-04	5.7867E-04	8.8759E-04
MINIMUM	-0.1896	0.1742	-0.2441	-6.5661E-05	5.7867E-04	-6.0307E-04
Pile N.	1	7	23	1	1	23
MAXIMUM	0.3500	0.3663	0.3420	3.9911E-04	9.5789E-04	9.7097E-04
Pile N.	28	2	22	7	2	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	-166.31	12.488	17.515	-0.010919	-1160.4	848.61
2	-17.781	13.619	-18.045	0.051069	1623.9	754.91
3	29.275	13.739	-17.189	0.051069	1556.2	764.25

4	75.469	13.860	-16.310	0.051069	1487.0	773.69
5	121.66	13.993	-15.432	0.051069	1418.3	784.00
6	164.09	14.118	-14.500	0.051069	1345.4	793.51
7	240.87	10.791	20.124	0.066368	-1315.8	724.76
8	-148.99	11.858	16.751	-0.010919	-1129.6	822.68
9	-16.714	12.615	-16.912	0.029755	1548.7	697.01
10	36.490	12.633	-16.432	0.029755	1511.3	702.44
11	90.246	12.650	-15.946	0.029755	1473.3	707.92
12	144.00	12.667	-15.455	0.029755	1434.9	713.44
13	181.10	12.723	-14.995	0.029755	1398.7	719.54
14	293.44	10.795	18.518	0.066368	-1203.4	726.48
15	-90.018	11.746	16.832	-0.010919	-1144.4	819.35
16	71.719	12.164	-16.949	0.029755	1551.7	677.07
17	125.47	12.183	-16.472	0.029755	1514.3	682.52
18	168.44	12.221	-15.998	0.029755	1476.7	687.90
19	205.16	12.270	-15.522	0.029755	1438.7	693.25
20	241.87	12.329	-15.065	0.029755	1402.5	699.34
21	346.01	11.049	17.334	0.066368	-1108.8	737.94
22	-21.490	11.798	17.183	-0.010919	-1173.6	823.13
23	68.600	11.771	-18.048	4.3800E-03	1633.3	647.64
24	122.21	11.699	-17.935	4.3800E-03	1626.6	648.98
25	169.39	11.638	-17.828	4.3800E-03	1620.0	650.26
26	205.11	11.596	-17.731	4.3800E-03	1613.7	651.40
27	240.82	11.553	-17.635	4.3800E-03	1607.4	652.55
28	398.57	11.321	16.092	0.066368	-1010.4	750.16
MINIMUM	-166.31	10.791	-18.048	-0.010919	-1315.8	647.64
Pile N.	1	7	23	1	7	23
MAXIMUM	398.57	14.118	20.124	0.066368	1633.3	848.61
Pile N.	28	6	7	7	23	1

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	20.073
2	15.923
3	16.138
4	17.368
5	18.623
6	19.757
7	20.964
8	19.116
9	14.890
10	15.397
11	16.895
12	18.395
13	19.430
14	22.165
15	17.393
16	16.252
17	17.744
18	18.925
19	19.925
20	20.945
21	23.579
22	15.533
23	16.118
24	17.666
25	19.027
26	20.054
27	21.082
28	25.018
MINIMUM	14.890
Pile N.	9
MAXIMUM	25.018
Pile N.	28

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-1.6603E-03	-1.3938E-03	-848.61	-1160.4	-1.7717	-4.0716	-0.039970	-0.080659	4.8345	1.2847E+07	3.5380E+07
x(FT)	23.382	25.980	0.0000	0.0000	20.784	23.382	26.846	26.846	45.032	0.0000	0.0000
2	-3.0153E-03	-0.2464	-754.91	-360.99	-2.1520	-17.767	-0.064980	-0.098182	0.5169	1.2847E+07	3.5380E+07
x(FT)	22.516	1.7320	0.0000	18.186	19.918	0.0000	26.846	6.9280	45.032	0.0000	0.0000
3	-3.1935E-03	-0.2283	-764.25	-343.08	-2.2224	-16.940	-0.063372	-0.093697	0.8510	1.2847E+07	3.5380E+07
x(FT)	22.516	1.7320	0.0000	18.186	19.052	0.0000	26.846	6.9280	45.032	0.0000	0.0000
4	-3.3511E-03	-0.2104	-773.69	-324.56	-2.3096	-16.089	-0.062063	-0.088977	2.1939	1.2847E+07	3.5380E+07
x(FT)	22.516	2.5980	0.0000	18.186	19.052	0.0000	26.846	6.9280	44.166	0.0000	0.0000
5	-3.5734E-03	-0.1928	-784.00	-307.46	-2.4113	-15.238	-0.058948	-0.084230	3.5367	1.2847E+07	3.5380E+07
x(FT)	21.650	2.5980	0.0000	17.320	19.052	0.0000	26.846	7.7940	44.166	0.0000	0.0000
6	-3.7813E-03	-0.1753	-793.51	-287.88	-2.4920	-14.334	-0.058654	-0.079294	4.7700	1.2847E+07	3.5380E+07
x(FT)	21.650	2.5980	0.0000	17.320	19.052	0.0000	26.846	8.6600	43.300	0.0000	0.0000
7	-1.7074E-03	-2.4182E-03	-724.76	-1315.8	-1.7167	-4.7477	-0.028407	-0.1062	7.0022	1.2847E+07	3.5380E+07
x(FT)	21.650	24.248	0.0000	0.0000	19.052	21.650	21.650	26.846	45.032	0.0000	0.0000
8	-1.5036E-03	-1.1917E-03	-822.68	-1129.6	-1.6837	-3.9591	-0.041240	-0.073212	4.3310	1.2847E+07	3.5380E+07
x(FT)	23.382	25.980	0.0000	0.0000	21.650	24.248	26.846	27.712	46.764	0.0000	0.0000
9	-2.4263E-03	-0.2367	-697.01	-339.81	-2.0235	-16.669	-0.075865	-0.090355	0.4859	1.2847E+07	3.5380E+07
x(FT)	22.572	2.5080	0.0000	18.392	20.064	0.0000	25.916	6.6880	45.980	0.0000	0.0000
10	-2.6033E-03	-0.2268	-702.44	-330.64	-2.0769	-16.209	-0.076601	-0.087985	1.0607	1.2847E+07	3.5380E+07
x(FT)	22.572	2.5080	0.0000	18.392	20.064	0.0000	25.916	6.6880	45.144	0.0000	0.0000
11	-2.7723E-03	-0.2169	-707.92	-321.25	-2.1294	-15.743	-0.076905	-0.085562	2.6234	1.2847E+07	3.5380E+07
x(FT)	22.572	2.5080	0.0000	18.392	19.228	0.0000	25.916	7.5240	44.308	0.0000	0.0000
12	-2.9424E-03	-0.2070	-713.44	-311.63	-2.1938	-15.272	-0.076881	-0.083149	4.1861	1.2847E+07	3.5380E+07
x(FT)	21.736	2.5080	0.0000	18.392	19.228	0.0000	25.916	7.5240	44.308	0.0000	0.0000
13	-3.1183E-03	-0.1971	-719.54	-303.15	-2.2599	-14.828	-0.074786	-0.080704	5.2644	1.2847E+07	3.5380E+07
x(FT)	21.736	2.5080	0.0000	18.392	19.228	0.0000	25.916	7.5240	44.308	0.0000	0.0000
14	-1.8820E-03	-2.4323E-03	-726.48	-1203.4	-1.7674	-4.4500	-0.028008	-0.1006	8.5303	1.2847E+07	3.5380E+07
x(FT)	21.650	24.248	0.0000	0.0000	19.052	21.650	26.846	26.846	45.032	0.0000	0.0000
15	-1.5579E-03	-1.2306E-03	-819.35	-1144.4	-1.6998	-4.0165	-0.041357	-0.073937	2.6168	1.2847E+07	3.5380E+07

x(FT)	23.382	25.980	0.0000	0.0000	21.650	24.248	26.846	27.712	46.764	0.0000	0.0000
16	-2.5666E-03	-0.2366	-677.07	-342.06	-2.0181	-16.721	-0.076032	-0.091382	2.0848	1.2847E+07	3.5380E+07
x(FT)	22.572	1.6720	0.0000	18.392	20.064	0.0000	25.916	6.6880	45.144	0.0000	0.0000
17	-2.7309E-03	-0.2267	-682.52	-332.80	-2.0709	-16.264	-0.076386	-0.089024	3.6475	1.2847E+07	3.5380E+07
x(FT)	22.572	2.5080	0.0000	18.392	19.228	0.0000	25.916	6.6880	45.144	0.0000	0.0000
18	-2.8800E-03	-0.2168	-687.90	-323.11	-2.1257	-15.808	-0.076301	-0.086587	4.8966	1.2847E+07	3.5380E+07
x(FT)	21.736	2.5080	0.0000	18.392	19.228	0.0000	25.916	6.6880	44.308	0.0000	0.0000
19	-3.0539E-03	-0.2070	-693.25	-313.09	-2.1757	-15.348	-0.075951	-0.084149	5.9639	1.2847E+07	3.5380E+07
x(FT)	21.736	2.5080	0.0000	18.392	19.228	0.0000	25.916	7.5240	44.308	0.0000	0.0000
20	-3.2101E-03	-0.1971	-699.34	-304.75	-2.2383	-14.907	-0.073426	-0.081712	7.0312	1.2847E+07	3.5380E+07
x(FT)	21.736	2.5080	0.0000	17.556	19.228	0.0000	25.916	7.5240	44.308	0.0000	0.0000
21	-2.0226E-03	-2.4507E-03	-737.94	-1108.8	-1.8408	-4.2461	-0.027976	-0.098064	10.058	1.2847E+07	3.5380E+07
x(FT)	21.650	23.382	0.0000	0.0000	19.052	20.784	26.846	26.846	45.032	0.0000	0.0000
22	-1.6794E-03	-1.3546E-03	-823.13	-1173.6	-1.7531	-4.1130	-0.041074	-0.076964	0.6247	1.2847E+07	3.5380E+07
x(FT)	23.382	25.980	0.0000	0.0000	20.784	24.248	26.846	27.712	46.764	0.0000	0.0000
23	-2.8742E-03	-0.2546	-647.64	-364.19	-1.9288	-17.786	-0.062687	-0.098509	1.9942	1.2847E+07	3.5380E+07
x(FT)	22.516	1.7320	0.0000	18.186	19.918	0.0000	26.846	6.9280	46.764	0.0000	0.0000
24	-2.9976E-03	-0.2530	-648.98	-363.86	-1.9614	-17.687	-0.062270	-0.098198	3.5525	1.2847E+07	3.5380E+07
x(FT)	22.516	1.7320	0.0000	18.186	19.918	0.0000	26.846	6.9280	45.898	0.0000	0.0000
25	-3.1059E-03	-0.2515	-650.26	-363.37	-1.9939	-17.593	-0.061890	-0.097881	4.9241	1.2847E+07	3.5380E+07
x(FT)	22.516	1.7320	0.0000	18.186	19.052	0.0000	26.846	6.9280	45.898	0.0000	0.0000
26	-3.1885E-03	-0.2500	-651.40	-362.60	-2.0215	-17.506	-0.061568	-0.097556	5.9624	1.2847E+07	3.5380E+07
x(FT)	22.516	1.7320	0.0000	18.186	19.052	0.0000	26.846	6.9280	45.898	0.0000	0.0000
27	-3.2702E-03	-0.2484	-652.55	-361.81	-2.0489	-17.420	-0.061254	-0.097230	7.0006	1.2847E+07	3.5380E+07
x(FT)	22.516	1.7320	0.0000	18.186	19.052	0.0000	26.846	6.9280	45.898	0.0000	0.0000
28	-2.1405E-03	-2.4588E-03	-750.16	-1010.4	-1.9288	-3.9904	-0.027882	-0.094905	11.586	1.2847E+07	3.5380E+07
x(FT)	21.650	23.382	0.0000	0.0000	18.186	20.784	26.846	26.846	44.166	0.0000	0.0000
Min.	-3.7813E-03	-0.2546	-848.61	-1315.8	-2.4920	-17.786	-0.076905	-0.1062	0.4859	1.2847E+07	3.5380E+07
Pile N.	6	23	1	7	6	23	11	7	9	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	0.2431	0.3302	174.39	428.40	12.144	17.085	0.086580	0.1069	20.073	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	14.722	15.588	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
2	0.3663	5.8185E-04	236.20	1623.9	13.189	3.7542	0.1018	0.070063	15.923	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.980	6.0620	28.578	0.0000	0.0000	0.0000
3	0.3663	5.6632E-04	240.63	1556.2	13.316	3.5748	0.1037	0.068894	16.138	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.114	6.0620	28.578	0.0000	0.0000	0.0000
4	0.3663	5.5093E-04	245.12	1487.0	13.446	3.4039	0.1055	0.067623	17.368	1.2847E+07	3.5380E+07
x(FT)	0.0000	26.846	12.990	0.0000	0.0000	25.114	6.0620	28.578	0.0000	0.0000	0.0000
5	0.3663	5.8343E-04	250.23	1418.3	13.587	3.2374	0.1075	0.066576	18.623	1.2847E+07	3.5380E+07
x(FT)	0.0000	26.846	12.990	0.0000	0.0000	25.114	6.0620	28.578	0.0000	0.0000	0.0000
6	0.3663	5.6464E-04	254.74	1345.4	13.721	3.0320	0.1094	0.064928	19.757	1.2847E+07	3.5380E+07
x(FT)	0.0000	26.846	12.990	0.0000	0.0000	25.114	6.0620	28.578	0.0000	0.0000	0.0000
7	0.1814	0.3301	151.34	485.54	10.596	19.668	0.080953	0.1328	20.964	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	13.856	14.722	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
8	0.2434	0.3342	169.02	417.05	11.542	16.349	0.081013	0.1007	19.116	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	14.722	15.588	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
9	0.3560	4.7918E-04	223.13	1548.7	12.233	3.6161	0.094515	0.066034	14.890	1.2847E+07	3.5380E+07
x(FT)	0.0000	28.424	13.376	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
10	0.3560	4.5587E-04	226.24	1511.3	12.262	3.5261	0.095484	0.065129	15.397	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.588	12.540	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
11	0.3560	4.4695E-04	229.57	1473.3	12.290	3.4302	0.096458	0.064221	16.895	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.588	12.540	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
12	0.3560	4.3613E-04	232.94	1434.9	12.319	3.3284	0.097436	0.063254	18.395	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.588	12.540	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
13	0.3560	4.3093E-04	236.42	1398.7	12.383	3.2547	0.098494	0.062281	19.430	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.588	12.540	0.0000	0.0000	25.080	5.8520	28.424	0.0000	0.0000	0.0000
14	0.1814	0.3061	153.37	455.69	10.615	18.102	0.081398	0.1229	22.165	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	13.856	14.722	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
15	0.2435	0.3381	169.62	422.58	11.452	16.438	0.080635	0.1015	17.393	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	14.722	16.454	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
16	0.3457	4.8317E-04	219.57	1551.7	11.810	3.6454	0.092465	0.066204	16.252	1.2847E+07	3.5380E+07
x(FT)	0.0000	28.424	12.540	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
17	0.3457	4.7158E-04	222.81	1514.3	11.841	3.5513	0.093447	0.065289	17.744	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.588	12.540	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
18	0.3457	4.5973E-04	225.81	1476.7	11.887	3.4496	0.094448	0.064326	18.925	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.588	12.540	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
19	0.3457	4.4525E-04	228.68	1438.7	11.943	3.3418	0.095462	0.063278	19.925	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.588	12.540	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
20	0.3457	4.3919E-04	232.08	1402.5	12.010	3.2864	0.096540	0.062359	20.945	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.588	12.540	0.0000	0.0000	25.080	5.8520	28.424	0.0000	0.0000	0.0000
21	0.1812	0.2822	157.12	429.94	10.875	16.942	0.084283	0.1167	23.579	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	13.856	14.722	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
22	0.2434	0.3420	172.07	433.24	11.521	16.789	0.081840	0.1045	15.533	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	14.722	15.588	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
23	0.3354	5.6609E-04	212.83	1633.3	11.407	3.7875	0.089224	0.067447	16.118	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.980	6.0620	28.578	0.0000	0.0000	0.0000
24	0.3354	5.8078E-04	214.41	1626.6	11.349	3.7900	0.089323	0.067711	17.666	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.980	6.0620	28.578	0.0000	0.0000	0.0000
25	0.3354	5.9331E-04	215.85	1620.0	11.300	3.7893	0.089428	0.067928	19.027	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.980	6.0620	28.578	0.0000	0.0000	0.0000
26	0.3354	6.0219E-04	217.00	1613.7	11.267	3.7844	0.089549	0.068063	20.054	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.980	5.1960	28.578	0.0000	0.0000	0.0000
27	0.3354	6.1083E-04	218.15	1607.4	11.233	3.7789	0.089679	0.068195	21.082	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.980	5.1960	28.578	0.0000	0.0000	0.0000
28	0.1810	0.2582	161.70	402.38	11.153	15.723	0.087363	0.1100	25.018	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	12.990	14.722	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
Max.	0.3663	0.3420	254.74	1633.3	13.721	19.668	0.1094	0.1328	25.018	1.2847E+07	3.5380E+07
Pile N.	2	22	6	23	6	7	6	7	28	1	1

LOAD CASE : 10
CASE NAME : Extreme Event I - D
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8469	1.0000
2	0.8469	1.0000
3	0.8469	1.0000
4	0.8469	1.0000
5	0.8469	1.0000
6	0.8469	1.0000
7	1.0000	1.0000
8	0.7891	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.9662	1.0000
15	0.7891	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	0.9662	1.0000
22	0.8066	1.0000
23	0.8025	1.0000
24	0.8025	1.0000
25	0.8025	1.0000
26	0.8025	1.0000
27	0.8025	1.0000
28	0.9662	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
3308.00	319.000	804.000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
3204.00	3.34704E+05	1.30836E+05

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.0888833	0.18367	0.37870

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
1.77175E-04	5.34404E-04	9.78384E-04

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	-0.095364	0.2449	0.3786	1.7718E-04	5.3440E-04	9.7838E-04
2	-0.063300	0.2343	0.3786	1.7718E-04	5.3440E-04	9.7838E-04
3	-0.031235	0.2236	0.3786	1.7718E-04	5.3440E-04	9.7838E-04
4	8.2872E-04	0.2130	0.3786	1.7718E-04	5.3440E-04	9.7838E-04
5	0.032893	0.2024	0.3786	1.7718E-04	5.3440E-04	9.7838E-04
6	0.064957	0.1918	0.3786	1.7718E-04	5.3440E-04	9.7838E-04
7	0.097021	0.1811	0.3786	1.7718E-04	5.3440E-04	9.7838E-04
8	-0.036661	0.2449	0.3680	1.7718E-04	5.3440E-04	9.7838E-04
9	-4.5967E-03	0.2343	0.3680	1.7718E-04	5.3440E-04	9.7838E-04
10	0.027467	0.2236	0.3680	1.7718E-04	5.3440E-04	9.7838E-04
11	0.059532	0.2130	0.3680	1.7718E-04	5.3440E-04	9.7838E-04
12	0.091596	0.2024	0.3680	1.7718E-04	5.3440E-04	9.7838E-04
13	0.1237	0.1918	0.3680	1.7718E-04	5.3440E-04	9.7838E-04
14	0.1557	0.1811	0.3680	1.7718E-04	5.3440E-04	9.7838E-04
15	0.022042	0.2449	0.3574	1.7718E-04	5.3440E-04	9.7838E-04
16	0.054106	0.2343	0.3574	1.7718E-04	5.3440E-04	9.7838E-04
17	0.086171	0.2236	0.3574	1.7718E-04	5.3440E-04	9.7838E-04
18	0.1182	0.2130	0.3574	1.7718E-04	5.3440E-04	9.7838E-04
19	0.1503	0.2024	0.3574	1.7718E-04	5.3440E-04	9.7838E-04
20	0.1824	0.1918	0.3574	1.7718E-04	5.3440E-04	9.7838E-04
21	0.2144	0.1811	0.3574	1.7718E-04	5.3440E-04	9.7838E-04
22	0.080745	0.2449	0.3467	1.7718E-04	5.3440E-04	9.7838E-04
23	0.1128	0.2343	0.3467	1.7718E-04	5.3440E-04	9.7838E-04
24	0.1449	0.2236	0.3467	1.7718E-04	5.3440E-04	9.7838E-04
25	0.1769	0.2130	0.3467	1.7718E-04	5.3440E-04	9.7838E-04
26	0.2090	0.2024	0.3467	1.7718E-04	5.3440E-04	9.7838E-04
27	0.2411	0.1918	0.3467	1.7718E-04	5.3440E-04	9.7838E-04
28	0.2731	0.1811	0.3467	1.7718E-04	5.3440E-04	9.7838E-04
MINIMUM	-0.095364	0.1811	0.3467	1.7718E-04	5.3440E-04	9.7838E-04
Pile N.	1	7	22	1	1	1
MAXIMUM	0.2731	0.2449	0.3786	1.7718E-04	5.3440E-04	9.7838E-04
Pile N.	28	1	1	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	-156.18	12.668	57.771	209.96	-1229.7	839.66
2	-10.819	16.116	13.978	191.09	-763.94	1652.0
3	31.439	25.830	14.095	193.28	-772.70	1586.2
4	72.645	35.260	14.214	195.49	-781.55	1518.9
5	113.86	44.667	14.333	197.72	-790.46	1450.1
6	152.81	53.509	14.466	200.16	-800.19	1381.8
7	224.55	10.947	77.601	-179.31	-1388.3	717.32
8	-133.93	12.016	51.365	203.45	-1196.3	813.61
9	-6.5754	17.182	12.930	0.030676	-727.24	1581.6
10	43.292	16.697	12.953	0.030676	-732.69	1543.5
11	92.937	16.207	12.976	0.030676	-738.18	1504.9
12	142.58	15.712	12.999	0.030676	-743.70	1465.8
13	177.32	15.221	13.048	0.030676	-749.11	1426.6
14	277.02	10.928	89.005	-179.44	-1271.2	717.84
15	-75.460	11.902	36.818	202.63	-1210.7	810.34
16	84.536	17.215	12.467	0.030676	-706.88	1584.6
17	134.18	16.735	12.493	0.030676	-712.34	1546.6
18	171.58	16.258	12.540	0.030676	-717.72	1508.3
19	205.49	15.778	12.593	0.030676	-723.12	1469.7
20	239.39	15.290	12.646	0.030676	-728.55	1430.5
21	329.36	11.189	100.91	-182.39	-1179.1	729.64
22	-3.7856	11.947	19.249	203.54	-1240.2	813.99
23	81.302	-1.3745	12.055	-163.94	-655.62	1672.9
24	129.68	-13.625	11.997	-164.35	-657.25	1663.1
25	170.79	-24.050	11.951	-164.74	-658.81	1653.4
26	203.02	-32.245	11.921	-165.11	-660.28	1644.0
27	235.24	-40.439	11.891	-165.48	-661.76	1634.5
28	381.73	11.458	112.73	-185.35	-1080.5	741.46
MINIMUM	-156.18	-40.439	11.891	-185.35	-1388.3	717.32
Pile N.	1	27	27	28	7	7
MAXIMUM	381.73	53.509	112.73	209.96	-655.62	1672.9
Pile N.	28	6	28	1	23	23

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	-0.1844	0.2449	0.3442	-6.5473E-05	5.3440E-04	9.9214E-04
2	-4.5722E-03	0.3786	-0.2426	3.0153E-04	9.7838E-04	-4.7546E-04
3	0.023955	0.3786	-0.2245	3.0153E-04	9.7838E-04	-4.7546E-04
4	0.052483	0.3786	-0.2065	3.0153E-04	9.7838E-04	-4.7546E-04
5	0.081010	0.3786	-0.1884	3.0153E-04	9.7838E-04	-4.7546E-04
6	0.1095	0.3786	-0.1703	3.0153E-04	9.7838E-04	-4.7546E-04
7	0.1860	0.1811	0.3438	4.0924E-04	5.3440E-04	9.0617E-04
8	-0.1248	0.2449	0.3481	-6.5473E-05	5.3440E-04	9.9214E-04
9	-4.5967E-03	0.3680	-0.2343	1.7718E-04	9.7838E-04	-5.3440E-04
10	0.027467	0.3680	-0.2236	1.7718E-04	9.7838E-04	-5.3440E-04
11	0.059532	0.3680	-0.2130	1.7718E-04	9.7838E-04	-5.3440E-04
12	0.091596	0.3680	-0.2024	1.7718E-04	9.7838E-04	-5.3440E-04
13	0.1237	0.3680	-0.1918	1.7718E-04	9.7838E-04	-5.3440E-04
14	0.2404	0.1811	0.3192	4.0924E-04	5.3440E-04	9.0617E-04
15	-0.065310	0.2449	0.3520	-6.5473E-05	5.3440E-04	9.9214E-04
16	0.054106	0.3574	-0.2343	1.7718E-04	9.7838E-04	-5.3440E-04
17	0.086171	0.3574	-0.2236	1.7718E-04	9.7838E-04	-5.3440E-04
18	0.1182	0.3574	-0.2130	1.7718E-04	9.7838E-04	-5.3440E-04
19	0.1503	0.3574	-0.2024	1.7718E-04	9.7838E-04	-5.3440E-04
20	0.1824	0.3574	-0.1918	1.7718E-04	9.7838E-04	-5.3440E-04
21	0.2947	0.1811	0.2947	4.0924E-04	5.3440E-04	9.0617E-04
22	-5.7817E-03	0.2449	0.3559	-6.5473E-05	5.3440E-04	9.9214E-04
23	0.052603	0.3467	-0.2546	4.2236E-05	9.7838E-04	-5.6142E-04
24	0.086288	0.3467	-0.2521	4.2236E-05	9.7838E-04	-5.6142E-04
25	0.1200	0.3467	-0.2496	4.2236E-05	9.7838E-04	-5.6142E-04
26	0.1537	0.3467	-0.2470	4.2236E-05	9.7838E-04	-5.6142E-04
27	0.1873	0.3467	-0.2445	4.2236E-05	9.7838E-04	-5.6142E-04
28	0.3491	0.1811	0.2701	4.0924E-04	5.3440E-04	9.0617E-04
MINIMUM	-0.1844	0.1811	-0.2546	-6.5473E-05	5.3440E-04	-5.6142E-04
Pile N.	1	7	23	1	1	23
MAXIMUM	0.3491	0.3786	0.3559	4.0924E-04	9.7838E-04	9.9214E-04
Pile N.	28	2	22	7	2	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	-165.53	12.668	18.156	-0.010887	-1229.7	865.52
2	-6.5862	13.978	-18.259	0.050141	1652.0	787.48
3	36.767	14.095	-17.432	0.050141	1586.2	796.51
4	79.029	14.214	-16.583	0.050141	1518.9	805.63
5	121.29	14.333	-15.711	0.050141	1450.1	814.82
6	161.22	14.466	-14.840	0.050141	1381.8	824.84
7	236.67	10.947	20.807	0.068052	-1388.3	739.39
8	-142.39	12.016	17.340	-0.010887	-1196.3	838.66
9	-6.5754	12.930	-17.182	0.030676	1581.6	727.24
10	43.292	12.953	-16.697	0.030676	1543.5	732.69
11	92.937	12.976	-16.207	0.030676	1504.9	738.18
12	142.58	12.999	-15.712	0.030676	1465.8	743.70
13	177.32	13.048	-15.221	0.030676	1426.6	749.11
14	290.34	10.928	19.141	0.068052	-1271.2	739.93
15	-82.138	11.902	17.412	-0.010887	-1210.7	835.29
16	84.536	12.467	-17.215	0.030676	1584.6	706.88
17	134.18	12.493	-16.735	0.030676	1546.6	712.34
18	171.58	12.540	-16.258	0.030676	1508.3	717.72
19	205.49	12.593	-15.778	0.030676	1469.7	723.12

20	239.39	12.646	-15.290	0.030676	1430.5	728.55
21	344.01	11.189	17.995	0.068052	-1179.1	752.09
22	-8.3422	11.947	17.755	-0.010887	-1240.2	839.05
23	79.207	12.055	-18.391	7.0235E-03	1672.9	675.81
24	129.11	11.997	-18.242	7.0235E-03	1663.1	677.49
25	171.52	11.951	-18.102	7.0235E-03	1653.4	679.09
26	204.77	11.921	-17.970	7.0235E-03	1644.0	680.61
27	238.02	11.891	-17.838	7.0235E-03	1634.5	682.13
28	397.67	11.458	16.757	0.068052	-1080.5	764.28
MINIMUM	-165.53	10.928	-18.391	-0.010887	-1388.3	675.81
Pile N.	1	14	23	1	7	23
MAXIMUM	397.67	14.466	20.807	0.068052	1672.9	865.52
Pile N.	28	6	7	7	23	1

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	20.476
2	16.113
3	16.878
4	18.000
5	19.129
6	20.215
7	21.273
8	19.330
9	15.095
10	16.095
11	17.473
12	18.854
13	19.803
14	22.466
15	17.569
16	17.117
17	18.490
18	19.508
19	20.428
20	21.350
21	23.919
22	15.558
23	16.917
24	18.350
25	19.565
26	20.513
27	21.462
28	25.377
MINIMUM	15.095
Pile N.	9
MAXIMUM	25.377
Pile N.	28

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-1.6391E-03	-1.3278E-03	-865.52	-1229.7	-1.7833	-4.1843	-0.041919	-0.079999	4.8119	1.2847E+07	3.5380E+07
x(FT)	23.382	25.980	0.0000	0.0000	20.784	23.382	26.846	27.712	45.898	0.0000	0.0000
2	-3.0685E-03	-0.2535	-787.48	-368.20	-2.2115	-17.982	-0.068868	-0.098775	0.1915	1.2847E+07	3.5380E+07
x(FT)	22.516	1.7320	0.0000	18.186	19.918	0.0000	26.846	6.9280	45.032	0.0000	0.0000
3	-3.2595E-03	-0.2357	-796.51	-350.80	-2.2817	-17.181	-0.067300	-0.094442	1.0688	1.2847E+07	3.5380E+07
x(FT)	22.516	1.7320	0.0000	18.186	19.918	0.0000	26.846	6.9280	45.032	0.0000	0.0000
4	-3.4295E-03	-0.2181	-805.63	-332.83	-2.3555	-16.359	-0.065989	-0.089895	2.2974	1.2847E+07	3.5380E+07
x(FT)	22.516	2.5980	0.0000	18.186	19.052	0.0000	26.846	6.9280	44.166	0.0000	0.0000
5	-3.5988E-03	-0.2009	-814.82	-314.29	-2.4411	-15.513	-0.064947	-0.085261	3.5259	1.2847E+07	3.5380E+07
x(FT)	21.650	2.5980	0.0000	18.186	19.052	0.0000	26.846	7.7940	44.166	0.0000	0.0000
6	-3.8150E-03	-0.1836	-824.84	-296.71	-2.5397	-14.669	-0.062346	-0.080574	4.6867	1.2847E+07	3.5380E+07
x(FT)	21.650	2.5980	0.0000	18.186	19.052	0.0000	26.846	8.6600	44.166	0.0000	0.0000
7	-1.7302E-03	-2.3414E-03	-739.39	-1388.3	-1.7252	-4.8701	-0.029061	-0.1075	6.8800	1.2847E+07	3.5380E+07
x(FT)	22.516	24.248	0.0000	0.0000	19.052	21.650	21.650	26.846	45.032	0.0000	0.0000
8	-1.5001E-03	-1.1378E-03	-838.66	-1196.3	-1.7069	-4.0919	-0.043478	-0.072932	4.1393	1.2847E+07	3.5380E+07
x(FT)	24.248	26.846	0.0000	0.0000	21.650	24.248	26.846	27.712	45.898	0.0000	0.0000
9	-2.4105E-03	-0.2454	-727.24	-348.35	-2.0743	-16.937	-0.076395	-0.091231	0.1911	1.2847E+07	3.5380E+07
x(FT)	22.572	2.5080	0.0000	18.392	20.064	0.0000	25.916	6.6880	45.980	0.0000	0.0000
10	-2.6004E-03	-0.2352	-732.69	-338.97	-2.1295	-16.472	-0.077617	-0.088838	1.2585	1.2847E+07	3.5380E+07
x(FT)	22.572	2.5080	0.0000	18.392	20.064	0.0000	25.916	6.6880	45.980	0.0000	0.0000
11	-2.7806E-03	-0.2250	-738.18	-329.37	-2.1831	-16.002	-0.078337	-0.086381	2.7016	1.2847E+07	3.5380E+07
x(FT)	22.572	2.5080	0.0000	18.392	20.064	0.0000	25.916	7.5240	45.144	0.0000	0.0000
12	-2.9515E-03	-0.2148	-743.70	-319.55	-2.2354	-15.526	-0.078668	-0.083942	4.1448	1.2847E+07	3.5380E+07
x(FT)	22.572	2.5080	0.0000	18.392	19.228	0.0000	25.916	7.5240	44.308	0.0000	0.0000
13	-3.0802E-03	-0.2046	-749.11	-309.22	-2.2895	-15.051	-0.078617	-0.081417	5.1546	1.2847E+07	3.5380E+07
x(FT)	22.572	2.5080	0.0000	18.392	19.228	0.0000	25.916	7.5240	44.308	0.0000	0.0000
14	-1.8096E-03	-2.2865E-03	-739.93	-1271.2	-1.7671	-4.5671	-0.028605	-0.1018	8.4401	1.2847E+07	3.5380E+07
x(FT)	22.516	24.248	0.0000	0.0000	19.052	21.650	21.650	26.846	45.032	0.0000	0.0000
15	-1.5492E-03	-1.1765E-03	-835.29	-1210.7	-1.7257	-4.1515	-0.043613	-0.073685	2.3877	1.2847E+07	3.5380E+07
x(FT)	24.248	26.846	0.0000	0.0000	21.650	24.248	26.846	27.712	45.898	0.0000	0.0000
16	-2.5799E-03	-0.2454	-706.88	-350.80	-2.0740	-16.988	-0.077005	-0.092267	2.4575	1.2847E+07	3.5380E+07
x(FT)	22.572	1.6720	0.0000	18.392	20.064	0.0000	25.916	6.6880	45.144	0.0000	0.0000
17	-2.7547E-03	-0.2352	-712.34	-341.32	-2.1254	-16.527	-0.077817	-0.089884	3.9006	1.2847E+07	3.5380E+07
x(FT)	22.572	2.5080	0.0000	18.392	20.064	0.0000	25.916	6.6880	45.144	0.0000	0.0000
18	-2.8933E-03	-0.2250	-717.72	-331.37	-2.1702	-16.067	-0.078078	-0.087421	4.9878	1.2847E+07	3.5380E+07
x(FT)	22.572	2.5080	0.0000	18.392	19.228	0.0000	25.916	6.6880	45.144	0.0000	0.0000
19	-3.0167E-03	-0.2148	-723.12	-321.15	-2.2216	-15.602	-0.078033	-0.084949	5.9735	1.2847E+07	3.5380E+07
x(FT)	22.572	2.5080	0.0000	18.392	19.228	0.0000	25.916	7.5240	44.308	0.0000	0.0000
20	-3.1926E-03	-0.2046	-728.55	-310.72	-2.2724	-15.129	-0.077786	-0.082431	6.9591	1.2847E+07	3.5380E+07
x(FT)	21.736	2.5080	0.0000	18.392	19.228	0.0000	25.916	7.5240	44.308	0.0000	0.0000
21	-2.0327E-03	-2.3943E-03	-752.09	-1179.1	-1.8625	-4.3433	-0.029231	-0.099407	10.000	1.2847E+07	3.5380E+07
x(FT)	21.650	24.248	0.0000	0.0000	19.052	20.784	26.846	26.846	45.032	0.0000	0.0000
22	-1.6618E-03	-1.2701E-03	-839.05	-1240.2	-1.7699	-4.2656	-0.043275	-0.076963	0.2425	1.2847E+07	3.5380E+07
x(FT)	23.382	26.846	0.0000	0.0000	21.650	24.248	26.846	27.712	46.764	0.0000	0.0000
23	-2.8989E-03	-0.2653	-675.81	-374.56	-1.9756	-18.127	-0.067009	-0.099780	2.3025	1.2847E+07	3.5380E+07

x(FT)	22.516	1.7320	0.0000	18.186	19.918	0.0000	26.846	6.9280	45.898	0.0000	0.0000
24	-3.0318E-03	-0.2629	-677.49	-373.31	-2.0103	-17.993	-0.066533	-0.099270	3.7532	1.2847E+07	3.5380E+07
x(FT)	22.516	1.7320	0.0000	18.186	19.918	0.0000	26.846	6.9280	45.898	0.0000	0.0000
25	-3.1449E-03	-0.2604	-679.09	-371.85	-2.0402	-17.865	-0.066092	-0.098752	4.9861	1.2847E+07	3.5380E+07
x(FT)	22.516	1.7320	0.0000	18.186	19.918	0.0000	26.846	6.9280	45.898	0.0000	0.0000
26	-3.2346E-03	-0.2579	-680.61	-370.14	-2.0643	-17.743	-0.065694	-0.098226	5.9527	1.2847E+07	3.5380E+07
x(FT)	22.516	1.7320	0.0000	18.186	19.918	0.0000	26.846	6.9280	45.898	0.0000	0.0000
27	-3.3231E-03	-0.2554	-682.13	-368.42	-2.0915	-17.621	-0.065305	-0.097695	6.9193	1.2847E+07	3.5380E+07
x(FT)	22.516	1.7320	0.0000	18.186	19.052	0.0000	26.846	6.9280	45.898	0.0000	0.0000
28	-2.1722E-03	-2.4184E-03	-764.28	-1080.5	-1.9343	-4.1307	-0.029190	-0.096655	11.560	1.2847E+07	3.5380E+07
x(FT)	21.650	23.382	0.0000	0.0000	19.052	20.784	26.846	26.846	44.166	0.0000	0.0000
Min.	-3.8150E-03	-0.2653	-865.52	-1388.3	-2.5397	-18.127	-0.078668	-0.1075	0.1911	1.2847E+07	3.5380E+07
Pile N.	6	23	1	7	6	23	12	7	9	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	0.2521	0.3442	177.95	440.43	12.320	17.718	0.087309	0.1096	20.476	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	14.722	15.588	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
2	0.3786	5.8414E-04	242.44	1652.0	13.545	3.8276	0.1039	0.070569	16.113	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.980	6.0620	28.578	0.0000	0.0000	0.0000
3	0.3786	5.7284E-04	246.79	1586.2	13.670	3.6560	0.1056	0.069503	16.878	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.980	6.0620	28.578	0.0000	0.0000	0.0000
4	0.3786	5.5303E-04	251.18	1518.9	13.797	3.4800	0.1074	0.068273	18.000	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.114	6.0620	28.578	0.0000	0.0000	0.0000
5	0.3786	5.4197E-04	255.65	1450.1	13.924	3.3048	0.1092	0.066949	19.129	1.2847E+07	3.5380E+07
x(FT)	0.0000	26.846	12.990	0.0000	0.0000	25.114	6.0620	28.578	0.0000	0.0000	0.0000
6	0.3786	5.6339E-04	260.68	1381.8	14.066	3.1339	0.1111	0.065837	20.215	1.2847E+07	3.5380E+07
x(FT)	0.0000	26.846	12.990	0.0000	0.0000	25.114	6.0620	28.578	0.0000	0.0000	0.0000
7	0.1885	0.3438	154.52	498.36	10.750	20.346	0.081619	0.1357	21.273	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	13.856	14.722	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
8	0.2525	0.3481	172.35	429.78	11.698	16.932	0.081643	0.1031	19.330	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	14.722	15.454	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
9	0.3680	5.1038E-04	228.92	1581.6	12.546	3.6982	0.096161	0.066936	15.095	1.2847E+07	3.5380E+07
x(FT)	0.0000	28.424	13.376	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
10	0.3680	4.8462E-04	231.96	1543.5	12.580	3.6113	0.097139	0.066152	16.095	1.2847E+07	3.5380E+07
x(FT)	0.0000	28.424	13.376	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
11	0.3680	4.5818E-04	235.03	1504.9	12.614	3.5172	0.098122	0.065262	17.473	1.2847E+07	3.5380E+07
x(FT)	0.0000	28.424	13.376	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
12	0.3680	4.4758E-04	238.13	1465.8	12.648	3.4170	0.099109	0.064335	18.854	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.588	13.376	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
13	0.3680	4.3360E-04	240.85	1426.6	12.705	3.3089	0.1001	0.063326	19.803	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.588	13.376	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
14	0.1884	0.3192	156.08	466.11	10.746	18.720	0.081894	0.1256	22.466	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	13.856	14.722	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
15	0.2525	0.3520	173.02	435.35	11.606	17.012	0.081276	0.1038	17.569	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	14.722	16.454	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
16	0.3574	5.1611E-04	225.25	1584.6	12.114	3.7338	0.094105	0.067246	17.117	1.2847E+07	3.5380E+07
x(FT)	0.0000	28.424	13.376	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
17	0.3574	4.8916E-04	228.24	1546.6	12.150	3.6419	0.095097	0.066384	18.490	1.2847E+07	3.5380E+07
x(FT)	0.0000	28.424	13.376	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
18	0.3574	4.7198E-04	230.92	1508.3	12.205	3.5408	0.096109	0.065420	19.508	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.588	13.376	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
19	0.3574	4.5834E-04	233.63	1469.7	12.265	3.4344	0.097130	0.064434	20.428	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.588	12.540	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
20	0.3574	4.4311E-04	236.57	1430.5	12.325	3.3233	0.098155	0.063381	21.350	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.588	12.540	0.0000	0.0000	25.916	5.8520	28.424	0.0000	0.0000	0.0000
21	0.1883	0.2947	160.44	443.08	11.014	17.599	0.084823	0.1196	23.919	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	13.856	14.722	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
22	0.2525	0.3559	175.71	446.06	11.672	17.358	0.082500	0.1068	15.558	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	14.722	16.454	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
23	0.3467	5.7375E-04	217.91	1672.9	11.691	3.8804	0.090722	0.067990	16.917	1.2847E+07	3.5380E+07
x(FT)	0.0000	28.578	12.990	0.0000	0.0000	25.980	6.0620	28.578	0.0000	0.0000	0.0000
24	0.3467	5.7712E-04	219.60	1663.1	11.646	3.8767	0.090915	0.068188	18.350	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.980	6.0620	28.578	0.0000	0.0000	0.0000
25	0.3467	5.8914E-04	221.11	1653.4	11.612	3.8687	0.091117	0.068331	19.565	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.980	6.0620	28.578	0.0000	0.0000	0.0000
26	0.3467	5.9780E-04	222.39	1644.0	11.590	3.8563	0.091330	0.068407	20.513	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.980	6.0620	28.578	0.0000	0.0000	0.0000
27	0.3467	6.0603E-04	223.67	1634.5	11.568	3.8430	0.091543	0.068479	21.462	1.2847E+07	3.5380E+07
x(FT)	0.0000	27.712	12.990	0.0000	0.0000	25.980	6.0620	28.578	0.0000	0.0000	0.0000
28	0.1881	0.2701	164.47	416.00	11.289	16.385	0.087873	0.1130	25.377	1.2847E+07	3.5380E+07
x(FT)	1.7320	0.0000	12.990	14.722	0.0000	0.0000	6.9280	6.9280	0.0000	0.0000	0.0000
Max.	0.3786	0.3559	260.68	1672.9	14.066	20.346	0.1111	0.1357	25.377	1.2847E+07	3.5380E+07
Pile N.	2	22	6	23	6	7	6	7	28	1	1

***** SUMMARY FOR LOAD CASES AND COMBINATIONS *****

***** LOAD CASES RESULTS *****

LOAD CASE : 1

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
5147.00	108.000	24.0000	11208.0	1.42440E+05	59280.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
0.13959	0.0146657	1.32421E-04	1.60471E-04	3.27770E-04	3.62898E-04

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.047932	-3.3321E-03	-0.024143	1.6047E-04	3.2777E-04	3.6290E-04
Pile N.	1	7	22	1	1	1
MAXIMUM	0.2313	0.054437	4.7417E-03	1.6047E-04	3.2777E-04	3.6290E-04
Pile N.	28	1	1	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	66.352	-52.354	-42.698	-24.400	80.200	-14.949
Pile N.	1	27	22	7	2	6
MAXIMUM	263.47	43.998	54.260	102.24	786.28	775.53
Pile N.	28	4	28	1	28	23

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.045350	-0.024143	-0.079523	6.7638E-05	3.2777E-04	-3.5691E-04
Pile N.	1	23	28	1	1	23
MAXIMUM	0.2185	0.054437	0.029375	2.4372E-04	3.6290E-04	3.9099E-04
Pile N.	28	1	6	7	2	1

