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M E M O R A N D U M

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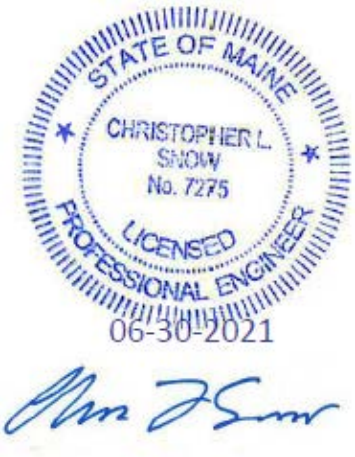
GZA GeoEnvironmental, Inc.

DATE: June 30, 2021

FILE NO.: 09.0026090.00

SUBJECT: Geotechnical Design Basis Memorandum
Remaining Overhead Sign Support Structures
AC-IM-1927(000)E State WIN 019270.00
Piscataqua River Wearing Surface Replacement
Kittery, Maine and Portsmouth, New Hampshire



GZA GeoEnvironmental, Inc. (GZA) has prepared this geotechnical design basis memorandum for the remainder of the proposed overhead sign structures and closed circuit television (CCTV) poles along Interstate 95 (I-95) (northbound and southbound shoulder/lane) in Kittery, Maine and Portsmouth, New Hampshire. Our services were provided in accordance with our executed contract dated November 30, 2020, which incorporates the scope of work in GZA's November 18, 2020 proposal No. 09.P000133.21. This memorandum is subject to the *Limitations* included in **Appendix A**.

BACKGROUND

SPS New England, Inc. (SPS) is currently constructing the project that includes the part-time shoulder use along I-95 over the Piscataqua River Bridge between Portsmouth, New Hampshire and Kittery, Maine. The roadway upgrades include new bridge and cantilever type overhead sign structures (OHSS), a road weather information system (RWIS), CCTV poles, a dynamic messaging sign (DMS) support, and one antenna tower.

This memorandum has been prepared specifically for the remaining 12 structures to supplement GZA's January 8, 2021, high priority structure group memo in Portsmouth, New Hampshire and Kittery, Maine. The remaining 12 structures are listed with the associated borings in the following section.

We understand that foundations under consideration for the proposed sign structures include spread footings, driven piles, or drilled shafts.

SUBSURFACE EXPLORATIONS

GZA completed a subsurface investigation program consisting of 13 test borings to develop subsurface conditions at the following proposed Phase II sign structures:

- GZ-1 at approximately STA. 474+00 (Cantilever Structure);
- GZ-2 at approximately STA. 496+25 (Cantilever Structure);
- GZ-3 and -3A at approximately STA. 507+75 (Cantilever Structure);
- GZ-4 at approximately STA. 519+00 (Cantilever Structure);
- GZ-5 at approximately STA. 532+50 (Self-Supporting Antenna Tower Structure);
- GZ-6 at approximately STA. 574+75 (Cantilever Structure);
- GZ-7 at approximately STA. 575+25 (Dynamic Message Sign (DMS));
- GZ-11 at approximately STA. 583+00, 102 Dennett Road, Kittery, Maine (CCTV Pole);
- GZ-12 at approximately STA. 589+25 (Cantilever Structure);
- GZ-15 at approximately STA. 617+50 (CCTV Pole);
- GZ-16 at approximately STA. 676+75 (CCTV Pole); and
- GZ-17 at approximately STA. 708+50 (CCTV Pole).

The test boring locations were laid-out in the field by SPS using optical survey to establish the locations and elevations. When the as-drilled locations were moved, GZA measured the offset using a tape and estimated the elevation difference using a hand-held level with respect to the surveyed locations. The approximate exploration locations are shown on **Figure 1**. Elevations referenced in this report are in feet and refer to the North American Vertical Datum of 1988 (NAVD88).

The test borings were drilled to depths from approximately 16 to 49 feet below ground surface (bgs) and were terminated after roller cone advancement into presumed bedrock, or after coring bedrock in accordance with the planned scope of work. The borings were drilled by New England Boring Contractors (NEBC) of Derry, New Hampshire between December 15, 2020 and January 25, 2021. Prior to the drilling, NEBC contacted Dig Safe® and DigSmart of Maine to complete clearance of utilities near the boring locations. GZA personnel monitored the drilling work and prepared logs of each boring that are included in **Appendix B**. SPS provided traffic control for the drilling work.

The borings were drilled using 3- and 4-inch driven casing and drive-and-wash drilling techniques. Standard penetration testing (SPT) and split-spoon sampling were typically performed continuously within the upper 15 feet, and at 5-foot typical intervals thereafter in the overburden using a 24-inch-long, 1-3/8-inch inside-diameter sampler. The sampler was driven with a 140-lb calibrated automatic hammer with a 30-inch drop from the ATV- or Truck-mounted drill rig. Approximately 5.3 to 15.0 feet of bedrock core was taken from borings GZ-1, -4, -5, -11, -12, -15, -16, and -17 using NX coring equipment. A tricone roller bit was advanced approximately 1.5 feet into probable rock at GZ-2. GZ-3 was drilled at the approximate proposed location of the sign structure and was terminated due to time constraints, and GZ-3A was completed to gather the

remaining subsurface information at the same location. The borings were backfilled with soil cuttings and/or sand and patched with asphalt cold patch where they were drilled through pavement.

LABORATORY TESTING

GZA retained Thielsch Engineering's Geotechnical Laboratory in Cranston, Rhode Island to complete a soil and rock testing program to assess the gradation and engineering characteristics of the soil and the strength of the bedrock. The program included 19 gradation analysis / AASHTO Classification / Frost Classification assessments, two (2) Atterberg Limits evaluations, 19 moisture content determinations on split spoon samples from the borings; and four (4) unconfined compressive strength / secant modulus tests on recovered rock cores. Results of the testing are included in **Appendix C**.

SUBSURFACE CONDITIONS

SURFICIAL AND BEDROCK GEOLOGY

Surficial soils underlying the site are mapped[1] as the following:

- Marine Regressive Sand Deposits which consist of massive to stratified and cross-stratified, well-sorted brown to gray-brown sand, typically having a gradational basal contact with the Presumpscot Formation;
- Presumpscot formation which consists of laminated, grey and blue-grey Silt and Silty CLAY, locally containing boulders, sand, and gravel, and typically occurring as blanket deposit over bedrock and older glacial sediments; and
- Till which consists of well graded mixture of Silt, Sand, Pebbles, Cobbles, and Boulders. The Till forms a blanket deposit over bedrock, and is inferred to underlie younger sediments where not exposed at surface.

Bedrock in the vicinity of the site is mapped[2] as the Kittery formation of the Merrimack Group. The rock is described as variably thin- to thick-bedded, buff-weathering feldspathic and calcareous Metawacke.

SUBSURFACE PROFILE

Four principal subsurface units were encountered in the test borings beneath surficial Topsoil or Asphalt, and overlying Bedrock: Fill, Sand, Silty Clay, and Glacial Till. The generalized descriptions of the units are summarized in the following table in descending order from ground surface. Detailed descriptions of the materials encountered at specific locations are provided on the boring logs in **Appendix B**.

[1] Marvinney, Robert G., 1999, Surficial Geology of the Portsmouth Quadrangle, Maine: Maine Geological Survey, Open-File 99-96, color map, scale 1:24,000. Maine Geological Survey Maps. 99-96.

[2] Marvinney, Robert G., 2012, Bedrock geology of the Portsmouth quadrangle, Maine: Maine Geological Survey, Progress Map 12-29, color map, scale 1:24,000. Maine Geological Survey Maps. 12-29.

GENERALIZED SUBSURFACE CONDITIONS	
Soil Unit	**Generalized Description**
Topsoil	Brown, fine to coarse SAND, little to some Silt, few to frequent roots observed. *Encountered in borings GZ-5, -11, -12 and -17.*
Asphalt	Asphalt pavement. *Encountered in boring GZ-1, -2, -3, -3A, -4, -6, -7, -15, and -16*
Fill	Variable: From Brown, loose to very dense, fine to coarse SAND, with varying amounts of Gravel and Silt to brown to grey, medium dense GRAVEL, trace to some Sand, trace to little Silt, with few brick and rock fragments (USCS: GP-GM, SP-SM). Cobbles/boulders were encountered within the unit at GZ-3A. Maine Department of Transportation (MaineDOT) Frost Classification = 0, II, III *Encountered in all borings with the exception of GZ-16*
Sand	Brown, dense to very dense, Silty fine to medium SAND, with occasional coarse Sand seams (USCS: SM). *Encountered in boring GZ-17 only.*
Silty Clay	Grey, hard, Silty CLAY, trace to some fine to coarse Sand. (USCS: CL) *Encountered in boring GZ-15 only.*
Glacial Till	Variable: From brown to grey, medium dense to very dense, fine to coarse SAND, with varying amounts of Gravel and Silt to stiff brown Silty CLAY, little fine Sand, trace Gravel. *Encountered in borings GZ-1, -2, -3, -3, -3A, -4, -5, -6, -7, -12, and -16*
Bedrock	Hard, fresh to slightly weathered, aphanitic, grey, METAWACKE. Primary joints are generally described as extremely close to moderately spaced, horizontal to moderately dipping, planar to undulating, rough, fresh to discolored, tight to open. Secondary joints are close to moderately spaced, moderately dipping to vertical, planar to undulating, rough, fresh to discolored, partially open to open. RQD ranged from RQD 12 to 63% in borings GZ-15 and -17 respectively. *Bedrock was cored at GZ-1, -4, -5, 11, -12, -15, -16 and -17.* *Roller cone and/or split spoon refusal indicated probable bedrock at borings GZ-2, -3A, and -7*

GROUNDWATER

Groundwater was measured in test borings GZ-3A, -4, -5, -7, -11, -12, -15, and -17 at depths of approximately 2 to 31 feet bgs. These observations were made during drilling which included introduction of water due to the rotary wash drilling method and were likely affected by the drilling operations. Groundwater levels vary due to season, precipitation, construction activities and other factors. Consequently, water levels during and after construction are likely to vary from those encountered in the borings.

ENGINEERING EVALUATIONS

Evaluations were based on Section 13.6.1 of *AASHTO Standard Specifications for Structural Support for Highway Signs, Luminaires, and Traffic Signals 1st Edition 2015* including 2017, 2018 and 2020 interim revisions (LRFD LTS), which references Section 10 of *AASHTO LRFD Bridge Design Specifications, 8th Edition* with May 2018 revisions (LRFD Bridge).

FEASIBLE FOUNDATION TYPES

This report covers five cantilever structures, four 60- to 90-foot-tall CCTV Poles, and a self-supporting antenna tower structure. The structures will have the foundations outside the I-95 and side street shoulders.

Feasible foundation types for this project are influenced by site space constraints, depth to bedrock, and the strength and composition of the overlying soils. Technically feasible foundation types include driven piles, drilled shafts, and spread footings. Where available space and constructability are limited, spread footing foundations are likely not a viable solution. Spread footings are also likely not viable where soft soils are present below the bearing level due to compressibility. Where shallow rock is encountered, driven piles are not considered practical due to the lack of overburden soil to achieve the necessary embedment.

DRILLED SHAFT DESIGN BASIS AND RECOMMENDATIONS

LATERAL RESISTANCE

We understand that the designer intends to complete lateral load-deformation evaluations for drilled shafts using a design approach such as L-Pile® for single shafts, or using Group® or FBPier® for multiple shafts. Development of structure-specific lateral design parameters is described below.

AXIAL RESISTANCE

Per Section 13.6.1 of LRFD LTS, axial design parameters were calculated based on Section 10 of AASHTO LRFD Bridge Design Specifications. The upper 5 feet of the shaft should typically be ignored when calculating the axial capacity, unless the surrounding materials can be shown to be drained and non-frost-susceptible. Structure-specific axial design parameters are described below.

DEVELOPMENT OF FOUNDATION DESIGN PARAMETERS

GZA estimated the internal friction angle, undrained shear strength, and unit weight based on correlations with the average corrected SPT blow counts encountered in the test borings. The estimated internal friction and undrained shear strength were used to calculate the lateral analysis design parameters including horizontal subgrade moduli (k) and/or the strain corresponding to one-half the maximum principal stress difference (E_{50}), depending on soil type, based on the *LPile Technical Manual*. GZA also used the corrected SPT blow counts, estimated internal friction angles, and undrained shear strengths to calculate the nominal side and tip resistances for soil using procedures described in LRFD Bridge Section 10.8.3.5.1b and 10.8.3.5.1c for cohesive soils using the alpha method, and LRFD Bridge Section 10.8.3.5.2b and 10.8.3.5.2c for cohesionless soils using the beta method. The side resistance of cohesionless soil was also dependent on the relative depth and overburden of each stratum, and was broken into discrete depth ranges with assigned resistance values.

Lateral and axial bedrock design properties for drilled shafts including the Rock Quality Designation (RQD), Geologic Strength Index, rock group constant (m_i), unconfined compressive strength (UCS), total unit weight (γ), and Secant Modulus were based on rock descriptions, UCS laboratory results, and LRFD Bridge Section 10.4.6.4. Based on similar bedrock conditions encountered across the boring locations, design bedrock UCSs and the strain factors at 50 percent of UCS (k_{rm}) were taken as the average of the lab results. The RQD was

based on a weighted average RQD encountered in the cores of each boring. The Equivalent Rock Modulus (E_m) was calculated as the average between the two methods shown in LRFD Bridge Table 10.4.6.5-1.

The nominal side and tip resistances for rock were estimated using procedures described in LRFD Bridge Section 10.8.3.5.4b and LRFD Bridge 10.8.3.5.4c, respectively, based on the design bedrock properties discussed above. The results of our engineering evaluations are presented in the design tables in the following sections.

RESISTANCE FACTORS

The recommended LRFD resistance factors for strength limit state design of foundations were derived from LRFD Bridge 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/Sliding	Footing on Soil (SAND)	0.45/0.8	10.5.5.2.2-1
Bearing/Sliding	Footing on Soil (CLAY)	0.5/0.85	10.5.5.2.2-1
Bearing/Sliding	Footing on Rock[1]	0.45/0.8	10.5.5.2.2-1
DRIVEN PILES			
Nominal Bearing Resistance of Single Pile – Dynamic Analysis	Axial Resistance	0.65	10.5.5.2.3-1
Nominal Bearing Resistance of Single Pile – Wave equation analysis, no Dynamic Analysis, Field confirmation of hammer performance	Axial Resistance	0.5	10.5.5.2.3-1
DRILLED SHAFTS			
Nominal Axial Compressive/ Tensile Resistance (Single Shaft)	Side Resistance in Sand, No Load testing	0.55/0.45	10.5.5.2.4-1
Nominal Axial Compressive Resistance (Single Shaft)	Tip Resistance in Sand, No Load testing	0.5	10.5.5.2.4-1
Nominal Axial Compressive/ Tensile Resistance (Single Shaft)	Side Resistance in Clay, No Load testing	0.45/0.35	10.5.5.2.4-1
Nominal Axial Compressive Resistance (Single Shaft)	Tip Resistance in Clay, No Load testing	0.4	10.5.5.2.4-1
Nominal Axial Compressive/ Tensile Resistance (Single Shaft)	Side Resistance in Rock, No Load Testing	0.55/0.4	10.5.5.2.4-1
Nominal Axial Compressive Resistance (Single Shaft)	Tip Resistance in Rock	0.5	10.5.5.2.4-1
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. If used, structural resistance of driven piles should be checked at the strength limit state considering a resistance factor ϕ_c=0.50, per AASHTO LRFD Bridge Article 10.7.3.2.3 for hard driving condition.

SIGN FOUNDATION RECOMMENDATIONS

GZA developed a design subsurface profile and recommended foundation design parameters for each foundation location. These are listed by foundation location and reference test borings in the tables that follow. Resistance factors are based on LRFD Bridge Table 10.5.5.2.4-1.

STA. 474+00 Cantilever Structure (Boring ID: GZ-1)

A drilled shaft foundation is recommended for this location, due to the relatively shallow thickness of overburden and the limited space along the shoulder.

Design Profile – Boring GZ-1						
Stratum	**Top of Layer Elevation, feet**	**Thickness (ft)**	**Average N160**	**Weighted Average RQD %**	**Secant Modulus @ 50% Strain, E (ksi)**	**Unconfined Compressive Strength, UCS (psi)**
Ground Surface	61.1	--	--	--	--	--
Fill	61.1	18.5	61	--	--	--
Glacial Till	42.6	13.0	45		--	--
Bedrock	29.6	--	--	24	1800	5000
Groundwater	42.6	--	--	--	--	--

Note: Groundwater was approximated based on soil description moistures.

Recommended Lateral Design Parameters for Drilled Shafts – Boring GZ-1						
Stratum	**Soil Model**	**Effective Unit Weight γ_e (pcf) Above GW / below GW**	**k (pci) Above GW/below GW**	**ϕ' (deg) / S_u (psf) / UCS (psi)**	**Equivalent Rock Modulus, E_m, ksi**	**E_{50}/krm**
Fill	Reese Sand	125	165	36	--	--
Glacial Till	Reese Sand	67.6	95	36	--	--
Bedrock	Weak Rock	107.6	--	2,000	1,215	0.00318

Recommended Axial Design Parameters for Drilled Shafts – Boring GZ-1			
Stratum	**Depth (feet)**	**Nominal Unit Side Resistance, q_s (ksf)**	**Nominal Unit Tip Resistance, q_p (ksf)**
.22	0-8.0	0.5	N/A
Fill	8.0-18.5	1.5	36
Glacial Till	18.5-31.5	2.5	36
Bedrock	31.5	24	---

Note: Due to uncertainty in the mobilization of tip resistance in bedrock, we recommend ignoring the end bearing in calculating the axial resistance of the drilled shaft. GZA can revisit this issue if the design shows there is a significant impact on the shaft length.

STA. 496+25 Cantilever Structure (Boring ID: GZ-2)

A drilled shaft foundation is recommended for this location, due to the relatively shallow thickness of overburden at this location and the limited space along the shoulder.

Design Profile – Boring GZ-2						
Stratum	**Top of Layer Elevation, feet**	**Thickness (ft)**	**Average N160**	**Weighted Average RQD**	**Secant Modulus @ 50% Strain, E (psi)**	**Unconfined Compressive Strength, UCS, (psi)**
Ground Surface	59.6	--	--	--	--	--
Fill	59.6	18.5	69	--	--	--
Glacial Till	41.1	19.5	47	--	--	--
Bedrock	21.6	--	--	N/A	1800	5000
Groundwater	41.1	--	--	--	--	--

Note: Groundwater was approximated based on soil descriptions.

Recommended Lateral Design Parameters for Drilled Shafts – Boring GZ-2						
Stratum	**Soil Model**	**Effective Unit Weight γ_e (pcf) Above GW / below GW**	**k (pci) Above GW/below GW**	**ϕ' (deg) / S_u (psf) / UCS (psi)**	**Equivalent Rock Modulus, E_m, ksi**	**E_{50}/krm**
Fill	Reese Sand	125	165	36	--	--
Glacial Till	Reese Sand	67.6	95	36	--	--
Bedrock	Weak Rock	107.6	--	2,000	1,215	0.00318

Recommended Axial Design Parameters for Drilled Shafts – Boring GZ-2			
Stratum	**Depth (feet)**	**Nominal Unit Side Resistance, q_s (ksf)**	**Nominal Unit Tip Resistance, q_p (ksf)**
Fill	0-8.0	0.5	N/A
Fill	8.0-18.5	1.5	36
Glacial Till	18.5-38.0	2.5	36
Bedrock	38.0	24	---

Note: Due to uncertainty in the mobilization of tip resistance in bedrock, we recommend ignoring the end bearing in calculating the axial resistance of the drilled shaft. GZA can revisit this issue if the design shows there is a significant impact on the shaft length.

STA. 507+75 Cantilever Structure (Boring ID: GZ-3 & GZ-3A)

A drilled shaft foundation is recommended for this location, due to the relatively shallow thickness of overburden at this location and the limited space along the shoulder. The design profile was developed by using the subsurface conditions encountered in GZ-3, and the subsurface conditions encountered in GZ-3A below the termination depth of GZ-3.

Design Profile – Boring GZ-3 & GZ-3A						
Stratum	**Top of Layer Elevation, feet**	**Thickness (ft)**	**Average N160**	**Weighted Average RQD**	**Secant Modulus @ 50% Strain, E (psi)**	**Unconfined Compressive Strength, UCS, (psi)**
Ground Surface	55.7	--	--	--	--	--
Fill	55.7	22.0	48	--	--	--
Glacial Till	33.7	18.0	24	--	--	--
Bedrock	15.7	--	--	N/A	1800	5000
Groundwater	35.7	--	--	--	--	--

Recommended Lateral Design Parameters for Drilled Shafts – Boring GZ-3-3A						
Stratum	**Soil Model**	**Effective Unit Weight γ_e (pcf) Above GW / below GW**	**k (pci) Above GW/below GW**	**ϕ' (deg) / S_u (psf) / UCS (psi)**	**Equivalent Rock Modulus, E_m, ksi**	**E_{50}/krm**
Fill	Reese Sand	125/62.6	85/55	32	--	--
Glacial Till	Reese Sand	67.6	75	34	--	--
Bedrock	Weak Rock	107.6	--	2,000	1,215	0.00318

Recommended Axial Design Parameters for Drilled Shafts – Boring GZ-3 and GZ-3A			
Stratum	**Depth (feet)**	**Nominal Unit Side Resistance, q_s (ksf)**	**Nominal Unit Tip Resistance, q_p (ksf)**
Fill	0-22.0	1.0	N/A
Glacial Till	22.0-40.0	1.5	20
Bedrock	40.0	24	---

Note: Due to uncertainty in the mobilization of tip resistance in bedrock, we recommend ignoring the end bearing in calculating the axial resistance of the drilled shaft. GZA can revisit this issue if the design shows there is a significant impact on the shaft length.

STA. 519+00 Cantilever Structure (Boring ID: GZ-4)

A drilled shaft foundation is recommended for this location, due to the relatively shallow thickness of overburden at this location and the limited space along the shoulder.

Design Profile – Boring GZ-4						
Stratum	**Top of Layer Elevation, feet**	**Thickness (ft)**	**Average N160**	**Weighted Average RQD**	**Secant Modulus @ 50% Strain, E (psi)**	**Unconfined Compressive Strength, UCS, (psi)**
Ground Surface	64.0	--	--	--	--	--
Fill	64.0	3.8	87	--	--	--
Glacial Till	60.2	6.3	80	--	--	--
Bedrock	53.9	--	--	39	1800	5000
Groundwater	57.5	--	--	--	--	--

Recommended Lateral Design Parameters for Drilled Shafts – Boring GZ-4						
Stratum	**Soil Model**	**Effective Unit Weight γ_e (pcf) Above GW / below GW**	**k (pci) Above GW/below GW**	**ϕ' (deg) / S_u (psf) / UCS (psi)**	**Equivalent Rock Modulus, E_m, ksi**	**E_{50}/krm**
Fill	Reese Sand	125	165	36	--	--
Glacial Till	Reese Sand	130/67.6	165/95	36	--	--
Bedrock	Weak Rock	107.6	--	2,000	1,215	0.00318

Recommended Axial Design Parameters for Drilled Shafts – Boring GZ-4			
Stratum	**Depth (feet)**	**Nominal Unit Side Resistance, q_s (ksf)**	**Nominal Unit Tip Resistance, q_p (ksf)**
Fill	0-3.8	0.5	N/A
Glacial Till	3.8-10.1	1.0	36
Bedrock	10.1	24	---

Note: Due to uncertainty in the mobilization of tip resistance in bedrock, we recommend ignoring the end bearing in calculating the axial resistance of the drilled shaft. GZA can revisit this issue if the design shows there is a significant impact on the shaft length.

STA. 532+50 Cantilever Structure (Boring ID: GZ-5)

A drilled shaft foundation is recommended for this location, due to the relatively shallow thickness of overburden at this location.

Design Profile – Boring GZ-5						
Stratum	**Top of Layer Elevation, feet**	**Thickness (ft)**	**Average N160**	**Weighted Average RQD**	**Secant Modulus @ 50% Strain, E (psi)**	**Unconfined Compressive Strength, UCS, (psi)**
Ground Surface	68.0	--	--	--	--	--
Fill	68.0	2.0	57	--	--	--
Glacial Till	66.0	2.2	51	--	--	--
Bedrock	63.8	--	--	55	1800	5000
Groundwater	63.0	--	--	--	--	--

Recommended Lateral Design Parameters for Drilled Shafts – Boring GZ-5						
Stratum	**Soil Model**	**Effective Unit Weight γ_e (pcf) Above GW / below GW**	**k (pci) Above GW/below GW**	**ϕ' (deg) / S_u (psf) / UCS (psi)**	**Equivalent Rock Modulus, E_m, ksi**	**E_{50}/krm**
Fill	Reese Sand	125	165	36	--	--
Glacial Till	Reese Sand	130/67.6	165/95	36	--	--
Bedrock	Weak Rock	107.6	--	2,000	1,215	0.00318

Recommended Axial Design Parameters for Drilled Shafts – Boring GZ-5			
Stratum	**Depth (feet)**	**Nominal Unit Side Resistance, q_s (ksf)**	**Nominal Unit Tip Resistance, q_p (ksf)**
Fill	0-2.0	0.5	N/A
Glacial Till	2.0-4.2	1.0	N/A
Bedrock	4.2	24	---

Note: Due to uncertainty in the mobilization of tip resistance in bedrock, we recommend ignoring the end bearing in calculating the axial resistance of the drilled shaft. GZA can revisit this issue if the design shows there is a significant impact on the shaft length.

