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GEOTECHNICAL DATA REPORT
TRAFTON ROAD BRIDGE NO. 5812 OVER INTERSTATE 95 MAINE DOT WIN 29486.00 (LEGACY WIN 26152.00) SIDNEY, MAINE

June 2025
09.0026242.00

Prepared for:
Maine Department of Transportation
Augusta, Maine

Prepared by:
GZA GeoEnvironmental, Inc.
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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

We are pleased to provide this Geotechnical Data Report, which includes geotechnical data related to the replacement of Maine Department of Transportation (MaineDOT) Trafton Road Bridge No. 5812 in Sidney, Maine. Our work was completed in accordance with GZA GeoEnvironmental, Inc.'s Project Contract for the above referenced project dated July 22, 2024, and our Proposal No. 09.P000130.24e, dated December 18, 2023, and the Limitations included in **Appendix A** of this report.

1.1 BACKGROUND

The existing Trafton Road Bridge No. 5812 was constructed circa 1959 and spans east to west, carrying Trafton Road over Interstate 95 (I-95), as shown in **Figure 1**. Bridge No. 5812 is a 346-foot-long, six-span, continuous bridge with steel beams and a reinforced concrete deck. The bridge is 29 feet wide and supported by concrete piers and concrete stub abutments.

The 1958 as-built plans indicate that the two stub abutments are supported by HP 10x42 piles that are either plumb or battered at 2.5H:12V. Abutments 1 and 2 are supported by nine piles each and were designed using an allowable design capacity of 37 tons per pile and have estimated lengths of approximately 20 and 30 feet, respectively. The five piers are shown to be supported by spread footings bearing on bedrock. The plans do not provide an allowable bearing capacity for the footings. The existing approach embankments are approximately 14 to 24 feet above original grades. The available historic foundation drawings are attached in **Appendix B**.

Elevations referenced in this report are in feet and refer to the North American Vertical Datum of 1988 (NAVD88) unless noted otherwise. Elevations shown on the 1958 drawings are in feet and refer to the National Geodetic Vertical Datum of 1929 (NGVD29). Stantec indicated that a datum shift of approximately -0.7 feet can be used to convert from NGVD29 to NAVD88.

It is GZA's understanding that a full bridge replacement is planned for this project. The bridge will be designed and constructed as part of a Design-Build bundle. Requirements for on- or off-alignment bridge replacement alternatives will be specified in the MaineDOT Design-Build Request for Proposals (RFP).

1.2 OBJECTIVES AND SCOPE OF SERVICES

The objectives of our work were to collect data on the subsurface conditions as the Owner's Geotechnical Consultant to be provided to prospective Design-Build teams in the MaineDOT Design-Build Request for Proposals (RFP). To meet these objectives, GZA completed the following Scope of Services:

- Conducted a site visit to observe surficial conditions and reviewed existing bridge plans, historical topography, historical geotechnical reports, and mapped surficial and bedrock geology of the site;
- Coordinated and observed a subsurface exploration program, consisting of three test borings, to evaluate subsurface conditions for the bridge;

- Conducted a laboratory testing program to evaluate engineering and index properties of the site soils and rock; and
- Prepared this report summarizing our findings.

2.0 SUBSURFACE EXPLORATIONS

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

2.1 PREVIOUS (1958) BORING

In 1958, MaineDOT conducted nine test borings, designated BOR #1 through #9, four rod soundings, designated as SNDG #1 through 4, and five test pits, designated as Test Pit #1 through #5, to explore subsurface conditions for bridge construction. All explorations drilled for the design of the existing bridge were drilled prior to construction of I-95. At the time, the grades were 14 to 24 feet lower than Trafton Road is today. Each boring was drilled through the overburden and to bedrock, and approximately 5 to 10 feet of core was collected from each boring. Depths to bedrock ranged from 5 to 16 feet below original grades in these borings.

The boring log sheets from the 1958 geotechnical report are included in **Appendix B**.

2.2 RECENT BORINGS

GZA completed a subsurface exploration program consisting of three (3) test borings designated as BB-WTR-101 through BB-WTR-103. The locations and designations are shown on the attached **Boring Location Plan, Figure 2**. Borings BB-WTR-101 and -103 were completed about 15 feet behind the face of each abutment, and boring BB-WTR-102 was drilled through the bridge deck between Pier 3 and Pier 4. All three borings were drilled from Trafton Road. The as-drilled boring locations and elevations were surveyed by MaineDOT, provided to GZA and shown on the logs; the surveyed as-drilled locations are shown on **Figure 2**.

The borings were drilled to depths of approximately 17 to 49 feet below ground surface (bgs) and terminated approximately 9 to 11 feet into bedrock. New England Boring Contractors of Hermon, Maine provided drilling services and coordinated utility clearance. The drilling was completed from April 24 through April 26, 2023. GZA personnel monitored the drilling work and prepared logs of each boring, included in **Appendix C**.

The borings were drilled using 4-inch casing and drive-and-wash techniques through the overburden and coring equipment in the bedrock. Standard Penetration Testing (SPT) and split-spoon sampling were performed at 5-foot typical intervals in overburden soils. SPTs were conducted according to MaineDOT requirements, using an automatic hammer system calibrated in accordance with ASTM D4633-05 and MaineDOT procedures. SPTs were conducted using automatic hammer NEBC #20, which had a rated hammer energy transfer ratio of 0.742 at the time of drilling. The drilling subcontractor backfilled the approach boreholes with cuttings or sand and topped them with asphalt cold patch upon completion, and they patched the bridge deck hole with quick-set concrete. Approximately 9 to 10 feet of rock core

was taken from each boring using NX (2.0-inch diameter) coring equipment. Bedrock core photographs are presented in **Appendix E**.

3.0 LABORATORY TESTING

GZA retained Thielsch Engineering's Geotechnical Laboratory in Cranston, Rhode Island to complete a laboratory testing program to assess the gradation and index properties of the soil and bedrock. The testing program included:

COMPLETED LABORATORY TESTS		
Laboratory Test	**ASTM Standard**	**Number of Tests**
Grain Size Analysis	D6913	5
Hydrometer	D7928	3
Atterberg Limits	D4318	1
Moisture Content	D2216	6
Unconfined Compressive Strength (with axial and lateral strain)	D7012 Method D	2

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

4.0 SUBSURFACE CONDITIONS

4.1 SURFICIAL AND BEDROCK GEOLOGY

Based on available surficial geologic mapping[1], the surficial unit at the site is Presumpscot Formation, which consists of a marine silt, clay, and local sand beds deposited on late-glacial sea floor. Glacial Till is mapped to the west and southwest of the site and consists of a poorly sorted mixture of clay, silt, and sand and can include cobbles and boulders. Thin drift Glacial Till, usually around 10 feet thick or less with bedrock outcroppings, are mapped to the northeast of the site.

Bedrock in the vicinity of the site is mapped[2] as the Waterville Formation and the Mayflower Hill Formation. The Waterville formation is characterized as fine to medium grained siltstone and claystone pelite and fine grained to very fine grained, non-foliated, quartz-plagioclase, metasandstone. The Mayflower Hill Formation is described as light grey phyllite.

---

[1] Weddle, Thomas K. and Eckert, Sydney D., 2016, Surficial geology of the Waterville quadrangle, Maine: Maine Geological Survey, Open-File Map 16-8, map, scale 1:24,000. *Maine Geological Survey Maps*. 1034. http://digitalmaine.com/mgs_maps/1034

[2] Osberg, Philip H., 1968, Stratigraphy, structural geology, and metamorphism of the Waterville-Vassalboro area, Maine: Maine Geological Survey (Department of Economic Development), Bulletin 20, 64 p. report, color map, cross section, scale 1:62,500. *Maine Geological Survey Maps*. 80. http://digitalmaine.com/mgs_maps/80

4.2 SUBSURFACE PROFILE

Four soil units, Fill, Marine Clay, Marine Sand, and Glacial Till were encountered in the test borings underlying approximately 6 to 10 inches of asphalt pavement (in Trafton Road approaches) and overlying bedrock. The thicknesses and generalized descriptions of the soil units are presented in the following table, in descending order from existing ground surface. Detailed descriptions of the materials encountered at specific locations are provided in the boring logs in **Appendix C**.

INTERPRETED SUBSURFACE CONDITIONS		
Soil Unit	**Approximate Encountered Thickness (ft)**	**Generalized Description**
Fill	2 to 22	Variable from brown, very loose to very dense, fine to coarse SAND, trace gravel to Gravelly, trace silt to Silty, to: very stiff, Clayey SILT, some fine to coarse sand, trace gravel. Typical MaineDOT Frost Classification Range= 0 to IV 3 Grain Size, 2 Hydrometer, and 3 Moisture Content Analyses: • AASHTO Classifications: A-1-b, A-4(0) • USCS Classifications: SP-SM, SM, ML • Moisture Content: 3.3 to 15.6% *Encountered in all borings (Clayey SILT only in BB-WTR-103)*
Marine Clay	6	Grey-brown, hard, Silty CLAY, trace fine sand. Typical MaineDOT Frost Classification = IV 1 Atterberg Limit and 1 Moisture Content Analysis: • AASHTO Classification: A-7-6 • USCS Classification: CL • Liquid Limit: 29 • Plastic Limit: 19 • Plasticity Index: 10 • Moisture Content: 21.4% *Encountered in BB-WTR-103 only*
Marine Sand	5	Brown, medium dense, fine to medium SAND, some silt, trace gravel. Typical MaineDOT Frost Classification = II 1 Grain Size and 1 Moisture Content Analysis: • AASHTO Classification: A-2-4(0) • USCS Classification: SM • Moisture Content: 22.2% *Encountered in BB-WTR-102*
Glacial Till	1 to 10	Brown, medium dense to very dense, fine to coarse SAND, some gravel, some silt to Silty, possible cobbles/boulders. Boulders were noted in several of the circa-1958 borings. Typical MaineDOT Frost Classification Range = II to III 1 Grain Size and 1 Moisture Content Analysis: • AASHTO Classification: A-2-4(0) • USCS Classification: SM • Moisture Content: 19.4% *Encountered in all borings*
Estimated Top of Bedrock	Approx. El. 182 to 206 (8 to 36 feet bgs)	
*Note: Estimated top of bedrock is based on recent borings. Depths to bedrock refer to ground surface at either Trafton Road (approach/abutment borings) or I-95 (pier borings).		

4.2.1 Bedrock

Bedrock was encountered beneath the glacial till stratum in borings. Bedrock was cored in each test boring and was described as Phyllite of the Mayflower Formation. Phyllite was generally described as hard, fresh to slightly weathered, aphanitic, and grey, with quartzite laminae and intrusions. Primary joints in the Phyllite were characterized as very close to moderately spaced, horizontal to low angle, stepped to planar, smooth, fresh to decomposed, and tight to open. Secondary joints were characterized as very close to moderately spaced, high angle to vertical, planar, smooth, fresh to discolored, and partially to open. A highly weathered and fractured zone was encountered in BB-WTR-102 at 11.4 to 12.9 feet bgs, 2.6 to 5.1 feet below top of rock. The RQD ranged from 0 to 78 percent, indicating Rock Quality of Very Poor to Good. The bedrock core data are summarized in **Table 2**. Wet and dry photographs of the collected rock core are included in **Appendix E**.

Unconfined compressive strength and elastic modulus tests were conducted on two rock specimens, the results of which are summarized in the following table.

SUMMARY OF BEDROCK STRENGTH TEST RESULTS						
Boring	**Depth below Existing Ground (ft)**	**Depth below Top of Rock (ft)**	**Unconfined Compressive Strength (psi)**	**Secant Modulus @ 50% of Failure Stress (ksi)**	**Unit Weight (pcf)**	**Rock Type**
BB-WTR-101	19.1 - 19.5	0.0 - 0.5	15,834	3,190	168.1	Phyllite
BB-WTR-102	10.4 - 10.8	2.6 - 3.0	12,194	3,620	169.3	Phyllite

4.2.3 Groundwater

The groundwater depth was measured in all borings. Groundwater depths ranged from approximately 5.6 to 24.3 feet, corresponding to approximately El. 196.1 to El. 205.8. Groundwater levels in the borings were measured during or immediately after drilling and were likely affected by cased drilling procedures, which included introduction of water for drilling purposes.

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

SIGNATURE PAGE

This report has been prepared and reviewed by:

GZA GEOENVIRONMENTAL, INC.

Blaine Cardali
Senior Project Manager

Christopher L. Snow, P.E.
Consultant/Reviewer

Andrew R. Blaisdell, P.E.
Associate Principal

BMC/ARB/CLS:cc

TABLES

TABLE 1
Summary of Subsurface Explorations
Trafton Road Bridge Replacement
Waterville, Maine
GZA job#: 09.0026242.00

Boring ID	Northing	Easting	Ground Surface El. (ft)	Top of Stratum Elevation						Stratum Thickness					Depth to Bedrock (ft)	Bottom of Boring Depth (ft)	Bottom of Boring El. (ft)	Groundwater	
				Asphalt	Fill	Marine Clay	Marine Sand	Glacial Till	Bedrock	Asphalt	Fill	Marine Clay	Marine Sand	Glacial Till				El. (ft)	Depth (ft)
BB-WTR-101	611274.9	1159315.0	225.0	225.0	224.2	NE	NE	212.0	206.0	0.8	12.2	NE	NE	6.0	19.0	30.0	195.0	205.8	19.2
BB-WTR-102	611234.8	1159508.8	203.6	NE	203.6	NE	201.6	196.2	195.8	NE	2.0	NE	5.4	0.4	7.8	17.4	186.2	198.0	5.6
BB-WTR-103	611197.8	1159691.1	220.4	220.4	219.9	197.9	NE	191.9	181.9	0.5	22.0	6.0	NE	10.0	38.5	49.0	171.4	196.1	24.3

El. = Elevation, NE = Not Encountered

Notes:
1. Refer to the boring logs in Appendix C for additional information.
2. Project elevation datum is North American Vertical Datum (NAVD 88), unless noted otherwise.
3. Project coordinates are in survey feet and reference the North American Datum of 1983 (NAD83) Maine Coordinate System 2000 West, unless noted otherwise.
4. As-drilled locations were surveyed by MaineDOT and provided to GZA.
5. Stratum depths, thickness and elevations are rounded to the nearest 0.1 foot as interpreted on the boring logs, but this does not represent the precision of the data.