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	68.462	-3.9531	-11.278	0.011248	-14.949	-212.42
Pile N.	1	20	28	1	6	27
MAXIMUM	268.76	8.4180	3.5760	0.040528	786.28	421.37
Pile N.	28	1	6	7	28	1

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL.	DISPL.	MOMENT	MOMENT	SHEAR	SHEAR	SOIL REACT	SOIL REACT	TOTAL
	y-DIR	z-DIR	z-DIR	y-DIR	y-DIR	z-DIR	y-DIR	z-DIR	STRESS
	IN	IN	KIP-IN	KIP-IN	KIP	KIP	KIP/IN	KIP/IN	KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-0.028634	-0.081883	-421.37	-176.49	-3.8356	-11.036	-0.036325	-0.077868	1.9902
Pile N.	23	28	1	28	20	28	20	28	1
Max.	0.056888	0.029375	212.42	786.28	8.1393	3.3353	0.077037	0.054274	12.648
Pile N.	22	6	27	28	1	6	1	28	27

LOAD CASE : 2

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
3552.00	166.000	103.000	0.00000	64332.0	63468.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
0.0877237	0.0322738	0.0225306	-2.58420E-06	1.14267E-04	3.24889E-04

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.037915	0.041555	0.018870	-2.5842E-06	1.1427E-04	3.2489E-04
Pile N.	1	1	1	1	1	1
MAXIMUM	0.1375	0.042486	0.019335	-2.5842E-06	1.1427E-04	3.2489E-04
Pile N.	28	7	22	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	48.451	-30.336	-27.171	-85.814	-259.32	288.57
Pile N.	1	27	22	7	22	22
MAXIMUM	184.63	36.904	42.522	80.171	233.26	750.16
Pile N.	28	6	28	1	28	27

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.032205	0.018870	-0.072768	-8.1325E-05	1.1427E-04	-1.1427E-04
Pile N.	1	2	27	1	1	9
MAXIMUM	0.1381	0.042486	0.042143	7.6311E-05	3.2489E-04	3.1581E-04
Pile N.	28	7	22	7	2	7

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	48.988	1.1608	-10.766	-0.013524	-259.32	38.563
Pile N.	1	27	27	1	22	27
MAXIMUM	189.43	7.3714	5.2185	0.012690	750.16	353.78
Pile N.	28	7	22	7	27	7

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL.	DISPL.	MOMENT	MOMENT	SHEAR	SHEAR	SOIL REACT	SOIL REACT	TOTAL
	y-DIR	z-DIR	z-DIR	y-DIR	y-DIR	z-DIR	y-DIR	z-DIR	STRESS
	IN	IN	KIP-IN	KIP-IN	KIP	KIP	KIP/IN	KIP/IN	KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-6.7617E-04	-0.075273	-353.78	-259.32	-1.2415	-10.530	-0.020110	-0.074431	1.4241
Pile N.	8	27	7	22	7	27	7	27	1
Max.	0.044395	0.042143	76.724	750.16	7.1137	5.0471	0.069735	0.050733	10.934
Pile N.	28	22	7	27	7	22	7	27	28

LOAD CASE : 3

* TABLE L * COMPUTATION ON PILE CAP

```
 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *
      LOAD X,KIP     LOAD Y,KIP     LOAD Z,KIP    MOM X,KIP-IN   MOM Y,KIP-IN   MOM Z,KIP-IN
          4345.00        0.00000        0.00000        0.00000        0.00000        3333.60

 * DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *
       DISP X,IN      DISP Y,IN      DISP Z,IN      ROT X,RAD      ROT Y,RAD      ROT Z,RAD
          0.10751   -9.66441E-04    1.08403E-14    5.09349E-16   -6.71034E-18    1.66913E-05

 * TABLE M *   COMPUTATION ON INDIVIDUAL PILE

   * PILE TOP DISPLACEMENTS, GLOBAL *
               DISP. X,IN   DISP. Y,IN   DISP. Z,IN   ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
              ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM         0.1060  -4.6570E-04  -3.4802E-14   5.0935E-16  -6.7103E-18   1.6691E-05
   Pile N.          1            1           28            2            1            1
   MAXIMUM         0.1090  -4.6570E-04   5.6883E-14   5.0935E-16  -6.7103E-18   1.6691E-05
   Pile N.         22            1            2            1            1            1

   * PILE TOP REACTIONS, GLOBAL *
               FOR. X,KIP   FOR. Y,KIP   FOR. Z,KIP MOM X,KIP-IN MOM Y,KIP-IN MOM Z,KIP-IN
              ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM         150.16      -31.814      -32.597      -0.9377      -309.15      -259.57
   Pile N.          2           23           15           28           22            2
   MAXIMUM         160.77       32.079       32.597       0.9377       309.15       319.29
   Pile N.         16            2           21           22           28           23

   * PILE TOP DISPLACEMENTS, LOCAL *
               DISP. x,IN   DISP. y,IN   DISP. z,IN   ROT. x,RAD   ROT. y,RAD   ROT. z,RAD
              ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM         0.1027  -4.6570E-04    -0.026445  -4.0493E-06  -6.7103E-18  -1.1706E-16
   Pile N.          2            1           28            1            1           23
   MAXIMUM         0.1080   5.6881E-14     0.026445   4.0493E-06   1.6691E-05   1.6193E-05
   Pile N.         16            2           22            7            2            1

   * PILE TOP REACTIONS, LOCAL *
                AXIAL,KIP   LAT. y,KIP   LAT. z,KIP MOM x,KIP-IN MOM y,KIP-IN MOM z,KIP-IN
              ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM         153.46  -6.7043E-12      -6.6165  -6.7336E-04      -309.15  -2.6919E-10
   Pile N.          2           23           23            1           22           23
   MAXIMUM         160.77     0.024139       6.5388   6.7336E-04       319.29       3.8679
   Pile N.         16           15           22            7           23           22

   * EFFECTS FOR LATERALLY LOADED PILE *

  PILE     DISPL.      DISPL.      MOMENT      MOMENT       SHEAR       SHEAR    SOIL REACT  SOIL REACT     TOTAL
           y-DIR       z-DIR       z-DIR       y-DIR        y-DIR       z-DIR       y-DIR       z-DIR      STRESS
             IN          IN        KIP-IN      KIP-IN        KIP         KIP       KIP/IN      KIP/IN     KIP/IN**2
 ******  **********  **********  **********  **********  **********  **********  **********  **********  **********
   Min. -4.6570E-04   -0.026445     -3.8679     -309.15 -5.5011E-03     -6.3904 -7.9599E-04   -0.059678      4.4610
Pile N.       1          28          22          22           1          23          22          23           2
   Max.  8.2984E-05    0.026445      0.2863      319.29    0.040075      6.3111  5.2322E-04    0.059421      6.4460
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Pile N.      15          22          15          23          22          22           1          22          23

 LOAD CASE :     4

 * TABLE L *   COMPUTATION ON PILE CAP

 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *
      LOAD X,KIP     LOAD Y,KIP     LOAD Z,KIP    MOM X,KIP-IN   MOM Y,KIP-IN   MOM Z,KIP-IN
          4753.00        178.000        80.0000        8652.00    1.46424E+05        80880.0

 * DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *
       DISP X,IN      DISP Y,IN      DISP Z,IN      ROT X,RAD      ROT Y,RAD      ROT Z,RAD
          0.12730      0.0357508      0.0128028    1.57605E-04    3.21307E-04    4.85547E-04

 * TABLE M *   COMPUTATION ON INDIVIDUAL PILE

   * PILE TOP DISPLACEMENTS, GLOBAL *
               DISP. X,IN   DISP. Y,IN   DISP. Z,IN   ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
              ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM       0.025770     0.021948    -0.011021   1.5761E-04   3.2131E-04   4.8555E-04
   Pile N.          1            7           22            1            1            1
   MAXIMUM         0.2288     0.078686     0.017348   1.5761E-04   3.2131E-04   4.8555E-04
   Pile N.         28            1            1            1            1            1

   * PILE TOP REACTIONS, GLOBAL *
               FOR. X,KIP   FOR. Y,KIP   FOR. Z,KIP MOM X,KIP-IN MOM Y,KIP-IN MOM Z,KIP-IN
              ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM         31.281      -48.267      -40.148      -70.038      -1.5656       221.98
   Pile N.          1           27           22            7            6           28
   MAXIMUM         264.06       49.107       55.332       128.41       718.30       956.48
   Pile N.         28            6           28            1           28           23

   * PILE TOP DISPLACEMENTS, LOCAL *
               DISP. x,IN   DISP. y,IN   DISP. z,IN   ROT. x,RAD   ROT. y,RAD   ROT. z,RAD
              ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM       0.020791    -0.011021    -0.099293   3.5104E-05   3.2131E-04  -3.4994E-04
   Pile N.          1           23           23            1            1           23
   MAXIMUM         0.2193     0.078686     0.023082   2.7069E-04   4.8555E-04   5.0928E-04
   Pile N.         28            1            1            7            2            1

   * PILE TOP REACTIONS, LOCAL *
                AXIAL,KIP   LAT. y,KIP   LAT. z,KIP MOM x,KIP-IN MOM y,KIP-IN MOM z,KIP-IN
              ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM         32.079      -2.0934      -12.816   5.8374E-03       72.761      -149.28
   Pile N.          1           27           23            1            1           27
   MAXIMUM         269.59       9.9743       0.6586     0.045013       956.48       529.29
   Pile N.         28            1            1            7           23            1

   * EFFECTS FOR LATERALLY LOADED PILE *

  PILE     DISPL.      DISPL.      MOMENT      MOMENT       SHEAR       SHEAR    SOIL REACT  SOIL REACT     TOTAL
           y-DIR       z-DIR       z-DIR       y-DIR        y-DIR       z-DIR       y-DIR       z-DIR      STRESS
```

	IN	IN	KIP-IN	KIP-IN	KIP	KIP	KIP/IN	KIP/IN	KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-0.017431	-0.1039	-529.29	-204.57	-2.0720	-12.552	-0.024553	-0.087038	0.9325
Pile N.	23	23	1	23	27	23	1	2	1
Max.	0.081925	0.023081	149.28	956.48	9.6591	2.2788	0.086626	0.060368	13.417
Pile N.	15	1	27	23	1	23	1	23	28

LOAD CASE : 5

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
3668.00	140.000	65.0000	6408.00	1.11612E+05	63060.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
0.0921794	0.0229442	9.61269E-03	9.32025E-05	2.12679E-04	3.34516E-04

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.023791	0.016203	-5.1559E-03	9.3203E-05	2.1268E-04	3.3452E-04
Pile N.	1	7	22	1	1	1
MAXIMUM	0.1606	0.049756	0.011621	9.3203E-05	2.1268E-04	3.3452E-04
Pile N.	28	1	1	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	30.604	-36.447	-29.533	-54.046	-6.1446	175.03
Pile N.	1	27	22	7	6	28
MAXIMUM	201.52	37.206	41.745	93.915	537.73	724.53
Pile N.	28	6	28	1	28	23

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.020261	-5.1559E-03	-0.066320	9.2649E-06	2.1268E-04	-2.2894E-04
Pile N.	1	23	23	1	1	23
MAXIMUM	0.1545	0.049756	0.017045	1.7157E-04	3.3452E-04	3.4713E-04
Pile N.	28	1	1	7	2	1

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	31.293	-1.4031	-10.423	1.5407E-03	24.272	-97.624
Pile N.	1	27	23	1	1	27
MAXIMUM	205.62	7.8198	1.0124	0.028531	724.53	387.11
Pile N.	28	1	1	7	23	1

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL.	DISPL.	MOMENT	MOMENT	SHEAR	SHEAR	SOIL REACT	SOIL REACT	TOTAL
	y-DIR	z-DIR	z-DIR	y-DIR	y-DIR	z-DIR	y-DIR	z-DIR	STRESS
	IN	IN	KIP-IN	KIP-IN	KIP	KIP	KIP/IN	KIP/IN	KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-9.3531E-03	-0.069171	-387.11	-156.74	-1.3890	-10.185	-0.020708	-0.071958	0.9097
Pile N.	23	23	1	23	27	23	1	23	1
Max.	0.051855	0.017045	97.624	724.53	7.5527	1.8680	0.071786	0.049144	10.253
Pile N.	15	1	27	23	1	23	1	23	28

LOAD CASE : 6

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
2808.00	93.0000	58.0000	0.00000	36180.0	36360.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
0.0681469	0.0101480	9.72804E-03	-2.24647E-06	6.00021E-05	1.66115E-04

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.042396	0.014727	7.7258E-03	-2.2465E-06	6.0002E-05	1.6611E-04
Pile N.	1	1	1	1	1	1
MAXIMUM	0.093898	0.015536	8.1302E-03	-2.2465E-06	6.0002E-05	1.6611E-04
Pile N.	28	7	22	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	58.577	-23.150	-20.360	-43.457	-209.98	141.53
Pile N.	1	27	22	7	22	22
MAXIMUM	136.03	25.307	29.608	39.570	228.12	462.95
Pile N.	28	6	28	1	28	27

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.039255	7.7258E-03	-0.036847	-4.2479E-05	6.0002E-05	-6.0002E-05
Pile N.	1	2	27	1	1	9
MAXIMUM	0.093065	0.015536	0.025427	3.8120E-05	1.6611E-04	1.6170E-04
Pile N.	28	7	22	7	2	7

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN

```
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM        59.433       0.6612      -7.5262  -7.0638E-03      -209.98       18.097
  Pile N.         1           27           27           1           22           27
  MAXIMUM        139.15       4.2041       4.5858   6.3390E-03       462.95       179.16
  Pile N.        28            7           22           7           27            7

  * EFFECTS FOR LATERALLY LOADED PILE *

 PILE     DISPL.      DISPL.      MOMENT      MOMENT       SHEAR       SHEAR    SOIL REACT  SOIL REACT     TOTAL
          y-DIR       z-DIR       z-DIR       y-DIR        y-DIR       z-DIR       y-DIR       z-DIR       STRESS
            IN          IN        KIP-IN      KIP-IN        KIP         KIP       KIP/IN      KIP/IN     KIP/IN**2
******  **********  **********  **********  **********  **********  **********  **********  **********  **********
  Min. -2.9065E-04   -0.037867     -179.16     -209.98     -0.5702     -7.3293   -0.010929   -0.057346      1.7277
Pile N.      1          27           7          22           7          27           7          27           1
  Max.   0.016529    0.025426     34.991      462.95      4.0293      4.4191    0.045019    0.039876      6.9932
Pile N.     28          22           7          27           7          22           7          22          28

 LOAD CASE :     7

 * TABLE L *   COMPUTATION ON PILE CAP

 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *
      LOAD X,KIP     LOAD Y,KIP     LOAD Z,KIP    MOM X,KIP-IN   MOM Y,KIP-IN   MOM Z,KIP-IN
         3219.00        985.000        244.000        2916.00    1.33932E+05    3.90756E+05

 * DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *
       DISP X,IN      DISP Y,IN      DISP Z,IN      ROT X,RAD      ROT Y,RAD      ROT Z,RAD
       0.0863987        0.95163        0.17113    3.35186E-04    2.84204E-04    3.61248E-03

 * TABLE M *   COMPUTATION ON INDIVIDUAL PILE

  * PILE TOP DISPLACEMENTS, GLOBAL *
              DISP. X,IN   DISP. Y,IN   DISP. Z,IN   ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM       -0.2899       0.9997       0.1324   3.3519E-04   2.8420E-04   3.6125E-03
  Pile N.         1            7           22           1            1            1
  MAXIMUM        0.4627       1.1203       0.1928   3.3519E-04   2.8420E-04   3.6125E-03
  Pile N.        28            1            1           1            1            1

  * PILE TOP REACTIONS, GLOBAL *
              FOR. X,KIP   FOR. Y,KIP   FOR. Z,KIP MOM X,KIP-IN MOM Y,KIP-IN MOM Z,KIP-IN
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM       -167.85      -14.694      -82.653      -682.20      -705.36       2455.1
  Pile N.         1           27           22           7            7           28
  MAXIMUM        508.05       67.271       126.65       731.78       90.611       5428.2
  Pile N.        28            6           28           1           28            2

  * PILE TOP DISPLACEMENTS, LOCAL *
              DISP. x,IN   DISP. y,IN   DISP. z,IN   ROT. x,RAD   ROT. y,RAD   ROT. z,RAD
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM       -0.3280       0.1324      -1.1589  -5.5121E-04   2.8420E-04  -3.5703E-04
  Pile N.         1           23           23           1            1           23

  MAXIMUM        0.4810       1.1203       0.2325   1.2016E-03   3.6125E-03   3.5859E-03
  Pile N.        28            1            7           7            2            1

  * PILE TOP REACTIONS, LOCAL *
              AXIAL,KIP    LAT. y,KIP   LAT. z,KIP MOM x,KIP-IN MOM y,KIP-IN MOM z,KIP-IN
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM       -173.99       2.2498      -52.987    -0.091661      -705.36       134.96
  Pile N.         1           23            2           1            7           23
  MAXIMUM        523.60       39.505       9.1474       0.1998       5428.2       3016.8
  Pile N.        28            1            7           7            2            1

  * EFFECTS FOR LATERALLY LOADED PILE *

 PILE     DISPL.      DISPL.      MOMENT      MOMENT       SHEAR       SHEAR    SOIL REACT  SOIL REACT     TOTAL
          y-DIR       z-DIR       z-DIR       y-DIR        y-DIR       z-DIR       y-DIR       z-DIR       STRESS
            IN          IN        KIP-IN      KIP-IN        KIP         KIP       KIP/IN      KIP/IN     KIP/IN**2
******  **********  **********  **********  **********  **********  **********  **********  **********  **********
  Min. -7.7504E-03     -1.2088     -3016.8     -1173.7     -6.7905     -52.181     -0.1434     -0.2516      0.1043
Pile N.     28          23           1           2          22           2           1           2           2
  Max.     1.1522      0.2325     657.75      5428.2      38.482      12.536      0.2379      0.1705      55.927
Pile N.     22           7           1           2           1           2           1           2          28

 LOAD CASE :     8

 * TABLE L *   COMPUTATION ON PILE CAP

 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *
      LOAD X,KIP     LOAD Y,KIP     LOAD Z,KIP    MOM X,KIP-IN   MOM Y,KIP-IN   MOM Z,KIP-IN
         3308.00        992.000        246.000        3204.00    1.17180E+05    3.93240E+05

 * DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *
       DISP X,IN      DISP Y,IN      DISP Z,IN      ROT X,RAD      ROT Y,RAD      ROT Z,RAD
       0.0895036        0.96225        0.18198    3.38937E-04    2.36455E-04    3.64409E-03

 * TABLE M *   COMPUTATION ON INDIVIDUAL PILE

  * PILE TOP DISPLACEMENTS, GLOBAL *
              DISP. X,IN   DISP. Y,IN   DISP. Z,IN   ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM       -0.2810       1.0106       0.1444   3.3894E-04   2.3645E-04   3.6441E-03
  Pile N.         1            7           22           1            1            1
  MAXIMUM        0.4600       1.1326       0.2054   3.3894E-04   2.3645E-04   3.6441E-03
  Pile N.        28            1            1           1            1            1

  * PILE TOP REACTIONS, GLOBAL *
              FOR. X,KIP   FOR. Y,KIP   FOR. Z,KIP MOM X,KIP-IN MOM Y,KIP-IN MOM Z,KIP-IN
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM       -167.41      -13.877      -84.748      -686.51      -780.04       2474.2
  Pile N.         1           27           22           7            7           28
  MAXIMUM        508.21       66.593       127.31       736.78       24.350       5459.1
  Pile N.        28            6           28           1           28            2
```

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   * PILE TOP DISPLACEMENTS, LOCAL *
             DISP. x,IN   DISP. y,IN   DISP. z,IN   ROT. x,RAD   ROT. y,RAD   ROT. z,RAD
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM       -0.3225       0.1444      -1.1734  -5.5524E-04   2.3645E-04  -3.1162E-04
   Pile N.          1            23           23            1            1           23
   MAXIMUM        0.4813       1.1326       0.2468   1.2129E-03   3.6441E-03   3.6175E-03
   Pile N.         28             1            7            7            2            1

   * PILE TOP REACTIONS, LOCAL *
             AXIAL,KIP    LAT. y,KIP   LAT. z,KIP MOM x,KIP-IN MOM y,KIP-IN MOM z,KIP-IN
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM       -173.73       2.5509      -53.145    -0.092332      -780.04       162.28
   Pile N.          1            23            2            1            7           23
   MAXIMUM        523.91       39.696       9.8798       0.2017       5459.1       3037.4
   Pile N.         28             1            7            7            2            1

   * EFFECTS FOR LATERALLY LOADED PILE *

  PILE     DISPL.      DISPL.      MOMENT      MOMENT       SHEAR       SHEAR     SOIL REACT  SOIL REACT     TOTAL
           y-DIR       z-DIR       z-DIR       y-DIR        y-DIR       z-DIR       y-DIR       z-DIR       STRESS
            IN          IN         KIP-IN      KIP-IN       KIP         KIP         KIP/IN      KIP/IN     KIP/IN**2
 ******  **********  **********  **********  **********  **********  **********  **********  **********  **********
   Min. -7.9478E-03     -1.2238     -3037.4     -1182.5     -6.8370     -52.348     -0.1427     -0.2520      0.2344
Pile N.      28          23           1           2          22           2           1           2          12
   Max.      1.1649      0.2468      662.36      5459.1      38.669      12.626      0.2386      0.1716      56.249
Pile N.      22           7           1           2           1           2           1           2          28

 LOAD CASE :     9

 * TABLE L *   COMPUTATION ON PILE CAP

 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *
      LOAD X,KIP     LOAD Y,KIP     LOAD Z,KIP    MOM X,KIP-IN   MOM Y,KIP-IN   MOM Z,KIP-IN
         3219.00        312.000        802.000        2916.00    3.51456E+05    1.28352E+05

 * DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *
       DISP X,IN      DISP Y,IN      DISP Z,IN      ROT X,RAD      ROT Y,RAD      ROT Z,RAD
       0.0865305        0.17641        0.36824    1.71857E-04    5.78665E-04    9.57894E-04

 * TABLE M *   COMPUTATION ON INDIVIDUAL PILE

   * PILE TOP DISPLACEMENTS, GLOBAL *
             DISP. X,IN   DISP. Y,IN   DISP. Z,IN   ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM       -0.1038       0.1742       0.3354   1.7186E-04   5.7867E-04   9.5789E-04
   Pile N.          1             7           22            1            1            1
   MAXIMUM        0.2769       0.2361       0.3663   1.7186E-04   5.7867E-04   9.5789E-04
   Pile N.         28             1            1            1            1            1

   * PILE TOP REACTIONS, GLOBAL *
             FOR. X,KIP   FOR. Y,KIP   FOR. Z,KIP MOM X,KIP-IN MOM Y,KIP-IN MOM Z,KIP-IN
            ***********  ***********  ***********  ***********  ***********  ***********

   MINIMUM       -157.09      -41.315       11.553      -181.92      -1315.8       703.12
   Pile N.          1            27           27           28            7            7
   MAXIMUM        382.76       53.875       112.31       205.86      -628.29       1633.3
   Pile N.         28             6           28            1           23           23

   * PILE TOP DISPLACEMENTS, LOCAL *
             DISP. x,IN   DISP. y,IN   DISP. z,IN   ROT. x,RAD   ROT. y,RAD   ROT. z,RAD
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM       -0.1896       0.1742      -0.2441  -6.5661E-05   5.7867E-04  -6.0307E-04
   Pile N.          1             7           23            1            1           23
   MAXIMUM        0.3500       0.3663       0.3420   3.9911E-04   9.5789E-04   9.7097E-04
   Pile N.         28             2           22            7            2            1

   * PILE TOP REACTIONS, LOCAL *
             AXIAL,KIP    LAT. y,KIP   LAT. z,KIP MOM x,KIP-IN MOM y,KIP-IN MOM z,KIP-IN
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM       -166.31       10.791      -18.048    -0.010919      -1315.8       647.64
   Pile N.          1             7           23            1            7           23
   MAXIMUM        398.57       14.118       20.124     0.066368       1633.3       848.61
   Pile N.         28             6            7            7           23            1

   * EFFECTS FOR LATERALLY LOADED PILE *

  PILE     DISPL.      DISPL.      MOMENT      MOMENT       SHEAR       SHEAR     SOIL REACT  SOIL REACT     TOTAL
           y-DIR       z-DIR       z-DIR       y-DIR        y-DIR       z-DIR       y-DIR       z-DIR       STRESS
            IN          IN         KIP-IN      KIP-IN       KIP         KIP         KIP/IN      KIP/IN     KIP/IN**2
 ******  **********  **********  **********  **********  **********  **********  **********  **********  **********
   Min. -3.7813E-03     -0.2546     -848.61     -1315.8     -2.4920     -17.786   -0.076905     -0.1062      0.4859
Pile N.       6          23           1           7           6          23          11           7           9
   Max.      0.3663      0.3420      254.74      1633.3      13.721      19.668      0.1094      0.1328      25.018
Pile N.       2          22           6          23           6           7           6           7          28

 LOAD CASE :    10

 * TABLE L *   COMPUTATION ON PILE CAP

 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *
      LOAD X,KIP     LOAD Y,KIP     LOAD Z,KIP    MOM X,KIP-IN   MOM Y,KIP-IN   MOM Z,KIP-IN
         3308.00        319.000        804.000        3204.00    3.34704E+05    1.30836E+05

 * DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *
       DISP X,IN      DISP Y,IN      DISP Z,IN      ROT X,RAD      ROT Y,RAD      ROT Z,RAD
       0.0888833        0.18367        0.37870    1.77175E-04    5.34404E-04    9.78384E-04

 * TABLE M *   COMPUTATION ON INDIVIDUAL PILE

   * PILE TOP DISPLACEMENTS, GLOBAL *
             DISP. X,IN   DISP. Y,IN   DISP. Z,IN   ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
            ***********  ***********  ***********  ***********  ***********  ***********
   MINIMUM     -0.095364       0.1811       0.3467   1.7718E-04   5.3440E-04   9.7838E-04
   Pile N.          1             7           22            1            1            1
   MAXIMUM        0.2731       0.2449       0.3786   1.7718E-04   5.3440E-04   9.7838E-04
```

Pile N.	28	1	1	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	-156.18	-40.439	11.891	-185.35	-1388.3	717.32
Pile N.	1	27	27	28	7	7
MAXIMUM	381.73	53.509	112.73	209.96	-655.62	1672.9
Pile N.	28	6	28	1	23	23

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	-0.1844	0.1811	-0.2546	-6.5473E-05	5.3440E-04	-5.6142E-04
Pile N.	1	7	23	1	1	23
MAXIMUM	0.3491	0.3786	0.3559	4.0924E-04	9.7838E-04	9.9214E-04
Pile N.	28	2	22	7	2	1

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	-165.53	10.928	-18.391	-0.010887	-1388.3	675.81
Pile N.	1	14	23	1	7	23
MAXIMUM	397.67	14.466	20.807	0.068052	1672.9	865.52
Pile N.	28	6	7	7	23	1

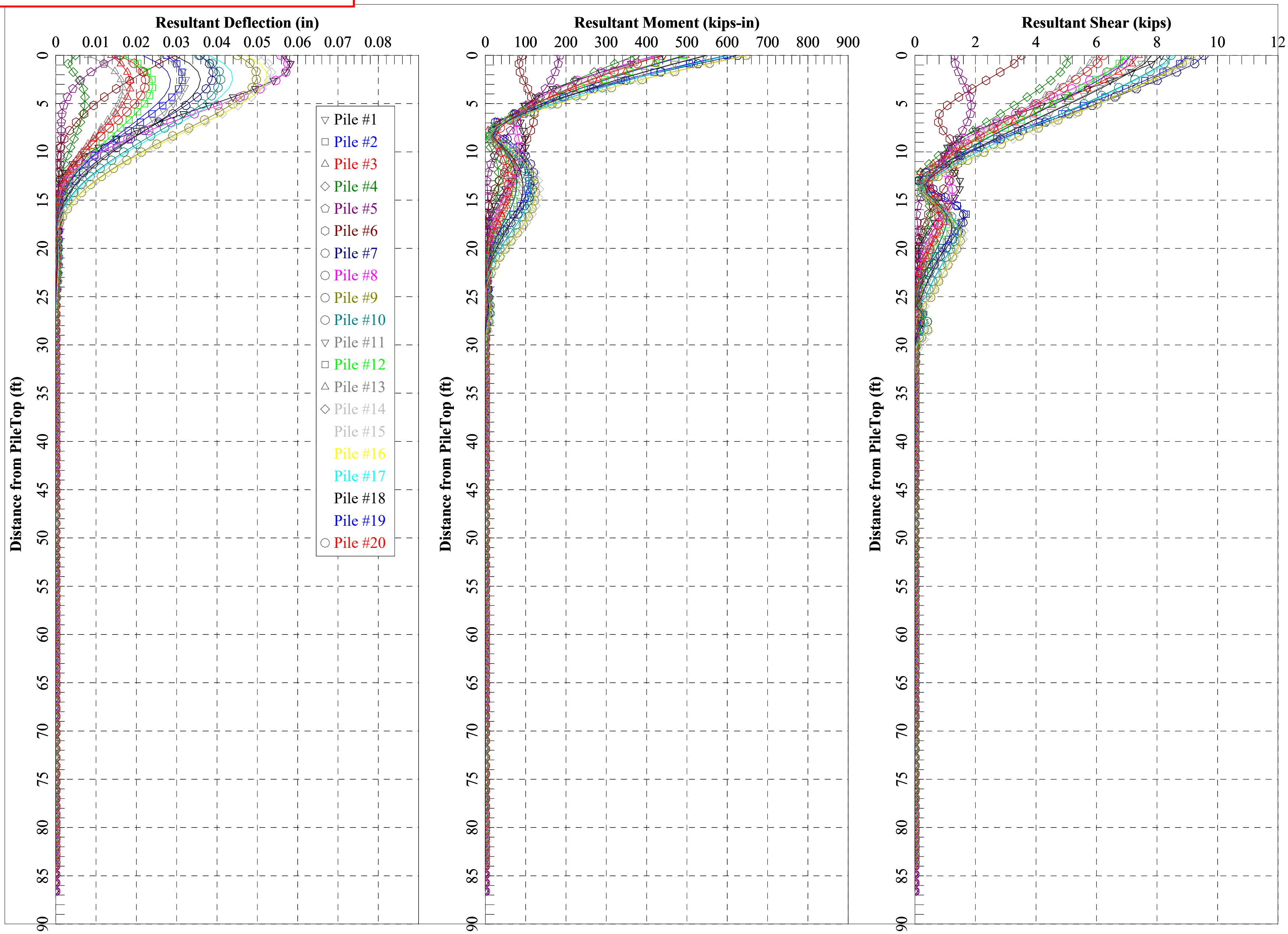
* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-3.8150E-03	-0.2653	-865.52	-1388.3	-2.5397	-18.127	-0.078668	-0.1075	0.1911
Pile N.	6	23	1	7	6	23	12	7	9
Max.	0.3786	0.3559	260.68	1672.9	14.066	20.346	0.1111	0.1357	25.377
Pile N.	2	22	6	23	6	7	6	7	28

Pier 2 14x117
4 Rows - Battered
Outer Piles

Graph Outputs (Strength 5 & Extreme IA and Extreme 1C)

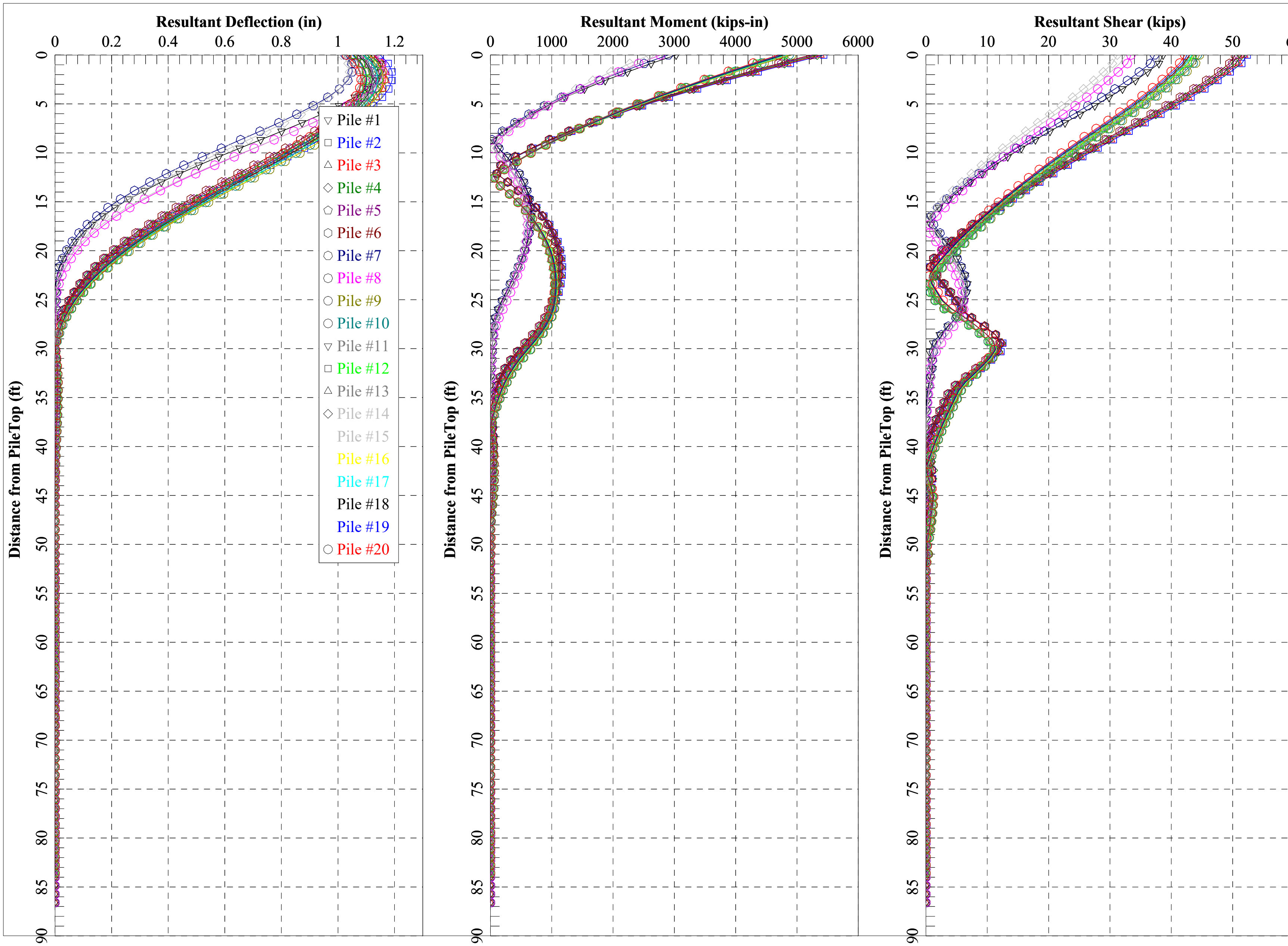
Pier 2 14x117
4 Rows - Battered Outer Piles
Strength V



Pier 2 14x117

4 Rows - Battered Outer Piles

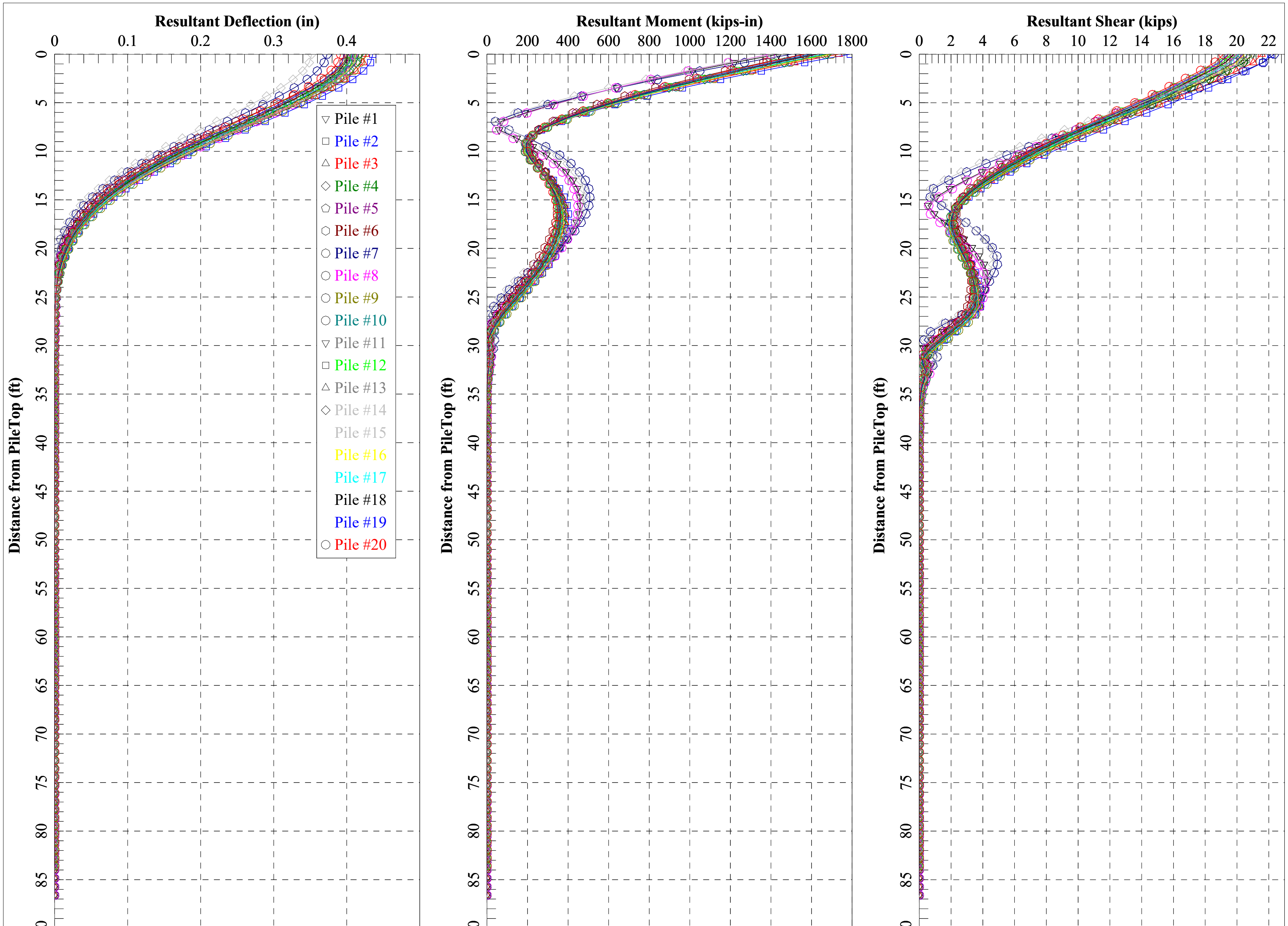
Extreme IA



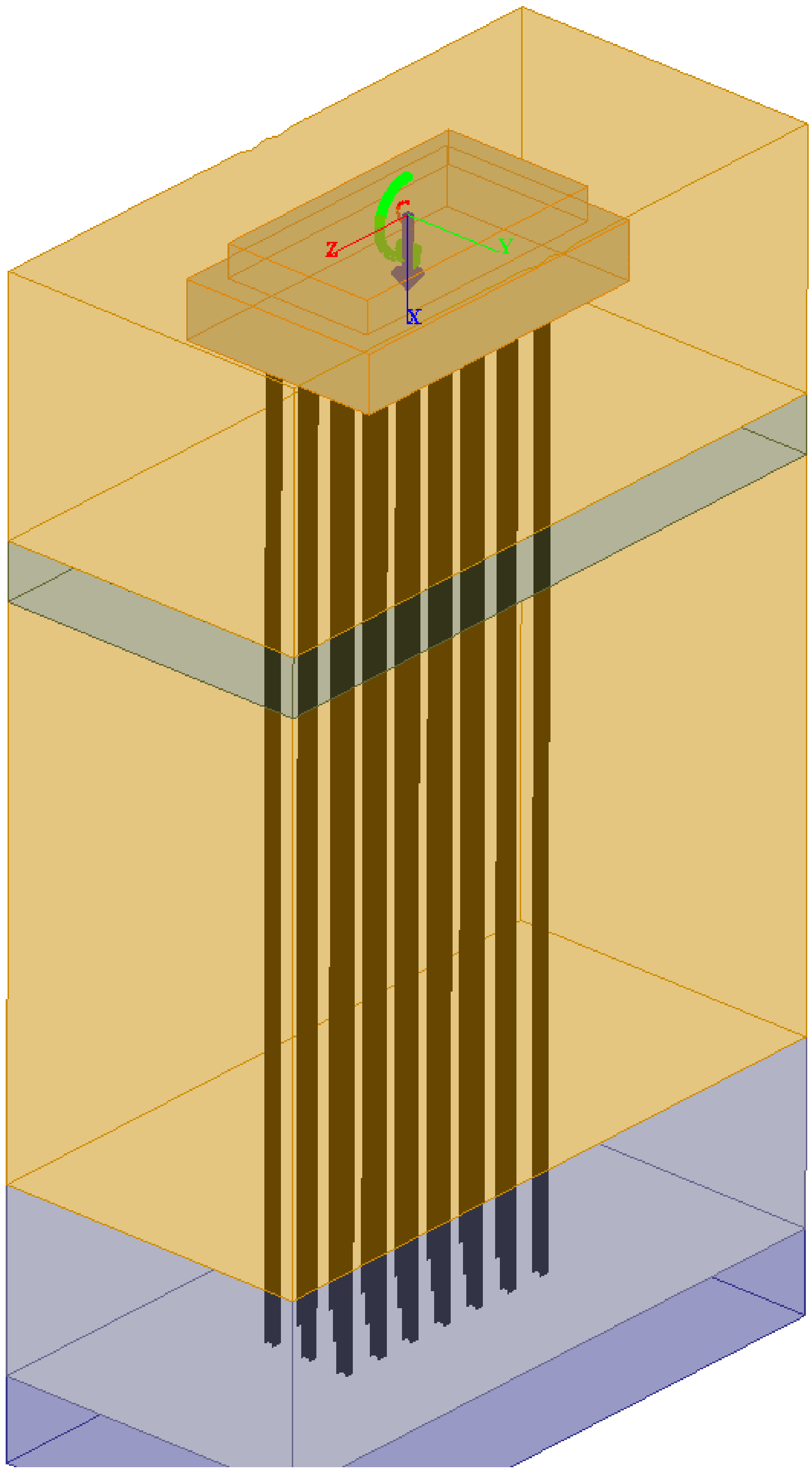
Pier 2 14x117

4 Rows - Battered Outer Piles

Extreme IC



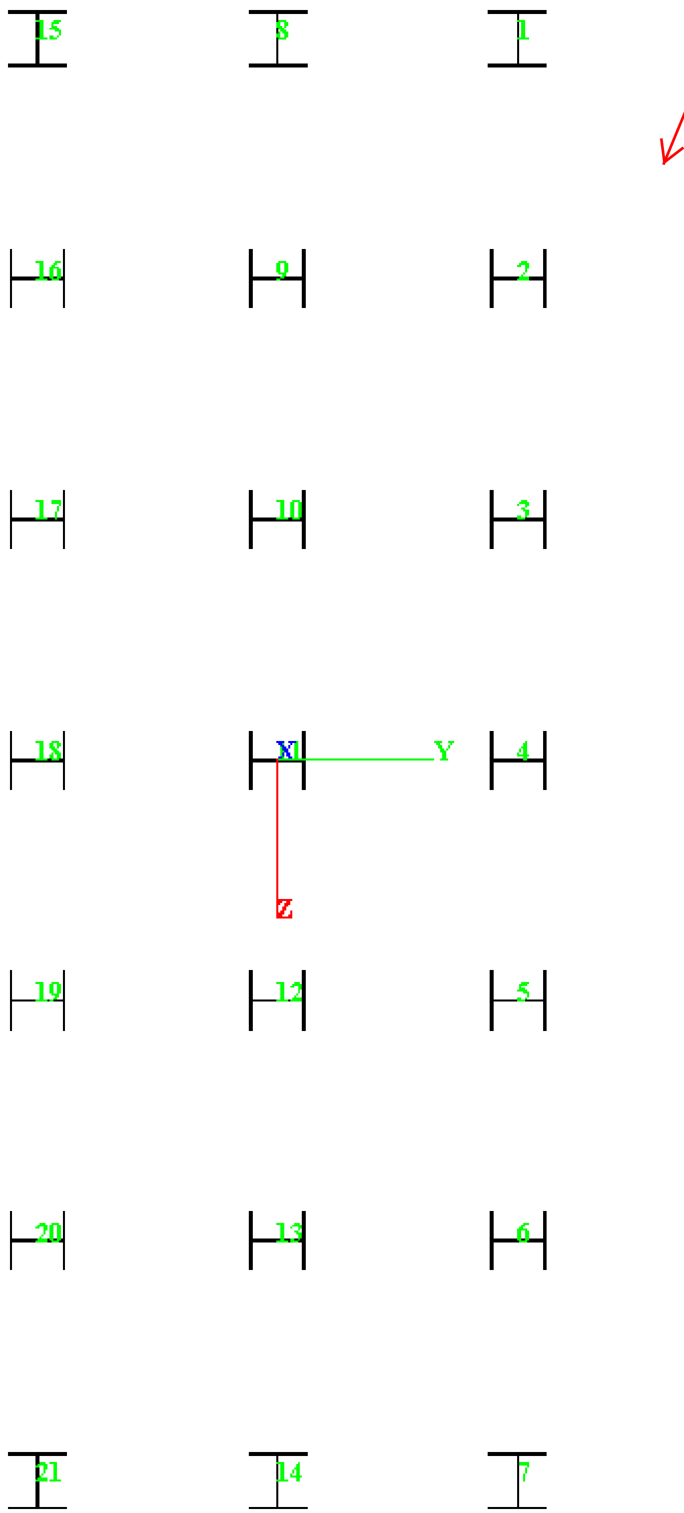
Pier 3 14x117
3 Rows - Plumb
Group Inputs/Results



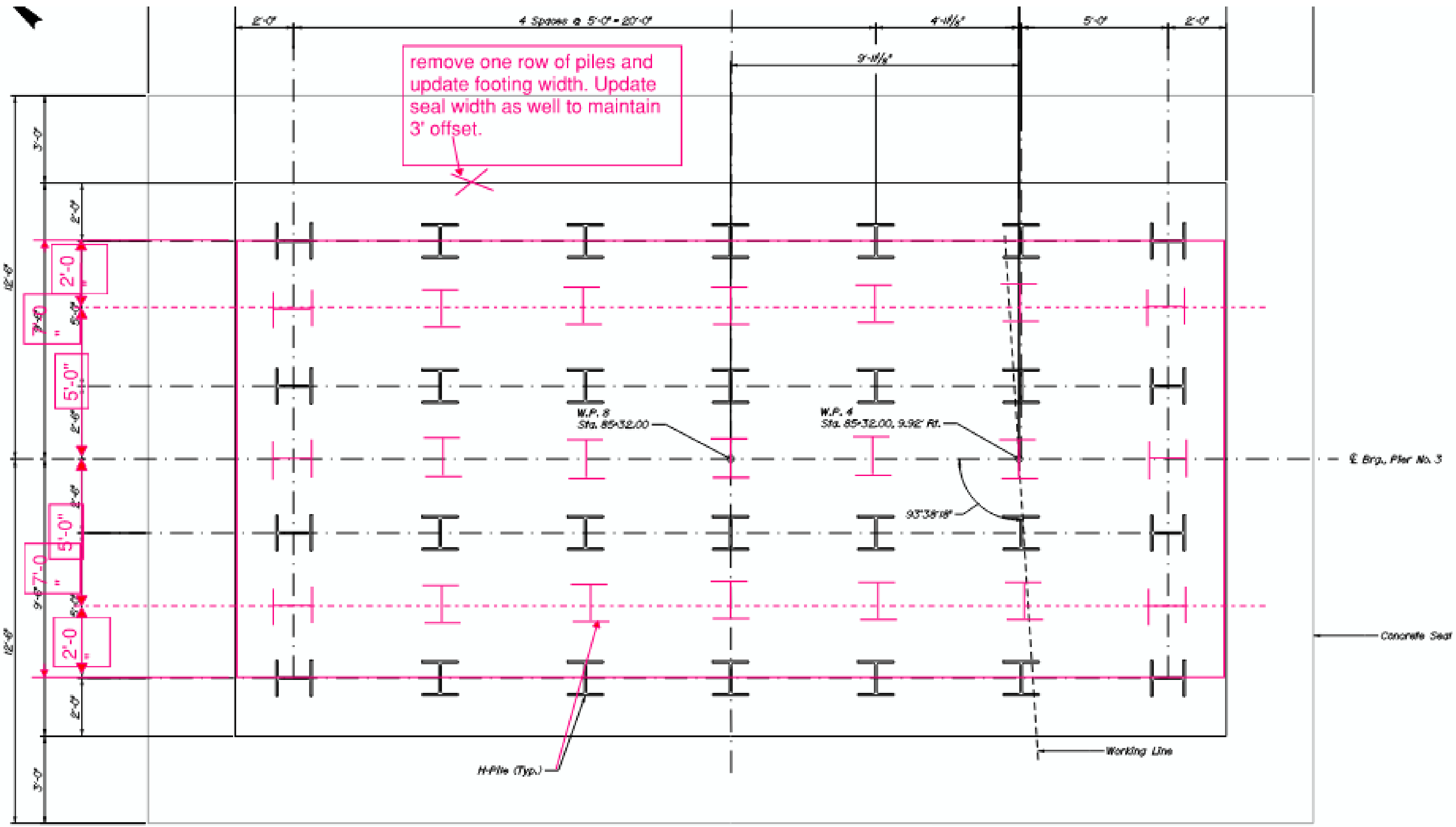
Pier 3 - 21 14x117 HP

Top down view without pile cap (Piles only)
showing pile orientation

All Piles Plumb
Oriented per HNTB Drawing



HNTB 8/26 Markup



PIER NO. 3 SEAL & FOOTING PLAN

Group Output Summary
Maine Department of Transportation - Station 46 Bridge
GZA GeoEnvironmental, Inc.

GZA FILE NO.	09.0026035.01
CALCULATED BY	B.Cardali, 6/17/21
CHECKED BY	C.Snow, 6/17/21
REVISED	B.Cardali,8/30/21, C.Snow 8/31/21

PIER 3 - 14x117

LOAD CASE	Maximum Stress (ksi)	Maximum Axial Pile Demand (kip)	Resistance Factor	Required Nominal Resistance (kip)	Controlling Required Nominal Resistance (kip)
Strength I	12.4	362	0.65	557	557 (Strength I)
Strength III	8.4	219	0.65	337	
Strength IV	6.7	216	0.65	332	
Strength V	12.7	343	0.65	528	
Service I	9.5	270	1.00	270	
Service IV	5.6	163	1.00	163	
Extreme Event I	8.2	179	1.0	179	

Group Input
Basis
(Plans&HNTB
Loading)

Design for Expansion Pier 3

Calc. for	Station 46	Job No.	75298
Made by	KEB (Ind. Checker)	Date	05/28/21
Chkd by	YP (Original Design)	Date	

HNTB

Note: Reduced Loads include reduction for actual transverse seismic force at Pier 3, previous loads included Pier 2 conservatively.

Resulted in approximately 47% reduction in transverse force for Extreme Event.

PIER FOOTING DESIGN LOADS:

Unfactored Force Summary:

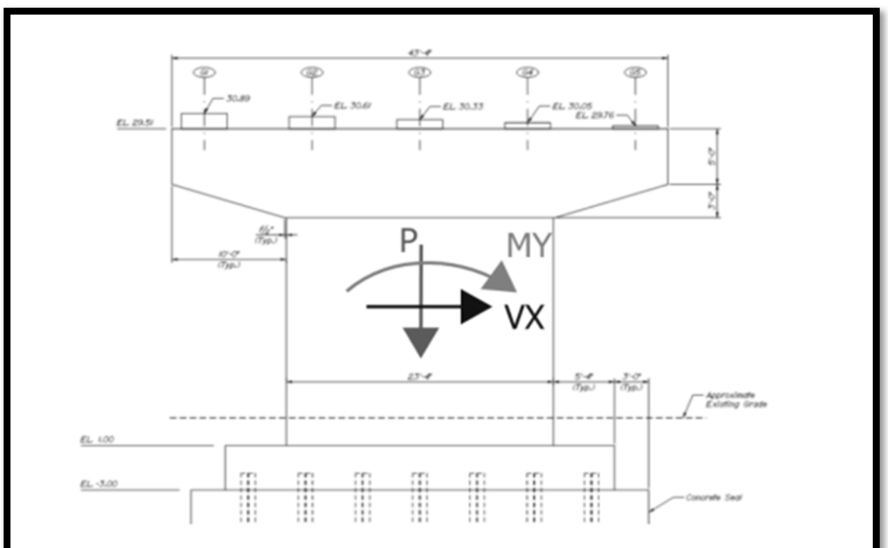
	P Compress	Vx Strong	Vy Weak	Mx Weak	My Strong	Torsion
Units	kip	kip	kip	kip-ft	kip-ft	kip-ft
DC*	2542	0	0	463	0	0
DW	355	0	0	0	0	0
WS	-158	103	0	0	5361	0
WL	0	18	25	755	798	0
EQ1	0	127	0	0	4118	0
EQ2	0	422	0	0	13725	0
LL 1a	457	6	0	1852	7063	0
LL 2a	762	11	0	1852	7961	0
LL 3a	762	11	0	1852	339	0
LL 4a	971	14	0	1852	4643	0
LL 5a	971	14	0	1852	432	0
LL 1b	386	6	0	1852	6003	0
LL 2b	644	11	0	1852	6783	0
LL 3b	644	11	0	1852	339	0
LL 4b	821	14	0	1852	3992	0
LL 5b	821	14	0	1852	432	0
LL 1 b/o	0	6	0	0	206	0
LL 2 b/o	0	11	0	0	342	0
LL 3 b/o	0	11	0	0	339	0
LL 4 b/o	0	14	0	0	434	0
LL 5 b/o	0	14	0	0	432	0

A-Cases not applicable for pile design. B-Cases w/out impact used in factored tables below.

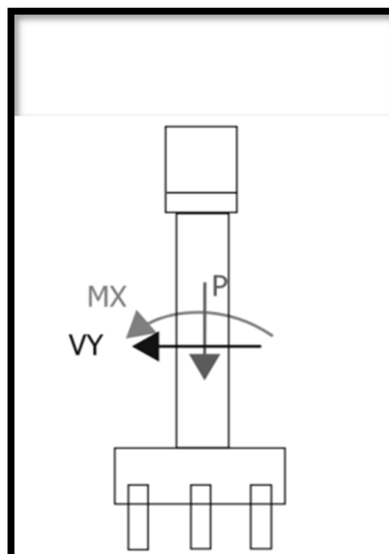
P,Vx, My (HNTB)
Fx,Fz,My (Group)

...elf weight
...rectionality

P,Vy, Mx (HNTB)
Fx,Fy,Mz (Group)



Pier Elevation - Load Nomenclature



Pier Section - Load Nomenclature

Strength I Load Combinations

Units	Fx	Fz Vx	Fy Vy	Mz Mx	My My	Mx Torsion	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
1	4386	11	0	3819	10505	0	Max Live w/ CE & BR, Live 1, Max Dead
2	4837	19	0	3819	11870	0	Max Live w/ CE & BR, Live 2, Max Dead
3	4837	19	0	3819	594	0	Max Live w/ CE & BR, Live 3, Max Dead
4	5147	24	0	3819	6987	0	Max Live w/ CE & BR, Live 4, Max Dead
5	5147	24	0	3819	757	0	Max Live w/ CE & BR, Live 5, Max Dead
8	3195	11	0	3657	10505	0	Max Live w/ CE & BR, Live 1, Min Dead
9	3646	19	0	3657	11870	0	Max Live w/ CE & BR, Live 2, Min Dead
10	3646	19	0	3657	594	0	Max Live w/ CE & BR, Live 3, Min Dead
11	3956	24	0	3657	6987	0	Max Live w/ CE & BR, Live 4, Min Dead
12	3956	24	0	3657	757	0	Max Live w/ CE & BR, Live 5, Min Dead
15	3710	11	0	579	361	0	Min Live w/ CE & BR, Live 1, Max Dead
16	3710	19	0	579	599	0	Min Live w/ CE & BR, Live 2, Max Dead
17	3710	19	0	579	593	0	Min Live w/ CE & BR, Live 3, Max Dead
18	3710	24	0	579	760	0	Min Live w/ CE & BR, Live 4, Max Dead
19	3710	24	0	579	757	0	Min Live w/ CE & BR, Live 5, Max Dead
22	2518	11	0	417	361	0	Min Live w/ CE & BR, Live 1, Min Dead
23	2518	19	0	417	599	0	Min Live w/ CE & BR, Live 2, Min Dead
24	2518	19	0	417	593	0	Min Live w/ CE & BR, Live 3, Min Dead
25	[illegible] Fx	Fz	Fy	[illegible] Mz	My	Mx	Min Live w/ CE & BR, Live 4, Min Dead
26	[illegible]	24	[illegible]	417	[illegible]	[illegible]	Min Live w/ CE & BR, Live 5, Min Dead
Envelope	5147	24	0	45,828 kip-in	142,440 kip-in	0	Maximum
	2518	11	0	417	361	0	Minimum

Strength III Load Combinations

Units	Fx	Fz Vx	Fy Vy	Mz Mx	My My	Mx Torsion	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
27	3552	103	0	6,948 kip-in	64,332 kip-in	0	Wind, Max Dead
28	2361	103	0	417	5361	0	Wind, Min Dead

Strength IV Load Combinations

	Fx	Fz	Fy	Mz	My	Mx	
31	4345.5	0.0	0.0	8,332.8 kip-in	0.0	0.0	Max Dead

Strength V Load Combinations

Units	Fx	Fz Vx	Fy Vy	Mz Mx	My My	Mx Torsion	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
29	4166	70	25	3834	11149	0	Max Live, Live 1, Max Dead, WS V, WL
30	4513	76	25	3834	12202	0	Max Live, Live 2, Max Dead, WS V, WL
31	4513	76	25	3834	3503	0	Max Live, Live 3, Max Dead, WS V, WL
32	4753	80	25	3834	8435	0	Max Live, Live 4, Max Dead, WS V, WL
33	4753	80	25	3834	3629	0	Max Live, Live 5, Max Dead, WS V, WL
34	2974	70	25	3672	11149	0	Max Live, Live 1, Min Dead, WS V, WL
35	3322	76	25	3672	12202	0	Max Live, Live 2, Min Dead, WS V, WL
36	3322	76	25	3672	3503	0	Max Live, Live 3, Min Dead, WS V, WL
37	3561	80	25	3672	8435	0	Max Live, Live 4, Min Dead, WS V, WL
38	3561	80	25	3672	3629	0	Max Live, Live 5, Min Dead, WS V, WL
39	3644	70	25	1334	3324	0	Min Live, Live 1, Max Dead, WS V, WL
40	3644	76	25	1334	3507	0	Min Live, Live 2, Max Dead, WS V, WL
41	3644	76	25	1334	3503	0	Min Live, Live 3, Max Dead, WS V, WL
42	3644	80	25	1334	3631	0	Min Live, Live 4, Max Dead, WS V, WL
43	3644	80	25	1334	3629	0	Min Live, Live 5, Max Dead, WS V, WL
44	2452	70	25	1172	3324	0	Min Live, Live 1, Min Dead, WS V, WL
45	2452	76	25	1172	3507	0	Min Live, Live 2, Min Dead, WS V, WL
46	2452	76	25	1172	3503	0	Min Live, Live 3, Min Dead, WS V, WL
47	[illegible] Fx	Fz	Fy	[illegible] Mz	My	Mx	Min Live, Live 4, Min Dead, WS V, WL
48	[illegible]	80	25	1172	3629	[illegible]	Min Live, Live 5, Min Dead, WS V, WL
Envelope	4753	80	25	46,008 kip-in	146,424 kip-in	0	Maximum
	2452	70	25	1172	3324	0	Minimum

Calc. for	Station 46	Job No.	75298
Made by	KEB	Date	04/30/21
Chkd by		Date	

HNTB

Service I Load Combinations

Units	Fx	Fz	Fy	Mz	My	Mx	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
49	3233	58	25	3070	8521	0	Max Live, Live 1, Dead, WS
50	3490	62	25	3070	9301	0	Max Live, Live 2, Dead, WS
51	3490	62	25	3070	2857	0	Max Live, Live 3, Dead, WS
52	3668	65	25	3070	6511	0	Max Live, Live 4, Dead, WS
53	3668	65	25	3070	2951	0	Max Live, Live 5, Dead, WS
54	2846	58	25	1218	2725	0	Min Live, Live 1, Dead, WS
55	2846	62	25	1218	2861	0	Min Live, Live 2, Dead, WS
56	2846	62	25	1218	2857	0	Min Live, Live 3, Dead, WS
57	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Min Live, Live 4, Dead, WS
58	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Min Live, Live 5, Dead, WS
Envelope	3668	65	25	36,840 kip-in	111,612 kip-in	0	Maximum
	2846	58	25	1218	2725	0	Minimum

Service IV Load Combinations

Units	Fx	Fz	Fy	Mz	My	Mx	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
59	2808	58	0	5,556 kip-in	36,180 kip-in	0	Only Service IV Case

Extreme Event I Load Combinations

Units	Fx	Fz	Fy	Mz	My	Mx	Description of Case
	kip	kip	kip	kip-ft	kip-ft	kip-ft	
60	2897	127	0	463	4118	0	Seismic LC1, No Live, Max Dead
61	2897	422	0	463	13725	0	Seismic LC2, No Live, Max Dead
62	3090	130	0	1389	7119	0	Seismic LC1, Live 1, Max Dead
63	3219	132	0	1389	7509	0	Seismic LC1, Live 2, Max Dead
64	3219	132	0	1389	4287	0	Seismic LC1, Live 3, Max Dead
65	3308	134	0	1389	6114	0	Seismic LC1, Live 4, Max Dead
66	3308	134	0	1389	4334	0	Seismic LC1, Live 5, Max Dead
67	3090	426	0	1389	16726	0	Seismic LC2, Live 1, Max Dead
68	3219	428	0	1389	17116	0	Seismic LC2, Live 2, Max Dead
69	3219	428	0	1389	13894	0	Seismic LC2, Live 3, Max Dead
70	3308	429	0	1389	15721	0	Seismic LC2, Live 4, Max Dead
71	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Seismic LC2, Live 5, Max Dead
Envelope	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Maximum
	2897	127	0	5,556 kip-in	49,416 kip-in	0	Minimum

Pier 3 14x117

3 Rows - Plumb

Input Summary

