

### **REPORT**

## Preliminary Geotechnical Data Report

Interstate 95 Bridges 1427 and 5800 over Stillwater Avenue, Bangor, Maine (WIN 0274176.00)

Submitted to:

## **Maine Department of Transportation**

Submitted by:

## WSP USA, Inc.

428 Dow Highway Eliot, Maine 03903



## **Table of Contents**

1.0	INTR	ODUCTION	1
2.0	PRO	JECT UNDERSTANDING	1
3.0	GEO	LOGIC SETTING	1
4.0	SUB	SURFACE INVESTIGATIONS	1
	4.1	Geotechnical Borings	1
	4.2	Geologic Evaluation of Exposed Rock Cuts	2
5.0	LAB	ORATORY TESTING PROGRAM	2
6.0	SUB	SURFACE CONDITIONS	3
7.0	CON	DITIONS OF EXPOSED ROCK CUTS	4
8.0	REP	ORT AND EXPLORATION LIMITATIONS	5
TAE	BLES		
Tab	e 5-1:	Number and Type of Laboratory Tests Performed	3
Tab	e 6-1:	Summary of Subsurface Fill and Soil Encountered	3

## **TABLES** (attached)

Table 1: Summary of Subsurface Explorations

Table 2: Summary of Rock Cut Discontinuities

Table 3: Summary of Rock Core Quality

## FIGURES (attached)

Figure 1: Site Location Plan

Figure 2: Boring Location Plan

wsp

## **APPENDICES**

## **APPENDIX A**

**Boring Logs** 

## **APPENDIX B**

Rock Core Photographs

## **APPENDIX C**

Laboratory Test Results

## **APPENDIX D**

Rock Discontinuity Calculations



## 1.0 INTRODUCTION

This Preliminary Geotechnical Data Report (PGDR) summarizes the results of the geotechnical subsurface investigation and laboratory testing program of site soils and rock that WSP USA Inc. (WSP) performed to support the replacement of Bridge No. 1427 & No. 5800 that carries Interstate 95 (I-95) over Stillwater Avenue in Bangor, Maine. Figure 1 shows the site location.

### 2.0 PROJECT UNDERSTANDING

WSP reviewed the historical drawings<sup>1</sup> for the two existing I-95 bridges over Stillwater Avenue including historical boring logs provided by MaineDOT. The existing structures were constructed in 1960 and consist of two (2) three-span bridges with two (2) piers and two (2) abutments each.

## 3.0 GEOLOGIC SETTING

Available site geology information, consisting of surficial<sup>2</sup> geologic maps of the area indicate subsurface conditions consist of road embankment fills overlying Pleistocene Presumpscot Formation glaciomarine deposits generally consisting predominantly of silt and fine sand.

Available site geology information, consisting of bedrock<sup>3</sup> geologic maps of the area indicate bedrock in the region is mapped as the Medium bedded facies of the Penobscot River Member of the Silurian-aged Bangor Formation of the Vassalboro Group, consisting of medium to dark gray, fine-grained to very fine-grained, metawacke; a metamorphosed impure, poorly sorted sandstone with appreciable clay minerals. The 1958 historical Kenduskeag Avenue boring logs<sup>1</sup> characterize bedrock as phyllite (a general term for metamorphosed clay-rich rocks).

## 4.0 SUBSURFACE INVESTIGATIONS

## 4.1 Geotechnical Borings

WSP completed six (6) borings (BB-BSA-102, BB-BSA-103, BB-BSA-108, BB-BSA-109, BB-BSA-109A, and BB-BSA-110) within the paved roadway of Stillwater Avenue beyond the extents of the existing bridges in May 2024 and seven (7) borings (BB-BSA-101, BB-BSA-104, BB-BSA-104A, BB-BSA-105, BB-BSA-106, BB-BSA-107, and BB-BSA-111) within the paved roadway of I-95 beyond the existing bridge abutments in July 2024. The as-drilled boring locations and elevations are summarized in Table 1 and boring locations with respect to existing site features are illustrated in the Boring Location Plan in Figure 2.

The field program included Standard Penetration Testing (SPT) of predominantly coarse-grained soils and recovery of rock core from the bedrock. A WSP geotechnical engineer monitored drilling activities, selected sampling intervals, logged subsurface conditions encountered, and obtained soil samples for use in visual descriptions and subsequent laboratory testing and classification.

WSP subcontracted Seaboard Drilling, LLC (Seaboard) of Bangor, Maine, who completed the borings using a Diedrich D-50 drill rig for all borings. Borings were advanced using solid stem augers (SSA) followed by 4-inch or

wsp

1

Maine State Highway Commission, 1960 Final As Built Plans, Project No. I-95-8(6)180, Interstate #95 over Stillwater Ave. in the City of Bangor, Penobscot County, Plans and Profiles, 41 sheets, Received from HNTB, Filename: 1427 & 5800 Bangor 1958 As-Built.pdf.

<sup>&</sup>lt;sup>2</sup> Syverson, K.M., Thompson, A.M., and Johnston, R.A., (2011). Surficial Geology, Bangor Quadrangle, Maine. Open-File No. 11-6, Maine Geological Survey, 1 sheet, scale 1:24,000.

<sup>&</sup>lt;sup>3</sup> Pollock, S.G., Johnston, R.A., (2011). Bedrock Geology of the Bangor Quadrangle, Maine, Open-File No. 11-57, Maine Geological Survey, 1 sheet, scale 1:240,000.

3-inch casing and drive and wash methods to refusal; rock coring was performed in either 4-inch or 3-inch casing seated in rock, depending on the drilling conditions.

SPT was performed using a calibrated automatic hammer system and standard 2-inch split spoon sampler in general accordance with American Society for Testing and Materials (ASTM) D1586. Sampling was conducted at approximately 5-foot intervals, where split spoons were advanced 24 inches with a 140-pound hammer dropped 30 inches. WSP recorded the number of hammer blows required to advance the sampler through each 6-inch increment. Measured, uncorrected N-values, calculated as the sum of the hammer blows to advance the sampler during the 6-inch to 18-inch intervals. Seaboard provided WSP with a copy of the automatic hammer calibration report from November 2023<sup>4</sup> for both drill rigs used. WSP used a calibrated hammer energy transfer ratio of 106.6% for the May borings and 108.7% for the July borings provided by in the report convert the measured N-values to N<sub>60</sub> values. Uncorrected N-values and N<sub>60</sub> are shown on the boring logs (Appendix A). WSP collected and stored soil samples in sealed glass jars for later evaluation and laboratory testing.

Up to 10 feet of rock core was collected in each boring using NX size (1-7/8-inch diameter) diamond tipped core barrels following either refusal of casing or failure to advance the split spoon sampler or roller bit. Rock core samples were placed in wooden boxes and transported to the WSP office. WSP recorded the lithology, Total Core Recovery (TCR), Rock Quality Designation (RQD), and coring rates for each core run which are provided in the boring logs in Appendix A. Photographs of all collected rock core are presented in Appendix B.

The boring logs provided in Appendix A present details of the sampling methods used, field data obtained, and soil and rock conditions encountered during the investigation. A description of the boring log symbols and terms used for the soil and rock descriptions precedes the boring logs. A WSP geotechnical engineer monitored drilling activities, selected sampling intervals, logged subsurface conditions encountered, and obtained soil samples for use in visual descriptions and subsequent laboratory testing and classification WSP field characterized the soils in accordance with ASTM D2488. WSP field characterized the bedrock lithology.

## 4.2 Geologic Evaluation of Exposed Rock Cuts

On April 23, 2024, WSP visited the Stillwater Avenue site to collect geological data from the exposed rock cuts along Stillwater Avenue beneath the I-95 existing bridge foundations. Locations are shown in Appedix D. During the site visit, WSP measured 37 geologic discontinuities and photographed existing rock cut conditions. Our discontinuity measurements and observations are presented in Table 2 (attached) and include discontinuity type, orientation, persistence, aperture, infilling materials, estimated strength, surface roughness, shape, spacing, and groundwater conditions. Our measured discontinuity orientations are plotted in Appendix D.1.

## 5.0 LABORATORY TESTING PROGRAM

After reviewing the collected samples in the office, WSP transferred select samples to GeoTesting Express (GTX) of Acton, Massachusetts for geotechnical laboratory testing in accordance with applicable AASHTO and ASTM testing procedures. The types and numbers of each of the laboratory tests conducted on soil samples and rock core are presented in Table 5-1. Soil testing results are included on the boring logs in Appendix A. Complete soil and rock laboratory testing results are provided in Appendix C.

<sup>&</sup>lt;sup>4</sup> GRL Engineers, Inc., SPT Energy Calibration on November 2, 2023, Submitted to Eric Baron of S.W. Cole Explorations, LLC (now known as Seaboard Drilling LLC) on November 10, 2023.



2

Table 5-1: Number and Type of Laboratory Tests Performed

Laboratory Test	Test Standard	No. Tests Completed
Moisture content	AASHTO T267, ASTM D2216	18
Grain size analysis (coarse)	AASHTO T88, ASTM D6913	37
Grain size (fine)	AASHTO T88, ASTM D7928	12
Atterberg limits	AASHTO T89 / T90, ASTM D4318	11
Chlorides	AASHTO T291, ASTM D512	2
рН	AASHTO T289, ASTM D4972	2
Sulfates	AASHTO T290	2
Electric Resistivity	ASTM G57	1
Elastic Moduli of Rock in Uniaxial Compression - Rock	ASTM D7012 Method D	6

## 6.0 SUBSURFACE CONDITIONS

The boring logs in Appendix A provide detailed descriptions of the soil, bedrock, and measured groundwater conditions encountered in the borings.

**Soils**: The soils encountered in the borings generally consist of fill materials placed during construction of the bridge and roadway and naturally occurring sand deposits, clay deposits, sand and gravel interpreted as glacial till. Table 6-1 summarizes the major stratigraphic units, the range of thicknesses, and generalized material descriptions for soils encountered.

Table 6-1: Summary of Subsurface Fill and Soil Encountered

Stratigraphic Unit	Approximate Range in Encountered Thickness (feet)	Generalized Description
Asphalt	0.5 to 0.8	Asphalt pavement approximately 5-inch to 10-inch thick (Encountered in all borings)
Fill	2.6 to 20	The fill consists of olive brown to brown or grey to brown, dry to moist, medium dense to very dense, hard, fine to coarse Sand or SILT, with trace to little fine to coarse gravel, and non-plastic to slightly plastic.  USCS: SM, ML, GM. AASHTO: A-1-b (0), A-4 (0), A-2-4 (0) (Encountered in all borings)
Sand, Silt, Gravel	1.3 to 22	Olive to brown to grey, moist to wet, medium dense to very dense, very stiff to hard, fine to coarse SAND or SILT with varying amounts of fine to coarse GRAVEL, and non-plastic to slightly plastic.  USCS: SM, ML, GM, SC. AASHTO: A-2-4 (0), A-4 (0) (Encountered in BB-BSA-101, -102, -105, -106, -107, -108, and -109)



Stratigraphic Unit	Approximate Range in Encountered Thickness (feet)	Generalized Description
Clay	3 to 14.5	Grey with brown and olive, wet, very soft to hard, CLAY, trace to little fine sand, trace gravel, medium plasticity with interbedded silt or sand lenses.  USCS: CL. AASHTO: A–6 (9, 10, 11, 15, 18, 19, 37) (Encountered in BB-BSA-104, -106, -107, and -111))
Glacial Till	3 to 10.3	Grey with brown to olive, wet, very dense to hard, fine to coarse SAND and fine to coarse GRAVEL, with varying amounts of silt and gravel, non-plastic, and weathered rock fragments.  USCS: SM, GM, ML. AASHTO: A-1-b (0), A-4 (0)  (Encountered in BB-BSA-104, -106, -107, and -111)

Notes: USCS classification from laboratory testing in accordance with ASTM D2487. AASHTO classification from laboratory testing and includes Group Classification and Group Index in parentheses in accordance with AASHTO M145.

**Bedrock:** Bedrock was cored for each boring location. Bedrock cores for BB-BSA-104 and BB-BSA-109 were taken at the offset borings BB-BSA-104A and BB-BSA-109A respectively. For the borings performed from Stillwater Avenue, top of bedrock surface ranged from 3.5 feet bgs (EL. 123.5 feet NAVD88) to 12.2 feet bgs (EL. 121.3 feet NAVD88). For the borings performed from I-95, top of bedrock ranged from 17.8 feet bgs (130.5 feet NAVD88) to 63.8 feet bgs (EL. 79.8 feet NAVD88). The bedrock was described as grey, very fine to fine grained, very thinly to thinly bedded, Metawacke [metasandstone] with calcite veins, medium strong to very strong, slightly to moderately weathered.

Rock quality designation (RQD) is a common parameter that is used to help assess the competency of sampled bedrock. RQD is defined as the sum of pieces of recovered bedrock greater than 4 inches in length divided by the total length of the core run. RQD values for bedrock encountered at the site ranges between 0 and 88 percent, which generally correlates to Rock Mass Quality ratings of very poor to good.

**Groundwater:** Groundwater levels were measured in all borings except BB-BSA-104, BB-BSA-104A, and BB-BSA-109. Groundwater was measured before the casing was withdrawn and at the end of the drilling day. Groundwater elevations vary from approximately EL. 123.1 feet to EL. 135.1 feet (NAVD88), ground water levels encountered at the time of drilling may have been influenced by the drilling methods used. Groundwater levels will fluctuate due to soil conditions and topography and seasonal variations in precipitation. Groundwater levels encountered during construction may differ from those recorded from the borings.

### 7.0 CONDITIONS OF EXPOSED ROCK CUTS

Rock Mass Rating (RMR) and Geological Strength Index (GSI) values were calculated for the existing rock cut exposures along Stillwater Avenue and for the rock core collected in each boring for comparison. The RMR system<sup>5</sup> assigns numerical ratings to six parameters, including strength of the intact rock, RQD, discontinuity spacing, discontinuity surface conditions, groundwater conditions, and orientation of discontinuities. These ratings

<sup>&</sup>lt;sup>5</sup> Bieniawski, Z.T. 1989. Engineering Rock Mass Classifications: A Complete Manual for Engineers and Geologists in Mining, Civil, and Petroleum Engineering. John Wiley & Sons.



Pe

are summed to provide the RMR value. The GSI system<sup>6</sup> assigns a numerical rating to qualitative estimates of the lithology, discontinuity structure, and discontinuity surface conditions in a rock mass.