TABLE 2
Summary of Bedrock Data
Trafton Road Bridge #5812 over I-95
Waterville, ME
WIN 26152.00

Boring ID	Core Run	Ground Surface El. (ft)	Depth of Core Run below GS (ft)			Depth to Rock (ft)	Depth Below Top of Rock (ft)			Length of Core Run (in)	Rec (in)	Rec (%)	RQD (in)	RQD %	Joint Spacing (in)	Joint Aperture (in)	LAB							Rock Type
			Top		Bottom		Top		Bottom								Depth of Sample (ft)	Depth of Sample into Rock (ft)	Elev Top of Sample (ft)	UCS (psi)	Poissons Ratio	Modulus (ksi)	Unit Wt (pcf)	
BB-WTR-101	R1	225	19.0	-	23.0	19.0	0.0	-	4.0	48.0	48	100%	34	71%	2.5-8	0.01-0.1	19.0	0.0	206.0	15,834	0.44	3,190	168.1	Phyllite
BB-WTR-101	R2	225	23.0	-	28.0	19.0	4.0	-	9.0	60.0	60	100%	38	63%	2.5-8	0.004-0.1								Phyllite
BB-WTR-101	R3	225	28.0	-	30.0	19.0	9.0	-	11.0	24.0	24	100%	18	75%	2.5	0.004-0.1								Phyllite
BB-WTR-102	R1	203.6	8.4	-	12.9	7.8	0.6	-	5.1	54.0	48	89%	33	61%	0.75-8	0.004-0.1	10.3	2.5	193.4	12,194	0.96	3,620	169.3	Phyllite
BB-WTR-102	R2	203.6	12.9	-	16.4	7.8	5.1	-	8.6	42.0	42	100%	19	45%	0.75-8	0.02-0.1								Phyllite
BB-WTR-102	R3	2036	16.4	-	17.4	7.8	8.6	-	9.6	12.0	12	100%	0	0%	2.5	0.02-0.1								Phyllite
BB-WTR-103	R1	220.4	39.0	-	41.0	38.5	0.5	-	2.5	24.0	20	83%	4	17%	0.75-2.5	0.02-0.4								Phyllite
BB-WTR-103	R2	220.4	41.0	-	44.0	38.5	2.5	-	5.5	36.0	32	89%	18	50%	0.75-2.5	0.02-0.4								Phyllite
BB-WTR-103	R3	220.4	44.0	-	49.0	38.5	5.5	-	10.5	60.0	52	87%	47	78%	2.5-8	0.01-0.1								Phyllite

Notes:
1. Refer to boring logs in Appendix C for additional information.
2. Project elevation datum is North American Vertical Datum (NAVD88), unless noted otherwise.
3. As-drilled locations and elevations were surveyed by MaineDOT and provided to GZA.

FIGURES

© 2025 - GZA GeoEnvironmental, Inc.
P:\09 Jobs\00226200s\09.0026242.00 - Stantec - Sidney 5 Bridges Bundle\Figures\GIS\APRX\APRX.aprx, April 08, 2025 - 2:08 PM, Elizabeth.Fulton

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

0 1,000 2,000 4,000
SCALE IN FEET

TRAFTON ROAD BRIDGE #5812 OVER I-95
WATERVILLE, ME

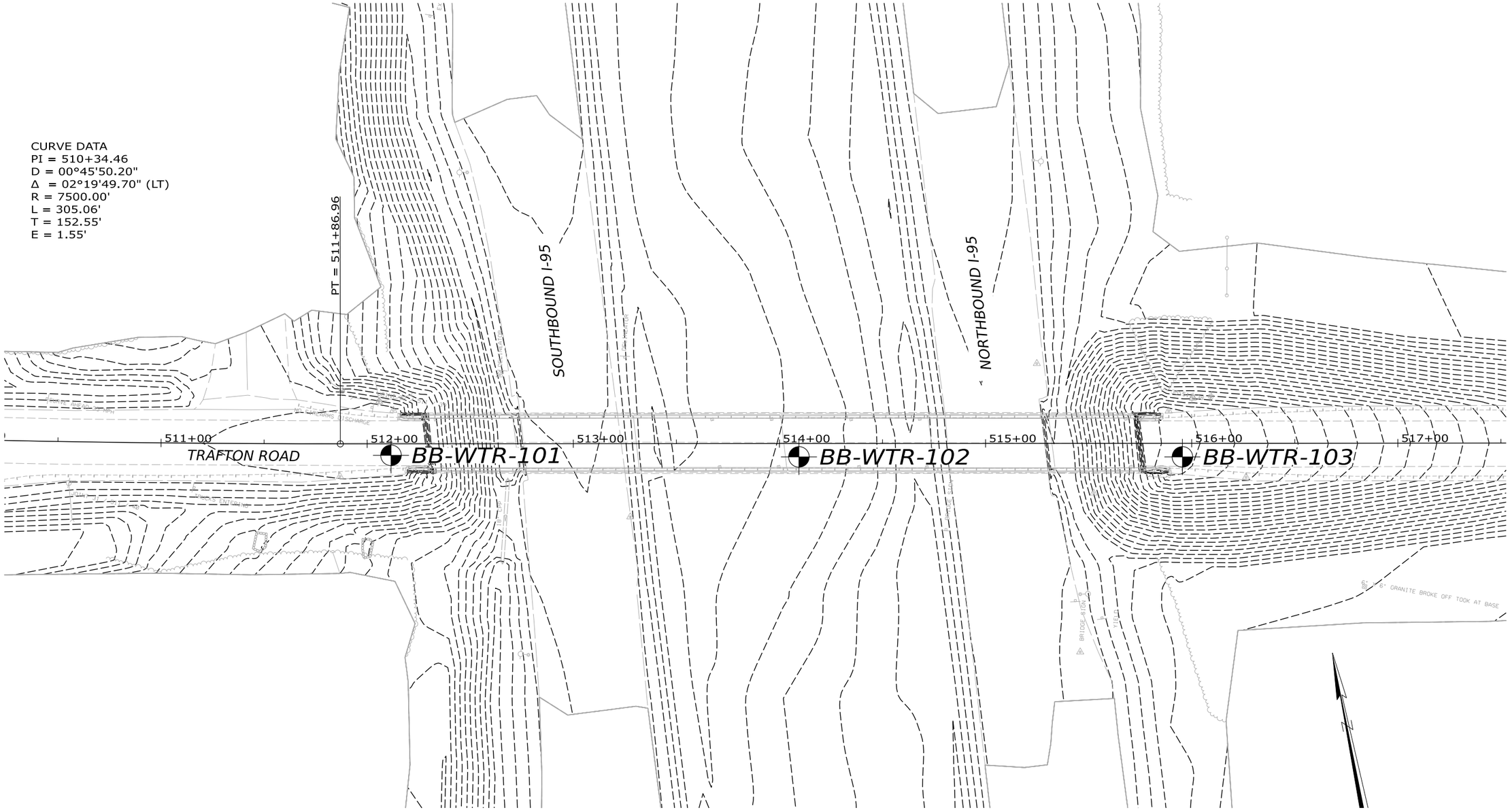
LOCUS PLAN

PREPARED BY:
GZA GeoEnvironmental, Inc.
www.gza.com

PREPARED FOR:
STANTEC

PROJ MGR: BMC	REVIEWED BY: CLS	CHECKED BY: ARB	FIGURE 1
DESIGNED BY: EAF	DRAWN BY: EAF	SCALE: 1 in = 2,000 ft	
DATE: APRIL 2025	PROJECT NO: 09.0026242.00	REVISION NO:	

CURVE DATA
PI = 510+34.46
D = 00°45'50.20"
Δ = 02°19'49.70" (LT)
R = 7500.00'
L = 305.06'
T = 152.55'
E = 1.55'



NOTES

1) Base map developed from the Work Set electronic files provided by Stantec on April 6, 2025.

2) The as-drilled locations of the test borings were surveyed and provided by Stantec in an electronic file (Topo.dgn) on April 6, 2025.

BORING LOCATION PLAN LEGEND

BB-WTR-103

Location and deisgnation of BB-WTR-100 series borings performed by New England Boring Contractors, LLC of Derry, NH and observed by GZA personnel between April 24 and 26, 2023.

PLAN

25 0 25 50
Scale of Feet

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

26152.00

WIN 26152.00
Bridge No. 5812
HIGHWAY PLANS

		BY	DATE
PROJ. MANAGER	J. BRASK		
DESIGN-DETAILED	NVW	NVW	5/15/2025
CHECKED-REVIEWED	ABB	CLS	5/16/2025
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

TRAFTON ROAD BRIDGE
OVER I-95

BORING LOCATION PLAN

SHEET NUMBER
2
OF 2

Username: nicholas.williams Date: 5/15/2025

Filename: P:\09 Jobs\MEDOT_ORD\WIN\26152_00\GEOTECH\Boring_Location_Plan.dgn

APPENDIX A – LIMITATIONS

GEOTECHNICAL LIMITATIONS

Use of Report

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

Standard of Care

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

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

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

Subsurface Conditions

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

6. In preparing this report, GZA relied on certain information provided by the Client, state and local officials, and other parties referenced therein which were made available to GZA at the time of our

evaluation. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

7. Water level readings have been made in test holes (as described in this Report) and monitoring wells at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this Report. Fluctuations in the level of the groundwater however occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, the presence of subsurface utilities, and/or natural or artificially induced perturbations. The water table encountered in the course of the work may differ from that indicated in the Report.

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

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

Compliance with Codes and Regulations

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

Cost Estimates

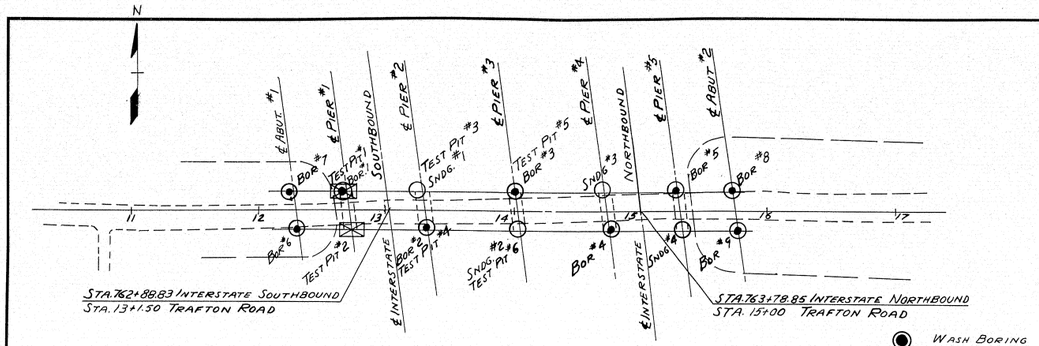
11. Unless otherwise stated, our cost estimates are only for comparative and general planning purposes. These estimates may involve approximate quantity evaluations. Note that these quantity estimates are not intended to be sufficiently accurate to develop construction bids, or to predict the actual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

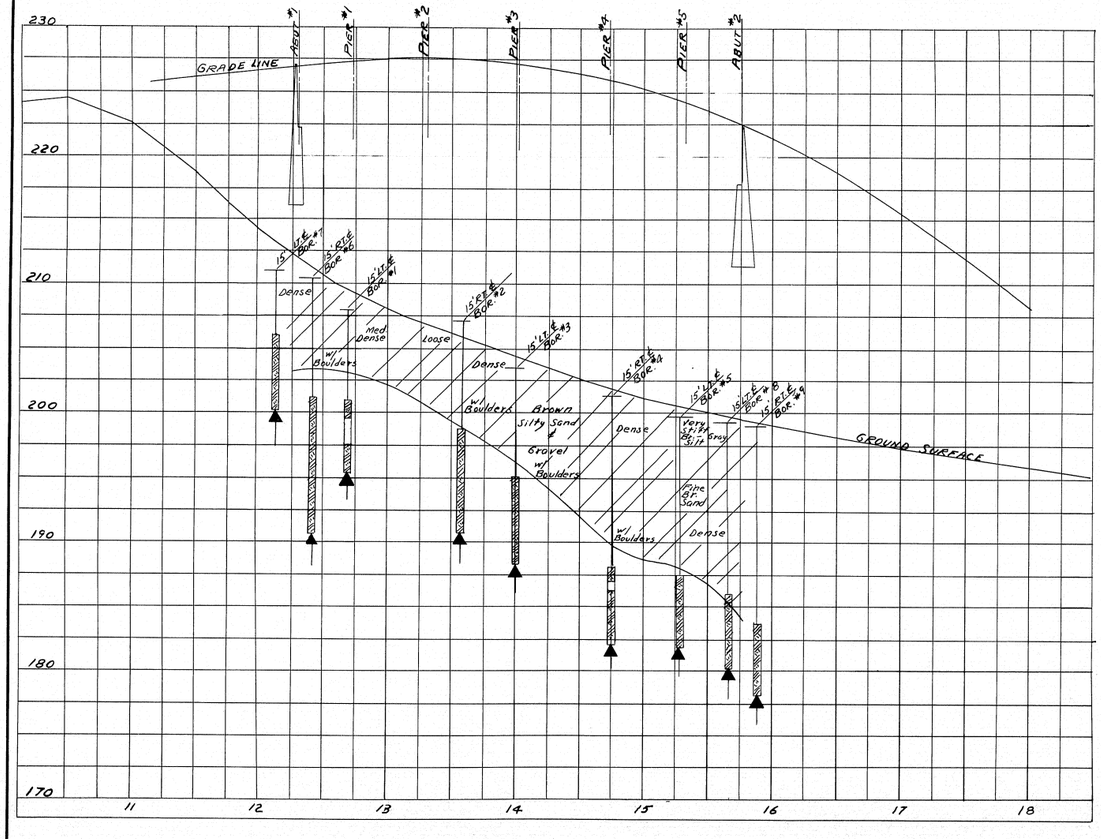
Additional Services

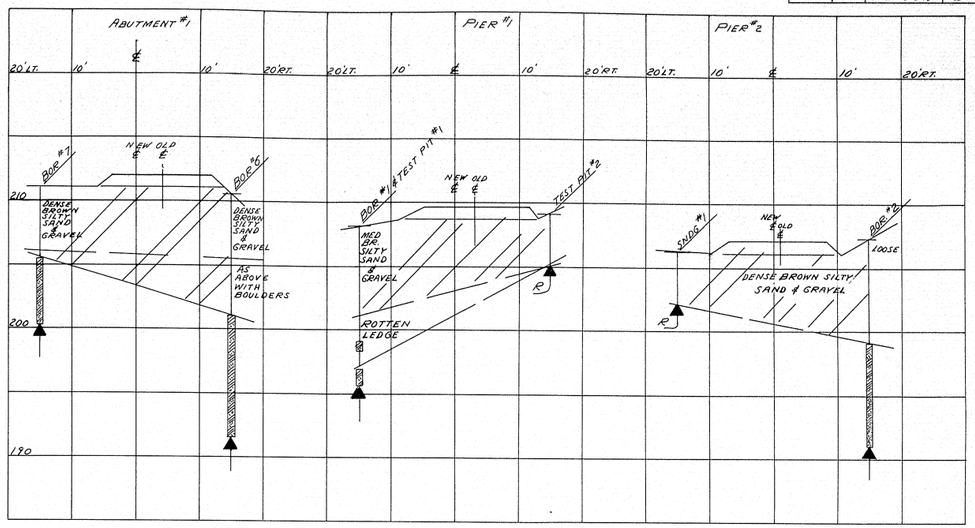
12. GZA recommends that we be retained to provide services during any future: site observations, design, implementation activities, construction and/or property development/redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions;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