STA. 574+75 Cantilever Structure (Boring ID: GZ-6)

A drilled shaft foundation is recommended for this location, due to the limited space along the shoulder.

Design Profile – Boring GZ-6						
Stratum	**Top of Layer Elevation, feet**	**Thickness (ft)**	**Average N160**	**Weighted Average RQD**	**Secant Modulus @ 50% Strain, E (psi)**	**Unconfined Compressive Strength, UCS, (psi)**
Ground Surface	82.4	--	--	--	--	--
Fill	82.4	23.5	102	--	--	--
Glacial Till	58.9	24	45	--	--	--
Bedrock	NE	--	--	N/A	--	--
Groundwater	50.5	--	--	--	--	--

Note: Groundwater was approximated based on the water level measured in GZ-7 conducted directly across I-95.

Recommended Lateral Design Parameters for Drilled Shafts – Boring GZ-6						
Stratum	**Soil Model**	**Effective Unit Weight γ_e (pcf) Above GW / below GW**	**k (pci) Above GW/below GW**	**ϕ' (deg) / S_u (psf) / UCS (psi)**	**Equivalent Rock Modulus, E_m, ksi**	**E_{50}/krm**
Fill	Reese Sand	125	165	36	--	--
Glacial Till	Reese Sand	130/67.6	165/95	36	--	--

Recommended Axial Design Parameters for Drilled Shafts – Boring GZ-6			
Stratum	**Depth (feet)**	**Nominal Unit Side Resistance, q_s (ksf)**	**Nominal Unit Tip Resistance, q_p (ksf)**
Fill	0-8.0	0.5	N/A
Fill	8.0-15	1.5	36
Fill	15-23.5	2.75	36
Glacial Till	23.5-47.5	2.5	36

Note: Due to uncertainty in the mobilization of tip resistance in bedrock, we recommend ignoring the end bearing in calculating the axial resistance of the drilled shaft. GZA can revisit this issue if the design shows there is a significant impact on the shaft length.

STA. 575+25 Cantilever Structure (Boring ID: GZ-7)

A drilled shaft foundation is recommended for this location, due to the limited space along the shoulder.

Design Profile – Boring GZ-7						
Stratum	**Top of Layer Elevation, feet**	**Thickness (ft)**	**Average N160**	**Weighted Average RQD**	**Secant Modulus @ 50% Strain, E (psi)**	**Unconfined Compressive Strength, UCS, (psi)**
Ground Surface	81.6	--	--	--	--	--
Fill	81.6	25.2	140	--	--	--
Glacial Till	56.4	23.9	83	--		
Bedrock	32.5	--	--	N/A	1800	5000
Groundwater	50.5	--	--	--	--	--

Recommended Lateral Design Parameters for Drilled Shafts – Boring GZ-7						
Stratum	**Soil Model**	**Effective Unit Weight γ_e (pcf) Above GW / below GW**	**k (pci) Above GW/below GW**	**ϕ' (deg) / S_u (psf) / UCS (psi)**	**Equivalent Rock Modulus, E_m, ksi**	**E_{50}/krm**
Fill	Reese Sand	125	165	36	--	--
Glacial Till	Reese Sand	130/67.6	165/95	36	--	--
Bedrock	Weak Rock	107.6	--	2,000	1,215	0.00318

Recommended Axial Design Parameters for Drilled Shafts – Boring GZ-7			
Stratum	**Depth (feet)**	**Nominal Unit Side Resistance, q_s (ksf)**	**Nominal Unit Tip Resistance, q_p (ksf)**
Fill	0-8.0	0.5	N/A
Fill	8.0-15	1.5	36
Fill	15-25.2	2.75	36
Glacial Till	25.2-491	2.5	36
Bedrock	49.1	24	---

Note: Due to uncertainty in the mobilization of tip resistance in bedrock, we recommend ignoring the end bearing in calculating the axial resistance of the drilled shaft. GZA can revisit this issue if the design shows there is a significant impact on the shaft length.

102 Dennett Road, Kittery, Maine – CCTV Pole (Boring ID: GZ-11)

A drilled shaft foundation is recommended for this location, due to the relatively shallow thickness of overburden at this location.

Design Profile – Boring GZ-11						
Stratum	**Top of Layer Elevation, feet**	**Thickness (ft)**	**Average N160**	**Weighted Average RQD**	**Secant Modulus @ 50% Strain, E (psi)**	**Unconfined Compressive Strength, UCS, (psi)**
Ground Surface	56.2	--	--	--	--	--
Fill	56.2	2.6	32	--	--	--
Bedrock	53.6	--	--	45	1800	5000
Groundwater	54.2	--	--	--	--	--

Recommended Lateral Design Parameters for Drilled Shafts – Boring GZ-11						
Stratum	**Soil Model**	**Effective Unit Weight γ_e (pcf) Above GW / below GW**	**k (pci) Above GW/below GW**	**ϕ' (deg) / S_u (psf) / UCS (psi)**	**Equivalent Rock Modulus, E_m, ksi**	**E_{50}/krm**
Fill	Reese Sand	125/62.6	85/55	32	--	--
Bedrock	Weak Rock	107.6	--	2,000	1,215	0.00318

Recommended Axial Design Parameters for Drilled Shafts – Boring GZ-11			
Stratum	**Depth (feet)**	**Nominal Unit Side Resistance, q_s (ksf)**	**Nominal Unit Tip Resistance, q_p (ksf)**
Fill	0-2.6	0.5	N/A
Bedrock	2.6	24	---

Note: Due to uncertainty in the mobilization of tip resistance in bedrock, we recommend ignoring the end bearing in calculating the axial resistance of the drilled shaft. GZA can revisit this issue if the design shows there is a significant impact on the shaft length.

STA 589+25 Cantilever Structure (Boring ID: GZ-12)

A drilled shaft foundation is recommended for this location, due to the relatively shallow thickness of overburden at this location.

Design Profile – Boring GZ-12						
Stratum	**Top of Layer Elevation, feet**	**Thickness (ft)**	**Average N160**	**Weighted Average RQD**	**Secant Modulus @ 50% Strain, E (psi)**	**Unconfined Compressive Strength, UCS, (psi)**
Ground Surface	55.6	--	--	--	--	--
Fill	55.6	4.0	20	--	--	--
Glacial Till	51.6	5.0	151	--	--	--
Bedrock	46.6	--	--	15	1800	5000
Groundwater	45.6	--	--	--	--	--

Recommended Lateral Design Parameters for Drilled Shafts – Boring GZ-12						
Stratum	**Soil Model**	**Effective Unit Weight γ_e (pcf) Above GW / below GW**	**k (pci) Above GW/below GW**	**ϕ' (deg) / S_u (psf) / UCS (psi)**	**Equivalent Rock Modulus, E_m, ksi**	**E_{50}/krm**
Fill	Reese Sand	125	85	32	--	--
Glacial Till	Reese Sand	130	165	36	--	--
Bedrock	Weak Rock	107.6	--	2,000	1,215	0.00318

Recommended Axial Design Parameters for Drilled Shafts – Boring GZ-12			
Stratum	**Depth (feet)**	**Nominal Unit Side Resistance, q_s (ksf)**	**Nominal Unit Tip Resistance, q_p (ksf)**
Fill	0-4.0	0.5	N/A
Glacial Till	4.0-9.0	1.0	36
Bedrock	9.0	24	---

Note: Due to uncertainty in the mobilization of tip resistance in bedrock, we recommend ignoring the end bearing in calculating the axial resistance of the drilled shaft. GZA can revisit this issue if the design shows there is a significant impact on the shaft length.

STA. 617+50 CCTV Pole (Boring ID: GZ-15)

A drilled shaft foundation is recommended for this location, due to the relatively shallow thickness of overburden at this location.

Design Profile – Boring GZ-15						
Stratum	**Top of Layer Elevation, feet**	**Thickness (ft)**	**Average N160**	**Weighted Average RQD**	**Secant Modulus @ 50% Strain, E (psi)**	**Unconfined Compressive Strength, UCS, (psi)**
Ground Surface	31.3	--	--	--	--	--
Fill	31.3	5	47	--	--	--
Silty Clay	26.3	3.9	58	--		
Bedrock	22.4	--	--	12	1800	5000
Groundwater	28.8	--	--	--	--	--

Recommended Lateral Design Parameters for Drilled Shafts – Boring GZ-15						
Stratum	**Soil Model**	**Effective Unit Weight γ_e (pcf) Above GW / below GW**	**k (pci) Above GW/below GW**	**ϕ' (deg) / S_u (psf) / UCS (psi)**	**Equivalent Rock Modulus, E_m, ksi**	**E_{50}/krm**
Fill	Reese Sand	125/62.6	165/95	36	--	--
Silty Clay	Stiff Clay	55.6	--	3,500	--	0.005
Bedrock	Weak Rock	107.6	--	2,000	1,215	0.00318

Recommended Axial Design Parameters for Drilled Shafts – Boring GZ-15			
Soil Stratum	**Depth (feet)**	**Nominal Unit Side Resistance, q_s (ksf)**	**Nominal Unit Tip Resistance, q_p (ksf)**
Fill	0-4.0	0.5	N/A
Silty Clay	4.0-9.0	1.8	10.0
Bedrock	9.0	24	--

Note: Due to uncertainty in the mobilization of tip resistance in bedrock, we recommend ignoring the end bearing in calculating the axial resistance of the drilled shaft. The nominal tip resistance in Silty Clay has been reduced to account for imperfect bottom cleaning. GZA can revisit this issue if the design shows there is a significant impact on the shaft length.

STA. 676+75 CCTV Pole (Boring ID: GZ-16)

A drilled shaft foundation is recommended for this location, due to the relatively shallow thickness of overburden at this location.

Design Profile – Boring GZ-16						
Stratum	**Top of Layer Elevation, feet**	**Thickness (ft)**	**Average N160**	**Weighted Average RQD**	**Secant Modulus @ 50% Strain, E (psi)**	**Unconfined Compressive Strength, UCS, (psi)**
Ground Surface	28.3	--	--	--	--	--
Glacial Till	28.3	5.6	52	--	--	--
Bedrock	22.7	--	--	37	1800	5000
Groundwater	22.7	--	--	--	--	--

Recommended Lateral Design Parameters for Drilled Shafts – Boring GZ-16						
Stratum	**Soil Model**	**Effective Unit Weight γ_e (pcf) Above GW / below GW**	**k (pci) Above GW/below GW**	**ϕ' (deg) / S_u (psf) / UCS (psi)**	**Equivalent Rock Modulus, E_m, ksi**	**E_{50}/krm**
Glacial Till	Reese Sand	130	165	36	--	--
Bedrock	Weak Rock	107.6	--	2,000	1,215	0.00318

Recommended Axial Design Parameters for Drilled Shafts – Boring GZ-16			
Stratum	**Depth (feet)**	**Nominal Unit Side Resistance, q_s (ksf)**	**Nominal Unit Tip Resistance, q_p (ksf)**
Glacial Till	0-5.6	1.0	N/A
Bedrock	5.6	24	---

Note: Due to uncertainty in the mobilization of tip resistance in bedrock, we recommend ignoring the end bearing in calculating the axial resistance of the drilled shaft. GZA can revisit this issue if the design shows there is a significant impact on the shaft length.

STA. 708+50 CCTV Pole (Boring ID: GZ-17)

A drilled shaft foundation is recommended for this location, due to the relatively shallow thickness of overburden at this location and the limited space along the shoulder.

Design Profile – Boring GZ-17						
Stratum	**Top of Layer Elevation, feet**	**Thickness (ft)**	**Average N160**	**Weighted Average RQD**	**Secant Modulus @ 50% Strain, E (psi)**	**Unconfined Compressive Strength, UCS, (psi)**
Ground Surface	43.9	--	--	--	--	--
Fill	43.9	4.0	43	--		
Sand	39.9	21.2	60	--	--	--
Bedrock	18.7	--	--	63	1800	5000
Groundwater	33.9	--	--	--	--	--

Recommended Lateral Design Parameters for Drilled Shafts – Boring GZ-17						
Stratum	**Soil Model**	**Effective Unit Weight γ_e (pcf) Above GW / below GW**	**k (pci) Above GW/below GW**	**ϕ' (deg) / S_u (psf) / UCS (psi)**	**Equivalent Rock Modulus, E_m, ksi**	**E_{50}/krm**
Fill	Reese Sand	125	85	36	--	--
Sand	Reese Sand	130/67.6	165/95	36	--	--
Bedrock	Weak Rock	107.6	--	2,000	1,215	0.00318

Recommended Axial Design Parameters for Drilled Shafts – Boring GZ-17			
Soil Stratum	**Depth (feet)**	**Nominal Unit Side Resistance, q_s (ksf)**	**Nominal Unit Tip Resistance, q_p (ksf)**
Fill	0-5.6	0.5	N/A
Sand	5.6-8.0	1.0	N/A
Sand	8.0-18.7	1.8	36
Bedrock	18.7	24	--

Note: Due to uncertainty in the mobilization of tip resistance in bedrock, we recommend ignoring the end bearing in calculating the axial resistance of the drilled shaft. GZA can revisit this issue if the design shows there is a significant impact on the shaft length.

FROST DEPTH

Based on the MaineDOT BDG, Section 5.2.1, the Freezing Index for the site is 1100, and with low-moisture content (<10 percent) soils, the estimated depth of frost penetration is approximately 5.0 feet. Consequently, the upper 5 feet of the shaft should typically be ignored when calculating the axial capacity, unless the surrounding materials can be shown to be drained and non-frost-susceptible.

Granular fill soils encountered near the surface at the structure locations were typically classified as AASHTO A-1-b and A-4 and A-2-4 with MaineDOT Frost Classification from 0 to III, indicating they are considered to exhibit low to moderate frost susceptibility. GZA can provide a location-by-location assessment of drainage and frost-susceptibility in the upper 5 feet if the designer opts to utilize this layer in estimating axial resistance.

REVIEW OF FOUNDATION ANALYSES

The generalized design profiles and geotechnical parameters provided herein are intended for foundation design by others. We recommend that GZA be provided the opportunity to review the results of the soil/rock-structure interaction analysis results to assess if the modelled behavior is consistent with the geotechnical design intent.

GZA anticipates that design refinement may be required as the designs develop. GZA can support that effort by providing refined design parameters, which may take into account other factors based on location-specific soil analyses or design methodology used by the structural designer.

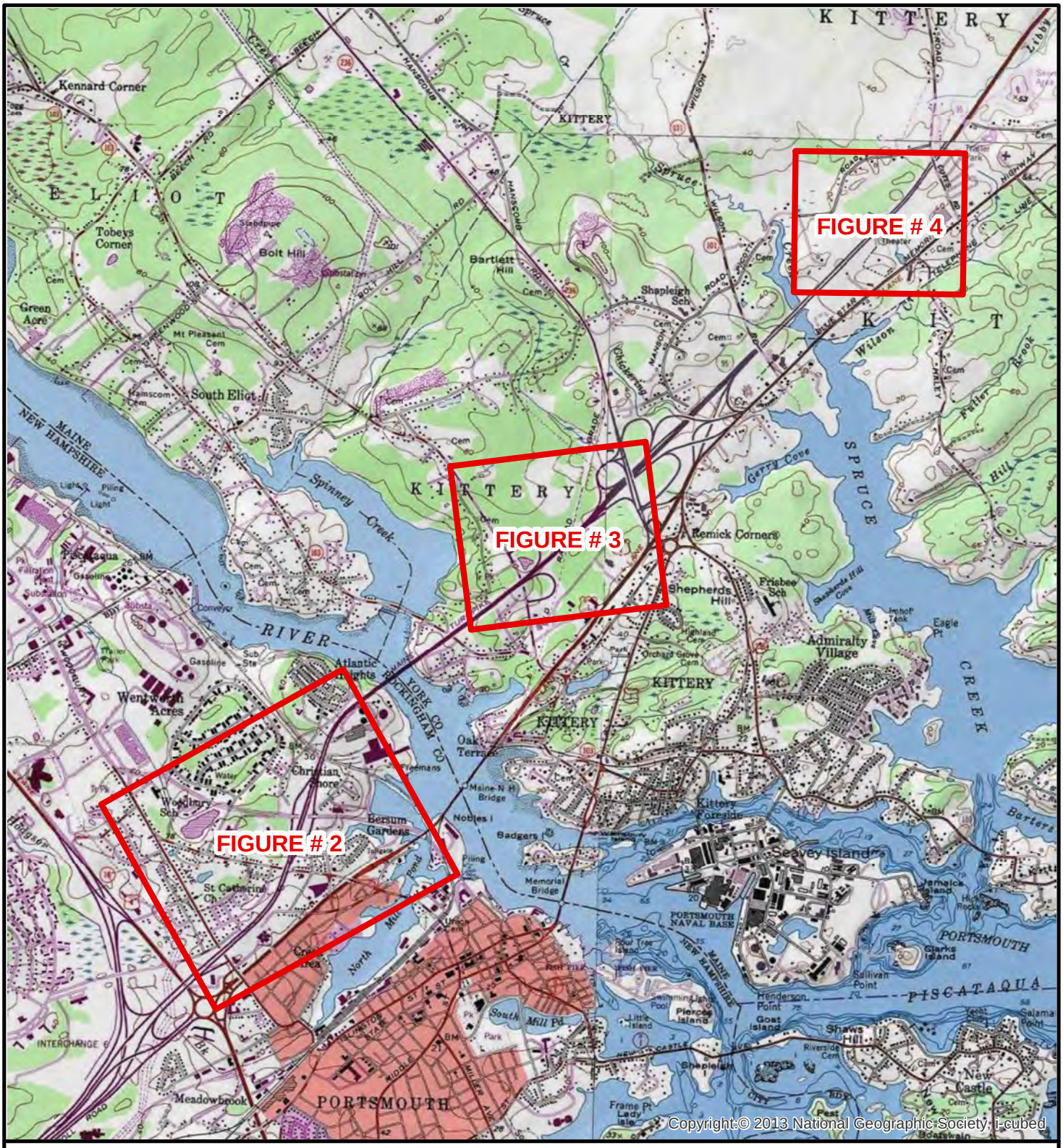
CLOSURE

We trust that this information meets current project needs. Please feel free to call Nicholas Williams at (207) 358-5129 if you have any questions about this memorandum or if we can be of further assistance.

NVW/CLS/ARB:erc
\\GZAPort1\Jobs\09 Jobs\0026000s\09.0026090.00 - SPS - I-95 Signage Kittery-Portsmouth\Report\SupplementDesignMemo\FINAL\FINAL 26090 I-95 Phase II Signage Memo 06302021.docx

Attachments: Figure 1 – Locus Plan
Figures 2-4 – Boring Location Plans
Appendix A – Limitations
Appendix B – Boring Logs
Appendix C – Laboratory Test Results

FIGURES



USGS QUADRANGLE LOCATION

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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 1,500 3,000 6,000 9,000

SCALE IN FEET

Data Supplied by : esri USGS science for a changing world

PROJ. MGR.: NVW
DESIGNED BY: ADM
REVIEWED BY: CLS
OPERATOR: ADM

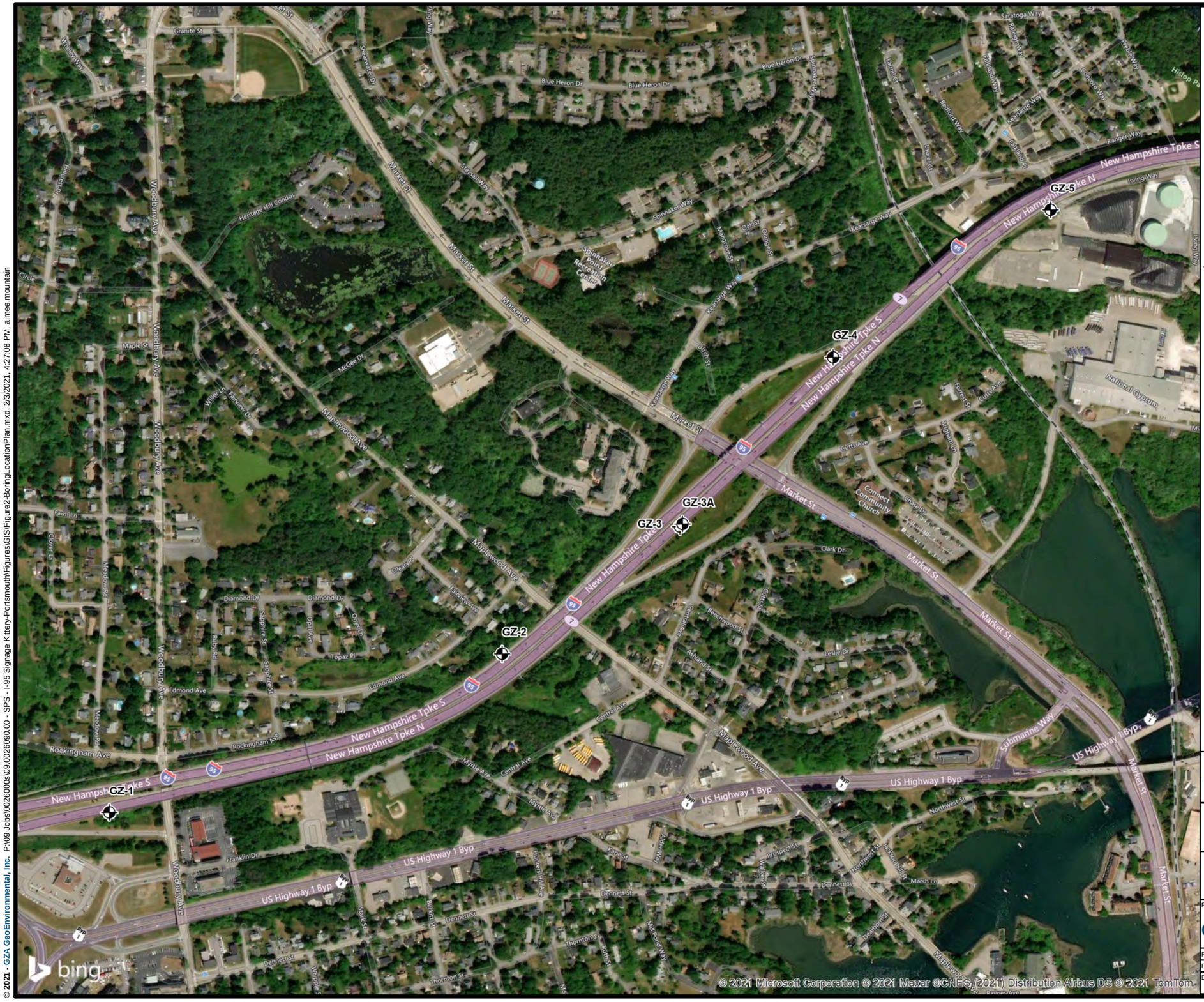
DATE: 02-03-2021

LOCUS PLAN

JOB NO. 09.0026090.00

I-95 FOUNDATION EVALUATION
PORTSMOUTH, NH AND KITTERY, ME

FIGURE NO. 1



LEGEND

GZ-17 — BORING LOCATION AND DESIGNATION

NOTES:

1) BORINGS WERE DRILLED AT PROPOSED LOCATIONS SURVEYED BY SPS NEW ENGLAND, OR MEASURED WITH TAPE TIES FROM SURVEYED LOCATIONS.
2) THE BORINGS WERE PERFORMED BY NEW ENGLAND BORING CONTRACTORS (NEBC) IN DECEMBER 2020 AND JANUARY 2021, AND OBSERVED AND LOGGED BY GZA PERSONNEL.

N W E S

0 250 500 1,000
SCALE IN FEET

I-95 FOUNDATION EVALUATION FOR PROPOSED SIGNAGE
PORTSMOUTH, NEW HAMPSHIRE AND KITTERY, MAINE

BORING LOCATION PLAN
GZ-1 TO GZ-5

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: SPS New England, Inc.	
PROJ MGR: NVW	REVIEWED BY: CLS	CHECKED BY: ARB	FIGURE 2
DESIGNED BY: NVW	DRAWN BY: ADM	SCALE: 1 " = 500 FEET	
DATE: 02/03/2021	PROJECT NO. 09.0026090.00	REVISION NO.	

LEGEND

GZ-14 — PRIORITY BORING LOCATION AND DESIGNATION

GZ-17 — BORING LOCATION AND DESIGNATION

NOTES:

1) BORINGS WERE DRILLED AT PROPOSED LOCATIONS SURVEYED BY SPS NEW ENGLAND, OR MEASURED WITH TAPE TIES FROM SURVEYED LOCATIONS.
2) THE BORINGS WERE PERFORMED BY NEW ENGLAND BORING CONTRACTORS (NEBC) IN DECEMBER 2020 AND JANUARY 2021, AND OBSERVED AND LOGGED BY GZA PERSONNEL.

N W E S

0 175 350 700
SCALE IN FEET

I-95 FOUNDATION EVALUATION FOR PROPOSED SIGNAGE
PORTSMOUTH, NEW HAMPSHIRE AND KITTERY, MAINE

BORING LOCATION PLAN
GZ-6 TO GZ-15

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: SPS New England, Inc.	
PROJ MGR: NVW	REVIEWED BY: CLS	CHECKED BY: ARB	FIGURE 3
DESIGNED BY: NVW	DRAWN BY: ADM	SCALE: 1 " = 350 FEET	
DATE: 02/03/2021	PROJECT NO. 09.0026090.00	REVISION NO.	

LEGEND

GZ-17 ⊕ BORING LOCATION AND DESIGNATION

NOTES:

1) BORINGS WERE DRILLED AT PROPOSED LOCATIONS SURVEYED BY SPS NEW ENGLAND, OR MEASURED WITH TAPE TIES FROM SURVEYED LOCATIONS.
2) THE BORINGS WERE PERFORMED BY NEW ENGLAND BORING CONTRACTORS (NEBC) IN DECEMBER 2020 AND JANUARY 2021, AND OBSERVED AND LOGGED BY GZA PERSONNEL.