To determine the RMR, WSP used the discontinuities described in each rock cut exposure or core run and the RQD measured in each core run to assign ratings. We used the discontinuity orientations measured in the rock cuts to assign rating adjustments for the discontinuity sets that we identified as having unfavorable orientations relative to the existing foundation orientation (i.e., kinematically susceptible to sliding or toppling failure). The proposed foundation orientation may allow for a different rating adjustment for discontinuity orientation, and thus a modification to the RMR value. Our calculated RMR values are summarized in Table 2 (attached) for the measured rock cut exposures and Table 3 (attached) for the boring rock core runs. Full RMR calculations including the individual parameter ratings are provided in Appendix D.2. Based on our field observations and measurements at the Stillwater Avenue bridge site, we estimate that:

- RMR values range from 40 to 79 and average 63 for the exposed rock cuts from 37 discontinuities evaluated...
- RMR values range from 26 to 72 and average 44 for the rock core runs from 30 runs.

To determine the GSI, WSP used the discontinuity structure observed in the existing rock cuts and the discontinuity surface conditions described in the rock cuts and core runs to assign a rating. We selected the GSI value from the range established by Marinos and Hoek<sup>6</sup> for typical sandstone lithologies. The GSI chart is presented in Appendix D.3. Based on our field observations and measurements, we estimate a GSI value of 55 for the exposed rock cuts at the Stillwater Avenue bridge site.

#### REPORT AND EXPLORATION LIMITATIONS 8.0

This Preliminary Geotechnical Data Report (PGDR) was prepared for the replacement of I-95 Bridge No. 1427 & Bridge No. 5800 over Stillwater Ave in Bangor, Maine. The professional services provided by WSP for this project include only the geotechnical aspects of the subsurface conditions at this site. The presence or implications of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this report and have not been investigated or addressed.

<sup>&</sup>lt;sup>6</sup> Marinos, Paul and Hoek, Evert. November 2000. GSI: a geologically friendly tool for rock mass strength estimation. ISRM International Symposium, Melbourne, Australia, paper number ISRM-IS-2000-035,



# Signature Page

## WSP USA, Inc.



Melissa E. Landon, PhD, PE Lead Consultant, Geotechnical Engineering ( I don't

Jeffrey D. Lloyd, PE Assistant Vice President, Geotechnical Engineering

RJN/MEL/JDL

https://wsponlinenam.sharepoint.com/sites/us-win02609500/shared documents/06 deliverables/stillwater geotech data report/hntb stillwater ave bangor win 027176.00 wsp pgdr.docx



## **TABLES**



September 2024 WIN 027176.00 / WSP US0025840.3905

Table 1: Summary of Subsurface Explorations
Geotechnical Data Report
MaineDOT I-95 Bridge Over Stillwater Avenue, Bangor, Maine
MaineDOT WIN 027176.00

		As-Drilled	Locations <sup>4</sup>			Appro	ximate Stra	ıta Thickı	ness (feet)		Approximate		Approximate	Approximate
				Ground							Top of	Approximate	Bottom of	Elevation of
	<b>T</b> . <b>D</b> .			Suface Elevation <sup>4</sup>			Sand,				Bedrock Depth	Elevation of Top of Bedrock	Exploration Depth (ft)	Bottom of Exploration
	Test Boring No. <sup>1,2,3</sup>	Northing	Easting	(feet NAVD88)	Aanhalt	Fill	Silt, Gravel <sup>6</sup>	Clay	Glacial Till	Weathered Bedrock	· -	(feet NAVD88)		(feet NAVD88)
			Easting	, ,	Asphalt						(feet bgs <sup>5</sup> )	,	(feet bgs <sup>5</sup> )	, ,
e G	BB-BSA-101	482856.27	1735264.27	150.5	0.6	12.9	15.0	NE <sup>5</sup>	3.0	NE <sup>5</sup>	31.5	119.0	41.5	109.0
Bridge	BB-BSA-102	482969.08	1735451.57	133.5	0.6	4.4	7.2	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	12.2	121.3	22.2	111.3
nd E	BB-BSA-103	482888.01	1735425.94	132.1	0.6	2.5	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	4.1	7.2	124.9	17.2	114.9
bound #1427	BB-BSA-104	483018.96	1735602.84	151.9	0.8	14.7	NE <sup>5</sup>	3.0	4.5	NE <sup>5</sup>	23.0	128.9	23.5	128.4
South	BB-BSA-104A	483017.59	1735600.99	152.0	0.7	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	20.4	131.6	31.0	121.0
SS	BB-BSA-105	482984.90	1735593.56	152.1	8.0	12.3	11.9	NE <sup>5</sup>	NE <sup>5</sup>	1.4	26.4	125.7	36.2	115.9
300	BB-BSA-106	482611.20	1735095.82	143.6	0.8	18.2	22.0	12.5	10.3	NE <sup>5</sup>	63.8	79.8	74.1	69.5
#5800	BB-BSA-107	482578.95	1735092.78	143.1	0.5	20.0	18.5	14.5	9.9	NE <sup>5</sup>	63.4	79.7	77.2	65.9
idge	BB-BSA-108	482749.52	1735322.13	129.5	0.6	2.6	3.5	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	6.7	122.8	16.7	112.8
d Br	BB-BSA-109	482636.37	1735255.48	127.0	0.7	8	1.3	NE <sup>5</sup>	NE <sup>5</sup>	0.1	NE <sup>5</sup>	NE <sup>5</sup>	10.1	116.9
bound Bridge	BB-BSA-109A	482637.93	1735257.73	127.0	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	3.5	123.5	14.0	113.0
E P	BB-BSA-110	482660.73	1735292.34	127.5	0.6	4.7	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	5.3	122.2	15.3	112.2
North	BB-BSA-111	482728.68	1735418.07	148.3	0.6	8.9	NE <sup>5</sup>	4.0	4.3	NE <sup>6</sup>	17.8	130.5	29.0	119.3

#### Notes:

- 2. Borings BB-BSA-102, BB-BSA-103, BB-BSA-108, BB-BSA-109, BB-BSA-109A, and BB-BSA-110 were performed by Seaboard Drilling, LLC in May, 2024. Borings BB-BSA-101, BB-BSA-104, BB-BSA-104A, BB-BSA-105, BB-BSA-106, BB-BSA-107, and BB-BSA-111 were performed by Seaboard Drilling, LLC in July, 2024.
- 3. Boring logs are presented in Appendix A of the Preliminary Geotechnical Data Report.
- 4. As drilled Boring Locations Derived from the Electronic file "Ground.dgn" Provided to WSP by HNTB on August 12, 2024.
- 5. bgs = below ground surface, NE = not encountered

6. This layer mainly consists of silty Sand or sandy Silt, but includes Gravel with some sand in borings BB-BSA-102 and BB-BSA-108 strata layers.

Prepared By: RJN

Checked By: LMP

Reviewed By: MEL

<sup>1.</sup> Boring locations are shown in Figure 2 - Boring Location Plan of the Preliminary Geotechnical Data Report.

Table 2: Summary of Rock Cut Discontinuities
Preliminary Geotechnical Design Report
Bridge #1427 & #5800, I-95 over Stillwater Ave, Bangor, Maine
MaineDOT WIN 027176.00

Outcrop Area	Disc	ontinuity	Dip	Uncorrected Dip Direction State Plane Grid North	<b>Dip Direction</b>		Persistence	Aperture	Infilling	Infilling Shear Strength <sup>(3)</sup>	Surface Roughness	Discontinuity Shape	Water	Discontinuity Spacing	Notes/Comments <sup>(4)</sup>	RMR
Alca	ID		[degrees]	[degrees]	[degrees]	361	[ft]	[in]	9	Strength	Rouginiess	Gnape	Tratoi	[ft]	Notes/Comments	TXIIIX
	1	bedding	32	348	333	5	10	0.13	none	-	rough	undulating to stepped	dry	0.2		40
	2	joint	84	229	214	3	15	0.25	lichen	low	slightly rough	planar	dry	1.5		64
	3	joint	88	245	230	3	3	0.50	none	-	slightly rough	planar	dry	2.8		78
	4	joint	85	265	250	2	8	0.25	lichen	low	smooth	planar	dry	0.9		46
	5	joint	11	243	228	1	5	0.13	none	-	smooth	undulating	dry	5.9		78
	6	joint	83	186	171	4	10	0.06	none	-	slightly rough	planar	dry	1.6		72
	7	bedding	25	335	320	5	10	tight	none	-	rough	stepped	dry	0.3		49
	8	joint	8	100	85	1	3	0.50	sandy soil	medium	smooth	planar	dry	5.9		73
	9	joint	75	50	35	3	15	0.06	none	-	slightly rough	planar	dry	1.1	Quartz veins 0.25" thick in vicinity	58
	10	joint	10	58	43	1	20	0.75	quartz	high	slightly rough	planar	dry	1.0		52
	11	joint	64	4	349	-	4	0.75	quartz	high	rough	irregular	dry	3.7		64
	12	joint	83	41	26	3	12	0.06	none	-	slightly rough	planar	dry	4.5		66
	13	joint	65	278	263	2	6	0.13	none	-	slightly rough	stepped	dry	5.4		54
	14	joint	4	48	33	1	10	0.50	quartz	high	slightly rough	undulating	dry	0.9		63
Stillwater	15	joint	83	133	118	2	5	tight	none	-	smooth	planar	dry	5.1		68
Ave	16	joint	8	124	109	1	10	0.38	broken rock	high	rough	undulating	dry	1.3		67
Northbound	17	joint	89	357	342	4	15	0.06	roots	low	slightly rough	undulating	dry	2.5		71
	18	joint	67	213	198	-	15	tight	none	-	smooth	undulating	dry	2.5		78
	19	joint	87	20	5	4	15	0.06	none	-	rough	stepped	dry	1.8		71
	20	joint	88	124	109	2	15	0.25	topsoil	low	slightly rough	planar	dry	1.7		47
	21	bedding	21	26	11	5	6	0.06	none	-	smooth	stepped	dry	0.4		42
	22	joint	80	278	263	2	10	0.13	none	-	slightly rough	planar	dry	1.8	Shotcrete and dowel repair 2 ft north	54
	23	joint	10	111	96	1	22.5	0.25	quartz	high	smooth	planar	dry	2.0		64
	24	joint	18	65	50	1	20	tight	none	-	slightly rough	undulating	dry	1.4		72
	25	joint	85	190	175	4	15	tight	none	-	slightly rough	planar	dry	2.3		79
	26	joint	59	212	197	-	15	1.50	quartz	high	smooth	planar	dry	2.2	Blast fragmentation to south	67
	27	joint	31	106	91	1	10	0.50	roots, topsoil	low	smooth	planar	dry	4.0		68
	28	joint	25	5	350	5	10	0.50	quartz, broken rock	high	rough	undulating	dry	1.8		69
	29	joint	81	10	355	4	10	0.13	broken rock	high	rough	planar	dry	2.2		74
	30	joint	10	220	205	1	24.8	0.50	broken rock	high	slightly rough	planar	dry	1.6		67
	31	joint	84	55	40	3	4.5	0.50	roots, sandy soil	low	slightly rough	planar	dry	2.3		69

Table 2: Summary of Rock Cut Discontinuities
Preliminary Geotechnical Design Report
Bridge #1427 & #5800, I-95 over Stillwater Ave, Bangor, Maine
MaineDOT WIN 027176.00

Outcrop Area	Disc	ontinuity Type	Dip [degrees]	State Plane	Corrected Dip Direction State Plane Grid North <sup>(1)</sup> [degrees]		Persistence [ft]	Aperture [in]	Infilling	Infilling Shear Strength <sup>(3)</sup>	Surface Roughness	Discontinuity Shape	Water	Discontinuity Spacing [ft]	Notes/Comments <sup>(4)</sup>	RMR
	32	joint	76	329	314	-	3.9	0.25	sandy soil	medium	very rough	undulating	dry	0.9		66
	33	joint	72	183	168	4	3.5	0.13	sandy soil	medium	rough	planar to stepped	dry	0.2		53
Stillwater	34	joint	66	278	263	2	-	0.13	sandy soil	medium	very rough	planar	dry	0.3		40
Ave Southbound	35	joint	17	62	47	1	9.7	0.50	none	-	rough	undulating	dry	2.0		74
	36	joint	88	219	204	3	2.9	0.13	sandy soil	medium	smooth	planar	dry	0.6		60
	37	joint	89	262	247	2	3.4	0.25	none	-	smooth	stepped	dry	0.4		41

- (1) Dip direction data corrected for magnetic declination (15 degrees west).
- (2) See Appendix E for stereonets.
- (3) Shear strength of infilling materials as follows:

Low = friction angle < 20 degrees

Medium = 20 degrees < friction angle < 30 degrees

High = 30 degrees < friction angle

(4) Discontinuity measurements were collected on April 23, 2024.