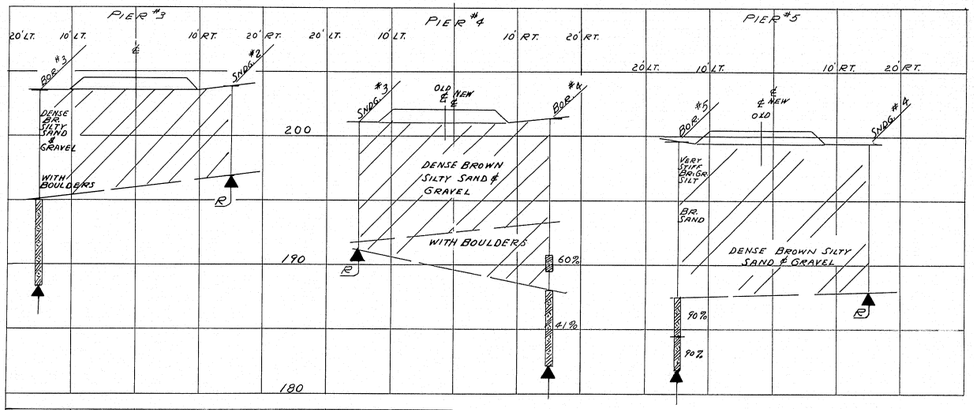
APPENDIX B – HISTORIC GEOTECHNICAL DATA AND FOUNDATION DRAWINGS

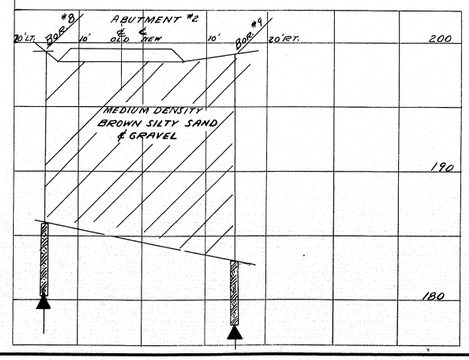
B. P. R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-95-6(16)	2	19











DESIGN – V. SMITH
TRACE – V. SMITH
CHECK – C. TITOF

BRIDGE NO.
SURVEY –
PLOT –

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

TRAFTON ROAD BRIDGE
OVER
INTERSTATE HIGHWAY
IN THE CITY OF
WATERVILLE
KENNEBEC COUNTY

SOILS PROFILE

SHEET 2 OF 19 AUGUSTA, MAINE MAY 1958

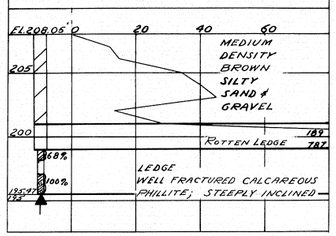
73-168

0 1 2 3 4 5 INCHES

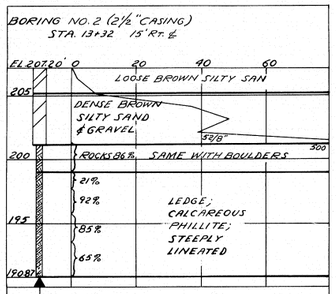
B. P. R. DIV. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-95-6(16)	3	19

DRIVING RESISTANCE (BLOWS/FT.)

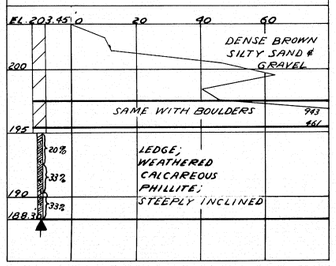
BORING NO. 1 (2½" CASING)
STA. 12+67 13'LT. ℄



BORING NO. 2 (2½" CASING)
STA. 13+32 15'RT. ℄

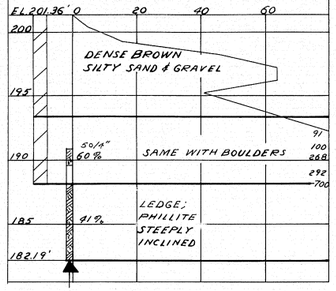


BORING NO. 3 (2½" CASING)
STA. 13+98 15'LT. ℄

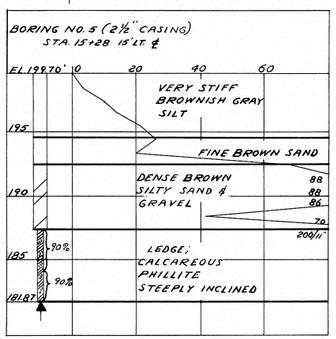


DRIVING RESISTANCE (BLOWS/FT.)

BORING NO. 4 (2½" CASING)
STA. 14+75 15'RT. ℄

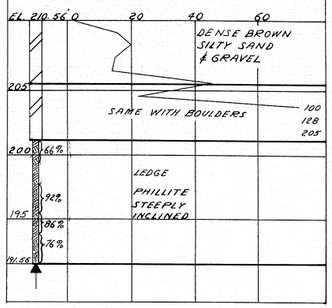


BORING NO. 5 (2½" CASING)
STA. 15+28 15'LT. ℄

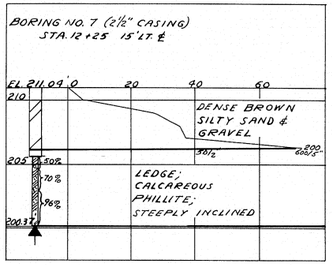


DRIVING RESISTANCE (BLOWS/FT.)

BORING NO. 6 (2½" CASING)
STA. 12+31 15'RT. ℄

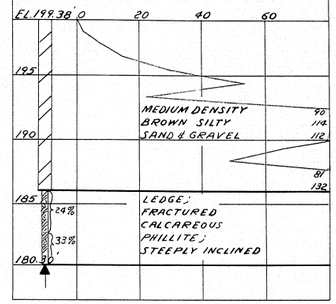


BORING NO. 7 (2½" CASING)
STA. 12+25 15'LT. ℄

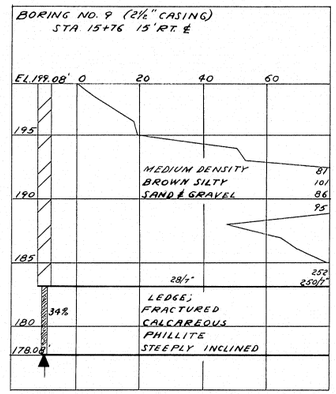


DRIVING RESISTANCE (BLOWS/FT.)

BORING NO. 8 (2½" CASING)
STA. 15+70 15'LT. ℄



BORING NO. 9 (2½" CASING)
STA. 15+76 15'RT. ℄



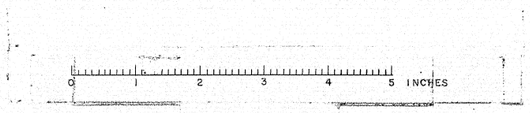
BORING NOTES

Number of blows of 275 # hammer falling 18" required to drive extra heavy casing one foot thus:

Bottom of boring indicated thus:

Refusol of drill rods or casing indicated thus:

Percent recovery of rock core by diamond bit thus: 71%



DESIGN–	BRIDGE NO.
TRACE – V.SMITH	SURVEY–
CHECK – C.S.T.P.O.T.	PLOT –

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

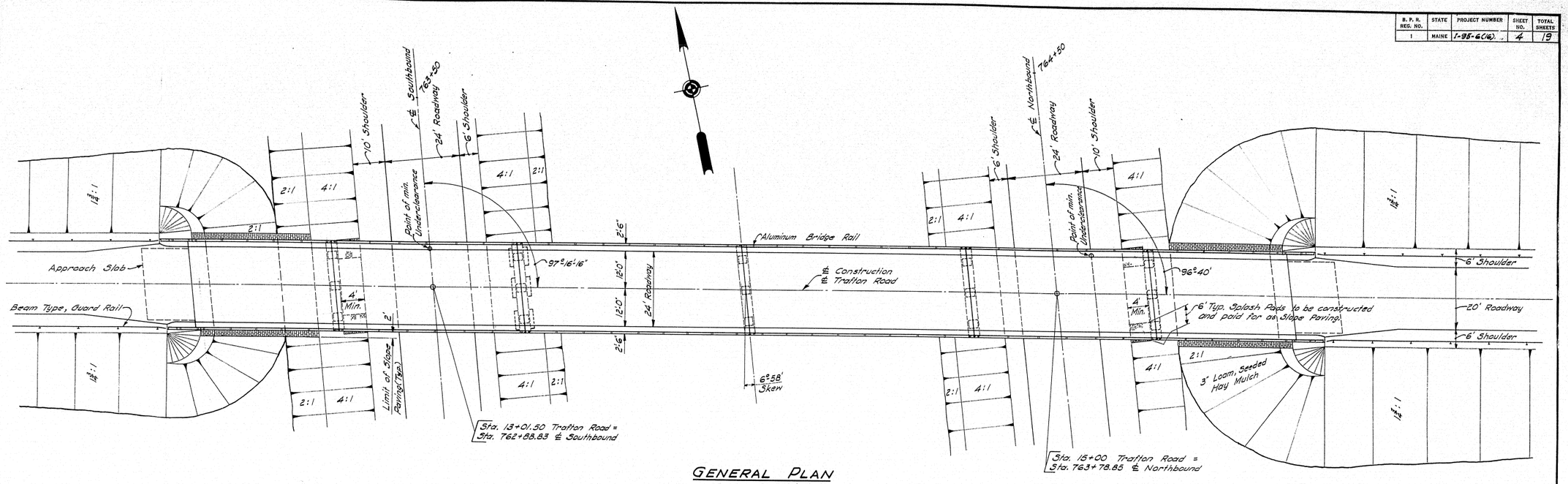
TRAFTON ROAD BRIDGE
OVER
INTERSTATE HIGHWAY
IN THE CITY OF
WATERVILLE
KENNEBEC COUNTY

BORINGS

SHEET 3 OF 19 AUGUSTA, MAINE MAY 1958

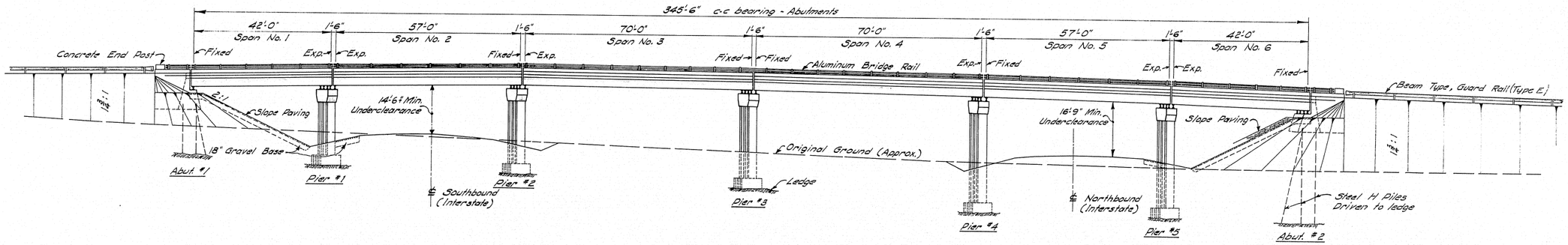
73-169

B. P. R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-95-6(16)	4	19



GENERAL PLAN

Scale - 1" = 15'



ELEVATION

Scale - 1" = 15'

LOADING H20-44

DESIGN SPECIFICATIONS

A.A.S.H.O. STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES 1953.

CONTRACT SPECIFICATIONS

STATE OF MAINE, STATE HIGHWAY COMMISSION STANDARD SPECIFICATIONS, REVISION OF JAN. 1956.

Payment for excavation for base of Slope Paving to be made under Item 204-14, Structural Earth Excavation, Piers. The 18" Gravel Base under the Slope Paving and Splash Pads may be reduced or omitted if in the opinion of the Engineer the fill is suitable.

CONCRETE CLASSIFICATION

PIERS, SUPERSTRUCTURE & APPROACH SLABS.....CLASS A
ABUTMENTS (EXCEPT AS NOTED).....CLASS B

PLAN - Clark
TRACE -
CHECK - Cotton

BRIDGE NO.
SURVEY -
PLOT -

STATE HIGHWAY COMMISSIO.
BRIDGE DIVISION

TRAFTON ROAD BRIDGE
OVER
INTERSTATE HIGHWAY
IN THE CITY OF
WATERVILLE
KENNEBEC COUNTY

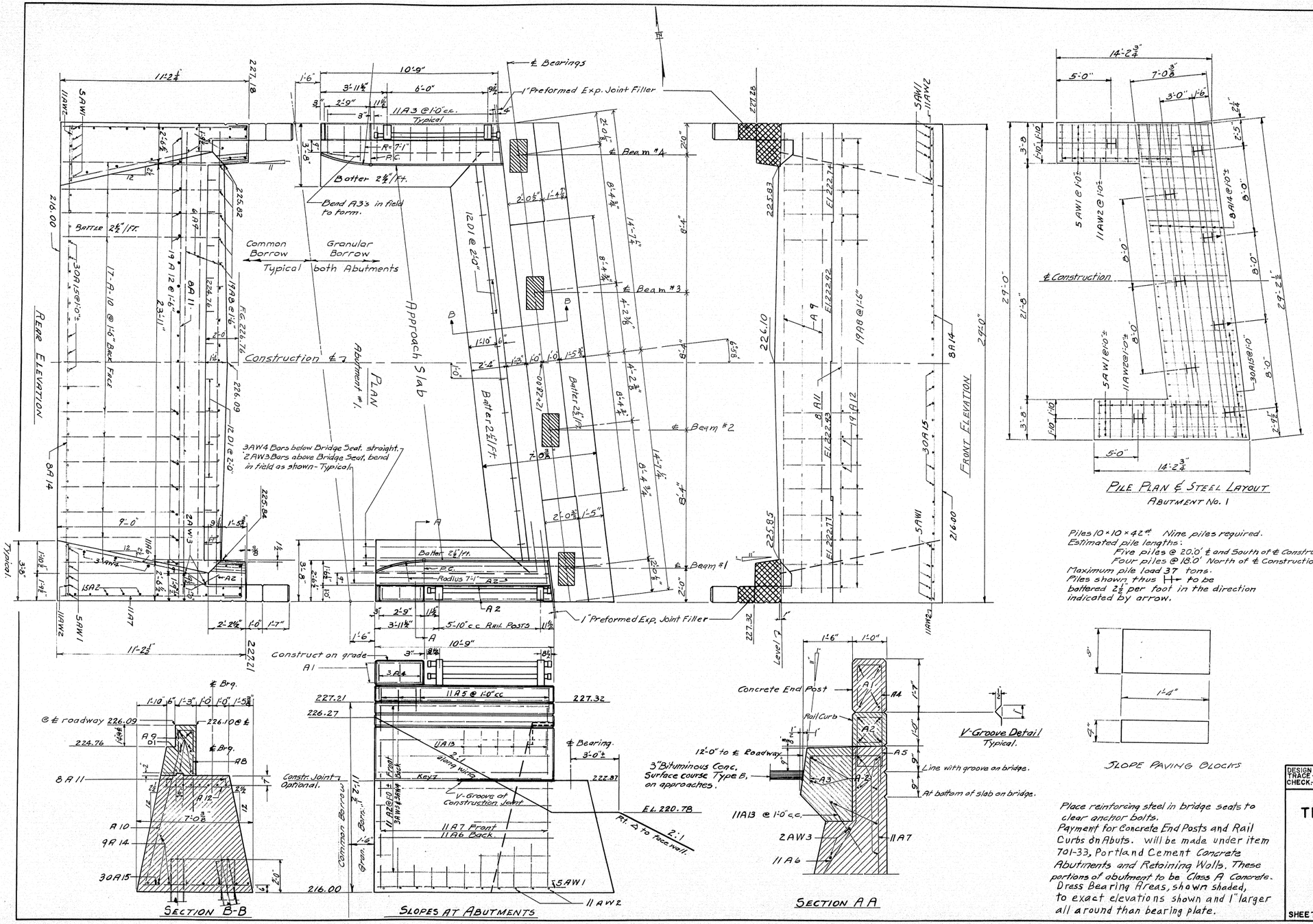
GENERAL PLAN & ELEVATION

SHEET 4 OF 19 AUGUSTA, MAINE MAY 1958

73-170

0 1 2 3 4 5 INCHES

B. P. R. REG. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
1	MAINE	I-95-6(16)	10	19



Piles 10 × 10 × 42# Nine piles required.
Estimated pile lengths:
Five piles @ 20.0' ℄ and South of ℄ Construction.
Four piles @ 18.0' North of ℄ Construction.
Maximum pile load 37 tons.
Piles shown thus ⊢ to be battered 2½ per foot in the direction indicated by arrow.