```
=========================================================================

                GROUP for Windows, Version 2016.10.13

                 Serial Number : 364300562

                 Analysis of A Group of Piles
              Subjected to Axial and Lateral Loading

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=========================================================================


This program is licensed to :

GZA GeoEnvironmental, Inc.
Portland, ME

Path to file locations      : C:\Users\nicholas.williams\Desktop\WoolwichGroup\3Rows_Plumb\
Name of input data file     : Pier3_14x117_3Rows_Plumb.gp10r
Name of output echo file    : Pier3_14x117_3Rows_Plumb.gp10e
Name of output results file : Pier3_14x117_3Rows_Plumb.gp10o
Name of output summary file : Pier3_14x117_3Rows_Plumb.gp10t
Name of plot output file    : Pier3_14x117_3Rows_Plumb.gp10p
Name of runtime file        : Pier3_14x117_3Rows_Plumb.gp10r


-------------------------------------------------------------------------
                     Time and Date of Analysis
-------------------------------------------------------------------------

          Date:  August 26, 2021     Time:  10:20:57




           *****     INPUT INFORMATION     *****


Woolwich - Pier 3

ANALYSIS TYPE = 3D ANALYSIS

ADJUST DEPTH FOR BATTER PILES

GENERATE LOAD-DISP (AND T-R) CURVES BASED ON SOIL PROFILE

EXTEND INTERPOLATION FOR L-DP (AND T-R) CURVES

UNITS SYSTEM  = ENGL
```

```
* TABLE B *  PILE CAP OPTIONS

LENGTH,YY    ( FT ) =    25.00
WIDTH, ZZ    ( FT ) =    40.00
THICKNESS,XX ( FT ) =    7.000

* PILE CAP DIMENSIONS ARE NOT CONSIDERED
  FOR THE PILE GROUP ANALYSIS



* TABLE C *  LOAD AND CONTROL PARAMETERS


** LOAD CASES **


NUMBER OF LOAD CASES :    7


LOAD CASE    :     1
CASE NAME    : Strength I Load Combination
LOAD TYPE    : Dead, DL
SCALE FACTOR :       1.0000

* CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
      KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   5.15E+03      0.00      24.0      0.00  1.42E+05  4.58E+04      0.00      0.00      0.00


* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
             5147.00           0.00000           24.0000

       MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
             0.00000       1.42440E+05           45828.0


* THE LOADING IS STATIC *


* CONTROL PARAMETERS *
    TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
    TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
    MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
    MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
    FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
    MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
    PRINT RESULTS AT PILE CAP AND PILE HEADS
```

```
 LOAD CASE    :     2
 CASE NAME    : Strength III Load Combination
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000

 * CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
      KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   3.55E+03      0.00  1.03E+02      0.00  6.43E+04  6.95E+03      0.00      0.00      0.00


 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
              3552.00           0.00000           103.000

       MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
              0.00000           64332.0           6948.00


 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     3
 CASE NAME    : Strength IV Load Combination
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000

 * CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
      KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   4.35E+03      0.00      0.00      0.00      0.00  8.33E+03      0.00      0.00      0.00


 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
              4345.50           0.00000           0.00000

       MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
              0.00000           0.00000           8332.80
```

```
 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     4
 CASE NAME    : Strength V Load Combination
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000

 * CONCENTRATED LOADS *

NL  VERT.LOAD HR.LOAD Y HR.LOAD Z  MOMENT X  MOMENT Y  MOMENT Z   COORD X   COORD Y   COORD Z
      KIP       KIP       KIP      KIP-IN    KIP-IN    KIP-IN      FT        FT        FT
 1   4.75E+03      25.0      80.0      0.00  1.46E+05  4.60E+04      0.00      0.00      0.00


 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

       VER.LOAD X,KIP     HOR.LOAD Y,KIP     HOR.LOAD Z,KIP
              4753.00           25.0000           80.0000

       MOMENT X,KIP-IN    MOMENT Y,KIP-IN    MOMENT Z,KIP-IN
              0.00000       1.46424E+05           46008.0


 * THE LOADING IS STATIC *


 * CONTROL PARAMETERS *
     TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT        =  1.00000E-04
     TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS       =  1.00000E-03 IN
     MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS =      100
     MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS   =      100
     FACTOR TO APPLY THE LOAD IN INCREMENTS               =   1.0000
     MINIMUM FACTOR FOR LOAD INCREMENTS                   =   1.0000
     PRINT RESULTS AT PILE CAP AND PILE HEADS


 LOAD CASE    :     5
 CASE NAME    : Service I Load Combination
 LOAD TYPE    : Dead, DL
 SCALE FACTOR :       1.0000