N
W E
S

0 150 300 600
SCALE IN FEET

I-95 FOUNDATION EVALUATION FOR PROPOSED SIGNAGE
PORTSMOUTH, NEW HAMPSHIRE AND KITTERY, MAINE

BORING LOCATION PLAN
GZ-16 AND GZ-17

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: SPS New England, Inc.	
PROJ MGR: NVW	REVIEWED BY: CLS	CHECKED BY: ARB	FIGURE 4
DESIGNED BY: NVW	DRAWN BY: ADM	SCALE: 1 " = 300 FEET	
DATE: 02/03/2021	PROJECT NO. 09.0026090.00	REVISION NO.	

APPENDIX A – LIMITATIONS

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 agreement, 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.

Subsurface Conditions

4. 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.

5. 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.

6. Water level readings have been made in test holes (as described in the 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.

7. 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.

Compliance with Codes and Regulations

8. 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.

APPENDIX B – BORING LOGS

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **NHDOT - I-95 SIGN FOUNDATIONS 16189B** BRIDGE NO. N/A
DESCRIPTION 09.0026090.00

BORING NO. **GZ-1**
SHEET NO. 1 OF 2
STA. _____ OFF. _____
BASELINE _____
ELEVATION (ft) 61.1
START/END 1/6/21 / 1/6/21
DRILLER M. D'Ambrosio
INSPECTOR E. Tome
CLASSIFIER E. Tome
EAST/NORTH (ft) -- / --

GROUNDWATER					
DATE	TIME	DEPTH (ft)	ELEV. (ft)	BOTTOM OF CASING	BOTTOM OF HOLE
	NOT ENCOUNTERED				

EQUIPMENT	SAMPLER	CASING	CORE
TYPE:	S	HW/NW	NX
SIZE I.D. (in):	1.375	4/3	1.875
HAMMER WT. (lb):	140	DRILL RIG	
HAMMER FALL (in):	30	Truck - GT8	
HAMMER TYPE:	Automatic		

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
0	0.4	60.7					- ASPHALT -	
			17 24 24 21	S-1	1.6 [80]	1.0 – 3.0	Dense, brown/tan, gravelly COARSE - FINE SAND, trace silt. Dry	
			19 20 19 17	S-2	1.6 [80]	3.0 – 5.0	Dense, brown/tan, COARSE - FINE SAND, some gravel, trace silt. Dry	
5			18 17 17 17	S-3	1.6 [80]	5.0 – 7.0	Dense, brown/tan, COARSE - FINE SAND, some gravel, trace silt. Dry	
			24 19 19 17	S-4	1.3 [65]	7.0 – 9.0	Dense, brown/tan, COARSE - FINE SAND, some gravel, trace silt. Dry	
			19 14 13 10	S-5	1.8 [90]	9.0 – 11.0	- FILL - Medium dense, brown/tan, COARSE - FINE SAND, some gravel, trace silt. Dry	
10			13 17 16 23	S-6	1.4 [70]	11.0 – 13.0	Dense, brown/tan, COARSE - FINE SAND, some gravel, trace silt. Dry	
			26 25 28 19	S-7	1.3 [65]	13.0 – 15.0	Very dense, brown/tan, COARSE - FINE SAND, some gravel, trace silt. Dry	
			18 16 14 19	S-8	1.0 [50]	15.0 – 17.0	Dense, brown/tan, COARSE - FINE SAND, some gravel, trace silt. Moist	
15								
	18.5	42.6						
20			12 8 15 17	S-9	0.8 [42]	20.0 – 22.0	Medium dense, brown/gray, COARSE - FINE SAND, some gravel, some silt. Wet	
25			19 25 23 23	S-10	1.3 [65]	25.0 – 27.0	- GLACIAL TILL - Dense, brown/gray, COARSE - FINE SAND, some gravel, some silt. Wet	

Sampler	Identification
S	Standard Split Spoon
SL	Large Spoon (O.D.= 3 in)
T	Thin Wall Tube
U	Undisturbed Piston
O	Open End Rod
A	Auger Flight
C	Core Barrel
NR	Not Recorded

COHESIVE SOILS	
Blows/foot (N)	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

NON-COHESIVE SOILS	
Blows/foot (N)	Apparent Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

WOR - Weight of Rod
WOH - Weight of Hammer

Soil Descriptions	Proportion
Capitalized Soil Name	Major Component
Lower Case Adjective	35% - 50%
Some	20% - 35%
Little	10% - 20%
Trace	1% - 10%

ENGLISH

TB-12 P:\GINT PROJECT DATABASES\09.0026090.00 NHDOT FORMAT I-95 KITTERY SIGNAGE LOGS.GPJ 6/29/2021 10:34:26 AM TB-12

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **NHDOT - I-95 SIGN FOUNDATIONS 16189B** BRIDGE NO. N/A
DESCRIPTION 09.0026090.00

BORING NO. **GZ-1**
SHEET NO. 2 OF 2
STA. _____ OFF. _____
BASELINE _____
ELEVATION (ft) 61.1

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
30			24					
			31	S-11	1.3 [100]	30.0 – 31.3	Very dense, olive-brown, silty MEDIUM - FINE SAND, some gravel. Wet Splitspoon refusal at 31.5' bgs indicates probable bedrock. Increase in roller cone resistance during advancement at 31.5' bgs.	
	31.5	29.6	70/3"/0.3				- BEDROCK -	
35				C1	3.3 [100]	33.5 – 36.8	Hard, slightly weathered, aphanitic, gray, METAWACKE. Joints are very close to close, low angle, undulating, rough, discolored, partially open. One secondary joint is high angle, undulating, rough, discolored, partially open. RQD: 1.3 / 3.3 = 38% Rock Core Times (min:sec): 33.5-34.5' (4:05), 34.5-35.5' (2:36), 35.5-36.5' (2:57), 36.5-36.8' (1:50)	
				C2	2.0 [100]	36.8 – 38.8	Hard, slightly weathered, aphanitic, gray, METAWACKE. Joints are extremely close to close, low angle, undulating, rough, partially open to open. RQD: 0 / 2.0 = 0% Rock Core Times (min:sec): 36.8-37.8' (2:53), 37.8-38.8' (4:16)	
40							Bottom of Exploration @ 38.8 ft (El. 22.3)	
45								
50								
55								
60								
65								

TB-12 P:\GINT PROJECT DATABASES\09.0026090.00 NHDOT FORMAT I-95 KITTERY SIGNAGE LOGS.GPJ 6/29/2021 10:34:26 AM TB-12

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **NHDOT - I-95 SIGN FOUNDATIONS 16189B** BRIDGE NO. N/A
DESCRIPTION 09.0026090.00

BORING NO. **GZ-2**
SHEET NO. 1 OF 2
STA. _____ OFF. _____
BASELINE _____
ELEVATION (ft) 59.6
START/END 12/23/20 / 12/23/20
DRILLER M. D'Ambrosio
INSPECTOR E. Tome
CLASSIFIER E. Tome
EAST/NORTH (ft) -- / --

GROUNDWATER					
DATE	TIME	DEPTH (ft)	ELEV. (ft)	BOTTOM OF CASING	BOTTOM OF HOLE
	NOT ENCOUNTERED				

EQUIPMENT	SAMPLER	CASING	CORE
TYPE:	S	HW/NW	
SIZE I.D. (in):	1.375	4/3	
HAMMER WT. (lb):	140	DRILL RIG	
HAMMER FALL (in):	30	Truck - GT8	
HAMMER TYPE:	Automatic		

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
0	0.4	59.2					- ASPHALT -	
			14 16 16 19	S-1	1.2 [60]	1.0 3.0	Dense, brown, COARSE - FINE SAND, little gravel, little silt. Dry	
			19 25 31 17	S-2	1.3 [65]	3.0 5.0	Very dense, brown, COARSE - FINE SAND, little gravel, trace silt. Dry	
5			17 16 23/0.4 23	S-3	0.9 [64]	5.0 6.4	Dense, brown, COARSE - FINE SAND, little gravel, little silt. Dry Increase in resistance during roller cone advancement from 6.4' to 9.0' indicates possible cobbles/boulder.	
			13 15 18 16	S-4	1.2 [60]	9.0 11.0	- FILL - Dense, brown, COARSE - FINE SAND, little gravel, little silt. Dry	
10			55 35 28 18	S-5	1.2 [60]	11.0 13.0	Dense, brown, COARSE - FINE SAND, little gravel, little silt. Dry	
			19 19 19 31	S-6	1.2 [60]	13.0 15.0	Very dense, brown, COARSE - FINE SAND, little gravel, little silt. Moist	
15			20 14 12 11	S-7	1.1 [55]	15.0 17.0	Dense, brown, COARSE - FINE SAND, little gravel, little silt. Moist	
	18.5	41.1						
20			13 15 18 16	S-8	1.6 [80]	20.0 22.0	Dense, gray, silty MEDIUM - FINE SAND, trace gravel, some sand. Wet	
25			55 35 28 18				Top 6": Dense, gray, COARSE - FINE SAND, some silt, some gravel. Wet Bottom 3": Very stiff, gray, CLAYEY SILT, some gravel, some sand. Wet - GLACIAL TILL -	

Sampler	Identification
S	Standard Split Spoon
SL	Large Spoon (O.D.= 3 in)
T	Thin Wall Tube
U	Undisturbed Piston
O	Open End Rod
A	Auger Flight
C	Core Barrel
NR	Not Recorded

COHESIVE SOILS	
Blows/foot (N)	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

NON-COHESIVE SOILS	
Blows/foot (N)	Apparent Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

WOR - Weight of Rod
WOH - Weight of Hammer

Soil Descriptions	Proportion
Capitalized Soil Name	Major Component
Lower Case Adjective	35% - 50%
Some	20% - 35%
Little	10% - 20%
Trace	1% - 10%

ENGLISH

TB-12 P:\GINT PROJECT DATABASES\09.0026090.00 NHDOT FORMAT I-95 KITTERY SIGNAGE LOGS.GPJ 6/29/2021 10:34:29 AM TB-12

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **NHDOT - I-95 SIGN FOUNDATIONS 16189B** BRIDGE NO. N/A
DESCRIPTION 09.0026090.00

BORING NO. **GZ-2**
SHEET NO. 2 OF 2
STA. _____ OFF. _____
BASELINE _____
ELEVATION (ft) 59.6

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
30			19 19 19 31	S-10	0.9 [46]	30.0 32.0	Dense, gray, COARSE - FINE SAND, some gravel, some silt. Wet - GLACIAL TILL -	
35			20 14 12 11	S-11	0.7 [35]	35.0 37.0	Very stiff, gray, CLAYEY SILT, some gravel, some sand. Wet	
	38.0	21.6					- BEDROCK - Increase in resistance during roller cone advancement at 38.0' bgs indicates probable bedrock; rock chips observed in wash return; advanced roller cone to 39.5' bgs and terminated boring. Bottom of Exploration @ 39.5 ft (El. 20.1)	
40								
45								
50								
55								
60								
65								

TB-12 P:\GINT PROJECT DATABASES\09.0026090.00 NHDOT FORMAT I-95 KITTERY SIGNAGE LOGS.GPJ 6/29/2021 10:34:29 AM TB-12

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **NHDOT - I-95 SIGN FOUNDATIONS 16189B** BRIDGE NO. N/A
DESCRIPTION 09.0026090.00

BORING NO. **GZ-3**
SHEET NO. 1 OF 1
STA. _____ OFF. _____
BASELINE _____
ELEVATION (ft) 55.7
START/END 1/7/21 / 1/7/21
DRILLER M. D'Ambrosio
INSPECTOR E. Tome
CLASSIFIER E. Tome
EAST/NORTH (ft) -- / --

GROUNDWATER					
DATE	TIME	DEPTH (ft)	ELEV. (ft)	BOTTOM OF CASING	BOTTOM OF HOLE
	NOT ENCOUNTERED				

EQUIPMENT	SAMPLER	CASING	CORE
TYPE:	S	HW/NW	
SIZE I.D. (in):	1.375	4/3	
HAMMER WT. (lb):	140	DRILL RIG	
HAMMER FALL (in):	30	Truck - GT8	
HAMMER TYPE:	Automatic		

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
0								
	1.0	54.7					- ASPHALT -	
			25 26 21 20	S-1	1.4 [70]	1.0 – 3.0	Dense, Brown/Tan, COARSE - FINE SAND, trace gravel, trace silt. Dry	
			16 20 19 21	S-2	1.8 [90]	3.0 – 5.0	Top 15": Dense, brown/tan, MEDIUM - FINE SAND, trace gravel, trace silt. Dry Bottom 7": Dense, gray, COARSE - FINE SAND, some gravel, some silt. Dry	
5			8 6 6 7	S-3	1.3 [65]	5.0 – 7.0	Stiff, gray, silty CLAY, little coarse - fine sand, little gravel. Wet	
			15 21 22 20	S-4	1.2 [60]	7.0 – 9.0	Dense, gray/brown, silty MEDIUM - FINE SAND, little gravel. Dry	
			22 27 45 92	S-5	1.2 [60]	9.0 – 11.0	Very dense, gray/brown, silty MEDIUM - FINE SAND, little gravel, with wood fragments. Dry	
10			20 8 8 6	S-6	0.3 [15]	11.0 – 13.0	- FILL - Medium dense, gray, GRAVEL, trace sand, trace silt. Wet	
			10 6 8 18	S-7	0.3 [13]	13.0 – 15.0	Medium dense, gray, GRAVEL, trace sand, trace silt. Wet	
15			10 6 8 18	S-8	0.5 [25]	15.0 – 17.0	Medium dense, gray, COARSE - FINE SAND, some gravel, trace silt. Wet	
20			9 1 1 1	S-9	0.5 [25]	20.0 – 22.0	Very loose, gray, COARSE - FINE SAND, some gravel, some silt. Wet	
	22.0	33.7	9 10 10 7	S-10	1.0 [50]	22.0 – 24.0	- GLACIAL TILL - Medium dense, olive-brown, silty MEDIUM - FINE SAND, trace gravel. Wet	
25							Bottom of Exploration @ 24.0 ft (El. 31.7)	

Sampler	Identification
S	Standard Split Spoon
SL	Large Spoon (O.D.= 3 in)
T	Thin Wall Tube
U	Undisturbed Piston
O	Open End Rod
A	Auger Flight
C	Core Barrel
NR	Not Recorded

COHESIVE SOILS	
Blows/foot (N)	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

NON-COHESIVE SOILS	
Blows/foot (N)	Apparent Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

WOR - Weight of Rod
WOH - Weight of Hammer

Soil Descriptions	Proportion
Capitalized Soil Name	Major Component
Lower Case Adjective	35% - 50%
Some	20% - 35%
Little	10% - 20%
Trace	1% - 10%

ENGLISH

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TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **NHDOT - I-95 SIGN FOUNDATIONS 16189B** BRIDGE NO. N/A
DESCRIPTION 09.0026090.00

BORING NO. GZ-3A
SHEET NO. 1 OF 2
STA. _____ OFF. _____
BASELINE _____
ELEVATION (ft) 55.7
START/END 1/11/21 / 1/11/21
DRILLER M. D'Ambrosio
INSPECTOR E. Tome
CLASSIFIER E. Tome
EAST/NORTH (ft) -- / --

GROUNDWATER					
DATE	TIME	DEPTH (ft)	ELEV. (ft)	BOTTOM OF CASING	BOTTOM OF HOLE
1/11/21	1530	20.0	35.7		

EQUIPMENT	SAMPLER	CASING	CORE
TYPE:	S	HW/NW	
SIZE I.D. (in):	1.375	4/3	
HAMMER WT. (lb):	140	DRILL RIG	
HAMMER FALL (in):	30	Truck - GT8	
HAMMER TYPE:	Automatic		

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
0							Advanced casing and roller cone to 10.0' bgs and set up to sample.	
5								
10	10.0	45.7	44 120/6"	S-1	1.0 [100]	10.0 11.0	Very dense, brown/gray, COARSE - FINE SAND, some gravel, some silt, with brick fragments. Wet	
15			7 8 9 5	S-2	1.0 [50]	15.0 17.0	Medium dense, gray, GRAVEL, some coarse - fine sand, little silt. Wet Increase in resistance during roller cone advancement at 18.5' indicates probable boulder. Set up to core. - FILL -	
20				C1	0.8 [55]	18.5 20.0	Hard, slightly weathered, aphanitic, gray, METAWACKE boulder.	
				C2	0.3 [8]	20.0 24.0	Hard, slightly weathered, aphanitic, gray, METAWACKE boulder.	
	24.0	31.7	5 4 5 16	S-3	1.0 [50]	24.0 26.0	Medium dense, brown, COARSE - FINE SAND, some silt, some gravel. Wet - GLACIAL TILL -	
25								

Sampler	Identification
S	Standard Split Spoon
SL	Large Spoon (O.D.= 3 in)
T	Thin Wall Tube
U	Undisturbed Piston
O	Open End Rod
A	Auger Flight
C	Core Barrel
NR	Not Recorded

COHESIVE SOILS	
Blows/foot (N)	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

NON-COHESIVE SOILS	
Blows/foot (N)	Apparent Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

WOR - Weight of Rod
WOH - Weight of Hammer

Soil Descriptions	Proportion
Capitalized Soil Name	Major Component
Lower Case Adjective	35% - 50%
Some	20% - 35%
Little	10% - 20%
Trace	1% - 10%

ENGLISH

TB-12 P:\GINT PROJECT DATABASES\09.0026090.00 NHDOT FORMAT I-95 KITTERY SIGNAGE LOGS.GPJ 6/29/2021 10:34:31 AM TB-12

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **NHDOT - I-95 SIGN FOUNDATIONS 16189B** BRIDGE NO. N/A
DESCRIPTION 09.0026090.00

BORING NO. **GZ-3A**
SHEET NO. 2 OF 2
STA. _____ OFF. _____
BASELINE _____
ELEVATION (ft) 55.7

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
30			10 9 15 18	S-4	1.3 [65]	30.0 32.0	Medium dense, brown, silty COARSE - FINE SAND, some silt, some gravel. Wet Increase in roller cone resistance and observed drill chatter during advancement at 33.5' indicate probable weathered rock.	
35			65 37 38 27	S-5	1.3 [65]	35.0 37.0	Increase in roller cone resistance and observed drill chatter during advancement at 33.5'. Very dense, olive-brown/gray, GRAVEL, trace silt. Wet	
40			50/0"/0				S-6, 40' - 40', no recovery. - PROBABLE BEDROCK - Splitspoon refusal at 40.0'; indicates probable bedrock. Bottom of Exploration @ 40.0 ft (El. 15.7)	
45								
50								
55								
60								
65								

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TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **NHDOT - I-95 SIGN FOUNDATIONS 16189B** BRIDGE NO. N/A
DESCRIPTION 09.0026090.00

BORING NO. GZ-4

SHEET NO. 1 OF 1
STA. _____ OFF. _____
BASELINE _____
ELEVATION (ft) 64.0
START/END 1/4/21 / 1/4/21
DRILLER M. D'Ambrosio
INSPECTOR E. Tome
CLASSIFIER E. Tome
EAST/NORTH (ft) -- / --

GROUNDWATER					
DATE	TIME	DEPTH (ft)	ELEV. (ft)	BOTTOM OF CASING	BOTTOM OF HOLE
1/4/21	1300	6.5	57.5		

EQUIPMENT	SAMPLER	CASING	CORE
TYPE:	S	HW/NW	
SIZE I.D. (in):	1.375	4/3	
HAMMER WT. (lb):	140	DRILL RIG	
HAMMER FALL (in):	30	Truck - GT8	
HAMMER TYPE:	Automatic		

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
0								
	0.4	63.6	14 27 20 19	S-1	1.3 [50]	0.4 3.0	- ASPHALT - - FILL - Dense, brown, COARSE - FINE SAND, trace gravel, trace silt. Dry Top 10": Medium dense, brown, COARSE - FINE SAND, trace gravel, trace silt. Dry	
	3.8	60.2	14 15 48 26	S-2	1.4 [70]	3.0 5.0	- GLACIAL TILL - Bottom 7": Very dense, brown, GRAVEL, some coarse - fine sand, little silt. Moist	
5			32 22 19 12	S-3	1.5 [75]	5.0 7.0	Dense, gray, COARSE - FINE SAND, little gravel, little silt. Wet	
			17 11 14 12	S-4	0.6 [30]	7.0 9.0	Medium dense, brown, sandy GRAVEL, little silt. Wet	
			46 78 50/1"	S-5	0.8 [36]	9.0 11.1	Very dense, gray, silty COARSE - FINE SAND, with silt lenses. Wet - Top of Probable Bedrock - Splitspoon refusal at 10.1' indicates probable bedrock. Advanced roller cone to 12.0'.	
10	10.1	53.9	50/1"				Very dense, gray, GRAVEL. Wet Splitspoon refusal at 12.1'. Advanced roller cone to 14.0' and set up to core.	
				C1	3.0 [86]	14.0 17.5	C1: Hard, slightly weathered, aphanitic, gray, METAWACKE. Joints are close, low angle, undulating, rough, discolored, open. Rock is fractured into gravel pieces from 14.0'-14.7' and 17.3'-17.5'. RQD: 1.0 / 3.5 = 27% Rock Core Times (min:sec): 14.0-15.0' (1:15), 15.0-16.0' (1:29), 16.0-17.0' (2:03), 17.0-17.5' (1:10)	
15				C2	0.3 [30]	17.5 18.5	C2: Hard, slightly weathered, aphanitic, gray, METAWACKE. Recovery indicates rock is probably highly fractured, recovered core has one joint described as low angle, undulating, rough, discolored, open. RQD: 0 / 1.0 = 0% Rock Core Times (min:sec): 17.5-18.5' (4:00)	
				C3	2.0 [100]	18.5 20.5	- METAWACKE - C3: Hard, slightly weathered, aphanitic, gray, METAWACKE. Primary joints are very close to close, horizontal to low angle, undulating, rough, discolored, tight to open. Secondary joints are close to moderately spaced, moderately dipping, planar, rough, fresh to discolored, partially open. RQD: 0.5 / 2.0 = 25% Rock Core Times (min:sec): 18.5-19.5' (1:30), 19.5-20.5' (1:40)	
20				C4	5.0 [100]	20.5 25.5	C4: Hard, slightly weathered, aphanitic, gray, METAWACKE. Primary joints are very close to close, horizontal to low angle, undulating, rough, discolored, tight to open. Secondary joints are closely spaced, moderately dipping to high angle, planar, rough, discolored, partially open. RQD: 3.0 / 5 = 60% Rock Core Times (min:sec): 20.5-21.5' (1:47), 21.5-22.5' (2:49), 22.5-23.5' (2:37), 23.5-24.5' (3:04), 24.5-25.5' (5:00)	
25							Bottom of Exploration @ 25.5 ft (El. 38.5)	

Sampler	Identification
S	Standard Split Spoon
SL	Large Spoon (O.D.= 3 in)
T	Thin Wall Tube
U	Undisturbed Piston
O	Open End Rod
A	Auger Flight
C	Core Barrel
NR	Not Recorded

COHESIVE SOILS	
Blows/foot (N)	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

NON-COHESIVE SOILS	
Blows/foot (N)	Apparent Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

WOR - Weight of Rod
WOH - Weight of Hammer

Soil Descriptions	Proportion
Capitalized Soil Name	Major Component
Lower Case Adjective	35% - 50%
Some	20% - 35%
Little	10% - 20%
Trace	1% - 10%

ENGLISH

TB-12 P:\GINT PROJECT DATABASES\09.0026090.00 NHDOT FORMAT I-95 KITTERY SIGNAGE LOGS.GPJ 6/29/2021 10:34:33 AM TB-12

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT NAME **NHDOT - I-95 SIGN FOUNDATIONS 16189B** BRIDGE NO. N/A
DESCRIPTION 09.0026090.00

BORING NO. GZ-5

SHEET NO. 1 OF 1
STA. _____ OFF. _____
BASELINE _____
ELEVATION (ft) 68.0
START/END 12/18/20 / 12/18/20
DRILLER M. Soucy
INSPECTOR E. Tome
CLASSIFIER E. Tome
EAST/NORTH (ft) -- / --

GROUNDWATER					
DATE	TIME	DEPTH (ft)	ELEV. (ft)	BOTTOM OF CASING	BOTTOM OF HOLE
12/18/20	1200	5.0	63.0		

EQUIPMENT	SAMPLER	CASING	CORE
TYPE:	S	HW/NW	
SIZE I.D. (in):	1.375	4/3	
HAMMER WT. (lb):	140	DRILL RIG	
HAMMER FALL (in):	30	Truck - GT8	
HAMMER TYPE:	Automatic		