SLOPE PAVING BLOCKS

DESIGN: H. JONES TRACE – W.W.M. CHECK – Cotton	BRIDGE NO.

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

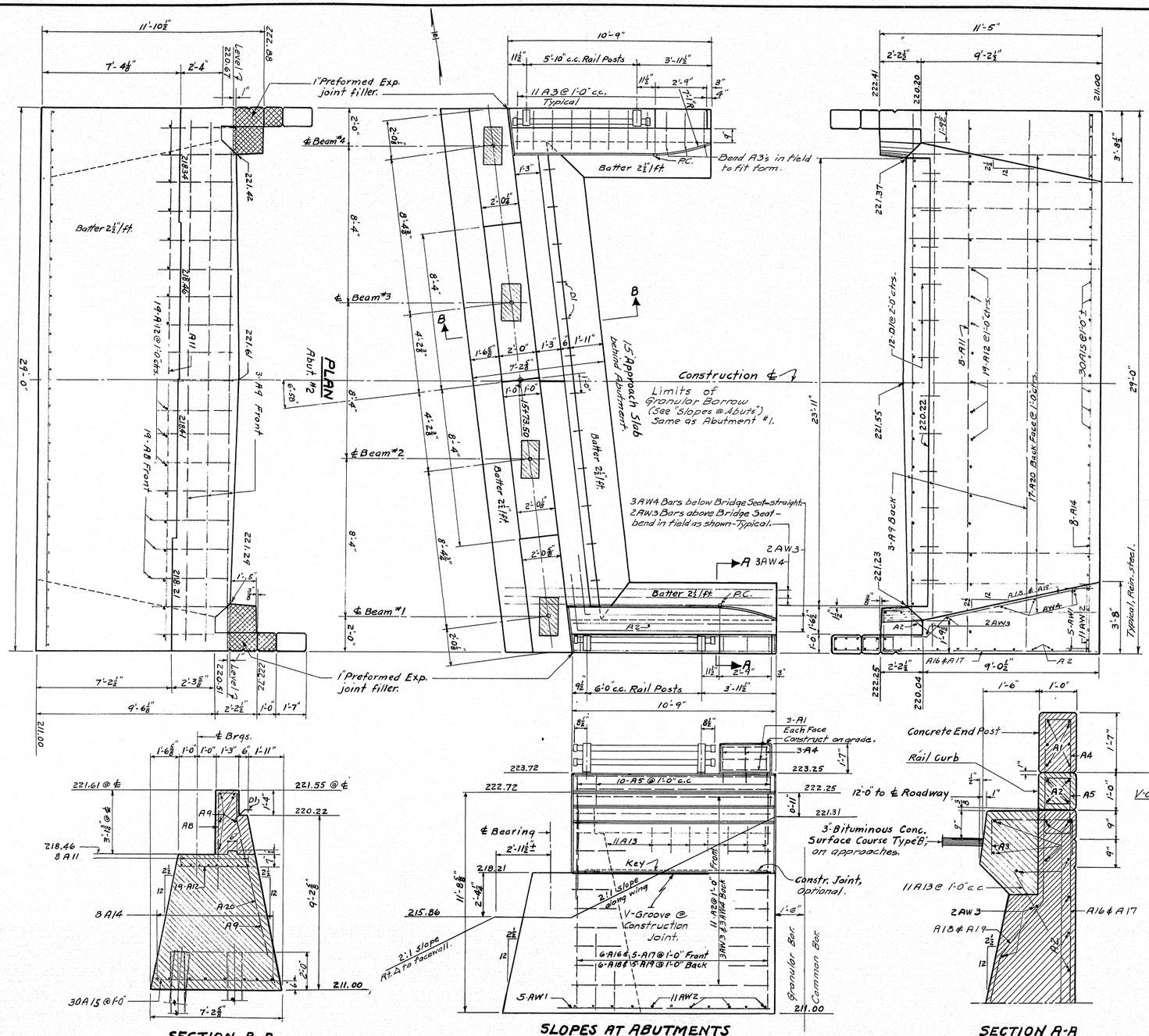
TRAFTON ROAD BRIDGE
OVER
INTERSTATE HIGHWAY
IN THE CITY OF
WATERVILLE
KENNEBEC COUNTY

ABUTMENT NO. ONE

SHEET 10 OF 19 AUGUSTA, MAINE MAY 1958

73-176

B. P. R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	F-95-6(16)	11	19



DESIGN – H. JONES	BRIDGE NO.
TRACE – WELCH	SURVEY –
CHECK – Cotton	PLOT –

STATE HIGHWAY COMMISSION
BRIDGE DIVISION

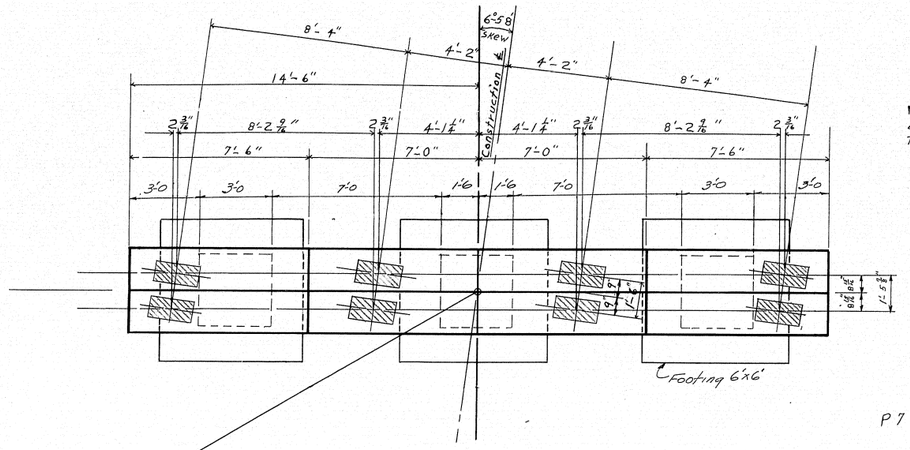
TRAFTON ROAD BRIDGE
OVER
INTERSTATE HIGHWAY
IN THE CITY OF
WATERVILLE
KENNEBEC COUNTY

ABUTMENT NO. TWO

SHEET 11 OF 19 AUGUSTA, MAINE MAY 1958

73-177

A. P. D. Proj. No.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
1	MAINE	I-95-6(12)	12	19



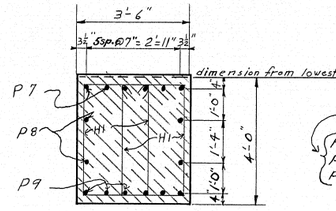
TYPICAL PIER PLAN

℄ Pier 1 Sta. 12+70.75
℄ Pier 2 Sta. 13+29.25
℄ Pier 3 Sta. 14+00.75
℄ Pier 4 Sta. 14+72.25
℄ Pier 5 Sta. 15+30.75

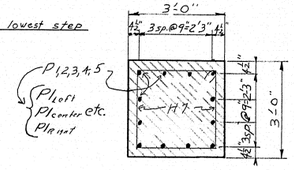
Note: Dress bearing area 1" larger all around than size of masonry plate and To exact elevation shown

BEARING AREAS

Description	ELEVATIONS A	B	C	D	Description	ELEVATIONS E	F	G	H
Span 5 Pier 5	219.81	219.93	219.89	219.70	Span 6 Abt 2	218.34	218.46	218.41	218.21
Span 4 Pier 4	221.55	221.69	221.66	221.47	Span 6 Pier 5	219.98	220.11	220.07	219.87
Span 3 Pier 3	223.05	223.20	223.19	223.01	Span 5 Pier 4	221.70	221.84	221.81	221.62
Span 2 Pier 2	223.45	223.61	223.61	223.45	Span 4 Pier 3	223.03	223.18	223.17	222.99
Span 1 Pier 1	223.16	223.33	223.35	223.20	Span 3 Pier 2	223.26	223.42	223.42	223.26
Span 1 Abut 1	222.74	222.92	222.93	222.77	Span 2 Pier 1	222.93	223.10	223.11	222.96

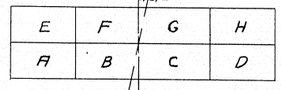


SECTION A-A

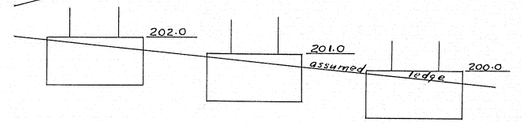


SECTION B-B

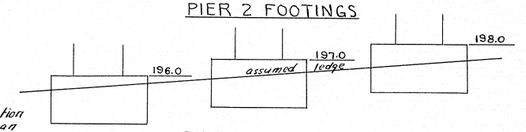
Scheme



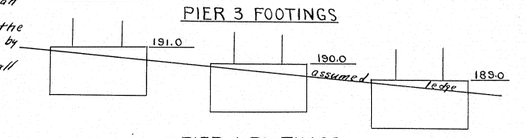
PIER 1 FOOTINGS



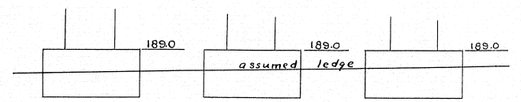
PIER 2 FOOTINGS



PIER 3 FOOTINGS

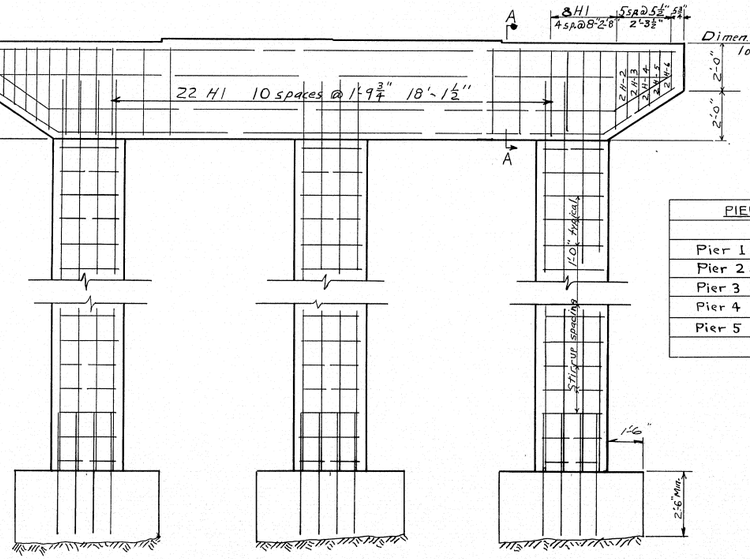


PIER 4 FOOTINGS



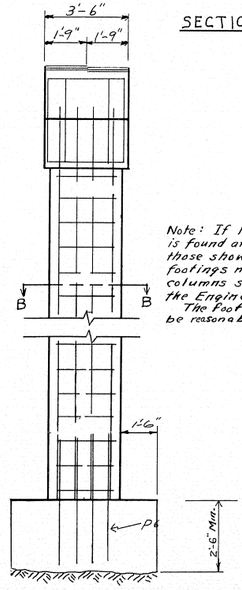
PIER 5 FOOTINGS

Pier 1 El. = 218.93
" 2 " = 219.26
" 3 " = 218.99
" 4 " = 217.47
" 5 " = 215.70



TYPICAL PIER ELEVATION

PIER COLUMN LENGTHS	Left	℄	Right
Pier 1	17.93	15.93	12.93
Pier 2	17.26	18.26	19.26
Pier 3	22.99	21.99	20.99
Pier 4	26.47	27.47	28.47
Pier 5	26.70	26.70	26.70



END ELEVATION

Note: If ledge suitable for foundation is found at higher elevations than those shown on the plans the footings may be raised and the columns shortened as directed by the Engineer in the field. The footing foundations shall be reasonably level.

DESIGN-GORMLEY
TRACE-MORRISON—BARNES
CHECK Cotton
BRIDGE NO.