 * CONCENTRATED LOADS *
```

NL	VERT.LOAD	HR.LOAD Y	HR.LOAD Z	MOMENT X	MOMENT Y	MOMENT Z	COORD X	COORD Y	COORD Z
	KIP	KIP	KIP	KIP-IN	KIP-IN	KIP-IN	FT	FT	FT
1	3.67E+03	25.0	65.0	0.00	1.12E+05	3.68E+04	0.00	0.00	0.00

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VER.LOAD X,KIP	HOR.LOAD Y,KIP	HOR.LOAD Z,KIP
3668.00	25.0000	65.0000

MOMENT X,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	1.11612E+05	36840.0

* THE LOADING IS STATIC *

* CONTROL PARAMETERS *
TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT = 1.00000E-04
TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS = 1.00000E-03 IN
MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS = 100
MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS = 100
FACTOR TO APPLY THE LOAD IN INCREMENTS = 1.0000
MINIMUM FACTOR FOR LOAD INCREMENTS = 1.0000
PRINT RESULTS AT PILE CAP AND PILE HEADS

LOAD CASE : 6
CASE NAME : Service IV Load Combination
LOAD TYPE : Dead, DL
SCALE FACTOR : 1.0000

* CONCENTRATED LOADS *

NL	VERT.LOAD	HR.LOAD Y	HR.LOAD Z	MOMENT X	MOMENT Y	MOMENT Z	COORD X	COORD Y	COORD Z
	KIP	KIP	KIP	KIP-IN	KIP-IN	KIP-IN	FT	FT	FT
1	2.81E+03	0.00	58.0	0.00	3.62E+04	5.56E+03	0.00	0.00	0.00

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VER.LOAD X,KIP	HOR.LOAD Y,KIP	HOR.LOAD Z,KIP
2808.00	0.00000	58.0000

MOMENT X,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	36180.0	5556.00

* THE LOADING IS STATIC *

* CONTROL PARAMETERS *
TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT = 1.00000E-04
TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS = 1.00000E-03 IN
MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS = 100
MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS = 100
FACTOR TO APPLY THE LOAD IN INCREMENTS = 1.0000
MINIMUM FACTOR FOR LOAD INCREMENTS = 1.0000
PRINT RESULTS AT PILE CAP AND PILE HEADS

LOAD CASE : 7
CASE NAME : Extreme Event I
LOAD TYPE : Dead, DL
SCALE FACTOR : 1.0000

* CONCENTRATED LOADS *

NL	VERT.LOAD	HR.LOAD Y	HR.LOAD Z	MOMENT X	MOMENT Y	MOMENT Z	COORD X	COORD Y	COORD Z
	KIP	KIP	KIP	KIP-IN	KIP-IN	KIP-IN	FT	FT	FT
1	2.90E+03	0.00	1.27E+02	0.00	4.94E+04	5.56E+03	0.00	0.00	0.00

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VER.LOAD X,KIP	HOR.LOAD Y,KIP	HOR.LOAD Z,KIP
2897.00	0.00000	127.000

MOMENT X,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	49416.0	5556.00

* THE LOADING IS STATIC *

* CONTROL PARAMETERS *
TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT = 1.00000E-04
TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS = 1.00000E-03 IN
MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS = 100
MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS = 100
FACTOR TO APPLY THE LOAD IN INCREMENTS = 1.0000
MINIMUM FACTOR FOR LOAD INCREMENTS = 1.0000
PRINT RESULTS AT PILE CAP AND PILE HEADS

* TABLE D * ARRANGEMENT OF PILE GROUPS

GROUP	CONN.Z-Z	CONN.Y-Y	PILE PROP	P-Y CURVE	L-S CURVE	T-R CURVE	R-F-L SET
1	FIX	FIX	1	0	1 G	1 G	0
2	FIX	FIX	1	0	1 G	1 G	0
3	FIX	FIX	1	0	1 G	1 G	0
4	FIX	FIX	1	0	1 G	1 G	0
5	FIX	FIX	1	0	1 G	1 G	0
6	FIX	FIX	1	0	1 G	1 G	0
7	FIX	FIX	1	0	1 G	1 G	0
8	FIX	FIX	1	0	1 G	1 G	0
9	FIX	FIX	1	0	1 G	1 G	0
10	FIX	FIX	1	0	1 G	1 G	0

11	FIX	FIX	1	0	1 G	1 G	0
12	FIX	FIX	1	0	1 G	1 G	0
13	FIX	FIX	1	0	1 G	1 G	0
14	FIX	FIX	1	0	1 G	1 G	0
15	FIX	FIX	1	0	1 G	1 G	0
16	FIX	FIX	1	0	1 G	1 G	0
17	FIX	FIX	1	0	1 G	1 G	0
18	FIX	FIX	1	0	1 G	1 G	0
19	FIX	FIX	1	0	1 G	1 G	0
20	FIX	FIX	1	0	1 G	1 G	0
21	FIX	FIX	1	0	1 G	1 G	0

GROUP	CorX,FT	CorY,FT	CorZ,FT	ALPHA,DEG	BETA,DEG	THETA,DEG	GROUND,FT	SPz,KIP-IN	SPy,KIP-IN
1	2.500	5.000	-15.00	0.000	90.00	0.000	-4.500	0.000	0.000
2	2.500	5.000	-10.00	0.000	90.00	90.00	-4.500	0.000	0.000
3	2.500	5.000	-5.000	0.000	90.00	90.00	-4.500	0.000	0.000
4	2.500	5.000	0.000	0.000	90.00	90.00	-4.500	0.000	0.000
5	2.500	5.000	5.000	0.000	90.00	90.00	-4.500	0.000	0.000
6	2.500	5.000	10.00	0.000	90.00	90.00	-4.500	0.000	0.000
7	2.500	5.000	15.00	0.000	90.00	0.000	-4.500	0.000	0.000
8	2.500	0.000	-15.00	0.000	90.00	0.000	-4.500	0.000	0.000
9	2.500	0.000	-10.00	0.000	90.00	90.00	-4.500	0.000	0.000
10	2.500	0.000	-5.000	0.000	90.00	90.00	-4.500	0.000	0.000
11	2.500	0.000	0.000	0.000	90.00	90.00	-4.500	0.000	0.000
12	2.500	0.000	5.000	0.000	90.00	90.00	-4.500	0.000	0.000
13	2.500	0.000	10.00	0.000	90.00	90.00	-4.500	0.000	0.000
14	2.500	0.000	15.00	0.000	90.00	0.000	-4.500	0.000	0.000
15	2.500	-5.000	-15.00	0.000	90.00	0.000	-4.500	0.000	0.000
16	2.500	-5.000	-10.00	0.000	90.00	90.00	-4.500	0.000	0.000
17	2.500	-5.000	-5.000	0.000	90.00	90.00	-4.500	0.000	0.000
18	2.500	-5.000	0.000	0.000	90.00	90.00	-4.500	0.000	0.000
19	2.500	-5.000	5.000	0.000	90.00	90.00	-4.500	0.000	0.000
20	2.500	-5.000	10.00	0.000	90.00	90.00	-4.500	0.000	0.000
21	2.500	-5.000	15.00	0.000	90.00	0.000	-4.500	0.000	0.000

* TABLE E *   PILE GEOMETRY AND PROPERTIES
PILE TYPE = 1 - DRIVEN PILE
= 2 - DRILLED SHAFT

PROP	SECTS	INC	PILE TYPE	LENGTH, FT
1	1	100	1	123.20
2	1	100	1	86.600

* PILE SECTIONS *

PROP	SECT	FROM,FT	TO,FT	CROSS SECT
1	1	0.00000	123.200	1
2	1	0.00000	86.6000	1

* PILE CROSS SECTIONS *

CROSS SECTION : 1
SECTION NAME : HP

TYPE : ELASTIC
CROSS SECTION TYPE : AISC SECTION (HP)
AISC SECTION NAME : HP14X117
EQUIVALENT DIAMETER : 14.2500 IN
EXTERNAL WIDTH : 14.9000 IN
EXTERNAL DEPTH : 14.2000 IN
FLANGE THICKNESS : 0.80500 IN
WEB THICKNESS : 0.80500 IN
YOUNG MODULUS : 29000.0 KIP/IN**2
SHEAR MODULUS : 11153.8 KIP/IN**2

* PILE CROSS SECTIONS PROPERTIES *

ELASTIC SECTIONS

SECT	DIAM,IN	AREA,IN**2	Iz,IN**4	Iy,IN**4	GJ,KIP-IN**2	Mn,KIP-IN	Vn,KIP
1	14.250	34.400	443.00	1220.0	8.9455E+04	0.0000	0.0000

* TABLE F *   SOIL DATA

SOILS INFORMATION

GROUND SURFACE = -2.00000 FT

5 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SOFT CLAY

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	-2.00000	29.0000
EFFECTIVE UNIT WEIGHT	(KIP/FT**3)	0.0480000	0.0480000
UNDRAINED COHESION, C	(KIP/FT**2)	0.40000	0.40000
STRAIN AT 50% STRESS		1.00000E-02	1.00000E-02
ULTIMATE UNIT SIDE FRICTION	(KIP/FT**2)	0.40000 (P)	0.57862 (P)
ULTIMATE UNIT TIP RESISTANCE	(KIP/FT**2)	0.00000	0.00000

LAYER 2
THE SOIL IS A STIFF CLAY WITHOUT FREE WATER

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	29.0000	36.0000
EFFECTIVE UNIT WEIGHT	(KIP/FT**3)	0.0530000	0.0530000
UNDRAINED COHESION, C	(KIP/FT**2)	0.90000	0.90000
STRAIN AT 50% STRESS		7.00000E-03	7.00000E-03
ULTIMATE UNIT SIDE FRICTION	(KIP/FT**2)	0.57862 (P)	0.50558 (P)
ULTIMATE UNIT TIP RESISTANCE	(KIP/FT**2)	0.00000	0.00000

LAYER 3
THE SOIL IS A SOFT CLAY

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	36.0000	103.000
EFFECTIVE UNIT WEIGHT	(KIP/FT**3)	0.0530000	0.0530000
UNDRAINED COHESION, C	(KIP/FT**2)	0.55000	0.55000

STRAIN AT 50% STRESS		8.00000E-03	8.00000E-03
ULTIMATE UNIT SIDE FRICTION	(KIP/FT**2)	0.50558 (P)	0.86248 (P)
ULTIMATE UNIT TIP RESISTANCE	(KIP/FT**2)	0.00000	0.00000

LAYER 4
THE SOIL IS A SAND

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	103.000	125.000
EFFECTIVE UNIT WEIGHT	(KIP/FT**3)	0.0670000	0.0670000
FRICTION ANGLE	(DEGREES)	33.0000	33.0000
P-Y SUBGRADE MODULUS	(KIP/IN**3)	0.0650000	0.0650000
ULTIMATE UNIT SIDE FRICTION	(KIP/FT**2)	2.30272 (P)	0.00000
ULTIMATE UNIT TIP RESISTANCE	(KIP/FT**2)	0.00000	0.00000

LAYER 5
THE LAYER IS A VUGGY LIMESTONE

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	125.000	135.000
EFFECTIVE UNIT WEIGHT	(KIP/FT**3)	0.10800	0.10800
UNIAXIAL COMPRESSIVE STRENGTH	(KIP/IN**2)	5.20000	5.20000
ULTIMATE UNIT SIDE FRICTION	(KIP/FT**2)	1.00000	1.00000
ULTIMATE UNIT TIP RESISTANCE	(KIP/FT**2)	5000.00	5000.00

Notes : Program estimated values for listed parameters
if zero input values were entered:
(P) ULTIMATE UNIT SIDE FRICTION for Driven Piles

* TABLE H * AXIAL LOAD VS DISPLACEMENT

AXIAL LOAD-DISPLACEMENT CURVES GENERATED INTERNALLY

NUM OF CURVES 1

CURVE 1 NUM OF POINTS 19

DISPLACEMENT, IN	AXIAL LOAD,KIP
-2.38988	-387.101
-1.35790	-363.379
-0.84190	-351.518
-0.34145	-277.522
-0.26013	-256.197
-0.0859620	-125.327
-0.0423018	-66.0812
-8.23258E-03	-12.4383
-8.23258E-04	-1.24383
0.00000	0.00000
0.0243956	38.2946
0.21018	244.718
0.62277	534.377
0.93043	743.656
1.93279	1409.09
2.11320	1499.73
2.58044	1548.91
3.09643	1560.77
4.12841	1584.49

* TABLE I * TORS. MOM. VS ANGLE ROT.

TORQUE-ROTATION CURVES GENERATED INTERNALLY

NUM OF CURVES 1

CURVE 1 NUM OF POINTS 19

ROT. ANGLE,Rad.	TORS.MOMEN,KIP-IN
-32.3444	-2792.61
-31.4077	-2742.83
-30.7495	-2705.71
-29.0891	-2604.85
-28.4370	-2564.20
-25.2470	-2361.92
-23.8180	-2269.54
-20.7124	-2064.70
-16.4157	-1771.92
0.00000	0.00000
16.4157	1771.92
20.7124	2064.70
23.8180	2269.54
25.2470	2361.92
28.4370	2564.20
29.0891	2604.85
30.7495	2705.71
31.4077	2742.83
32.3444	2792.61

* TABLE J * MOMENT CURVATURE SETS

USER DEFINED MOMENT CURVATURE

NUM OF SETS : 1

CURVE SET 1 NUM OF CURVES 1

CURVE 1 AXIAL LOAD 0.000E+00KIPS

POINT	MOMENT KIPS-IN	CURVATURE RADIAN/IN
1	0.00000	0.00000

* TABLE K *   REDUCTION FACTORS

AVERAGE DIAMETER IS USED TO GET RATIO S/B

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS ALONG Y-DIRECTION
ESTIMATED ASSUMING MOVEMENT IN THE DIRECTION OF Y-FORCE (+)

GROUP NO	P-FACTOR	Y-FACTOR
1	1.0000	1.0000
2	1.0000	1.0000
3	1.0000	1.0000
4	1.0000	1.0000
5	1.0000	1.0000
6	1.0000	1.0000
7	1.0000	1.0000
8	0.8066	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.8066	1.0000
15	0.8066	1.0000
16	0.7850	1.0000
17	0.7850	1.0000
18	0.7850	1.0000
19	0.7850	1.0000
20	0.7850	1.0000
21	0.8066	1.0000

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS ALONG Z-DIRECTION
ESTIMATED ASSUMING MOVEMENT IN THE DIRECTION OF Z-FORCE (+)

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8066	1.0000
2	0.8066	1.0000
3	0.8066	1.0000
4	0.8066	1.0000
5	0.8066	1.0000
6	0.8066	1.0000
7	1.0000	1.0000
8	0.7850	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	1.0000	1.0000
15	0.8066	1.0000
16	0.8066	1.0000
17	0.8066	1.0000
18	0.8066	1.0000
19	0.8066	1.0000
20	0.8066	1.0000
21	1.0000	1.0000

Pier 3 14x117

3 Rows - Plumb

Summary Output (All Load Cases)

===

GROUP for Windows, Version 2016.10.13

Serial Number : 364300562

Analysis of A Group of Piles
Subjected to Axial and Lateral Loading

===

Time and Date of Analysis

Date: August 26, 2021 Time: 10:20:57

***** COMPUTATION RESULTS *****

Woolwich - Pier 3

***** LOAD CASES RESULTS *****

LOAD CASE : 1
CASE NAME : Strength I Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8066	1.0000
2	0.7915	1.0000
3	0.7915	1.0000
4	0.7915	1.0000
5	0.7915	1.0000
6	0.7915	1.0000
7	0.8691	1.0000
8	0.8002	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.8691	1.0000
15	0.9462	1.0000
16	0.9462	1.0000
17	0.9462	1.0000
18	0.9462	1.0000
19	0.9462	1.0000
20	0.9462	1.0000
21	1.0000	1.0000

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
5147.00	0.00000	24.0000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	1.42440E+05	45828.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.22542	-0.0696210	0.0455221

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
1.33166E-06	5.37493E-04	8.97632E-04

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.074811	-0.042452	0.029477	1.3317E-06	5.3749E-04	8.9763E-04
2	0.1071	-0.042532	0.029477	1.3317E-06	5.3749E-04	8.9763E-04
3	0.1393	-0.042612	0.029477	1.3317E-06	5.3749E-04	8.9763E-04
4	0.1716	-0.042692	0.029477	1.3317E-06	5.3749E-04	8.9763E-04
5	0.2038	-0.042772	0.029477	1.3317E-06	5.3749E-04	8.9763E-04
6	0.2361	-0.042852	0.029477	1.3317E-06	5.3749E-04	8.9763E-04

7	0.2683	-0.042932	0.029477	1.3317E-06	5.3749E-04	8.9763E-04
8	0.1287	-0.042452	0.029397	1.3317E-06	5.3749E-04	8.9763E-04
9	0.1609	-0.042532	0.029397	1.3317E-06	5.3749E-04	8.9763E-04
10	0.1932	-0.042612	0.029397	1.3317E-06	5.3749E-04	8.9763E-04
11	0.2254	-0.042692	0.029397	1.3317E-06	5.3749E-04	8.9763E-04
12	0.2577	-0.042772	0.029397	1.3317E-06	5.3749E-04	8.9763E-04
13	0.2899	-0.042852	0.029397	1.3317E-06	5.3749E-04	8.9763E-04
14	0.3222	-0.042932	0.029397	1.3317E-06	5.3749E-04	8.9763E-04
15	0.1825	-0.042452	0.029317	1.3317E-06	5.3749E-04	8.9763E-04
16	0.2148	-0.042532	0.029317	1.3317E-06	5.3749E-04	8.9763E-04
17	0.2470	-0.042612	0.029317	1.3317E-06	5.3749E-04	8.9763E-04
18	0.2793	-0.042692	0.029317	1.3317E-06	5.3749E-04	8.9763E-04
19	0.3115	-0.042772	0.029317	1.3317E-06	5.3749E-04	8.9763E-04
20	0.3438	-0.042852	0.029317	1.3317E-06	5.3749E-04	8.9763E-04
21	0.3760	-0.042932	0.029317	1.3317E-06	5.3749E-04	8.9763E-04
MINIMUM	0.074811	-0.042932	0.029317	1.3317E-06	5.3749E-04	8.9763E-04
Pile N.	1	7	15	1	1	1
MAXIMUM	0.3760	-0.042452	0.029477	1.3317E-06	5.3749E-04	8.9763E-04
Pile N.	21	1	1	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
1	94.310	-0.9667	0.7340	1.4374E-04	167.70	114.13
2	130.14	0.5691	1.2238	1.4374E-04	40.453	365.43
3	165.97	0.5623	1.2125	1.4374E-04	40.263	363.97
4	201.81	0.5556	1.2012	1.4374E-04	40.074	362.51
5	237.64	0.5489	1.1899	1.4374E-04	39.884	361.05
6	262.89	0.5395	1.1813	1.4374E-04	39.767	359.76
7	285.53	-1.1036	0.8175	1.4374E-04	163.52	106.69
8	154.15	-0.9342	0.6921	1.4374E-04	168.34	113.59
9	189.98	0.5975	1.1858	1.4374E-04	40.758	364.62
10	225.81	0.5908	1.1746	1.4374E-04	40.568	363.16
11	255.41	0.5826	1.1648	1.4374E-04	40.421	361.80
12	278.06	0.5726	1.1568	1.4374E-04	40.323	360.55
13	300.70	0.5626	1.1488	1.4374E-04	40.224	359.31
14	323.34	-1.0929	0.7927	1.4374E-04	164.12	106.17
15	213.99	-1.2385	0.9696	1.4374E-04	162.51	107.60
16	247.94	0.2284	1.4406	1.4374E-04	35.766	358.13
17	270.58	0.2168	1.4320	1.4374E-04	35.682	356.84
18	293.23	0.2053	1.4235	1.4374E-04	35.598	355.54
19	315.87	0.1939	1.4149	1.4374E-04	35.514	354.25
20	338.51	0.1825	1.4064	1.4374E-04	35.430	352.95
21	361.15	-1.3724	1.0371	1.4374E-04	159.28	100.95
MINIMUM	94.310	-1.3724	0.6921	1.4374E-04	35.430	100.95
Pile N.	1	21	8	1	20	21
MAXIMUM	361.15	0.5975	1.4406	1.4374E-04	168.34	365.43
Pile N.	21	9	16	1	8	2

THE PILE COORDINATE SYSTEM (LOCAL AXES)
----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
1	0.074811	-0.042452	0.029477	1.3317E-06	5.3749E-04	8.9763E-04
2	0.1071	0.029477	0.042532	1.3317E-06	8.9763E-04	-5.3749E-04
3	0.1393	0.029477	0.042612	1.3317E-06	8.9763E-04	-5.3749E-04
4	0.1716	0.029477	0.042692	1.3317E-06	8.9763E-04	-5.3749E-04
5	0.2038	0.029477	0.042772	1.3317E-06	8.9763E-04	-5.3749E-04
6	0.2361	0.029477	0.042852	1.3317E-06	8.9763E-04	-5.3749E-04
7	0.2683	-0.042932	0.029477	1.3317E-06	5.3749E-04	8.9763E-04
8	0.1287	-0.042452	0.029397	1.3317E-06	5.3749E-04	8.9763E-04
9	0.1609	0.029397	0.042532	1.3317E-06	8.9763E-04	-5.3749E-04
10	0.1932	0.029397	0.042612	1.3317E-06	8.9763E-04	-5.3749E-04
11	0.2254	0.029397	0.042692	1.3317E-06	8.9763E-04	-5.3749E-04
12	0.2577	0.029397	0.042772	1.3317E-06	8.9763E-04	-5.3749E-04
13	0.2899	0.029397	0.042852	1.3317E-06	8.9763E-04	-5.3749E-04
14	0.3222	-0.042932	0.029397	1.3317E-06	5.3749E-04	8.9763E-04
15	0.1825	-0.042452	0.029317	1.3317E-06	5.3749E-04	8.9763E-04
16	0.2148	0.029317	0.042532	1.3317E-06	8.9763E-04	-5.3749E-04
17	0.2470	0.029317	0.042612	1.3317E-06	8.9763E-04	-5.3749E-04
18	0.2793	0.029317	0.042692	1.3317E-06	8.9763E-04	-5.3749E-04
19	0.3115	0.029317	0.042772	1.3317E-06	8.9763E-04	-5.3749E-04
20	0.3438	0.029317	0.042852	1.3317E-06	8.9763E-04	-5.3749E-04
21	0.3760	-0.042932	0.029317	1.3317E-06	5.3749E-04	8.9763E-04
MINIMUM	0.074811	-0.042932	0.029317	1.3317E-06	5.3749E-04	-5.3749E-04
Pile N.	1	7	15	1	1	2
MAXIMUM	0.3760	0.029477	0.042852	1.3317E-06	8.9763E-04	8.9763E-04
Pile N.	21	2	6	1	2	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
1	94.310	-0.9667	0.7340	1.4374E-04	167.70	114.13
2	130.14	1.2238	-0.5691	1.4374E-04	365.43	-40.453
3	165.97	1.2125	-0.5623	1.4374E-04	363.97	-40.263
4	201.81	1.2012	-0.5556	1.4374E-04	362.51	-40.074
5	237.64	1.1899	-0.5489	1.4374E-04	361.05	-39.884
6	262.89	1.1813	-0.5395	1.4374E-04	359.76	-39.767
7	285.53	-1.1036	0.8175	1.4374E-04	163.52	106.69
8	154.15	-0.9342	0.6921	1.4374E-04	168.34	113.59
9	189.98	1.1858	-0.5975	1.4374E-04	364.62	-40.758
10	225.81	1.1746	-0.5908	1.4374E-04	363.16	-40.568
11	255.41	1.1648	-0.5826	1.4374E-04	361.80	-40.421
12	278.06	1.1568	-0.5726	1.4374E-04	360.55	-40.323
13	300.70	1.1488	-0.5626	1.4374E-04	359.31	-40.224
14	323.34	-1.0929	0.7927	1.4374E-04	164.12	106.17
15	213.99	-1.2385	0.9696	1.4374E-04	162.51	107.60
16	247.94	1.4406	-0.2284	1.4374E-04	358.13	-35.766
17	270.58	1.4320	-0.2168	1.4374E-04	356.84	-35.682
18	293.23	1.4235	-0.2053	1.4374E-04	355.54	-35.598
19	315.87	1.4149	-0.1939	1.4374E-04	354.25	-35.514

20	338.51	1.4064	-0.1825	1.4374E-04	352.95	-35.430
21	361.15	-1.3724	1.0371	1.4374E-04	159.28	100.95
MINIMUM	94.310	-1.3724	-0.5975	1.4374E-04	159.28	-40.758
Pile N.	1	21	9	1	21	9
MAXIMUM	361.15	1.4406	1.0371	1.4374E-04	365.43	114.13
Pile N.	21	16	21	1	2	1

Controlling Axial Pile Demand

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	4.8221
2	6.0144
3	7.0469
4	8.0795
5	9.1121
6	9.8383
7	10.264
8	6.5558
9	7.7508
10	8.7834
11	9.6356
12	10.286
13	10.937
14	11.358
15	8.1944
16	9.3769
17	10.027
18	10.678
19	11.328
20	11.979
21	12.370
MINIMUM	4.8221
Pile N.	1
MAXIMUM	12.370
Pile N.	21

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-0.042452	-1.6002E-03	-128.51	-10.187	-0.6837	-1.7681	-0.037447	-0.017528	2.7416	1.2847E+07	3.5380E+07
x(FT)	0.0000	12.320	2.4640	18.480	0.0000	8.6240	0.0000	13.552	55.440	0.0000	0.0000
2	-1.3755E-03	-3.3205E-03	-3.9350	-18.409	-0.9016	-3.0959	-0.011289	-0.027251	3.7832	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	56.672	0.0000	0.0000
3	-1.3827E-03	-3.3260E-03	-3.9542	-18.442	-0.9063	-3.0985	-0.011335	-0.027266	4.8248	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	56.672	0.0000	0.0000
4	-1.3898E-03	-3.3315E-03	-3.9733	-18.476	-0.9111	-3.1012	-0.011381	-0.027282	5.8665	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	56.672	0.0000	0.0000
5	-1.3969E-03	-3.3371E-03	-3.9925	-18.510	-0.9158	-3.1038	-0.011427	-0.027298	6.9081	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	56.672	0.0000	0.0000
6	-1.4017E-03	-3.3389E-03	-4.0049	-18.522	-0.9188	-3.1045	-0.011460	-0.027298	7.6420	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	56.672	0.0000	0.0000
7	-0.042932	-1.5898E-03	-128.07	-10.450	-0.7860	-1.8276	-0.040595	-0.018343	8.3002	1.2847E+07	3.5380E+07
x(FT)	0.0000	12.320	2.4640	18.480	0.0000	8.6240	0.0000	13.552	55.440	0.0000	0.0000
8	-0.042452	-1.6182E-03	-128.47	-10.280	-0.6494	-1.7702	-0.037171	-0.017509	4.4811	1.2847E+07	3.5380E+07
x(FT)	0.0000	12.320	2.4640	18.480	0.0000	8.6240	0.0000	13.552	55.440	0.0000	0.0000
9	-1.3915E-03	-3.3563E-03	-3.9689	-18.554	-0.9086	-3.1017	-0.011286	-0.027221	5.5228	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	56.672	0.0000	0.0000
10	-1.3986E-03	-3.3618E-03	-3.9881	-18.588	-0.9133	-3.1043	-0.011331	-0.027236	6.5644	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	56.672	0.0000	0.0000
11	-1.4043E-03	-3.3650E-03	-4.0032	-18.608	-0.9170	-3.1058	-0.011369	-0.027243	7.4248	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	56.672	0.0000	0.0000
12	-1.4085E-03	-3.3657E-03	-4.0138	-18.614	-0.9196	-3.1060	-0.011399	-0.027239	8.0830	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	56.672	0.0000	0.0000
13	-1.4126E-03	-3.3664E-03	-4.0245	-18.621	-0.9223	-3.1062	-0.011429	-0.027236	8.7412	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	54.208	0.0000	0.0000
14	-0.042932	-1.5983E-03	-128.09	-10.516	-0.7729	-1.8318	-0.040619	-0.018372	9.3993	1.2847E+07	3.5380E+07
x(FT)	0.0000	12.320	2.4640	18.480	0.0000	8.6240	0.0000	13.552	55.440	0.0000	0.0000
15	-0.042452	-1.5417E-03	-129.90	-10.407	-0.9001	-1.8734	-0.043980	-0.019231	6.2207	1.2847E+07	3.5380E+07
x(FT)	0.0000	11.088	2.4640	18.480	0.0000	8.6240	0.0000	12.320	52.976	0.0000	0.0000
16	-1.3080E-03	-3.1063E-03	-3.8879	-18.178	-0.9956	-3.2609	-0.012745	-0.030268	7.2077	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	55.440	0.0000	0.0000
17	-1.3111E-03	-3.1074E-03	-3.8963	-18.192	-0.9981	-3.2613	-0.012771	-0.030269	7.8658	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	55.440	0.0000	0.0000
18	-1.3142E-03	-3.1087E-03	-3.9047	-18.207	-1.0005	-3.2617	-0.012798	-0.030272	8.5240	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	55.440	0.0000	0.0000
19	-1.3173E-03	-3.1100E-03	-3.9131	-18.221	-1.0030	-3.2621	-0.012824	-0.030274	9.1822	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	11.088	11.088	55.440	0.0000	0.0000
20	-1.3205E-03	-3.1113E-03	-3.9214	-18.237	-1.0055	-3.2625	-0.012857	-0.030277	9.8403	1.2847E+07	3.5380E+07
x(FT)	11.088	11.088	17.248	18.480	7.3920	7.3920	9.8560	11.088	55.440	0.0000	0.0000
21	-0.042932	-1.5460E-03	-129.36	-10.547	-1.0057	-1.9196	-0.046765	-0.019977	10.498	1.2847E+07	3.5380E+07
x(FT)	0.0000	11.088	2.4640	18.480	0.0000	8.6240	0.0000	12.320	52.976	0.0000	0.0000
Min.	-0.042932	-3.3664E-03	-129.90	-18.621	-1.0057	-3.2625	-0.046765	-0.030277	2.7416	1.2847E+07	3.5380E+07
Pile N.	7	13	15	13	21	20	21	20	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	1.9237E-03	0.029477	5.7609	179.07	1.5365	0.5385	0.019576	0.028772	5.0579	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	16.016	2.4640	7.3920	0.0000	9.8560	6.1600	2.4640	0.0000	0.0000
2	0.029477	0.042532	71.560	365.43	1.0323	0.2946	0.026626	0.036784	6.0462	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	2.4640	0.0000	1.2320	0.0000	0.0000
3	0.029477	0.042612	71.609	363.97	1.0204	0.2954	0.026584	0.036822	7.0824	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	2.4640	0.0000	1.2320	0.0000	0.0000
4	0.029477	0.042692	71.657	362.51	1.0084	0.2963	0.026542	0.036860	8.1185	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	2.4640	0.0000	1.2320	0.0000	0.0000
5	0.029477	0.042772	71.705	361.05	0.9965	0.2971	0.026500	0.036898	9.1546	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	2.4640	0.0000	1.2320	0.0000	0.0000
6	0.029477	0.042852	71.733	359.76	0.9874	0.2976	0.026460	0.036945	9.8837	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	2.4640	1.2320	1.2320	0.0000	0.0000
7	1.9385E-03	0.029477	5.9639	179.18	1.6085	0.6018	0.020877	0.030495	10.611	1.2847E+07	3.5380E+07

x(FT)	9.8560	0.0000	16.016	2.4640	7.3920	0.0000	9.8560	4.9280	2.4640	0.0000	0.0000
8	1.9574E-03	0.029397	5.8393	179.41	1.5451	0.4964	0.019605	0.028465	6.7979	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	16.016	2.4640	7.3920	0.0000	9.8560	6.1600	2.4640	0.0000	0.0000
9	0.029397	0.042532	71.640	364.62	0.9949	0.2970	0.026318	0.036501	7.7847	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	2.4640	0.0000	1.2320	0.0000	0.0000
10	0.029397	0.042612	71.688	363.16	0.9830	0.2978	0.026276	0.036539	8.8208	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	2.4640	0.0000	1.2320	0.0000	0.0000
11	0.029397	0.042692	71.724	361.80	0.9727	0.2984	0.026236	0.036576	9.6762	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	2.4640	0.0000	1.2320	0.0000	0.0000
12	0.029397	0.042772	71.747	360.55	0.9644	0.2988	0.026196	0.036616	10.330	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	2.4640	1.2320	1.2320	0.0000	0.0000
13	0.029397	0.042852	71.770	359.31	0.9560	0.2992	0.026156	0.036668	10.983	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	2.4640	1.2320	1.2320	0.0000	0.0000
14	1.9565E-03	0.029397	6.0159	179.58	1.6169	0.5760	0.020958	0.030359	11.711	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	16.016	2.4640	7.3920	0.0000	9.8560	4.9280	2.4640	0.0000	0.0000
15	1.8644E-03	0.029317	5.8619	180.56	1.6446	0.7379	0.021910	0.033063	8.5609	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	16.016	2.4640	7.3920	0.0000	9.8560	3.6960	2.4640	0.0000	0.0000
16	0.029317	0.042532	74.062	358.13	1.2112	0.2887	0.031378	0.044026	9.4659	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	1.2320	0.0000	2.4640	0.0000	0.0000
17	0.029317	0.042612	74.084	356.84	1.2024	0.2892	0.031343	0.044071	10.122	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	1.2320	0.0000	2.4640	0.0000	0.0000
18	0.029317	0.042692	74.105	355.54	1.1935	0.2898	0.031308	0.044116	10.777	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	1.2320	0.0000	2.4640	0.0000	0.0000
19	0.029317	0.042772	74.127	354.25	1.1847	0.2903	0.031273	0.044161	11.433	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	1.2320	0.0000	2.4640	0.0000	0.0000
20	0.029317	0.042852	74.148	352.95	1.1759	0.2909	0.031238	0.044209	12.089	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	22.176	1.2320	1.2320	2.4640	0.0000	0.0000
21	1.8728E-03	0.029317	5.9892	180.68	1.7022	0.7890	0.022960	0.034543	12.831	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	16.016	2.4640	7.3920	0.0000	9.8560	3.6960	2.4640	0.0000	0.0000
Max.	0.029477	0.042852	74.148	365.43	1.7022	0.7890	0.031378	0.044209	12.831	1.2847E+07	3.5380E+07
Pile N.	2	6	20	2	21	21	16	20	21	1	1

LOAD CASE : 2
CASE NAME : Strength III Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8066	1.0000
2	0.8059	1.0000
3	0.8059	1.0000
4	0.8059	1.0000
5	0.8059	1.0000
6	0.8059	1.0000
7	0.9941	1.0000
8	0.7857	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.9941	1.0000
15	0.8139	1.0000
16	0.8139	1.0000
17	0.8139	1.0000
18	0.8139	1.0000
19	0.8139	1.0000
20	0.8139	1.0000
21	1.0000	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
3552.00	0.00000	103.000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	64332.0	6948.00

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.14216	-8.87698E-03	0.0476418

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
-2.73280E-07	2.11500E-04	1.10755E-04

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.097447	-5.6035E-03	0.041280	-2.7328E-07	2.1150E-04	1.1076E-04
2	0.1101	-5.5871E-03	0.041280	-2.7328E-07	2.1150E-04	1.1076E-04
3	0.1228	-5.5707E-03	0.041280	-2.7328E-07	2.1150E-04	1.1076E-04
4	0.1355	-5.5543E-03	0.041280	-2.7328E-07	2.1150E-04	1.1076E-04
5	0.1482	-5.5379E-03	0.041280	-2.7328E-07	2.1150E-04	1.1076E-04
6	0.1609	-5.5215E-03	0.041280	-2.7328E-07	2.1150E-04	1.1076E-04
7	0.1736	-5.5051E-03	0.041280	-2.7328E-07	2.1150E-04	1.1076E-04
8	0.1041	-5.6035E-03	0.041297	-2.7328E-07	2.1150E-04	1.1076E-04

9	0.1168	-5.5871E-03	0.041297	-2.7328E-07	2.1150E-04	1.1076E-04
10	0.1295	-5.5707E-03	0.041297	-2.7328E-07	2.1150E-04	1.1076E-04
11	0.1422	-5.5543E-03	0.041297	-2.7328E-07	2.1150E-04	1.1076E-04
12	0.1548	-5.5379E-03	0.041297	-2.7328E-07	2.1150E-04	1.1076E-04
13	0.1675	-5.5215E-03	0.041297	-2.7328E-07	2.1150E-04	1.1076E-04
14	0.1802	-5.5051E-03	0.041297	-2.7328E-07	2.1150E-04	1.1076E-04
15	0.1107	-5.6035E-03	0.041313	-2.7328E-07	2.1150E-04	1.1076E-04
16	0.1234	-5.5871E-03	0.041313	-2.7328E-07	2.1150E-04	1.1076E-04
17	0.1361	-5.5707E-03	0.041313	-2.7328E-07	2.1150E-04	1.1076E-04
18	0.1488	-5.5543E-03	0.041313	-2.7328E-07	2.1150E-04	1.1076E-04
19	0.1615	-5.5379E-03	0.041313	-2.7328E-07	2.1150E-04	1.1076E-04
20	0.1742	-5.5215E-03	0.041313	-2.7328E-07	2.1150E-04	1.1076E-04
21	0.1869	-5.5051E-03	0.041313	-2.7328E-07	2.1150E-04	1.1076E-04
MINIMUM	0.097447	-5.6035E-03	0.041280	-2.7328E-07	2.1150E-04	1.1076E-04
Pile N.	1	1	1	1	1	1
MAXIMUM	0.1869	-5.5051E-03	0.041313	-2.7328E-07	2.1150E-04	1.1076E-04
Pile N.	21	7	15	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
1	119.46	-0.1294	5.6669	-2.9498E-05	-220.81	13.314
2	133.56	0.048958	4.4428	-2.9498E-05	-148.76	44.169
3	147.66	0.052880	4.4386	-2.9498E-05	-148.81	44.323
4	161.76	0.056800	4.4343	-2.9498E-05	-148.86	44.476
5	175.86	0.060719	4.4301	-2.9498E-05	-148.90	44.630
6	189.96	0.064638	4.4258	-2.9498E-05	-148.95	44.783
7	204.06	-0.1648	6.6014	-2.9498E-05	-250.12	12.882
8	126.84	-0.1231	5.5577	-2.9498E-05	-217.62	13.403
9	140.94	0.056268	4.3572	-2.9498E-05	-146.76	44.281
10	155.04	0.060122	4.3530	-2.9498E-05	-146.81	44.432
11	169.14	0.063976	4.3488	-2.9498E-05	-146.85	44.583
12	183.24	0.067828	4.3445	-2.9498E-05	-146.90	44.734
13	197.34	0.071680	4.3403	-2.9498E-05	-146.95	44.886
14	211.44	-0.1644	6.6016	-2.9498E-05	-250.28	12.872
15	134.23	-0.1308	5.7044	-2.9498E-05	-222.25	13.257
16	148.33	0.046935	4.4728	-2.9498E-05	-149.74	44.094
17	162.43	0.050880	4.4686	-2.9498E-05	-149.78	44.249
18	176.53	0.054823	4.4643	-2.9498E-05	-149.83	44.403
19	190.63	0.058766	4.4601	-2.9498E-05	-149.88	44.558
20	204.73	0.062708	4.4558	-2.9498E-05	-149.93	44.712
21	218.83	-0.1656	6.6309	-2.9498E-05	-251.32	12.837
MINIMUM	119.46	-0.1656	4.3403	-2.9498E-05	-251.32	12.837
Pile N.	1	21	13	1	21	21
MAXIMUM	218.83	0.071680	6.6309	-2.9498E-05	-146.76	44.886
Pile N.	21	13	21	1	9	13

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
1	0.097447	-5.6035E-03	0.041280	-2.7328E-07	2.1150E-04	1.1076E-04
2	0.1101	0.041280	5.5871E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
3	0.1228	0.041280	5.5707E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
4	0.1355	0.041280	5.5543E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
5	0.1482	0.041280	5.5379E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
6	0.1609	0.041280	5.5215E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
7	0.1736	-5.5051E-03	0.041280	-2.7328E-07	2.1150E-04	1.1076E-04
8	0.1041	-5.6035E-03	0.041297	-2.7328E-07	2.1150E-04	1.1076E-04
9	0.1168	0.041297	5.5871E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
10	0.1295	0.041297	5.5707E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
11	0.1422	0.041297	5.5543E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
12	0.1548	0.041297	5.5379E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
13	0.1675	0.041297	5.5215E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
14	0.1802	-5.5051E-03	0.041297	-2.7328E-07	2.1150E-04	1.1076E-04
15	0.1107	-5.6035E-03	0.041313	-2.7328E-07	2.1150E-04	1.1076E-04
16	0.1234	0.041313	5.5871E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
17	0.1361	0.041313	5.5707E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
18	0.1488	0.041313	5.5543E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
19	0.1615	0.041313	5.5379E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
20	0.1742	0.041313	5.5215E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
21	0.1869	-5.5051E-03	0.041313	-2.7328E-07	2.1150E-04	1.1076E-04
MINIMUM	0.097447	-5.6035E-03	5.5215E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
Pile N.	1	1	6	1	2	2
MAXIMUM	0.1869	0.041313	0.041313	-2.7328E-07	2.1150E-04	1.1076E-04
Pile N.	21	16	15	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
1	119.46	-0.1294	5.6669	-2.9498E-05	-220.81	13.314
2	133.56	4.4428	-0.048958	-2.9498E-05	44.169	148.76
3	147.66	4.4386	-0.052880	-2.9498E-05	44.323	148.81
4	161.76	4.4343	-0.056800	-2.9498E-05	44.476	148.86
5	175.86	4.4301	-0.060719	-2.9498E-05	44.630	148.90
6	189.96	4.4258	-0.064638	-2.9498E-05	44.783	148.95
7	204.06	-0.1648	6.6014	-2.9498E-05	-250.12	12.882
8	126.84	-0.1231	5.5577	-2.9498E-05	-217.62	13.403
9	140.94	4.3572	-0.056268	-2.9498E-05	44.281	146.76
10	155.04	4.3530	-0.060122	-2.9498E-05	44.432	146.81
11	169.14	4.3488	-0.063976	-2.9498E-05	44.583	146.85
12	183.24	4.3445	-0.067828	-2.9498E-05	44.734	146.90
13	197.34	4.3403	-0.071680	-2.9498E-05	44.886	146.95
14	211.44	-0.1644	6.6016	-2.9498E-05	-250.28	12.872
15	134.23	-0.1308	5.7044	-2.9498E-05	-222.25	13.257
16	148.33	4.4728	-0.046935	-2.9498E-05	44.094	149.74
17	162.43	4.4686	-0.050880	-2.9498E-05	44.249	149.78
18	176.53	4.4643	-0.054823	-2.9498E-05	44.403	149.83
19	190.63	4.4601	-0.058766	-2.9498E-05	44.558	149.88
20	204.73	4.4558	-0.062708	-2.9498E-05	44.712	149.93
21	218.83	-0.1656	6.6309	-2.9498E-05	-251.32	12.837

MINIMUM	119.46	-0.1656	-0.071680	-2.9498E-05	-251.32	12.837
Pile N.	1	21	13	1	21	21
MAXIMUM	218.83	4.4728	6.6309	-2.9498E-05	44.886	149.93
Pile N.	21	16	21	1	13	20

PILE GROUP	STRESS,KIP/IN**2
**********	***************
1	4.7799
2	6.2890
3	6.6997
4	7.1105
5	7.5212
6	7.9320
7	7.4073
8	4.9764
9	6.4717
10	6.8824
11	7.2932
12	7.7039
13	8.1146
14	7.6228
15	5.2173
16	6.7338
17	7.1446
18	7.5553
19	7.9661
20	8.3768
21	7.8434
MINIMUM	4.7799
Pile N.	1
MAXIMUM	8.3768
Pile N.	20

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-5.6035E-03	-8.1114E-04	-15.137	-220.81	-0.086334	-1.4237	-5.7069E-03	-0.016740	3.4727	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.248	2.4640	0.0000	0.0000	14.784	0.0000	17.248	43.120	0.0000	0.0000
2	-7.5673E-04	-1.8601E-04	-148.76	-1.5047	-1.0267	-0.3763	-0.015570	-8.0272E-03	3.8826	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
3	-7.5863E-04	-1.8800E-04	-148.81	-1.5100	-1.0288	-0.3773	-0.015581	-8.0362E-03	4.2924	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
4	-7.6055E-04	-1.8998E-04	-148.86	-1.5152	-1.0310	-0.3784	-0.015593	-8.0452E-03	4.7023	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
5	-7.6249E-04	-1.9195E-04	-148.90	-1.5203	-1.0331	-0.3794	-0.015606	-8.0540E-03	5.1122	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
6	-7.6444E-04	-1.9392E-04	-148.95	-1.5255	-1.0353	-0.3805	-0.015619	-8.0628E-03	5.5221	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
7	-5.5051E-03	-7.4320E-04	-15.503	-250.12	-0.1122	-1.6165	-6.9115E-03	-0.019490	5.9319	1.2847E+07	3.5380E+07
x(FT)	0.0000	16.016	2.4640	0.0000	0.0000	13.552	0.0000	17.248	40.656	0.0000	0.0000
8	-5.6035E-03	-8.2766E-04	-15.121	-217.62	-0.081029	-1.4223	-5.5575E-03	-0.016514	3.6873	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.248	2.4640	0.0000	0.0000	14.784	0.0000	17.248	43.120	0.0000	0.0000
9	-7.6397E-04	-1.8792E-04	-146.76	-1.5057	-1.0072	-0.3746	-0.015206	-8.1201E-03	4.0972	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
10	-7.6583E-04	-1.8998E-04	-146.81	-1.5116	-1.0093	-0.3756	-0.015216	-8.1292E-03	4.5071	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
11	-7.6772E-04	-1.9204E-04	-146.85	-1.5174	-1.0115	-0.3766	-0.015227	-8.1383E-03	4.9169	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
12	-7.6962E-04	-1.9410E-04	-146.90	-1.5231	-1.0137	-0.3777	-0.015237	-8.1472E-03	5.3268	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
13	-7.7155E-04	-1.9615E-04	-146.95	-1.5288	-1.0159	-0.3787	-0.015249	-8.1560E-03	5.7367	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
14	-5.5051E-03	-7.4426E-04	-15.503	-250.28	-0.1117	-1.6177	-6.9097E-03	-0.019500	6.1466	1.2847E+07	3.5380E+07
x(FT)	0.0000	16.016	2.4640	0.0000	0.0000	13.552	0.0000	17.248	40.656	0.0000	0.0000
15	-5.6035E-03	-8.0782E-04	-15.142	-222.25	-0.087192	-1.4257	-5.7551E-03	-0.016830	3.9020	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.248	2.4640	0.0000	0.0000	14.784	0.0000	17.248	43.120	0.0000	0.0000
16	-7.5744E-04	-1.8629E-04	-149.74	-1.5102	-1.0371	-0.3772	-0.015729	-7.9581E-03	4.3118	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
17	-7.5938E-04	-1.8824E-04	-149.78	-1.5152	-1.0393	-0.3783	-0.015742	-7.9672E-03	4.7217	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
18	-7.6133E-04	-1.9019E-04	-149.83	-1.5202	-1.0415	-0.3793	-0.015755	-7.9763E-03	5.1316	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
19	-7.6330E-04	-1.9212E-04	-149.88	-1.5251	-1.0436	-0.3804	-0.015769	-7.9853E-03	5.5415	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
20	-7.6529E-04	-1.9406E-04	-149.93	-1.5299	-1.0457	-0.3814	-0.015783	-7.9942E-03	5.9513	1.2847E+07	3.5380E+07
x(FT)	13.552	11.088	0.0000	18.480	11.088	8.6240	13.552	11.088	36.960	0.0000	0.0000
21	-5.5051E-03	-7.4509E-04	-15.508	-251.32	-0.1126	-1.6256	-6.9487E-03	-0.019600	6.3612	1.2847E+07	3.5380E+07
x(FT)	0.0000	16.016	2.4640	0.0000	0.0000	13.552	0.0000	17.248	40.656	0.0000	0.0000
Min.	-5.6035E-03	-8.2766E-04	-149.93	-251.32	-1.0457	-1.6256	-0.015783	-0.019600	3.4727	1.2847E+07	3.5380E+07
Pile N.	1	8	20	21	20	21	20	21	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	1.5134E-04	0.041280	0.7038	116.48	0.1581	5.3616	5.1911E-03	0.052180	4.7799	1.2847E+07	3.5380E+07
x(FT)	11.088	0.0000	14.784	9.8560	8.6240	0.0000	13.552	6.1600	0.0000	0.0000	0.0000
2	0.041280	5.5871E-03	67.185	44.169	4.1437	0.030947	0.048963	5.6854E-03	6.2890	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
3	0.041280	5.5707E-03	67.228	44.323	4.1407	0.031041	0.048962	5.6689E-03	6.6997	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
4	0.041280	5.5543E-03	67.271	44.476	4.1376	0.031132	0.048961	5.6524E-03	7.1105	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
5	0.041280	5.5379E-03	67.315	44.630	4.1346	0.031220	0.048960	5.6359E-03	7.5212	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
6	0.041280	5.5215E-03	67.358	44.783	4.1316	0.031305	0.048959	5.6194E-03	7.9320	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
7	1.5621E-04	0.041280	0.7053	126.45	0.1721	6.2290	3.6780E-03	0.063209	7.4073	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	14.784	9.8560	7.3920	0.0000	12.320	4.9280	0.0000	0.0000	0.0000
8	1.5098E-04	0.041297	0.7130	115.37	0.1572	5.2607	5.4540E-03	0.050951	4.9764	1.2847E+07	3.5380E+07

x(FT)	11.088	0.0000	14.784	9.8560	8.6240	0.0000	13.552	6.1600	0.0000	0.0000	0.0000
9	0.041297	5.5871E-03	66.667	44.281	4.0666	0.030692	0.047773	5.5362E-03	6.4717	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
10	0.041297	5.5707E-03	66.710	44.432	4.0636	0.030802	0.047772	5.5202E-03	6.8824	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
11	0.041297	5.5543E-03	66.753	44.583	4.0606	0.030910	0.047771	5.5041E-03	7.2932	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
12	0.041297	5.5379E-03	66.796	44.734	4.0575	0.031015	0.047770	5.4881E-03	7.7039	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
13	0.041297	5.5215E-03	66.839	44.886	4.0545	0.031118	0.047770	5.4720E-03	8.1146	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
14	1.5657E-04	0.041297	0.7063	126.51	0.1722	6.2295	3.6856E-03	0.063220	7.6228	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	14.784	9.8560	7.3920	0.0000	12.320	4.9280	0.0000	0.0000	0.0000
15	1.5232E-04	0.041313	0.7031	116.99	0.1588	5.3970	5.0861E-03	0.052626	5.2173	1.2847E+07	3.5380E+07
x(FT)	11.088	0.0000	14.784	9.8560	8.6240	0.0000	13.552	6.1600	0.0000	0.0000	0.0000
16	0.041313	5.5871E-03	67.486	44.094	4.1719	0.031137	0.049432	5.7385E-03	6.7338	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
17	0.041313	5.5707E-03	67.529	44.249	4.1689	0.031223	0.049431	5.7218E-03	7.1446	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
18	0.041313	5.5543E-03	67.573	44.403	4.1659	0.031305	0.049430	5.7052E-03	7.5553	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
19	0.041313	5.5379E-03	67.616	44.558	4.1628	0.031385	0.049429	5.6885E-03	7.9661	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
20	0.041313	5.5215E-03	67.660	44.712	4.1598	0.031462	0.049428	5.6719E-03	8.3768	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
21	1.5660E-04	0.041313	0.7065	126.85	0.1728	6.2569	3.7277E-03	0.063577	7.8434	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	14.784	9.8560	7.3920	0.0000	12.320	4.9280	0.0000	0.0000	0.0000
Max.	0.041313	0.041313	67.660	126.85	4.1719	6.2569	0.049432	0.063577	8.3768	1.2847E+07	3.5380E+07
Pile N.	16	15	20	21	16	21	16	21	20	1	1

LOAD CASE : 3
CASE NAME : Strength IV Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8066	1.0000
2	0.7850	1.0000
3	0.7850	1.0000
4	0.7850	1.0000
5	0.7850	1.0000
6	0.7850	1.0000
7	0.8066	1.0000
8	0.8066	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.8066	1.0000
15	1.0000	1.0000
16	1.0000	1.0000
17	1.0000	1.0000
18	1.0000	1.0000
19	1.0000	1.0000
20	1.0000	1.0000
21	1.0000	1.0000

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
4345.50	0.00000	0.00000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	0.00000	8332.80

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.17617	-7.37484E-03	-2.54602E-13

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
-9.39647E-14	-4.39458E-16	1.25436E-04

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.1686	-3.6118E-03	-5.8793E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
2	0.1686	-3.6118E-03	-5.8793E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
3	0.1686	-3.6118E-03	-5.8793E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
4	0.1686	-3.6118E-03	-5.8793E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
5	0.1686	-3.6118E-03	-5.8793E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
6	0.1686	-3.6118E-03	-5.8793E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
7	0.1686	-3.6118E-03	-5.8793E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
8	0.1762	-3.6118E-03	-2.4142E-13	-9.3965E-14	-4.3946E-16	1.2544E-04
9	0.1762	-3.6118E-03	-2.4142E-13	-9.3965E-14	-4.3946E-16	1.2544E-04
10	0.1762	-3.6118E-03	-2.4142E-13	-9.3965E-14	-4.3946E-16	1.2544E-04