Prepared by: KAR

Checked by: BK

Reviewed by: JDL

Table 3: Summary of Rock Core Quality
Preliminary Geotechnical Design Report
Bridge #1427 & #5800, I-95 over Stillwater Ave, Bangor, Maine
MaineDOT WIN 027176.00

				R	un			TC	R <sup>1</sup>		RQI	) <sup>2</sup>	Physical	Rock Parame	eters	
Test Boring Designation	Core Size (in)	No.	Midpoint Depth Below Bedrock Surface (ft)		Surface	Ground (ft) Midpoint	Length (ft)	Length (ft)	%	Length (ft)	%	Designation	Weathering <sup>3</sup>	Estimated Mass nering <sup>3</sup> Field Ratin Strength <sup>3</sup> [RMR		Lithologic, Rock Mass and Discontinuity Description <sup>5,6</sup>
	(11)	R1	0.4	31.5	32.4	32.0	0.9	0.8	89%	0.00	0%	Very Poor	Slightly Weathered (W2)	Very Strong (R5)	31	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with calcite veins, very strong, slightly weathered; discontinuities low angle to steep dipping, very close to close spacing, smooth to very rough, tight to open, highly fractured, clay infilling at bottom of run [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
BB-BSA-101	NX	R2	1.2	32.4	32.9	32.7	0.5	0.5	100%	0.00	0%	Very Poor	Slightly Weathered (W2)	Strong (R4) to Very Strong (R5)	30	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone], clay and sand infilling at the top of run, strong to very strong, slightly weathered; discontinuities low angle to steep dipping, very close spacing, rough, open, highly fractured [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
BB-B3A-101	(1.88)	R3	3.2	32.9	36.5	34.7	3.6	3.6	100%	0.50	14%	Very Poor	Slightly Weathered (W2) to Fresh (W1)	Strong (R4) to Very Strong (R5)	39	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with frequent calcite veins, strong to very strong, slightly weathered to fresh; discontinuities low angle to steep dipping, very close to close spacing, rough to very rough, tight to open, average 3.5 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
		R4	7.5	36.5	41.5	39.0	5.0	5.0	100%	3.00	60%	Fair	Fresh (W1)	Strong (R4)	56	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with frequent calcite veins, strong, fresh; discontinuities low angle to steep dipping, very close spacing, rough to very rough, tight, average 1.6 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
BB-BSA-102	NX (1.88)	R1	2.5	12.2	17.2	14.7	5.0	4.5	90%	2.58	52%	Fair	Slightly Weathered (W2)	Strong (R4) to Extremely Strong (R6)	40	Grey, very fine to fine grained, thinly to thickly laminated, METAWACKE [metasandstone], frequent thin to thick calcite veins, strong to extremely strong, slightly weathered; discontinuities moderately to steeply dipping, close to moderately close spacing, irregular to planar, smooth to very rough, open; average 3.2 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
	(1.00)	R2	7.5	17.2	22.2	19.7	5.0	4.9	98%	4.38	88%	Good	Fresh (W1)	Extremely Strong (R6)	72	Grey, very fine to fine grained, thinly laminated, METAWACKE [metasandstone], frequent calcite veins, extremely strong, fresh; discontinuities horizontal dipping, close to wide spacing, irregular to planar, smooth to very rough, open; average 0.2 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].



1

Table 3: Summary of Rock Core Quality
Preliminary Geotechnical Design Report
Bridge #1427 & #5800, I-95 over Stillwater Ave, Bangor, Maine
MaineDOT WIN 027176.00

	Midpoint				lun			TC	R <sup>1</sup>		RQI	) <sup>2</sup>	Physical	Rock Parame	eters	
Test Boring Designation	Core Size (in)	No.	Midpoint Depth Below Bedrock Surface (ft)		Surface	Ground (ft) Midpoint	Length (ft)	Length (ft)	%	Length (ft)	%	Designation	Weathering <sup>3</sup>	Estimated Field Strength <sup>3</sup>	Rock Mass Rating [RMR] <sup>4</sup>	Lithologic, Rock Mass and Discontinuity Description <sup>5,6</sup>
	()		(1-7)	otal t		шарош	(1-)	(1-1)	,,	(1-)	,,,					Grey, very fine to fine grained, METAWACKE [metasandstone] with thin calcite veins
BB-BSA-103	NX	R1	2.5	7.2	12.2	9.7	5.0	5.0	100%	1.54	31%	Poor	Slightly Weathered (W2)	Extremely Strong (R6)	44	and thick quartz veins, extremely strong, thinly laminated, slightly weathered; discontinuities low angle to steep dipping, very close to close spacing, stepped to irregular, very rough to smooth, open; average 4.0 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
DD-D3A-103	(1.88)															Grey, very fine to fine grained, METAWACKE [metasandstone] with thin calcite and
		R2	7.5	12.2	17.2	14.7	5.0	5.0	100%	3.50	70%	Fair	Fresh (W1)	Extremely Strong (R6)		quartz veins, extremely strong, thinly laminated, fresh; discontinuities moderately dipping, close to moderately close spacing, stepped to irregular, rough, open; average 0.8 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
													Slightly	Strong (R4)		Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with frequent calcite veins, strong to very strong, slightly weathered to fresh, clay and
		R1	3.1	21.0	26.0	23.5	5.0	4.8	95%	2.80	56%	Fair	Weathered (W2) to Fresh (W1)	to Very Strong (R5)	41	sand infilling 22.5 ft to 23 ft; discontinuities low angle to steep dipping, very close to close spacing, rough to very rough, tight to open, average 1.6 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
BB-BSA-104A	NX													Strong (R4)		Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with calcite veins, strong to very strong, fresh; discontinuities low angle to moderate
	(1.88)	R2	7.0	26.0	28.8	27.4	2.8	2.1	75%	1.70	61%	Fair	Fresh (W1)	to Very Strong (R5)	58	dipping, very close spacing, rough to very rough, tight, average 0.5 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
		Do	0.5	00.0	04.0	00.0	0.0	0.0	040/	0.50	000/		E 1 (MA)	Strong (R4)	4.4	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone], strong to very strong, fresh; discontinuities low angle to steep dipping, very close
		R3	9.5	28.8	31.0	29.9	2.2	2.0	91%	0.50	23%	Very Poor	Fresh (W1)	to Very Strong (R5)		spacing, rough, tight to open, average 3.5 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
													Slightly Weathered			Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with calcite veins, strong, slightly weathered to fresh; discontinuities low angle to steep
BB-BSA-105	NX	R1	2.5	26.4	31.4	28.9	5.0	5.0	100%	1.50	30%	Poor	(W2) to Fresh (W1)	Strong (R4)		dipping, very close to close spacing, rough to very rough, tight to open, average 3.2 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
22 23,1100	(1.88)	Do	7.	04.4	00.0	00.0	4.0	4.0	4000/	0.00	750/	<b>.</b> .	Frank (MA)	Very Strong		Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with calcite veins, very strong, fresh; discontinuities low angle to steep dipping, very
		R2	7.4	31.4	36.2	33.8	4.8	4.8	100%	3.60	75%	Fair	Fresh (W1)	(R5)	26	close spacing, smooth to rough, tight, average 1.6 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].



Table 3: Summary of Rock Core Quality
Preliminary Geotechnical Design Report
Bridge #1427 & #5800, I-95 over Stillwater Ave, Bangor, Maine
MaineDOT WIN 027176.00

				R	un			TC	R <sup>1</sup>		RQI	) <sup>2</sup>	Physical	Rock Parame	eters	
Test Boring Designation	Core Size (in)	No.	Midpoint Depth Below Bedrock Surface (ft)		Surface	Ground (ft) Midpoint	Length (ft)	Length (ft)	%	Length (ft)	%	Designation	Weathering <sup>3</sup>	Estimated Field Strength <sup>3</sup>	Rock Mass Rating [RMR] <sup>4</sup>	Lithologic, Rock Mass and Discontinuity Description <sup>5,6</sup>
	()	R1	0.5	63.8	64.8	64.3	1.0	0.3	30%	0.00	0%	Very Poor	Slightly Weathered (W2) to Fresh (W1)	Strong (R4) to Very Strong (R5)	36	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with calcite veins, strong to very strong, slightly weathered to fresh; discontinuities low angle dipping, very close to close spacing, rough to very rough, tight to open [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
BB-BSA-106	NX (1.88)	R2	3.1	64.8	69.1	67.0	4.3	4.3	100%	2.00	47%	Poor	Fresh (W1)	Strong (R4) to Very Strong (R5)	35	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with frequent calcite veins, strong to very strong, fresh with chemical weathering 67.4 ft to 68.3 ft, sand infilling 67.9 ft to 68.3 ft; discontinuities low angle to vertical dipping, very close to close spacing, smooth to rough, tight to open, average 3.3 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
		R3	7.8	69.1	74.1	71.6	5.0	5.0	100%	3.10	62%	Fair	Fresh (W1)	Weak (R2)		Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with frequent calcite veins, weak, fresh; discontinuities low angle to steep dipping, very close to close spacing, rough to very rough, tight to open, average 1.4 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
		R1	2.3	63.4	67.2	65.3	3.8	0.6	16%	0.00	0%	Very Poor	Highly Weathered (W4)	Strong (R4)		Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone], strong, highly weathered with clay and sand infilling from 64.2 ft to 67.2; discontinuities low angle to steep dipping, close spacing, rough to very rough, open, highly fractured [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
		R2	4.7	67.2	68.2	67.7	1.0	0.2	17%	0.00	0%	Very Poor	Highly Weathered (W4)	Strong (R4)	27	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone], strong, highly weathered with clay and sand infilling; discontinuities low angle dipping, close spacing, very rough, open, highly fractured [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
BB-BSA-107	NX (1.88)	R3	7.2	68.2	72.2	70.2	4.0	3.8	95%	1.41	35%	Poor	Slightly Weathered (W2)	Strong (R4) to Very Strong (R5)	36	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with calcite veins, strong to very strong, slightly weathered, occasional moderate to severe chemical weathering with sand infilling; discontinuities low angle to steep dipping, very close to close spacing, rough to very rough, tight to open, average 3.5 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
		R4	11.7	72.2	77.2	74.7	5.0	5.0	100%	1.96	39%	Poor	Slightly Weathered (W2)	Strong (R4) to Very Strong (R5)	36	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with calcite veins, strong to very strong, slightly weathered, occasional moderate to severe chemical weathering with sand and clay infilling; discontinuities low angle to steep dipping, very close to close spacing, rough to very rough, tight to open, average 3.2 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].



Table 3: Summary of Rock Core Quality
Preliminary Geotechnical Design Report
Bridge #1427 & #5800, I-95 over Stillwater Ave, Bangor, Maine
MaineDOT WIN 027176.00

			R	un			TC	R <sup>1</sup>		RQI	) <sup>2</sup>	Physical	Rock Parame	eters		
Test Boring Designation	Core Size	No.	Midpoint Depth Below Bedrock Surface		Surface	` ′	Length			Length		Designation	Weathering <sup>3</sup>	Estimated Field Strength <sup>3</sup>	Rock Mass Rating [RMR] <sup>4</sup>	Lithologic, Rock Mass and Discontinuity Description <sup>5,6</sup>
	(in)		(ft)	Start	End	Midpoint	(ft)	(ft)	%	(ft)	%					
		R1	2.5	6.7	11.7	9.2	5.0	4.9	98%	2.92	58%	Fair	Slightly Weathered (W2)	Very Strong (R5) to Extremely Strong (R6)	51	Grey, very fine to fine grained, METAWACKE [metasandstone] with frequent calcite veins, very to extremely strong, thinly laminated, slightly weathered; discontinuities moderate to steep dipping, close to moderately close spacing, rough to polished, open; average 2.6 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
BB-BSA-108	NX	R2	5.5	11.7	12.7	12.2	1.0	0.9	92%	0.42	42%	Poor	Slightly Weathered (W2) to Fresh (W1)	Extremely Strong (R6)	51	Grey, very fine to fine grained, METAWACKE [metasandstone] with some calcite veins, extremely strong, thinly laminated, fresh to slightly weathered; discontinuities low angle to steep dipping, very close to close spacing, planar to stepped, rough to smooth, open; average 1.0 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
BB-B3A-108	(1.88)	R3	7.0	12.7	14.7	13.7	2.0	1.8	88%	0.33	17%	Very Poor	Slightly Weathered (W2) to Fresh (W1)	Extremely Strong (R6)	45	Grey, very fine to fine grained, METAWACKE [metasandstone] with some calcite veins, extremely strong, thinly laminated, fresh to slightly weathered; discontinuities low angle to steep dipping, very close to close spacing, planar to stepped, rough to smooth, open; average 2.5 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
		R4	9.0	14.7	16.7	15.7	2.0	1.9	96%	0.71	35%	Poor	Slightly Weathered (W2) to Fresh (W1)	Extremely Strong (R6)	48	Grey, very fine to fine grained, METAWACKE [metasandstone] with some calcite veins, extremely strong, thinly laminated, fresh to slightly weathered; discontinuities low angle to steep dipping, very close to close spacing, planar to stepped, rough to smooth, open; average 2.0 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
BB-BSA-109A	NX	R1	2.9	4.0	8.8	6.4	4.8	4.6	95%	1.42	30%	Poor	Slightly Weathered (W2) to Fresh (W1)	Very Strong (R5) to Extremely Strong (R6)	43	Grey, very fine grained, METAWACKE [metasandstone] with frequent calcite veins, very to extremely strong, thinly laminated, fresh to slightly weathered; discontinuities steep dipping, close spacing, planar to stepped, rough to smooth, open; average 2.1 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
BB-B3A-109A	(1.88)	R2	7.9	8.8	14.0	11.4	5.2	5.1	99%	2.54	49%	Poor	Fresh (W1)	Very Strong (R5) to Extremely Strong (R6)	49	Grey, very fine grained, METAWACKE [metasandstone] with frequent calcite veins (0.1 to 0.7 in thick), very to extremely strong, thinly laminated, fresh; discontinuities low angle to steep dipping, very close to moderately close spacing, planar to stepped, rough to smooth, open; average 1.8 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
BB-BSA-110	NX	R1	2.5	5.3	10.3	7.8	5.0	4.8	95%	2.46	49%	Poor	Fresh (W1)	Medium Strong (R3)	43	Grey, very fine grained, METAWACKE [metasandstone] with frequent thick and thin calcite veins, medium strong, thinly laminated, fresh; discontinuities horizontal to steep dipping, close to moderately close spacing, stepped, smooth to polished, open; average 1.0 fractures per foot [MEDIUM BEDDEDFACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
BB BOX 110	(1.88)	R2	7.5	10.3	15.3	12.8	5.0	5.0	100%	3.54	71%	Fair	Fresh (W1)	Very Strong (R5) to Extremely Strong (R6)	54	Grey, very fine grained, METAWACKE [metasandstone] with frequent thick and thin calcite veins, very to extremely strong, thinly laminated, fresh; discontinuities steep dipping, close to wide spacing, stepped, smooth, open; average 0.8 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].



Table 3: Summary of Rock Core Quality
Preliminary Geotechnical Design Report
Bridge #1427 & #5800, I-95 over Stillwater Ave, Bangor, Maine
MaineDOT WIN 027176.00

				R	un			TC	R 1		RQI	) <sup>2</sup>	Physical	Rock Parame	eters	
Test Boring Designation	Core Size	No.	Midpoint Depth Below Bedrock Surface		n Below Surface	Ground (ft)	Length	Length		Length		Designation	Weathering <sup>3</sup>	Estimated Field Strength <sup>3</sup>	Rock Mass Rating [RMR] <sup>4</sup>	Lithologic, Rock Mass and Discontinuity Description <sup>5,6</sup>
	(in)		(ft)	Start	End	Midpoint	(ft)	(ft)	%	(ft)	%					
BB-BSA-111	NX (1.88)	R1	3.7	19.0	24.0	21.5	5.0	3.4	68%	0.75	15%	Very Poor	Slightly Weathered (W2)	Strong (R4) to Very Strong (R5)	37	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with frequent calcite veins, strong to very strong, slightly weathered with signs of chemical weathering; discontinuities low angle to steep dipping, close to very close spacing, rough to very rough, open to tight, highly fractured average from 19 ft to 21.3 ft [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
DD DOA-111	(1.00)	R2	8.7	24.0	29.0	26.5	5.0	5.0	100%	3.00	60%	Fair	Fresh (W1)	Strong (R4) to Very Strong (R5)	54	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with frequent calcite veins, strong to very strong, fresh; discontinuities low angle dipping, very close spacing, rough, tight, average 1.6 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].