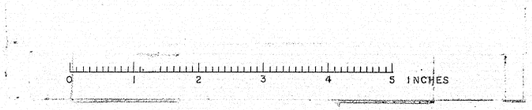
STATE HIGHWAY COMMISSION
BRIDGE DIVISION

TRAFTON ROAD BRIDGE
OVER
INTERSTATE HIGHWAY
IN THE CITY OF
WATERVILLE
KENNEBEC COUNTY

PIERS

SHEET 12 OF 19 AUGUSTA, MAINE MAY 1956

73-178



APPENDIX C – RECENT TEST BORINGS

UNIFIED SOIL CLASSIFICATION SYSTEM

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

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

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

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

MODIFIED BURMISTER SYSTEM

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

TERMS DESCRIBING DENSITY/CONSISTENCY

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

Density of Cohesionless Soils	Standard Penetration Resistance N_{60}-Value (blows per foot)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

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

Consistency of Cohesive soils	SPT N_{60}-Value (blows per foot)	Approximate Undrained Shear Strength (psf)	Field Guidelines
Very Soft	WOH, WOR, WOP, <2	0 - 250	Fist easily penetrates
Soft	2 - 4	250 - 500	Thumb easily penetrates
Medium Stiff	5 - 8	500 - 1000	Thumb penetrates with moderate effort
Stiff	9 - 15	1000 - 2000	Indented by thumb with great effort
Very Stiff	16 - 30	2000 - 4000	Indented by thumbnail
Hard	>30	over 4000	Indented by thumbnail with difficulty

Rock Quality Designation (RQD):

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

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

Rock Quality Based on RQD

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

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

Color (Munsell color chart)
Texture (aphanitic, fine-grained, etc.)
Rock Type (granite, schist, sandstone, etc.)
Hardness (very hard, hard, mod. hard, etc.)
Weathering (fresh, very slight, slight, moderate, mod. severe, severe, etc.)
Geologic discontinuities/jointing:
-dip (horiz - 0-5 deg., low angle - 5-35 deg., mod. dipping - 35-55 deg., steep - 55-85 deg., vertical - 85-90 deg.)
-spacing (very close - <2 inch, close - 2-12 inch, mod. close - 1-3 feet, wide - 3-10 feet, very wide >10 feet)
-tightness (tight, open, or healed)
-infilling (grain size, color, etc.)
Formation (Waterville, Ellsworth, Cape Elizabeth, etc.)
RQD and correlation to rock quality (very poor, poor, etc.)
ref: ASTM D6032 and FHWA NHI-16-072 GEC 5 - Geotechnical Site Characterization, Table 4-12
Recovery (inch/inch and percentage)
Rock Core Rate (X.X ft - Y.Y ft (min:sec))

Sample Container Labeling Requirements:

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Trafton Road Bridge No. 5812
Location: Waterville, Maine

Boring No.: BB-WTR-101
WIN: 26152.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	225.0	**Auger ID/OD:**	4.25" OD
Operator:	T. Schaefer	**Datum:**	NAVD88	**Sampler:**	Standard
Logged By:	E. Tombaugh	**Rig Type:**	ATV Track Mobile B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4-26-23 / 4-26-23	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	N611274.9, E1159315.0	**Casing ID/OD:**	4.0"/4.5"	**Water Level*:**	19.2'
Hammer Efficiency Factor: 0.742		**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 = Insitu Vane Shear Test
MV = Unsuccessful Insitu 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 = weight of rods
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/12	0.0 - 2.0	17-26-16-14	42	52	SSA	224.2	0'-0.8': Asphalt 0.8 (Used 3" spoon) Brown, dry, dense, Gravelly fine to coarse SAND, little silt, (Fill).	23-S-B265 A-1-b, SP-SM WC=3.3%
5	2D	24/18	5.0 - 7.0	2-2-2-3	4	5	20		Brown, moist, loose, Silty fine to coarse SAND, (Fill).	
							26			
							24			
							36			
							81			
10	3D	24/10	10.0 - 12.0	8-10-9-11	19	23	27		Brown, moist, medium dense, Silty fine to coarse SAND, trace gravel, (Fill).	
							50			
							62			
							24/3"	211.7	13.3 Increased casing resistance at 13.3'. Advanced casing to 15.0'; gravel fragments observed in wash return, possible cobbles, (Glacial Till).	
							RC			
15	4D	24/9	15.0 - 17.0	7-7-6-10	13	16	48		Brown, moist, medium dense, fine to coarse SAND, some gravel, some silt, (Glacial Till).	23-S-B266 A-2-4 (0), SM WC=19.4%
							59			
							107			
							89/6"		Casing refusal at 18.5'. Increased roller cone resistance at 19.0' with rock fragments in wash return; possible bedrock. Set up to core at 19.0'.	
	R1	48/48	19.0 - 23.0	RQD = 71%			NX	206.0	19.0 R1: Hard, fresh, aphanitic, grey, PHYLLITE, with quartzite laminae and intrusions. Primary joints are close to moderately spaced, low angle to horizontal, planar, smooth, fresh to discolored, partially open to open. Recovery = 100% Rock Quality = Fair Rock Core Times (min:sec): 19.0-20.0' (2:55), 20.0-21.0' (2:16), 21.0-22.0' (2:06), 22.0-23.0' (1:50)	
20										qp=2,280 ksf
	R2	60/60	23.0 - 28.0	RQD = 63%					R2: Hard, fresh to slightly weathered, aphanitic, grey, PHYLLITE,with quartzite laminae. Joints are close to	
25										

Remarks:

1. Automatic hammer NEBC #20 Energy Transfer Ratio = 0.742.
2. No wash return after 20' during coring.
3. Water level measured immediately after removal of casing.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Trafton Road Bridge No. 5812
Location: Waterville, Maine

Boring No.: BB-WTR-101
WIN: 26152.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	225.0	**Auger ID/OD:**	4.25" OD
Operator:	T. Schaefer	**Datum:**	NAVD88	**Sampler:**	Standard
Logged By:	E. Tombaugh	**Rig Type:**	ATV Track Mobile B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4-26-23 / 4-26-23	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	N611274.9, E1159315.0	**Casing ID/OD:**	4.0"/4.5"	**Water Level*:**	19.2'
Hammer Efficiency Factor:	0.742	**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 = Insitu Vane Shear Test
MV = Unsuccessful Insitu 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 = weight of rods
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane 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										moderately spaced, low angle, planar, smooth, fresh to discolored, tight to open. Recovery = 100% Rock Quality = Fair Rock Core Times (min:sec): 23.0-24.0' (2:52), 24.0-25.0' (2:04), 25.0-26.0' (2:03), 26.0-27.0' (1:51), 27.0-28.0' (2:14)	
	R3	24/24	28.0 - 30.0	RQD = 75%						R3: Hard, fresh to slightly weathered, aphanitic, grey, PHYLLITE, with quartzite laminae. Joints are close, low angle, stepped to planar, smooth, discolored, tight to open. Recovery = 100% Rock Quality = Fair Rock Core Times (min:sec): 28.0-29.0' (2:16), 29.0-30.0' (1:50)	
30								195.0		30.0 **Bottom of Exploration at 30.0 feet below ground surface.**	
35											
40											
45											
50											

Remarks:

1. Automatic hammer NEBC #20 Energy Transfer Ratio = 0.742.
2. No wash return after 20' during coring.
3. Water level measured immediately after removal of casing.

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Trafton Road Bridge No. 5812

Location: Waterville, Maine

Boring No.: BB-WTR-102

WIN: 26152.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	203.6	**Auger ID/OD:**	4.25" OD
Operator:	T. Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard
Logged By:	E. Tombaugh	**Rig Type:**	ATV Track Mobile B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4-25-23 / 4-25-23	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	N611274.9, E1159315.0	**Casing ID/OD:**	4.25"/4.5"	**Water Level*:**	5.6'
Hammer Efficiency Factor: 0.742		**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 = Insitu Vane Shear Test
MV = Unsuccessful Insitu 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 = weight of rods
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/0	0.0 - 2.0	2-4-4-5	8	10	SPIN			No recovery. Fine to medium Sand and wood fragments observed in wash return from 0.0'-2.0', (Fill)	
							8				
								201.6		2.0	
	2D	24/10	2.4 - 4.4	7-7-7-6	14	17	26			Brown, dry, medium dense, fine to medium SAND, some silt, trace gravel, (Marine Sand).	23-S-B267 A-2-4 (0), SM WC=22.2%
							15				
							30				
							33				
5							55				
							82				
	3D	5/5	7.4 - 7.8	80/5"	R		NX	196.2		7.4	
	R1	54/48	8.4 - 12.9	RQD = 61%				195.8		Brown, moist, very dense, fine to coarse SAND, some gravel, some silt, (Glacial Till)	
										7.8	
										Increased roller cone resistance at 7.8', and began to lose wash water. Advanced casing to refusal at 8.4'. Roller coned to 8.4'; set up to core at 8.4'.	qp=1,756 ksf
10										R1: Hard, fresh, aphanitic, grey, PHYLLITE with quartzite laminae and intrusions. Highly weathered andfr actured from 11.4'-12.9'. Primary joints are very closeto moderately spaced, high angle, stepped to planar, smooth, discolored to decomposed, tight to open. One joint is horizontal, planar, smooth, fresh, open. Recovery = 89% Rock Quality = Fair Rock Core Times (min:sec): 8.4-9.4' (1:54), 9.4-10.4' (1:43), 10.4-11.4' (1:33), 11.4-12.4' (1:34), 12.4-12.9' (1:11)	
	R2	42/42	12.9 - 16.4	RQD = 45%						R2: Hard, fresh, aphanitic, grey, PHYLLITE, with quartzite laminae. Primary joints are very close to moderately spaced, low angle to horizontal, planar, smooth, discolored. Secondary joints are close to moderately spaced, high angle, planar, smooth, fresh to discolored, open. Recovery = 100% Rock Quality = Poor Rock Core Times (min:sec): 12.9-13.9' (1:42), 13.9-14.9'(1:25), 14.9-15.9' (1:11)	
15											
	R3	12/12	16.4 - 17.4	RQD = 0%				186.2		R3: Hard, fresh, aphanitic, grey, PHYLLITE, with quartzite laminae. Primary joints are closely spaced, low angle, planar, smooth, discolored, open. Secondary joints are very closely spaced, high angle to vertical, planar, smooth, fresh to discolored, partially open to open, one joint with clay infilling. Recovery = 100% Rock Quality = Very Poor Rock Core Times (min:sec): 16.4-17.4' (1:15)	
20										17.4	
25										**Bottom of Exploration at 17.4 feet below ground**	

Remarks:

1. Advanced casing through 0.8' asphalt/concrete bridge deck to ground surface at 22.6'.
2. Automatic hammer NEBC #20 Energy Transfer Ratio = 0.742.
3. No wash return during coring.
4. Water level measured immediately after removal of casing.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Trafton Road Bridge No. 5812

Location: Waterville, Maine

Boring No.: BB-WTR-102

WIN: 26152.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	203.6	**Auger ID/OD:**	4.25" OD
Operator:	T. Schaefer	**Datum:**	NAVD 88	**Sampler:**	Standard
Logged By:	E. Tombaugh	**Rig Type:**	ATV Track Mobile B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4-25-23 / 4-25-23	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	N611274.9, E1159315.0	**Casing ID/OD:**	4.25"/4.5"	**Water Level*:**	5.6'
Hammer Efficiency Factor:	0.742	**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 = Insitu Vane Shear Test
MV = Unsuccessful Insitu 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 = weight of rods
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane 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										**surface.**	
30											
35											
40											
45											
50											

Remarks:

1. Advanced casing through 0.8' asphalt/concrete bridge deck to ground surface at 22.6'.
2. Automatic hammer NEBC #20 Energy Transfer Ratio = 0.742.
3. No wash return during coring.
4. Water level measured immediately after removal of casing.

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Trafton Road Bridge No. 5812

Location: Waterville, Maine

Boring No.: BB-WTR-103

WIN: 26152.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	220.4	**Auger ID/OD:**	4.25" OD
Operator:	T. Schaefer	**Datum:**	NAVD88	**Sampler:**	Standard
Logged By:	E. Tombaugh	**Rig Type:**	ATV Track Mobile B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4-24-23 / 4-24-23	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	N611197.8, E1159691.1	**Casing ID/OD:**	4.25"/4.5"	**Water Level*:**	24.3'
Hammer Efficiency Factor: 0.742		**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 = Insitu Vane Shear Test
MV = Unsuccessful Insitu 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 = weight of rods
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/14	0.5 - 2.5	26-36-27-21	63	78	SSA	219.9		0'-0.5': Asphalt.	
										0.5	
										(Used 3" spoon) Brown, dry, very dense, Gravelly fine to coarse SAND, trace silt, (Fill). Piece of gravel in spoon tip.	
5	2D	24/13	5.0 - 7.0	4-5-3-3	8	10				Brown, dry, loose, Silty fine to coarse SAND, trace gravel, (Fill).	
							76				
							144				
							RC				
10	3D	24/12	10.0 - 12.0	7-9-13-12	22	27				Brown, moist, very stiff, Clayey SILT, some fine to medium sand, trace gravel, (Fill).	23-S-B268 A-4 (0), ML WC=15.6%
							57			Autohammer broke at 11.0'. Switched to 300 lb manual hammer to advance casing and 140 lb safety hammer for spoons starting at sample 4D.	
							60				
							66				
15	4D	24/12	15.0 - 17.0	12-15-26-20	41	41	26			Brown, wet, dense, Silty fine to coarse SAND, some gravel, (Fill).	
							43				
							56				
							37				
							34				
20	5D	24/4	20.0 - 22.0	4-2-1-1	3	3	11			Brown, wet, very loose, fine to coarse SAND, some gravel, some silt, (Fill).	23-S-B269 A-1-b, SM WC=13.8%
							10				
							19	197.9		22.5	
							24			Observed gravel and chunks of silty clay in wash return while washing down to 25.0'.	
25							35				

Remarks:

1. Automatic hammer NEBC #20 Energy Transfer Ratio = 0.742.
2. Water level measured immediately after removal of casing.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Trafton Road Bridge No. 5812
Location: Waterville, Maine

Boring No.: BB-WTR-103
WIN: 26152.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	220.4	**Auger ID/OD:**	4.25" OD
Operator:	T. Schaefer	**Datum:**	NAVD88	**Sampler:**	Standard
Logged By:	E. Tombaugh	**Rig Type:**	ATV Track Mobile B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4-24-23 / 4-24-23	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	N611197.8, E1159691.1	**Casing ID/OD:**	4.25"/4.5"	**Water Level*:**	24.3'
Hammer Efficiency Factor:	0.742	**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 = Insitu Vane Shear Test; MV = Unsuccessful Insitu 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 = weight of rods; WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf); T_v = Pocket Torvane Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-uncorrected = Raw field SPT N-value; Hammer Efficiency Factor = Annual Calibration Value; N_{60} = SPT N-uncorrected corrected for hammer efficiency; N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf); WC = water content, percent; LL = Liquid Limit; PL = Plastic Limit; PI = Plasticity Index; G = Grain Size Analysis; C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	6D	24/15	25.0 - 27.0	9-14-17-22	31	31	32			Grey-brown, wet, hard, Silty CLAY, trace fine sand. Gradual transition to SILT with fine sand in bottom 1", (Marine Clay).	23-S-B269 A-7-6, CL WC=21.4% LL=29 PL=19 PI=10
							94				
							98				
							115	191.9		28.5	
							RC			29.0'-30.0': Observed gravel fragments in wash return.	
30	7D	24/18	30.0 - 32.0	19-24-25-26	49	49				Brown, wet, dense, Silty fine to coarse SAND, some gravel, (Glacial Till).	
35	8D	24/16	35.0 - 37.0	33-66-48-44	114	114	61			Brown, wet, very dense, fine to coarse SAND, some silt, some gravel, possible decomposed rock structure, (Glacial Till).	
							142				
							149				
							53/3"	181.9		38.5	
	R1	24/20	39.0 - 41.0	RQD = 17%			NX			Increased roller cone resistance at 38.5', possible rock fragments observed in wash return. Advanced roller cone to refusal at 39.0', set up to core at 39.0'. R1: Hard, fresh, aphanitic, grey, PHYLLITE, with quartzite laminae. Primary joints are very close to closely spaced, horizontal to low angle, planar, smooth, fresh to discolored, open to moderately wide. Secondary joints are very closely spaced, high angle, planar, smooth, tight, one fresh and one infilled with 0.5" of clayey silt. Recovery = 83% Rock Quality = Very Poor Rock Core Times (min:sec): 39.0-40.0' (2:39), 40.0-41.0' (2:13)	
40											
	R2	36/32	41.0 - 44.0	RQD = 50%						R2: Hard, fresh, aphanitic, grey, PHYLLITE. Primary joints are very close to closely spaced, horizontal to low angle, planar, smooth, fresh to discolored, open to moderately wide. One high angle joint with clay & silt infilling. Recovery = 89% Rock Quality = Fair Rock Core Times (min:sec): 41.0-42.0' (1:44), 42.0-43.0' (1:39), 43.0-44.0' (2:55)	
	R3	60/52	44.0 - 49.0	RQD = 78%							
45											
								171.4		R3: Hard, fresh, aphanitic, grey, PHYLLITE, with quartzite laminae and intrusions. Joints are close to	
50											