11	0.1762	-3.6118E-03	-2.4142E-13	-9.3965E-14	-4.3946E-16	1.2544E-04
12	0.1762	-3.6118E-03	-2.4142E-13	-9.3965E-14	-4.3946E-16	1.2544E-04
13	0.1762	-3.6118E-03	-2.4142E-13	-9.3965E-14	-4.3946E-16	1.2544E-04
14	0.1762	-3.6118E-03	-2.4142E-13	-9.3965E-14	-4.3946E-16	1.2544E-04
15	0.1837	-3.6118E-03	5.3965E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
16	0.1837	-3.6118E-03	5.3965E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
17	0.1837	-3.6118E-03	5.3965E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
18	0.1837	-3.6118E-03	5.3965E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
19	0.1837	-3.6118E-03	5.3965E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
20	0.1837	-3.6118E-03	5.3965E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
21	0.1837	-3.6118E-03	5.3965E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
MINIMUM	0.1686	-3.6118E-03	-5.8793E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
Pile N.	1	1	1	1	1	1
MAXIMUM	0.1837	-3.6118E-03	5.3965E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
Pile N.	15	1	15	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	198.57	-0.2386	-5.8587E-09	-1.0012E-11	1.8145E-07	26.686
2	198.57	0.1641	-4.6664E-09	-1.0012E-11	1.2053E-07	77.097
3	198.57	0.1641	-4.6664E-09	-1.0012E-11	1.2053E-07	77.097
4	198.57	0.1641	-4.6664E-09	-1.0012E-11	1.2053E-07	77.097
5	198.57	0.1641	-4.6664E-09	-1.0012E-11	1.2053E-07	77.097
6	198.57	0.1641	-4.6664E-09	-1.0012E-11	1.2053E-07	77.097
7	198.57	-0.2386	-5.8587E-09	-1.0012E-11	1.8145E-07	26.686
8	206.93	-0.2384	-2.2765E-10	-1.0012E-11	6.8049E-09	26.673
9	206.93	0.1656	-1.8261E-10	-1.0012E-11	4.6089E-09	77.115
10	206.93	0.1656	-1.8261E-10	-1.0012E-11	4.6089E-09	77.115
11	206.93	0.1656	-1.8261E-10	-1.0012E-11	4.6089E-09	77.115
12	206.93	0.1656	-1.8261E-10	-1.0012E-11	4.6089E-09	77.115
13	206.93	0.1656	-1.8261E-10	-1.0012E-11	4.6089E-09	77.115
14	206.93	-0.2384	-2.2765E-10	-1.0012E-11	6.8049E-09	26.673
15	215.29	-0.3632	6.1205E-09	-1.0012E-11	-1.8290E-07	25.542
16	215.29	1.2532E-03	4.7140E-09	-1.0012E-11	-1.1728E-07	75.807
17	215.29	1.2532E-03	4.7140E-09	-1.0012E-11	-1.1728E-07	75.807
18	215.29	1.2533E-03	4.7140E-09	-1.0012E-11	-1.1728E-07	75.807
19	215.29	1.2533E-03	4.7140E-09	-1.0012E-11	-1.1728E-07	75.807
20	215.29	1.2533E-03	4.7140E-09	-1.0012E-11	-1.1728E-07	75.807
21	215.29	-0.3632	6.1205E-09	-1.0012E-11	-1.8290E-07	25.542
MINIMUM	198.57	-0.3632	-5.8587E-09	-1.0012E-11	-1.8290E-07	25.542
Pile N.	1	15	1	1	15	15
MAXIMUM	215.29	0.1656	6.1205E-09	-1.0012E-11	1.8145E-07	77.115
Pile N.	15	9	15	1	1	9

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.1686	-3.6118E-03	-5.8793E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
2	0.1686	-5.8793E-12	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
3	0.1686	-5.8793E-12	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
4	0.1686	-5.8793E-12	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
5	0.1686	-5.8793E-12	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
6	0.1686	-5.8793E-12	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
7	0.1686	-3.6118E-03	-5.8793E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
8	0.1762	-3.6118E-03	-2.4142E-13	-9.3965E-14	-4.3946E-16	1.2544E-04
9	0.1762	-2.4142E-13	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
10	0.1762	-2.4142E-13	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
11	0.1762	-2.4142E-13	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
12	0.1762	-2.4142E-13	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
13	0.1762	-2.4142E-13	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
14	0.1762	-3.6118E-03	-2.4142E-13	-9.3965E-14	-4.3946E-16	1.2544E-04
15	0.1837	-3.6118E-03	5.3965E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
16	0.1837	5.3965E-12	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
17	0.1837	5.3965E-12	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
18	0.1837	5.3965E-12	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
19	0.1837	5.3965E-12	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
20	0.1837	5.3965E-12	3.6118E-03	-9.3965E-14	1.2544E-04	4.3946E-16
21	0.1837	-3.6118E-03	5.3965E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
MINIMUM	0.1686	-3.6118E-03	-5.8793E-12	-9.3965E-14	-4.3946E-16	4.3946E-16
Pile N.	1	1	1	1	1	2
MAXIMUM	0.1837	5.3965E-12	3.6118E-03	-9.3965E-14	1.2544E-04	1.2544E-04
Pile N.	15	16	2	1	2	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	198.57	-0.2386	-5.8587E-09	-1.0012E-11	1.8145E-07	26.686
2	198.57	-4.6664E-09	-0.1641	-1.0012E-11	77.097	-1.2053E-07
3	198.57	-4.6664E-09	-0.1641	-1.0012E-11	77.097	-1.2053E-07
4	198.57	-4.6664E-09	-0.1641	-1.0012E-11	77.097	-1.2053E-07
5	198.57	-4.6664E-09	-0.1641	-1.0012E-11	77.097	-1.2053E-07
6	198.57	-4.6664E-09	-0.1641	-1.0012E-11	77.097	-1.2053E-07
7	198.57	-0.2386	-5.8587E-09	-1.0012E-11	1.8145E-07	26.686
8	206.93	-0.2384	-2.2765E-10	-1.0012E-11	6.8049E-09	26.673
9	206.93	-1.8261E-10	-0.1656	-1.0012E-11	77.115	-4.6089E-09
10	206.93	-1.8261E-10	-0.1656	-1.0012E-11	77.115	-4.6089E-09
11	206.93	-1.8261E-10	-0.1656	-1.0012E-11	77.115	-4.6089E-09
12	206.93	-1.8261E-10	-0.1656	-1.0012E-11	77.115	-4.6089E-09
13	206.93	-1.8261E-10	-0.1656	-1.0012E-11	77.115	-4.6089E-09
14	206.93	-0.2384	-2.2765E-10	-1.0012E-11	6.8049E-09	26.673
15	215.29	-0.3632	6.1205E-09	-1.0012E-11	-1.8290E-07	25.542
16	215.29	4.7140E-09	-1.2532E-03	-1.0012E-11	75.807	1.1728E-07
17	215.29	4.7140E-09	-1.2532E-03	-1.0012E-11	75.807	1.1728E-07
18	215.29	4.7140E-09	-1.2533E-03	-1.0012E-11	75.807	1.1728E-07
19	215.29	4.7140E-09	-1.2533E-03	-1.0012E-11	75.807	1.1728E-07
20	215.29	4.7140E-09	-1.2533E-03	-1.0012E-11	75.807	1.1728E-07
21	215.29	-0.3632	6.1205E-09	-1.0012E-11	-1.8290E-07	25.542
MINIMUM	198.57	-0.3632	-0.1656	-1.0012E-11	-1.8290E-07	-1.2053E-07

Pile N.	1	15	9	1	15	2
MAXIMUM	215.29	4.7140E-09	6.1205E-09	-1.0012E-11	77.115	26.686
Pile N.	15	16	15	1	9	1

PILE GROUP	STRESS,KIP/IN**2
1	6.2015
2	6.2225
3	6.2225
4	6.2225
5	6.2225
6	6.2225
7	6.2015
8	6.4444
9	6.4657
10	6.4657
11	6.4657
12	6.4657
13	6.4657
14	6.4444
15	6.6693
16	6.7012
17	6.7012
18	6.7012
19	6.7012
20	6.7012
21	6.6693

MINIMUM	6.2015
Pile N.	1
MAXIMUM	6.7012
Pile N.	16

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
1	-3.6118E-03	-5.8793E-12	-28.485	-4.6405E-08	-0.096786	-5.6403E-09	-0.018778	-2.0797E-10	5.7723	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	1.2320	4.9280	0.0000	0.0000	0.0000	3.6960	38.192	0.0000	0.0000
2	-5.8793E-12	-5.8212E-04	-4.8983E-08	-4.1531	-4.4603E-09	-0.9659	-2.7426E-10	-0.012155	5.7723	1.2847E+07	3.5380E+07
x(FT)	0.0000	7.3920	3.6960	13.552	0.0000	4.9280	3.6960	6.1600	48.048	0.0000	0.0000
3	-5.8793E-12	-5.8212E-04	-4.8983E-08	-4.1531	-4.4603E-09	-0.9659	-2.7426E-10	-0.012155	5.7723	1.2847E+07	3.5380E+07
x(FT)	0.0000	7.3920	3.6960	13.552	0.0000	4.9280	3.6960	6.1600	48.048	0.0000	0.0000
4	-5.8793E-12	-5.8212E-04	-4.8983E-08	-4.1531	-4.4603E-09	-0.9659	-2.7426E-10	-0.012155	5.7723	1.2847E+07	3.5380E+07
x(FT)	0.0000	7.3920	3.6960	13.552	0.0000	4.9280	3.6960	6.1600	48.048	0.0000	0.0000
5	-5.8793E-12	-5.8212E-04	-4.8983E-08	-4.1531	-4.4603E-09	-0.9659	-2.7426E-10	-0.012155	5.7723	1.2847E+07	3.5380E+07
x(FT)	0.0000	7.3920	3.6960	13.552	0.0000	4.9280	3.6960	6.1600	48.048	0.0000	0.0000
6	-5.8793E-12	-5.8212E-04	-4.8983E-08	-4.1531	-4.4603E-09	-0.9659	-2.7426E-10	-0.012155	5.7723	1.2847E+07	3.5380E+07
x(FT)	0.0000	7.3920	3.6960	13.552	0.0000	4.9280	3.6960	6.1600	48.048	0.0000	0.0000
7	-3.6118E-03	-5.8793E-12	-28.485	-4.6405E-08	-0.096786	-5.6403E-09	-0.018778	-2.0797E-10	5.7723	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	1.2320	4.9280	0.0000	0.0000	0.0000	3.6960	38.192	0.0000	0.0000
8	-3.6118E-03	-2.4142E-13	-28.482	-1.9369E-09	-0.096401	-2.1867E-10	-0.018778	-8.1655E-12	6.0154	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	1.2320	4.9280	0.0000	0.0000	0.0000	3.6960	38.192	0.0000	0.0000
9	-2.4142E-13	-5.8198E-04	-1.9783E-09	-4.1526	-1.7412E-10	-0.9655	-1.0710E-11	-0.012149	6.0154	1.2847E+07	3.5380E+07
x(FT)	0.0000	7.3920	3.6960	13.552	0.0000	4.9280	3.6960	7.3920	48.048	0.0000	0.0000
10	-2.4142E-13	-5.8198E-04	-1.9783E-09	-4.1526	-1.7412E-10	-0.9655	-1.0710E-11	-0.012149	6.0154	1.2847E+07	3.5380E+07
x(FT)	0.0000	7.3920	3.6960	13.552	0.0000	4.9280	3.6960	7.3920	48.048	0.0000	0.0000
11	-2.4142E-13	-5.8198E-04	-1.9783E-09	-4.1526	-1.7412E-10	-0.9655	-1.0710E-11	-0.012149	6.0154	1.2847E+07	3.5380E+07
x(FT)	0.0000	7.3920	3.6960	13.552	0.0000	4.9280	3.6960	7.3920	48.048	0.0000	0.0000
12	-2.4142E-13	-5.8198E-04	-1.9783E-09	-4.1526	-1.7412E-10	-0.9655	-1.0710E-11	-0.012149	6.0154	1.2847E+07	3.5380E+07
x(FT)	0.0000	7.3920	3.6960	13.552	0.0000	4.9280	3.6960	7.3920	48.048	0.0000	0.0000
13	-2.4142E-13	-5.8198E-04	-1.9783E-09	-4.1526	-1.7412E-10	-0.9655	-1.0710E-11	-0.012149	6.0154	1.2847E+07	3.5380E+07
x(FT)	0.0000	7.3920	3.6960	13.552	0.0000	4.9280	3.6960	7.3920	48.048	0.0000	0.0000
14	-3.6118E-03	-2.4142E-13	-28.482	-1.9369E-09	-0.096401	-2.1867E-10	-0.018778	-8.1655E-12	6.0154	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	1.2320	4.9280	0.0000	0.0000	0.0000	3.6960	38.192	0.0000	0.0000
15	-3.6118E-03	-1.8690E-13	-28.720	-1.8290E-07	-0.1880	-6.8431E-10	-0.023280	-1.0484E-11	6.2585	1.2847E+07	3.5380E+07
x(FT)	0.0000	11.088	1.2320	0.0000	0.0000	8.6240	0.0000	12.320	38.192	0.0000	0.0000
16	-6.2169E-13	-5.2505E-04	-1.1728E-07	-4.0509	-9.8272E-10	-1.0424	-1.6529E-11	-0.014290	6.2585	1.2847E+07	3.5380E+07
x(FT)	7.3920	7.3920	0.0000	13.552	4.9280	4.9280	7.3920	6.1600	48.048	0.0000	0.0000
17	-6.2169E-13	-5.2505E-04	-1.1728E-07	-4.0509	-9.8272E-10	-1.0424	-1.6529E-11	-0.014290	6.2585	1.2847E+07	3.5380E+07
x(FT)	7.3920	7.3920	0.0000	13.552	4.9280	4.9280	7.3920	6.1600	48.048	0.0000	0.0000
18	-6.2169E-13	-5.2505E-04	-1.1728E-07	-4.0509	-9.8272E-10	-1.0424	-1.6529E-11	-0.014290	6.2585	1.2847E+07	3.5380E+07
x(FT)	7.3920	7.3920	0.0000	13.552	4.9280	4.9280	7.3920	6.1600	48.048	0.0000	0.0000
19	-6.2169E-13	-5.2505E-04	-1.1728E-07	-4.0509	-9.8272E-10	-1.0424	-1.6529E-11	-0.014290	6.2585	1.2847E+07	3.5380E+07
x(FT)	7.3920	7.3920	0.0000	13.552	4.9280	4.9280	7.3920	6.1600	48.048	0.0000	0.0000
20	-6.2169E-13	-5.2505E-04	-1.1728E-07	-4.0509	-9.8272E-10	-1.0424	-1.6529E-11	-0.014290	6.2585	1.2847E+07	3.5380E+07
x(FT)	7.3920	7.3920	0.0000	13.552	4.9280	4.9280	7.3920	6.1600	48.048	0.0000	0.0000
21	-3.6118E-03	-1.8690E-13	-28.720	-1.8290E-07	-0.1880	-6.8431E-10	-0.023280	-1.0484E-11	6.2585	1.2847E+07	3.5380E+07
x(FT)	0.0000	11.088	1.2320	0.0000	0.0000	8.6240	0.0000	12.320	38.192	0.0000	0.0000
Min.	-3.6118E-03	-5.8212E-04	-28.720	-4.1531	-0.1880	-1.0424	-0.023280	-0.014290	5.7723	1.2847E+07	3.5380E+07
Pile N.	1	2	15	2	15	16	15	16	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
1	2.8629E-04	1.9091E-13	1.3545	1.8145E-07	0.4734	6.4255E-10	8.6696E-03	9.6579E-12	6.2304	1.2847E+07	3.5380E+07
x(FT)	6.1600	11.088	11.088	0.0000	4.9280	8.6240	6.1600	12.320	1.2320	0.0000	0.0000
2	7.0359E-13	3.6118E-03	1.2054E-07	77.097	9.2029E-10	0.071717	1.4691E-11	0.018957	6.2225	1.2847E+07	3.5380E+07
x(FT)	7.3920	0.0000	0.0000	0.0000	4.9280	17.248	7.3920	3.6960	0.0000	0.0000	0.0000
3	7.0359E-13	3.6118E-03	1.2054E-07	77.097	9.2029E-10	0.071717	1.4691E-11	0.018957	6.2225	1.2847E+07	3.5380E+07
x(FT)	7.3920	0.0000	0.0000	0.0000	4.9280	17.248	7.3920	3.6960	0.0000	0.0000	0.0000
4	7.0359E-13	3.6118E-03	1.2054E-07	77.097	9.2029E-10	0.071717	1.4691E-11	0.018957	6.2225	1.2847E+07	3.5380E+07
x(FT)	7.3920	0.0000	0.0000	0.0000	4.9280	17.248	7.3920	3.6960	0.0000	0.0000	0.0000
5	7.0359E-13	3.6118E-03	1.2054E-07	77.097	9.2029E-10	0.071717	1.4691E-11	0.018957	6.2225	1.2847E+07	3.5380E+07
x(FT)	7.3920	0.0000	0.0000	0.0000	4.9280	17.248	7.3920	3.6960	0.0000	0.0000	0.0000
6	7.0359E-13	3.6118E-03	1.2054E-07	77.097	9.2029E-10	0.071717	1.4691E-11	0.018957	6.2225	1.2847E+07	3.5380E+07
x(FT)	7.3920	0.0000	0.0000	0.0000	4.9280	17.248	7.3920	3.6960	0.0000	0.0000	0.0000
7	2.8629E-04	1.9091E-13	1.3545	1.8145E-07	0.4734	6.4255E-10	8.6696E-03	9.6579E-12	6.2304	1.2847E+07	3.5380E+07
x(FT)	6.1600	11.088	11.088	0.0000	4.9280	8.6240	6.1600	12.320	1.2320	0.0000	0.0000
8	2.8665E-04	8.0654E-15	1.3560	6.8049E-09	0.4737	2.6562E-11	8.6744E-03	3.9692E-13	6.4735	1.2847E+07	3.5380E+07
x(FT)	6.1600	11.088	11.088	0.0000	4.9280	8.6240	6.1600	12.320	1.2320	0.0000	0.0000
9	2.8541E-14	3.6118E-03	4.6089E-09	77.115	3.7337E-11	0.071750	5.9579E-13	0.018818	6.4657	1.2847E+07	3.5380E+07

x(FT)	7.3920	0.0000	0.0000	0.0000	4.9280	17.248	7.3920	3.6960	0.0000	0.0000	0.0000
10	2.8541E-14	3.6118E-03	4.6089E-09	77.115	3.7337E-11	0.071750	5.9579E-13	0.018818	6.4657	1.2847E+07	3.5380E+07
x(FT)	7.3920	0.0000	0.0000	0.0000	4.9280	17.248	7.3920	3.6960	0.0000	0.0000	0.0000
11	2.8541E-14	3.6118E-03	4.6089E-09	77.115	3.7337E-11	0.071750	5.9579E-13	0.018818	6.4657	1.2847E+07	3.5380E+07
x(FT)	7.3920	0.0000	0.0000	0.0000	4.9280	17.248	7.3920	3.6960	0.0000	0.0000	0.0000
12	2.8541E-14	3.6118E-03	4.6089E-09	77.115	3.7337E-11	0.071750	5.9579E-13	0.018818	6.4657	1.2847E+07	3.5380E+07
x(FT)	7.3920	0.0000	0.0000	0.0000	4.9280	17.248	7.3920	3.6960	0.0000	0.0000	0.0000
13	2.8541E-14	3.6118E-03	4.6089E-09	77.115	3.7337E-11	0.071750	5.9579E-13	0.018818	6.4657	1.2847E+07	3.5380E+07
x(FT)	7.3920	0.0000	0.0000	0.0000	4.9280	17.248	7.3920	3.6960	0.0000	0.0000	0.0000
14	2.8665E-04	8.0654E-15	1.3560	6.8049E-09	0.4737	2.6562E-11	8.6744E-03	3.9692E-13	6.4735	1.2847E+07	3.5380E+07
x(FT)	6.1600	11.088	11.088	0.0000	4.9280	8.6240	6.1600	12.320	1.2320	0.0000	0.0000
15	2.6459E-04	5.3965E-12	1.3311	4.8552E-08	0.5052	5.8716E-09	9.9196E-03	2.2175E-10	6.7204	1.2847E+07	3.5380E+07
x(FT)	6.1600	0.0000	11.088	4.9280	4.9280	0.0000	6.1600	3.6960	1.2320	0.0000	0.0000
16	5.3965E-12	3.6118E-03	4.8579E-08	75.807	4.4714E-09	0.069029	2.6845E-10	0.025216	6.7012	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	16.016	3.6960	3.6960	0.0000	0.0000	0.0000
17	5.3965E-12	3.6118E-03	4.8579E-08	75.807	4.4714E-09	0.069029	2.6845E-10	0.025216	6.7012	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	16.016	3.6960	3.6960	0.0000	0.0000	0.0000
18	5.3965E-12	3.6118E-03	4.8579E-08	75.807	4.4714E-09	0.069029	2.6845E-10	0.025216	6.7012	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	16.016	3.6960	3.6960	0.0000	0.0000	0.0000
19	5.3965E-12	3.6118E-03	4.8579E-08	75.807	4.4714E-09	0.069029	2.6845E-10	0.025216	6.7012	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	16.016	3.6960	3.6960	0.0000	0.0000	0.0000
20	5.3965E-12	3.6118E-03	4.8579E-08	75.807	4.4714E-09	0.069029	2.6845E-10	0.025216	6.7012	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	3.6960	0.0000	0.0000	16.016	3.6960	3.6960	0.0000	0.0000	0.0000
21	2.6459E-04	5.3965E-12	1.3311	4.8552E-08	0.5052	5.8716E-09	9.9196E-03	2.2175E-10	6.7204	1.2847E+07	3.5380E+07
x(FT)	6.1600	0.0000	11.088	4.9280	4.9280	0.0000	6.1600	3.6960	1.2320	0.0000	0.0000
Max.	2.8665E-04	3.6118E-03	1.3560	77.115	0.5052	0.071750	9.9196E-03	0.025216	6.7204	1.2847E+07	3.5380E+07
Pile N.	8	2	8	9	15	9	15	16	15	1	1

LOAD CASE : 4
CASE NAME : Strength V Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8066	1.0000
2	0.7968	1.0000
3	0.7968	1.0000
4	0.7968	1.0000
5	0.7968	1.0000
6	0.7968	1.0000
7	0.9168	1.0000
8	0.7949	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.9168	1.0000
15	0.9001	1.0000
16	0.9001	1.0000
17	0.9001	1.0000
18	0.9001	1.0000
19	0.9001	1.0000
20	0.9001	1.0000
21	1.0000	1.0000

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
4753.00	25.0000	80.0000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	1.46424E+05	46008.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.20431	-0.0610137	0.0665512

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
2.24004E-06	5.38932E-04	8.35840E-04

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.057155	-0.035535	0.050518	2.2400E-06	5.3893E-04	8.3584E-04
2	0.089491	-0.035670	0.050518	2.2400E-06	5.3893E-04	8.3584E-04
3	0.1218	-0.035804	0.050518	2.2400E-06	5.3893E-04	8.3584E-04
4	0.1542	-0.035938	0.050518	2.2400E-06	5.3893E-04	8.3584E-04
5	0.1865	-0.036073	0.050518	2.2400E-06	5.3893E-04	8.3584E-04
6	0.2188	-0.036207	0.050518	2.2400E-06	5.3893E-04	8.3584E-04
7	0.2512	-0.036342	0.050518	2.2400E-06	5.3893E-04	8.3584E-04
8	0.1073	-0.035535	0.050383	2.2400E-06	5.3893E-04	8.3584E-04
9	0.1396	-0.035670	0.050383	2.2400E-06	5.3893E-04	8.3584E-04
10	0.1720	-0.035804	0.050383	2.2400E-06	5.3893E-04	8.3584E-04
11	0.2043	-0.035938	0.050383	2.2400E-06	5.3893E-04	8.3584E-04
12	0.2366	-0.036073	0.050383	2.2400E-06	5.3893E-04	8.3584E-04

13	0.2690	-0.036207	0.050383	2.2400E-06	5.3893E-04	8.3584E-04
14	0.3013	-0.036342	0.050383	2.2400E-06	5.3893E-04	8.3584E-04
15	0.1575	-0.035535	0.050249	2.2400E-06	5.3893E-04	8.3584E-04
16	0.1898	-0.035670	0.050249	2.2400E-06	5.3893E-04	8.3584E-04
17	0.2221	-0.035804	0.050249	2.2400E-06	5.3893E-04	8.3584E-04
18	0.2545	-0.035938	0.050249	2.2400E-06	5.3893E-04	8.3584E-04
19	0.2868	-0.036073	0.050249	2.2400E-06	5.3893E-04	8.3584E-04
20	0.3191	-0.036207	0.050249	2.2400E-06	5.3893E-04	8.3584E-04
21	0.3515	-0.036342	0.050249	2.2400E-06	5.3893E-04	8.3584E-04
MINIMUM	0.057155	-0.036342	0.050249	2.2400E-06	5.3893E-04	8.3584E-04
Pile N.	1	7	15	1	1	1
MAXIMUM	0.3515	-0.035535	0.050518	2.2400E-06	5.3893E-04	8.3584E-04
Pile N.	21	1	1	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	74.693	0.044824	4.0389	2.4179E-04	-23.391	138.51
2	110.62	1.7522	3.5379	2.4179E-04	-64.841	393.25
3	146.55	1.7356	3.5232	2.4179E-04	-65.131	391.38
4	182.48	1.7190	3.5085	2.4179E-04	-65.420	389.51
5	218.40	1.7025	3.4938	2.4179E-04	-65.709	387.64
6	250.79	1.6852	3.4803	2.4179E-04	-65.968	385.83
7	273.49	-0.1417	4.4783	2.4179E-04	-39.859	130.16
8	130.41	0.072328	3.9510	2.4179E-04	-21.265	137.98
9	166.34	1.7734	3.4616	2.4179E-04	-63.642	392.22
10	202.27	1.7570	3.4471	2.4179E-04	-63.933	390.36
11	238.20	1.7406	3.4324	2.4179E-04	-64.225	388.49
12	263.30	1.7220	3.4218	2.4179E-04	-64.425	386.80
13	286.00	1.7030	3.4119	2.4179E-04	-64.606	385.14
14	308.70	-0.1340	4.4502	2.4179E-04	-39.085	129.71
15	186.14	-0.046998	4.4060	2.4179E-04	-34.826	135.80
16	222.06	1.6717	3.8554	2.4179E-04	-73.745	392.59
17	253.10	1.6521	3.8420	2.4179E-04	-73.983	390.73
18	275.81	1.6308	3.8316	2.4179E-04	-74.152	388.99
19	298.51	1.6094	3.8213	2.4179E-04	-74.320	387.25
20	321.21	1.5881	3.8109	2.4179E-04	-74.488	385.51
21	343.91	-0.2370	4.7958	2.4179E-04	-48.867	127.88
MINIMUM	74.693	-0.2370	3.4119	2.4179E-04	-74.488	127.88
Pile N.	1	21	13	1	20	21
MAXIMUM	343.91	1.7734	4.7958	2.4179E-04	-21.265	393.25
Pile N.	21	9	21	1	8	2

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.057155	-0.035535	0.050518	2.2400E-06	5.3893E-04	8.3584E-04

2	0.089491	0.050518	0.035670	2.2400E-06	8.3584E-04	-5.3893E-04
3	0.1218	0.050518	0.035804	2.2400E-06	8.3584E-04	-5.3893E-04
4	0.1542	0.050518	0.035938	2.2400E-06	8.3584E-04	-5.3893E-04
5	0.1865	0.050518	0.036073	2.2400E-06	8.3584E-04	-5.3893E-04
6	0.2188	0.050518	0.036207	2.2400E-06	8.3584E-04	-5.3893E-04
7	0.2512	-0.036342	0.050518	2.2400E-06	5.3893E-04	8.3584E-04
8	0.1073	-0.035535	0.050383	2.2400E-06	5.3893E-04	8.3584E-04
9	0.1396	0.050383	0.035670	2.2400E-06	8.3584E-04	-5.3893E-04
10	0.1720	0.050383	0.035804	2.2400E-06	8.3584E-04	-5.3893E-04
11	0.2043	0.050383	0.035938	2.2400E-06	8.3584E-04	-5.3893E-04
12	0.2366	0.050383	0.036073	2.2400E-06	8.3584E-04	-5.3893E-04
13	0.2690	0.050383	0.036207	2.2400E-06	8.3584E-04	-5.3893E-04
14	0.3013	-0.036342	0.050383	2.2400E-06	5.3893E-04	8.3584E-04
15	0.1575	-0.035535	0.050249	2.2400E-06	5.3893E-04	8.3584E-04
16	0.1898	0.050249	0.035670	2.2400E-06	8.3584E-04	-5.3893E-04
17	0.2221	0.050249	0.035804	2.2400E-06	8.3584E-04	-5.3893E-04
18	0.2545	0.050249	0.035938	2.2400E-06	8.3584E-04	-5.3893E-04
19	0.2868	0.050249	0.036073	2.2400E-06	8.3584E-04	-5.3893E-04
20	0.3191	0.050249	0.036207	2.2400E-06	8.3584E-04	-5.3893E-04
21	0.3515	-0.036342	0.050249	2.2400E-06	5.3893E-04	8.3584E-04
MINIMUM	0.057155	-0.036342	0.035670	2.2400E-06	5.3893E-04	-5.3893E-04
Pile N.	1	7	2	1	1	2
MAXIMUM	0.3515	0.050518	0.050518	2.2400E-06	8.3584E-04	8.3584E-04
Pile N.	21	2	1	1	2	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	74.693	0.044824	4.0389	2.4179E-04	-23.391	138.51
2	110.62	3.5379	-1.7522	2.4179E-04	393.25	64.841
3	146.55	3.5232	-1.7356	2.4179E-04	391.38	65.131
4	182.48	3.5085	-1.7190	2.4179E-04	389.51	65.420
5	218.40	3.4938	-1.7025	2.4179E-04	387.64	65.709
6	250.79	3.4803	-1.6852	2.4179E-04	385.83	65.968
7	273.49	-0.1417	4.4783	2.4179E-04	-39.859	130.16
8	130.41	0.072328	3.9510	2.4179E-04	-21.265	137.98
9	166.34	3.4616	-1.7734	2.4179E-04	392.22	63.642
10	202.27	3.4471	-1.7570	2.4179E-04	390.36	63.933
11	238.20	3.4324	-1.7406	2.4179E-04	388.49	64.225
12	263.30	3.4218	-1.7220	2.4179E-04	386.80	64.425
13	286.00	3.4119	-1.7030	2.4179E-04	385.14	64.606
14	308.70	-0.1340	4.4502	2.4179E-04	-39.085	129.71
15	186.14	-0.046998	4.4060	2.4179E-04	-34.826	135.80
16	222.06	3.8554	-1.6717	2.4179E-04	392.59	73.745
17	253.10	3.8420	-1.6521	2.4179E-04	390.73	73.983
18	275.81	3.8316	-1.6308	2.4179E-04	388.99	74.152
19	298.51	3.8213	-1.6094	2.4179E-04	387.25	74.320
20	321.21	3.8109	-1.5881	2.4179E-04	385.51	74.488
21	343.91	-0.2370	4.7958	2.4179E-04	-48.867	127.88
MINIMUM	74.693	-0.2370	-1.7734	2.4179E-04	-48.867	63.642
Pile N.	1	21	9	1	21	9
MAXIMUM	343.91	3.8554	4.7958	2.4179E-04	393.25	138.51

Pile N.	21	16	21	1	2	1

PILE GROUP	STRESS,KIP/IN**2
**********	****************
1	4.4032
2	5.7380
3	6.7745
4	7.8109
5	8.8474
6	9.7811
7	10.057
8	6.0138
9	7.3444
10	8.3809
11	9.4173
12	10.139
13	10.792
14	11.073
15	7.6045
16	9.0367
17	9.9312
18	10.583
19	11.236
20	11.888
21	12.074
MINIMUM	4.4032
Pile N.	1
MAXIMUM	12.074
Pile N.	21

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-0.035535	-1.0930E-03	-138.51	-23.391	-0.086275	-1.6771	-0.027835	-0.018454	2.1713	1.2847E+07	3.5380E+07
x(FT)	0.0000	16.016	0.0000	0.0000	18.480	12.320	0.0000	16.016	41.888	0.0000	0.0000
2	-1.3113E-03	-3.4675E-03	-64.841	-19.207	-1.0227	-3.0472	-0.013041	-0.030071	3.2157	1.2847E+07	3.5380E+07
x(FT)	13.552	9.8560	0.0000	18.480	9.8560	6.1600	14.784	9.8560	43.120	0.0000	0.0000
3	-1.3233E-03	-3.4512E-03	-65.131	-19.184	-1.0307	-3.0424	-0.013102	-0.030020	4.2601	1.2847E+07	3.5380E+07
x(FT)	13.552	9.8560	0.0000	18.480	9.8560	6.1600	14.784	9.8560	43.120	0.0000	0.0000
4	-1.3353E-03	-3.4351E-03	-65.420	-19.160	-1.0386	-3.0376	-0.013162	-0.029969	5.3046	1.2847E+07	3.5380E+07
x(FT)	13.552	9.8560	0.0000	18.480	9.8560	6.1600	14.784	9.8560	43.120	0.0000	0.0000
5	-1.3474E-03	-3.4191E-03	-65.709	-19.137	-1.0466	-3.0329	-0.013223	-0.029917	6.3490	1.2847E+07	3.5380E+07
x(FT)	13.552	9.8560	0.0000	18.480	9.8560	6.1600	14.784	9.8560	43.120	0.0000	0.0000
6	-1.3584E-03	-3.4019E-03	-65.968	-19.108	-1.0539	-3.0275	-0.013297	-0.029860	7.2905	1.2847E+07	3.5380E+07
x(FT)	13.552	9.8560	0.0000	18.480	9.8560	6.1600	13.552	9.8560	43.120	0.0000	0.0000
7	-0.036342	-1.0999E-03	-131.81	-39.859	-0.086763	-1.8318	-0.032191	-0.020857	7.9504	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	1.2320	0.0000	18.480	12.320	0.0000	16.016	41.888	0.0000	0.0000
8	-0.035535	-1.1041E-03	-137.98	-21.265	-0.087475	-1.6681	-0.027464	-0.018266	3.7911	1.2847E+07	3.5380E+07
x(FT)	0.0000	16.016	0.0000	0.0000	18.480	12.320	0.0000	16.016	43.120	0.0000	0.0000
9	-1.3319E-03	-3.5271E-03	-63.642	-19.415	-1.0210	-3.0482	-0.012938	-0.029874	4.8355	1.2847E+07	3.5380E+07
x(FT)	13.552	9.8560	0.0000	18.480	9.8560	6.1600	14.784	9.8560	43.120	0.0000	0.0000
10	-1.3442E-03	-3.5108E-03	-63.933	-19.390	-1.0290	-3.0435	-0.012999	-0.029823	5.8800	1.2847E+07	3.5380E+07
x(FT)	13.552	9.8560	0.0000	18.480	9.8560	6.1600	14.784	9.8560	43.120	0.0000	0.0000
11	-1.3564E-03	-3.4946E-03	-64.225	-19.365	-1.0369	-3.0388	-0.013060	-0.029772	6.9244	1.2847E+07	3.5380E+07
x(FT)	13.552	9.8560	0.0000	18.480	9.8560	6.1600	14.784	9.8560	43.120	0.0000	0.0000
12	-1.3653E-03	-3.4741E-03	-64.425	-19.319	-1.0428	-3.0321	-0.013104	-0.029705	7.6541	1.2847E+07	3.5380E+07
x(FT)	13.552	9.8560	0.0000	18.480	9.8560	6.1600	14.784	9.8560	43.120	0.0000	0.0000
13	-1.3735E-03	-3.4527E-03	-64.606	-19.268	-1.0482	-3.0250	-0.013145	-0.029633	8.3140	1.2847E+07	3.5380E+07
x(FT)	13.552	9.8560	0.0000	18.480	9.8560	6.1600	14.784	9.8560	43.120	0.0000	0.0000
14	-0.036342	-1.1062E-03	-131.65	-39.085	-0.087439	-1.8336	-0.032229	-0.020880	8.9739	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	1.2320	0.0000	18.480	12.320	0.0000	16.016	41.888	0.0000	0.0000
15	-0.035535	-1.0825E-03	-135.80	-34.826	-0.087495	-1.7991	-0.031134	-0.020422	5.4109	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	0.0000	0.0000	18.480	12.320	0.0000	16.016	41.888	0.0000	0.0000
16	-1.3102E-03	-3.2079E-03	-73.745	-18.505	-1.1411	-3.1557	-0.014958	-0.032561	6.4553	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	18.480	9.8560	6.1600	13.552	9.8560	43.120	0.0000	0.0000
17	-1.3227E-03	-3.1917E-03	-73.983	-18.490	-1.1479	-3.1496	-0.015034	-0.032489	7.3577	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	18.480	9.8560	6.1600	13.552	9.8560	43.120	0.0000	0.0000
18	-1.3322E-03	-3.1726E-03	-74.152	-18.459	-1.1531	-3.1419	-0.015093	-0.032405	8.0176	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	18.480	9.8560	6.1600	13.552	9.8560	43.120	0.0000	0.0000
19	-1.3417E-03	-3.1536E-03	-74.320	-18.428	-1.1583	-3.1343	-0.015152	-0.032321	8.6775	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	18.480	9.8560	6.1600	13.552	9.8560	43.120	0.0000	0.0000
20	-1.3512E-03	-3.1347E-03	-74.488	-18.398	-1.1635	-3.1266	-0.015211	-0.032237	9.3375	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	18.480	9.8560	6.1600	13.552	9.8560	43.120	0.0000	0.0000
21	-0.036342	-1.1038E-03	-131.42	-48.867	-0.088659	-1.9235	-0.035196	-0.022411	9.9974	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	1.2320	0.0000	17.248	12.320	0.0000	16.016	41.888	0.0000	0.0000
Min.	-0.036342	-3.5271E-03	-138.51	-48.867	-1.1635	-3.1557	-0.035196	-0.032561	2.1713	1.2847E+07	3.5380E+07
Pile N.	7	9	1	21	20	16	21	16	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	1.8444E-03	0.050518	5.4997	158.75	1.3269	3.7467	0.020802	0.049787	4.4032	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	14.784	7.3920	6.1600	0.0000	11.088	4.9280	0.0000	0.0000	0.0000
2	0.050518	0.035670	81.923	393.25	3.2533	0.3145	0.046687	0.027577	5.7380	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
3	0.050518	0.035804	82.086	391.38	3.2403	0.3145	0.046636	0.027658	6.7745	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	22.176	3.6960	0.0000	0.0000	0.0000	0.0000
4	0.050518	0.035939	82.248	389.51	3.2272	0.3149	0.046585	0.027738	7.8109	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	22.176	3.6960	0.0000	0.0000	0.0000	0.0000
5	0.050518	0.036073	82.410	387.64	3.2141	0.3152	0.046533	0.027819	8.8474	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	22.176	3.6960	0.0000	0.0000	0.0000	0.0000
6	0.050518	0.036207	82.557	385.83	3.2021	0.3155	0.046482	0.027899	9.7811	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	22.176	3.6960	0.0000	0.0000	0.0000	0.0000
7	1.6955E-03	0.050518	5.4175	166.43	1.3835	4.1498	0.023276	0.056026	10.075	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	14.784	7.3920	7.3920	0.0000	11.088	4.9280	1.2320	0.0000	0.0000
8	1.8850E-03	0.050383	5.5588	158.15	1.3351	3.6638	0.020815	0.049016	6.0138	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	14.784	7.3920	6.1600	0.0000	11.088	4.9280	0.0000	0.0000	0.0000
9	0.050383	0.035670	81.588	392.22	3.1837	0.3184	0.045944	0.027199	7.3444	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	22.176	3.6960	0.0000	0.0000	0.0000	0.0000
10	0.050383	0.035804	81.750	390.36	3.1707	0.3188	0.045893	0.027279	8.3809	1.2847E+07	3.5380E+07

x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	22.176	3.6960	0.0000	0.0000	0.0000	0.0000
11	0.050383	0.035939	81.913	388.49	3.1577	0.3191	0.045842	0.027358	9.4173	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	22.176	3.6960	0.0000	0.0000	0.0000	0.0000
12	0.050383	0.036073	82.029	386.80	3.1482	0.3191	0.045794	0.027437	10.139	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	22.176	3.6960	0.0000	0.0000	0.0000	0.0000
13	0.050383	0.036207	82.135	385.14	3.1395	0.3189	0.045745	0.027517	10.792	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	22.176	3.6960	0.0000	0.0000	0.0000	0.0000
14	1.7067E-03	0.050383	5.4513	166.46	1.3909	4.1224	0.023431	0.055927	11.096	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	14.784	7.3920	7.3920	0.0000	11.088	4.9280	1.2320	0.0000	0.0000
15	1.7420E-03	0.050249	5.5840	164.78	1.3866	4.0819	0.022981	0.055033	7.6045	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	14.784	7.3920	6.1600	0.0000	11.088	4.9280	0.0000	0.0000	0.0000
16	0.050249	0.035670	86.494	392.59	3.5397	0.3266	0.052132	0.031226	9.0367	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
17	0.050249	0.035804	86.636	390.73	3.5278	0.3261	0.052075	0.031317	9.9312	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
18	0.050249	0.035939	86.742	388.99	3.5188	0.3254	0.052020	0.031408	10.583	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
19	0.050249	0.036073	86.847	387.25	3.5097	0.3247	0.051965	0.031499	11.236	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
20	0.050249	0.036207	86.952	385.51	3.5006	0.3240	0.051909	0.031589	11.888	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	20.944	3.6960	0.0000	0.0000	0.0000	0.0000
21	1.6149E-03	0.050249	5.4433	171.32	1.4303	4.4396	0.025053	0.060593	12.114	1.2847E+07	3.5380E+07
x(FT)	9.8560	0.0000	14.784	7.3920	7.3920	0.0000	11.088	4.9280	1.2320	0.0000	0.0000
Max.	0.050518	0.050518	86.952	393.25	3.5397	4.4396	0.052132	0.060593	12.114	1.2847E+07	3.5380E+07
Pile N.	2	1	20	2	16	21	16	21	21	1	1

LOAD CASE : 5
CASE NAME : Service I Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8066	1.0000
2	0.7967	1.0000
3	0.7967	1.0000
4	0.7967	1.0000
5	0.7967	1.0000
6	0.7967	1.0000
7	0.9158	1.0000
8	0.7950	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.9158	1.0000
15	0.9011	1.0000
16	0.9011	1.0000
17	0.9011	1.0000
18	0.9011	1.0000
19	0.9011	1.0000
20	0.9011	1.0000
21	1.0000	1.0000

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
3668.00	25.0000	65.0000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	1.11612E+05	36840.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.14803	-0.0387684	0.0418688

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
1.29535E-06	3.51083E-04	5.73986E-04

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
----

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.050392	-0.021316	0.031414	1.2954E-06	3.5108E-04	5.7399E-04
2	0.071457	-0.021393	0.031414	1.2954E-06	3.5108E-04	5.7399E-04
3	0.092522	-0.021471	0.031414	1.2954E-06	3.5108E-04	5.7399E-04
4	0.1136	-0.021549	0.031414	1.2954E-06	3.5108E-04	5.7399E-04
5	0.1346	-0.021626	0.031414	1.2954E-06	3.5108E-04	5.7399E-04
6	0.1557	-0.021704	0.031414	1.2954E-06	3.5108E-04	5.7399E-04
7	0.1768	-0.021782	0.031414	1.2954E-06	3.5108E-04	5.7399E-04
8	0.084832	-0.021316	0.031336	1.2954E-06	3.5108E-04	5.7399E-04
9	0.1059	-0.021393	0.031336	1.2954E-06	3.5108E-04	5.7399E-04
10	0.1270	-0.021471	0.031336	1.2954E-06	3.5108E-04	5.7399E-04
11	0.1480	-0.021549	0.031336	1.2954E-06	3.5108E-04	5.7399E-04
12	0.1691	-0.021626	0.031336	1.2954E-06	3.5108E-04	5.7399E-04
13	0.1902	-0.021704	0.031336	1.2954E-06	3.5108E-04	5.7399E-04
14	0.2112	-0.021782	0.031336	1.2954E-06	3.5108E-04	5.7399E-04

15	0.1193	-0.021316	0.031259	1.2954E-06	3.5108E-04	5.7399E-04
16	0.1403	-0.021393	0.031259	1.2954E-06	3.5108E-04	5.7399E-04
17	0.1614	-0.021471	0.031259	1.2954E-06	3.5108E-04	5.7399E-04
18	0.1825	-0.021549	0.031259	1.2954E-06	3.5108E-04	5.7399E-04
19	0.2035	-0.021626	0.031259	1.2954E-06	3.5108E-04	5.7399E-04
20	0.2246	-0.021704	0.031259	1.2954E-06	3.5108E-04	5.7399E-04
21	0.2457	-0.021782	0.031259	1.2954E-06	3.5108E-04	5.7399E-04
MINIMUM	0.050392	-0.021782	0.031259	1.2954E-06	3.5108E-04	5.7399E-04
Pile N.	1	7	15	1	1	1
MAXIMUM	0.2457	-0.021316	0.031414	1.2954E-06	3.5108E-04	5.7399E-04
Pile N.	21	1	1	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
1	67.179	0.2199	3.2973	1.3982E-04	-27.078	110.28
2	90.584	1.6601	2.8639	1.3982E-04	-51.361	304.21
3	113.99	1.6458	2.8573	1.3982E-04	-51.481	303.10
4	137.39	1.6314	2.8507	1.3982E-04	-51.601	302.00
5	160.80	1.6170	2.8440	1.3982E-04	-51.720	300.89
6	184.20	1.6027	2.8374	1.3982E-04	-51.839	299.78
7	207.61	0.075428	3.6384	1.3982E-04	-37.528	105.40
8	105.44	0.2354	3.2367	1.3982E-04	-25.514	110.06
9	128.85	1.6714	2.8132	1.3982E-04	-50.449	303.69
10	152.25	1.6571	2.8067	1.3982E-04	-50.570	302.59
11	175.66	1.6429	2.8001	1.3982E-04	-50.690	301.49
12	199.06	1.6287	2.7935	1.3982E-04	-50.810	300.38
13	222.47	1.6146	2.7869	1.3982E-04	-50.930	299.28
14	245.45	0.080897	3.6176	1.3982E-04	-36.988	105.10
15	143.71	0.1489	3.5822	1.3982E-04	-34.431	108.94
16	167.11	1.6037	3.1124	1.3982E-04	-56.993	304.44
17	190.52	1.5880	3.1055	1.3982E-04	-57.108	303.29
18	213.92	1.5723	3.0986	1.3982E-04	-57.223	302.15
19	237.33	1.5567	3.0916	1.3982E-04	-57.337	301.00
20	254.84	1.5403	3.0862	1.3982E-04	-57.422	299.90
21	269.63	6.6757E-03	3.8799	1.3982E-04	-43.438	104.12
MINIMUM	67.179	6.6757E-03	2.7869	1.3982E-04	-57.422	104.12
Pile N.	1	21	13	1	20	21
MAXIMUM	269.63	1.6714	3.8799	1.3982E-04	-25.514	304.44
Pile N.	21	9	21	1	8	16

THE PILE COORDINATE SYSTEM (LOCAL AXES)

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
1	0.050392	-0.021316	0.031414	1.2954E-06	3.5108E-04	5.7399E-04
2	0.071457	0.031414	0.021393	1.2954E-06	5.7399E-04	-3.5108E-04
3	0.092522	0.031414	0.021471	1.2954E-06	5.7399E-04	-3.5108E-04
4	0.1136	0.031414	0.021549	1.2954E-06	5.7399E-04	-3.5108E-04
5	0.1346	0.031414	0.021626	1.2954E-06	5.7399E-04	-3.5108E-04
6	0.1557	0.031414	0.021704	1.2954E-06	5.7399E-04	-3.5108E-04
7	0.1768	-0.021782	0.031414	1.2954E-06	3.5108E-04	5.7399E-04
8	0.084832	-0.021316	0.031336	1.2954E-06	3.5108E-04	5.7399E-04
9	0.1059	0.031336	0.021393	1.2954E-06	5.7399E-04	-3.5108E-04
10	0.1270	0.031336	0.021471	1.2954E-06	5.7399E-04	-3.5108E-04
11	0.1480	0.031336	0.021549	1.2954E-06	5.7399E-04	-3.5108E-04
12	0.1691	0.031336	0.021626	1.2954E-06	5.7399E-04	-3.5108E-04
13	0.1902	0.031336	0.021704	1.2954E-06	5.7399E-04	-3.5108E-04
14	0.2112	-0.021782	0.031336	1.2954E-06	3.5108E-04	5.7399E-04
15	0.1193	-0.021316	0.031259	1.2954E-06	3.5108E-04	5.7399E-04
16	0.1403	0.031259	0.021393	1.2954E-06	5.7399E-04	-3.5108E-04
17	0.1614	0.031259	0.021471	1.2954E-06	5.7399E-04	-3.5108E-04
18	0.1825	0.031259	0.021549	1.2954E-06	5.7399E-04	-3.5108E-04
19	0.2035	0.031259	0.021626	1.2954E-06	5.7399E-04	-3.5108E-04
20	0.2246	0.031259	0.021704	1.2954E-06	5.7399E-04	-3.5108E-04
21	0.2457	-0.021782	0.031259	1.2954E-06	3.5108E-04	5.7399E-04
MINIMUM	0.050392	-0.021782	0.021393	1.2954E-06	3.5108E-04	-3.5108E-04
Pile N.	1	7	2	1	1	2
MAXIMUM	0.2457	0.031414	0.031414	1.2954E-06	5.7399E-04	5.7399E-04
Pile N.	21	2	1	1	2	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
1	67.179	0.2199	3.2973	1.3982E-04	-27.078	110.28
2	90.584	2.8639	-1.6601	1.3982E-04	304.21	51.361
3	113.99	2.8573	-1.6458	1.3982E-04	303.10	51.481
4	137.39	2.8507	-1.6314	1.3982E-04	302.00	51.601
5	160.80	2.8440	-1.6170	1.3982E-04	300.89	51.720
6	184.20	2.8374	-1.6027	1.3982E-04	299.78	51.839
7	207.61	0.075428	3.6384	1.3982E-04	-37.528	105.40
8	105.44	0.2354	3.2367	1.3982E-04	-25.514	110.06
9	128.85	2.8132	-1.6714	1.3982E-04	303.69	50.449
10	152.25	2.8067	-1.6571	1.3982E-04	302.59	50.570
11	175.66	2.8001	-1.6429	1.3982E-04	301.49	50.690
12	199.06	2.7935	-1.6287	1.3982E-04	300.38	50.810
13	222.47	2.7869	-1.6146	1.3982E-04	299.28	50.930
14	245.45	0.080897	3.6176	1.3982E-04	-36.988	105.10
15	143.71	0.1489	3.5822	1.3982E-04	-34.431	108.94
16	167.11	3.1124	-1.6037	1.3982E-04	304.44	56.993
17	190.52	3.1055	-1.5880	1.3982E-04	303.29	57.108
18	213.92	3.0986	-1.5723	1.3982E-04	302.15	57.223
19	237.33	3.0916	-1.5567	1.3982E-04	301.00	57.337
20	254.84	3.0862	-1.5403	1.3982E-04	299.90	57.422
21	269.63	6.6757E-03	3.8799	1.3982E-04	-43.438	104.12
MINIMUM	67.179	6.6757E-03	-1.6714	1.3982E-04	-43.438	50.449
Pile N.	1	21	9	1	21	9
MAXIMUM	269.63	3.1124	3.8799	1.3982E-04	304.44	110.28
Pile N.	21	16	21	1	16	1

PILE GROUP	STRESS,KIP/IN**2
1	3.7337
2	4.5926
3	5.2679
4	5.9432
5	6.6186
6	7.2939
7	7.7445
8	4.8417
9	5.6960
10	6.3714
11	7.0467
12	7.7220
13	8.3974
14	8.8393
15	5.9413
16	6.8583
17	7.5336
18	8.2089
19	8.8842
20	9.3881
21	9.5316
MINIMUM	3.7337
Pile N.	1
MAXIMUM	9.5316
Pile N.	21

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
1	-0.021316	-7.9314E-04	-110.28	-27.078	-0.068290	-1.2333	-0.023096	-0.014251	1.9529	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	0.0000	0.0000	17.248	11.088	0.0000	14.784	55.440	0.0000	0.0000
2	-8.9840E-04	-2.6620E-03	-51.361	-14.610	-0.7687	-2.5364	-0.010227	-0.025435	2.6333	1.2847E+07	3.5380E+07
x(FT)	12.320	8.6240	0.0000	17.248	9.8560	4.9280	13.552	8.6240	55.440	0.0000	0.0000
3	-9.0378E-04	-2.6460E-03	-51.481	-14.571	-0.7717	-2.5293	-0.010263	-0.025363	3.3136	1.2847E+07	3.5380E+07
x(FT)	12.320	8.6240	0.0000	17.248	9.8560	4.9280	13.552	8.6240	55.440	0.0000	0.0000
4	-9.0916E-04	-2.6346E-03	-51.601	-14.532	-0.7746	-2.5223	-0.010298	-0.025304	3.9940	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	17.248	9.8560	4.9280	13.552	9.8560	55.440	0.0000	0.0000
5	-9.1453E-04	-2.6251E-03	-51.720	-14.494	-0.7776	-2.5152	-0.010333	-0.025245	4.6744	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	17.248	9.8560	4.9280	13.552	9.8560	55.440	0.0000	0.0000
6	-9.1991E-04	-2.6157E-03	-51.839	-14.456	-0.7805	-2.5081	-0.010368	-0.025187	5.3548	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	17.248	9.8560	4.9280	13.552	9.8560	55.440	0.0000	0.0000
7	-0.021782	-7.8830E-04	-105.40	-37.528	-0.068551	-1.3320	-0.026673	-0.015916	6.0351	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	0.0000	0.0000	17.248	11.088	0.0000	14.784	55.440	0.0000	0.0000
8	-0.021316	-7.9767E-04	-110.06	-25.514	-0.068771	-1.2268	-0.022790	-0.014106	3.0652	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	0.0000	0.0000	17.248	11.088	0.0000	14.784	55.440	0.0000	0.0000
9	-9.0511E-04	-2.6903E-03	-50.449	-14.717	-0.7656	-2.5352	-0.010153	-0.025305	3.7456	1.2847E+07	3.5380E+07
x(FT)	12.320	8.6240	0.0000	17.248	9.8560	4.9280	13.552	8.6240	55.440	0.0000	0.0000
10	-9.1056E-04	-2.6742E-03	-50.570	-14.678	-0.7686	-2.5282	-0.010189	-0.025233	4.4260	1.2847E+07	3.5380E+07
x(FT)	12.320	8.6240	0.0000	17.248	9.8560	4.9280	13.552	8.6240	55.440	0.0000	0.0000
11	-9.1601E-04	-2.6637E-03	-50.690	-14.638	-0.7715	-2.5212	-0.010224	-0.025162	5.1064	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	17.248	9.8560	4.9280	13.552	8.6240	55.440	0.0000	0.0000
12	-9.2146E-04	-2.6542E-03	-50.810	-14.599	-0.7745	-2.5142	-0.010259	-0.025098	5.7867	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	17.248	9.8560	4.9280	13.552	9.8560	55.440	0.0000	0.0000
13	-9.2691E-04	-2.6447E-03	-50.930	-14.560	-0.7774	-2.5072	-0.010295	-0.025040	6.4671	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	17.248	9.8560	4.9280	13.552	9.8560	55.440	0.0000	0.0000
14	-0.021782	-7.9036E-04	-105.10	-36.988	-0.069075	-1.3343	-0.026703	-0.015936	7.1351	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	0.0000	0.0000	17.248	11.088	0.0000	14.784	55.440	0.0000	0.0000
15	-0.021316	-7.8164E-04	-108.94	-34.431	-0.069565	-1.3125	-0.025858	-0.015644	4.1776	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	0.0000	0.0000	17.248	11.088	0.0000	14.784	55.440	0.0000	0.0000
16	-9.0595E-04	-2.5154E-03	-56.993	-14.162	-0.8209	-2.6021	-0.011116	-0.027135	4.8580	1.2847E+07	3.5380E+07
x(FT)	12.320	8.6240	0.0000	17.248	9.8560	4.9280	13.552	8.6240	54.208	0.0000	0.0000
17	-9.1061E-04	-2.5004E-03	-57.108	-14.130	-0.8237	-2.5946	-0.011148	-0.027058	5.5383	1.2847E+07	3.5380E+07
x(FT)	12.320	8.6240	0.0000	17.248	9.8560	4.9280	13.552	8.6240	54.208	0.0000	0.0000
18	-9.1527E-04	-2.4855E-03	-57.223	-14.098	-0.8265	-2.5872	-0.011200	-0.026982	6.2187	1.2847E+07	3.5380E+07
x(FT)	12.320	8.6240	0.0000	17.248	9.8560	4.9280	12.320	8.6240	54.208	0.0000	0.0000
19	-9.1994E-04	-2.4707E-03	-57.337	-14.067	-0.8292	-2.5797	-0.011251	-0.026906	6.8991	1.2847E+07	3.5380E+07
x(FT)	12.320	8.6240	0.0000	17.248	9.8560	4.9280	12.320	8.6240	54.208	0.0000	0.0000