### Notes:

- 1. TCR = total core recovery. Total core recovery is the length of core recovered divided by the length of the run.
- 2. RQD = rock quality designation. RQD is the total length of intact, full diameter core pieces recovered with a length greater than or equal to 4 inches measured along the core axis. The percent RQD is the total length of RQD measured divided by the run length. Note that vertical discontinuities are not included in determination of RQD.
- 3. Weathering and Estimated Field Strength based on Tables II.4 and II.3 (respectively) in Wyllie and Mah, 2004, Rock Slope Engineering: Civil and Mining, 4th Edition (based on ISRM, 1981).
- 4. Rock Mass Rating (RMR) System (Bieniawski, 1989) assigns numerical ratings to six parameters, including the strength of the intact rock, the RQD, the discontinuity spacing, groundwater conditions, and orientation of discontinuities. These ratings are summed to provide the RMR value. The rating adjustment for joint orientation was assigned a value of -4, which is the average of the orientation adjustments obtained from geologic field mapping of the exposed rock outcrops and which is based on the existing rock cut orientation. The proposed foundation orientation may allow for a different rating adjustment for joint orientation, and thus a modification to the RMR value shown on this table.
- 5. Bedrock formation name from: Pollock, Stephen G. 2011. Bedrock geology of the Bangor Quadrangle, Maine. Maine Geological Survey Open-File No. 11-57. Map scale 1:24,000.
- 6. ft = feet, in = inches

Prepared by: KAR

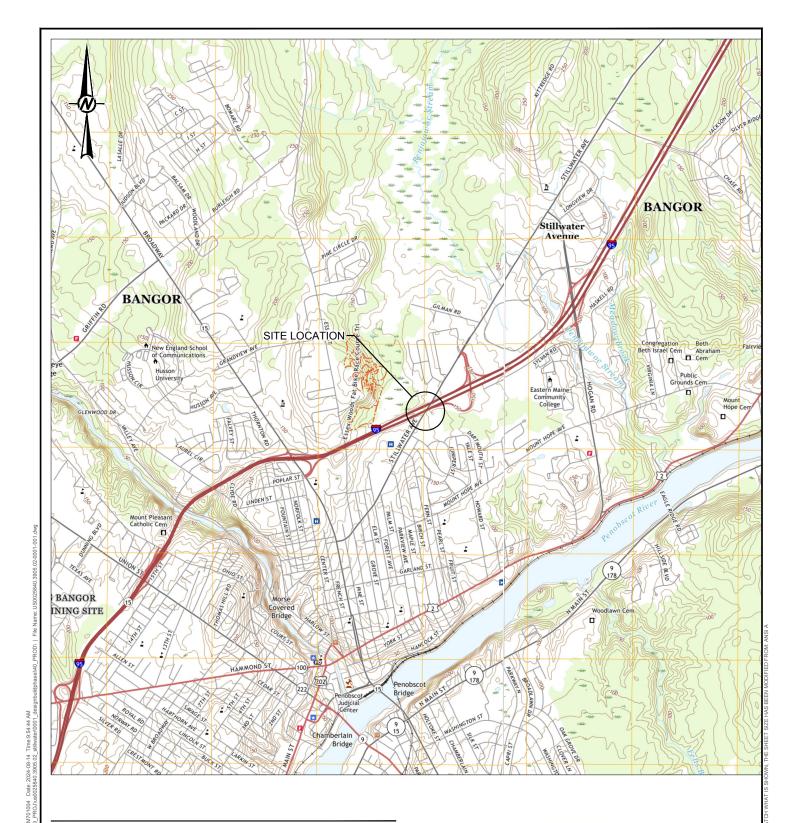
Checked by: BK

Reviewed by: JDL



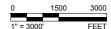
## **FIGURES**





#### REFERENCE(S)

 BASE MAP TAKEN FROM U.S.G.S. 7.5 MINUTE QUADRANGLES OF BANGOR AND VEAZIE, MAINE DATED 2021



CLIENT

HNTB CORPORATION 82 RUNNING HILL ROAD, SUITE 201 SOUTH PORTLAND, ME 04106

CONSULTANT



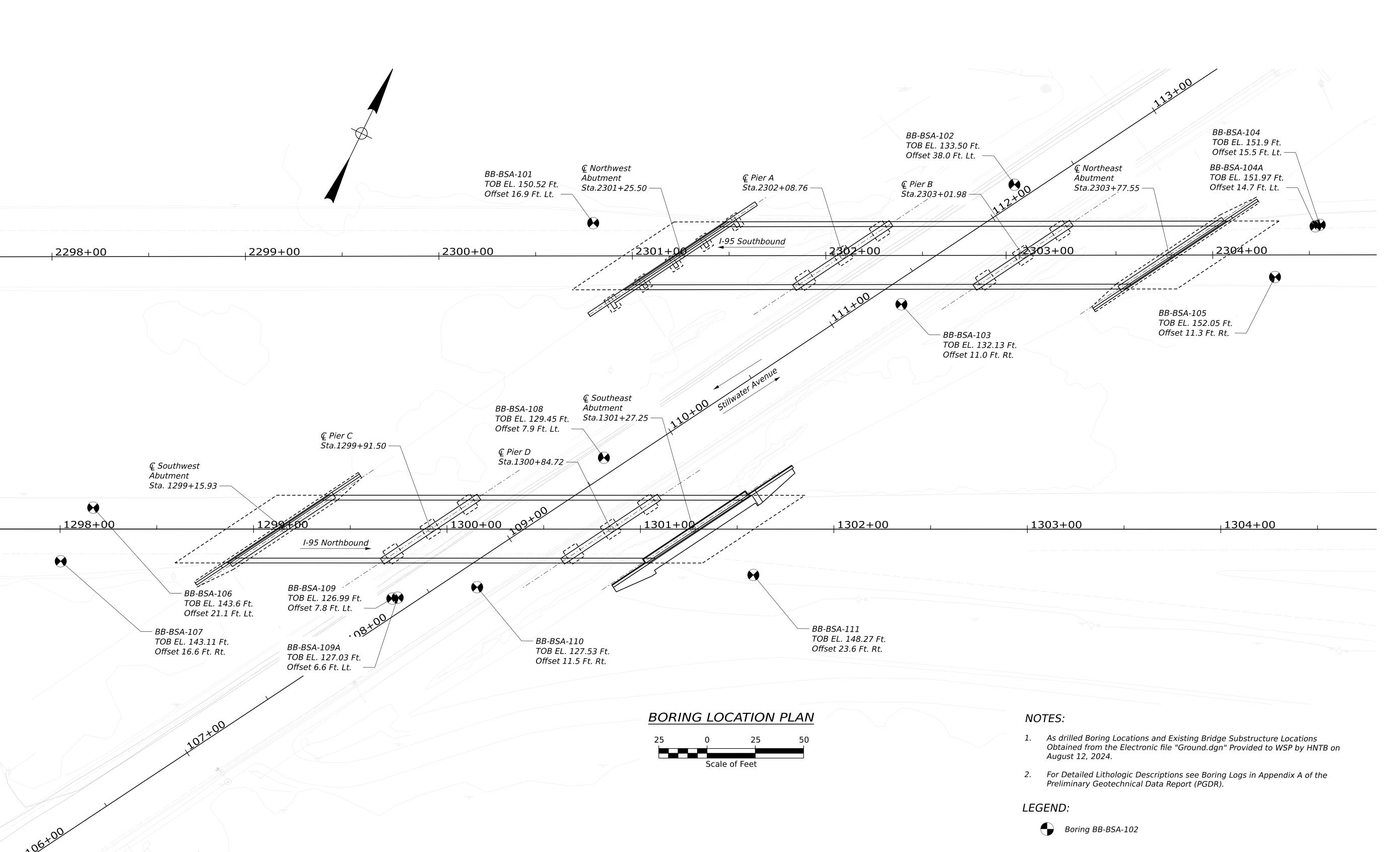
YYYY-MM-DD	2024-08-14
DESIGNED	DEB
PREPARED	AM
REVIEWED	MEL
APPROVED	

PROJECT
DESIGN BUILD PHASE I
I-95 BRIDGE NO. 1427 & 5800 OVER STILLWATER AVENUE
BANGOR, ME (WIN 027176.00)

TITLE

SITE LOCATION MAP

PROJECT NO.	CONTROL	REV.	FIGURE
US0025840.3905	0001-001	0	<u> </u>



SHEET NUMBER

OF 02

**APPENDIX A** 

**Boring Logs** 

	UNIFIE	ED SOIL C	LASSIFIC	CATION SYSTEM		MODIFIED B	SURMISTER S	YSTEM
MA	JOR DIVISION	ONS	GROUP SYMBOLS	TYPICAL NAMES				
COARSE- GRAINED SOILS	GRAVELS	CLEAN GRAVELS (little or no fines)	GW GP	Well-graded gravels, gravel- sand mixtures, little or no fines.  Poorly-graded gravels, gravel sand mixtures, little or no fines.	tr li so	tive Term race ittle ome Sandy, Clayey)	<u>Port</u>	ion of Total (%) 0 - 10 11 - 20 21 - 35 36 - 50
	(more than half of coarse fraction is larger than No. 4 sleve size)					DENSIT	S DESCRIBINO Y/CONSISTEN	ICY
rial is larger s size)	(more tha fraction is sic	GRAVEL WITH FINES (Appreciable amount of fines)	GM GC	Silty gravels, gravel-sand-silt mixtures.  Clayey gravels, gravel-sand-clay mixtures.	sieve): Includes (´Clayey or Gravelly penetration resista	sity of	ilty or Clayey gravel ated according to sta Standard Pe	s; and (3) Silty, ndard enetration Resistance
(more than half of material is larger than No. 200 sleve size)	SANDS	CLEAN SANDS	SW	Well-graded sands, Gravelly sands, little or no fines	Very Lo	nless Soils y loose pose m Dense	N <sub>60</sub> -Val	ue (blows per foot) 0 - 4 5 - 10 11 - 30
(more than	f coarse nan No. 4 )	(little or no fines)	SP	Poorly-graded sands, Gravelly sand, little or no fines.	Very	ense Dense  Is (more than half of n	naterial is smaller th	31 - 50 > 50 an No. 200
	(more than half of coarse fraction is smaller than No. 4 sieve size)	SANDS WITH	SM	Silty sands, sand-silt mixtures	sieve): Includes (*	 1) inorganic and orgar (3) Clayey silts. Con	nic silts and clays; (2 sistency is rated acc	
	(more fraction	FINES (Appreciable amount of fines)	SC	Clayey sands, sand-clay mixtures.	Consistency of Cohesive soils	SPT N <sub>60</sub> -Value (blows per foot)	Approximate Undrained Shear Strength (psf)	<u>Field</u> Guidelines
			ML	Inorganic silts and very fine sands, rock flour, Silty or Clayey fine sands, or Clayey silts with	Very Soft Soft Medium Stiff	WOH, WOR, WOP, <2 2 - 4 5 - 8	0 - 250 250 - 500 500 - 1000	Fist easily penetrates Thumb easily penetrates Thumb penetrates with
FINE- GRAINED SOILS		ND CLAYS	CL	slight plasticity.  Inorganic clays of low to medium plasticity, Gravelly clays, Sandy clays, Silty clays, lean clays.	Stiff Very Stiff Hard	9 - 15 16 - 30 >30	1000 - 2000 2000 - 4000 over 4000	moderate effort Indented by thumb with great effort Indented by thumbnail Indented by thumbnail with difficulty
(e	OILS clays, Silty clays, lean clays.  OL Organic silts and organic Silt clays of low plasticity.		Organic silts and organic Silty clays of low plasticity.	Rock Quality Des	signation (RQD): sum of the lengths	of intact pieces o	f core* > 4 inches	
(more than half of material is smaller than No. 200 sleve size)	SILTS AN	ND CLAYS	МН	Inorganic silts, micaceous or diatomaceous fine Sandy or Silty soils, elastic silts.  Inorganic clays of high		*Minimu  Rock Quality Ba  Rock Quality  Very Poor  Poor  Fair	um NQ rock core ( ased on RQD RQD (%) ≤25 26 - 50 51 - 75	1.88 in. OD of core)
(more the smaller the	(liquid limit gr	reater than 50)	ОН	plasticity, fat clays.  Organic clays of medium to high plasticity, organic silts.	Desired Rock C	Good Excellent Observations (in th	76 - 90 91 - 100	cable):
		ORGANIC DILS	Pt	Peat and other highly organic soils.	Rock Type (gra Hardness (very	itic, fine-grained, et nite, schist, sandst hard, hard, mod. h esh, very slight, slig	one, etc.) ard, etc.)	d. severe, severe, etc.)
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. Gradation (well-graded, poorly-graded, uniform, etc.) Plasticity (non-plastic, slightly plastic, moderately plastic, highly plastructure (layering, fractures, cracks, etc.) Bonding (well, moderately, loosely, etc., ) Cementation (weak, moderate, or strong) Geologic Origin (till, marine clay, alluvium, etc.) Groundwater level				side)  portions - trace, little, etc.) m, etc.) tely plastic, highly plastic)	Formation (Wat RQD and correl ref: ASTM D6 Site Characte Recovery (inch/	ntinuities/jointing: -dip (horiz - 0-5 de 35-55 deg., stee -spacing (very clos	g., low angle - 5-3 ep - 55-85 deg., vo ee - <2 inch, close wide - 3-10 feet, ben, or healed) c, color, etc.) Cape Elizabeth, et y (very poor, poor HI-16-072 GEC 5 - ge)	5 deg., mod. dipping - ertical - 85-90 deg.) - 2-12 inch, mod. very wide >10 feet) c.)
Groundwater level  Maine Department of  Geotechnical S  Key to Soil and Rock Desc  Field Identification			<i>nical</i> Sed Descrip	ction otions and Terms	Sample Cont WIN Bridge Name Boring Numbe Sample Numb Sample Depth	er oer	Requirements: Blow Counts Sample Recov Date Personnel Initia	ery

Table A-2

## Classification of Rock Material Strengths<sup>1</sup>

Grade	Description	Field Identification	Compress	nge of Uniaxial iive Strength
			MPa	psi
S1	Very soft clay	Easily penetrated several inches by fist	<0.025	<4
S2	Soft clay	Easily penetrated several inches by thumb	0.025-0.05	4-7
S3	Firm clay	Can be penetrated several inches by thumb with moderate effort	0.05-0.10	7-15
S4	Stiff clay	Readily indented by thumb but penetrated only with great effort	0.10-0.25	15-35
S5	Very stiff clay	Readily indented by thumbnail	0.25-0.50	35-70
S6	Hard clay	Indented with difficulty by thumbnail	>0.50	>70
R0	Extremely weak rock	Indented by thumbnail	0.25-1.0	35-150
R1	Very weak rock	Crumbles under firm blows with point of geological hammer; can be peeled by a pocket knife	1-5	150-725
R2	Weak rock	Can be peeled by a pocket knife with difficulty; shallow indentations made by firm blow with point of geological hammer	5-25	725-3,500
R3	Medium strong rock	Cannot be scraped or peeled with a pocket knife; specimen can be fractured with single firm blow of geological hammer	25-50	3,500-7,000
R4	Strong rock	Specimen requires more than one blow of geological hammer to fracture it	50-100	7,000-15,000
R5	Very strong rock	Specimen requires many blows of geological hammer to fracture it	100-250	15,000-36,000
R6	Extremely strong rock	Specimen can only be chipped with geological hammer	>250	>36,000

*Note:* Grades S1 to S6 apply to cohesive soils, for example clays, silty clays, and combinations of silts and clays with sand, generally slow draining. Discontinuity wall strength will generally be characterized by grades R0-R6 (rock) while S1-S6 (clay) will generally apply to filled discontinuities.