DEPTH (ft)	STRATUM CHANGE (ft) DEPTH	STRATUM CHANGE (ft) ELEVATION	BLOWS PER 0.5 ft	SAMPLE NUMBER	SAMPLER RECOVERY (ft) [%]	DEPTH RANGE (ft)	FIELD CLASSIFICATION AND REMARKS	STRATUM SYMBOL
0	0.3	67.7	7 15 14 15	S-1	1.3 [65]	0.0 2.0	- TOPSOIL - Top 3": Brown, silty COARSE - FINE SAND, with frequent roots. Moist Bottom 12": Medium dense, brown, COARSE - FINE SAND, some gravel, little silt. Dry	
	2.0	66.0	10 12 14	S-2	1.7 [94]	2.0 3.8	- FILL - - GLACIAL TILL - Top 16": Medium dense, olive-brown, silty COARSE - FINE SAND, trace gravel. Dry Bottom 4": Gray, GRAVEL. Dry	
	3.5	64.5	85/4"/0.3 50/2"/0.2				- Top of Probable Bedrock - S-3, 4' - 4.2', 0.1' recovered. Very dense, gray, COARSE SAND, trace gravel from fractured rock. Dry Splitspoon refusal at 4.2' bgs; increase in resistance and observed drill chatter from 4.2' to 9.0' bgs during roller cone advancement indicates probable weathered bedrock or bedrock.	
5								
10				C1	5.0 [100]	9.0 14.0	Increase in resistance during roller cone advancement at 9.0' bgs. C1: Hard, fresh, aphanitic, gray, METAWACKE. Joints are very close to moderately spaced, low angle, undulating, rough, fresh to discolored, partially open with one moderately wide joint. Rock fractured into gravel pieces from 13.6'-13.7'. RQD: 2.1 / 5 = 42% Rock Core Times (min:sec): 9.0-10.0' (3:45), 10.0-11.0' (3:27), 11.0-12.0' (3:43), 12.0-13.0' (3:37), 13.0-14.0' (3:56)	
15				C2	4.7 [94]	14.0 19.0	- METAWACKE - C2: Hard, fresh, aphanitic, gray, METAWACKE. Joints are very close to moderately spaced, horizontal to low angle, undulating, rough, fresh, tight to open. RQD: 3.3 / 5 = 67% Rock Core Times (min:sec): 14.0-15.0' (2:57), 15.0-16.0' (4:06), 16.0-17.0' (5:50), 17.0-18.0' (3:00), 18.0-19.0' (3:11)	
20							Bottom of Exploration @ 19.0 ft (El. 49.0)	
25								

Sampler	Identification
S	Standard Split Spoon
SL	Large Spoon (O.D.= 3 in)
T	Thin Wall Tube
U	Undisturbed Piston
O	Open End Rod
A	Auger Flight
C	Core Barrel
NR	Not Recorded

COHESIVE SOILS	
Blows/foot (N)	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
> 30	Hard

NON-COHESIVE SOILS	
Blows/foot (N)	Apparent Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

WOR - Weight of Rod
WOH - Weight of Hammer

Soil Descriptions	Proportion
Capitalized Soil Name	Major Component
Lower Case Adjective	35% - 50%
Some	20% - 35%
Little	10% - 20%
Trace	1% - 10%

ENGLISH

TB-12 P:\GINT PROJECT DATABASES\09.0026090.00 NHDOT FORMAT I-95 KITTERY SIGNAGE LOGS.GPJ 6/29/2021 10:34:34 AM TB-12

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-95 Sign Foundations

Location: Kittery, ME - Portsmouth, NH

Boring No.: GZ-6

WIN:

Driller:	New England Boring Contractors	**Elevation (ft.)**	82.4	**Auger ID/OD:**	4.25"
Operator:	M. D'Ambrosio	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	E. Tome	**Rig Type:**	Truck - GT8	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	01/05/2021-01/05/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	N/A
Boring Location:	See Plan	**Casing ID/OD:**	4/4.5"	**Water Level*:**	Not Measured
Hammer Efficiency Factor:	0.87	**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.
				Sample Information							
0								82.0		0'-0.4': Asphalt	
										0.4	
	1D	24/16	1.0 - 3.0	46-48-35-32	83	120				Brown/grey, dry, very dense, gravelly fine to medium SAND, trace silt, (Fill).	
	2D	24/21	3.0 - 5.0	25-25-36-56	61	88				Brown, dry, very dense, fine to coarse SAND, some gravel, some silt, fractured rock in spoon tip, (Fill).	G#19 A-2-4, SM WC=6.8
5	3D	24/24	5.0 - 7.0	41-28-28-27	56	81				Olive-brown, dry, very dense, fine to coarse SAND, some gravel, some silt, (Fill).	
	4D	24/24	7.0 - 9.0	20-30-30-30	60	87				Brown/tan, dry, very dense, fine to coarse SAND, some gravel, some silt, (Fill).	
	5D	24/24	9.0 - 11.0	35-47-50-40	97	141				Brown/tan, dry, very dense, fine to coarse SAND, some gravel, some silt, (Fill).	
10	6D	24/16	11.0 - 13.0	28-39-38-31	77	112				Brown/tan, dry, very dense, fine to coarse SAND, some gravel, some silt, (Fill).	
	7D	24/16	13.0 - 15.0	15-18-20-20	38	55				Brown/tan, moist, dense, fine to coarse SAND, some gravel, some silt, (Fill).	
15	8D	24/19	15.0 - 17.0	19-28-37-38	65	94				Brown/tan, moist, very dense, fine to coarse SAND, some gravel, some silt, (Fill).	
20	9D	24/17	20.0 - 22.0	25-20-30-19	50	73				Brown/tan, wet, very dense, fine to coarse SAND, some gravel, some silt, (Fill).	
								58.9		23.5	
25											

Remarks:

1. Automatic hammer NEBC #GT8. Energy Transfer Ratio = 87%.
2. Borehole was flushed prior to casing removal; water level not obtained.
3. Ground surface elevation was measured based on surveyed stake elevations.
4. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterburg Limit tests if available, rather than the MaineDOT Standard based percentages passing specific grain sizes.

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: I-95 Sign Foundations

Location: Kittery, ME - Portsmouth, NH

Boring No.: GZ-6

WIN:

Driller:	New England Boring Contractors	**Elevation (ft.)**	82.4	**Auger ID/OD:**	4.25"
Operator:	M. D'Ambrosio	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	E. Tome	**Rig Type:**	Truck - GT8	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	01/05/2021-01/05/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	N/A
Boring Location:	See Plan	**Casing ID/OD:**	4/4.5"	**Water Level*:**	Not Measured
Hammer Efficiency Factor: 0.87		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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	10D	24/16	25.0 - 27.0	19-15-14-27	29	42				Grey, wet, dense, fine to coarse SAND, some gravel, some silt, (Glacial Till).	G#20 A-2-4, SM WC=10.7
30	11D	24/17	30.0 - 32.0	25-24-17-16	41	59				Olive-brown, moist, dense, fine to coarse SAND, some gravel, some silt, (Glacial Till).	
35	12D	24/19	35.0 - 37.0	15-16-22-24	38	55				Olive-brown, moist, dense, fine to coarse SAND, some gravel, some silt, (Glacial Till).	
40	13D	24/17	40.0 - 42.0	13-18-17-21	35	51				Olive-brown, moist, dense, Silty, fine to medium SAND, (Glacial Till).	G#21 A-4, SM WC=24.4
45	14D	24/14	45.0 - 47.0	15-23-42-48	65	94				Top 10": Olive-brown, moist, very dense, fine to medium SAND, little silt, (Glacial Till). Bottom 4": Grey, wet, very hard, GRAVEL, little sand, little silt, (Glacial Till).	
								34.9		47.5 **Bottom of Exploration at 47.5 feet below ground surface.**	
50											

Remarks:

1. Automatic hammer NEBC #GT8. Energy Transfer Ratio = 87%.
2. Borehole was flushed prior to casing removal; water level not obtained.
3. Ground surface elevation was measured based on surveyed stake elevations.
4. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterburg Limit tests if available, rather than the

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-95 Sign Foundations

Location: Kittery, ME - Portsmouth, NH

Boring No.: GZ-7

WIN:

Driller:	New England Boring Contractors	**Elevation (ft.)**	81.6	**Auger ID/OD:**	4.25"
Operator:	K. Smith	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	E. Tome	**Rig Type:**	Truck - GT8	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	01/25/2021-01/25/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	N/A
Boring Location:	See Plan	**Casing ID/OD:**	4/4.5"	**Water Level*:**	31.1'
Hammer Efficiency Factor:	0.87	**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.
										Sample Information	
0							81			0'-0.8': Asphalt	
								80.8		0.8	
	1D	24/18	1.0 - 3.0	29-58-57-91	115	167	51			Brown, wet, very dense, fine to coarse SAND, some gravel, little silt, (Fill).	
							105				
							119				
	2D	24/18	4.0 - 6.0	37-48-59-64	107	155	67			Brown, wet, very dense, fine to coarse SAND, some gravel, some silt, (Fill).	
5							94				
							132				
							80				
							85				
	3D	24/14	9.0 - 11.0	39-38-33-38	71	103	59			Brown, wet, very dense, fine to coarse SAND, some gravel, some silt, with brick fragments, (Fill).	
10							72				
							79				
							88				
							154				
	4D	24/16	14.0 - 16.0	54-43-41-39	84	122	80			Brown, wet, very dense, fine to coarse SAND, some gravel, some silt, with rock fragments, (Fill).	
15							89				
							113				
							120				
							147				
	5D	24/18	19.0 - 21.0	33-44-44-45	88	128	80			Brown, wet, very dense, fine to medium SAND, some silt, (Fill).	
20							74				
							78				
							94				
							121				
	6D	20/12	24.0 - 25.7	24-33-56-80/2"	89	129				Top 8": Brown, wet, very dense, fine to coarse SAND, some gravel, some silt, (Fill).	
25											

Remarks:

1. Automatic hammer NEBC #GT8. Energy Transfer Ratio = 87%.
2. Water level measured prior to casing removal.
3. Ground surface elevation was measured based on surveyed stake elevations.
4. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterburg Limit tests if available, rather than the MaineDOT Standard based percentages passing specific grain sizes.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-95 Sign Foundations

Location: Kittery, ME - Portsmouth, NH

Boring No.: GZ-7

WIN:

Driller:	New England Boring Contractors	**Elevation (ft.)**	81.6	**Auger ID/OD:**	4.25"
Operator:	K. Smith	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	E. Tome	**Rig Type:**	Truck - GT8	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	01/25/2021-01/25/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	N/A
Boring Location:	See Plan	**Casing ID/OD:**	4/4.5"	**Water Level*:**	31.1'
Hammer Efficiency Factor: 0.87		**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
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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							WASH	56.4			
							AHEAD			Bottom 4": Grey, wet, very dense, gravelly fine to coarse SAND, trace silt, (Glacial Till).	
	7D	24/21	29.0 - 31.0	56-92-118-82	210	305				Brown, wet, very dense, fine to coarse SAND, little gravel, little silt, (Glacial Till).	
30							124				
							186				
							215				
							225				
	8D	8/0	34.0 - 34.7	120-65/2"	R		200			No recovery.	
35							WASH				
							AHEAD				
	9D	24/8	39.0 - 41.0	37-58-23-19	81	117				Brown, wet, very dense, fine to coarse SAND, some gravel, trace silt.	
40											
	10D	24/8	44.0 - 46.0	5-4-6-6	10	15				Brown, wet, stiff, Silty CLAY, little fine sand, trace gravel, (Glacial Till).	
45											
								32.6			
	11D	1/1	49.0 - 49.1	100/1"	R			32.5		Grey, wet, GRAVEL, with fractured Metawacke pieces, Probable Bedrock	
50											

25.2
49.0

Remarks:

1. Automatic hammer NEBC #GT8. Energy Transfer Ratio = 87%.
2. Water level measured prior to casing removal.
3. Ground surface elevation was measured based on surveyed stake elevations.
4. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterburg Limit tests if available, rather than the

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-95 Sign Foundations

Location: Kittery, ME - Portsmouth, NH

Boring No.: GZ-7

WIN:

Driller:	New England Boring Contractors	**Elevation (ft.)**	81.6	**Auger ID/OD:**	4.25"
Operator:	K. Smith	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	E. Tome	**Rig Type:**	Truck - GT8	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	01/25/2021-01/25/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	N/A
Boring Location:	See Plan	**Casing ID/OD:**	4/4.5"	**Water Level*:**	31.1'
Hammer Efficiency Factor: 0.87		**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
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: 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										Rock).	
										49.1	
										Bottom of Exploration at 49.1 feet below ground surface.	
55											
60											
65											
70											
75											

Remarks:

1. Automatic hammer NEBC #GT8. Energy Transfer Ratio = 87%.
2. Water level measured prior to casing removal.
3. Ground surface elevation was measured based on surveyed stake elevations.
4. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterburg Limit tests if available, rather than the

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-95 Sign Foundations

Location: Kittery, ME - Portsmouth, NH

Boring No.: GZ-11

WIN:

Driller:	New England Boring Contractors	**Elevation (ft.)**	56.2	**Auger ID/OD:**	4.25"
Operator:	M. Soucy	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	E. Tome	**Rig Type:**	ATV - B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	12/15/2020-12/15/2020	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	See Plan	**Casing ID/OD:**	4/4.5"	**Water Level*:**	2.0'
Hammer Efficiency Factor:	0.919	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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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	24/9	0.0 - 2.0	1-3-3-3	6	9		56.0		Top 2": Brown, dry, fine to coarse SAND, some silt, roots present, (Topsoil). 0.2 Bottom 7": Loose, brown, Silty fine to coarse SAND, trace gravel, dry, (Fill).	
	2D	7/5	2.0 - 2.6	13-55/1"	R			53.6		Brown, dry, medium dense, Silty SAND, trace gravel, (Fill). 2.6 Splitspoon refusal at 2.6' bgs indicates bedrock. Advanced roller cone to 3.0' bgs and set up to core.	
	R1	60/60	3.0 - 8.0	RQD = 48%						R1: Hard, fresh, aphanitic, grey, METAWACKE. Primary joints are very close to moderately spaced, horizontal to low angle, planar to undulating, smooth to rough, fresh, tight to partially open. Secondary joints are close to moderately spaced, high angle to vertical, planar, rough, fresh, open. Rock Quality = Poor Recovery = 100% Rock Core Times (min:sec): 3.0-4.0' (2:30), 4.0-5.0' (2:57), 5.0-6.0' (3:15), 6.0-7.0' (3:03), 7.0-8.0' (3:00)	
5	R2	60/60	8.0 - 13.0	RQD = 53%						R2: Hard, fresh, aphanitic, grey, METAWACKE. Primary joints are very close to close, low angle, planar, rough, fresh to discolored, tight, with one moderately wide joint. Secondary joints are high angle to vertical, moderately spaced, undulating, rough, fresh, partially open. Rock Quality = Poor Recovery = 100% Rock Core Times (min:sec): 8.0-9.0' (2:02), 9.0-10.0' (2:30), 10.0-11.0' (2:27), 11.0-12.0' (2:46), 12.0-13.0' (3:00)	q_p=999 ksf
10	R3	60/60	13.0 - 18.0	RQD = 35%						R3: Hard, fresh to slightly weathered, aphanitic, grey, METAWACKE. Primary joints are very close to close, low angle to moderately dipping, undulating, rough, fresh to discolored, partially open. Two secondary joints at 13.3' and 13.5' are high angle, planar, rough, discolored, partially open. Rock Quality = Poor Recovery = 100% Rock Core Times (min:sec): 13.0-14.0' (2:05), 14.0-15.0' (2:35), 15.0-16.0' (2:25), 16.0-17.0' (3:51), 17.0-18.0' (5:08)	
15								38.2		18.0 **Bottom of Exploration at 18.0 feet below ground surface.**	
20											
25											

Remarks:

1. Automatic hammer NEBC #D26. Energy Transfer Ratio = 91.9%.
2. Borehole was flushed prior to casing removal; water level not obtained.
3. Ground surface elevation was measured based on surveyed stake elevations.
4. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterburg Limit tests if available, rather than the MaineDOT Standard based percentages passing specific grain sizes.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-95 Sign Foundations

Location: Kittery, ME - Portsmouth, NH

Boring No.: GZ-12

WIN:

Driller:	New England Boring Contractors	**Elevation (ft.)**	55.6	**Auger ID/OD:**	4.25"
Operator:	M. Soucy	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	E. Tome	**Rig Type:**	ATV - B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	12/15/2020-12/15/2020	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	See Plan	**Casing ID/OD:**	4/4.5"	**Water Level*:**	10.0'
Hammer Efficiency Factor:	0.919	**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	24/16	0.0 - 2.0	3-5-2-2	7	11		55.1		Top 6": Brown, dry, fine to medium S AND, some silt, with few roots, (Topsoil).	
										0.5	
										Bottom 10": Brown, dry, medium dense, fine to coarse SAND, little silt, trace gravel, (Fill).	
	2D	24/2	2.0 - 4.0	4-6-7-9	13	20				Brown, dry, medium dense, Silty SAND, with few roots, (Fill).	
								51.6		4.0	
	3D	24/18	4.0 - 6.0	14-21-39-53	60	92				Olive-brown, dry, very dense, Sandy GRAVEL, little Silt, (Glacial Till).	G#22 A-1-b, GM WC=7.1
5											
	4D	24/17	6.0 - 8.0	29-44-55-111	99	152				Olive-brown, dry, very dense, Sandy GRAVEL, little Silt, with rock fragments, (Glacial Till).	
								46.6		9.0	
	R1	36/22	9.0 - 12.0	RQD = 0%						Increase in roller cone resistance at 9.0' indicates probable bedrock; set up to core. R1: Very hard, moderately weathered, aphanitic, grey, METAWACKE. Rock fractured into discolored gravel pieces from 9.0'-12.0'. Rock Quality = Very Poor Recovery = 61% Rock Core Times (min:sec): 9.0-10.0' (2:38), 10.0-11.0' (4:00), 11.0-12.0' (4:15)	
10											
	R2	48/46	12.0 - 16.0	RQD = 27%						R2: Hard, slightly weathered, aphanitic, grey, METAWACKE. Primary joints are very close to close, low angle to moderately dipping, undulating, rough, discolored to slightly weathered, partially open to open. Two secondary joints are high angle, undulating, rough, slightly weathered. Rock fractured into gravel pieces from 13.2'- 14.0' and 14.6'-16.0'.	
15								39.6		Rock Quality = Poor Recovery = 96% Rock Core Times (min:sec): 12.0-13.0' (1:51), 3.0-14.0' (1:43), 14.0-15.0' (2:02), 15.0-16.0' (2:15)	
										16.0	
20										**Bottom of Exploration at 16.0 feet below ground surface.**	
25											

Remarks:

1. Automatic hammer NEBC #D26. Energy Transfer Ratio = 91.9%.
2. Borehole was flushed prior to casing removal; water level not obtained.
3. Ground surface elevation was measured based on surveyed stake elevations.
4. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterburg Limit tests if available, rather than the MaineDOT Standard based percentages passing specific grain sizes.

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: I-95 Sign Foundations

Location: Kittery, ME - Portsmouth, NH

Boring No.: GZ-15

WIN:

Driller:	New England Boring Contractors	**Elevation (ft.)**	31.3	**Auger ID/OD:**	4.25"
Operator:	M. D'Ambrosio	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	E. Tome	**Rig Type:**	Truck - GT8	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	12/22/20 - 12/22/20	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	See Plan	**Casing ID/OD:**	4/4.5"	**Water Level*:**	2.5'
Hammer Efficiency Factor:	0.87	**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								30.9		0'-0.4': Asphalt	
										0.4	
	1D	24/8	1.0 - 3.0	13-17-16-10	33	48				Brown, dry, dense, fine to coarse SAND, little silt, little gravel, (Fill).	
										No recovery. Sand observed in wash return.	
	2D	24/0	3.0 - 5.0	6-7-11-10	18	26					
5								26.3		5.0	
	3D	24/6	5.0 - 7.0	10-13-12-12	25	36				Olive-brown, moist, hard, Silty CLAY, some fine to coarse sand, (Silty Clay).	
	4D	23/23	7.0 - 8.9	11-13-22-65/5"	35	51				Olive-brown, moist, hard, Silty CLAY, trace fine sand, (Silty Clay).	LL=37 PL=20 PI=17 WC=23.1
								22.4		8.9	
10	R1	27/26	10.5 - 12.8	RQD = 15%						Splitspoon refusal at 8.9' indicates probable bedrock.	
										Advanced roller cone to 10.5' bgs and set up to core. R1: Hard, slightly weathered, aphanitic, grey, METAWACKE. Primary joints are very close to close, low angle to moderately dipping, undulating, rough, discolored, partially open to open. One secondary joint at 11.7' is vertical, undulating, rough, discolored. Rock Quality = Very Poor Recovery = 96% Rock Core Times (min:sec): 10.5-11.5' (1:36), 11.5-12.5' (1:42), 12.5'-12.8' (1:00)	
	R2	42/35	12.8 - 16.3	RQD = 10%						R2: Hard, moderately weathered, aphanitic, grey, METAWACKE. Joints are close, low angle, undulating, rough, open to moderately wide. Rock is fractured into gravel pieces from 12.8'- 13.9' and from 14.7'-16.3'. Rock Quality = Very Poor Recovery = 83% Rock Core Times (min:sec): 12.8-13.8' (3:11), 13.8-14.8' (3:24), 14.8'-15.8' (4:23), 15.8-16.3' (1:32)	
15								15.0		16.3	
										Bottom of Exploration at 16.3 feet below ground surface.	
20											
25											

Remarks:

1. Automatic hammer NEBC #GT8. Energy Transfer Ratio = 87%.
2. Ground surface elevation was measured relative to surveyed stake elevations.
3. Ground water level measured after completion of boring with casing in the ground.
4. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterburg Limit tests if available, rather than the MaineDOT Standard based percentages passing specific grain sizes.

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: I-95 Sign Foundations

Location: Kittery, ME - Portsmouth, NH

Boring No.: GZ-16

WIN:

Driller:	New England Boring Contractors	**Elevation (ft.)**	28.3	**Auger ID/OD:**	4.25"
Operator:	M. D'Ambrosio	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	E. Tome	**Rig Type:**	Truck - GT8	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	12/21/20 - 12/21/20	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	See Plan	**Casing ID/OD:**	4/4.5", 3/3.5"	**Water Level*:**	Not Encountered
Hammer Efficiency Factor:	0.87	**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								27.8		0'-0.5': Asphalt	
										0.5	
	1D	24/13	1.0 - 3.0	13-16-18-21	34	49				Brown, dry, dense, fine to coarse SAND, little silt, trace gravel, (Glacial Till).	
											G#23
	2D	24/15	3.0 - 5.0	11-11-14-13	25	36				Top 9": Brown, dry, dense, fine to coarse SAND, little silt, trace gravel, (Glacial Till). Bottom 6": Grey, dry, dense, fine to coarse SAND, little silt, trace gravel, (Glacial Till).	A-1-b, SP-SM WC=8.5 G#24
5											A-1-A, GM WC=6.7
	3D	7/7	5.0 - 5.6	44-50/1"	R			22.7		Grey, dry, dense, GRAVEL, some fine to coarse sand, little silt, fractured rock in tip of spoon, (Glacial Till).	
										5.6	
										Splitspoon refusal at 5.6' indicates probable bedrock.	
										Advanced roller cone to 8.0' and set up to core.	
	R1	5/3	8.0 - 8.4	RQD = 0%						R1: Hard, slightly weathered, aphanitic, grey, METAWACKE. Rock Quality = Very Poor Recovery = 52% Rock Core Times (min:sec): 8.0-8.4' (1:18)	
	R2	10/5	8.4 - 9.2	RQD = 0%						R2: Hard, slightly weathered, aphanitic, grey, METAWACKE. Fractured into gravel pieces. Rock Quality = Very Poor Recovery = 94% Rock Core Times (min:sec): 8.4-8.8' (2:58)	
10	R3	2/2	10.0 - 10.2	RQD = 0%						R3: Hard, slightly weathered, aphanitic, grey, METAWACKE. Rock Quality = Very Poor Recovery = 100% Rock Core Times (min:sec): 10.0-10.2' (0:30)	
	R4	10/10	10.2 - 11.0	RQD = 0%						R4: Hard, slightly weathered, aphanitic, grey, METAWACKE. Joints are closely spaced, low angle, undulating, rough, discolored, partially open, fractured into gravel pieces from 10.8'-11.0'. Rock Quality = Very Poor Recovery = 100% Rock Core Times (min:sec): 10.2-11.0' (4:54)	
	R5	18/15	11.0 - 12.5	RQD = 22%						R5: Hard, slightly weathered, aphanitic, grey, METAWACKE. Joints are very close, low angle to moderately dipping, undulating, rough, discolored, partially open. Rock Quality = Very Poor Recovery = 83% Rock Core Times (min:sec): 11.0-12.0' (2:24), 12.0-12.5' (1:30)	
	R6	10/9	12.5 - 13.3	RQD = 0%						R6: Hard, slightly weathered, aphanitic, grey, METAWACKE. Rock is fractured into gravel pieces. Rock Quality = Very Poor Recovery = 94% Rock Core Times (min:sec): 12.5-13.3' (2:36)	
	R7	36/36	13.3 - 16.3	RQD = 14%						R7: Hard, slightly weathered, aphanitic, grey, METAWACKE. Primary joints are extremely close to close, low angle to moderately dipping, undulating, rough, partially open to moderately wide. Secondary joints are moderately spaced, high angle to vertical, planar, rough, partially open. Rock is fractured into gravel pices from 13.3' to 14.3'.	
15											
	R8	42/42	17.0 - 20.5	RQD = 64%							
20	R9	54/54	20.5 - 25.0	RQD = 63%							q_p=594 ksf
								4.3			
25											

Remarks:

1. Automatic hammer NEBC #GT8. Energy Transfer Ratio = 87%.
2. Ground surface elevation was measured relative to surveyed stake elevations.
3. Ground water level measured after completion of the boring with casing in the ground.
4. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterburg Limit tests if available, rather than the MaineDOT Standard based percentages passing specific grain sizes.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-95 Sign Foundations

Location: Kittery, ME - Portsmouth, NH

Boring No.: GZ-16

WIN:

Driller:	New England Boring Contractors	**Elevation (ft.)**	28.3	**Auger ID/OD:**	4.25"
Operator:	M. D'Ambrosio	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	E. Tome	**Rig Type:**	Truck - GT8	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	12/21/20 - 12/21/20	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	See Plan	**Casing ID/OD:**	4/4.5", 3/3.5"	**Water Level*:**	Not Encountered
Hammer Efficiency Factor: 0.87		**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 Information: 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 = Very Poor Recovery = 100% Rock Core Times (min:sec): 13.3-14.3' (1:50), 14.3-15.3' (2:01), 15.3-16.3' (2:44) R8: Hard, slightly weathered, aphanitic, grey, METAWACKE. Joints are close to moderately spaced, low angle, undulating, rough, discolored, tight to open, rock fractured into gravel pieces from 20.2'-20.5'. One secondary join is high angle, undulating, rough, discolored. Rock Quality = Fair Recovery = 100% Rock Core Times (min:sec): 17.0-18.0' (2:32), 18.0-19.0' (2:01), 19.0-20.0' (2:14), 20.0-20.5' (2:07) R9: Hard, slightly weathered, aphanitic, grey, METAWACKE. Joints are very close to moderately spaced, low angle, undulating, rough, discolored, partially open to open, rock is fractured into gravel pieces from 22.5'-22.6' and from 23.7'-24.0'. Rock Quality = Fair Recovery = 100% Rock Core Times (min:sec): 20.5-21.5' (4:26), 21.5-22.5' (2:56), 22.5-23.5' (3:09), 23.5-24.0' (3:26)	
30											
35										24.0 **Bottom of Exploration at 24.0 feet below ground surface.**	
40											
45											
50											

Remarks:

1. Automatic hammer NEBC #GT8. Energy Transfer Ratio = 87%.
2. Ground surface elevation was measured relative to surveyed stake elevations.
3. Ground water level measured after completion of the boring with casing in the ground.
4. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterburg Limit tests if available, rather than the

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-95 Sign Foundations

Location: Kittery, ME - Portsmouth, NH

Boring No.: GZ-17

WIN:

Driller:	New England Boring Contractors	**Elevation (ft.)**	43.9	**Auger ID/OD:**	4.25"
Operator:	M. D'Ambrosio	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	E. Tome	**Rig Type:**	Truck - GT8	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	01/08/2021-01/08/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	See Plan	**Casing ID/OD:**	4/4.5", 3/3.5"	**Water Level*:**	10.0'
Hammer Efficiency Factor:	0.87	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/15	0.0 - 2.0	7-8-11-12	19	28		43.6		Top 3": Brown, dry, fine to medium SAND, little silt, (Topsoil). 0.3	
										Bottom 12": Brown/tan, dry, medium dense, fine to medium SAND, little silt, trace gravel, (Fill).	
	2D	24/4	2.0 - 4.0	16-18-10-7	28	41				Brown/tan, dry, dense, fine to medium SAND, little silt, trace gravel, (Fill).	G#25 A-2-4, SP-SM WC=7.8
								39.9		4.0	
	3D	24/12	4.0 - 6.0	2-3-10-9	13	19				Olive-Brown, wet, medium dense, silty fine to medium SAND, trace gravel, (Sand).	
5											
	4D	24/24	6.0 - 8.0	14-16-16-15	32	46				Olive-Brown, wet, dense, silty fine to medium SAND, trace gravel, (Sand).	
	5D	24/24	8.0 - 10.0	12-13-15-17	28	41				Olive-Brown, wet, dense, silty fine to medium SAND, trace gravel, (Sand).	G#26 A-4, SM WC=14.1
10	6D	24/19	10.0 - 12.0	12-15-17-17	32	46				Olive-Brown, wet, dense, silty fine to medium SAND, trace gravel, (Sand).	
	7D	24/18	12.0 - 14.0	15-17-20-25	37	54				Olive-Brown, wet, dense, silty fine to coarse SAND, trace gravel, (Sand).	
	8D	24/19	14.0 - 16.0	20-16-14-20	30	44				Olive-Brown, wet, dense, silty fine to coarse SAND, trace gravel, (Sand).	G#27 A-4, SM WC=10.4
15											
20	9D	24/21	20.0 - 22.0	29-49-65-57	114	165				Olive-Brown, wet, very dense, silty fine to coarse SAND, trace gravel, (Sand).	
							26				
							35				
							29				
25							20				

Remarks:

1. Automatic hammer NEBC #GT8. Energy Transfer Ratio = 87%.
2. Groundwater level measured after completion of the boring with casing in the ground.
3. Ground surface elevation was measured based on surveyed stake elevations.
4. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterburg Limit tests if available, rather than the MaineDOT Standard based percentages passing specific grain sizes.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-95 Sign Foundations

Location: Kittery, ME - Portsmouth, NH

Boring No.: GZ-17

WIN:

Driller:	New England Boring Contractors	**Elevation (ft.)**	43.9	**Auger ID/OD:**	4.25"
Operator:	M. D'Ambrosio	**Datum:**	NAVD 88	**Sampler:**	Standard Splitspoon
Logged By:	E. Tome	**Rig Type:**	Truck - GT8	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	01/08/2021-01/08/2021	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	See Plan	**Casing ID/OD:**	4/4.5", 3/3.5"	**Water Level*:**	10.0'
Hammer Efficiency Factor:	0.87	**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
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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 Information: 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	10D	2/2	25.0 - 25.2	50/2"	R		26	18.9		25.0	
	R1	60/52.5	25.5 - 30.5	RQD = 66%				18.7		Grey, wet, very dense, GRAVEL, (Weathered Bedrock).	
										25.2	
										Splitspoon refusal at 25.2' bgs indicates probable bedrock. Advanced roller cone to 25.5' and set up to core.	
										R1: Hard, slightly weathered, aphanitic, grey, METAWACKE. Joints are close to moderately spaced, low angle to moderately dipping, undulating, rough, discolored, open. Rock is fractured into gravel pieces from 27.2'-27.4'.	
										Rock Quality = Fair	
										Recovery = 88%	
30	R2	42/33	30.5 - 34.0	RQD = 35%						Rock Core Times (min:sec): 25.5-26.5' (3:46), 26.5-27.5' (3:00), 27.5-28.5' (3:45), 28.5-29.5' (3:26), 29.5-30.5' (4:43)	
										R2: Hard, slightly weathered, aphanitic, grey, METAWACKE. Joints are very close to moderately spaced, low angle, undulating, rough, open. One secondary joint is high angle, undulating, rough, partially open.	
										Rock Quality = Poor	
										Recovery = 79%	
	R3	60/60	34.0 - 39.0	RQD = 81%						Rock Core Times (min:sec): 30.5-31.5' (2:16), 31.5-32.5' (2:38), 32.5-33.5' (3:01), 33.5-34.0' (3:38)	
35										R3: Hard, slightly weathered, aphanitic, grey, METAWACKE. Joints are close to moderately spaced, low angle, undulating, rough, partially open to open.	
										Rock Quality = Good	
										Recovery = 100%	
										Rock Core Times (min:sec): 34.0-35.0' (3:21), 35.0-36.0' (2:31), 36.0-37.0' (2:40), 37.0-38.0' (2:30), 38.0-39.0' (2:05)	
	R4	18/18	39.0 - 40.5	RQD = 0%						R4: Hard, moderately weathered, aphanitic, grey, METAWACKE. Joints are very close to close, low angle, undulating, rough, open. One high angle joint, undulating, rough, partially open.	
40								3.4		Rock Quality = Very Poor	
										Recovery = 100%	
										Rock Core Times (min:sec): 39.0-40.0' (3:00), 40.0-40.5' (Not Measured)	
										40.5	
										Bottom of Exploration at 40.5 feet below ground surface.	
45											
50											

Remarks:

1. Automatic hammer NEBC #GT8. Energy Transfer Ratio = 87%.
2. Groundwater level measured after completion of the boring with casing in the ground.
3. Ground surface elevation was measured based on surveyed stake elevations.
4. Fine-Grained Soil Descriptions on this log are based on plasticity estimated using visual-manual classification techniques or laboratory Atterburg Limit tests if available, rather than the

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

APPENDIX C – LABORATORY TEST REPORTS

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: Nicholas Williams
Assigned By: Nicholas Williams
Collected By: E. Tome

Project Information:
Portsmouth/Kittery I-95 Sign Structures
Portsmouth, NH and Kittery, ME
GZA Project Number: 09.0026090.00
Summary Page: 1 of 2
Report Date: 02.03.21

LABORATORY TESTING DATA SHEET, Report No.: 7421-A-142, 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						
GZ-1	S-1	1-3	G-09	2.0			37.5	58.5	4.0											Light Brown Gravelly f-c SAND, trace Silt
GZ-1	S-10	25-27	G-10	10.1			25.0	50.2	24.8											Brown f-c SAND, some fine Gravel, some Silt
GZ-2	S-4	9-11	G-11	6.4			19.5	64.2	16.3											Brown f-c SAND, little fine Gravel, little Silt
GZ-2	S-10	30-32	G-12	8.9			30.5	36.6	32.9											Gray f-c SAND, some Clayey Silt, some f-c Gravel
GZ-2	S-11	35-37	A-4	9.7	17	16														Gray Clayey SILT
GZ-3	S-2 (top 15")	3-5	G-13	16.6			0.7	89.9	9.4											Brown f-m SAND, trace Silt, trace fine Gravel
GZ-3	S-2 (bot. 7")	3-5	G-14	9.0			27.1	46.2	26.7											Dark Brown f-c SAND, some fine Gravel, some Silt
GZ-3A	S-3	24-26	G-15	13.7			20.8	54.3	24.9											Brown f-c SAND, some Silt, some fine Gravel
GZ-3A	S-4	30-32	G-16	11.8			5.0	58.2	36.8											Brown Silty f-c SAND, trace fine Gravel
GZ-4	S-4	7-9	G-17	8.9			48.8	39.7	11.5											Brown Sandy f-c GRAVEL, little Silt
GZ-5	S-2 (top 16")	2-3.8	G-18	18.0			5.4	56.9	37.7											Brown Silty f-c SAND, trace fine Gravel

Date Received: *01.19.21*

Reviewed By:

Date Reviewed: *02.03.21*

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: Nicholas Williams
Assigned By: Nicholas Williams
Collected By: E. Tome

Project Information:
Portsmouth/Kittery I-95 Sign Structures
Portsmouth, NH and Kittery, ME
GZA Project Number: 09.0026090.00
Summary Page: 2 of 2
Report Date: 02.03.21

LABORATORY TESTING DATA SHEET, Report No.: 7421-A-142, 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						
GZ-6	2D	3-5	G-19	6.8			21.3	55.9	22.8											Brown f-c SAND, some Silt, some f-c Gravel
GZ-6	10D	25-27	G-20	10.7			29.2	44.4	26.4											Dark Brown f-c SAND, some f-c Gravel, some Silt
GZ-6	13D	40-42	G-21	12.4			6.2	53.4	40.4											Light Brown Silty f-m SAND, trace fine Gravel
GZ-12	3D	4-6	G-22	7.1			48.5	35.5	16.0											Brown Sandy f-c GRAVEL, little Silt
GZ-15	4D	7-8.9	A-5	23.1	37	20														Brown CLAY & SILT
GZ-16	2D (top 9")	3-5	G-23	8.5			9.8	79.2	11.0											Brown f-c SAND, little Silt, trace fine Gravel
GZ-16	2D (bot. 6")	3-5	G-24	6.7			55.4	32.0	12.6											Dark Brown fine GRAVEL, some f-c Sand, little Silt
GZ-17	2D	2-4	G-25	7.8			8.5	80.1	11.4											Brown f-m SAND, little Silt, trace fine Gravel
GZ-17	5D	8-10	G-26	14.1			7.3	49.1	43.6											Brown Silty f-m SAND, trace fine Gravel
GZ-17	8D	14-16	G-27	10.4			8.3	51.4	40.3											Brown Silty f-c SAND, trace fine Gravel

Date Received: *01.19.21*

Reviewed By:

Date Reviewed: *02.03.21*

THIELSCH ENGINEERING

State of Maine - Department of Transportation
Laboratory Testing Summary Sheet

Portsmouth/Kittery I-95 Sign Structures

MDOT Project Number:

GZA Project Number: 09.0026090.00

Town(s): Portsmouth, NH / Kittery, ME

Boring & Sample Identification Number	Station (Feet)	Sample No.	Depth (Feet)	Lab Number	Organic %	W.C.	L.L.	P.I.	Classification		
									Unified	AASHTO	Frost
GZ-1		S-1	1-3	G-09		2.0			SP	A-1-b	0
GZ-1		S-10	25-27	G-10		10.1			SM	A-1-b	II
GZ-2		S-4	9-11	G-11		6.4			SM	A-1-b	II
GZ-2		S-10	30-32	G-12		8.9			SM	A-2-4(0)	III
GZ-2		S-11	35-37	A-4		9.7	17	1	ML	A-4	IV
GZ-3		S-2 (Top 15")	3-5	G-13		16.6			SP-SM	A-3	0
GZ-3		S-2 (Bot. 7")	3-5	G-14		9.0			SM	A-2-4(0)	III
GZ-3A		S-3	24-26	G-15		13.7			SM	A-2-4(0)	II
GZ-3A		S-4	30-32	G-16		11.8			SM	A-4(0)	III
GZ-4		S-4	7-9	G-17		8.9			GP-GM	A-1-a	I
GZ-5		S-2 (Top 16")	2-3.8	G-18		18.0			SM	A-4(0)	III
GZ-6		2D	3-5	G-19		6.8			SM	A-2-4(0)	II
GZ-6		10D	25-27	G-20		10.7			SM	A-2-4(0)	II
GZ-6		13D	40-42	G-21		24.4			SM	A-4(0)	III
GZ-12		3D	4-6	G-22		7.1			GM	A-1-b	I
GZ-15		4D	7-8.9	A-5		23.1	37	17	CL	A-6	III
GZ-16		2D (Top 9")	3-5	G-23		8.5			SP-SM	A-1-b	II
GZ-16		2D (Bot 6")	3-5	G-24		6.7			GM	A-1-a	I
GZ-17		2D	2-4	G-25		7.8			SP-SM	A-2-4(0)	II
GZ-17		5D	8-10	G-26		14.1			SM	A-4(0)	III
GZ-17		8D	14-16	G-27		10.4			SM	A-4(0)	III

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

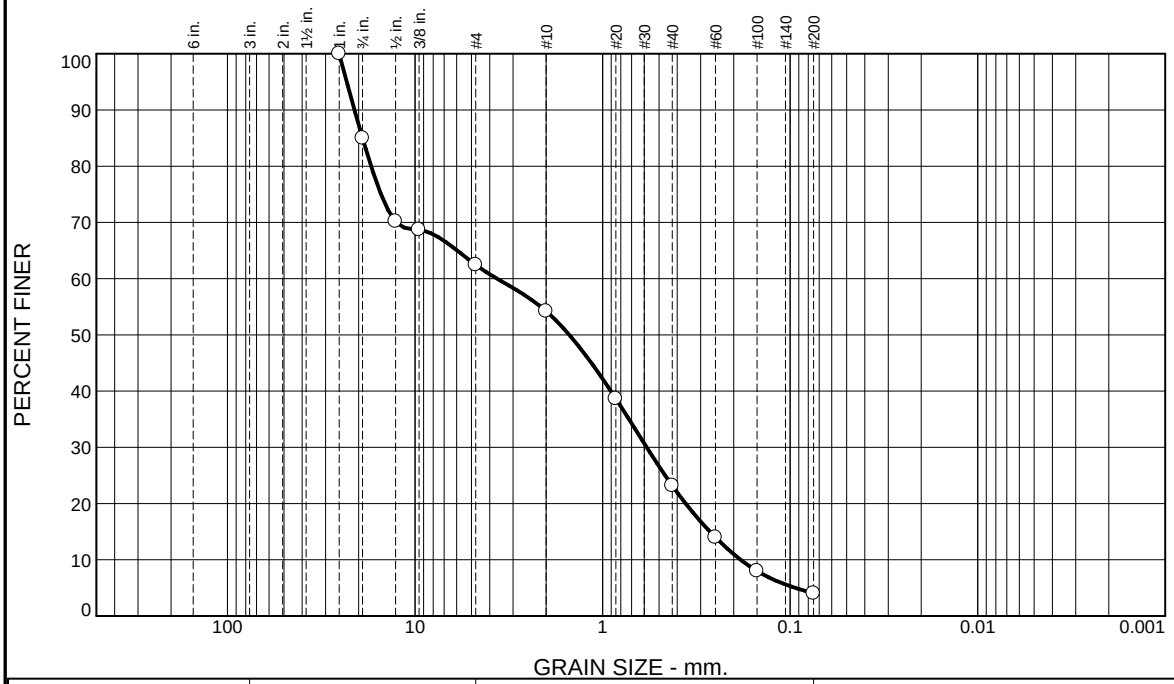
GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-93 (1996) and/or ASTM D 422-63 (Reapproved 1998)

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

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

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

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	15.0	22.5	8.3	31.0	19.2	4.0	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	85.0		
0.5"	70.2		
0.375"	68.7		
#4	62.5		
#10	54.2		
#20	38.7		
#40	23.2		
#60	14.0		
#100	8.0		
#200	4.0		

* (no specification provided)

Material Description

Light Brown Gravelly f-c SAND, 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}= 21.0285 D_{85}= 19.0550 D_{60}= 3.6530
D_{50}= 1.5044 D_{30}= 0.5817 D_{15}= 0.2676
D_{10}= 0.1834 C_u= 19.92 C_c= 0.50

Remarks

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 1-3' **Date Sampled:**

Sample Number: GZ-1 / S-1

Thielsch Engineering Inc.

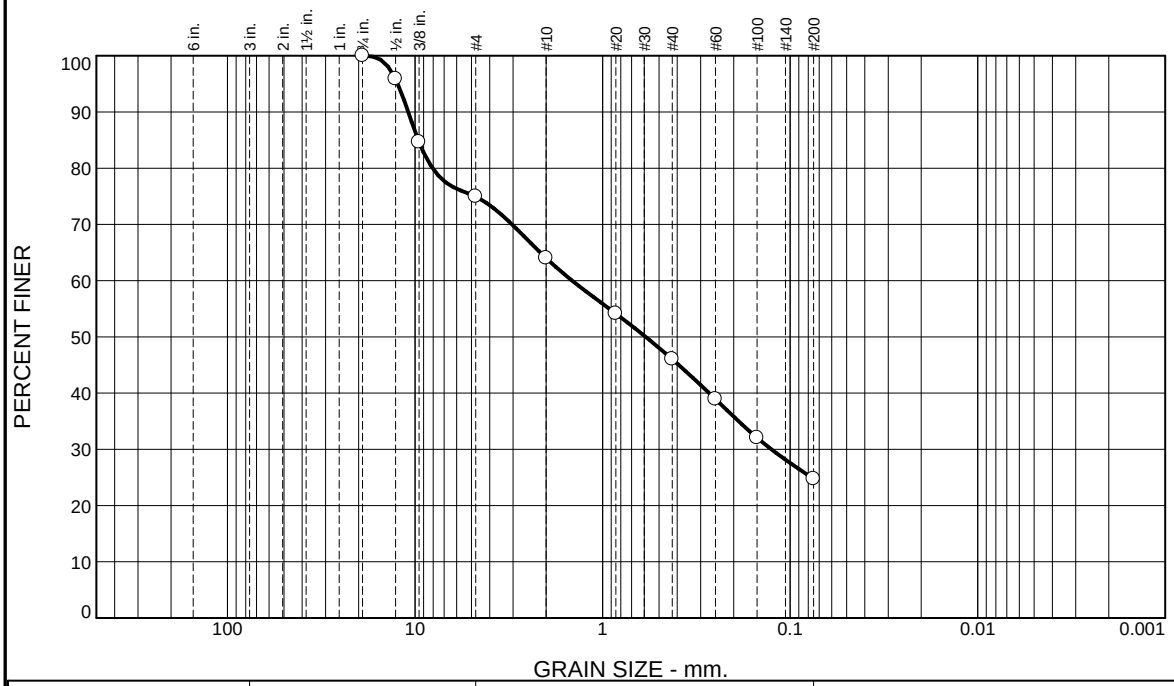
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-09

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	25.0	11.0	18.0	21.2	24.8	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	95.9		
0.375"	84.6		
#4	75.0		
#10	64.0		
#20	54.1		
#40	46.0		
#60	38.9		
#100	32.1		
#200	24.8		

* (no specification provided)

Material Description

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

Atterberg Limits (ASTM D 4318)

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

Classification

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

Coefficients

D_{90}= 10.8781 D_{85}= 9.6207 D_{60}= 1.4520
D_{50}= 0.5894 D_{30}= 0.1258 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 25-27' **Date Sampled:**
Sample Number: GZ-1 / S-10

Thielsch Engineering Inc.

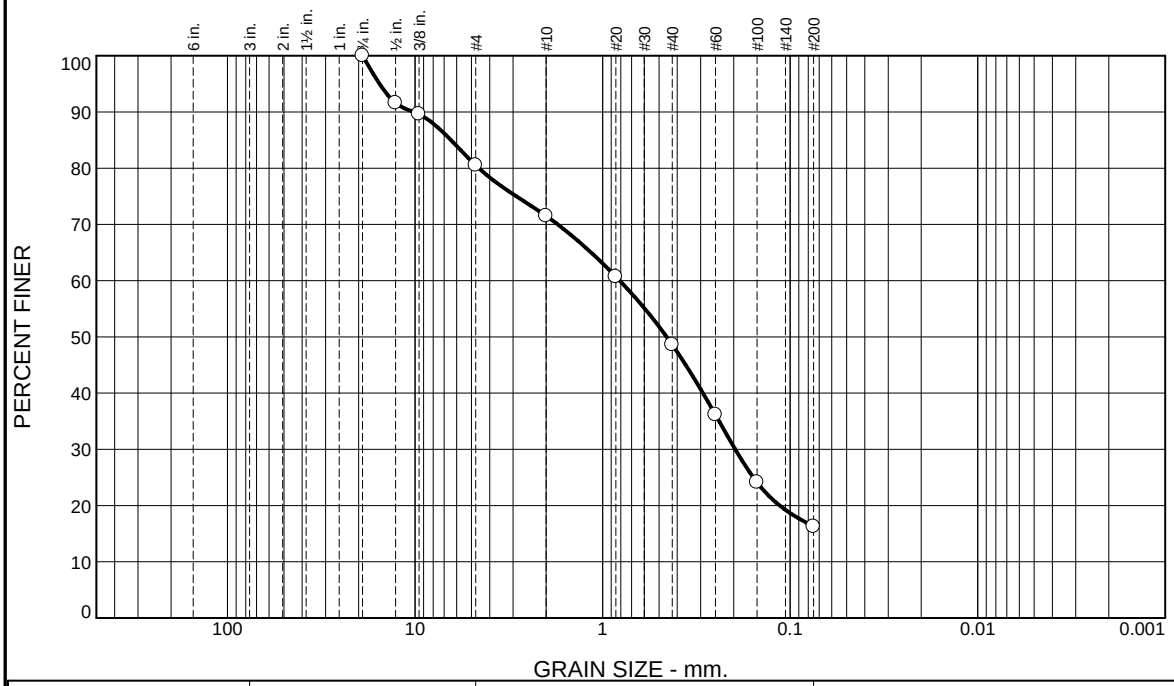
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-10

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	19.5	9.0	22.9	32.3	16.3	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	91.6		
0.375"	89.6		
#4	80.5		
#10	71.5		
#20	60.7		
#40	48.6		
#60	36.1		
#100	24.1		
#200	16.3		

* (no specification provided)

Material Description

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

Atterberg Limits (ASTM D 4318)

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

Classification

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

Coefficients

D_{90}= 10.1496 D_{85}= 6.4310 D_{60}= 0.8107
D_{50}= 0.4549 D_{30}= 0.1961 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 9-11' **Date Sampled:**
Sample Number: GZ-2 / S-4

Thielsch Engineering Inc.

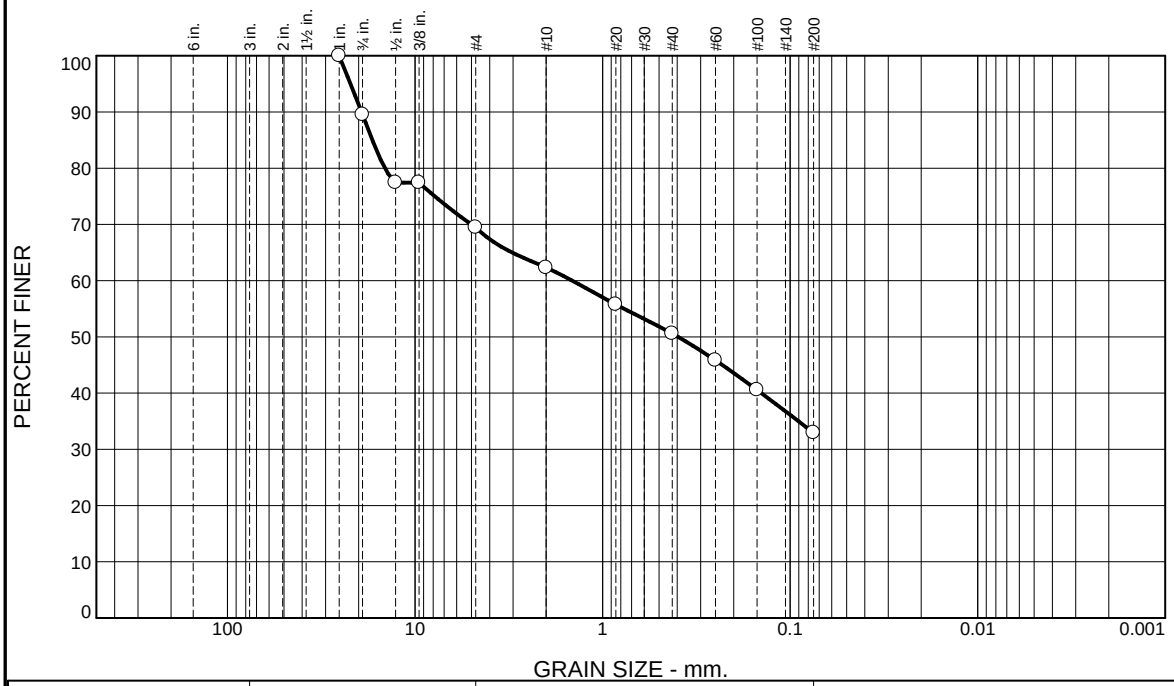
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-11

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.5	20.0	7.2	11.7	17.7	32.9	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	89.5		
0.5"	77.4		
0.375"	77.4		
#4	69.5		
#10	62.3		
#20	55.8		
#40	50.6		
#60	45.8		
#100	40.6		
#200	32.9		

* (no specification provided)

Material Description

Gray f-c SAND, some Clayey Silt, some f-c Gravel

Atterberg Limits (ASTM D 4318)

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

Classification

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

Coefficients

D_{90}= 19.2837 D_{85}= 16.8888 D_{60}= 1.4506
D_{50}= 0.3961 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

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

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 30-32' **Date Sampled:**

Sample Number: GZ-2 / S-10

Thielsch Engineering Inc.