Remarks:

1. Automatic hammer NEBC #20 Energy Transfer Ratio = 0.742.
2. Water level measured immediately after removal of casing.

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Trafton Road Bridge No. 5812

Location: Waterville, Maine

Boring No.: BB-WTR-103

WIN: 26152.00

Driller:	New England Boring Contractors	**Elevation (ft.)**	220.4	**Auger ID/OD:**	4.25" OD
Operator:	T. Schaefer	**Datum:**	NAVD88	**Sampler:**	Standard
Logged By:	E. Tombaugh	**Rig Type:**	ATV Track Mobile B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	4-24-23 / 4-24-23	**Drilling Method:**	Drive & Wash	**Core Barrel:**	NX
Boring Location:	N611197.8, E1159691.1	**Casing ID/OD:**	4.25"/4.5"	**Water Level*:**	24.3'
Hammer Efficiency Factor:	0.742	**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 = Insitu Vane Shear Test
MV = Unsuccessful Insitu 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 = weight of rods
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane 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										moderately spaced, low angle, planar, smooth, fresh to discolored, partially open to open. Recovery = 87% Rock Quality = Good Rock Core Times (min:sec): 44.0 45.0' (2:20), 45.0-46.0' (1:48), 46.0-47.0' (1:49), 47.0-48.0' (2:31), 48.0-49.0' (1:54)	
										49.0 **Bottom of Exploration at 49.0 feet below ground surface.**	
55											
60											
65											
70											
75											

Remarks:

1. Automatic hammer NEBC #20 Energy Transfer Ratio = 0.742.
2. Water level measured immediately after removal of casing.

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

APPENDIX D – LABORATORY TESTING RESULTS

Thielsch
DIVISION OF THE RISE GROUP

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Let's Build a Solid Foundation

Client Information:	
GZA GeoEnvironmental, Inc.	
South Portland, ME	
Project Manager:	Michael Johnescu
Assigned By:	Michael Johnescu
Collected By:	EPT

Project Information:	
Trafton Rd. Bridge	
Watervill, Maine	
Project Number:	09.0026186.00
Summary Page:	1 of 1
Report Date:	05.17.23

LABORATORY TESTING DATA SHEET, Report No.: 7423-E-B010

Boring No.	Sample No.	Depth (ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Rcvd Moisture Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	pH	g_d MAX (pcf) W_{opt} (%)	g_d MAX (pcf) W_{opt} (%) (Corr.)	Dry unit wt. (pcf)	Test Moisture Content %	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318		D6913			D2974	D4792	D1557								
BB-WTR-101	S1	0.8-2.8	23-S-B265	3.3			42.9	46.9	10.2											Brown f-c SAND and f-c GRAVEL, little Silt
BB-WTR-101	S4	15-17	23-S-B266	19.4			34.6	39.0	26.4											Brown f-c SAND, some fine Gravel, some Silt & Clay
BB-WTR-102	S2	2.4-4.4	23-S-B267	22.2			1.0	73.3	25.7											Brown f-m SAND, some Silt & Clay, trace fine Gravel
BB-WTR-103	S3	10-12	23-S-B268	15.6			1.0	22.9	76.1											Brown SILT & Clay, some f-m Sand, trace fine Gravel
BB-WTR-103	S5	20-22	23-S-B269	13.8			30.4	47.6	22.0											Brown f-c SAND, some fine Gravel, some Silt
BB-WTR-103	S6	25-27	23-S-B270	21.4	29	19														Gray lean Clay

Water Contents tested by SF on 05.11.2023

Date Received: 05.10.23 Reviewed By: Date Reviewed: 05.18.23

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CTS Laboratory
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State of Maine - Department of Transportation
Laboratory Testing Summary Sheet

Project ID: Trafton Rd. Bridge **MDOT Project Number:**

Town(s): Waterville, ME **GZA Project Number: 09.0026186.00**

Boring & Sample ID Number	Station (Feet)	Sample No.	Depth (Feet)	Lab Number	Organic %	W.C.	L.L.	P.I.	Classification		
									Unified	AASHTO	Frost
BB-WTR-101		S1	0.8-2.8	S-B265		3.3			SP-SM	A-1-b	0
BB-WTR-101		S4	15-17	S-B266		19.4			SM	A-2-4 (0)	II
BB-WTR-102		S2	2.4-4.4	S-B267		22.2			SM	A-2-4 (0)	II
BB-WTR-103		S3	10-12	S-B268		15.6			ML	A-4(0)	IV
BB-WTR-103		S5	20-22	S-B269		13.8			SM	A-1-b	II
BB-WTR-103		S6	25-27	S-B270		21.4	29	10	CL	A-7-6	IV

Classification of these soil samples is in accordance with AASHTO Classification System M-145-95. This classification is followed by the "Frost Susceptibility Rating" from zero (non-frost susceptible) to Class IV (highly frost susceptible). The "Frost Susceptibility Rating" is based upon the MDOT and Corps of Engineers Classification Systems.

GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-19 and/or ASTM D 7928-21e1 (Last Updated June 2021)

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

LL = Liquid limit as determined by AASHTO T 89-17 and/or ASTM D 4318-17E01

PI = Plasticity Index as determined by AASHTO 90-16 and/or ASTM D4318-17E01

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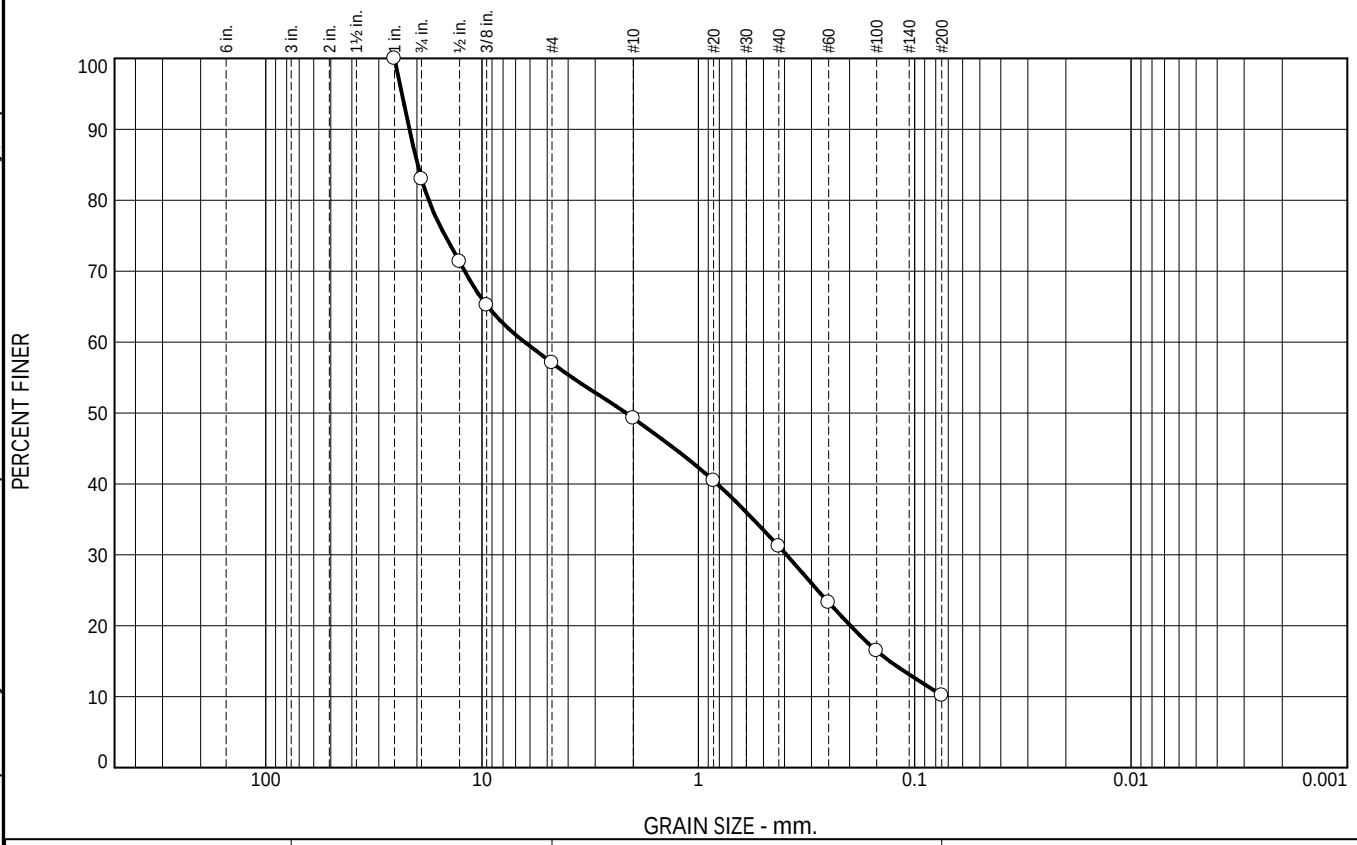
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	17.0	25.9	7.8	18.1	21.0	10.2	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	83.0		
1/2"	71.4		
3/8"	65.2		
#4	57.1		
#10	49.3		
#20	40.5		
#40	31.2		
#60	23.3		
#100	16.5		
#200	10.2		

* (no specification provided)

Soil Description

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

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 21.6650 D_{85}= 19.8630 D_{60}= 6.3513
D_{50}= 2.1593 D_{30}= 0.3912 D_{15}= 0.1304
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

Source of Sample: BB-WTR Depth: 0.8-2.8'
Sample Number: 101 / S1

Date: 05.12.23

Thielsch Engineering Inc.

Cranston, RI

Client: Stantec
Project: Trafton Rd. Bridge
Waterville, ME
Project No: 90.0026186.00

Figure 23-S-B265

Checked By: Andrew Vanasse

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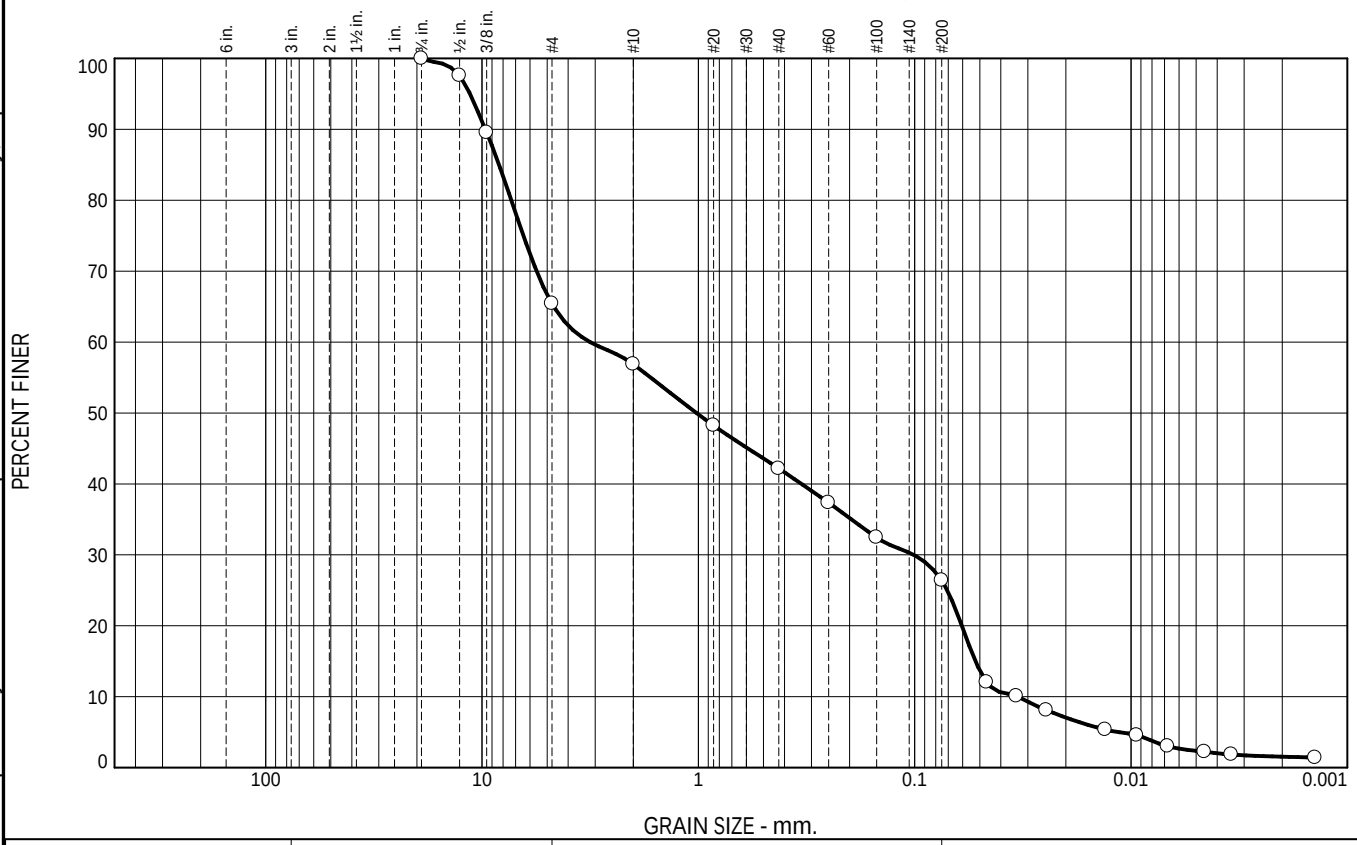
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	34.6	8.5	14.7	15.8	24.9	1.5

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	97.6		
3/8"	89.5		
#4	65.4		
#10	56.9		
#20	48.2		
#40	42.2		
#60	37.3		
#100	32.4		
#200	26.4		
0.0465 mm.	12.0		
0.0339 mm.	10.1		
0.0246 mm.	8.1		
0.0132 mm.	5.3		
0.0094 mm.	4.6		
0.0068 mm.	3.0		
0.0046 mm.	2.2		
0.0034 mm.	1.8		
0.0014 mm.	1.4		

* (no specification provided)

Soil Description

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

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 9.6641 D_{85}= 8.3451 D_{60}= 3.1635
D_{50}= 1.0198 D_{30}= 0.1012 D_{15}= 0.0524
D_{10}= 0.0335 C_u= 94.41 C_c= 0.10

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

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

Source of Sample: BB-WTR Depth: 15-17'
Sample Number: 101 / S4

Date: 05.15.23

Thielsch Engineering Inc.
Cranston, RI

Client: Stantec
Project: Trafton Rd. Bridge
Waterville, ME
Project No: 90.0026186.00