<sup>&</sup>lt;sup>1</sup> International Society for Rock Mechanics (ISRM), Commission on standardization of laboratory and field tests (1978): Suggested methods for the quantitative description of discontinuities in rock masses. Int. J. Rock Mech. Min. Sci. & Geomech. Abstr., Vol. 15, No. 6, pp. 319-368.

	_	Soil/Rock Exp US CUSTOM					Avenue				
	<u>l</u>	US CUSTOM			- 1	Locatio	n: Bangor, Ma	ine.			
							Dangor,		WIN:	0271	76.00
		C11		T =1-		/# \	150.52		A ID/OD:		
				-		(11.)		7		C+11 C1:+	C
		•		+					•		Spoon
	nich		0). 7/20/24 (2:15)	_							
								& wasii			20/24
			, E: 1/33204.27	_				Herdward o 🗆		24.8 at 1:47 7/	30/24
ons:	Clefficy F	actor. 1.087	R = Rock C			i ype.				Pocket Torvane She	ar Strength (psf)
Jnsuccess in Wall Tu Jnsuccess eld Vane S	sful Split Spo be Sample sful Thin Wa shear Test,	II Tube Sample A PP = Pocket Pe	npt HSA = Holling RC = Roller ttempt WOH = We netrometer WOR/C = V	ow Stem Cone ight of 1 leight of	Auger 40lb. Ha f Rods or	r Casing	q <sub>p</sub> = Unconfir N-uncorrecte Hammer Effic N <sub>60</sub> = SPT N	ed Compressive Strength (ksf) d = Raw Field SPT N-value iency Factor = Rig Specific Annual -uncorrected Corrected for Hamme	LL = PL = Calibration Value PI = Efficiency G =	ELiquid Limit EPlastic Limit Plasticity Index Grain Size Analysis	cent
					I	1					Laboratory
Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	09 <sub>N</sub>	Casing Blows	Elevation (ft.) Graphic Log	Visual De	scription and Remarks		Testing Results/ AASHTO and Unified Class.
1D	24/15	0.70 - 2.70	12-12-12-11	24	43	SSA	149.9	7" Asphlat Pavement		0.6-	Fines = 16.8%
								Light Olive Brown, dry, der little silt (FILL).	nse, fine to coarse SANE	), some gravel,	A-1-b (0),SM
2D	24/22	2.70 - 4.70	10-21-21-21	42	76					arse gravel, little	
3D	24/22	5.00 - 7.00	15-28-43-42	71	129					arse gravel, little	
4D	24/22	7.00 - 9.00	24-16-26-39	42	76			SILT, some fine to coarse s			WC = 11.1% Fines = 52.2% A-4 (0), ML
						11/	│	(I ILL).			71-4 (0), NIL
						$\perp V$	│	Olim mid barren arrist ba	1 CH T 6 4	1:41.	
5D	24/22	10.00 - 12.00	11-13-16-17	29	53	182	l ‱			coarse sand, little	
						171	l ‱				
						142	l ‱				
						85	137.0				
						53					
6D	22/6	15.00 - 16.83	16-16-10-22	26	47	OPEN		4 14 (0.77 577 7 0		ome fine to coarse	WC = 10.7% Fines = 28.8% A-2-4 (0), SM- GM
7D	24/9	20.00 - 22.00	13-22-30-30	52	94			gravel, some silt (SILTY SA	AND and GRAVEL)		
								some silt (SILTY SAND W	TTH GRAVEL)	ne fine gravel,	
								Increased roller bit resistand	ce		
8D	24/6	25.00 - 27.00	29-33-34-23	67	121					SANDY	WC = 9.6% Fines = 17.5% A-1-b (0), GM- SM
arks:						\ /					
	Ing Local mer Efficiency of the control of the cont	ator:  led By:  Start/Finish:  log Location:  mer Efficiency F ons: illi Spoon Sample Jnsuccessful Split Spi in Wall Tube Sample Jnsuccessful Field Va  log General Split Spi in Wall Tube Sample Jnsuccessful Field Va  Log General Split Spi in Wall Tube Sample Jnsuccessful Field Va  Log General Split Spi in Wall Tube Sample Jnsuccessful Field Va  Log General Split Spi in Wall Tube Sample Jnsuccessful Field Va  Log General Split Spi in Wall Tube Sample  Log General Split Split Spi In Wall Tube Sample  Log General Split Spi In Wall Tube Sa	Ryan H.	Ryan H.	Start/Finish: 7/29/24 (21:00); 7/30/24 (3:15)   Driver	Autor: Ryan H.   Bolton:   Rig Type:   Start/Finish:   7/29/24 (21:00); 7/30/24 (3:15)   Drilling M     Cocation: N: 482856.27, E: 1735264.27   Casing IE     Mammer   Constitution   Co	Red By   D. Burgess   Rig Type:	ator: Ryan H. Datum: Maine East Red By: D. Burgess Rig Type: Diedrich D. Start/Finish: 77/29/24 (21:00); 7/30/24 (31:15) Drilling Method: SSA. Drive gas Quality and property of the property	## Additional Control of Part	Add   Datum:   Maine Liss   Zone   Sampler:     Datum:   Maine Liss   Zone   Sampler:     Decirch O. 50   Hammer WL/Fall:   Decirch O. 50	## Additional Control   Pattern   Pa

- 1. Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023.

  2. As-drilled boring locations and ground surface elevations were provided by HNTB.

  3. Water level reading taken on 7/30/24 at 1:47 am was made after the rock coring.

\* 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.

Page 1 of 3

I	Main	e Depa	artment	of Transporta	ation	Project	: Main	eDOT I-	-95 Bridges Over Stillwater	Boring No.:	BB-B	SA-101
		_	Soil/Rock Exp	-		Locatio	Aven		- nina			
		<u> </u>	JS CUSTOM.	ARY UNITS		Location	ni. Dai	igor, ivia	une	WIN:	0271	76.00
Drill	er:		Seaboard		Elevation	n (ft.)	150	.52		Auger ID/OD:		
-	rator:		Ryan H.		Datum:	,		ine East	Zone	Sampler:	Standard Split	Spoon
Log	ged By:		D. Burgess		Rig Typ	e:	Die	drich D-	-50	Hammer Wt./Fall:	140lb/30in	
	Start/Fi	inish:		0); 7/30/24 (3:15)	+	Method:	SSA	A, Drive	& Wash	Core Barrel:	NQ/NX	
Bori	ng Loca	tion:		, E: 1735264.27	Casing		4" (			Water Level*:	24.8' at 1:47 7/	/30/24
			actor: 1.087	,	Hamme		Autom		Hydraulic □	Rope & Cathead □		
Defini D = S MD = U = T MU = V = F	tions: plit Spoon Unsuccess nin Wall Tu Unsuccess eld Vane S	Sample sful Split Spo ube Sample sful Thin Wa Shear Test,	oon Sample Atter II Tube Sample A PP = Pocket Pe ne Shear Test At	MSA = Hollor	ore Sample Stem Auger ow Stem Auge	Hammer or Casing	S <sub>u</sub> = S <sub>u</sub> (l: q <sub>p</sub> = N-ur Ham N <sub>60</sub>	Peak/Reab) = Lab Unconfirected nmer Effice = SPT N	emolded Field Vane Undrained She Vane Undrained Shear Strength (hed Compressive Strength (ksf) de Raw Field SPT N-value iency Factor = Rig Specific Annua -uncorrected Corrected for Hamme ner Efficiency Factor/60%)*N-unco	$\begin{array}{ll} \text{par Strength (psf)} & T_V = F \\ \text{psf)} & WC = \\ LL = L \\ PL = F \\ Calibration Value & Pl = P \\ \text{or Efficiency} & G = G \end{array}$	Pocket Torvane She Water Content, per Liquid Limit Plastic Limit Plasticity Index rain Size Analysis onsolidation Test	
		·		Sample Information	ס		$\overline{}$	┨				Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	Casing	Elevation (ft.)	Graphic Log		scription and Remarks		Testing Results/ AASHTO and Unified Class.
30	9D	8/3	30.00 - 30.67	50/3"	R	$\bot \bigvee$			Grey, wet, hard, SILT, som gravel, trace clay, fractured			
	R-1	10.8/9.6	31.50 - 32.40	RQD = 0%		NQ/NX	119.0	) # # # #	Bedrock encountered at 31.	5 feet bgs	31.5	
	R-2 R-3	6/6 43.2/43.2	32.40 - 32.90 32.90 - 36.50	RQD = 0% RQD = 14%			-		Top of Bedrock Elev. 119.0 R1 (31.5' - 32.4'): Grey, ver bedded, METAWACKE [n	) ft ry fine grained, thinly to ve		
25									strong, slightly weathered; very close to close spacing,	discontinuities low angle to	o steep dipping,	
- 35 -									fractured, clay infilling at b	ottom of run [MEDIUM B	EDDED	
	R-4	60/60	36.50 - 41.50	RQD = 60%					FORMATION].		N.	
									Rock Mass Quality = very 89% recovery	poor		
							1		0% RQD Rock Core Rate (min:sec)			
							1		31.5 - 32.4 ft (3:01)	C		
- 40 ·						1\/	1		R2 (32.4' - 32.9'): Grey, ver bedded, METAWACKE [n			
						$+ \forall$	109.0	,	top of run, strong to very st to steep dipping, very close			
							1		[MEDIUM BEDDED FAC			
							1		BANGOR FORMATION]. Rock Mass Quality = poor			
							┨		100% recovery 0% ROD			
- 45 -							4		Rock Core Rate (min:sec)			
							_		32.4 - 32.9 ft (1:03) R3 (32.9' - 36.5'): Grey, ve	ry fine grained thinly to y	ery thinly	
							-		bedded, METAWACKE [n strong to very strong, slight angle to steep dipping, very	netasandstone] with freque ly weathered to fresh; disc	nt calcite veins, continuities low	
									rough, tight to open, average BEDDED FACIES, PENO	ge 3.5 fractures per foot [M	EDIUM	
50									FORMATION]. Rock Mass Quality = very		,OOK	
- 50 -							1		100% recovery	poor		
							1		14% RQD Rock Core Rate (min:sec)			
							┪		32.9 - 33.5 ft (2:24)			
							┨		33.5 - 34.5 ft (3:07) 34.5 - 35.5 ft (3:25)			
							-		35.5 - 36.5 ft (3:23)			
- 55 -							1		R4 (36.5' - 41.5'): Grey, ver bedded, METAWACKE [n			
									strong, fresh; discontinuitie	s low angle to steep dippin	ng, very close	
									spacing, rough to very roug [MEDIUM BEDDED FAC	IES, PENOBSCOT RIVE		
									BANGOR FORMATION]. Rock Mass Quality = fair			
							1	1	100% recovery			
					+	+	1		60% RQD			
60	orks:								Rock Core Rate (min:sec)			
	arks:	Efficience	factor provid-1	hy S W Colo and tal	from "2022	DA 00074	SW C-	lo CDT	`Report" by GRL Engineers I	no datad 11/10/2022		

- 2. As-drilled boring locations and ground surface elevations were provided by HNTB.

  3. Water level reading taken on 7/30/24 at 1:47 am was made after the rock coring.

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.