20	-9.2359E-04	-2.4561E-03	-57.422	-14.028	-0.8315	-2.5715	-0.011293	-0.026821	7.4081	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	17.248	9.8560	4.9280	12.320	8.6240	54.208	0.0000	0.0000
21	-0.021782	-7.7363E-04	-104.12	-43.438	-0.069159	-1.3952	-0.029190	-0.017023	7.8380	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	0.0000	0.0000	17.248	11.088	0.0000	14.784	54.208	0.0000	0.0000
Min.	-0.021782	-2.6903E-03	-110.28	-43.438	-0.8315	-2.6021	-0.029190	-0.027135	1.9529	1.2847E+07	3.5380E+07
Pile N.	7	9	1	21	20	16	21	16	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
1	1.4370E-03	0.031414	4.2443	112.18	1.1062	3.0460	0.016933	0.043079	3.7337	1.2847E+07	3.5380E+07
x(FT)	8.6240	0.0000	14.784	7.3920	6.1600	0.0000	9.8560	4.9280	0.0000	0.0000	0.0000
2	0.031414	0.021393	59.217	304.21	2.6183	0.2321	0.040908	0.022878	4.5926	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
3	0.031414	0.021471	59.294	303.10	2.6125	0.2308	0.040874	0.022943	5.2679	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
4	0.031414	0.021549	59.371	302.00	2.6068	0.2294	0.040839	0.023008	5.9432	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
5	0.031414	0.021627	59.448	300.89	2.6011	0.2281	0.040803	0.023074	6.6186	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
6	0.031414	0.021704	59.525	299.78	2.5953	0.2267	0.040768	0.023139	7.2939	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
7	1.3322E-03	0.031414	4.1935	116.65	1.1345	3.3557	0.017869	0.048020	7.7445	1.2847E+07	3.5380E+07
x(FT)	8.6240	0.0000	13.552	6.1600	6.1600	0.0000	9.8560	4.9280	0.0000	0.0000	0.0000
8	1.4565E-03	0.031336	4.2816	111.72	1.1085	2.9896	0.016932	0.042465	4.8417	1.2847E+07	3.5380E+07
x(FT)	8.6240	0.0000	14.784	7.3920	6.1600	0.0000	9.8560	4.9280	0.0000	0.0000	0.0000
9	0.031336	0.021393	58.951	303.69	2.5727	0.2329	0.040308	0.022566	5.6960	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
10	0.031336	0.021471	59.029	302.59	2.5670	0.2315	0.040274	0.022631	6.3714	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
11	0.031336	0.021549	59.106	301.49	2.5612	0.2301	0.040239	0.022695	7.0467	1.2847E+07	3.5380E+07

x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
12	0.031336	0.021627	59.183	300.38	2.5555	0.2287	0.040204	0.022759	7.7220	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
13	0.031336	0.021704	59.260	299.28	2.5498	0.2273	0.040169	0.022823	8.3974	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
14	1.3406E-03	0.031336	4.2186	116.71	1.1399	3.3356	0.017965	0.047935	8.8393	1.2847E+07	3.5380E+07
x(FT)	8.6240	0.0000	13.552	6.1600	6.1600	0.0000	9.8560	4.9280	0.0000	0.0000	0.0000
15	1.3773E-03	0.031259	4.3502	115.83	1.1405	3.3030	0.017877	0.047246	5.9413	1.2847E+07	3.5380E+07
x(FT)	8.6240	0.0000	13.552	6.1600	6.1600	0.0000	9.8560	4.9280	0.0000	0.0000	0.0000
16	0.031259	0.021393	61.666	304.44	2.8378	0.2435	0.045371	0.025933	6.8583	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
17	0.031259	0.021471	61.743	303.29	2.8319	0.2421	0.045333	0.026007	7.5336	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
18	0.031259	0.021549	61.821	302.15	2.8260	0.2407	0.045294	0.026081	8.2089	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
19	0.031259	0.021627	61.898	301.00	2.8200	0.2393	0.045254	0.026155	8.8842	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
20	0.031259	0.021704	61.960	299.90	2.8154	0.2376	0.045216	0.026228	9.3881	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	3.6960	0.0000	0.0000	0.0000	0.0000
21	1.2900E-03	0.031259	4.2735	119.89	1.1640	3.5727	0.018673	0.051617	9.5316	1.2847E+07	3.5380E+07
x(FT)	8.6240	0.0000	13.552	6.1600	6.1600	0.0000	9.8560	3.6960	0.0000	0.0000	0.0000
Max.	0.031414	0.031414	61.960	304.44	2.8378	3.5727	0.045371	0.051617	9.5316	1.2847E+07	3.5380E+07
Pile N.	2	1	20	16	16	21	16	21	21	1	1

LOAD CASE : 6
CASE NAME : Service IV Load Combination
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8066	1.0000
2	0.8046	1.0000
3	0.8046	1.0000
4	0.8046	1.0000
5	0.8046	1.0000
6	0.8046	1.0000
7	0.9832	1.0000
8	0.7871	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.9832	1.0000
15	0.8270	1.0000
16	0.8270	1.0000
17	0.8270	1.0000
18	0.8270	1.0000
19	0.8270	1.0000
20	0.8270	1.0000
21	1.0000	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
2808.00	0.00000	58.0000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	36180.0	5556.00

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.11028	-6.31788E-03	0.0194848

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
-8.40976E-08	1.17512E-04	8.69881E-05

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.083904	-3.7234E-03	0.015954	-8.4098E-08	1.1751E-04	8.6988E-05
2	0.090955	-3.7183E-03	0.015954	-8.4098E-08	1.1751E-04	8.6988E-05
3	0.098006	-3.7133E-03	0.015954	-8.4098E-08	1.1751E-04	8.6988E-05
4	0.1051	-3.7082E-03	0.015954	-8.4098E-08	1.1751E-04	8.6988E-05
5	0.1121	-3.7032E-03	0.015954	-8.4098E-08	1.1751E-04	8.6988E-05
6	0.1192	-3.6981E-03	0.015954	-8.4098E-08	1.1751E-04	8.6988E-05
7	0.1262	-3.6931E-03	0.015954	-8.4098E-08	1.1751E-04	8.6988E-05
8	0.089123	-3.7234E-03	0.015959	-8.4098E-08	1.1751E-04	8.6988E-05
9	0.096174	-3.7183E-03	0.015959	-8.4098E-08	1.1751E-04	8.6988E-05
10	0.1032	-3.7133E-03	0.015959	-8.4098E-08	1.1751E-04	8.6988E-05
11	0.1103	-3.7082E-03	0.015959	-8.4098E-08	1.1751E-04	8.6988E-05
12	0.1173	-3.7032E-03	0.015959	-8.4098E-08	1.1751E-04	8.6988E-05
13	0.1244	-3.6981E-03	0.015959	-8.4098E-08	1.1751E-04	8.6988E-05
14	0.1314	-3.6931E-03	0.015959	-8.4098E-08	1.1751E-04	8.6988E-05
15	0.094343	-3.7234E-03	0.015964	-8.4098E-08	1.1751E-04	8.6988E-05
16	0.1014	-3.7183E-03	0.015964	-8.4098E-08	1.1751E-04	8.6988E-05

17	0.1084	-3.7133E-03	0.015964	-8.4098E-08	1.1751E-04	8.6988E-05
18	0.1155	-3.7082E-03	0.015964	-8.4098E-08	1.1751E-04	8.6988E-05
19	0.1226	-3.7032E-03	0.015964	-8.4098E-08	1.1751E-04	8.6988E-05
20	0.1296	-3.6981E-03	0.015964	-8.4098E-08	1.1751E-04	8.6988E-05
21	0.1366	-3.6931E-03	0.015964	-8.4098E-08	1.1751E-04	8.6988E-05
MINIMUM	0.083904	-3.7234E-03	0.015954	-8.4098E-08	1.1751E-04	8.6988E-05
Pile N.	1	1	1	1	1	1
MAXIMUM	0.1366	-3.6931E-03	0.015964	-8.4098E-08	1.1751E-04	8.6988E-05
Pile N.	21	7	15	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	104.41	-0.1312	3.1511	-9.0775E-06	-90.805	12.567
2	112.25	0.057681	2.5074	-9.0775E-06	-65.288	40.618
3	120.08	0.059503	2.5064	-9.0775E-06	-65.302	40.680
4	127.92	0.061324	2.5054	-9.0775E-06	-65.315	40.743
5	135.75	0.063145	2.5044	-9.0775E-06	-65.329	40.805
6	143.58	0.064966	2.5033	-9.0775E-06	-65.343	40.867
7	151.42	-0.1739	3.6306	-9.0775E-06	-102.72	12.068
8	110.21	-0.1252	3.0960	-9.0775E-06	-89.486	12.638
9	118.05	0.064042	2.4645	-9.0775E-06	-64.478	40.685
10	125.88	0.065840	2.4635	-9.0775E-06	-64.492	40.747
11	133.71	0.067637	2.4625	-9.0775E-06	-64.506	40.808
12	141.55	0.069434	2.4615	-9.0775E-06	-64.519	40.870
13	149.38	0.071230	2.4605	-9.0775E-06	-64.533	40.932
14	157.22	-0.1737	3.6310	-9.0775E-06	-102.78	12.063
15	116.01	-0.1366	3.2088	-9.0775E-06	-92.351	12.476
16	123.85	0.051104	2.5555	-9.0775E-06	-66.320	40.521
17	131.68	0.052952	2.5545	-9.0775E-06	-66.334	40.584
18	139.51	0.054800	2.5535	-9.0775E-06	-66.347	40.647
19	147.35	0.056647	2.5525	-9.0775E-06	-66.361	40.710
20	155.18	0.058493	2.5515	-9.0775E-06	-66.374	40.773
21	163.02	-0.1782	3.6760	-9.0775E-06	-103.91	11.995
MINIMUM	104.41	-0.1782	2.4605	-9.0775E-06	-103.91	11.995
Pile N.	1	21	13	1	21	21
MAXIMUM	163.02	0.071230	3.6760	-9.0775E-06	-64.478	40.932
Pile N.	21	13	21	1	9	13

THE PILE COORDINATE SYSTEM (LOCAL AXES)
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.083904	-3.7234E-03	0.015954	-8.4098E-08	1.1751E-04	8.6988E-05
2	0.090955	0.015954	3.7183E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
3	0.098006	0.015954	3.7133E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
4	0.1051	0.015954	3.7082E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
5	0.1121	0.015954	3.7032E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
6	0.1192	0.015954	3.6981E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
7	0.1262	-3.6931E-03	0.015954	-8.4098E-08	1.1751E-04	8.6988E-05
8	0.089123	-3.7234E-03	0.015959	-8.4098E-08	1.1751E-04	8.6988E-05
9	0.096174	0.015959	3.7183E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
10	0.1032	0.015959	3.7133E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
11	0.1103	0.015959	3.7082E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
12	0.1173	0.015959	3.7032E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
13	0.1244	0.015959	3.6981E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
14	0.1314	-3.6931E-03	0.015959	-8.4098E-08	1.1751E-04	8.6988E-05
15	0.094343	-3.7234E-03	0.015964	-8.4098E-08	1.1751E-04	8.6988E-05
16	0.1014	0.015964	3.7183E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
17	0.1084	0.015964	3.7133E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
18	0.1155	0.015964	3.7082E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
19	0.1226	0.015964	3.7032E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
20	0.1296	0.015964	3.6981E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
21	0.1366	-3.6931E-03	0.015964	-8.4098E-08	1.1751E-04	8.6988E-05
MINIMUM	0.083904	-3.7234E-03	3.6981E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
Pile N.	1	1	6	1	2	2
MAXIMUM	0.1366	0.015964	0.015964	-8.4098E-08	1.1751E-04	8.6988E-05
Pile N.	21	16	15	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
**********	***********	***********	***********	***********	***********	***********
1	104.41	-0.1312	3.1511	-9.0775E-06	-90.805	12.567
2	112.25	2.5074	-0.057681	-9.0775E-06	40.618	65.288
3	120.08	2.5064	-0.059503	-9.0775E-06	40.680	65.302
4	127.92	2.5054	-0.061324	-9.0775E-06	40.743	65.315
5	135.75	2.5044	-0.063145	-9.0775E-06	40.805	65.329
6	143.58	2.5033	-0.064966	-9.0775E-06	40.867	65.343
7	151.42	-0.1739	3.6306	-9.0775E-06	-102.72	12.068
8	110.21	-0.1252	3.0960	-9.0775E-06	-89.486	12.638
9	118.05	2.4645	-0.064042	-9.0775E-06	40.685	64.478
10	125.88	2.4635	-0.065840	-9.0775E-06	40.747	64.492
11	133.71	2.4625	-0.067637	-9.0775E-06	40.808	64.506
12	141.55	2.4615	-0.069434	-9.0775E-06	40.870	64.519
13	149.38	2.4605	-0.071230	-9.0775E-06	40.932	64.533
14	157.22	-0.1737	3.6310	-9.0775E-06	-102.78	12.063
15	116.01	-0.1366	3.2088	-9.0775E-06	-92.351	12.476
16	123.85	2.5555	-0.051104	-9.0775E-06	40.521	66.320
17	131.68	2.5545	-0.052952	-9.0775E-06	40.584	66.334
18	139.51	2.5535	-0.054800	-9.0775E-06	40.647	66.347
19	147.35	2.5525	-0.056647	-9.0775E-06	40.710	66.361
20	155.18	2.5515	-0.058493	-9.0775E-06	40.773	66.374
21	163.02	-0.1782	3.6760	-9.0775E-06	-103.91	11.995
MINIMUM	104.41	-0.1782	-0.071230	-9.0775E-06	-103.91	11.995
Pile N.	1	21	13	1	21	21
MAXIMUM	163.02	2.5555	3.6760	-9.0775E-06	40.932	66.374
Pile N.	21	16	21	1	13	20

PILE GROUP	STRESS,KIP/IN**2
**********	****************

1	3.6028
2	4.3395
3	4.5676
4	4.7956
5	5.0236
6	5.2516
7	5.0322
8	3.7646
9	4.4955
10	4.7235
11	4.9515
12	5.1796
13	5.4076
14	5.2011
15	3.9479
16	4.6928
17	4.9208
18	5.1488
19	5.3768
20	5.6048
21	5.3756
MINIMUM	3.6028
Pile N.	1
MAXIMUM	5.6048
Pile N.	20

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-3.7234E-03	-3.1440E-04	-13.857	-90.805	-0.078188	-0.7703	-7.0646E-03	-0.010305	3.0353	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	1.2320	0.0000	0.0000	12.320	0.0000	14.784	52.976	0.0000	0.0000
2	-3.1804E-04	-1.7825E-04	-65.288	-1.3513	-0.5426	-0.3808	-9.1472E-03	-6.8242E-03	3.2630	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	45.584	0.0000	0.0000
3	-3.1846E-04	-1.7884E-04	-65.302	-1.3548	-0.5430	-0.3813	-9.1508E-03	-6.8352E-03	3.4907	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	45.584	0.0000	0.0000
4	-3.1888E-04	-1.7942E-04	-65.315	-1.3583	-0.5434	-0.3817	-9.1544E-03	-6.8462E-03	3.7185	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	45.584	0.0000	0.0000
5	-3.1930E-04	-1.8001E-04	-65.329	-1.3617	-0.5438	-0.3822	-9.1579E-03	-6.8571E-03	3.9462	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	45.584	0.0000	0.0000
6	-3.1972E-04	-1.8060E-04	-65.343	-1.3652	-0.5441	-0.3827	-9.1615E-03	-6.8680E-03	4.1739	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	45.584	0.0000	0.0000
7	-3.6931E-03	-2.9209E-04	-14.095	-102.72	-0.1097	-0.8401	-8.5438E-03	-0.012589	4.4017	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	2.4640	0.0000	0.0000	11.088	0.0000	13.552	51.744	0.0000	0.0000
8	-3.7234E-03	-3.1711E-04	-13.866	-89.486	-0.073451	-0.7629	-6.8918E-03	-0.010136	3.2039	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	1.2320	0.0000	0.0000	12.320	0.0000	14.784	52.976	0.0000	0.0000
9	-3.2139E-04	-1.8079E-04	-64.478	-1.3573	-0.5369	-0.3791	-9.0117E-03	-6.7505E-03	3.4316	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	48.048	0.0000	0.0000
10	-3.2182E-04	-1.8139E-04	-64.492	-1.3609	-0.5373	-0.3795	-9.0153E-03	-6.7616E-03	3.6593	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	48.048	0.0000	0.0000
11	-3.2225E-04	-1.8199E-04	-64.506	-1.3645	-0.5376	-0.3800	-9.0190E-03	-6.7727E-03	3.8870	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	48.048	0.0000	0.0000
12	-3.2268E-04	-1.8259E-04	-64.519	-1.3681	-0.5380	-0.3805	-9.0226E-03	-6.7836E-03	4.1148	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	48.048	0.0000	0.0000
13	-3.2310E-04	-1.8319E-04	-64.533	-1.3717	-0.5384	-0.3811	-9.0263E-03	-6.7945E-03	4.3425	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	6.1600	12.320	9.8560	48.048	0.0000	0.0000
14	-3.6931E-03	-2.9237E-04	-14.096	-102.78	-0.1095	-0.8406	-8.5421E-03	-0.012592	4.5702	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	2.4640	0.0000	0.0000	11.088	0.0000	13.552	51.744	0.0000	0.0000
15	-3.7234E-03	-3.1244E-04	-13.842	-92.351	-0.082276	-0.7789	-7.2399E-03	-0.010487	3.3724	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	2.4640	0.0000	0.0000	12.320	0.0000	14.784	51.744	0.0000	0.0000
16	-3.1543E-04	-1.7583E-04	-66.320	-1.3462	-0.5503	-0.3831	-9.3108E-03	-6.9146E-03	3.6002	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	48.048	0.0000	0.0000
17	-3.1584E-04	-1.7640E-04	-66.334	-1.3495	-0.5507	-0.3836	-9.3144E-03	-6.9255E-03	3.8279	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	48.048	0.0000	0.0000
18	-3.1625E-04	-1.7697E-04	-66.347	-1.3529	-0.5510	-0.3840	-9.3179E-03	-6.9363E-03	4.0556	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	48.048	0.0000	0.0000
19	-3.1666E-04	-1.7754E-04	-66.361	-1.3562	-0.5514	-0.3845	-9.3214E-03	-6.9470E-03	4.2834	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	48.048	0.0000	0.0000
20	-3.1707E-04	-1.7811E-04	-66.374	-1.3596	-0.5518	-0.3849	-9.3250E-03	-6.9577E-03	4.5111	1.2847E+07	3.5380E+07
x(FT)	12.320	9.8560	0.0000	16.016	9.8560	7.3920	12.320	9.8560	48.048	0.0000	0.0000
21	-3.6931E-03	-2.9029E-04	-14.116	-103.91	-0.1128	-0.8506	-8.6859E-03	-0.012806	4.7388	1.2847E+07	3.5380E+07
x(FT)	0.0000	14.784	2.4640	0.0000	0.0000	11.088	0.0000	13.552	51.744	0.0000	0.0000
Min.	-3.7234E-03	-3.1711E-04	-66.374	-103.91	-0.5518	-0.8506	-9.3250E-03	-0.012806	3.0353	1.2847E+07	3.5380E+07
Pile N.	1	8	20	21	20	21	20	21	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	1.2773E-04	0.015954	0.6293	58.849	0.1636	2.9293	3.2691E-03	0.035093	3.6028	1.2847E+07	3.5380E+07
x(FT)	8.6240	0.0000	13.552	7.3920	7.3920	0.0000	11.088	3.6960	0.0000	0.0000	0.0000
2	0.015954	3.7183E-03	33.421	40.618	2.2884	0.023706	0.033444	7.0375E-03	4.3395	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
3	0.015954	3.7133E-03	33.431	40.680	2.2877	0.023743	0.033444	7.0283E-03	4.5676	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
4	0.015954	3.7082E-03	33.441	40.743	2.2869	0.023779	0.033445	7.0191E-03	4.7956	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
5	0.015954	3.7032E-03	33.452	40.805	2.2862	0.023816	0.033446	7.0099E-03	5.0236	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
6	0.015954	3.6981E-03	33.462	40.867	2.2855	0.023853	0.033447	7.0006E-03	5.2516	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
7	1.2668E-04	0.015954	0.6540	63.446	0.1749	3.3610	3.5367E-03	0.041952	5.0322	1.2847E+07	3.5380E+07
x(FT)	8.6240	0.0000	13.552	7.3920	6.1600	0.0000	11.088	3.6960	0.0000	0.0000	0.0000
8	1.2853E-04	0.015959	0.6272	58.319	0.1628	2.8797	3.2426E-03	0.034325	3.7646	1.2847E+07	3.5380E+07
x(FT)	8.6240	0.0000	13.552	7.3920	7.3920	0.0000	11.088	3.6960	0.0000	0.0000	0.0000
9	0.015959	3.7183E-03	33.114	40.685	2.2511	0.023882	0.032691	6.8646E-03	4.4955	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
10	0.015959	3.7133E-03	33.125	40.747	2.2503	0.023921	0.032692	6.8556E-03	4.7235	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
11	0.015959	3.7082E-03	33.135	40.808	2.2496	0.023960	0.032693	6.8466E-03	4.9515	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
12	0.015959	3.7032E-03	33.145	40.870	2.2489	0.023999	0.032694	6.8376E-03	5.1796	1.2847E+07	3.5380E+07

x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
13	0.015959	3.6981E-03	33.156	40.932	2.2482	0.024038	0.032695	6.8286E-03	5.4076	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
14	1.2683E-04	0.015959	0.6545	63.465	0.1750	3.3615	3.5397E-03	0.041958	5.2011	1.2847E+07	3.5380E+07
x(FT)	8.6240	0.0000	13.552	7.3920	6.1600	0.0000	11.088	3.6960	0.0000	0.0000	0.0000
15	1.2747E-04	0.015964	0.6330	59.444	0.1649	2.9816	3.3053E-03	0.035904	3.9479	1.2847E+07	3.5380E+07
x(FT)	8.6240	0.0000	13.552	7.3920	6.1600	0.0000	11.088	3.6960	0.0000	0.0000	0.0000
16	0.015964	3.7183E-03	33.807	40.521	2.3308	0.023541	0.034314	7.2304E-03	4.6928	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
17	0.015964	3.7133E-03	33.817	40.584	2.3300	0.023576	0.034315	7.2209E-03	4.9208	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
18	0.015964	3.7082E-03	33.828	40.647	2.3293	0.023610	0.034316	7.2115E-03	5.1488	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
19	0.015964	3.7032E-03	33.838	40.710	2.3286	0.023645	0.034317	7.2020E-03	5.3768	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
20	0.015964	3.6981E-03	33.848	40.773	2.3279	0.023680	0.034317	7.1925E-03	5.6048	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	6.1600	0.0000	0.0000	19.712	2.4640	0.0000	0.0000	0.0000	0.0000
21	1.2659E-04	0.015964	0.6601	63.880	0.1759	3.4020	3.5625E-03	0.042605	5.3756	1.2847E+07	3.5380E+07
x(FT)	8.6240	0.0000	12.320	7.3920	6.1600	0.0000	11.088	3.6960	0.0000	0.0000	0.0000
Max.	0.015964	0.015964	33.848	63.880	2.3308	3.4020	0.034317	0.042605	5.6048	1.2847E+07	3.5380E+07
Pile N.	16	15	20	21	16	21	19	21	20	1	1

LOAD CASE : 7
CASE NAME : Extreme Event I
LOAD TYPE : Dead, DL

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8066	1.0000
2	0.8063	1.0000
3	0.8063	1.0000
4	0.8063	1.0000
5	0.8063	1.0000
6	0.8063	1.0000
7	0.9974	1.0000
8	0.7853	1.0000
9	0.7850	1.0000
10	0.7850	1.0000
11	0.7850	1.0000
12	0.7850	1.0000
13	0.7850	1.0000
14	0.9974	1.0000
15	0.8099	1.0000
16	0.8099	1.0000
17	0.8099	1.0000
18	0.8099	1.0000
19	0.8099	1.0000
20	0.8099	1.0000
21	1.0000	1.0000

* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
2897.00	0.00000	127.000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	49416.0	5556.00

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
0.11409	-7.35539E-03	0.0594133

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
-3.14662E-07	1.73967E-04	8.90020E-05

* TABLE M *   COMPUTATION ON INDIVIDUAL PILE

THE GLOBAL STRUCTURAL COORDINATE SYSTEM
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* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
**********	***********	***********	***********	***********	***********	***********
1	0.077436	-4.7420E-03	0.054175	-3.1466E-07	1.7397E-04	8.9002E-05
2	0.087874	-4.7231E-03	0.054175	-3.1466E-07	1.7397E-04	8.9002E-05
3	0.098312	-4.7042E-03	0.054175	-3.1466E-07	1.7397E-04	8.9002E-05
4	0.1087	-4.6853E-03	0.054175	-3.1466E-07	1.7397E-04	8.9002E-05
5	0.1192	-4.6664E-03	0.054175	-3.1466E-07	1.7397E-04	8.9002E-05
6	0.1296	-4.6476E-03	0.054175	-3.1466E-07	1.7397E-04	8.9002E-05
7	0.1401	-4.6287E-03	0.054175	-3.1466E-07	1.7397E-04	8.9002E-05
8	0.082776	-4.7420E-03	0.054194	-3.1466E-07	1.7397E-04	8.9002E-05
9	0.093214	-4.7231E-03	0.054194	-3.1466E-07	1.7397E-04	8.9002E-05
10	0.1037	-4.7042E-03	0.054194	-3.1466E-07	1.7397E-04	8.9002E-05
11	0.1141	-4.6853E-03	0.054194	-3.1466E-07	1.7397E-04	8.9002E-05
12	0.1245	-4.6664E-03	0.054194	-3.1466E-07	1.7397E-04	8.9002E-05
13	0.1350	-4.6476E-03	0.054194	-3.1466E-07	1.7397E-04	8.9002E-05
14	0.1454	-4.6287E-03	0.054194	-3.1466E-07	1.7397E-04	8.9002E-05
15	0.088116	-4.7420E-03	0.054213	-3.1466E-07	1.7397E-04	8.9002E-05
16	0.098554	-4.7231E-03	0.054213	-3.1466E-07	1.7397E-04	8.9002E-05
17	0.1090	-4.7042E-03	0.054213	-3.1466E-07	1.7397E-04	8.9002E-05
18	0.1194	-4.6853E-03	0.054213	-3.1466E-07	1.7397E-04	8.9002E-05

19	0.1299	-4.6664E-03	0.054213	-3.1466E-07	1.7397E-04	8.9002E-05
20	0.1403	-4.6476E-03	0.054213	-3.1466E-07	1.7397E-04	8.9002E-05
21	0.1507	-4.6287E-03	0.054213	-3.1466E-07	1.7397E-04	8.9002E-05
MINIMUM	0.077436	-4.7420E-03	0.054175	-3.1466E-07	1.7397E-04	8.9002E-05
Pile N.	1	1	1	1	1	1
MAXIMUM	0.1507	-4.6287E-03	0.054213	-3.1466E-07	1.7397E-04	8.9002E-05
Pile N.	21	7	15	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
1	97.226	-0.096017	7.0539	-3.3965E-05	-328.94	10.108
2	108.82	0.033821	5.4359	-3.3965E-05	-208.39	33.767
3	120.42	0.037510	5.4316	-3.3965E-05	-208.43	33.934
4	132.02	0.041198	5.4274	-3.3965E-05	-208.47	34.101
5	143.62	0.044887	5.4232	-3.3965E-05	-208.52	34.268
6	155.21	0.048575	5.4189	-3.3965E-05	-208.56	34.435
7	166.81	-0.1197	8.3293	-3.3965E-05	-375.05	9.9613
8	103.16	-0.091272	6.9143	-3.3965E-05	-324.20	10.173
9	114.76	0.039312	5.3284	-3.3965E-05	-205.56	33.865
10	126.35	0.042924	5.3242	-3.3965E-05	-205.60	34.029
11	137.95	0.046534	5.3200	-3.3965E-05	-205.64	34.193
12	149.55	0.050145	5.3158	-3.3965E-05	-205.68	34.357
13	161.15	0.053755	5.3115	-3.3965E-05	-205.73	34.521
14	172.74	-0.1195	8.3294	-3.3965E-05	-375.21	9.9544
15	109.09	-0.096240	7.0749	-3.3965E-05	-329.96	10.082
16	120.69	0.033354	5.4517	-3.3965E-05	-209.05	33.731
17	132.29	0.037055	5.4475	-3.3965E-05	-209.10	33.899
18	143.89	0.040755	5.4432	-3.3965E-05	-209.14	34.066
19	155.48	0.044456	5.4390	-3.3965E-05	-209.19	34.234
20	167.08	0.048156	5.4347	-3.3965E-05	-209.23	34.402
21	178.68	-0.1197	8.3454	-3.3965E-05	-375.88	9.9391
MINIMUM	97.226	-0.1197	5.3115	-3.3965E-05	-375.88	9.9391
Pile N.	1	21	13	1	21	21
MAXIMUM	178.68	0.053755	8.3454	-3.3965E-05	-205.56	34.521
Pile N.	21	13	21	1	9	13

THE PILE COORDINATE SYSTEM (LOCAL AXES)

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
1	0.077436	-4.7420E-03	0.054175	-3.1466E-07	1.7397E-04	8.9002E-05
2	0.087874	0.054175	4.7231E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
3	0.098312	0.054175	4.7042E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
4	0.1087	0.054175	4.6853E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
5	0.1192	0.054175	4.6664E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
6	0.1296	0.054175	4.6476E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
7	0.1401	-4.6287E-03	0.054175	-3.1466E-07	1.7397E-04	8.9002E-05
8	0.082776	-4.7420E-03	0.054194	-3.1466E-07	1.7397E-04	8.9002E-05
9	0.093214	0.054194	4.7231E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
10	0.1037	0.054194	4.7042E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
11	0.1141	0.054194	4.6853E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
12	0.1245	0.054194	4.6664E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
13	0.1350	0.054194	4.6476E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
14	0.1454	-4.6287E-03	0.054194	-3.1466E-07	1.7397E-04	8.9002E-05
15	0.088116	-4.7420E-03	0.054213	-3.1466E-07	1.7397E-04	8.9002E-05
16	0.098554	0.054213	4.7231E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
17	0.1090	0.054213	4.7042E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
18	0.1194	0.054213	4.6853E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
19	0.1299	0.054213	4.6664E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
20	0.1403	0.054213	4.6476E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
21	0.1507	-4.6287E-03	0.054213	-3.1466E-07	1.7397E-04	8.9002E-05
MINIMUM	0.077436	-4.7420E-03	4.6476E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
Pile N.	1	1	6	1	2	2
MAXIMUM	0.1507	0.054213	0.054213	-3.1466E-07	1.7397E-04	8.9002E-05
Pile N.	21	16	15	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
1	97.226	-0.096017	7.0539	-3.3965E-05	-328.94	10.108
2	108.82	5.4359	-0.033821	-3.3965E-05	33.767	208.39
3	120.42	5.4316	-0.037510	-3.3965E-05	33.934	208.43
4	132.02	5.4274	-0.041198	-3.3965E-05	34.101	208.47
5	143.62	5.4232	-0.044887	-3.3965E-05	34.268	208.52
6	155.21	5.4189	-0.048575	-3.3965E-05	34.435	208.56
7	166.81	-0.1197	8.3293	-3.3965E-05	-375.05	9.9613
8	103.16	-0.091272	6.9143	-3.3965E-05	-324.20	10.173
9	114.76	5.3284	-0.039312	-3.3965E-05	33.865	205.56
10	126.35	5.3242	-0.042924	-3.3965E-05	34.029	205.60
11	137.95	5.3200	-0.046534	-3.3965E-05	34.193	205.64
12	149.55	5.3158	-0.050145	-3.3965E-05	34.357	205.68
13	161.15	5.3115	-0.053755	-3.3965E-05	34.521	205.73
14	172.74	-0.1195	8.3294	-3.3965E-05	-375.21	9.9544
15	109.09	-0.096240	7.0749	-3.3965E-05	-329.96	10.082
16	120.69	5.4517	-0.033354	-3.3965E-05	33.731	209.05
17	132.29	5.4475	-0.037055	-3.3965E-05	33.899	209.10
18	143.89	5.4432	-0.040755	-3.3965E-05	34.066	209.14
19	155.48	5.4390	-0.044456	-3.3965E-05	34.234	209.19
20	167.08	5.4347	-0.048156	-3.3965E-05	34.402	209.23
21	178.68	-0.1197	8.3454	-3.3965E-05	-375.88	9.9391
MINIMUM	97.226	-0.1197	-0.053755	-3.3965E-05	-375.88	9.9391
Pile N.	1	21	13	1	21	21
MAXIMUM	178.68	5.4517	8.3454	-3.3965E-05	34.521	209.23
Pile N.	21	16	21	1	13	20

PILE GROUP	STRESS,KIP/IN**2
1	4.7543
2	6.5209

3	6.8588
4	7.1967
5	7.5346
6	7.8725
7	7.0454
8	4.8993
9	6.6480
10	6.9858
11	7.3237
12	7.6616
13	7.9995
14	7.2188
15	5.1051
16	6.8765
17	7.2144
18	7.5523
19	7.8902
20	8.2281
21	7.3952
MINIMUM	4.7543
Pile N.	1
MAXIMUM	8.2281
Pile N.	20

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-4.7420E-03	-9.1189E-04	-11.514	-328.94	-0.065564	-1.6161	-4.0433E-03	-0.018062	2.8264	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.480	2.4640	0.0000	0.0000	16.016	0.0000	18.480	40.656	0.0000	0.0000
2	-8.7479E-04	-1.5159E-04	-208.39	-1.1510	-1.1865	-0.2705	-0.017186	-5.6396E-03	3.1635	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	33.264	0.0000	0.0000
3	-8.7747E-04	-1.5316E-04	-208.43	-1.1600	-1.1887	-0.2716	-0.017204	-5.6362E-03	3.5006	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	33.264	0.0000	0.0000
4	-8.8018E-04	-1.5472E-04	-208.47	-1.1689	-1.1910	-0.2728	-0.017223	-5.6327E-03	3.8378	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	33.264	0.0000	0.0000
5	-8.8292E-04	-1.5626E-04	-208.52	-1.1777	-1.1932	-0.2740	-0.017241	-5.6290E-03	4.1749	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	33.264	0.0000	0.0000
6	-8.8569E-04	-1.5780E-04	-208.56	-1.1865	-1.1954	-0.2751	-0.017261	-5.6253E-03	4.5120	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	33.264	0.0000	0.0000
7	-4.6287E-03	-1.0348E-03	-11.889	-375.05	-0.082675	-1.9546	-4.8805E-03	-0.022448	4.8492	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.248	2.4640	0.0000	0.0000	14.784	0.0000	18.480	43.120	0.0000	0.0000
8	-4.7420E-03	-9.0536E-04	-11.496	-324.20	-0.061577	-1.5842	-3.9355E-03	-0.017418	2.9988	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.480	2.4640	0.0000	0.0000	16.016	0.0000	19.712	40.656	0.0000	0.0000
9	-8.7926E-04	-1.5154E-04	-205.56	-1.1243	-1.1612	-0.2694	-0.016755	-5.9766E-03	3.3360	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	34.496	0.0000	0.0000
10	-8.8179E-04	-1.5326E-04	-205.60	-1.1346	-1.1634	-0.2705	-0.016768	-5.9701E-03	3.6731	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	34.496	0.0000	0.0000
11	-8.8436E-04	-1.5497E-04	-205.64	-1.1447	-1.1656	-0.2716	-0.016782	-5.9636E-03	4.0102	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	34.496	0.0000	0.0000
12	-8.8696E-04	-1.5667E-04	-205.68	-1.1548	-1.1679	-0.2728	-0.016797	-5.9570E-03	4.3474	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	33.264	0.0000	0.0000
13	-8.8960E-04	-1.5836E-04	-205.73	-1.1648	-1.1701	-0.2739	-0.016812	-5.9502E-03	4.6845	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	33.264	0.0000	0.0000
14	-4.6287E-03	-1.0362E-03	-11.889	-375.21	-0.082403	-1.9561	-4.8794E-03	-0.022461	5.0217	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.248	2.4640	0.0000	0.0000	14.784	0.0000	18.480	43.120	0.0000	0.0000
15	-4.7420E-03	-9.1554E-04	-11.516	-329.96	-0.065612	-1.6233	-4.0578E-03	-0.018192	3.1713	1.2847E+07	3.5380E+07
x(FT)	0.0000	18.480	2.4640	0.0000	0.0000	16.016	0.0000	18.480	40.656	0.0000	0.0000
16	-8.7798E-04	-1.5218E-04	-209.05	-1.1590	-1.1936	-0.2709	-0.017286	-5.5547E-03	3.5084	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	33.264	0.0000	0.0000
17	-8.8072E-04	-1.5371E-04	-209.10	-1.1677	-1.1959	-0.2721	-0.017305	-5.5517E-03	3.8456	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	33.264	0.0000	0.0000
18	-8.8348E-04	-1.5524E-04	-209.14	-1.1763	-1.1981	-0.2732	-0.017325	-5.5486E-03	4.1827	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	33.264	0.0000	0.0000
19	-8.8627E-04	-1.5675E-04	-209.19	-1.1849	-1.2003	-0.2744	-0.017345	-5.5454E-03	4.5199	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	33.264	0.0000	0.0000
20	-8.8909E-04	-1.5826E-04	-209.23	-1.1934	-1.2025	-0.2756	-0.017365	-5.5421E-03	4.8570	1.2847E+07	3.5380E+07
x(FT)	14.784	12.320	0.0000	18.480	12.320	8.6240	14.784	12.320	33.264	0.0000	0.0000
21	-4.6287E-03	-1.0381E-03	-11.890	-375.88	-0.082561	-1.9613	-4.8912E-03	-0.022531	5.1941	1.2847E+07	3.5380E+07
x(FT)	0.0000	17.248	2.4640	0.0000	0.0000	14.784	0.0000	18.480	43.120	0.0000	0.0000
Min.	-4.7420E-03	-1.0381E-03	-209.23	-375.88	-1.2025	-1.9613	-0.017365	-0.022531	2.8264	1.2847E+07	3.5380E+07
Pile N.	1	21	20	21	20	21	20	21	1	1	1

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2	FLEX. RIG. z-DIR KIP-IN**2	FLEX. RIG. y-DIR KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	1.5690E-04	0.054175	0.6501	134.86	0.1121	6.7191	3.0678E-03	0.059789	4.7543	1.2847E+07	3.5380E+07
x(FT)	11.088	0.0000	16.016	11.088	8.6240	0.0000	14.784	6.1600	0.0000	0.0000	0.0000
2	0.054175	4.7231E-03	80.092	33.767	5.1076	0.023356	0.055442	4.0256E-03	6.5209	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	22.176	4.9280	0.0000	0.0000	0.0000	0.0000
3	0.054175	4.7042E-03	80.151	33.934	5.1047	0.023367	0.055439	4.0096E-03	6.8588	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	22.176	4.9280	0.0000	0.0000	0.0000	0.0000
4	0.054175	4.6853E-03	80.210	34.101	5.1019	0.023376	0.055436	3.9936E-03	7.1967	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	22.176	4.9280	0.0000	0.0000	0.0000	0.0000
5	0.054175	4.6664E-03	80.269	34.268	5.0990	0.023383	0.055433	3.9776E-03	7.5346	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	22.176	4.9280	0.0000	0.0000	0.0000	0.0000
6	0.054175	4.6476E-03	80.328	34.435	5.0962	0.023389	0.055430	3.9616E-03	7.8725	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	22.176	4.9280	0.0000	0.0000	0.0000	0.0000
7	1.3389E-04	0.054175	0.5548	151.46	0.1250	7.9201	3.5793E-03	0.073293	7.0454	1.2847E+07	3.5380E+07
x(FT)	11.088	0.0000	14.784	11.088	8.6240	0.0000	13.552	6.1600	0.0000	0.0000	0.0000
8	1.6168E-04	0.054194	0.6457	133.28	0.1112	6.5888	2.8284E-03	0.058351	4.8993	1.2847E+07	3.5380E+07
x(FT)	11.088	0.0000	16.016	11.088	8.6240	0.0000	14.784	6.1600	0.0000	0.0000	0.0000
9	0.054194	4.7231E-03	79.072	33.865	5.0097	0.022821	0.054107	3.9182E-03	6.6480	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	22.176	4.9280	0.0000	0.0000	0.0000	0.0000
10	0.054194	4.7042E-03	79.131	34.029	5.0068	0.022859	0.054104	3.9027E-03	6.9858	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	22.176	4.9280	0.0000	0.0000	0.0000	0.0000
11	0.054194	4.6853E-03	79.189	34.193	5.0040	0.022896	0.054102	3.8871E-03	7.3237	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	22.176	4.9280	0.0000	0.0000	0.0000	0.0000
12	0.054194	4.6664E-03	79.248	34.357	5.0011	0.022932	0.054099	3.8715E-03	7.6616	1.2847E+07	3.5380E+07
x(FT)	0.0000	0.0000	8.6240	0.0000	0.0000	22.176	4.9280	0.0000	0.0000	0.0000	0.0000
13	0.054194	4.6476E-03	79.307	34.521	4.9982	0.022966	0.054096	3.8559E-03	7.9995	1.2847E+07	3.5380E+07

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 x(FT)     0.0000     0.0000      8.6240      0.0000     0.0000      22.176     4.9280     0.0000      0.0000     0.0000     0.0000
   14  1.3407E-04   0.054194      0.5560      151.53     0.1251      7.9206 3.5865E-03   0.073303      7.2188 1.2847E+07 3.5380E+07
 x(FT)     11.088     0.0000      14.784      11.088     8.6240      0.0000     13.552     6.1600      0.0000     0.0000     0.0000
   15  1.5674E-04   0.054213      0.6537      135.23     0.1125      6.7395 3.1226E-03   0.060026      5.1051 1.2847E+07 3.5380E+07
 x(FT)     11.088     0.0000      16.016      11.088     8.6240      0.0000     14.784     6.1600      0.0000     0.0000     0.0000
   16    0.054213 4.7231E-03      80.367      33.731     5.1233    0.023523   0.055680 4.0417E-03      6.8765 1.2847E+07 3.5380E+07
 x(FT)     0.0000     0.0000      8.6240      0.0000     0.0000      22.176     4.9280     0.0000      0.0000     0.0000     0.0000
   17    0.054213 4.7042E-03      80.426      33.899     5.1204    0.023529   0.055677 4.0256E-03      7.2144 1.2847E+07 3.5380E+07
 x(FT)     0.0000     0.0000      8.6240      0.0000     0.0000      22.176     4.9280     0.0000      0.0000     0.0000     0.0000
   18    0.054213 4.6853E-03      80.485      34.066     5.1176    0.023532   0.055674 4.0095E-03      7.5523 1.2847E+07 3.5380E+07
 x(FT)     0.0000     0.0000      8.6240      0.0000     0.0000      22.176     4.9280     0.0000      0.0000     0.0000     0.0000
   19    0.054213 4.6664E-03      80.545      34.234     5.1147    0.023534   0.055671 3.9935E-03      7.8902 1.2847E+07 3.5380E+07
 x(FT)     0.0000     0.0000      8.6240      0.0000     0.0000      22.176     4.9280     0.0000      0.0000     0.0000     0.0000
   20    0.054213 4.6476E-03      80.604      34.402     5.1119    0.023535   0.055668 3.9774E-03      8.2281 1.2847E+07 3.5380E+07
 x(FT)     0.0000     0.0000      8.6240      0.0000     0.0000      22.176     4.9280     0.0000      0.0000     0.0000     0.0000
   21  1.3390E-04   0.054213      0.5582      151.74     0.1253      7.9359 3.6134E-03   0.073486      7.3952 1.2847E+07 3.5380E+07
 x(FT)     11.088     0.0000      14.784      11.088     8.6240      0.0000     13.552     6.1600      0.0000     0.0000     0.0000

  Max.   0.054213   0.054213      80.604      151.74     5.1233      7.9359   0.055680   0.073486      8.2281 1.2847E+07 3.5380E+07
Pile N.     16         15          20          21         16          21         16         21          20          1          1


          *****     SUMMARY FOR LOAD CASES AND COMBINATIONS      *****


          *****     LOAD CASES RESULTS      *****

  LOAD CASE :     1

  * TABLE L *   COMPUTATION ON PILE CAP

  * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *
        LOAD X,KIP     LOAD Y,KIP     LOAD Z,KIP    MOM X,KIP-IN   MOM Y,KIP-IN   MOM Z,KIP-IN
           5147.00        0.00000        24.0000        0.00000     1.42440E+05        45828.0

  * DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *
         DISP X,IN      DISP Y,IN      DISP Z,IN      ROT X,RAD      ROT Y,RAD      ROT Z,RAD
           0.22542     -0.0696210      0.0455221    1.33166E-06    5.37493E-04    8.97632E-04

  * TABLE M *   COMPUTATION ON INDIVIDUAL PILE

    * PILE TOP DISPLACEMENTS, GLOBAL *
              DISP. X,IN   DISP. Y,IN   DISP. Z,IN   ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
             ***********  ***********  ***********  ***********  ***********  ***********
    MINIMUM     0.074811    -0.042932     0.029317   1.3317E-06   5.3749E-04   8.9763E-04
    Pile N.        1            7           15            1            1            1
    MAXIMUM       0.3760    -0.042452     0.029477   1.3317E-06   5.3749E-04   8.9763E-04
    Pile N.       21            1            1            1            1            1

    * PILE TOP REACTIONS, GLOBAL *
               FOR. X,KIP   FOR. Y,KIP   FOR. Z,KIP MOM X,KIP-IN MOM Y,KIP-IN MOM Z,KIP-IN
             ***********  ***********  ***********  ***********  ***********  ***********
    MINIMUM       94.310      -1.3724       0.6921   1.4374E-04       35.430       100.95
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    Pile N.        1           21            8            1           20           21
    MAXIMUM       361.15       0.5975       1.4406   1.4374E-04       168.34       365.43
    Pile N.       21            9           16            1            8            2

    * PILE TOP DISPLACEMENTS, LOCAL *
              DISP. x,IN   DISP. y,IN   DISP. z,IN   ROT. x,RAD   ROT. y,RAD   ROT. z,RAD
             ***********  ***********  ***********  ***********  ***********  ***********
    MINIMUM     0.074811    -0.042932     0.029317   1.3317E-06   5.3749E-04  -5.3749E-04
    Pile N.        1            7           15            1            1            2
    MAXIMUM       0.3760     0.029477     0.042852   1.3317E-06   8.9763E-04   8.9763E-04
    Pile N.       21            2            6            1            2            1

    * PILE TOP REACTIONS, LOCAL *
               AXIAL,KIP   LAT. y,KIP   LAT. z,KIP MOM x,KIP-IN MOM y,KIP-IN MOM z,KIP-IN
             ***********  ***********  ***********  ***********  ***********  ***********
    MINIMUM       94.310      -1.3724      -0.5975   1.4374E-04       159.28      -40.758
    Pile N.        1           21            9            1           21            9
    MAXIMUM       361.15       1.4406       1.0371   1.4374E-04       365.43       114.13
    Pile N.       21           16           21            1            2            1

    * EFFECTS FOR LATERALLY LOADED PILE *

  PILE    DISPL.     DISPL.     MOMENT      MOMENT       SHEAR       SHEAR    SOIL REACT  SOIL REACT     TOTAL
           y-DIR      z-DIR      z-DIR       y-DIR       y-DIR       z-DIR       y-DIR       z-DIR      STRESS
            IN         IN        KIP-IN      KIP-IN       KIP         KIP        KIP/IN      KIP/IN     KIP/IN**2
 ******  **********  **********  **********  **********  **********  **********  **********  **********  **********
   Min.  -0.042932 -3.3664E-03    -129.90     -18.621     -1.0057     -3.2625   -0.046765   -0.030277      2.7416
Pile N.       7          13          15          13          21          20          21          20           1
   Max.   0.029477    0.042852     74.148      365.43      1.7022      0.7890    0.031378    0.044209      12.831
Pile N.       2           6          20           2          21          21          16          20          21

  LOAD CASE :     2

  * TABLE L *   COMPUTATION ON PILE CAP

  * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *
        LOAD X,KIP     LOAD Y,KIP     LOAD Z,KIP    MOM X,KIP-IN   MOM Y,KIP-IN   MOM Z,KIP-IN
           3552.00        0.00000        103.000        0.00000        64332.0        6948.00

  * DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *
         DISP X,IN      DISP Y,IN      DISP Z,IN      ROT X,RAD      ROT Y,RAD      ROT Z,RAD
           0.14216   -8.87698E-03      0.0476418   -2.73280E-07    2.11500E-04    1.10755E-04

  * TABLE M *   COMPUTATION ON INDIVIDUAL PILE

    * PILE TOP DISPLACEMENTS, GLOBAL *
              DISP. X,IN   DISP. Y,IN   DISP. Z,IN   ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
             ***********  ***********  ***********  ***********  ***********  ***********
    MINIMUM     0.097447  -5.6035E-03     0.041280  -2.7328E-07   2.1150E-04   1.1076E-04
    Pile N.        1            1            1            1            1            1
    MAXIMUM       0.1869  -5.5051E-03     0.041313  -2.7328E-07   2.1150E-04   1.1076E-04
    Pile N.       21            7           15            1            1            1

    * PILE TOP REACTIONS, GLOBAL *
               FOR. X,KIP   FOR. Y,KIP   FOR. Z,KIP MOM X,KIP-IN MOM Y,KIP-IN MOM Z,KIP-IN
```