Figure 23-S-B266

Tested By: AV / SF Checked By: Andrew Vanasse

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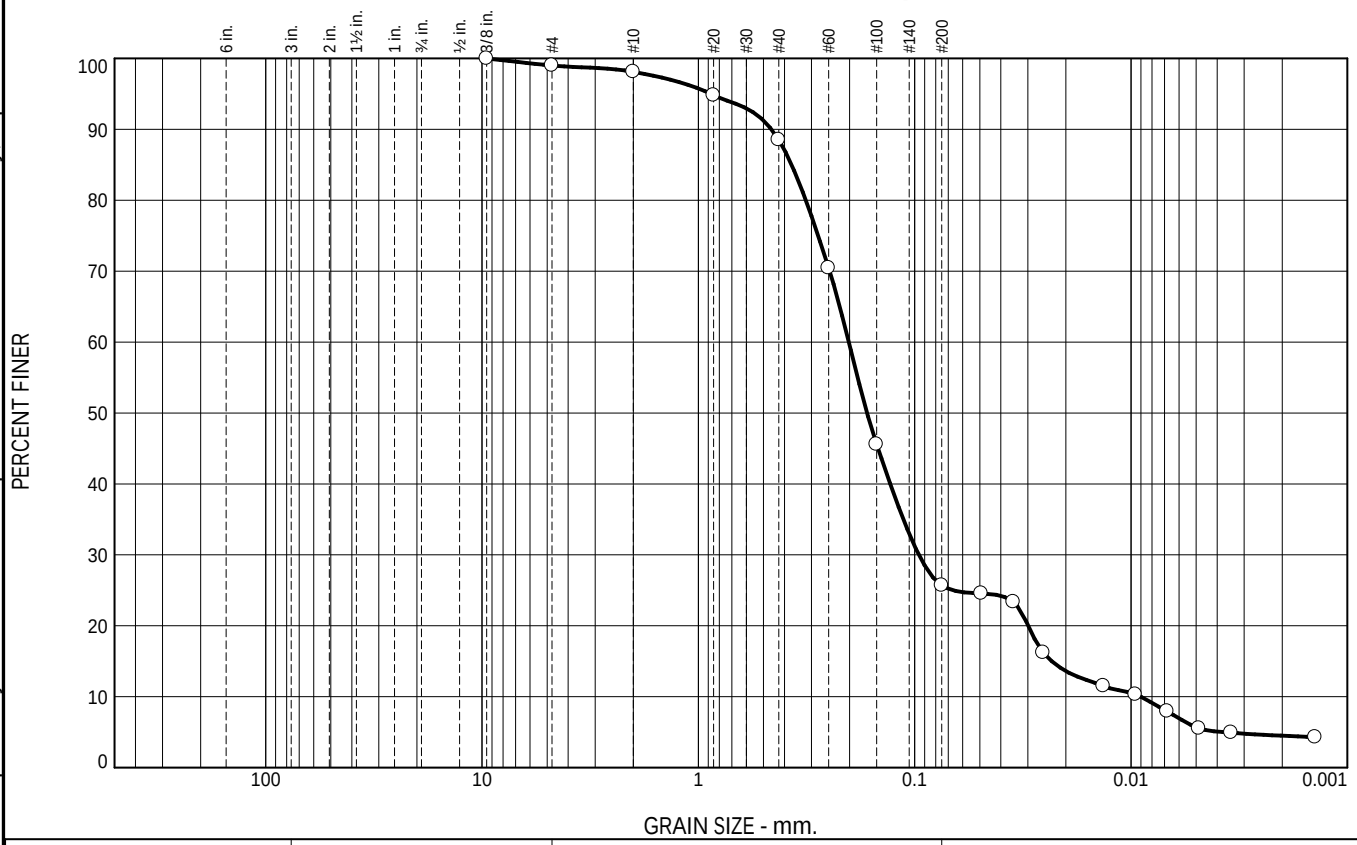
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.0	0.9	9.6	62.8	21.2	4.5

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.0		
#10	98.1		
#20	94.8		
#40	88.5		
#60	70.5		
#100	45.6		
#200	25.7		
0.0492 mm.	24.5		
0.0350 mm.	23.4		
0.0255 mm.	16.2		
0.0134 mm.	11.5		
0.0095 mm.	10.3		
0.0068 mm.	7.9		
0.0049 mm.	5.5		
0.0034 mm.	4.9		
0.0014 mm.	4.3		

* (no specification provided)

Source of Sample: BB-WTR Depth: 2.4-4.4'
Sample Number: 102 / S2

Date: 05.15.23

Soil Description

Brown f-m SAND, some Silt & Clay, trace fine Gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.4593 D_{85}= 0.3708 D_{60}= 0.2017
D_{50}= 0.1661 D_{30}= 0.0957 D_{15}= 0.0233
D_{10}= 0.0090 C_u= 22.29 C_c= 5.02

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

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

Thielsch Engineering Inc.

Cranston, RI

Client: Stantec
Project: Trafton Rd. Bridge
Waterville, ME
Project No: 90.0026186.00 Figure 23-S-B267

Tested By: AV / SF Checked By: Andrew Vanasse

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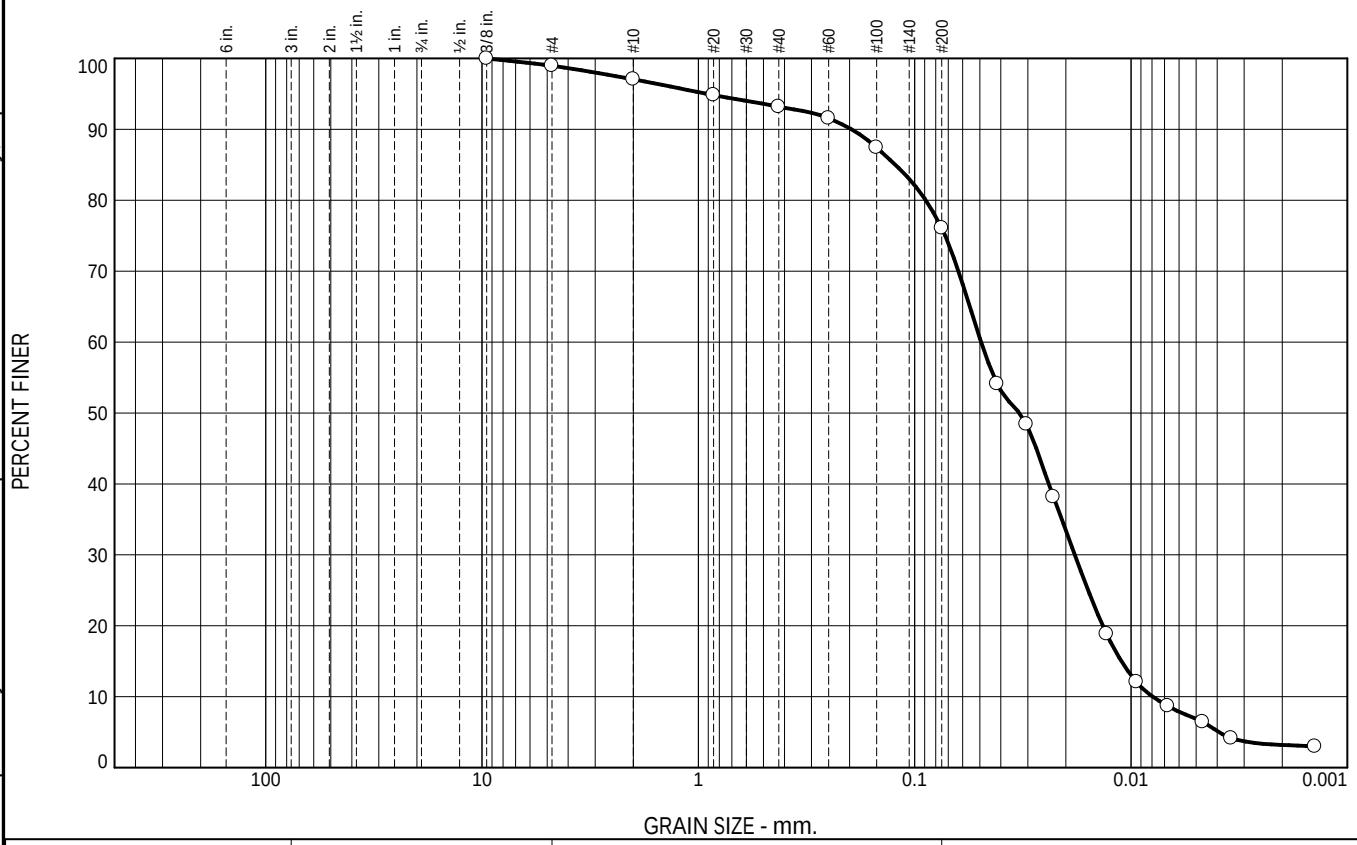
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.0	1.9	3.9	17.1	72.9	3.2

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.0		
#10	97.1		
#20	94.8		
#40	93.2		
#60	91.6		
#100	87.4		
#200	76.1		
0.0416 mm.	54.1		
0.0305 mm.	48.4		
0.0228 mm.	38.2		
0.0130 mm.	18.8		
0.0094 mm.	12.1		
0.0068 mm.	8.7		
0.0047 mm.	6.4		
0.0034 mm.	4.1		
0.0014 mm.	3.0		

* (no specification provided)

Soil Description

Brown SILT & Clay, some f-m Sand, trace fine Gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.1957 D_{85}= 0.1229 D_{60}= 0.0493
D_{50}= 0.0328 D_{30}= 0.0182 D_{15}= 0.0111
D_{10}= 0.0079 C_u= 6.21 C_c= 0.85

Classification

USCS= ML AASHTO= A-4(0)

Remarks

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

Source of Sample: BB-WTR Depth: 10-12'
Sample Number: 103 / S3

Date: 05.15.23

Thielsch Engineering Inc.

Cranston, RI

Client: Stantec
Project: Trafton Rd. Bridge
Waterville, ME
Project No: 90.0026186.00

Figure 23-S-B268

Tested By: AV / SF Checked By: Andrew Vanasse

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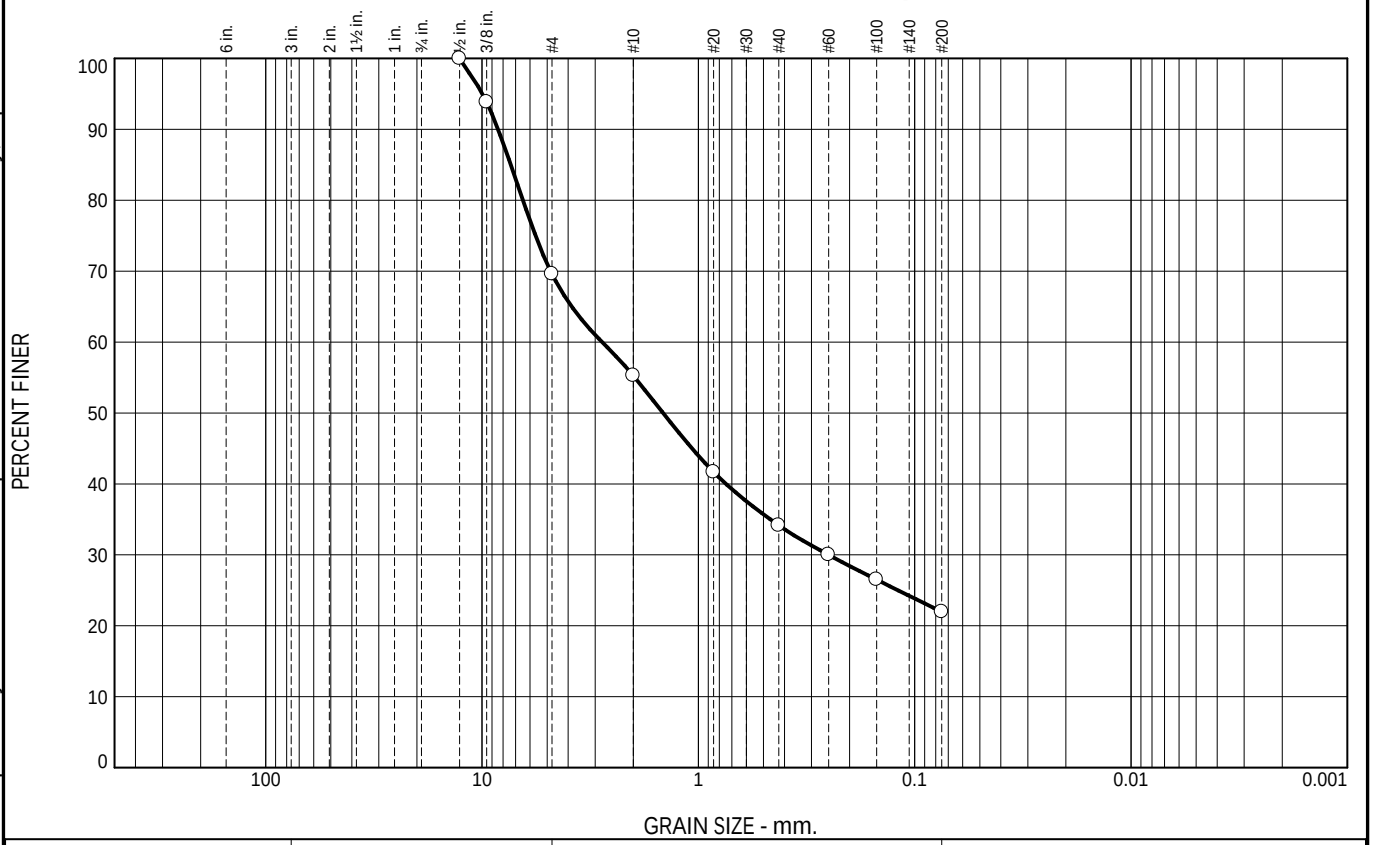
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	30.4	14.3	21.1	12.2	22.0	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	93.8		
#4	69.6		
#10	55.3		
#20	41.7		
#40	34.2		
#60	30.0		
#100	26.5		
#200	22.0		

* (no specification provided)

Soil Description

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

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 8.4343 D_{85}= 7.3615 D_{60}= 2.7860
D_{50}= 1.4561 D_{30}= 0.2503 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Source of Sample: BB-WTR Depth: 20-22'
Sample Number: 103 / S5

Date: 05.12.23

Thielsch Engineering Inc.