Page 2 of 3

N	Main	_		of Transpor	tatio	n	Project:			-95 Bridges Over Stillwater	Boring No.:	BB-BS	A-101
			Soil/Rock Exp US CUSTOM				Locatio	Avenu n: Bang	e gor, Ma	nine	WIN:	0271	76.00
Drille			Seaboard		Flo	vation	(ft \	150.:	52		Auger ID/OD:		
	ator:		Ryan H.			tum:	(11.)		ne East	Zone	Sampler:	Standard Split	Spoon
	ged By:		D. Burgess			Type:			rich D-		Hammer Wt./Fall:	140lb/30in	Spoon .
	Start/F	inish:		00); 7/30/24 (3:15)			lethod:			& Wash	Core Barrel:	NQ/NX	
	ng Loca			7, E: 1735264.27	-	sing ID		4" (I			Water Level*:	24.8' at 1:47 7/	30/24
			Factor: 1.087		_	mmer ·		Automa		Hydraulic □	Rope & Cathead □		
Definit D = Sp MD = 1 U = Th MU = 1 V = Fie	ions: olit Spoon Unsuccess nin Wall Tu Unsuccess eld Vane S	Sample sful Split Sp ube Sample sful Thin Wand	ooon Sample Atte	R = Rock   SSA = Sc   SSA = Sc   SSA = HEAR   SE = Rock   SSA = HEAR   SE = Rock   SSA = HEAR   SSA = HEAR	Veight of 1 Weight of Weight of	Auger Auger 40 lb. Ha f Rods or	Casing	S <sub>u</sub> = S <sub>u(la</sub> q <sub>p</sub> = N-und Hamr N <sub>60</sub> =	Peak/Reb) = Lab Unconfir corrected mer Effice SPT N	emolded Field Vane Undrained Shi Vane Undrained Shear Strength ( hed Compressive Strength (ksf) d= Raw Field SPT N-value eiency Factor = Rig Specific Annua -uncorrected Corrected for Hammer ter Efficiency Factor/60%)*N-unco	ear Strength (psf)	= Pocket Torvane Shei C = Water Content, pero = Liquid Limit = Plastic Limit = Plasticity Index = Grain Size Analysis = Consolidation Test	
		<u> </u>	ے	Sample Information									Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	09 <sub>N</sub>	Casing Blows	Elevation (ft.)	Graphic Log		escription and Remark	S	Testing Results/ AASHTO and Unified Class.
60										36.5 - 37.5 ft (3:04) 37.5 - 38.5 ft (3:24)			
										38.5 - 39.5 ft (3:32) 39.5 - 40.5 ft (4:40) 40.5 - 41.5 ft (4:44)			
										Bottom of Exploration	n at 41.5 feet below gro	ound surface.	
								-		Boring backfilled with ben- cuttings and gravel to botto			
65 -										asphalt.	an or purement and pass	med with cold pater	
								-					
					-								
. 70 -													
75 -								1					
								1					
								1					
								1					
- 80								1					
								}					
								-					
85 -					-								
90													
	arks:												
2. A	s-drilled	boring lo	cations and gro	d by S.W. Cole and tak bund surface elevations 24 at 1:47 am was mad	were pro	vided b	y HNTB.		e - SPT	Report" by GRL Engineers I	nc., dated 11/10/2023.		

than those present at the time measurements were made.

\* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other

Page 3 of 3

Logged By:         Lina-Maria Pua         Rig Type:         Diedrich D-50         Hammer Wt./Fall:         140 lbs           Date Start/Finish:         05/07/24 (23:53); 05/08/24 (02:12)         Drilling Method:         SSA, Cased Wash         Core Barrel:         NX	a 05/08/24 at 01:59 ane Shear Strength (psf)						
Driller:         Seaboard         Elevation (ft.)         133.5         Auger ID/OD:           Operator:         Kevin Hanscom         Datum:         Maine East Zone         Sampler:         Standa           Logged By:         Lina-Maria Pua         Rig Type:         Diedrich D-50         Hammer Wt./Fall:         140 lbs           Date Start/Finish:         05/07/24 (23:53); 05/08/24 (02:12)         Drilling Method:         SSA, Cased Wash         Core Barrel:         NX	d Split Spoon 30 in 1 05/08/24 at 01:59 ane Shear Strength (psf)						
Operator:         Kevin Hanscom         Datum:         Maine East Zone         Sampler:         Standa           Logged By:         Lina-Maria Pua         Rig Type:         Diedrich D-50         Hammer Wt./Fall:         140 lbs           Date Start/Finish:         05/07/24 (23:53); 05/08/24 (02:12)         Drilling Method:         SSA, Cased Wash         Core Barrel:         NX	30 in 05/08/24 at 01:59 ane Shear Strength (psf)						
Logged By:         Lina-Maria Pua         Rig Type:         Diedrich D-50         Hammer Wt./Fall:         140 lbs           Date Start/Finish:         05/07/24 (23:53); 05/08/24 (02:12)         Drilling Method:         SSA, Cased Wash         Core Barrel:         NX	30 in 05/08/24 at 01:59 ane Shear Strength (psf)						
Date Start/Finish:         05/07/24 (23:53); 05/08/24 (02:12)         Drilling Method:         SSA, Cased Wash         Core Barrel:         NX	a 05/08/24 at 01:59 ane Shear Strength (psf)						
Date Start/Finish:         05/07/24 (23:53); 05/08/24 (02:12)         Drilling Method:         SSA, Cased Wash         Core Barrel:         NX	ane Shear Strength (psf)						
	ane Shear Strength (psf)						
Hammer Efficiency Factor: 1.066 Hammer Type: Automatic ⊠ Hydraulic □ Rope & Cathead □							
D = Split Spoon Sample SSA = Solid Stem Auger MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger MU = Unsuccessful Thin Wall Tube Sample Attempt RC = Roller Cone MD = Unsuccessful Thin Wall Tube Sample Attempt WOH = Weight of 140lb. Hammer Ffficiency Factor = Rig Specific Annual Calibration Value PL = Plasticity In V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt WOP = Weight of One Person No0 = (Hammer Efficiency Factor/60%)*N-uncorrected Corrected for Hammer Efficiency Factor/60%)*N-uncorrected C = Consolidation Value C = Consolidation Value V = C = Consolidation Value V = V = V = V = V = V = V = V = V = V	alysis						
Sample Information	Laboratory						
Sample No. Sample No. Sample Depth (ft.) Shear Strength (pst) Or RQD (%) Or RQD (%) Graphic Log Graphic Log Graphic Log	Testing Results/ AASHTO and Unified Class						
O SSA 132.9 7.5" Asphalt Pavement	0.6						
1D 24/11.5 1.00 - 3.00 14-13-20-38 33 59 Brown, moist, very dense, fine to medium SAND, some fine gratitate silt (FILL).	WC = 3.7% Fines = 14.0% A-1-b(0), SM						
2D 24/12 3.00 - 5.00 15-24-12-43 36 64  Brown, dry to moist, very dense, medium to fine SILTY SANI fine gravel, non-plastic (FILL).  qp > 0.9ksf	Fines = 38.0% A-4 (0), SM						
5 3D 24/11 5.00 - 7.00 47-22-10-12 32 57 40 Brown to yellow, moist to wet, hard, SILT, some sand, trace gr nonplastic to low plasticity (SANDY SILT).							
Brown to vellow, wet hard SANDY SILT trace fine gravel in	n- Fines = 50.2%						
4D 24/12 7.00 - 9.00 15-14-9-39 23 41 45 plastic to low plasticity (SANDY SILT).	A-4 (0), ML						
92 $q_p = 0.8 \text{ksf}, 0.9 \text{ksf}$	9.0 wc 15.50/						
5D 24/5 9.00 - 11.00 69-34-27-13 61 108 36 Brown to yellow, wet, very dense, fine to coarse GRAVEL, so							
to coarse sand, some silt, low to medium plasticity (GRAVEL)	A-2-4 (0), GM						
100							
P1 C0/54 12 20 17 20 POP 72%	-12.2-						
Top of Pedrouk et Floy 1713 ft							
R1 (12.2'-17.2'): Grey, very fine to fine grained, thinly to thick							
laminated, METAWACKE [metasandstone], frequent thin to the calcite veins, strong to extremely strong, slightly weathered;	ck						
discontinuities moderately to steeply dipping, close to moderat close spacing, irregular to planar, smooth to very rough, open;							
close spacing, irregular to planar, smooth to very rough, open,  3.2 fractures per foot, chemical weathering in joints [MEDIUM]	verage						
R2 60/59 17.20 - 22.20 RQD = 98% BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANG FORMATION].	)R						
Rock Mass Quality = Fair							
90% Recovery Rock Core Rate (min:sec)							
20 12.2-13.2 ft (2:24)							
13.2-14.2 ft (3:05) 14.2-15.2 ft (3:17)							
15.2-16.2 ft (3:03)							
111.3 11.3 11.3	d,						
METAWACKE [metasandstone], frequent calcite veins, extrer	ely						
strong, fresh; discontinuities horizontal dipping, close to wide spacing, irregular to planar, smooth to very rough, open; aver.	ge 0.2						
fractures per foot [MEDIUM BEDDED FACIES, PENOBSCO RIVER MEMBER, BANGOR FORMATION].	Γ						
Rock Mass Quality = Fair							
98% Recovery Rock Core Rate (min:sec)							
Rock Core Rate (min:sec) 17.2-18.2 ft (2:54)							
18.2-19.2 ft (3:07)							
30 19.2-20.2 ft (2:48) 20.2-21.2 ft (3:15)							
Remarks:							

- 1. Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023.
- 2. As-drilled boring locations and ground surface elevations were provided by HNTB.

  3. Water level reading taken on 5/8/24 at 01:59 was made 15 minutes after completion of drilling with bottom of casing at 12.2 ft bgs.

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.

Page 1 of 2

I	Main	e Dep	artment	of Transporta	ation		Project:			5 Bridges Over Stillwater Boring No.: BB-BSA-1				
		_	Soil/Rock Exp	_			Locatio	Avenu n: Ban		nine				
			US CUSTOM	IARY UNITS					501, 111		WIN:	0271	76.00	
Drille	or.		Seaboard		Flov	ation	(ft )	133.	5		Auger ID/OD:			
-	rator:		Kevin Hansco	om.	Datu		(11.)		ne East	Zone	Sampler:	Standard Split	Spoon	
<u> </u>	ged By:		Lina-Maria P		Rig				lrich D		Hammer Wt./Fall:	140 lbs/30 in	Брооп	
	Start/Fi	nish·		53); 05/08/24 (02:12)			lethod:			l Wash	Core Barrel:	NX		
-	ng Loca			B, E: 1735451.57			O/OD:		3.25 in		Water Level*:	9.3 ft on 05/08	3/24 at 01:59	
			actor: 1.066	<u>,                                      </u>			Туре:	Automa		Hydraulic □	Rope & Cathead □			
Defini	tions:			R = Rock C	ore Sampl	le		Su =	Peak/Re	emolded Field Vane Undrained She	ear Strength (psf) T <sub>v</sub> =	Pocket Torvane She		
MD =		sful Split Sp	oon Sample Atter		w Stem A			$q_p =$	Unconfi	Vane Undrained Shear Strength ( ned Compressive Strength (ksf)	LL =	: Water Content, per Liquid Limit	cent	
MU =	Unsuccess		all Tube Sample A			) lb. Ha	ammer	Hamı	mer Effic	d = Raw Field SPT N-value siency Factor = Rig Specific Annua	I Calibration Value PI = I	Plastic Limit Plasticity Index		
			PP = Pocket Pe ane Shear Test At							-uncorrected Corrected for Hamme ner Efficiency Factor/60%)*N-unco		Grain Size Analysis Consolidation Test		
				Sample Information									Laboratory	
	,	Pen./Rec. (in.)	Sample Depth (ft.)	جَ ا	ted				5				Testing	
Œ.	Sample No.	ec.	De	h % (%	N-uncorrected			<u>ا</u> ج	Graphic Log	Visual De	scription and Remarks		Results/ AASHTO	
Depth (ft.)	nple	./R	l pldn	ws (sar engt	nco	_	sing	Elevation (ft.)	phic				and	
	Sar	Per	Sar (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	Ž	09 <sub>N</sub>	Casing Blows	Ele (ft.)	Gra				Unified Class.	
30										21.2-22.2 ft (3:31)		22.2		
l								1		Bottom of Exploration Boring backfilled with bent	n at 22.2 feet below groun	nd surface.		
										to bottom of pavement and				
								ł						
								-						
- 35 -														
- 40 -								1						
								-						
								-						
- 45 -														
"														
- 50 -								1						
					$\overline{}$			1						
								-						
								ł						
- 55 -								1						
"														
	<u></u>	<u></u>	<u> </u>				<u></u>							
								1						
								1						
Rem	arks:	L	I				1		I	l			<u> </u>	
		Efficiency	factor provided	d by S.W. Cole and taken	from "20	023P	<b>A</b> 00074 -	SW Col	e - SP1	Report" by GRL Engineers I	nc., dated 11/10/2023			
2. A	s-drilled	boring lo	cations and gro	ound surface elevations w	ere provi	ided b	y HNTB.							
3. V	Vater leve	el reading	taken on 5/8/24	4 at 01:59 was made 15 n	ninutes a	fter co	ompletion	of drill	ing wit	h bottom of casing at 12.2 ft b	gs.			
Stratif	ication line	s represent	approximate hou	undaries between soil types: t	ransitions	may h	e gradual				Page 2 of 2			

**Boring No.:** BB-BSA-102

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.