MINIMUM	119.46	-0.1656	4.3403	-2.9498E-05	-251.32	12.837
Pile N.	1	21	13	1	21	21
MAXIMUM	218.83	0.071680	6.6309	-2.9498E-05	-146.76	44.886
Pile N.	21	13	21	1	9	13

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.097447	-5.6035E-03	5.5215E-03	-2.7328E-07	1.1076E-04	-2.1150E-04
Pile N.	1	1	6	1	2	2
MAXIMUM	0.1869	0.041313	0.041313	-2.7328E-07	2.1150E-04	1.1076E-04
Pile N.	21	16	15	1	1	1

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	119.46	-0.1656	-0.071680	-2.9498E-05	-251.32	12.837
Pile N.	1	21	13	1	21	21
MAXIMUM	218.83	4.4728	6.6309	-2.9498E-05	44.886	149.93
Pile N.	21	16	21	1	13	20

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-5.6035E-03	-8.2766E-04	-149.93	-251.32	-1.0457	-1.6256	-0.015783	-0.019600	3.4727
Pile N.	1	8	20	21	20	21	20	21	1
Max.	0.041313	0.041313	67.660	126.85	4.1719	6.2569	0.049432	0.063577	8.3768
Pile N.	16	15	20	21	16	21	16	21	20

LOAD CASE : 3

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
4345.50	0.00000	0.00000	0.00000	0.00000	8332.80

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
0.17617	-7.37484E-03	-2.54602E-13	-9.39647E-14	-4.39458E-16	1.25436E-04

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.1686	-3.6118E-03	-5.8793E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
Pile N.	1	1	1	1	1	1
MAXIMUM	0.1837	-3.6118E-03	5.3965E-12	-9.3965E-14	-4.3946E-16	1.2544E-04
Pile N.	15	1	15	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	198.57	-0.3632	-5.8587E-09	-1.0012E-11	-1.8290E-07	25.542
Pile N.	1	15	1	1	15	15
MAXIMUM	215.29	0.1656	6.1205E-09	-1.0012E-11	1.8145E-07	77.115
Pile N.	15	9	15	1	1	9

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.1686	-3.6118E-03	-5.8793E-12	-9.3965E-14	-4.3946E-16	4.3946E-16
Pile N.	1	1	1	1	1	2
MAXIMUM	0.1837	5.3965E-12	3.6118E-03	-9.3965E-14	1.2544E-04	1.2544E-04
Pile N.	15	16	2	1	2	1

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	198.57	-0.3632	-0.1656	-1.0012E-11	-1.8290E-07	-1.2053E-07
Pile N.	1	15	9	1	15	2
MAXIMUM	215.29	4.7140E-09	6.1205E-09	-1.0012E-11	77.115	26.686
Pile N.	15	16	15	1	9	1

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-3.6118E-03	-5.8212E-04	-28.720	-4.1531	-0.1880	-1.0424	-0.023280	-0.014290	5.7723
Pile N.	1	2	15	2	15	16	15	16	1
Max.	2.8665E-04	3.6118E-03	1.3560	77.115	0.5052	0.071750	9.9196E-03	0.025216	6.7204
Pile N.	8	2	8	9	15	9	15	16	15

LOAD CASE : 4

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
4753.00	25.0000	80.0000	0.00000	1.46424E+05	46008.0

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
0.20431	-0.0610137	0.0665512	2.24004E-06	5.38932E-04	8.35840E-04

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.057155	-0.036342	0.050249	2.2400E-06	5.3893E-04	8.3584E-04
Pile N.	1	7	15	1	1	1
MAXIMUM	0.3515	-0.035535	0.050518	2.2400E-06	5.3893E-04	8.3584E-04

```
  Pile N.         21          1           1           1           1           1

  * PILE TOP REACTIONS, GLOBAL *
              FOR. X,KIP   FOR. Y,KIP   FOR. Z,KIP MOM X,KIP-IN MOM Y,KIP-IN MOM Z,KIP-IN
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM        74.693      -0.2370       3.4119   2.4179E-04      -74.488       127.88
  Pile N.         1           21           13           1            20           21
  MAXIMUM        343.91       1.7734       4.7958   2.4179E-04      -21.265       393.25
  Pile N.        21            9           21           1             8            2

  * PILE TOP DISPLACEMENTS, LOCAL *
              DISP. x,IN   DISP. y,IN   DISP. z,IN   ROT. x,RAD   ROT. y,RAD   ROT. z,RAD
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM      0.057155    -0.036342     0.035670   2.2400E-06   5.3893E-04  -5.3893E-04
  Pile N.         1            7            2           1            1            2
  MAXIMUM        0.3515     0.050518     0.050518   2.2400E-06   8.3584E-04   8.3584E-04
  Pile N.        21            2            1           1            2            1

  * PILE TOP REACTIONS, LOCAL *
              AXIAL,KIP    LAT. y,KIP   LAT. z,KIP MOM x,KIP-IN MOM y,KIP-IN MOM z,KIP-IN
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM        74.693      -0.2370      -1.7734   2.4179E-04      -48.867       63.642
  Pile N.         1           21            9           1            21            9
  MAXIMUM        343.91       3.8554       4.7958   2.4179E-04       393.25       138.51
  Pile N.        21           16           21           1             2            1

  * EFFECTS FOR LATERALLY LOADED PILE *

  PILE     DISPL.      DISPL.      MOMENT      MOMENT       SHEAR       SHEAR     SOIL REACT  SOIL REACT     TOTAL
           y-DIR       z-DIR       z-DIR       y-DIR        y-DIR       z-DIR       y-DIR       z-DIR       STRESS
            IN          IN         KIP-IN      KIP-IN        KIP         KIP        KIP/IN      KIP/IN     KIP/IN**2
 ******  **********  **********  **********  **********  **********  **********  **********  **********  **********
   Min.  -0.036342 -3.5271E-03     -138.51     -48.867     -1.1635     -3.1557   -0.035196   -0.032561      2.1713
Pile N.       7           9           1          21          20          16          21          16           1
   Max.   0.050518    0.050518      86.952      393.25      3.5397      4.4396    0.052132    0.060593      12.114
Pile N.       2           1          20           2          16          21          16          21          21

 LOAD CASE :     5

 * TABLE L *   COMPUTATION ON PILE CAP

 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *
      LOAD X,KIP     LOAD Y,KIP     LOAD Z,KIP    MOM X,KIP-IN   MOM Y,KIP-IN   MOM Z,KIP-IN
          3668.00        25.0000        65.0000        0.00000    1.11612E+05        36840.0

 * DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *
       DISP X,IN      DISP Y,IN      DISP Z,IN       ROT X,RAD      ROT Y,RAD      ROT Z,RAD
          0.14803     -0.0387684      0.0418688    1.29535E-06    3.51083E-04    5.73986E-04

 * TABLE M *   COMPUTATION ON INDIVIDUAL PILE

  * PILE TOP DISPLACEMENTS, GLOBAL *
              DISP. X,IN   DISP. Y,IN   DISP. Z,IN   ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM      0.050392    -0.021782     0.031259   1.2954E-06   3.5108E-04   5.7399E-04
```

```
  Pile N.         1            7           15           1            1            1
  MAXIMUM        0.2457    -0.021316     0.031414   1.2954E-06   3.5108E-04   5.7399E-04
  Pile N.        21            1            1           1            1            1

  * PILE TOP REACTIONS, GLOBAL *
              FOR. X,KIP   FOR. Y,KIP   FOR. Z,KIP MOM X,KIP-IN MOM Y,KIP-IN MOM Z,KIP-IN
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM        67.179   6.6757E-03       2.7869   1.3982E-04      -57.422       104.12
  Pile N.         1           21           13           1            20           21
  MAXIMUM        269.63       1.6714       3.8799   1.3982E-04      -25.514       304.44
  Pile N.        21            9           21           1             8           16

  * PILE TOP DISPLACEMENTS, LOCAL *
              DISP. x,IN   DISP. y,IN   DISP. z,IN   ROT. x,RAD   ROT. y,RAD   ROT. z,RAD
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM      0.050392    -0.021782     0.021393   1.2954E-06   3.5108E-04  -3.5108E-04
  Pile N.         1            7            2           1            1            2
  MAXIMUM        0.2457     0.031414     0.031414   1.2954E-06   5.7399E-04   5.7399E-04
  Pile N.        21            2            1           1            2            1

  * PILE TOP REACTIONS, LOCAL *
              AXIAL,KIP    LAT. y,KIP   LAT. z,KIP MOM x,KIP-IN MOM y,KIP-IN MOM z,KIP-IN
             ***********  ***********  ***********  ***********  ***********  ***********
  MINIMUM        67.179   6.6757E-03      -1.6714   1.3982E-04      -43.438       50.449
  Pile N.         1           21            9           1            21            9
  MAXIMUM        269.63       3.1124       3.8799   1.3982E-04       304.44       110.28
  Pile N.        21           16           21           1            16            1

  * EFFECTS FOR LATERALLY LOADED PILE *

  PILE     DISPL.      DISPL.      MOMENT      MOMENT       SHEAR       SHEAR     SOIL REACT  SOIL REACT     TOTAL
           y-DIR       z-DIR       z-DIR       y-DIR        y-DIR       z-DIR       y-DIR       z-DIR       STRESS
            IN          IN         KIP-IN      KIP-IN        KIP         KIP        KIP/IN      KIP/IN     KIP/IN**2
 ******  **********  **********  **********  **********  **********  **********  **********  **********  **********
   Min.  -0.021782 -2.6903E-03     -110.28     -43.438     -0.8315     -2.6021   -0.029190   -0.027135      1.9529
Pile N.       7           9           1          21          20          16          21          16           1
   Max.   0.031414    0.031414      61.960      304.44      2.8378      3.5727    0.045371    0.051617      9.5316
Pile N.       2           1          20          16          16          21          16          21          21

 LOAD CASE :     6

 * TABLE L *   COMPUTATION ON PILE CAP

 * EQUIVALENT CONCENTRATED LOAD AT ORIGIN *
      LOAD X,KIP     LOAD Y,KIP     LOAD Z,KIP    MOM X,KIP-IN   MOM Y,KIP-IN   MOM Z,KIP-IN
          2808.00        0.00000        58.0000        0.00000        36180.0        5556.00

 * DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *
       DISP X,IN      DISP Y,IN      DISP Z,IN       ROT X,RAD      ROT Y,RAD      ROT Z,RAD
          0.11028   -6.31788E-03      0.0194848   -8.40976E-08    1.17512E-04    8.69881E-05

 * TABLE M *   COMPUTATION ON INDIVIDUAL PILE

  * PILE TOP DISPLACEMENTS, GLOBAL *
              DISP. X,IN   DISP. Y,IN   DISP. Z,IN   ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
```

	***********	***********	***********	***********	***********	***********
MINIMUM	0.083904	-3.7234E-03	0.015954	-8.4098E-08	1.1751E-04	8.6988E-05
Pile N.	1	1	1	1	1	1
MAXIMUM	0.1366	-3.6931E-03	0.015964	-8.4098E-08	1.1751E-04	8.6988E-05
Pile N.	21	7	15	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	104.41	-0.1782	2.4605	-9.0775E-06	-103.91	11.995
Pile N.	1	21	13	1	21	21
MAXIMUM	163.02	0.071230	3.6760	-9.0775E-06	-64.478	40.932
Pile N.	21	13	21	1	9	13

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.083904	-3.7234E-03	3.6981E-03	-8.4098E-08	8.6988E-05	-1.1751E-04
Pile N.	1	1	6	1	2	2
MAXIMUM	0.1366	0.015964	0.015964	-8.4098E-08	1.1751E-04	8.6988E-05
Pile N.	21	16	15	1	1	1

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	104.41	-0.1782	-0.071230	-9.0775E-06	-103.91	11.995
Pile N.	1	21	13	1	21	21
MAXIMUM	163.02	2.5555	3.6760	-9.0775E-06	40.932	66.374
Pile N.	21	16	21	1	13	20

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-3.7234E-03	-3.1711E-04	-66.374	-103.91	-0.5518	-0.8506	-9.3250E-03	-0.012806	3.0353
Pile N.	1	8	20	21	20	21	20	21	1
Max.	0.015964	0.015964	33.848	63.880	2.3308	3.4020	0.034317	0.042605	5.6048
Pile N.	16	15	20	21	16	21	19	21	20

LOAD CASE : 7

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
2897.00	0.00000	127.000	0.00000	49416.0	5556.00

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
0.11409	-7.35539E-03	0.0594133	-3.14662E-07	1.73967E-04	8.90020E-05

* TABLE M * COMPUTATION ON INDIVIDUAL PILE

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.077436	-4.7420E-03	0.054175	-3.1466E-07	1.7397E-04	8.9002E-05
Pile N.	1	1	1	1	1	1
MAXIMUM	0.1507	-4.6287E-03	0.054213	-3.1466E-07	1.7397E-04	8.9002E-05
Pile N.	21	7	15	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	97.226	-0.1197	5.3115	-3.3965E-05	-375.88	9.9391
Pile N.	1	21	13	1	21	21
MAXIMUM	178.68	0.053755	8.3454	-3.3965E-05	-205.56	34.521
Pile N.	21	13	21	1	9	13

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
	***********	***********	***********	***********	***********	***********
MINIMUM	0.077436	-4.7420E-03	4.6476E-03	-3.1466E-07	8.9002E-05	-1.7397E-04
Pile N.	1	1	6	1	2	2
MAXIMUM	0.1507	0.054213	0.054213	-3.1466E-07	1.7397E-04	8.9002E-05
Pile N.	21	16	15	1	1	1

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
	***********	***********	***********	***********	***********	***********
MINIMUM	97.226	-0.1197	-0.053755	-3.3965E-05	-375.88	9.9391
Pile N.	1	21	13	1	21	21
MAXIMUM	178.68	5.4517	8.3454	-3.3965E-05	34.521	209.23
Pile N.	21	16	21	1	13	20

* EFFECTS FOR LATERALLY LOADED PILE *

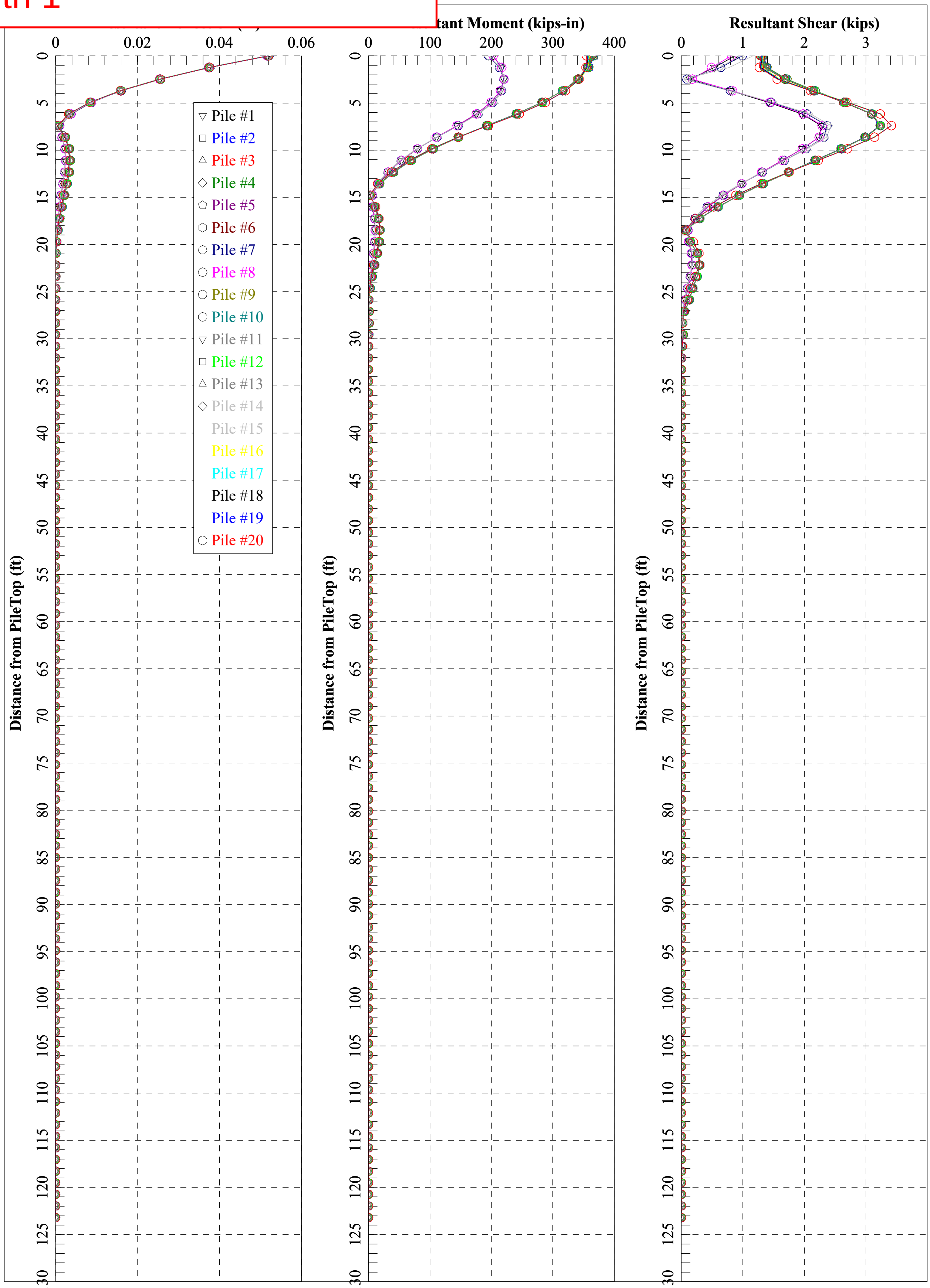
PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR KIP-IN	MOMENT y-DIR KIP-IN	SHEAR y-DIR KIP	SHEAR z-DIR KIP	SOIL REACT y-DIR KIP/IN	SOIL REACT z-DIR KIP/IN	TOTAL STRESS KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-4.7420E-03	-1.0381E-03	-209.23	-375.88	-1.2025	-1.9613	-0.017365	-0.022531	2.8264
Pile N.	1	21	20	21	20	21	20	21	1
Max.	0.054213	0.054213	80.604	151.74	5.1233	7.9359	0.055680	0.073486	8.2281
Pile N.	16	15	20	21	16	21	16	21	20

Pier 3 14x117

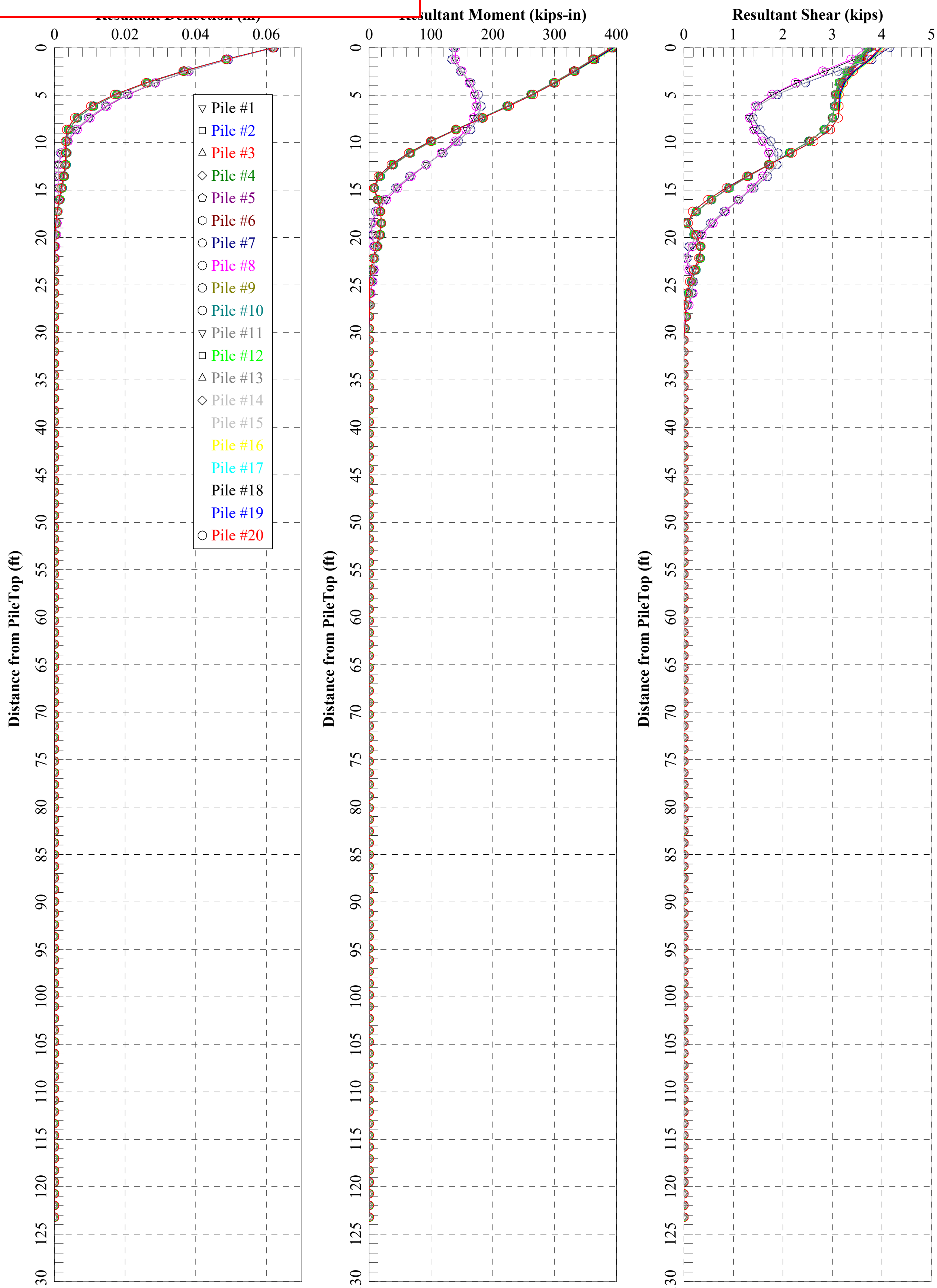
3 Rows - Plumb

Graph Outputs (Strength I & Extreme I)

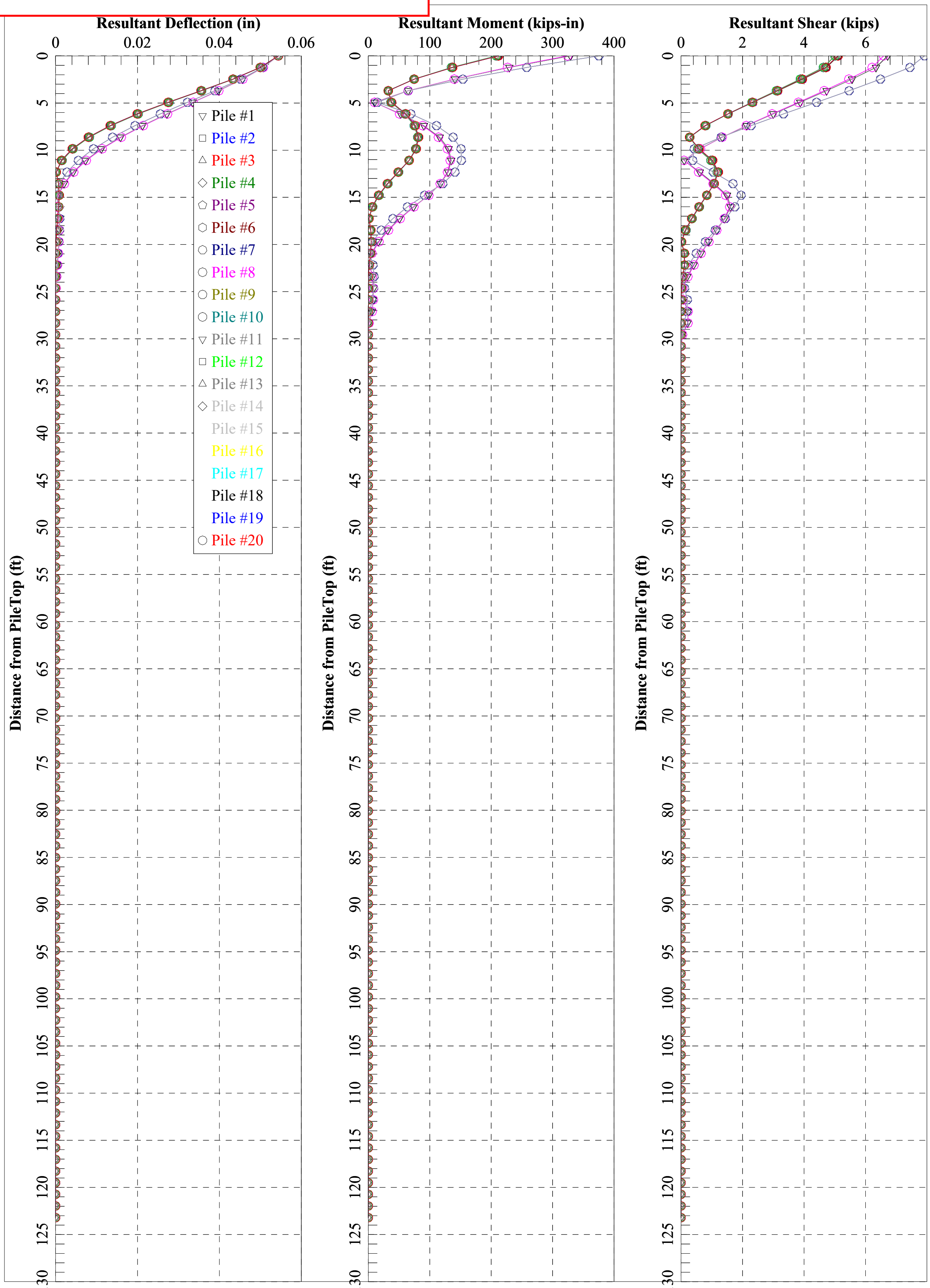
Pier 3 14x117
3 Rows - Plumb Piles
Strength 1



Pier 3 14x117
3 Rows - Plumb Piles
Strength V



Pier 3 14x117
3 Rows - Plumb Piles
Extreme I



Objective

Evaluate the axial geotechnical resistance of the piers for the Station 46 Bridge Replacement in Woolwich, ME. Evaluations were conducted to assess a suitable driving system to install piles to the required geotechnical nominal resistance of 440, 524, and 557 kips for the Pier 1, Pier 2, and Pier 3, respectively.

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 Station 46 Bridge Interpretive Subsurface Profile (see Figure 3), subsurface layering and properties relative to pile design are presented in the Apile outputs attached.

Structural Properties

HP14x117, ASTM A572, Gr. 50

Yield Strength of Steel	$F_y := 50\text{ksi}$
Area of section	$A_s := 34.4\text{in}^2$
Young's Modulus of Steel	$E_s := 30000 \cdot \text{ksi}$
Radius of gyration (weak axis)	$r_x := 5.96\text{in}$

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: $P_n := 0.66^{\lambda} \cdot F_y \cdot A_s$ $P_n = 1720 \cdot kip$

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

$P_r = 860 \cdot kip$

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

$P_r = 1720 \cdot kip$

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 440 and 524 kips for the pile configurations based on a maximum factored pile loads of 286 and 435 kips and a 0.65 resistance factor for the Pier 1 and a 1.0 Resistance Factor for Pier 2.

The estimated % skin friction was determined using APile from ensoft and resulted in resistance of 10 to 15% for the piles at the required nominal pile resistances. The estimated friction resistance of 45 kips and 85 kips for short and long piles, respectively.

5. Geotechnical Axial Resistance - Drivability Analysis

$\sigma_{dr} := 0.9 \cdot \phi_{da} \cdot f_y$ AASHTO Eq. 10.7.8.1

$f_y := 50ksi$ 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

$\sigma_{dr} := 0.9 \cdot \phi_{da} \cdot f_y$ $\sigma_{dr} = 45 \cdot ksi$ Driving Stress in pile cannot exceed 45 ksi

Pier 1 - Drive pile plumb through 28 feet of soil to rock with toe quake representative of tip resistance in hard rock (0.04 in) and no plug. Model pile length as 33 feet (5 foot stickup at end of drive).

Pier 2/3 - Drive pile plumb through 127 feet of soil to rock with toe quake representative of tip resistance in weak rock/very dense soil (0.07 in) and no plug. Model pile length as 133 feet (6 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 3, 2 below maximum and fuel setting 1, maximum for Pier 1 and Pier 2/3, respectively). **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 pier piles.

Pier 1: $R_{ndr1} := 440kip$ Required nominal geotechnical resistance, pile driving stress =24.3 ksi, final penetration resistance=9 bpi.

Pier 2: $R_{ndr2} := 524kip$ See below for pier 3

Pier 3: $R_{ndr3} := 557 \cdot kip$ Required nominal geotechnical resistance, pile driving stress =31.1 ksi, final penetration resistance= 9 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

Service and Extreme Limit State Factored Drivability Resistance: — $\phi_{serv\_ext} := 1$ — From Article 10.5.5.1 and 10.5.5.3

Pier 1 Controlled by Strength:

$$R_{ndr1\_factored} := R_{ndr1} \cdot \phi_{dyn}$$

$$R_{ndr1\_factored} = 286 \cdot kip$$

Pier 2 Controlled by Extreme:

$$R_{ndr2\_factored} := R_{ndr2} \cdot \phi_{serv\_ext}$$

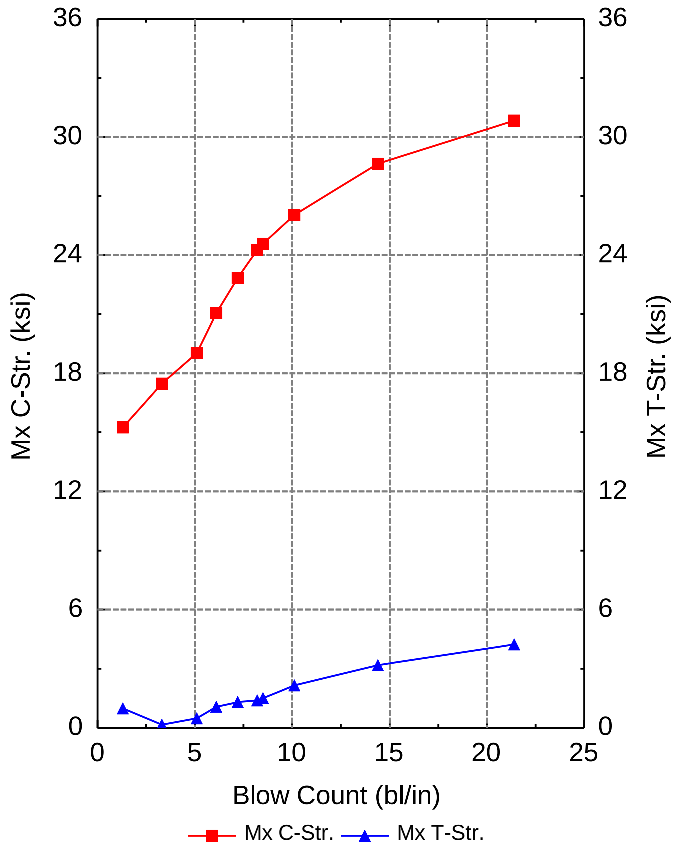
$$R_{ndr2\_factored} = 524 \cdot kip$$

Pier 3 Controlled by Strength:

$$R_{ndr3\_factored} := R_{ndr3} \cdot \phi_{dyn}$$

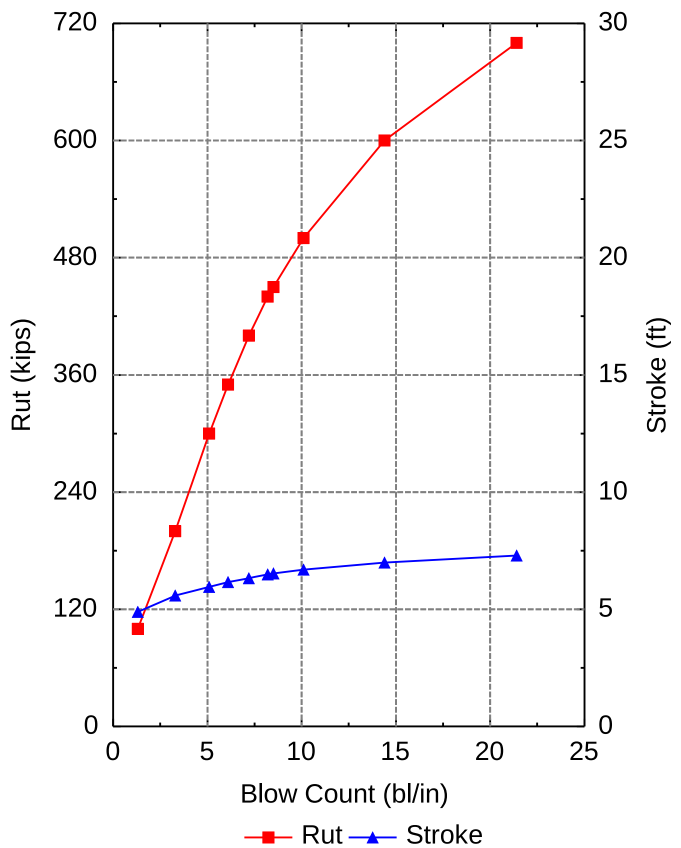
$$R_{ndr3\_factored} = 362 \cdot kip$$

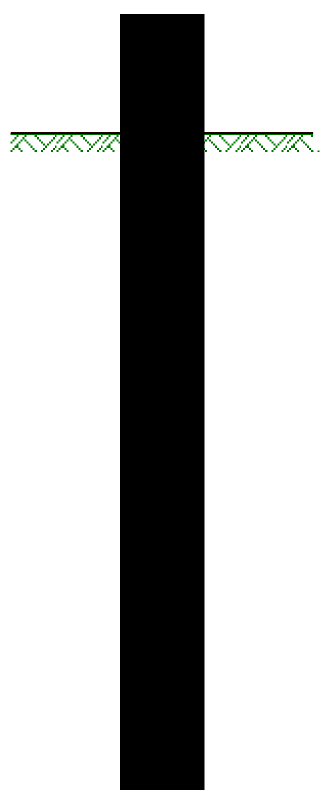
Since the driving stresses do not exceed the limiting driving stress of 45 ksi for ASTM A572 steel (50 ksi yield stress), and the calculated penetration resistance for the piers is within the MaineDOT preferred range of 6 to 15 blows per inch, the analyzed hammer system is judged acceptable to install the piles to the required nominal resistances. The selected hammer system is large enough for the all pier piles.



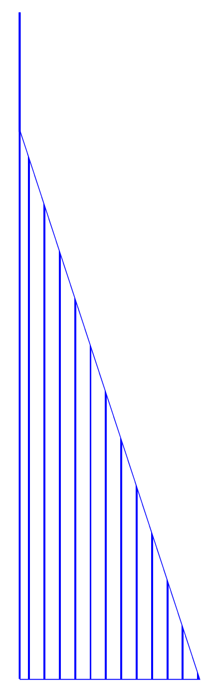
DELMAG D 19-52

Ram Weight	4.00	kips
Efficiency	0.800	
Pressure	1165.0 (72%)	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	0.200	s/ft
Toe Damping	0.150	s/ft
Pile Length	33.000	ft
Pile Penetration	28.000	ft
Pile Top Area	34.400	in²
RSA	No	





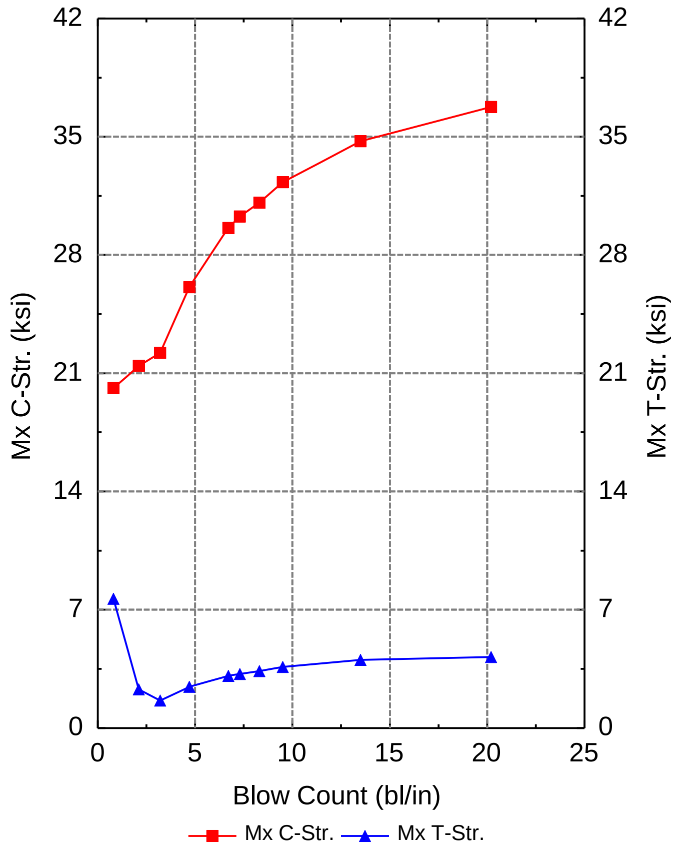
Pile Model

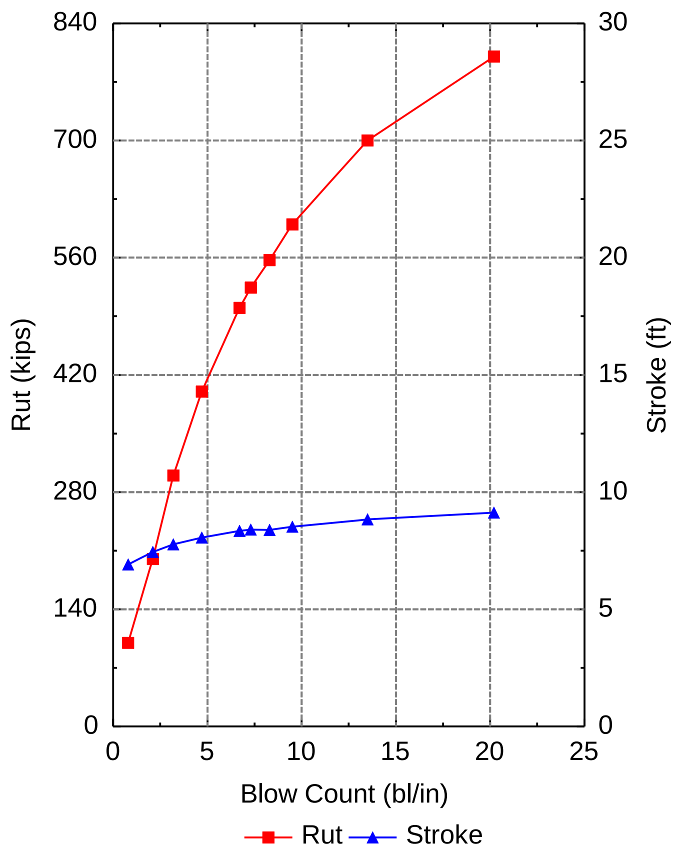


Shaft=10%
(Prop.)