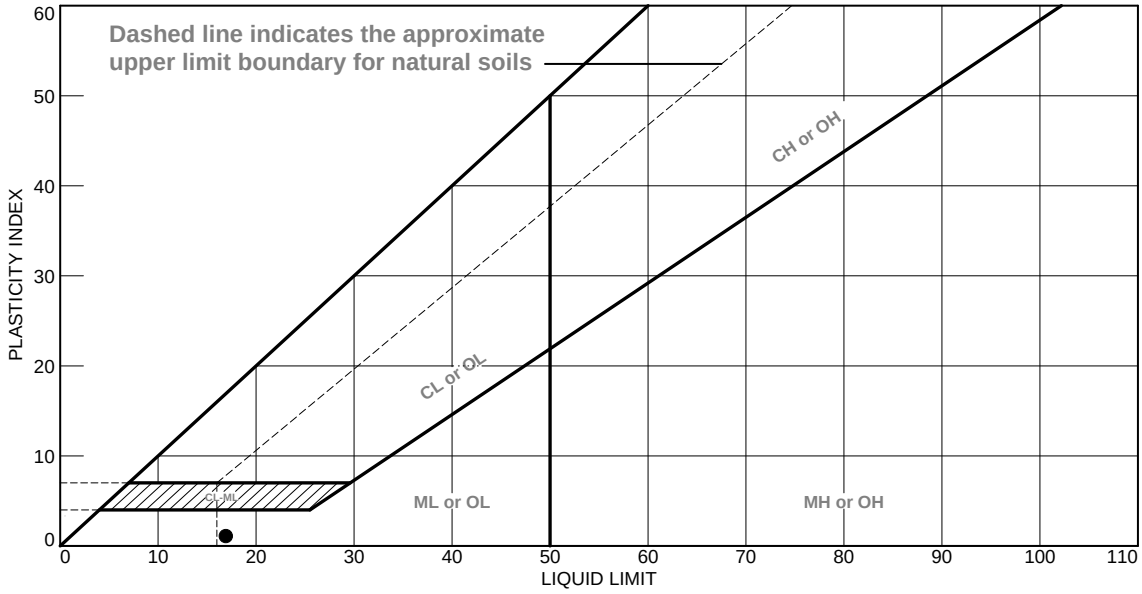
Cranston, RI

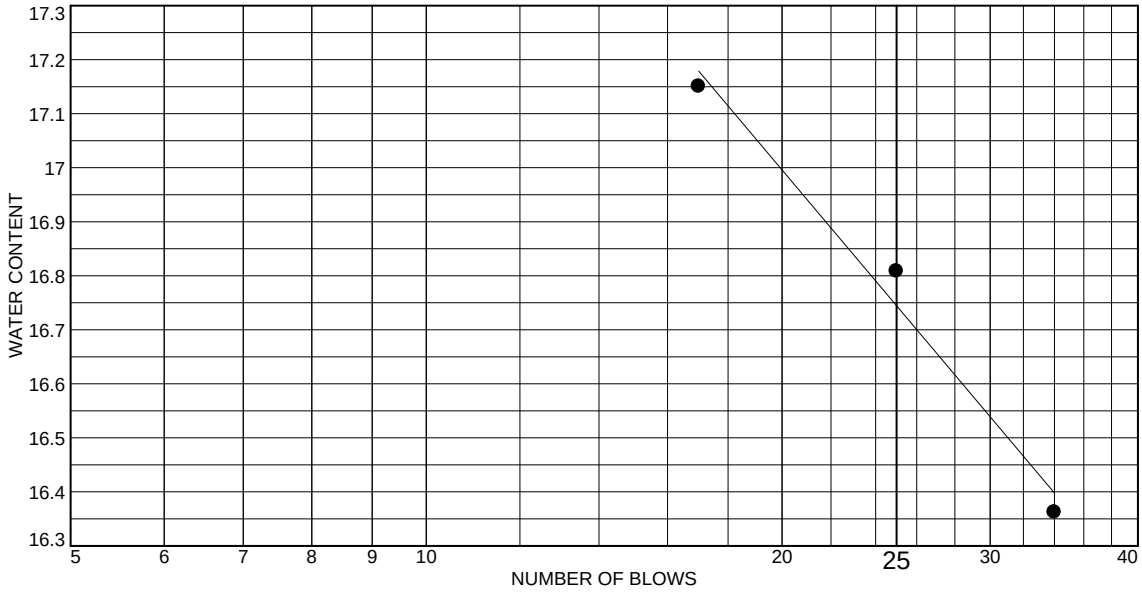
Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-12

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Clayey SILT	17	16	1			

Project No. 09.0026090.00 **Client:** GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures

Portsmouth, NH / Kittery, ME

Source of Sample: Boring (01.22.21) **Depth:** 35-37'

Sample Number: GZ-2 / S-11

Thielsch Engineering Inc.

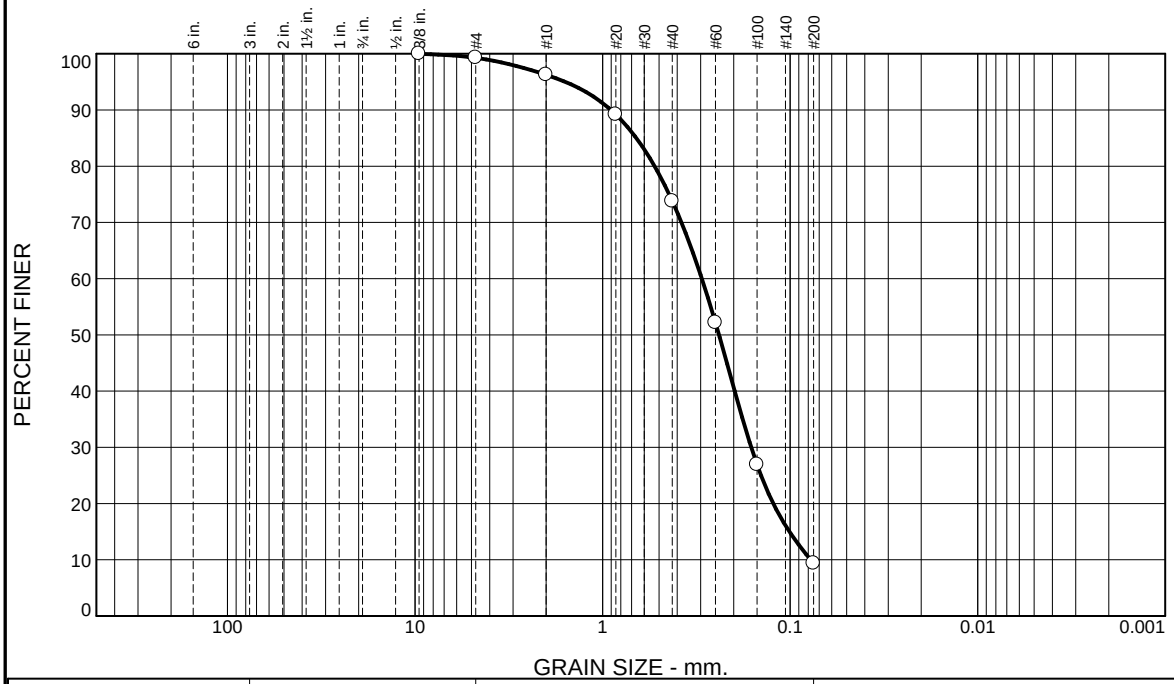
Cranston, RI

Remarks:

Figure L-4

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

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	3.0	22.5	64.4	9.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.375"	100.0		
#4	99.3		
#10	96.3		
#20	89.2		
#40	73.8		
#60	52.2		
#100	26.9		
#200	9.4		

* (no specification provided)

Material Description

Brown f-m SAND, trace 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-3

Coefficients

D_{90}= 0.9031 D_{85}= 0.6608 D_{60}= 0.2956
D_{50}= 0.2394 D_{30}= 0.1611 D_{15}= 0.1009
D_{10}= 0.0777 C_u= 3.80 C_c= 1.13

Remarks

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 3-5' **Date Sampled:**
Sample Number: GZ-3 / S-2 Top 15"

Thielsch Engineering Inc.

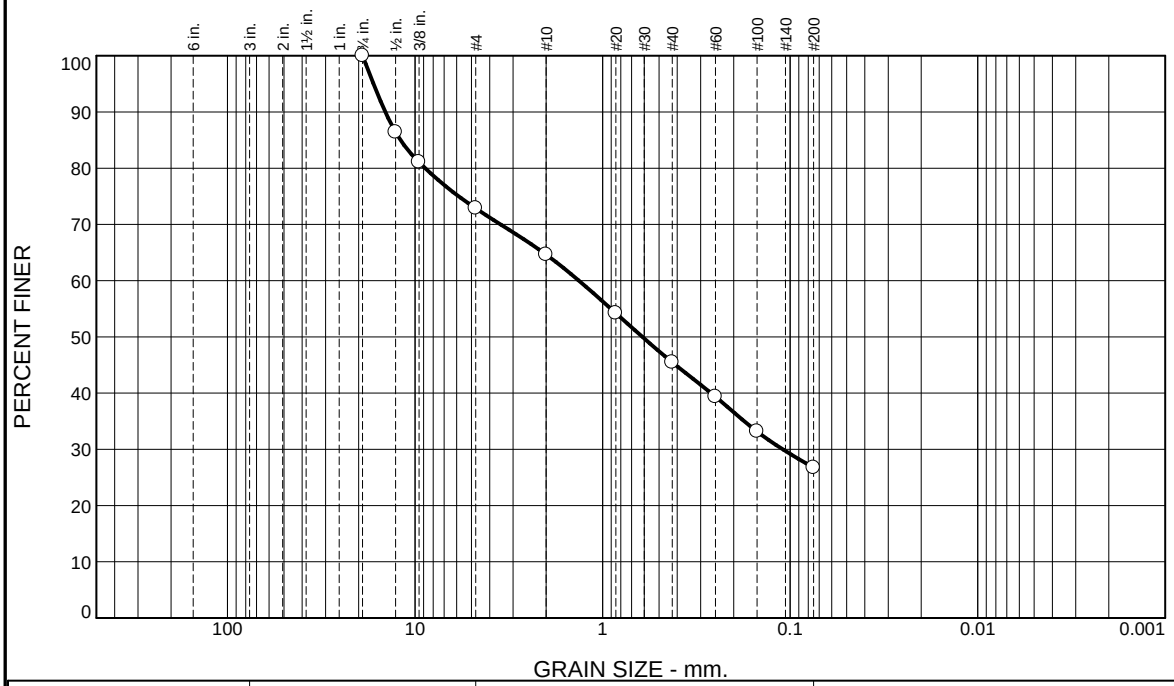
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-13

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	27.1	8.3	19.1	18.8	26.7	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	86.4		
0.375"	81.1		
#4	72.9		
#10	64.6		
#20	54.2		
#40	45.5		
#60	39.4		
#100	33.2		
#200	26.7		

* (no specification provided)

Material Description

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

Atterberg Limits (ASTM D 4318)

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

Classification

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

Coefficients

D_{90}= 14.4098 D_{85}= 11.9636 D_{60}= 1.3375
D_{50}= 0.6133 D_{30}= 0.1094 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 3-5' **Date Sampled:**
Sample Number: GZ-3 / S-2 Bot. 7"

Thielsch Engineering Inc.

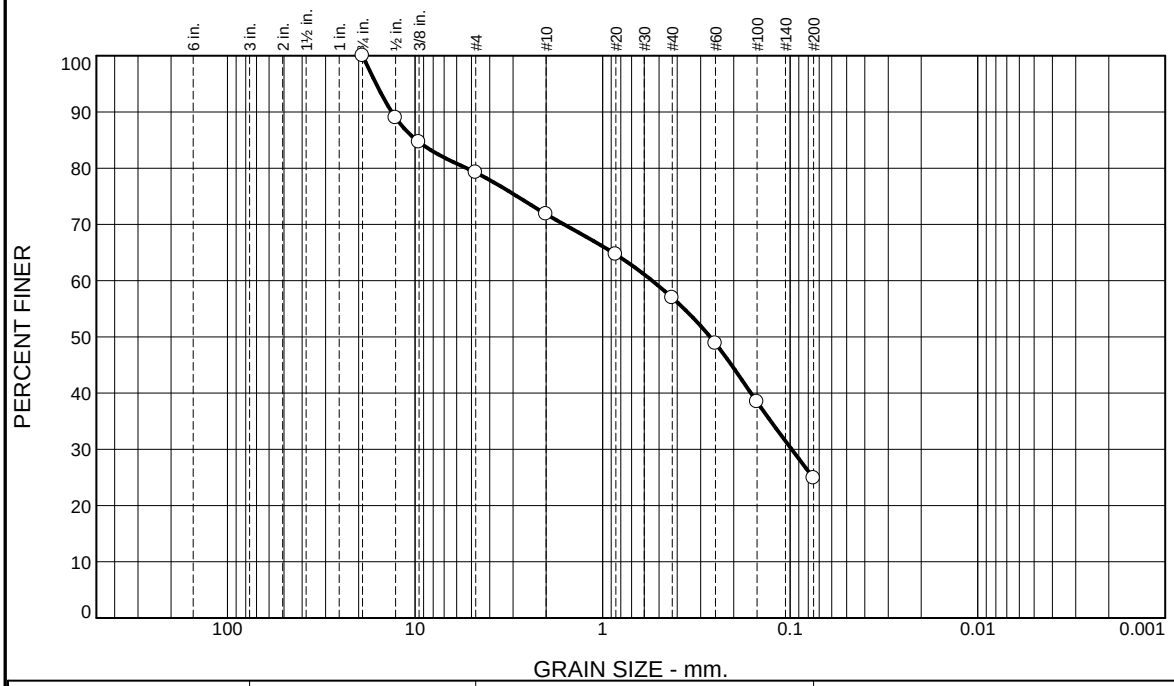
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-14

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	20.8	7.4	14.8	32.1	24.9	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	89.0		
0.375"	84.7		
#4	79.2		
#10	71.8		
#20	64.7		
#40	57.0		
#60	48.8		
#100	38.4		
#200	24.9		

* (no specification provided)

Material Description

Brown f-c SAND, some Silt, some 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}= 13.3224 D_{85}= 9.8197 D_{60}= 0.5440
D_{50}= 0.2668 D_{30}= 0.0982 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 24-26' **Date Sampled:**
Sample Number: GZ-3A / S-3

Thielsch Engineering Inc.

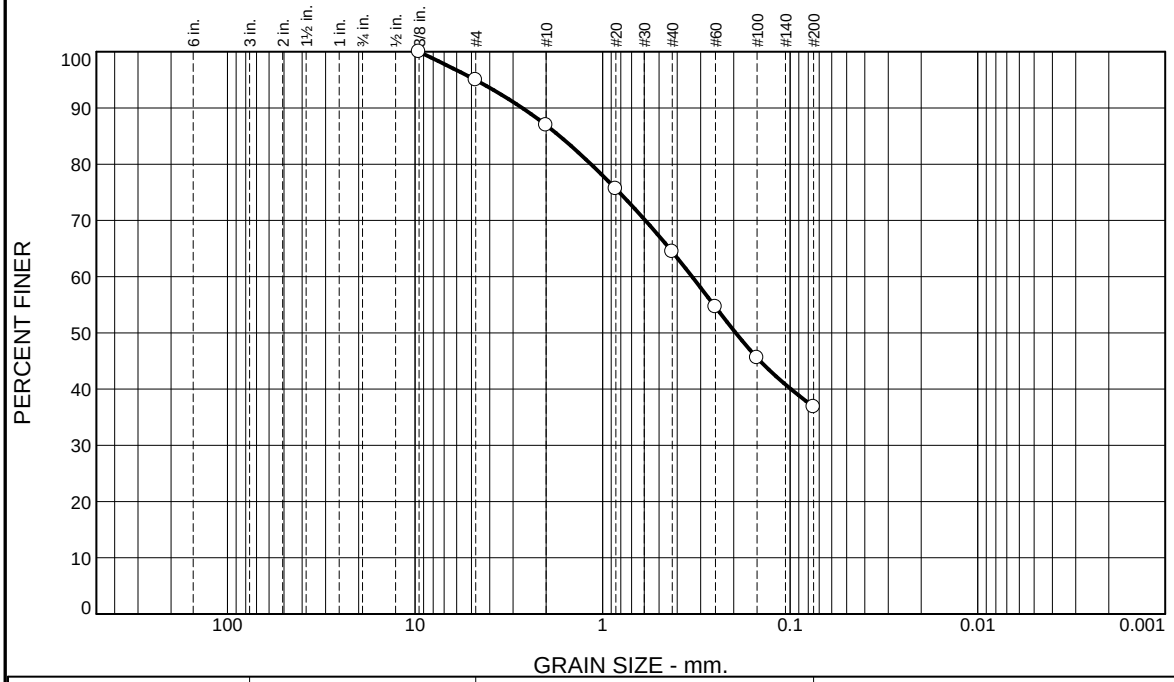
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-15

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.0	8.1	22.5	27.6	36.8	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.375"	100.0		
#4	95.0		
#10	86.9		
#20	75.6		
#40	64.4		
#60	54.6		
#100	45.6		
#200	36.8		

* (no specification provided)

Material Description

Brown Silty f-c 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}= 2.6783 D_{85}= 1.6930 D_{60}= 0.3332
D_{50}= 0.1950 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

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

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 30-32' **Date Sampled:**
Sample Number: GZ-3A / S-4

Thielsch Engineering Inc.

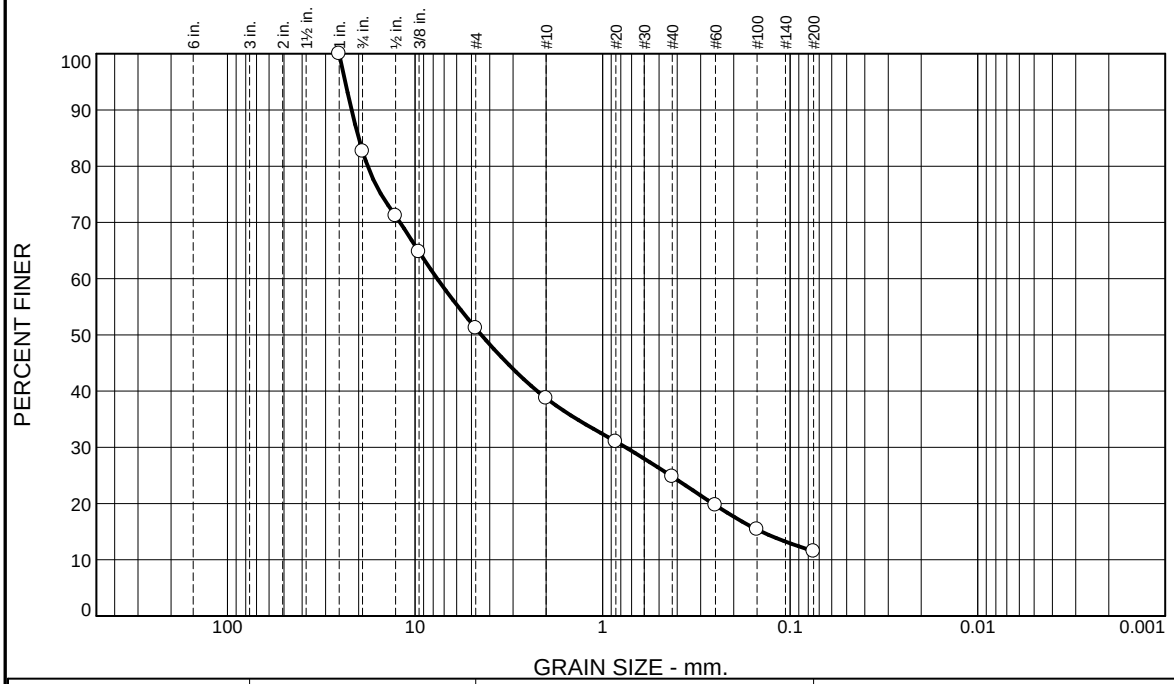
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-16

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	17.4	31.4	12.5	13.9	13.3	11.5	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	82.6		
0.5"	71.2		
0.375"	64.8		
#4	51.2		
#10	38.7		
#20	31.0		
#40	24.8		
#60	19.7		
#100	15.4		
#200	11.5		

* (no specification provided)

Material Description

Brown Sandy f-c 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}= 21.7916 D_{85}= 19.9731 D_{60}= 7.6117
D_{50}= 4.4299 D_{30}= 0.7542 D_{15}= 0.1421
D_{10}= C_u= C_c=

Remarks

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 7-9' **Date Sampled:**
Sample Number: GZ-4 / S-4

Thielsch Engineering Inc.

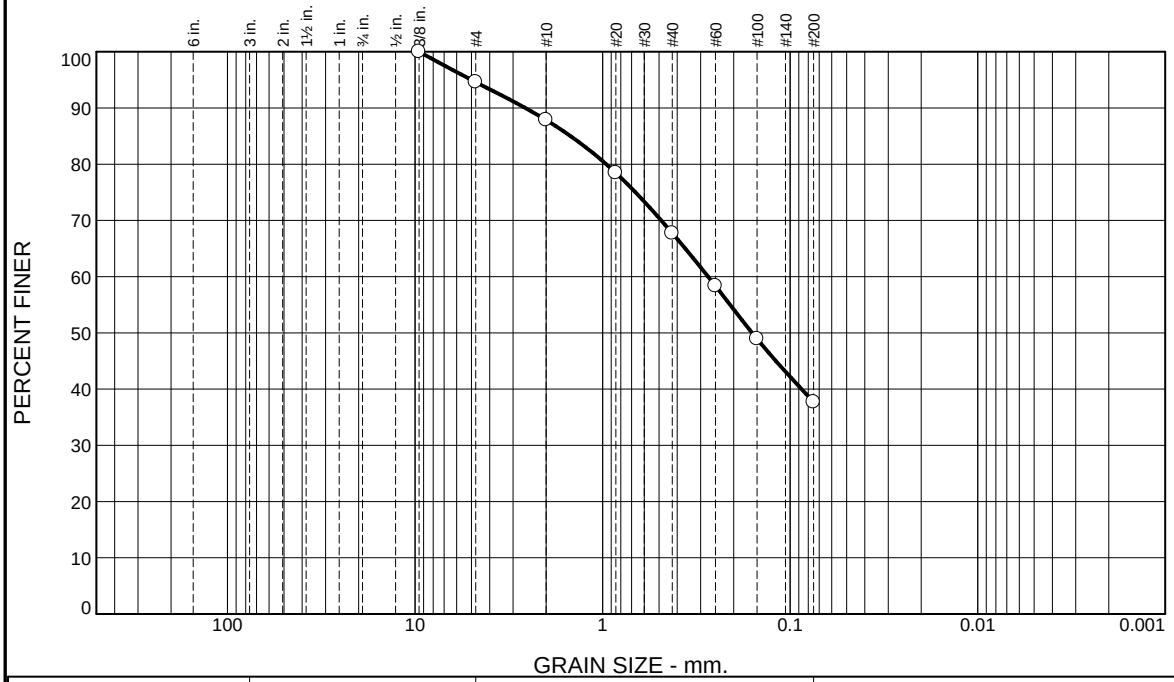
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-17

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.4	6.7	20.2	30.0	37.7	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.375"	100.0		
#4	94.6		
#10	87.9		
#20	78.5		
#40	67.7		
#60	58.3		
#100	48.9		
#200	37.7		

* (no specification provided)

Material Description

Brown Silty f-c SAND, trace fine 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}= 2.5823 D_{85}= 1.4806 D_{60}= 0.2736
D_{50}= 0.1593 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as non-plastic.

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 2-3.8' **Date Sampled:**

Sample Number: GZ-5 / S-2 Top 16"

Thielsch Engineering Inc.