N	Aain	_		of Transport	atio	n	Projec		Iainel Venu		95 Bridges Over Stillwater	Boring No.:		SA-103
		_	Soil/Rock Exp				Locati				ine	VAZIAL.	0271	76.00
		<u>,</u>	JS CUSTOM.	ARY UNITS								WIN:	0271	76.00
Drille	er:		Seaboard		Ele	vation	(ft.)		132.	13		Auger ID/OD:		
Oper	ator:		Kevin Hansco	m	Dat	tum:	. ,		Mair	ne East	Zone	Sampler:	Standard Split	Spoon
Logg	ed By:		Lina-Maria Pu	ıa	Rig	Type:			Died	rich D-	50	Hammer Wt./Fall:	140 lbs/30 in	
Date	Start/F	inish:	05/08/24 (21:3	32); 05/08/24 (23:30)	Dri	lling M	ethod		SSA,	, Cased	Wash	Core Barrel:	NX	
Bori	ng Loca			E: 1735425.94	Ca	sing ID	/OD:		3 in/.	3.25 in		Water Level*:	5.2 ft on 05/08	/24 at 23:14
Ham	mer Eff	iciency Fa	actor: 1.066		Ha	mmer ·	Гуре:	Au	itoma	tic 🛛	Hydraulic □	Rope & Cathead □		
MD = 1 U = Th MU = 1 V = Fig	olit Spoon Unsucces hin Wall To Unsucces ald Vane S	sful Split Spo ube Sample sful Thin Wal Shear Test,	on Sample Atten I Tube Sample A PP = Pocket Pe ne Shear Test Att	RC = Roller ttempt WOH = We netrometer WOR/C = V	d Stem A ow Stem r Cone light of 1 Veight of	Auger Auger Auger 40lb. Hai f Rods or	Casing		S <sub>u(lal</sub> q <sub>p</sub> = l N-und Hamr N <sub>60</sub> =	b) = Lab Unconfir corrected ner Effic = SPT N	molded Field Vane Undrained She Vane Undrained Shear Strength (k ed Compressive Strength (ksf) I = Raw Field SPT N-value ency Factor = Rig Specific Annual uncorrected Corrected for Hamme er Efficiency Factor/60%)*N-uncor	osf)	Pocket Torvane She = Water Content, per Liquid Limit - Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	
				Sample Information		I		_						Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows	Flevation	(ft.)	Graphic Log	Visual De:	scription and Remarks		Testing Results/ AASHTO and Unified Class
0							SSA		31.5	****	Asphalt Pavement		-0.6-	
	1D	24/16	1.00 - 3.00	21-24-21-21	45	80					Brown, dry, dense, SILTY (FILL).	GRAVEL, some sand, po		
	2D	24/12	3.00 - 5.00	7-10-6-48	16	28		1	29.0	****	2DA, Top 1 in: Brown, dry, sand, poorly-graded (FILL)		3.1-	
- 5 -	3D	26.4/15.5	5.00 - 7.20	45-34-45-50/4"	79	140		<del>-</del>			2DB, Bottom 11 in: Grey, d some weathered rock fragm Grey, moist to wet, very der little sand (WEATHERED)	ents (WEATHERED BE nse, WEATHERED BED	DROCK).	
							$\vdash \forall$	┨╻	24.9		nuic said (WEATHERED	BEDROCK).	7.2	
	R1	60/60	7.20 - 12.20	RQD = 31%			NX	վ ՝	24.7		Bedrock encountered at 7.2		7.2	
											Top of Bedrock at Elev. 124 R1 (7.2'-12.2'): Grey, very f		AWACKE	
											[metasandstone] with thin c	alcite veins and thick qua	artz veins,	
- 10 -											extremely strong, thinly lan low angle to steep dipping,			
											irregular, very rough to smo [MEDIUM BEDDEED FAC			
	R2	60/60	12.20 - 17.20	RQD = 71%							BANGOR FORMATION]. Rock Mass Quality = very p 100% Recovery		EK WEMBEK,	
								4			Rock Core Rate (min:sec)			
- 15 -								_			7.2-8.2 ft (4:32) 8.2-9.2 ft (4:43)			
10											9.2-10.2 ft (5:32)			
											10.2-11.2 ft (5:50) 11.2-12.2 ft (6:37)			
							\ \ \	1	14.9		R2 (12.2'-17.2'): Grey, very			
								1			[metasandstone] with thin c thinly laminated, fresh; disc			
											moderately close spacing, si 0.8 fractures per foot [MED			
- 20 -								+			RIVER MEMBER, BANGO	OR FORMATION].	as, i Livobsco i	
								-			Rock Mass Quality = Excel 100% Recovery	lent		
												at 17.2 feet below grou	17.2	
											Boring backfilled with bent to bottom of pavement and	onite chips in the rock co	ore socket, gravel	
ا م														
- 25 -														
								$\dashv$						
								$\exists$						
							-	$\dashv$						
								$\dashv$						
30														
Rem	arks:													

- 1. Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023.
- 2. As-drilled boring locations and ground surface elevations were provided by MaineDOT.

  3. Water level reading taken on 5/8/24 at 23:14 was made after completion of drilling with bottom of casing at 7.2 ft bgs.

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.

Page 1 of 1

		Popu		of Transporta	uon	1	Project:	MaineDOT I-	95 Bridges Over Stillwater	Boring No.:	DD-D	SA-104	
		_	Soil/Rock Expl				Location	Avenue 1: Bangor, Ma	ine				
		<u>L</u>	JS CUSTOMA	ARY UNITS				Dungor, ma		WIN:	0271	76.00	
Driller:			Seaboard		Flev	vation	(ft )	151.9		Auger ID/OD:			
Operat			Ryan H.		Date		(14.7)	Maine East	Zone	Sampler:	Standard Split	Spoon	
Logge			D. Burgess		-	Туре	:	Diedrich D-		Hammer Wt./Fall:	140lb/30in	-F	
Date S				5); 7/30/24 (23:38)	<del>+ -</del>		lethod:	SSA, Drive		Core Barrel:	NA		
Boring				E: 1735602.84	-	sing IE		4" (ID)		Water Level*:	Not measured		
			actor: 1.087		_			Automatic 🛛	Hydraulic □	Rope & Cathead □			
Definition	ns:			R = Rock Co					molded Field Vane Undrained She	ar Strength (psf) T <sub>V</sub> = I	Pocket Torvane She		
	successf	ful Split Spo	on Sample Atter		w Stem			q <sub>p</sub> = Unconfin	Vane Undrained Shear Strength (ped Compressive Strength (ksf)	LL = I	Water Content, pero Liquid Limit	ent	
MU = Un:	successf	oe Sample ful Thin Wal	I Tube Sample A	RC = Roller of tempt WOH = Weig	ht of 14			Hammer Effici	= Raw Field SPT N-value ency Factor = Rig Specific Annual	Calibration Value PI = F	Plastic Limit Plasticity Index		
			PP = Pocket Per ne Shear Test Att						uncorrected Corrected for Hamme er Efficiency Factor/60%)*N-uncor		Grain Size Analysis Consolidation Test		
Sample Information Lab													
		(in.)	Sample Depth (ft.)	÷	ted			D				Laboratory Testing	
Œ	Sample No	90.	De l	/6 ir	N-uncorrected			on c Log	Visual De	scription and Remarks		Results/ AASHTO	
Depth (ft.)	n ple	Pen./Rec.	l pple	ws as an	00	0	Casing Blows	Elevation (ft.) Graphic L				and	
Del	Sar	Per	Sar (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	ž	N <sub>60</sub>	Cas	(ft.) Gra				Unified Class.	
0	1D	24/16	0.80 - 2.80	15-14-14-12	28	51	SSA	151 1	8" Asphalt Pavement				
								151.1	Brown, dry, very dense, fine	e to coarse SAND, some f	ine to coarse		
F	2D	24/20	200 400	12 14 0 14	22	12			gravel, trace silt (FILL).				
$\vdash$	2D	24/20	2.80 - 4.80	13-14-9-14	23	42			Brown, dry, very dense, fine	e to coarse SAND, some f	ine to coarse		
									gravel, trace silt (FILL).			E: 55.20/	
. 5									Dark grayish brown, dry, ha fine to coarse gravel, non-p		edium sand, little	Fines = 55.3% A-4 (0), ML	
	3D	24/19	5.00 - 7.00	7-11-10-10	21	38			Dark grayish brown, dry, ha	ard, SILT, some fine to me	edium sand, little	, , ,	
									fine to coarse gravel, non-p	lastic (FILL).			
	4D	24/13	7.00 - 9.00	22-21-19-16	40	72			Dark grayish brown, dry, ha		edium sand, little		
⊢	40	24/13	7.00 - 9.00	22-21-19-10	40	12			fine to coarse gravel, non-p			WYG 6 504	
$\vdash$							+++		Dark grayish brown, dry to some fine to coarse gravel,		coarse SAND,	WC = 6.5% Fines = 20.4%	
. 10							$\perp V$					A-1-b (0), SM-	
L	5D	24/24	10.00 - 12.00	9-7-18-24	25	45	99		Grayish brown, moist, hard fine to coarse gravel, slightl		um sand, little	GM	
							128			,			
							92						
							196						
$\vdash$							82		Wood fragments in wash w	ater.			
15		24/12	15.00 15.00	2210	_	- 10							
-	6D	24/13	15.00 - 17.00	3-3-4-8	7	13	38	136.4	Grayish brown, wet, stiff, C	LAY, little sand, trace gra	avel, medium	WC = 25% Fines = 87.8%	
<u> </u>							57		plasticity (CLAY)			LL = 30	
							104					PL = 17 PI = 13	
							118	133.4			<u>18.5</u> -	LI = 0.6	
							62					A-6 (10), CL	
20	7D	24/6	20.00 - 22.00	24-33-24-35	57	103	OPEN		Greenish grey, wet, hard, S	· ·	and, little gravel,	WC =16.4%	
-	,,,	2.,0	20.00 22.00	21.00 21.00	,		10121		trace clay, slightly plastic (	GLACIAL TILL)		Fines = 59.5% A-4 (0), ML	
$\vdash$												(-//	
$\vdash$								128.9			23.0-		
L								128.4	Possible bedrock		23.5-		
										at 23.5 feet below groun	nd surface.		
25									Boring terminated due to shall 104A to rock core.	oe broken in noie. Offset	10 DD-D3A-		
									Boring backfilled with grav	el to bottom of pavement	and patched with		
$\vdash$									cold patch asphalt.				
$\vdash$													
$\vdash$													
30													
Remar	ks:												
				by S.W. Cole and taken and surface elevations we				SW Cole - SPT	Report" by GRL Engineers In	nc., dated 11/10/2023.			

\* 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.

Page 1 of 1

**Boring No.:** BB-BSA-104

I	Main	_	artment		_	tion		Proj	ect:			-95 Bridges Over Stillwater	Boring No.:	BB-BS	A-104A
			Soil/Rock Exp					Loca	atior	Avent 1: Ban		nine		0.254	<b>=</b> < 0.0
		<u>.</u>	JS CUSTOMA	ARY UNITS									WIN:	0271	76.00
Drille	er:		Seaboard			Eleva	tion	(ft.)		151.	97		Auger ID/OD:		
	ator:		Ryan H.			Datur		(,			ne East	Zone	Sampler:	Standard Split	Spoon
	ged By:		D. Burgess			Rig T					Orich E		Hammer Wt./Fall:	140lb/30in	-r
	Start/F	inish·	7/30/24 (23:40	)): 7/31/24 (2	:33)	Drillir	_		q.			& Wash	Core Barrel:	NX	
	ng Loca		N: 483017.59,			Casin	_			4" (I		CC 11 4011	Water Level*:	Not measured	
_			actor: NA	2. 1700000.		Hamr	_			Automa		Hydraulic □	Rope & Cathead □	1 tot measured	
Definit	ions:				R = Rock Cor	e Sample		- 7		S <sub>u</sub> =	Peak/R	emolded Field Vane Undrained She	ear Strength (psf) T <sub>v</sub>	= Pocket Torvane Shea	
	olit Spoon Unsucces:		oon Sample Atter	npt	SSA = Solid S HSA = Hollow					S <sub>u(la</sub>	<sub>b)</sub> = Lal Unconfi	Vane Undrained Shear Strength ( ned Compressive Strength (ksf)	psf) W(	C = Water Content, pero = Liquid Limit	cent
		ube Sample sful Thin Wa	II Tube Sample A	ttempt	RC = Roller C WOH = Weig		h Ha	mmer		N-un	correcte	d = Raw Field SPT N-value ciency Factor = Rig Specific Annual		= Plastic Limit = Plasticity Index	
V = Fi	eld Vane S	Shear Test,	PP = Pocket Per ne Shear Test Att	netrometer	WOR/C = Wei	ight of Ro	ds o	Casir	ıg	N <sub>60</sub>	= SPT N	-uncorrected Corrected for Hamme ner Efficiency Factor/60%)*N-uncor	er Efficiency G :	= Grain Size Analysis = Consolidation Test	
IVIV =	Unsucces	siui rieiu va		Sample Info		grit or Orie	rei	5011		1460	= (maini	lei Emciency Factor/60 /6) N-uncor	rected C :	= Consolidation Test	
		(in.)				p					1				Laboratory Testing
<u>.:</u>	No.	: <u></u>	Sample Depth (ft.)	Blows (/6 in.) Shear Strength	(%)	N-uncorrected				_	Graphic Log	Vigual De	scription and Remark	e	Results/
h (ft	ole I	Ä e	l ec	s (/e	Q	COL		l gc	S	atior	hic	Visual De	scription and Remark	5	AASHTO and
Depth (ft.)	Sample No.	Pen./Rec.	t.)	low hea	r R(	ş	N60	Casing	NO.	Elevation (ft.)	irap				Unified Class
0	o)	<u> </u>	o e	ш თ თ	90	_				ш #)	U	8" Asphalt pavement			
								SS	Α	151.3		o Asphan pavement		0.7-	
- 5 -						_									
								+	+						
- 10 -								$\vdash$							
								15	52						
								11	5						
								4	9						
								12	1						
								1	_						
- 15 -								21				Wood coming up in wash w	vater		
								4	9			Wood coming up in wash v	vater		
								4	4						
								5	3						
								5	4						
								4							
- 20 -								+ 4	_	101.6				20.4	
								N	X	131.6		Possible bedrock.		- — — —20.4-	
	R-1	60/57	21.00 - 26.00	RQD =	56%							Bedrock encountered at 20.			
												Top of Bedrock at Elev. 13 R1 (21.0' - 26.0'): Grey, ve	ry fine grained, thinly to		
												bedded, METAWACKE [r	netasandstone] with free	quent calcite veins,	
												strong to very strong, sligh infilling 22.5 ft to 23 ft; dis			
- 25 -			+ +					$\vdash$				very close to close spacing,	rough to very rough, ti	ght to open,	
		-							_			average 1.6 fractures per fo PENOBSCOT RIVER MEI			
	R-2	33.6/25.2	26.00 - 28.80	RQD =	61%							Rock Mass Quality = fair		1	
												95% recovery 56% RQD			
	R-3	26.4/24	28.80 - 31.00	RQD =	23%							Rock Core Rate (min:sec)			
												21.0 - 22.0 ft (3:06) 22.0 - 23.0 ft (2:42)			
30 Rem	arks:								/						
		hou! - 1	otions 1	and a	lavoti		الما	175	TD						
1. A	s-ariiled	poring loc	ations and grou	ind surface e	ievations wei	e provid	ied b	y HN	IB.						
Stratif	cation line	es represent	approximate bour	ndaries betwee	n soil types; tra	nsitions r	nay b	e grac	lual.				Page 1 of 2		
* Wate	er level rea	adings have	been made at time	es and under c	onditions state	d. Groun	dwate	er fluct	uatior	ns may o	ccur du	to conditions other			

than those present at the time measurements were made.