Bearing Graph Summary — DELMAG D 19-52

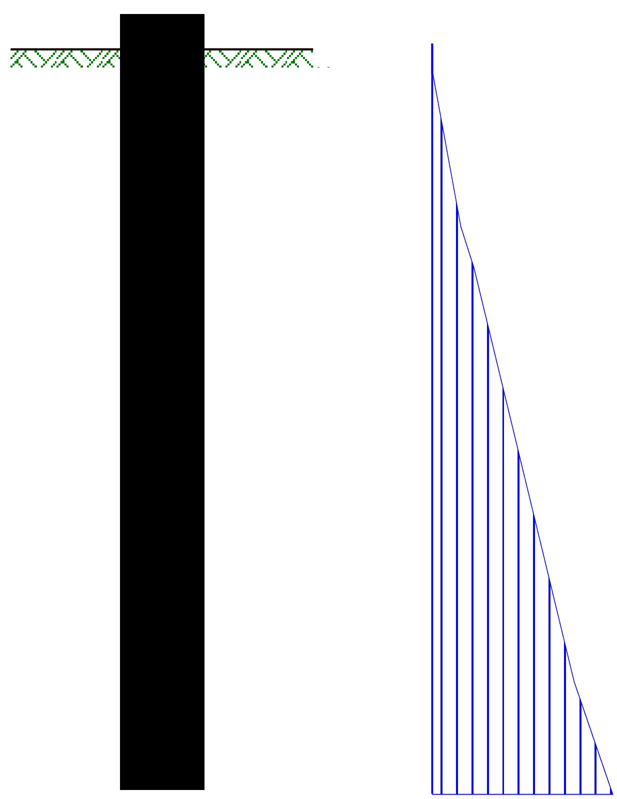
Rut kips	Mx C-Str. ksi	Mx T-Str. ksi	Blow Ct bl/in	Stroke ft	ENTHRU kip-ft	Hammer -
100.0	15.25	0.99	1.3	4.90	11.54	D 19-52
200.0	17.47	0.15	3.3	5.58	10.77	D 19-52
300.0	19.03	0.48	5.1	5.96	10.94	D 19-52
350.0	21.05	1.07	6.0	6.16	11.27	D 19-52
400.0	22.84	1.30	7.2	6.33	11.50	D 19-52
440.0	24.25	1.40	8.2	6.50	11.74	D 19-52
450.0	24.57	1.51	8.5	6.53	11.84	D 19-52
500.0	26.04	2.15	10.1	6.70	12.24	D 19-52
600.0	28.65	3.19	14.4	7.00	12.95	D 19-52
700.0	30.83	4.23	21.4	7.29	13.69	D 19-52





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	0.070	in
Skin Damping	0.050	s/ft
Toe Damping	0.150	s/ft
Pile Length	133.000	ft
Pile Penetration	127.000	ft
Pile Top Area	34.400	in²
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	-
100.0	20.12	7.66	0.8	6.91	19.16	D 19-52
200.0	21.42	2.30	2.1	7.44	18.98	D 19-52
300.0	22.22	1.62	3.2	7.77	19.41	D 19-52
400.0	26.10	2.43	4.6	8.06	20.11	D 19-52
500.0	29.61	3.09	6.7	8.34	20.78	D 19-52
524.0	30.28	3.20	7.3	8.40	20.94	D 19-52
557.0	31.10	3.36	8.3	8.39	20.90	D 19-52
600.0	32.31	3.61	9.5	8.53	21.22	D 19-52
700.0	34.73	4.04	13.5	8.83	22.03	D 19-52
800.0	36.77	4.20	20.2	9.13	22.77	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\09.0026035.00 - MEDOT - Woolwich - Station 46 Bridge
3039\09.0026035.01 - Final Design\Work\Calcs\Drivability\Apile\
Name of input data file     : S46 all Piers plumb.ap8d
Name of output file         : S46 all Piers plumb.ap8o
Name of plot output file    : S46 all Piers plumb.ap8p

-------------------------------------------------------------------------
                     Time and Date of Analysis
-------------------------------------------------------------------------

          Date:  June 25, 2021     Time:  08:54:05



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        =     34.40 IN2
```

NONCIRCULAR PILE PROPERTIES :

- TOTAL PILE LENGTH, TL = 132.00 FT.
- BATTER ANGLE = 0.00 DEG
- PILE STICKUP LENGTH, PSL = 5.00 FT.
- ZERO FRICTION LENGTH, ZFL = 5.00 FT.
- PERIMETER OF PILE = 58.20 IN.
- TIP AREA OF PILE = 34.40 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	CLAY	0.00	48.00	0.00	0.00
31.00	CLAY	0.00	48.00	0.00	0.00
31.00	CLAY	0.00	53.00	0.00	0.00
38.00	CLAY	0.00	53.00	0.00	0.00
38.00	CLAY	0.00	53.00	0.00	0.00
108.00	CLAY	0.00	53.00	0.00	0.00
108.00	SAND	1.25	67.00	33.00	0.00
140.00	SAND	1.25	67.00	33.00	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*	0.40	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.40	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.90	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.90	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
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

* 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
31.00	1.000	1.000
31.00	1.000	1.000
38.00	1.000	1.000
38.00	1.000	1.000
108.00	1.000	1.000
108.00	1.000	1.000
140.00	1.000	1.000

1

```
**********************
* COMPUTATION RESULT *
**********************

                  **********************
                  * ARMY CORPS METHOD  *
                  **********************

   PILE       TOTAL SKIN       END       ULTIMATE
```

PENETRATION FT.	FRICTION KIP	BEARING KIP	CAPACITY KIP
0.00	0.0	0.4	0.4
1.00	0.0	0.4	0.4
2.00	0.0	0.6	0.6
3.00	0.0	0.9	0.9
4.00	0.0	0.9	0.9
5.00	1.0	0.9	1.8
6.00	2.9	0.9	3.8
7.00	4.8	0.9	5.7
8.00	6.8	0.9	7.6
9.00	8.7	0.9	9.6
10.00	10.7	0.9	11.5
11.00	12.6	0.9	13.5
12.00	14.5	0.9	15.4
13.00	16.5	0.9	17.3
14.00	18.4	0.9	19.3
15.00	20.4	0.9	21.2
16.00	22.3	0.9	23.2
17.00	24.2	0.9	25.1
18.00	26.2	0.9	27.0
19.00	28.1	0.9	29.0
20.00	30.1	0.9	30.9
21.00	32.0	0.9	32.9
22.00	33.9	0.9	34.8
23.00	35.9	0.9	36.7
24.00	37.8	0.9	38.7
25.00	39.8	0.9	40.6
26.00	41.7	0.9	42.6
27.00	43.6	0.9	44.5
28.00	45.6	0.9	46.4
29.00	47.5	0.9	48.5
30.00	49.5	1.2	50.6
31.00	51.4	1.4	52.8
32.00	54.1	1.6	55.8
33.00	57.6	1.9	59.5
34.00	61.1	1.9	63.0
35.00	64.6	1.9	66.5
36.00	68.1	1.9	70.0

Pier 1 bot at 28'

37.00	71.6	1.7	73.3
38.00	75.1	1.6	76.6
39.00	78.1	1.4	79.5
40.00	80.7	1.2	82.0
41.00	83.3	1.2	84.5
42.00	85.9	1.2	87.1
43.00	88.5	1.2	89.7
44.00	91.1	1.2	92.3
45.00	93.7	1.2	94.9
46.00	96.3	1.2	97.5
47.00	98.9	1.2	100.1
48.00	101.5	1.2	102.7
49.00	104.1	1.2	105.3
50.00	106.7	1.2	107.9
51.00	109.3	1.2	110.5
52.00	111.9	1.2	113.1
53.00	114.5	1.2	115.7
54.00	117.1	1.2	118.3
55.00	119.7	1.2	120.9
56.00	122.3	1.2	123.5
57.00	124.9	1.2	126.1
58.00	127.5	1.2	128.7
59.00	130.1	1.2	131.3
60.00	132.7	1.2	133.9
61.00	135.3	1.2	136.5
62.00	137.9	1.2	139.1
63.00	140.5	1.2	141.7
64.00	143.1	1.2	144.3
65.00	145.7	1.2	146.9
66.00	148.3	1.2	149.5
67.00	150.9	1.2	152.1
68.00	153.5	1.2	154.7
69.00	156.1	1.2	157.3
70.00	158.7	1.2	159.9
71.00	161.3	1.2	162.5
72.00	164.0	1.2	165.1
73.00	166.6	1.2	167.7
74.00	169.2	1.2	170.3
75.00	171.8	1.2	172.9

76.00	174.4	1.2	175.5
77.00	177.0	1.2	178.1
78.00	179.6	1.2	180.7
79.00	182.2	1.2	183.3
80.00	184.8	1.2	185.9
81.00	187.4	1.2	188.5
82.00	190.0	1.2	191.1
83.00	192.6	1.2	193.7
84.00	195.2	1.2	196.3
85.00	197.8	1.2	198.9
86.00	200.4	1.2	201.5
87.00	203.0	1.2	204.1
88.00	205.6	1.2	206.7
89.00	208.2	1.2	209.3
90.00	210.8	1.2	211.9
91.00	213.4	1.2	214.5
92.00	216.0	1.2	217.1
93.00	218.6	1.2	219.8
94.00	221.2	1.2	222.4
95.00	223.8	1.2	225.0
96.00	226.4	1.2	227.6
97.00	229.0	1.2	230.2
98.00	231.6	1.2	232.8
99.00	234.2	1.2	235.4
100.00	236.8	1.2	238.0
101.00	239.4	1.2	240.6
102.00	242.0	1.2	243.2
103.00	244.6	1.2	245.8
104.00	247.2	1.2	248.4
105.00	249.8	1.2	251.0
106.00	252.4	1.8	254.1
107.00	255.0	3.6	258.6
108.00	257.6	5.4	263.0
109.00	260.7	7.3	268.0
110.00	264.5	9.1	273.6
111.00	268.2	9.7	277.9
112.00	271.9	9.7	281.6
113.00	275.6	9.7	285.3
114.00	279.3	9.7	289.0

Pier 2 bot at 83'

115.00	283.0	9.7	292.7
116.00	286.8	9.7	296.4
117.00	290.5	9.7	300.2
118.00	294.2	9.7	303.9
119.00	297.9	9.7	307.6
120.00	301.6	9.7	311.3
121.00	305.3	9.7	315.0
122.00	309.0	9.7	318.7
123.00	312.8	9.7	322.5
124.00	316.5	9.7	326.2
125.00	320.2	9.7	329.9
126.00	323.9	9.7	333.6
127.00	327.6	9.7	337.3

Pier 3 bot at 127'

```
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.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT 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	0.1553E+02		
			0.0000E+00	0.0000E+00
			0.5000E+00	0.1000E-01
			0.1056E+01	0.2000E-01
			0.2194E+01	0.4000E-01
			0.2694E+01	0.6000E-01
			0.2778E+01	0.8000E-01
			0.2694E+01	0.1200E+00
			0.2583E+01	0.1600E+00
			0.2583E+01	0.5000E+00
			0.2583E+01	0.1000E+02
3	10	0.3096E+02		
			0.0000E+00	0.0000E+00
			0.5000E+00	0.1000E-01
			0.1056E+01	0.2000E-01
			0.2194E+01	0.4000E-01
			0.2694E+01	0.6000E-01
			0.2778E+01	0.8000E-01
			0.2694E+01	0.1200E+00
			0.2583E+01	0.1600E+00
			0.2583E+01	0.5000E+00
			0.2583E+01	0.1000E+02
4	10	0.3100E+02		
			0.0000E+00	0.0000E+00
			0.5000E+00	0.1000E-01
			0.1056E+01	0.2000E-01
			0.2194E+01	0.4000E-01
			0.2694E+01	0.6000E-01
			0.2778E+01	0.8000E-01
			0.2694E+01	0.1200E+00
			0.2583E+01	0.1600E+00
			0.2583E+01	0.5000E+00
			0.2583E+01	0.1000E+02
5	10	0.3453E+02		
			0.0000E+00	0.0000E+00
			0.9000E+00	0.1000E-01
			0.1900E+01	0.2000E-01
			0.3950E+01	0.4000E-01
			0.4850E+01	0.6000E-01
			0.5000E+01	0.8000E-01
			0.4850E+01	0.1200E+00
			0.4650E+01	0.1600E+00
			0.4650E+01	0.5000E+00
			0.4650E+01	0.1000E+02
6	10	0.3796E+02		
			0.0000E+00	0.0000E+00
			0.9000E+00	0.1000E-01
			0.1900E+01	0.2000E-01
			0.3950E+01	0.4000E-01
			0.4850E+01	0.6000E-01
			0.5000E+01	0.8000E-01
			0.4850E+01	0.1200E+00
			0.4650E+01	0.1600E+00
			0.4650E+01	0.5000E+00
			0.4650E+01	0.1000E+02
7	10	0.3800E+02		
			0.0000E+00	0.0000E+00
			0.9000E+00	0.1000E-01
			0.1900E+01	0.2000E-01
			0.3950E+01	0.4000E-01
			0.4850E+01	0.6000E-01
			0.5000E+01	0.8000E-01
			0.4850E+01	0.1200E+00
			0.4650E+01	0.1600E+00
			0.4650E+01	0.5000E+00
			0.4650E+01	0.1000E+02
8	10	0.7303E+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
9	10	0.1080E+03		
			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
10	10	0.1080E+03		
			0.0000E+00	0.0000E+00
			0.6497E+00	0.1000E-01
			0.1106E+01	0.2000E-01
			0.1706E+01	0.4000E-01
			0.2082E+01	0.6000E-01
			0.2340E+01	0.8000E-01
			0.2671E+01	0.1200E+00
			0.2874E+01	0.1600E+00
			0.3402E+01	0.5000E+00
			0.3706E+01	0.1000E+02
11	10	0.1240E+03		
			0.0000E+00	0.0000E+00
			0.6856E+00	0.1000E-01
			0.1215E+01	0.2000E-01
			0.1978E+01	0.4000E-01
			0.2502E+01	0.6000E-01
			0.2884E+01	0.8000E-01
			0.3403E+01	0.1200E+00
			0.3740E+01	0.1600E+00
			0.4687E+01	0.5000E+00
			0.5285E+01	0.1000E+02
12	10	0.1400E+03		
			0.0000E+00	0.0000E+00
			0.6856E+00	0.1000E-01
			0.1215E+01	0.2000E-01
			0.1978E+01	0.4000E-01
			0.2502E+01	0.6000E-01
			0.2884E+01	0.8000E-01
			0.3403E+01	0.1200E+00
			0.3740E+01	0.1600E+00
			0.4687E+01	0.5000E+00
			0.5285E+01	0.1000E+02

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.1007E+00	0.1000E-03
0.7121E+00	0.5000E-02
0.1007E+01	0.1000E-01
0.2252E+01	0.5000E-01
0.3184E+01	0.1000E+00
0.4504E+01	0.2000E+00
0.7121E+01	0.5000E+00
0.1007E+02	0.1000E+01
0.1424E+02	0.2000E+01

LOAD VERSUS SETTLEMENT CURVE
****

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.1271E+01	0.9634E-03	0.1007E+00	0.1000E-03
0.8772E+01	0.6710E-02	0.2130E+00	0.1000E-02
0.4037E+02	0.3162E-01	0.7121E+00	0.5000E-02
0.6920E+02	0.5736E-01	0.1007E+01	0.1000E-01
0.1583E+03	0.1786E+00	0.2252E+01	0.5000E-01
0.2018E+03	0.2735E+00	0.3184E+01	0.1000E+00

0.2855E+03	0.7630E+00	0.7121E+01	0.5000E+00
0.2908E+03	0.1270E+01	0.1007E+02	0.1000E+01
0.2999E+03	0.2281E+01	0.1424E+02	0.2000E+01

GZA GeoEnvironmental, Inc
707 Sable Oaks Drive
Suite 150
South Portland, Maine 04106
207-879-9190
Fax 207-879-0099

Engineers and Scientists

JOB: 09.0026035.01 Station 46 Bridge
SUBJECT: Lateral Earth Pressures
SHEET: 1 OF 1
CALCULATED BY B. Cardali 8/2/21
CHECKED BY C.Snow 8/2/21

Subject:

Evaluate lateral earth pressure coefficients for Abutments and retaining walls

References:

1. MaineDOT Bridge Design Guide, Chapter 3
2. AASHTO LRFD Bridge Design Specifications, 9th Edition (2020)

Input Parameters:

$\phi := 32\text{deg}$ — Effective angle of internal friction *(Granular borrow, Soil Type 4, BDG Table 3-3)*

$\delta_f := 19.5\text{deg}$ — Average value, precast concrete against clean sand/silty sand-gravel mixture *(AASHTO LRFD Table 3.11.5.3-1)*

$\beta := 0\text{deg}$ — Angle of backfill to the horizontal

$\theta := 90\cdot\text{deg}$ — Angle of back face of wall to the horizontal

Article 3.6.4 of the BDG states that abutments with a height of 5 feet or more should be assumed to experience sufficient horizontal movement of the top of the wall to develop active conditions due to structural deformation of the stem and rotation of the foundation.

$$\alpha := \frac{(90\cdot\text{deg} + \beta - \phi)}{2} = 29\cdot\text{deg}$$

Based on Figure C3.11.5.3-1 of LRFD, the abutment is considered to be a short-heeled wall. Therefore, Coulomb theory should be used to calculate active earth pressures.

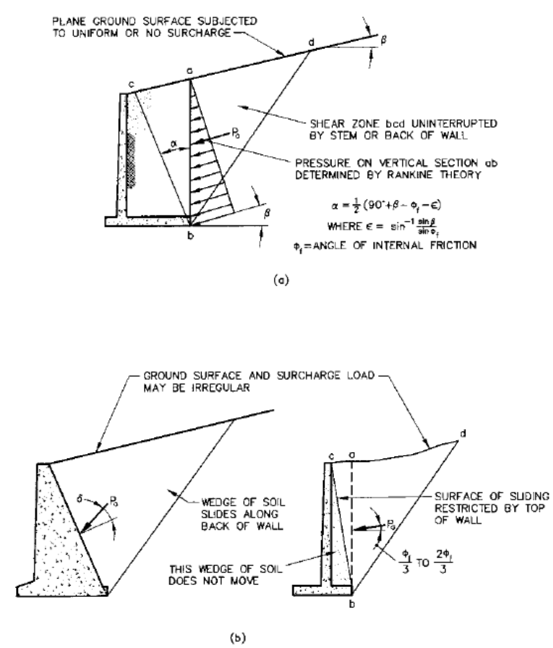


Figure C3.11.5.3-1—Application of (a) Rankine and (b) Coulomb Earth Pressure Theories in Retaining Wall Design

Coloumb Active Earth Pressure Coefficient (Short-Heeled Wall)

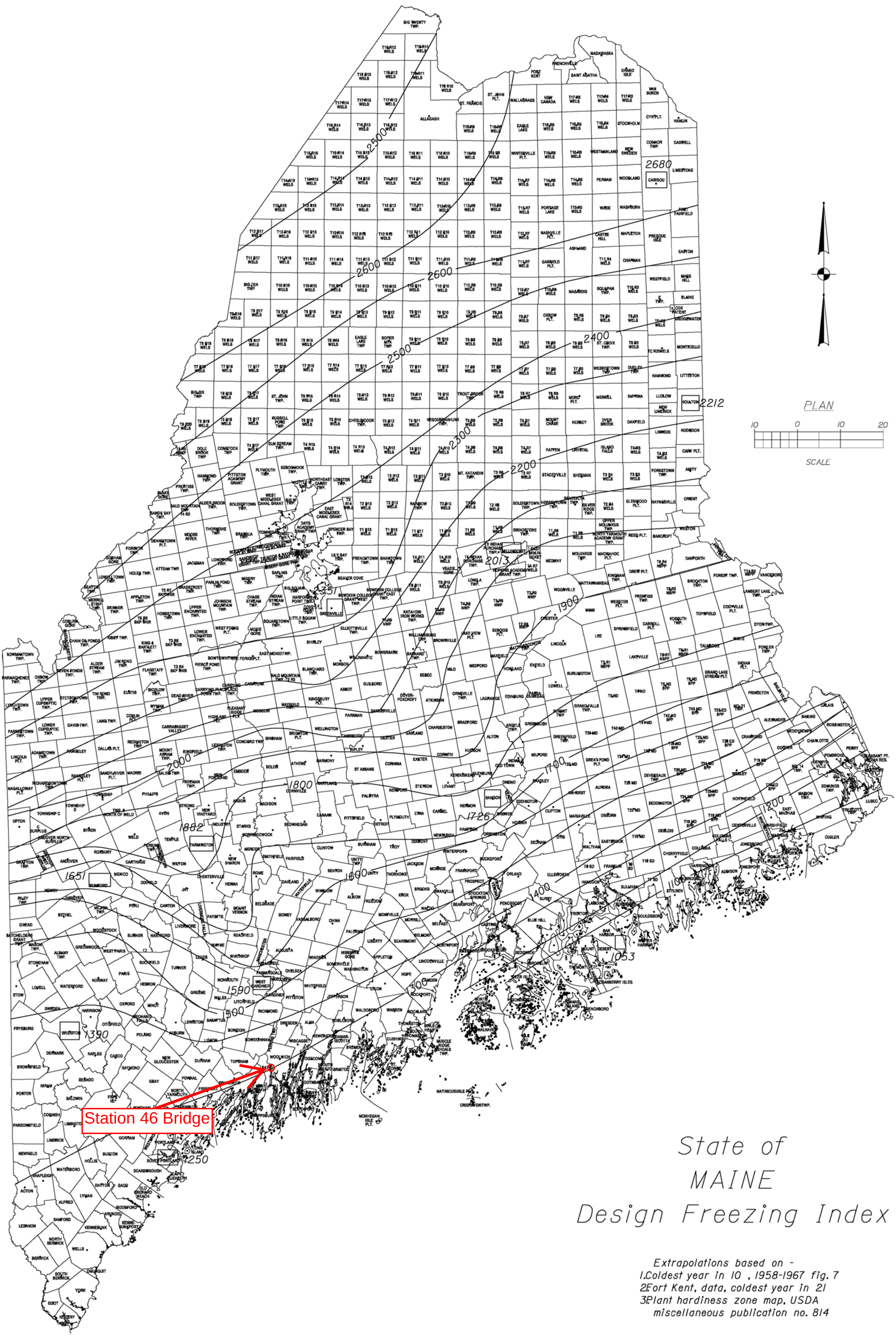
$$\Gamma := \left[1 + \sqrt{\left[\frac{\sin(\phi + \delta_f)\cdot(\sin(\phi - \beta))}{\sin(\theta - \delta_f)\cdot\sin(\theta + \beta)}\right]}\right]^2 = 2.77$$

$$K_{ac} := \frac{(\sin(\theta + \phi))^2}{\Gamma\cdot\left[(\sin(\theta))^2\cdot\sin(\theta - \delta_f)\right]}$$

$\boxed{K_{ac} = 0.28}$

March 2014

Figure 5-1 Maine Design Freezing Index Map



State of
MAINE
Design Freezing Index

Extrapolations based on -
1.Coldest year in 10 , 1958-1967 fig. 7
2.Fort Kent, data, coldest year in 21
3.Plant hardiness zone map, USDA
miscellaneous publication no. 814

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	49.8	[illegible]	[illegible]	38.7
1200	73.1	60.4	52.0	[illegible]	[illegible]	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
16[illegible]	[illegible]	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.

APPENDIX I – SITE SPECIFIC SEISMIC MEMORANDUM

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

TECHNICAL MEMORANDUM

DATE: May 12, 2021

TO: Laura Krusinski
Maine Department of Transportation

FROM: GZA GeoEnvironmental, Inc.
Jackson B. Hewlett, P.E. (MA),
Christopher Snow, P.E.,
Andrew R. Blaisdell, P.E.

SUBJECT: Site-Specific Seismic Response Analysis
Replacement of Station 46 Bridge No. 3039
Woolwich, Maine

FILE No.: 09.0026035.01

STATE OF MAINE
CHRISTOPHER L. SNOW
No. 7275
LICENSED
PROFESSIONAL ENGINEER
05-12-2021

GZA GeoEnvironmental, Inc. (GZA) performed a site-specific seismic response analysis for the proposed replacement of the Station 46 Bridge (Bridge No. 3039) located on Route 1 in Woolwich, Maine. Our analysis was performed in accordance with the requirements of the *AASHTO Bridge Design Specification, 9th Edition (2020)* and the *AASHTO Guide Specifications for LRFD Seismic Bridge Design, 2nd Edition (2011)*. The purpose of our work was to develop a site-specific recommended design response spectrum for the aforementioned bridge, currently classified as Site Class E based on the generalized procedure specified in the AASHTO code. This memorandum summarizes the assumptions, methodology, and results of our site-specific seismic analysis.

Our work consisted of the following tasks:

- Development of a design seismic soil profiles based on GZA's test borings and cone penetration test (CPT) data obtained from subsurface explorations at the site,
- Development of dynamic soil properties for use in a site-specific seismic analysis, and
- Development of a design response spectrum using the design soil profile and dynamic soil properties using a free-field one-dimensional, equivalent linear site response analysis.

Soil Profiles

Explorations performed in GZA's site investigation were used for development of a design proposed representative of the subsurface conditions at the site. A preliminary evaluation had been completed in December 2020 and considering the insufficient data at the Pier locations GZA recommended additional explorations be done in final design to complete the required analysis. Supplemental explorations were completed in the vicinity of the evaluation area including additional test borings, seismic CPT tests, and geophysical testing.

The subsurface conditions vary over the length of the bridge, with the greater depth to rock and thickness marine clay stratum near the center of the bridge and lesser overburden depths at the abutments. The attached **Interpretive Subsurface Profile (Figure 2)** is included to provide a sense of the general variations in the subsurface profile along the alignment. It has been updated to include the spring 2021 explorations.

Two subsurface profiles were developed for the site response analysis to reflect the variability in subsurface stratigraphy where Pier 2 (Profile A) and Pier 3 (Profile B) are anticipated to be located, as these conditions are anticipated to control the seismic response of the bridge. The design profiles are shown below:

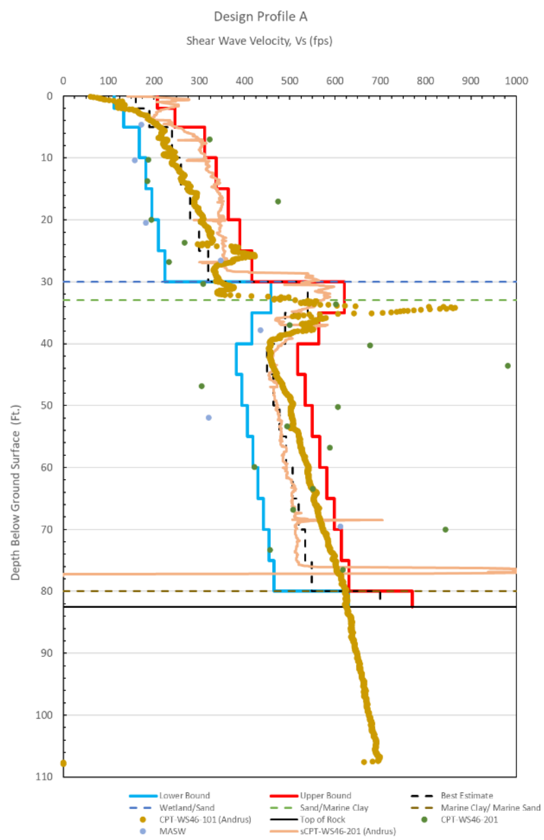
Stratum	**Modelled Thickness (ft)**	
	Profile A	**Profile B**
Wetland Deposit	30	30
Marine Clay	50	80
Marine Sand	2.5	17

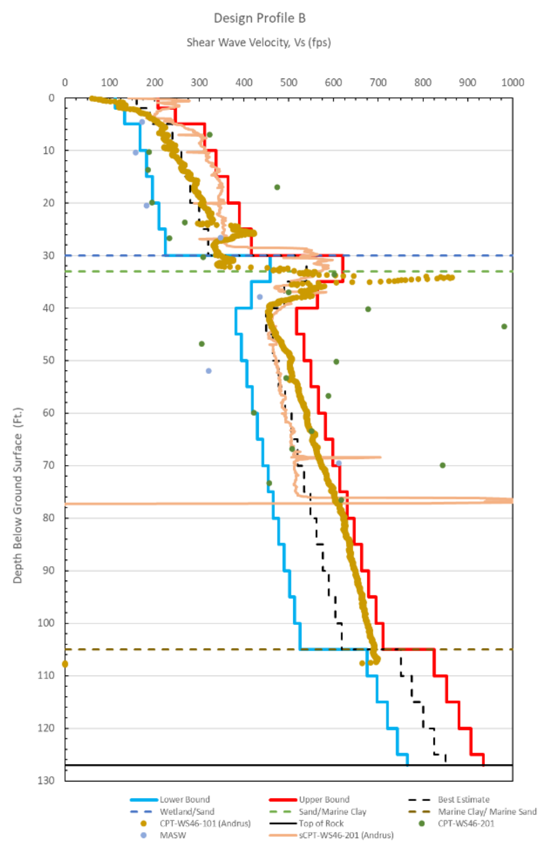
The depth to top of bedrock was observed to vary from approximately 82.5 to 127 feet at Pier 2 and Pier 3, respectively. To consider the difference in site response due the varying thickness of marine clay and depth to bedrock, two input soil profiles, Profile A and Profile B, were analyzed. Design Profiles A and B are summarized in **Table 1**, below.

Dynamic Soil Properties

To develop dynamic soil properties for use in the site-specific analysis, shear wave velocity (Vs) profiles were developed using measurements from CPT soundings (direct Vs measurements at 3.2 ft (1m) intervals, the empirical correlation suggested by Andrus (2007) using cone tip and sleeve resistance), empirical correlations proposed by PEER (2012) for estimates of Vs using SPT N-values, and shear wave velocity values estimated by Northeast Geophysical using the Multi-Channel Analysis of Surface Waves method.

These data were used to develop a “Best Estimate” Vs profile for Profile A and Profile B for use in the site-specific response analysis. Based on the variability in Vs values estimated from the subsurface exploration data, “Upper Bound” and “Lower Bound” Vs profiles were developed to create an envelope of approximately +-15 percent of the Best Estimate profile, shown in the figures below. The shear wave velocity of bedrock was assumed to be 2,500 feet per second in the for all Vs profiles.





Additional dynamic soil properties, including shear modulus and damping degradation curves used to model non-linear soil behavior, were assigned to each stratum. The design soil profile and dynamic soil properties are summarized in **Table 1**, attached.

Input Ground Motions and Site Response Analysis

Three earthquake time histories ("input motions") were used in the analysis. Each acceleration time history corresponds to a frequency of occurrence of 2 percent in 50 years and is representative of ground motions anticipated to occur within Site Class B bedrock at site.

A free-field, one-dimensional, equivalent linear site response analysis was performed using SHAKE2000 (SHAKE) software to obtain site-specific acceleration response spectra at the target depth of interest. For analysis, the subsurface strata in each profile are discretized into sub-layers ranging from 2 to 5 feet thick as shown in **Table 1.**

The site response is then estimated by SHAKE for each soil profile based on a combination of three Vs profiles (lower bound, best estimate, and upper bound) and three input motions, yielding nine output response spectra for each soil profile. For the analysis considering two soil profiles (Profile A and Profile B as described above), eighteen output spectra were computed.

Each output spectrum was generated at a depth below the top of the soil profile (i.e., depth below mudline) equivalent to the lower 1-foot of the pile caps, as the soil response at this depth is anticipated to be most representative of the seismic loads transmitted to the substructures.

Results and Conclusions

Based on design discussions with HNTB and Maine Department of Transportation regarding the proposed location of the piers, it was agreed that the results of the analysis for Soil Profile B are most appropriate for use in developing the recommended design response spectrum. The recommended design response spectrum and the output response spectra for each input time history for Soil Profile B are shown in **Figure 1**. Please note that each response spectrum was developed assuming a structural damping of 5 percent.

To account for the difference in site response based on variability in Vs and input motions, “mean” and “mean plus one standard deviation” spectra were calculated for the nine individual output spectra. The recommended design response spectrum shown was selected considering the mean plus one standard deviation response spectrum, and the code-based limitation that a design spectrum based on a site-specific analysis cannot be less than two-thirds of the design spectrum developed using the generic procedure (i.e., the site-specific design spectrum cannot be less than two-thirds of the Site Class E spectrum).

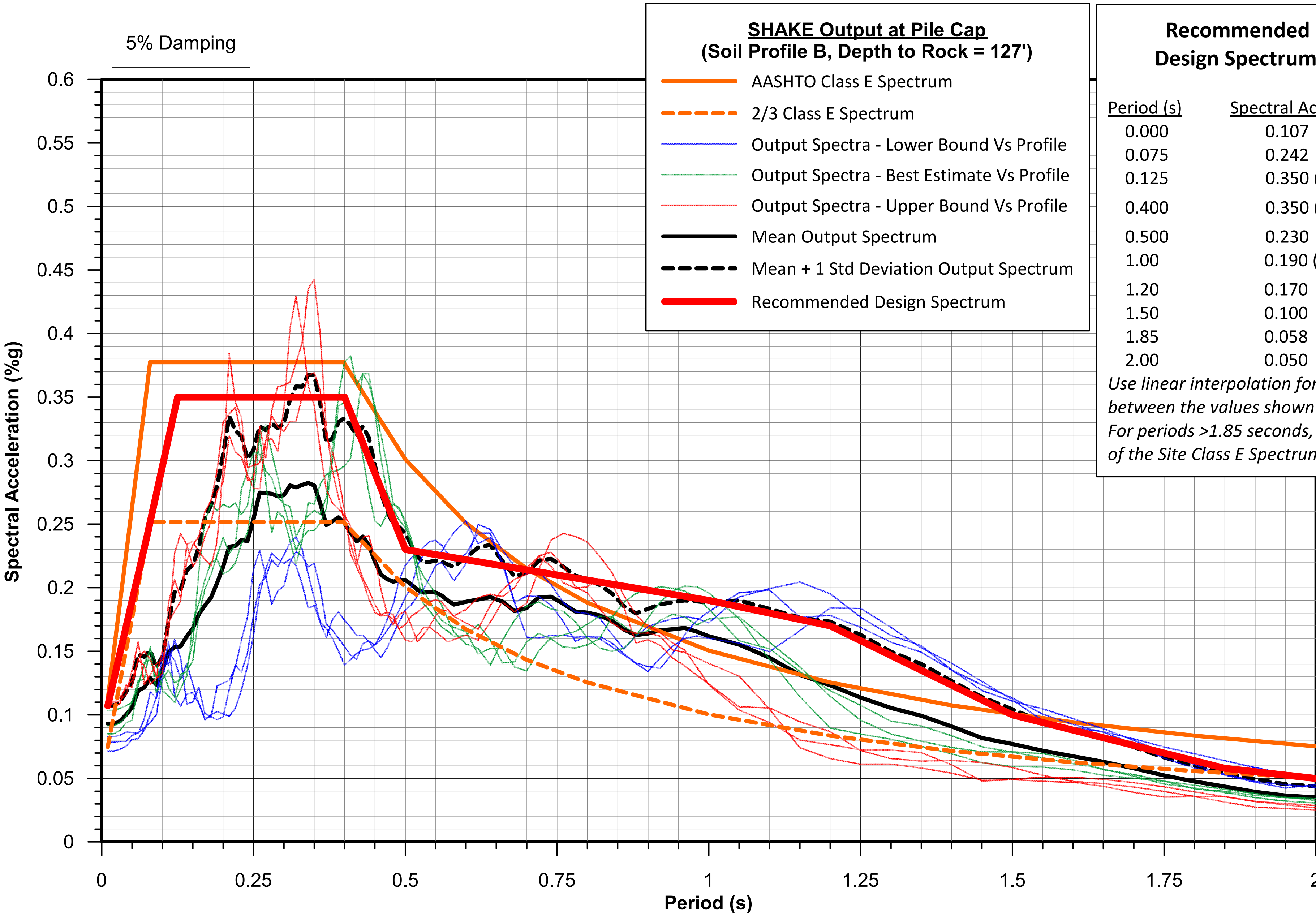
For the purpose of evaluating the appropriate Seismic Zone for the proposed bridge, we note that the recommended design spectrum is based on an S_{DS} of 0.35g and S_{D1} of 0.19g. As such, the bridge should be designated as Seismic Zone 2. Please note that the intermediate points of the design response spectrum should be estimated using the recommended curve shown on the attached figure in lieu of the typical spectrum construction equations contained in the AASHTO code for periods less than 1.85 seconds. For periods above 1.85 seconds, the design spectrum should be constructed using values equivalent to two-thirds of the Site Class E spectrum for this site.

Attachments: Table 1 – Summary of Site Response Analysis Input
Figure 1 – SHAKE Output Spectra – Pile Cap – Profile B (Sta. 85+32)
Figure 2 – Subsurface Profile

TABLE 1
SHAKE Seismic Profile and Input Summary
Station 46 Bridge No. 3039
Woolwich, Maine

Design Soil Profile	Sublayer No.	Stratum ID (Soil Type)	Depth at Top of Sublayer (ft)	Total Unit Weight (pcf)	Sublayer Thickness (ft)	Vs (Best Fit) ft/s	UB/LB variance (%, +/-)	Vs (Lower Bound) ft/s	Vs (Upper Bound) ft/s	Shear Modulus & Damping Degredation Curve Reference
Profile A Sta 83+74± (Depth to Rock = 82.5')	1	1	0	95	2	160	20%	112	208	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	2	1	2	95	3	190	20%	133	247	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	3	1	5	95	5	240	20%	168	312	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	4	1	10	95	5	260	20%	182	338	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	5	1	15	95	5	280	20%	196	364	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	6	1	20	95	5	300	20%	210	390	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	7	1	25	95	5	320	15%	224	416	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	8	3	30	115	5	540	15%	459	621	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	9	3	35	115	5	490	15%	417	564	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	10	3	40	115	5	450	15%	383	518	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	11	3	45	115	5	464	15%	394	534	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	12	3	50	115	5	478	15%	406	550	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	13	3	55	115	5	492	15%	418	566	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	14	3	60	115	5	506	15%	430	582	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	15	3	65	115	5	520	15%	442	598	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	16	3	70	115	5	534	15%	454	614	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	17	3	75	115	5	548	15%	466	630	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	18	4	80	130	2.5	700	10%	630	770	Deep Cohesionless Soils, 51-120ft (EPRI 1993)
	19	5	82.5	170	--	2500	0%	2500	2500	Rock, 82.5 to 120 feet (EPRI 1993)
Profile B Sta 85+32± (Depth to Rock = 127')	1	1	0	95	2	160	20%	112	208	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	2	1	2	95	3	190	20%	133	247	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	3	1	5	95	5	240	20%	168	312	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	4	1	10	95	5	260	20%	182	338	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	5	1	15	95	5	280	20%	196	364	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	6	1	20	95	5	300	20%	210	390	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	7	1	25	95	5	320	15%	224	416	Soil with PI=30, OCR=1-15 (Vucetic & Dobry, 1991)
	8	3	30	115	5	540	15%	459	621	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	9	3	35	115	5	490	15%	417	564	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	10	3	40	115	5	450	15%	383	518	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	11	3	45	115	5	464	15%	394	534	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	12	3	50	115	5	478	15%	406	550	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	13	3	55	115	5	492	15%	418	566	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	14	3	60	115	5	506	15%	430	582	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	15	3	65	115	5	520	15%	442	598	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	16	3	70	115	5	534	15%	454	614	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	17	3	75	115	5	548	15%	466	630	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	18	3	80	115	5	562	15%	478	646	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	19	3	85	115	5	576	15%	490	662	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	20	3	90	115	5	590	15%	502	679	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	21	3	95	115	5	604	15%	513	695	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	22	3	100	115	5	618	15%	525	711	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	23	3	105	115	5	750	15%	675	825	Soil with PI=15, OCR=1-15 (Vucetic & Dobry, 1991)
	24	4	110	130	5	775	10%	698	853	Deep Cohesionless Soils, 51-120ft (EPRI 1993)
	25	4	115	130	5	800	10%	720	880	Deep Cohesionless Soils, 51-120ft (EPRI 1993)
	26	4	120	130	5	825	10%	743	908	Deep Cohesionless Soils, 51-120ft (EPRI 1993)
	27	4	125	130	2	850	10%	765	935	Deep Cohesionless Soils, 51-120ft (EPRI 1993)
	28	5	127	170	--	2500	0%	2500	2500	Rock, 127 to 150 feet (EPRI 1993)

Stratum ID: 1 = Organic Silt (Wetland Deposit), 2 = Sand (Wetland Deposit, unused in this analysis), 3 = Silty Clay, 4 = Marine Sand, 5 = Bedrock



Recommended Design Spectrum

Period (s)	Spectral Accel (g)
0.000	0.107
0.075	0.242
0.125	0.350 (S_{DS})
0.400	0.350 (S_{DS})
0.500	0.230
1.00	0.190 (S_{D1})
1.20	0.170
1.50	0.100
1.85	0.058
2.00	0.050

Use linear interpolation for periods between the values shown above. For periods >1.85 seconds, use 2/3 of the Site Class E Spectrum.

Proj. Mgr.: ARB
Designed By: JBH
Reviewed By: ARB

Drawn By: JBH
Date: Apr 2021

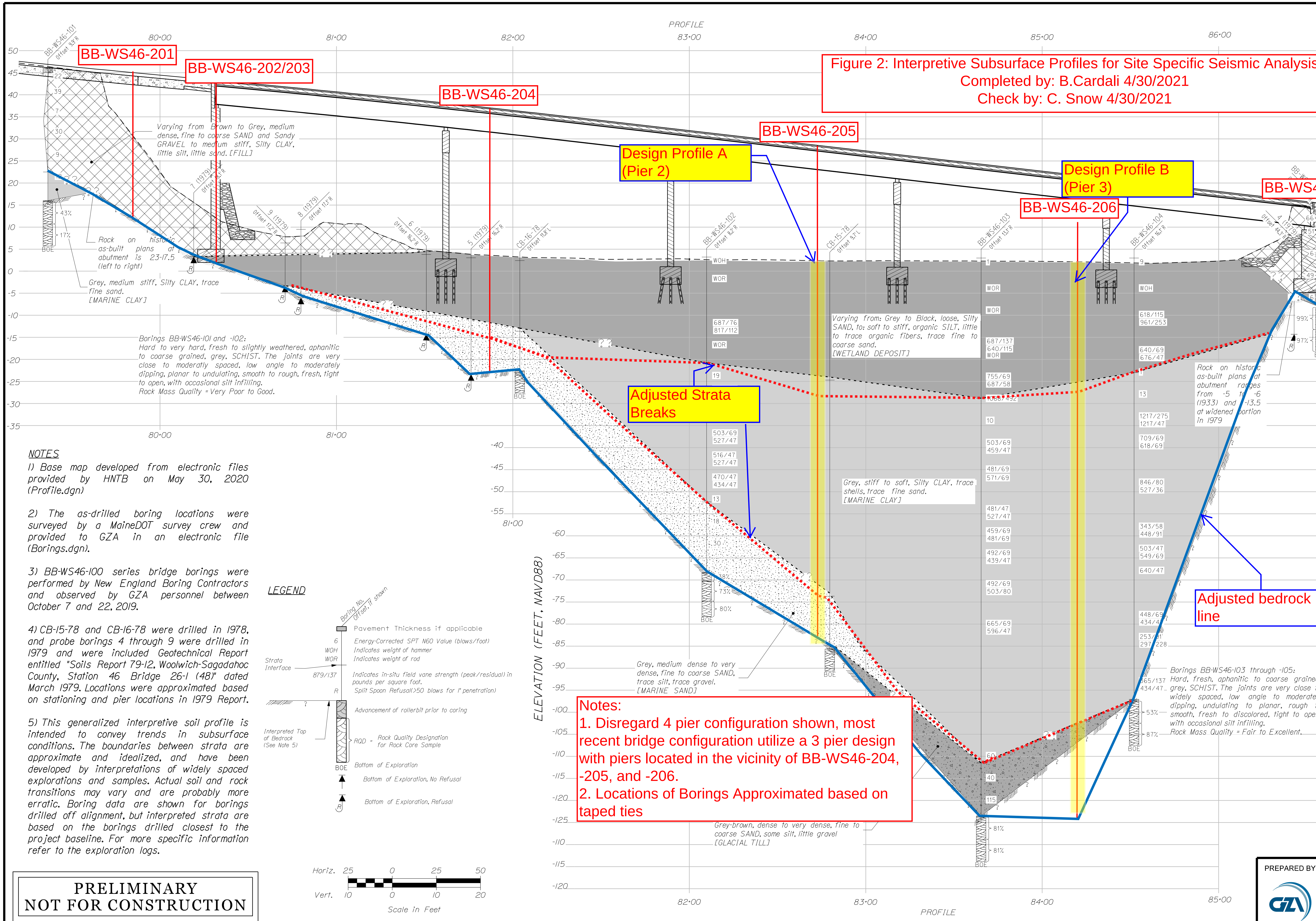
GZA GeoEnvironmental
Proactive By Design

Site Specific Seismic Ground Motion Analysis
Replacement of Station 46 Bridge No. 3039, Woolwich, ME

File No.: 09.0026035.01

SHAKE OUTPUT SPECTRA - PILE CAP - PROFILE B (Sta. 85+32±)

FIGURE 1



NOTES

1) Base map developed from electronic files provided by HNTB on May 30, 2020 (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) BB-WS46-100 series bridge borings were performed by New England Boring Contractors and observed by GZA personnel between October 7 and 22, 2019.

4) CB-15-78 and CB-16-78 were drilled in 1978, and probe borings 4 through 9 were drilled in 1979 and were included in Geotechnical Report entitled "Soils Report 79-12, Woolwich-Sagadahoc County, Station 46 Bridge 26-1 (48)" dated March 1979. Locations were approximated based on stationing and pier locations in 1979 Report.

5) 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.

PRELIMINARY
NOT FOR CONSTRUCTION

Division: Bridge
Filename: ...\ISP\Woolwich_ISP.dgn
Date:6/1/2020
Username: BMC

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
TBD
WIN 23929.00
BRIDGE PLANS
Bridge No. 3039

STATION 46 BRIDGE NO. 3039
ROUTE ONE OVER TIDAL ESTUARY
WOOLWICH, ME SAGADAHOC COUNTY
INTERPRETIVE SUBSURFACE PROFILE

PREPARED BY: GZA

SHEET NUMBER
3