Cranston, RI

Client: Stantec
Project: Trafton Rd. Bridge
Waterville, ME
Project No: 90.0026186.00

Figure 23-S-B269

Tested By: SF Checked By: Andrew Vanasse

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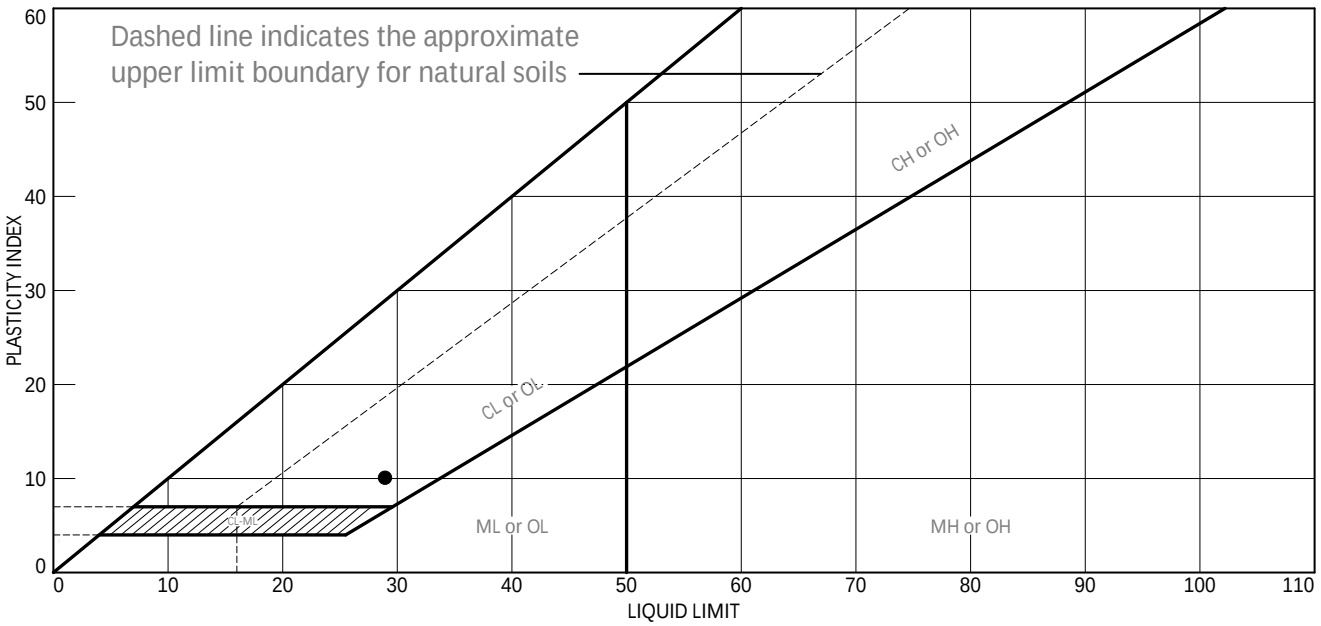
LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● Gray lean Clay	29	19	10			

Project No. 90.0026186.00 Client: Stantec

Project: Trafton Rd. Bridge

Waterville, ME

Source of Sample: BB-WTR Depth: 25-27'

Sample Number: 103 / S6

Thielsch Engineering Inc.

Cranston, RI

Remarks:

Figure 23-L-B270

Tested By: SF Checked By: Andrew Vanasse

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thielsch.com
Let's Build a Solid Foundation

Client Information:		Project Information:	
GZA GeoEnvironmental, Inc.		**Trafton Rd. Bridge**	
South Portland, ME		**Waterville, Maine**	
Project Manager:	Michael Johnescu	Project Number:	09.0026186.00
Assigned By:	Michael Johnescu	Summary Page:	1 of 1
Collected By:	EPT	Report Date:	05.25.23

LABORATORY TESTING DATA SHEET, Report No.: 7423-E-150

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	st PSI	Is_{50} PSI	(8) s_c PSI	
BB-WTR-101	R1	19.00-19.65	23-S-2113		1.991	4.498	168.1				15834	0.409	3.19	0.44				Grey Slate
Fresh break along foliation, minor break occurred at about 2500 lb (803 psi) may have affected the Poisson's Ratio																		
BB-WTR-102	R1	10.25-11.25	23-S-2114		1.991	4.527	169.3				12194	0.350	3.62	0.96				Grey Slate
Fresh break along foliation, possible minor break may have affected the Poisson's Ratio																		

(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: **05.10.23** Reviewed By: Date Reviewed: **05.25.23**

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www.thielsch.com
Let's Build a Solid Foundation

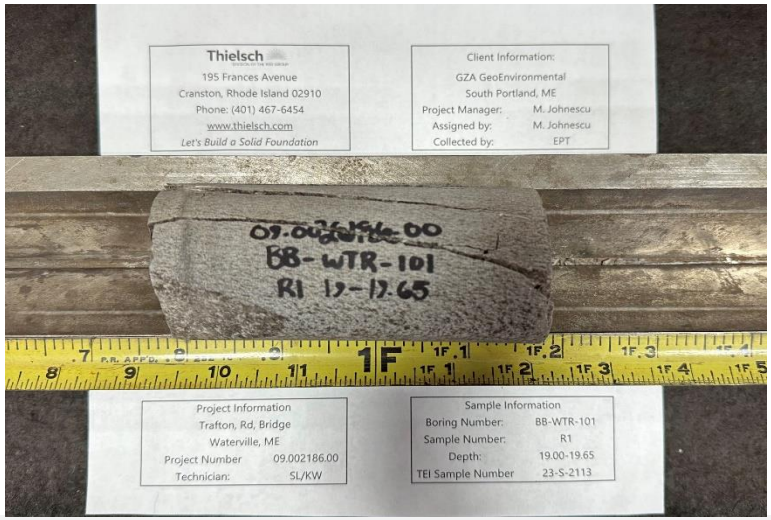
Client Information:	
GZA GeoEnvironmental	
South Portland, ME	
Project Manager:	Michael Johnescu
Assigned by:	Michael Johnescu
Collected by:	EPT

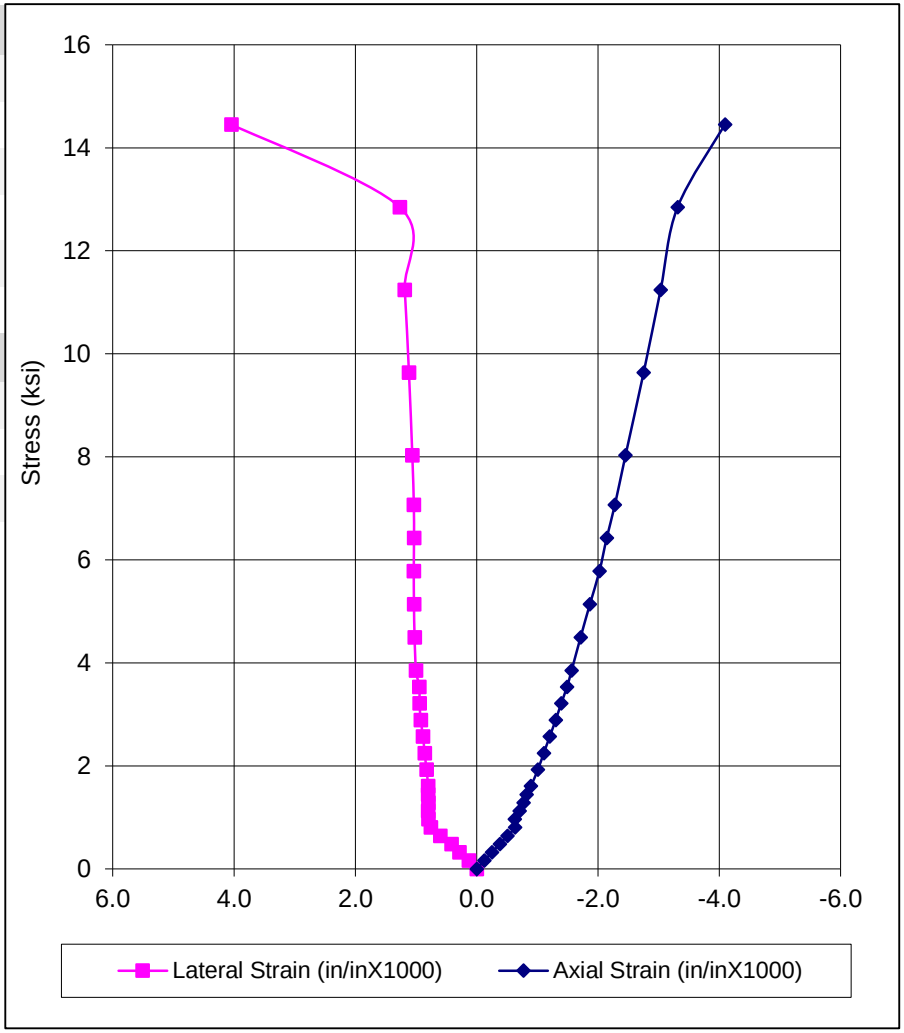
Project Information:	
Trafton Rd. Bridge	
Waterville, ME	
Project Number:	09.0026186.00
Technician:	SL
Report Date:	05.25.23

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

Sample Information		**Compressive Test Information**	
Boring ID:	BB-WTR-101	**Unit Weight (pcf):**	168.1
Sample #:	R1	**Failure Stress (psi):**	15,834
Depth (ft):	19.00-19.65	**Failure Mode:**	Foliation
Tested Depth (ft):	19.1-19.5	**Time to Failure (min)**	13.02
Rock Type:	Grey Slate		
Features:	Broke along foliation		

Test Specimen Information		**Elastic Moduli Test Information**	
Diameter, D (in):	1.991	**Poisson's Ratio @ 50%:**	0.44
Length, L (in):	4.498	**Strain %:**	0.409
L:D Ratio:	2.26	**E sec PSI @ 50%:**	3.19E+06





Testing Notes: Minor break occurred at about 2500lb (803psi) may have caused high Poisson's ratio

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Let's Build a Solid Foundation

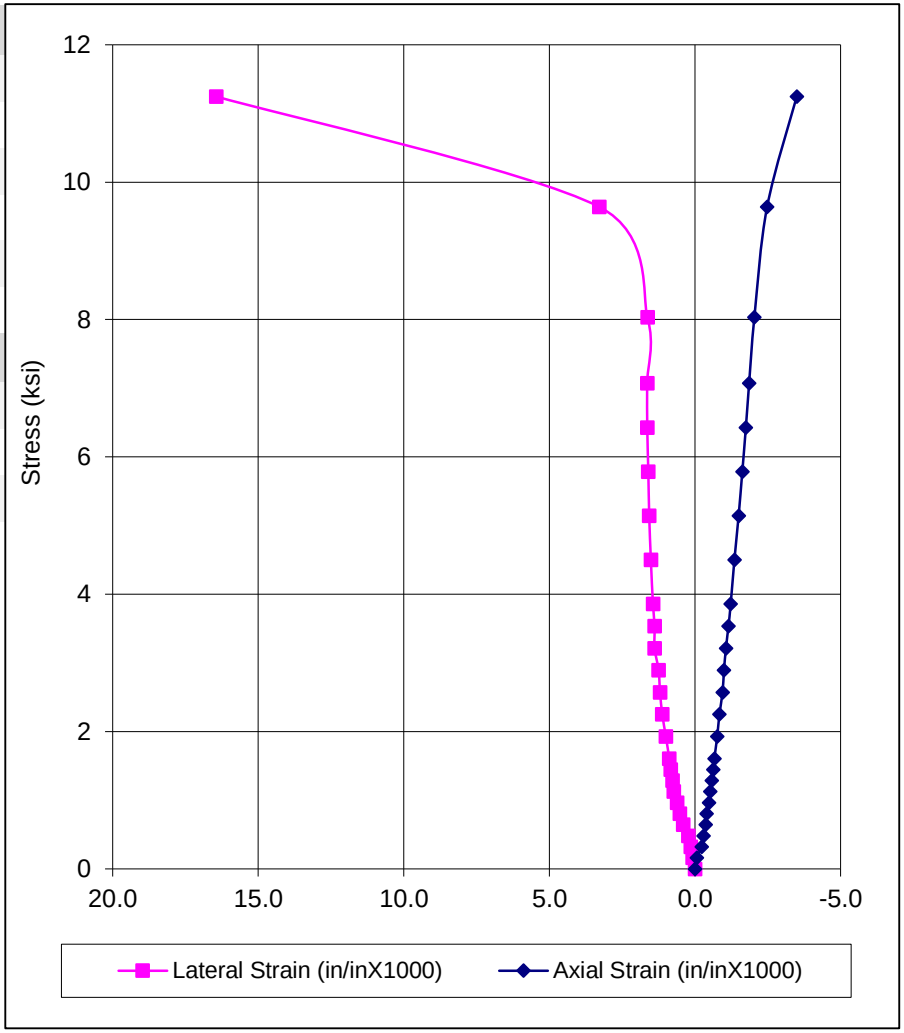
Client Information:	
GZA GeoEnvironmental	
South Portland, ME	
Project Manager:	Michael Johnescu
Assigned by:	Michael Johnescu
Collected by:	EPT

Project Information:	
Trafton Rd. Bridge	
Waterville, ME	
Project Number:	09.0026186.00
Technician:	SL
Report Date:	05.25.23

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

Sample Information		**Compressive Test Information**	
Boring ID:	BB-WTR-102	**Unit Weight (pcf):**	169.3
Sample #:	R1	**Failure Stress (psi):**	12,194
Depth (ft):	10.25-11.25	**Failure Mode:**	Foliation
Tested Depth (ft):	10.4-10.75	**Time to Failure (min)**	8.03
Rock Type:	Grey Slate		
Features:	Broke along foliation		

Test Specimen Information		**Elastic Moduli Test Information**	
Diameter, D (in):	1.991	**Poisson's Ratio @ 50%:**	0.96
Length, L (in):	4.527	**Strain %:**	0.350
L:D Ratio:	2.27	**E sec PSI @ 50%:**	3.62E+06



Testing Notes: **Early break along foliation may have caused high Poisson's Ratio**

APPENDIX E – ROCK CORE PHOTOGRAPHS

Trafton Road Bridge No. 5812
MaineDOT WIN 26152.00, Waterville, Maine
Rock Core Photographs

Boring No.	Run	Depth (ft)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
BB-WTR-101	R1	19.0 - 23.0	48	100	34	71	PHYLLITE	1
BB-WTR-101	R2	23.0 - 28.0	60	100	38	63	PHYLLITE	2
BB-WTR-101	R3	28.0 - 30.0	24	100	18	75	PHYLLITE	3

Notes: 1. Box row corresponds to the core box section in which the rock core sample is contained; Row 1=Top, Row 3=Bottom.
2. Top photo is dry, bottom photo is wet.

Trafton Road Bridge No. 5812
MaineDOT WIN 26152.00, Waterville, Maine
Rock Core Photographs

Boring No.	Run	Depth (ft)	Recovery (in)	Recovery (%)	RQD (in)	RQD (%)	Rock Type	Box Row
BB-WTR-103	R1	39.0 - 41.0	20	83	4	17	PHYLLITE	1
BB-WTR-103	R2	41.0 - 44.0	32	89	18	50	PHYLLITE	1
BB-WTR-103	R3	44.0 - 49.0	52	87	47	78	PHYLLITE	2
BB-WTR-102	R1	8.4 - 12.9	48	89	33	61	PHYLLITE	3
BB-WTR-102	R2	12.9 - 16.4	42	100	19	45	PHYLLITE	4
BB-WTR-102	R3	16.4 - 17.4	12	100	0	0	PHYLLITE	4

Notes: 1. Box row corresponds to the core box section in which the rock core sample is contained; Row 1=Top, Row 4=Bottom.
2. Top photo is dry, bottom photo is wet.