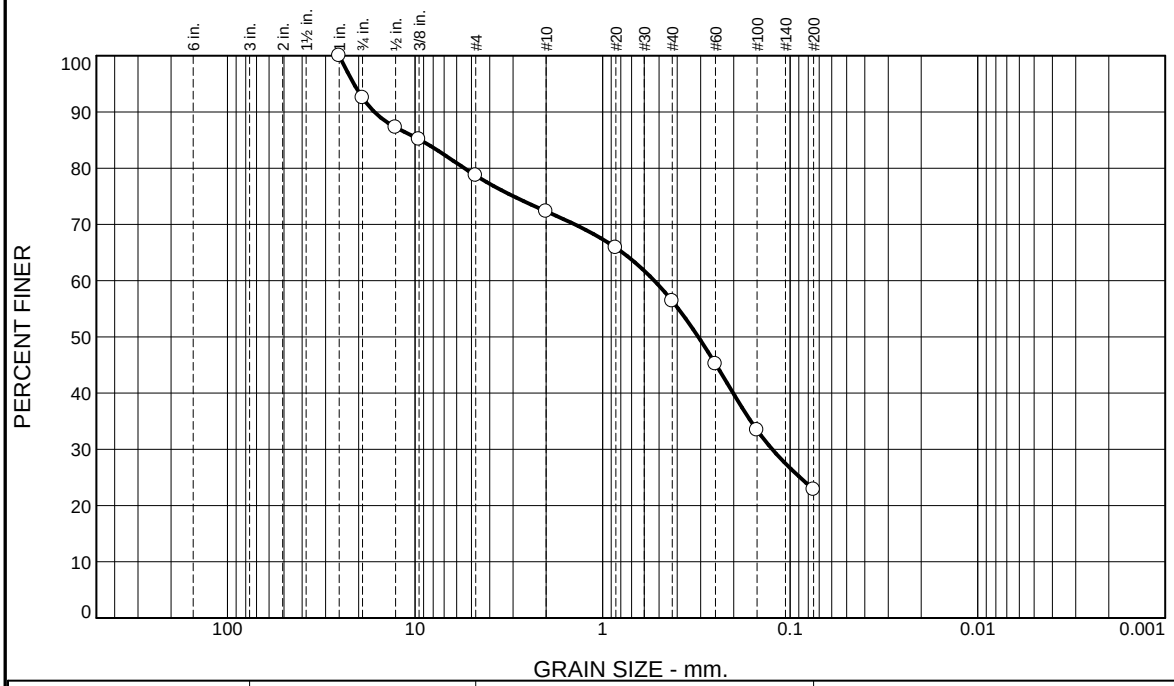
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-18

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.5	13.8	6.4	15.9	33.6	22.8	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	92.5		
0.5"	87.3		
0.375"	85.1		
#4	78.7		
#10	72.3		
#20	65.8		
#40	56.4		
#60	45.2		
#100	33.4		
#200	22.8		

* (no specification provided)

Material Description

Brown f-c SAND, some 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-2-4(0)

Coefficients

D_{90}= 16.4780 D_{85}= 9.3575 D_{60}= 0.5301
D_{50}= 0.3088 D_{30}= 0.1245 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 3-5' **Date Sampled:**
Sample Number: GZ-6 / 2D

Thielsch Engineering Inc.

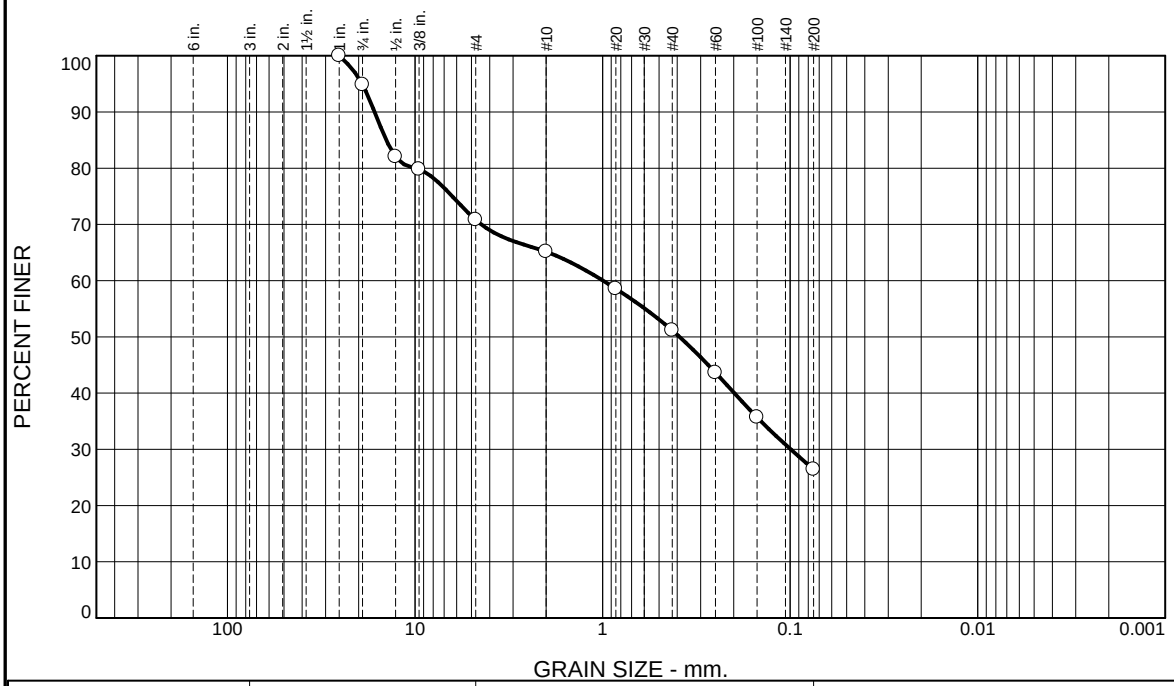
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-19

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.2	24.0	5.7	14.0	24.7	26.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	94.8		
0.5"	82.0		
0.375"	79.8		
#4	70.8		
#10	65.1		
#20	58.6		
#40	51.1		
#60	43.6		
#100	35.7		
#200	26.4		

* (no specification provided)

Material Description

Dark Brown 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-2-4(0)

Coefficients

D_{90}= 16.4398 D_{85}= 14.2364 D_{60}= 0.9944
D_{50}= 0.3887 D_{30}= 0.0993 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 25-27' **Date Sampled:**
Sample Number: GZ-6 / 10D

Thielsch Engineering Inc.

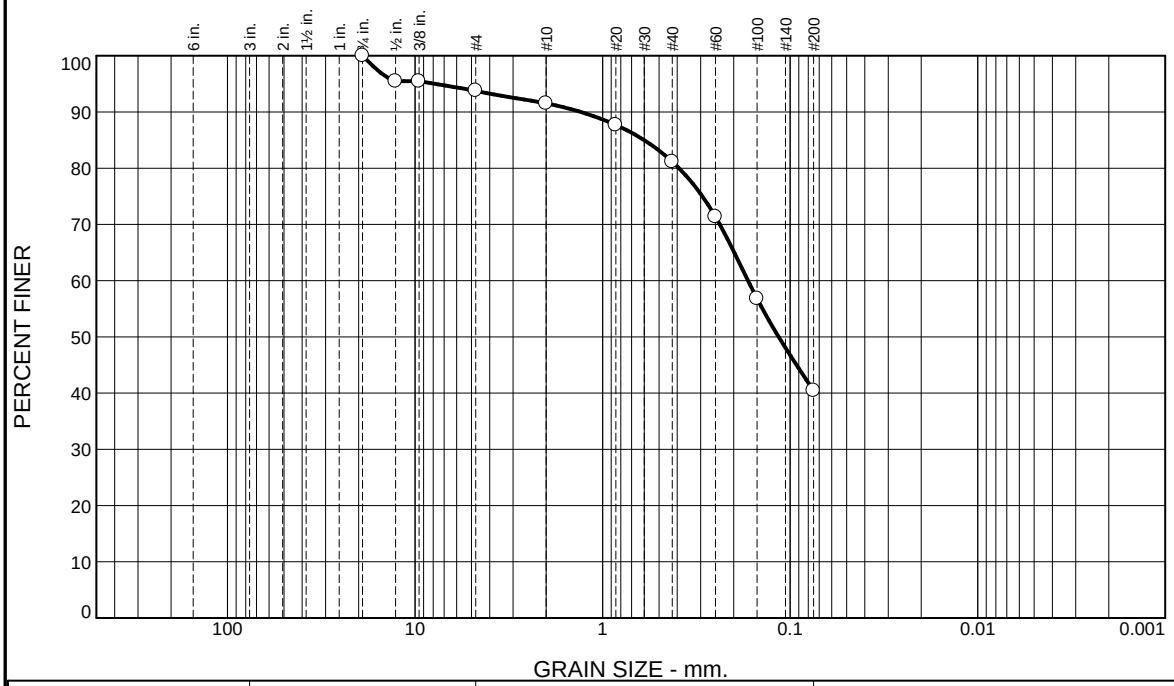
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-20

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.2	2.3	10.3	40.8	40.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	95.5		
0.375"	95.5		
#4	93.8		
#10	91.5		
#20	87.7		
#40	81.2		
#60	71.4		
#100	56.8		
#200	40.4		

* (no specification provided)

Material Description

Light Brown Silty f-m 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}= 1.3038 D_{85}= 0.6003 D_{60}= 0.1676
D_{50}= 0.1152 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

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

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 40-42' **Date Sampled:**
Sample Number: GZ-6 / 13D

Thielsch Engineering Inc.

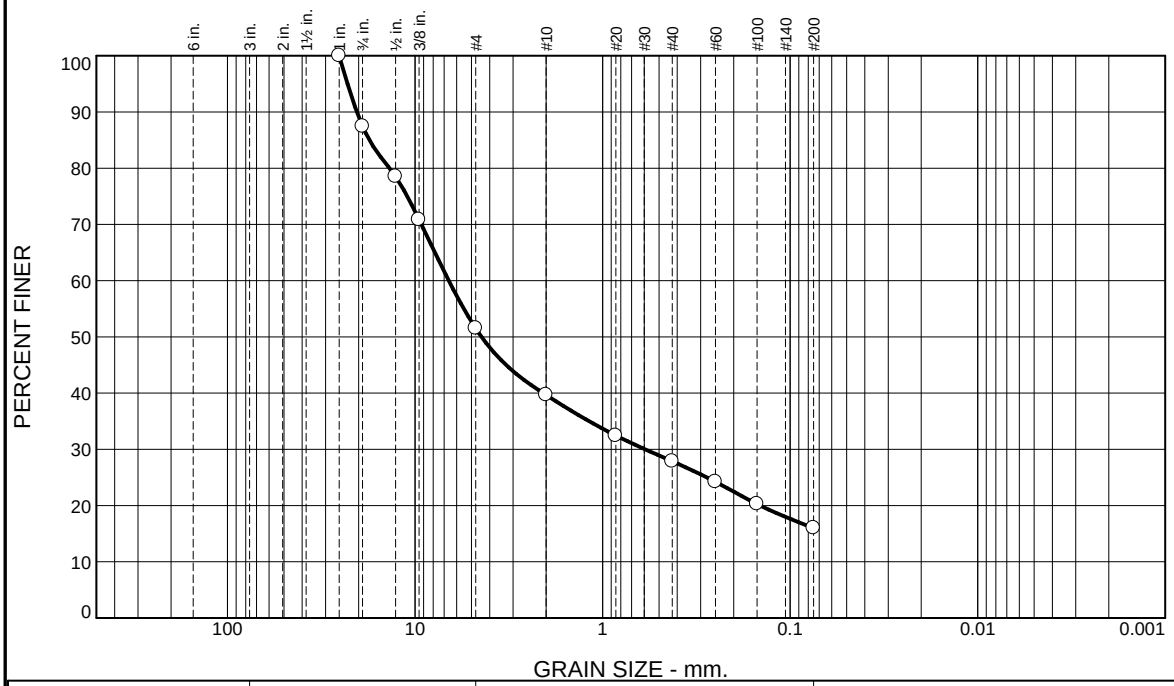
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-21

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.6	35.9	11.8	11.8	11.9	16.0	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	87.4		
0.5"	78.5		
0.375"	70.9		
#4	51.5		
#10	39.7		
#20	32.4		
#40	27.9		
#60	24.2		
#100	20.3		
#200	16.0		

* (no specification provided)

Material Description

Brown Sandy f-c GRAVEL, little Silt

Atterberg Limits (ASTM D 4318)

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

Classification

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

Coefficients

D_{90}= 20.4229 D_{85}= 17.5202 D_{60}= 6.6042
D_{50}= 4.4189 D_{30}= 0.5931 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 4-6' **Date Sampled:**
Sample Number: GZ-12 / 3D

Thielsch Engineering Inc.

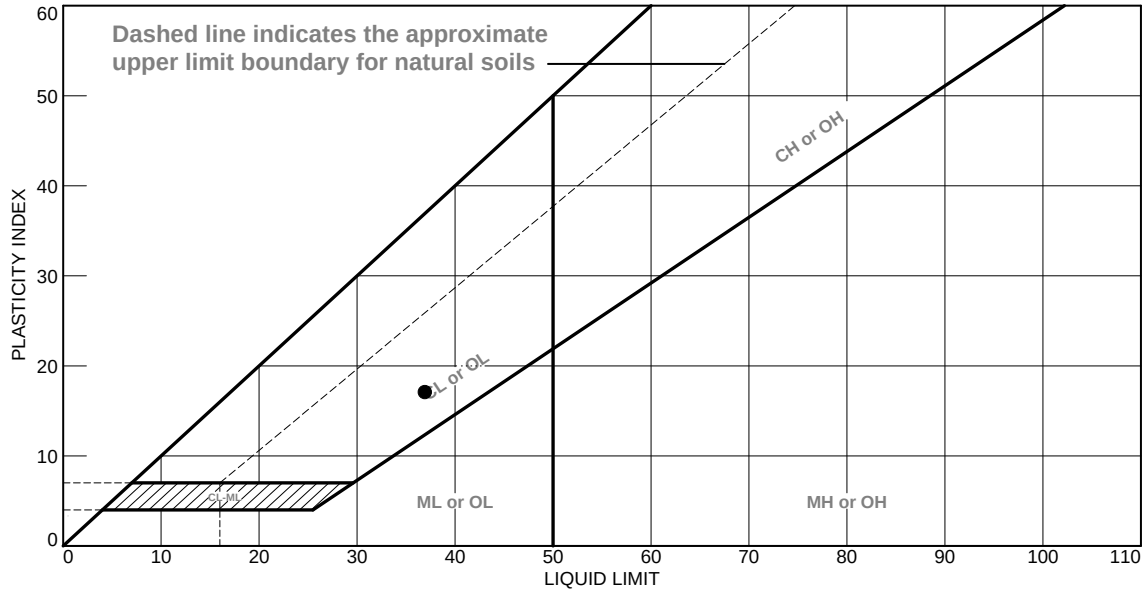
Cranston, RI

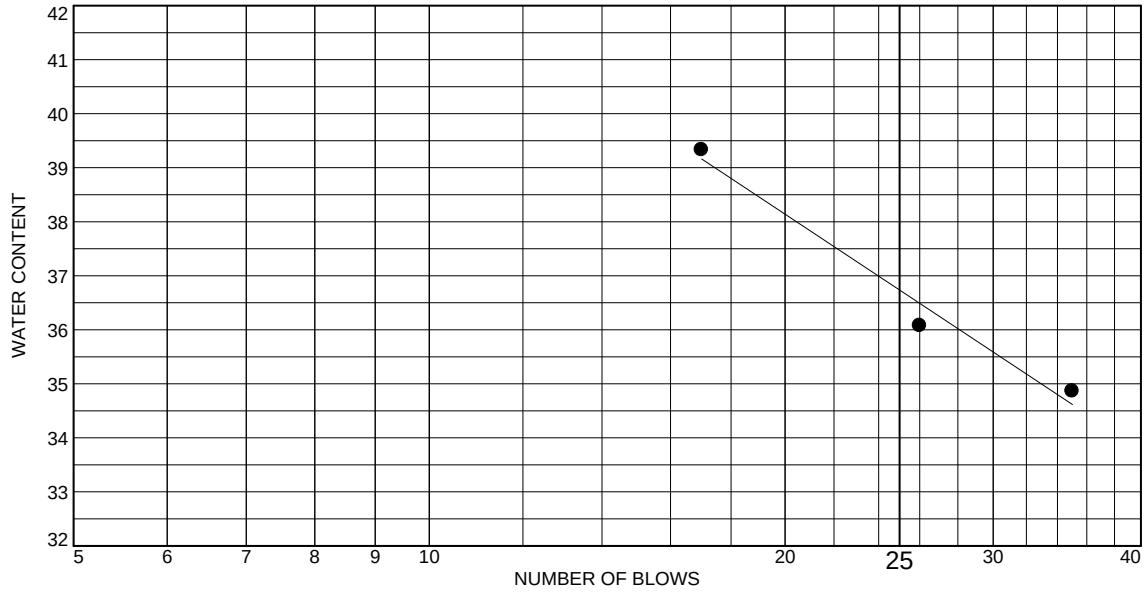
Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-22

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown CLAY & SILT	37	20	17			

Project No. 09.0026090.00 **Client:** GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures

Portsmouth, NH / Kittery, ME

Source of Sample: Boring (01.22.21) **Depth:** 7-8.9'

Sample Number: GZ-15 / 4D

Remarks:

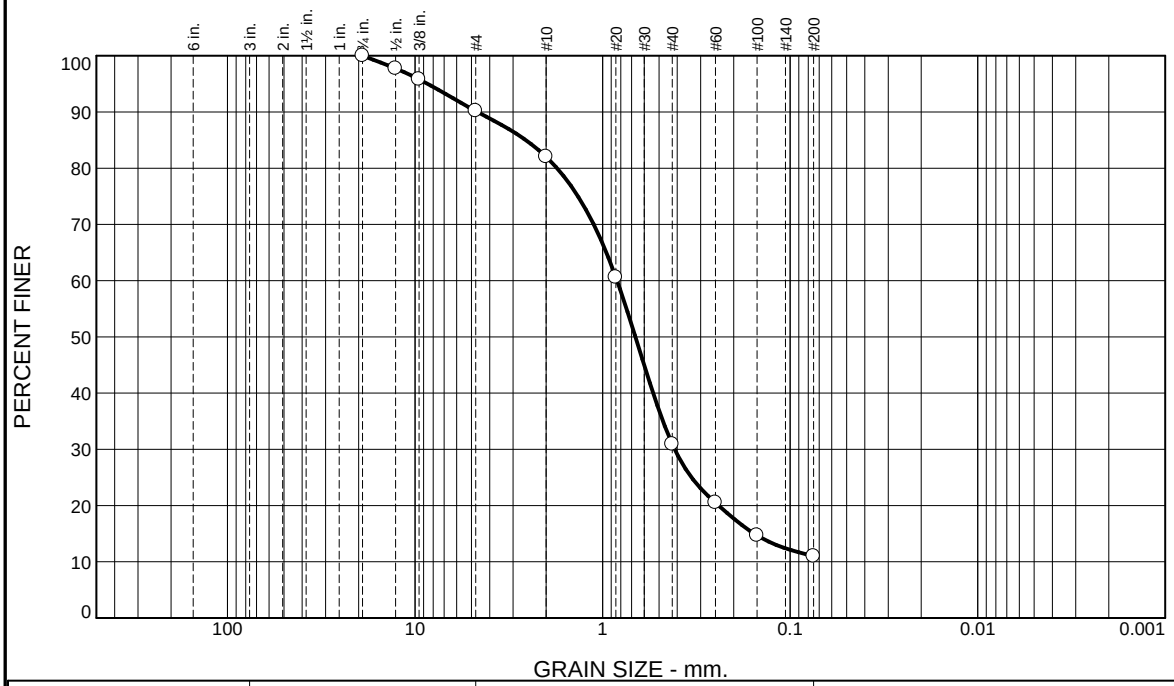
Thielsch Engineering Inc.

Cranston, RI

Figure L-5

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

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.8	8.2	51.1	19.9	11.0	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	97.7		
0.375"	95.8		
#4	90.2		
#10	82.0		
#20	60.6		
#40	30.9		
#60	20.5		
#100	14.7		
#200	11.0		

* (no specification provided)

Material Description

Brown f-c 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-1-b

Coefficients

D_{90}= 4.6455 D_{85}= 2.5659 D_{60}= 0.8377
D_{50}= 0.6687 D_{30}= 0.4126 D_{15}= 0.1553
D_{10}= C_u= C_c=

Remarks

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 3-5' **Date Sampled:**

Sample Number: GZ-16 / 2D Top 9"

Thielsch Engineering Inc.

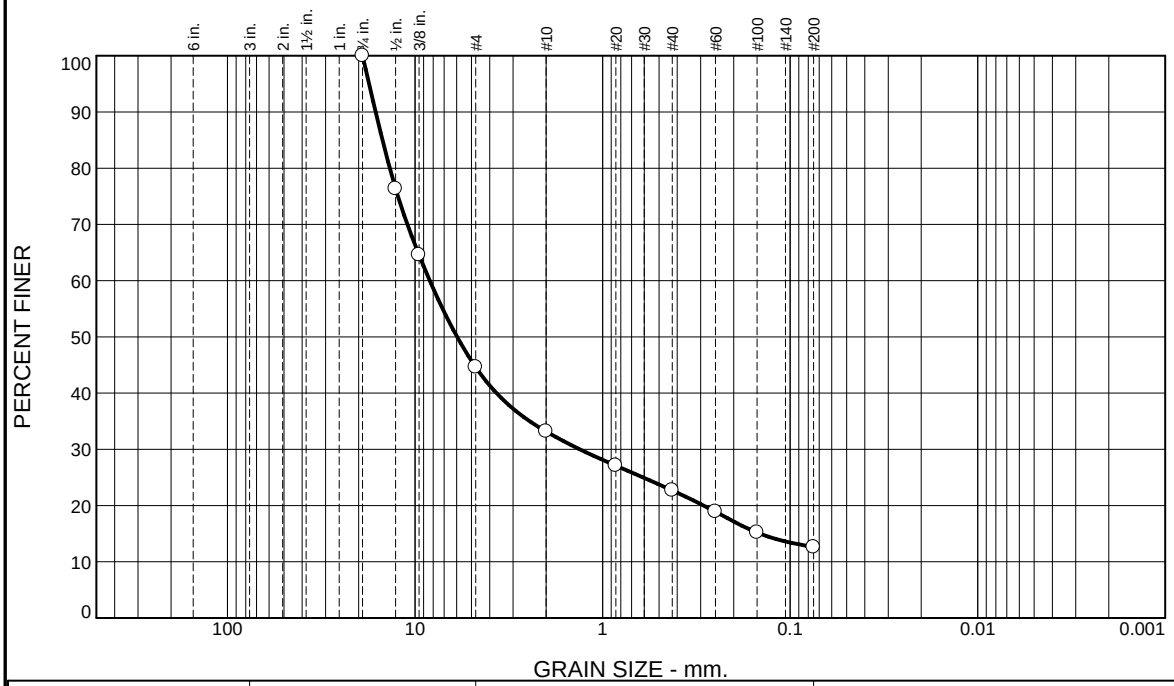
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-23

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	55.4	11.4	10.5	10.1	12.6	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	76.4		
0.375"	64.6		
#4	44.6		
#10	33.2		
#20	27.1		
#40	22.7		
#60	18.9		
#100	15.2		
#200	12.6		

* (no specification provided)

Material Description

Dark Brown fine GRAVEL, some f-c Sand, 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}= 16.2285 D_{85}= 14.9201 D_{60}= 8.3425
D_{50}= 5.9676 D_{30}= 1.3211 D_{15}= 0.1450
D_{10}= C_u= C_c=

Remarks

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 3-5' **Date Sampled:**

Sample Number: GZ-16 / 2D Bot 6"

Thielsch Engineering Inc.

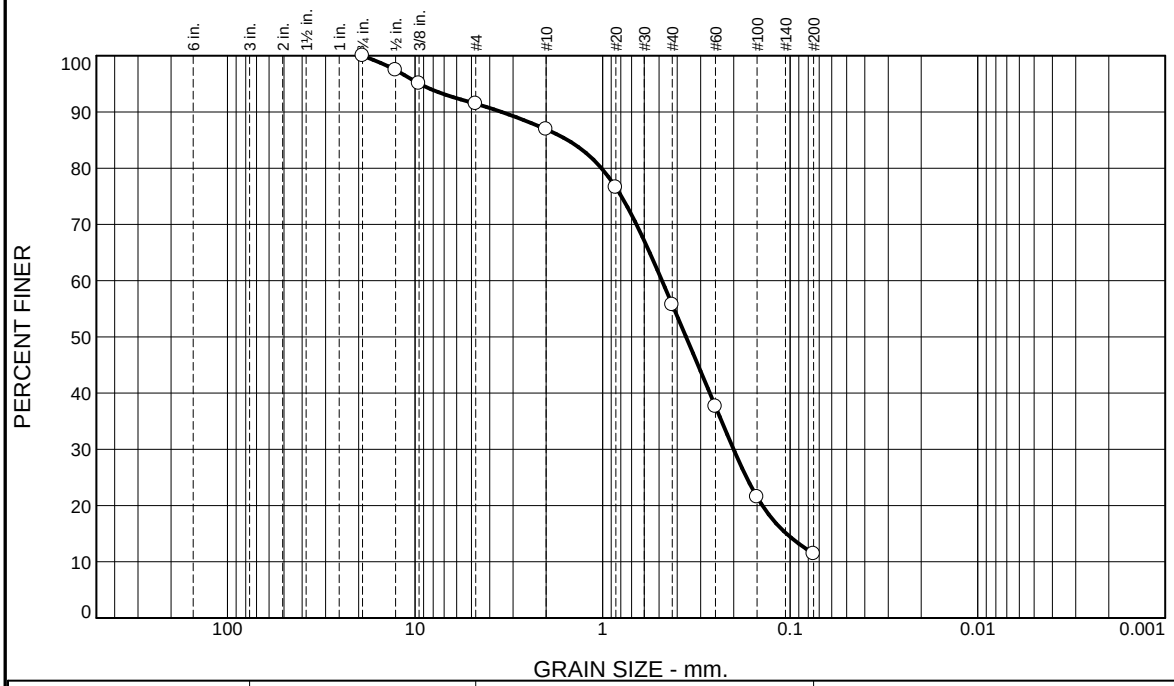
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-24

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.5	4.6	31.2	44.3	11.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	97.5		
0.375"	95.1		
#4	91.5		
#10	86.9		
#20	76.6		
#40	55.7		
#60	37.6		
#100	21.5		
#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}= 3.4545 D_{85}= 1.5339 D_{60}= 0.4822
D_{50}= 0.3590 D_{30}= 0.2002 D_{15}= 0.1047
D_{10}= C_u= C_c=

Remarks

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 2-4' **Date Sampled:**

Sample Number: GZ-17 / 2D

Thielsch Engineering Inc.

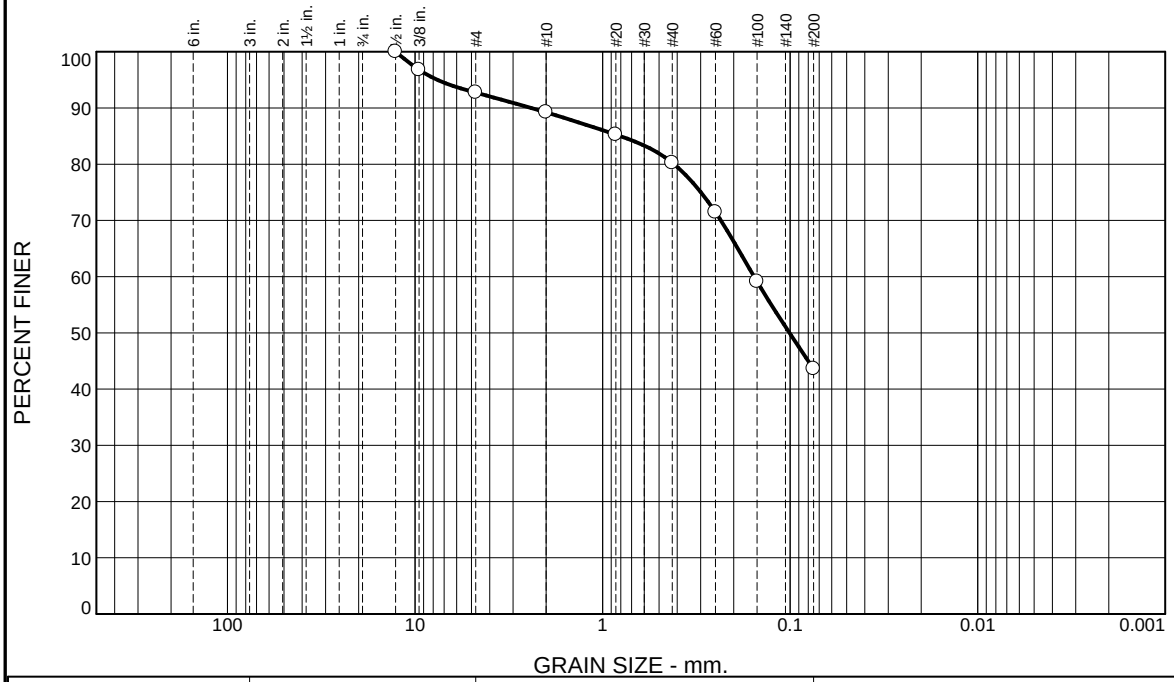
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-25

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.3	3.5	8.9	36.7	43.6	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.5"	100.0		
0.375"	96.8		
#4	92.7		
#10	89.2		
#20	85.3		
#40	80.3		
#60	71.4		
#100	59.1		
#200	43.6		

* (no specification provided)

Material Description

Brown Silty f-m 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}= 2.4026 D_{85}= 0.8072 D_{60}= 0.1555
D_{50}= 0.1009 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

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

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 8-10' **Date Sampled:**

Sample Number: GZ-17 / 5D

Thielsch Engineering Inc.

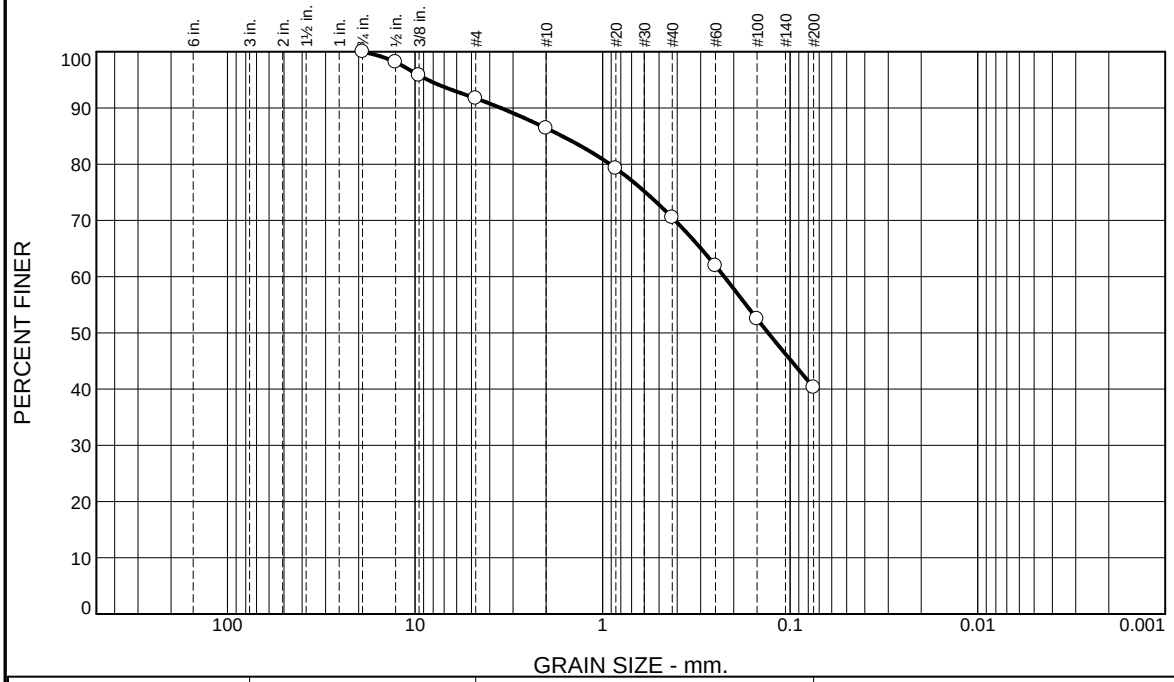
Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-26

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.3	5.3	15.9	30.2	40.3	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	98.2		
0.375"	95.8		
#4	91.7		
#10	86.4		
#20	79.3		
#40	70.5		
#60	61.9		
#100	52.5		
#200	40.3		

* (no specification provided)

Material Description

Brown Silty f-c SAND, trace fine 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}= 3.4871 D_{85}= 1.6413 D_{60}= 0.2245
D_{50}= 0.1309 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as non-plastic.

Date Received: 01.19.21 **Date Tested:** 01.21.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring (01.22.21) **Depth:** 14-16' **Date Sampled:**

Sample Number: GZ-17 / 8D

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental

Project: Portsmouth / Kittery I-95 Sign Structures
Portsmouth, NH / Kittery, ME

Project No: 09.0026090.00 **Figure** G-27

THIELSCH ENGINEERING
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Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
GZA GeoEnvironmental
South Portland, ME
PM: Nicholas Williams
Assigned By: Nicholas Williams
Collected By: E. Tome

Project Information:
Portsmouth/Kittery I-95 Sign Structures
Portsmouth, NH and Kittery, ME
GZA Project Number: 09.0026090.00
Summary Page: 1 of 1
Report Date: 01.22.21

LABORATORY TESTING DATA SHEET, Report No.: 7421-A-144

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	
GZ-1	R1	34.3-34.9	21-S-185		1.992	4.432	170.0				3493	0.162	1.74	0.32				Slate
Broke along quartz vein.																		
GZ-5	R1	9.9-10.3	21-S-186		1.992	3.982	172.1				8163	0.309	2.29	0.19				Slate
Minor break at 6953psi. All breaks were fresh.																		
GZ-11	R2	11.1-11.6	21-S-187		1.996	4.019	168.7				6939	0.538	1.41	0.34				Slate
Minor break at 4195psi. All breaks were fresh.																		
GZ-16	R9	21.1-21.8	21-S-188		1.991	4.434	167.8				4126	0.304	1.41	0.30				Slate
Broke along existing fault.																		

(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: *01.19.21* Reviewed By: Date Reviewed: *01.25.21*

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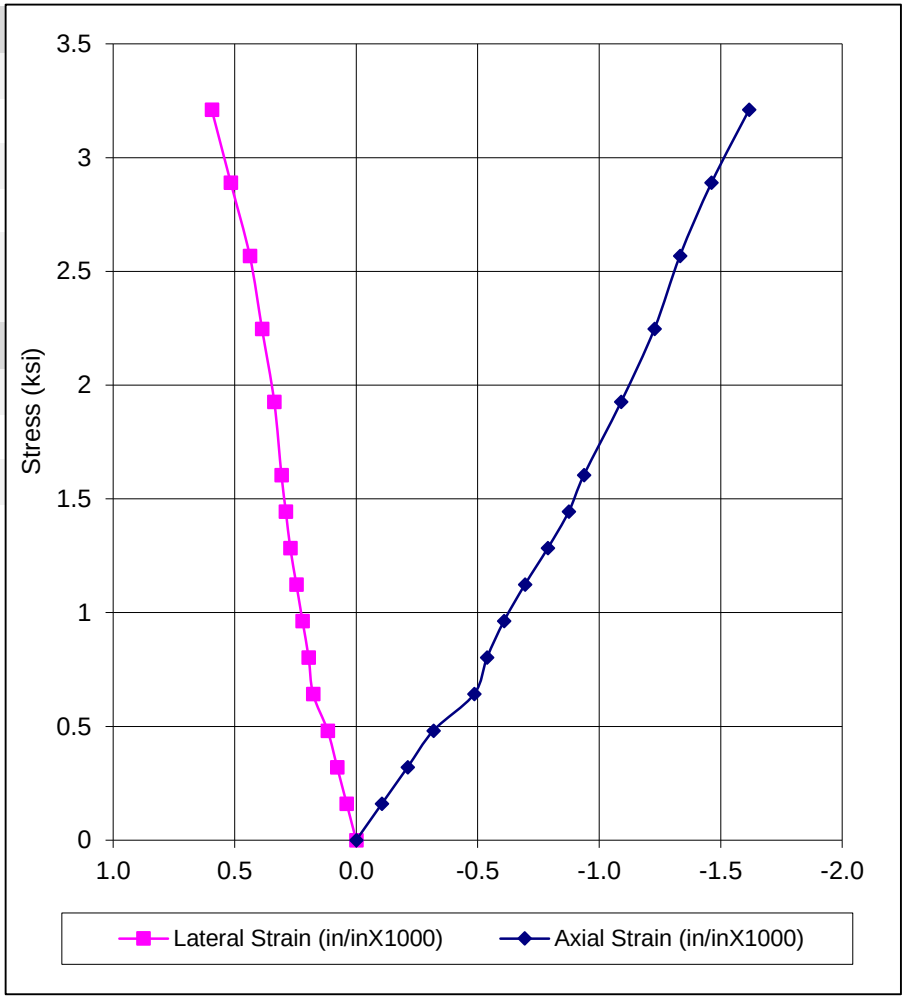
Client Information:
GZA GeoEnvironmental
Bedford, NH
PM: Nicholas Williams
Assigned by: Nicholas Williams
Collected by: E. Tome

Project Information:
Portsmouth/Kittery I-95 Sign Structures
Portsmouth, NH and Kittery, ME
Project Number: 09.0026090.00
Technician: JM
Report Date: 01.22.21

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

Sample Information		Compressive Test Information	
Boring ID:	GZ-1	**Unit Weight (pcf):**	170.0
Sample #:	R1	**Failure Stress (psi):**	3,493
Depth (ft):	34.3-34.9	**Failure Mode:**	Along Qtz vein
Tested Depth (ft):	34.4-34.8	**Time to Failure (min)**	2.23
Rock Type:	Slate		
Features:	Existing faults and quartz veins		

Test Specimen Information		Elastic Moduli Test Information	
Diameter, D (in):	1.992	**Poisson's Ratio @ 50%:**	0.32
Length, L (in):	4.432	**Strain %:**	0.162
L:D Ratio:	2.23	**E sec PSI @ 50%:**	1.74E+06



Testing Notes: Broke along quartz vein.

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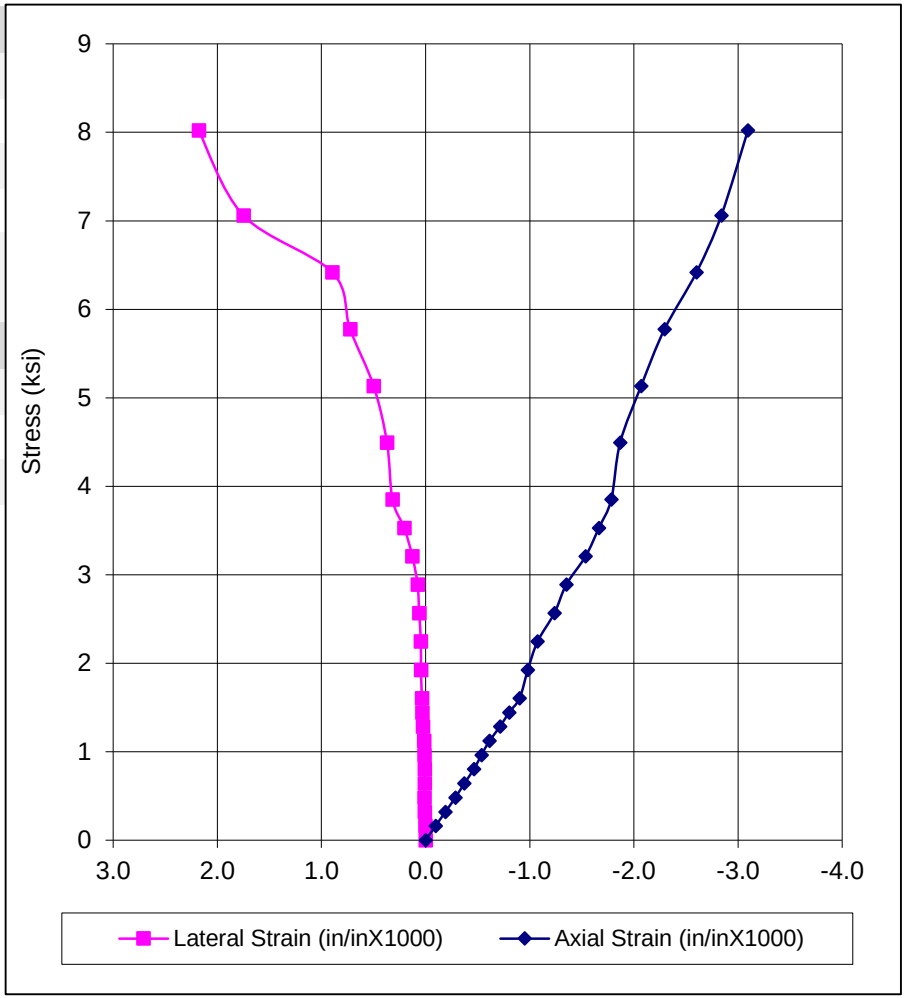
Portsmouth, NH and Kittery, ME
Project Number: 09.0026090.00
Technician: JM
Report Date: 01.22.21

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

Sample Information		Compressive Test Information	
Boring ID:	GZ-5	**Unit Weight (pcf):**	172.1
Sample #:	R1	**Failure Stress (psi):**	8,163
Depth (ft):	9.9-10.3	**Failure Mode:**	Fresh
Tested Depth (ft):	10.0-10.4	**Time to Failure (min)**	4.01
Rock Type:	Slate		
Features:	Quartz veins		
Test Specimen Information		**Elastic Moduli Test Information**	
Diameter, D (in):	1.992	**Poisson's Ratio @ 50%:**	0.19
Length, L (in):	3.982	**Strain %:**	0.309
L:D Ratio:	2.00	**E sec PSI @ 50%:**	2.29E+06



Testing Notes: Minor break at 6953psi. All breaks were fresh.

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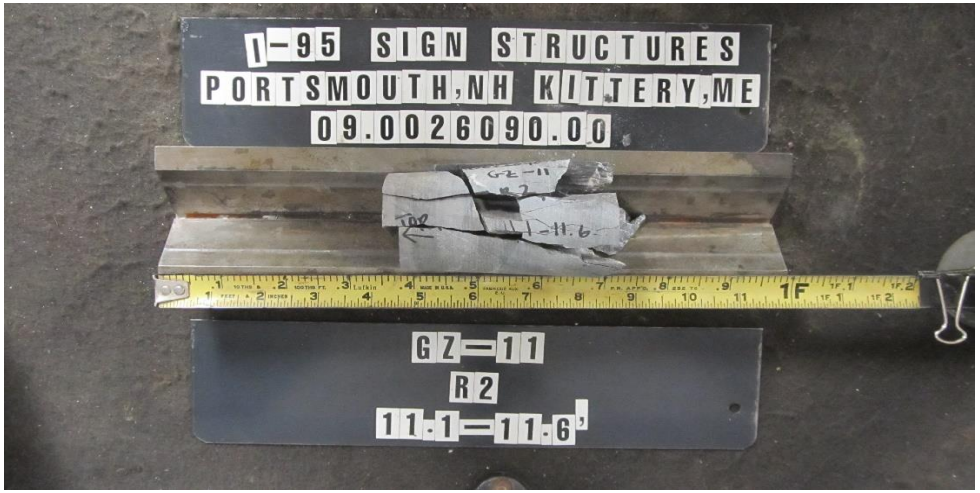
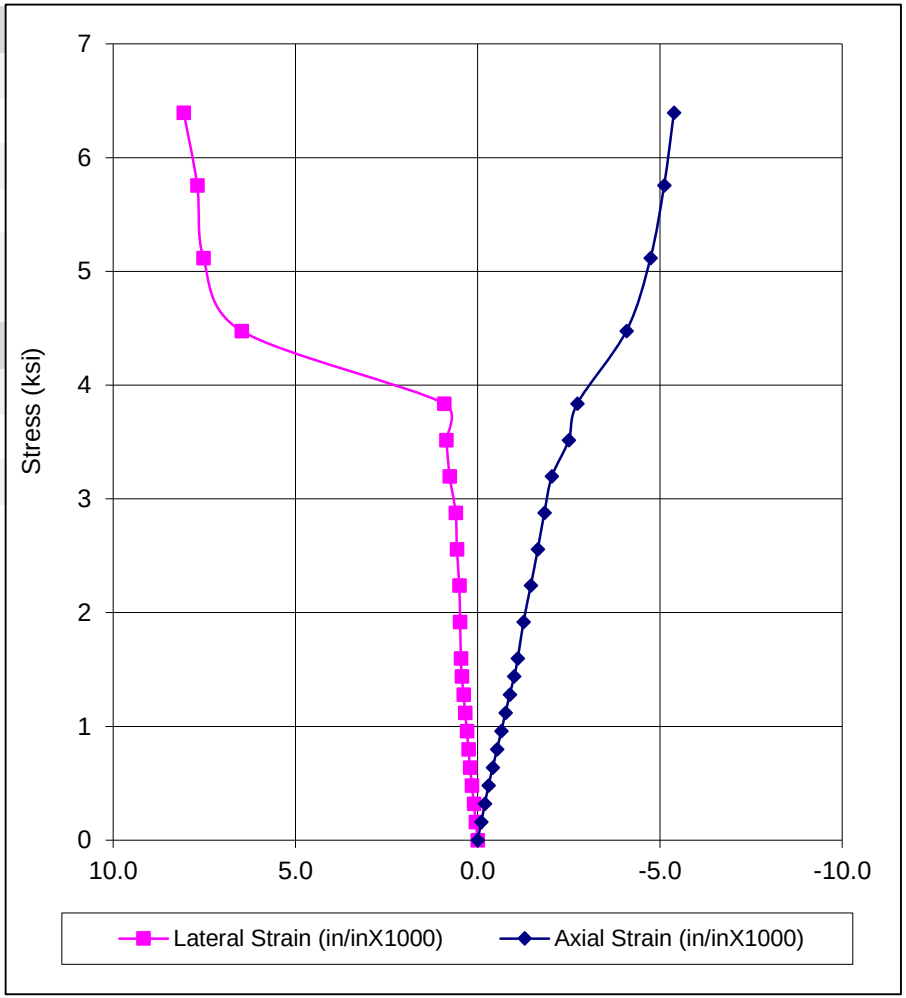
Project Information:
Portsmouth/Kittery I-95 Sign Structures
Portsmouth, NH and Kittery, ME
Project Number: 09.0026090.00
Technician: JM
Report Date: 01.22.21

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

Sample Information		Compressive Test Information	
Boring ID:	GZ-11	**Unit Weight (pcf):**	168.7
Sample #:	R2	**Failure Stress (psi):**	6,939
Depth (ft):	11.1-11.6	**Failure Mode:**	Fresh
Tested Depth (ft):	11.1-11.5	**Time to Failure (min)**	3.17
Rock Type:	Slate		
Features:	Quartz veins		

Test Specimen Information		Elastic Moduli Test Information	
Diameter, D (in):	1.996	**Poisson's Ratio @ 50%:**	0.34
Length, L (in):	4.019	**Strain %:**	0.538
L:D Ratio:	2.01	**E sec PSI @ 50%:**	1.41E+06





Testing Notes: Minor break at 4195psi. All breaks were fresh.

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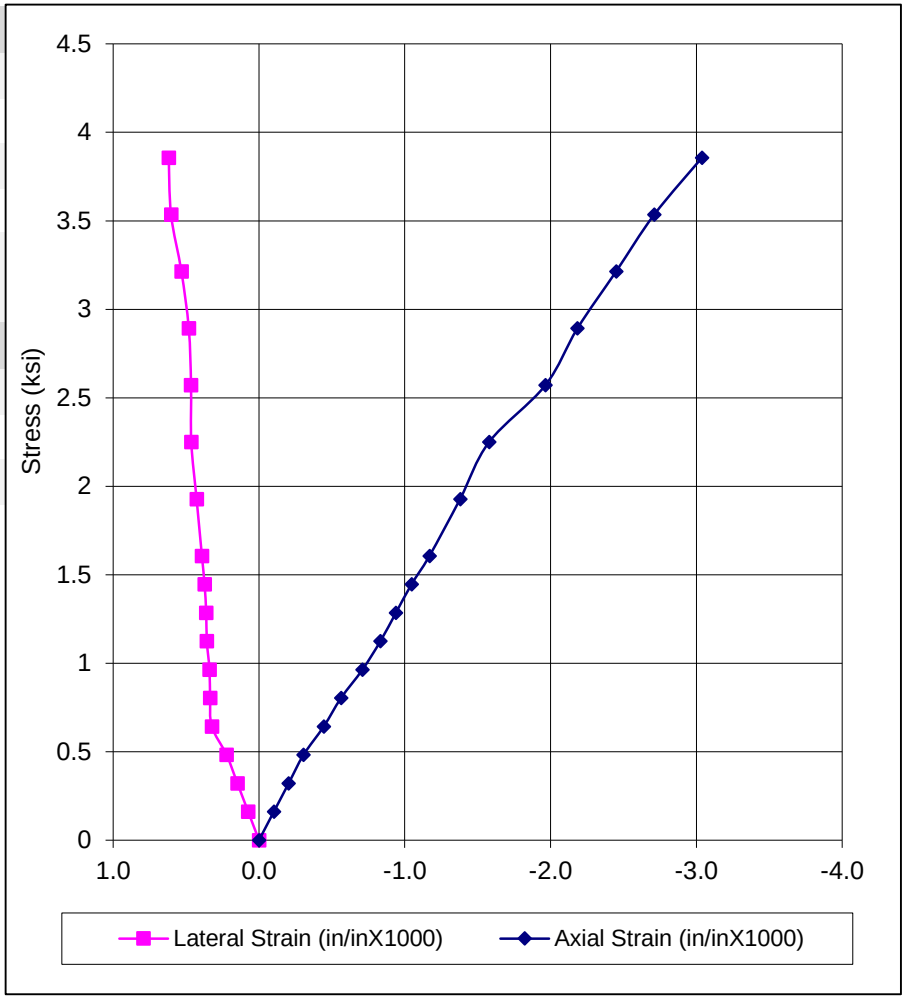
Project Number: 09.0026090.00
Technician: JM
Report Date: 01.22.21

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

Sample Information		Compressive Test Information	
Boring ID:	GZ-16	**Unit Weight (pcf):**	167.8
Sample #:	R9	**Failure Stress (psi):**	4,126
Depth (ft):	21.1-21.8	**Failure Mode:**	Fresh
Tested Depth (ft):	21.2-21.6	**Time to Failure (min)**	3.17
Rock Type:	Slate		
Features:	Existing faults and quartz veins		

Test Specimen Information		Elastic Moduli Test Information	
Diameter, D (in):	1.991	**Poisson's Ratio @ 50%:**	0.30
Length, L (in):	4.434	**Strain %:**	0.304
L:D Ratio:	2.23	**E sec PSI @ 50%:**	1.41E+06



Testing Notes: Broke along existing fault.