N	Maine	e Depa	artment	of Transporta	ation					Boring No.:	BB-BS	A-104A
Soil/Rock Exploration Log US CUSTOMARY UNITS						Locatio	Avenu n: Ban		nine	WIN:	027176.00	
					1							
Drille			Seaboard		Elevatio	n (ft.)	151.		_	Auger ID/OD:		~
⊢ <del>`</del>	ator:		Ryan H.		Datum:	_		ne East		Sampler:	Standard Split	Spoon
H					Rig Type			Drich E		Hammer Wt./Fall:	140lb/30in	
-	Start/Fi			40); 7/31/24 (2:33)	Drilling				& Wash	Core Barrel:	NX	
-	ng Loca			9, E: 1735600.99	Casing I		4" (I		**	Water Level*:	Not measured	
Definitions:					Stem Auger ow Stem Auger Cone ght of 140 lb. F reight of Rods	lammer or Casing	S <sub>u(la</sub> q <sub>p</sub> = N-un Hami N <sub>60</sub> :	natic    Hydraulic    Rope & Cathead    Full Pydraulic    Rope & Cathead    Tyl = Pocket Torvane    Tyl = Pocket Torvane    WC = Water Content,    LL = Liquid Limit    PL = Plastic Limit    PL = P				
		<u>.</u>		Sample Information	р			1				Laboratory Testing
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected N <sub>60</sub>	Casing Blows	Elevation (ft.)	Graphic Log		scription and Remarks		Results/ AASHTO and Unified Class.
30						TV			23.0 - 24.0 ft (2:08) 24.0 - 25.0 ft (2:14)			
- 35 40 50 - 50 -							121.0		24.0 - 25.0 ft (2:14) 25.0 - 26.0 ft (2:50) R2 (26.0' - 28.8'): Grey, ver bedded, METAWACKE [n very strong, fresh; discontin close spacing, rough to ver [MEDIUM BEDDED FAC BANGOR FORMATION]. Rock Mass Quality = fair 75% recovery 61% RQD Rock Core Rate (min:sec) 26.0 - 27.0 ft (2:19) 27.0 - 28.0 ft (2:28) 28.0 - 28.8 ft (0:15) R3 (28.8' - 31.0'): Grey, ver bedded, METAWACKE [n discontinuities low angle to tight to open, average 3.5 ft FACIES, PENOBSCOT RI FORMATION]. Rock Mass Quality = very 91% recovery 23% RQD Rock Core Rate (min:sec) 28.8 - 29.0 ft (0:08) 29.0 - 30.0 ft (2:56) 30.0 - 31.0 ft (3:18)	netasandstone] with calcite nutities low angle to moder by rough, tight, average 0.5 yies, PENOBSCOT RIVE or the grained, thinly to we netasandstone] strong to we be steep dipping, very close ractures per foot [MEDIUI VER MEMBER, BANGO POOT	eveins, strong to ate dipping, very fractures per foot R MEMBER,  ery thinly ery strong, fresh; spacing, rough, M BEDDED DR  31.0- nd surface. e socket, drill	
							-					
- 55 -							1					
			<u></u>									
60							L_	L				<u> </u>
1. A	Remarks:  1. As-drilled boring locations and ground surface elevations were provided by HNTB.											
Stratifi	cation lines	s represent	approximate bou	undaries between soil types; to	ransitions may	be gradual.			<del></del>	Page 2 of 2		

**Boring No.:** BB-BSA-104A

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							Project:			-95 Bridges Over Stillwater	Boring No.:	BB-BS	BB-BSA-105	
			Soil/Rock Expl US CUSTOMA			Avenue Location: Bangor, Maine					WIN:	0271	027176.00	
Drille	er:		Seaboard		Ele	vation	n (ft.)	152.	05		Auger ID/OD:			
Ope	ator:		Ryan H.			tum:		Mai	ne East	Zone	Sampler:	Standard Split	Spoon	
Logged By:			D. Burgess			ј Туре	:	Diec	lrich D-	-50	Hammer Wt./Fall:	140lb/30in		
Date	Start/F	inish:	7/31/24 (20:07	); 8/1/24 (0:30)	Dri	lling N	lethod:	SSA	, Cased	l Wash	Core Barrel:	NX		
Bori	ng Loca	tion:	N: 482984.9, I	E: 1735593.56	Cas	sing II	D/OD:				Water Level*:	17.0' BGS 11:5	56 7/31/24	
Ham	mer Eff	iciency F	actor: 1.087		Hai	mmer	Type:	Automa	atic 🛛	Hydraulic □	Rope & Cathead □			
Definitions:   R = Rock Core S:   D = Split Spoon Sample   SSA = Solid Sten   MD = Unsuccessful Split Spoon Sample Attempt   HSA = Hollow Str   U = Thin Wall Tube Sample   HSA = Hollow Str   WU = Unsuccessful Thin Wall Tube Sample Attempt   WOH = Weight of WOR/C = Weight   WY = Unsuccessful Field Vane Shear Test Attempt   WOR/C = Weight   WY = Unsuccessful Field Vane Shear Test Attempt   WO1P = Weight   WO2D = Weight   WO3D						Auger Auger 40lb. Ha f Rods o	r Casing	S <sub>u(la</sub> q <sub>p</sub> = N-un Ham N <sub>60</sub>	lb) = Lab Unconfir corrected mer Effic = SPT N	emolded Field Vane Undrained She Vane Undrained Shear Strength (ped Gompressive Strength (ksf) d = Raw Field SPT N-value iency Factor = Rig Specific Annual -uncorrected Corrected for Hamme ner Efficiency Factor/60%)*N-uncor	psf)	Pocket Torvane She Water Content, per Liquid Limit Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test		
				Sample Information		1	1						Laboratory	
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows	Elevation (ft.)	Graphic Log	Visual De:	scription and Remarks		Testing Results/ AASHTO and Unified Class	
0	1D	24/18	0.90 - 2.90	14-14-15-14	29	53	SSA	151.2		10" Asphalt pavement.		0.8		
	2D	24/19	2.90 - 4.90	9-11-13-12	24	43		131.2		Olive brown, dry, very dens coarse gravel, little silt (FIL			Fines = 16.2% A-1-b (0), SM	
									$\bowtie$	Olive with brown, dry, hard	l, SILT, some fine to coar	se sand, some		
- 5 -									$\bowtie$	fine to coarse gravel, non- p	plastic (FILL).			
	3D	8/8	5.00 - 5.67	11-50/2"	R					Dark grayish brown, dry, ha	ard, SANDY SILT, trace §	gravel (FILL).	Fines = 46.4% A-4 (0), ML/ SM	
	4D	24/10	7.00 - 9.00	13-23-20-16	43	78			$\bowtie$	Dark grayish brown, dry, ha	ard, SANDY SILT, trace g	gravel (FILL).		
	70	24/10	7.00 - 7.00	13-23-20-10	13	/6			$\bowtie$					
							+++		$\bowtie$					
- 10 -							$\perp V$		$\bowtie$					
10	5D	13.5/7	10.00 - 11.13	11-31-50/1.5"	R		35		₩	Dark grayish brown, dry, ha	ard, SANDY SILT, trace g	gravel (FILL).		
							67		$\bowtie$					
							40		$\bowtie$					
								139.0				<u>13.1</u> -		
							57							
- 15 -							45							
13	6D	24/13	15.00 - 17.00	3-4-8-11	12	22	38			Grayish brown, wet, medium little fine to coarse subround	m dense, SILT, some fine ded gravel (SANDY SILT	to coarse sand, to SILTY	WC = 20.5% Fines = 55.7%	
							33			SAND).	,		A-4 (0), ML	
							35							
							39							
- 20 -							40			Increased drilling resistance			WC 11.70/	
	7D	24/11	20.00 - 22.00	14-11-20-18	31	56	60			Olive brown, wet, very dens gravel (SANDY SILT to SI		ne to coarse	WC = 11.7% Fines = 40.3%	
							92			glaver (SANDT SILT to SI	ETT SAND).		A-4 (0), ML/	
							57						SM	
							165							
- 25 -							58	127.1						
	8D	14/6	25.00 - 26.17	20-28-30/2"			OPEN			Grey, wet, very dense, fract	ured rock with fine to coa			
	R-1	60/60	26.40 - 31.40	RQD = 30%			NX	125.7		(WEATHERED ROCK)		26.4		
										Bedrock encountered at 26. Top of Bedrock Elev. 125.7				
										R1 (26.4' - 31.4'): Grey, ver	y fine grained, thinly to v			
										bedded, METAWACKE [m slightly weathered to fresh;				
30										anguary weathered to fresh,	angle	steep dipping,		
Kem	arks:													
1. H	lammer E	Efficiency	factor provided	by S.W. Cole and take	en from '	'2023P.	A00074 -	SW Col	e - SPT	Report" by GRL Engineers In	nc., dated 11/10/2023.			

- 2. As-drilled boring locations and ground surface elevations were provided by HNTB.

  3. Water level reading taken on 7/31/24 at 23:58 was made after the rock coring.

\* 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.

Page 1 of 2

Maine Department of Transportatio						Project: MaineDOT I-95 Bridges Over Stillwater						Boring No.: BB-B		SA-105
Soil/Rock Exploration Log US CUSTOMARY UNITS				Avenue Location: Bangor, Maine										
		Ţ	JS CUSTOM/	ARY UNITS	<u> </u>				•	,		WIN:	0271	76.00
Drille	er:		Seaboard			Elevati	on (f	t.)	152.	05		Auger ID/OD:		
Operator: Ryan H.			Datum:	<u> </u>	,		ne East	Zone	Sampler:	Standard Split	Spoon			
<del>-</del>	ed By:		D. Burgess			Rig Ty	oe:		Died	rich D-	50	Hammer Wt./Fall:	140lb/30in	
	Start/Fi	inish:	7/31/24 (20:07	7): 8/1/24 (0:	30)	Drilling		hod:	SSA	, Cased	Wash	Core Barrel:	NX	
	ng Loca		N: 482984.9, I			Casing				,		Water Level*:	17.0' BGS 11:5	56 7/31/24
			actor: 1.087			Hamme			Automa	ıtic ⊠	Hydraulic □	Rope & Cathead □		
V = Field Vane Shear Test, PP = Pocket Penetrometer WOR/C = Weigi					Stem Auger v Stem Auge Cone ht of 140 lb.	Sample $S_U = Peak/Remolded Field Vane Undrained Shear Stem Auger S_{U(lab)} = Lab \ Vane \ Undrained Shear Strength (psf) Stem Auger q_D = Unconfined \ Compressive Strength (ksf) N-uncorrected = Raw \ Field \ SPT \ N-value to f 140 lb. Hammer = Lample = L$						v = Pocket Torvane She; /C = Water Content, perd L = Liquid Limit L = Plastic Limit I = Plasticity Index i = Grain Size Analysis = Consolidation Test		
Depth (ft.)	Sample No.	Pen./Rec. (in.)		Blows (/6 in.) Shear Strength	ormation	N-uncorrected		Casing Blows	Elevation (ft.)	Graphic Log		scription and Remarl		Laboratory Testing Results/ AASHTO and Unified Class
- 35	R-2		31.40 - 36.20	RQD =					115.9		very close to close spacing, 3.2 fractures per foot [MED RIVER MEMBER, BANG Rock Mass Quality = poor 100% recovery 30% RQD Rock Core Rate (min:sec) 26.4 - 27.4 ft (2:33) 27.4 - 28.4 ft (3:10) 28.4 - 29.4 ft (2:54) 29.4 - 30.4 ft (4:01) 30.4 - 31.4 ft (10:40) R2 (31.4' - 36.2'): Grey, ver bedded, METAWACKE [IN STRONG, fresh; discontinuitie spacing, smooth to rough, ti [MEDIUM BEDDED FAC BANGOR FORMATION]. Rock Mass Quality = fair 100% recovery 75% RQD Rock Core Rate (min:sec) 31.4 - 32.4 ft (2:36) 32.4 - 33.4 (2:51) 34.4 - 35.4 (2:41) 35.4 - 36.2 (4:20)  Bottom of Exploration Boring backfilled with bent cuttings and gravel to botto asphalt.	or property of the process of the pr	o very thinly leite veins, very pping, very close tres per foot VER MEMBER,	
60														
	arks:									-				
1. H	ammer E	Efficiency 1	factor provided	by S.W. Co	le and taken f	from "2023	BPA0	0074 - S	SW Col	e - SPT	Report" by GRL Engineers In	nc., dated 11/10/2023.		

- 2. As-drilled boring locations and ground surface elevations were provided by HNTB. 3. Water level reading taken on 7/31/24 at 23:58 was made after the rock coring.

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.

Page 2 of 2

Maine Department of Transportation							Project:		-95 Bridges Over Stillwater	Boring No.:	BB-BS	SA-106	
			Soil/Rock Exp	-			Location	Avenue 1: Bangor, M	aine				
		<u>L</u>	JS CUSTOM	ARY UNITS				Dungor, m		WIN:	0271	76.00	
Drille	ar.		Seaboard		E	evation	/f+ \	143.6		Auger ID/OD:			
	ator:		Ryan H.		_	atum:	(11.)	Maine Eas	Zone	Sampler:	Standard Split	Spoon	
•	ed By:		D. Burgess		+-	g Type		Diedrich D		Hammer Wt./Fall:	140lb/30in	Брооп	
	Start/Fi	nish:		9); 7/29/24 (1:56)	-		lethod:	SSA, Case		Core Barrel:			
	ng Loca		N: 482611.2, 1		-	asing IC		4" (ID)		Water Level*:	Refer to remark	ks note 3	
	· ·					ammer		Automatic 🖂	Hydraulic □	Rope & Cathead □	Treater to remain	is note 5	
Definit	ions:		1.007	R = Rock	Core Sa	mple	.,,,,,,	S <sub>U</sub> = Peak/R	emolded Field Vane Undrained She	ear Strength (psf) $T_V = Po$	ocket Torvane Shea		
	lit Spoon : Jnsuccess		on Sample Atten	SSA = Sol npt HSA = Hol				S <sub>u(lab)</sub> = La q <sub>p</sub> = Unconf	o Vane Undrained Shear Strength ( ned Compressive Strength (ksf)	psf) WC = \ LL = Li	Vater Content, pero quid Limit	cent	
		be Sample ful Thin Wa	II Tube Sample A	RC = Rolle ttempt WOH = W		140lb. Ha	mmer	N-uncorrecte	ed = Raw Field SPT N-value ciency Factor = Rig Specific Annual	PL = P	astic Limit asticity Index		
V = Fi	eld Vane S	hear Test,	PP = Pocket Pe	netrometer WOR/C =	Weight	of Rods o	r Casing	$N_{60} = SPT N$	I-uncorrected Corrected for Hamme	er Efficiency G = Gr	ain Size Analysis		
MV = Unsuccessful Field Vane Shear Test Attempt WO1P = Weight of One Person N <sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected C = Consolidation Test  Sample Information													
		(in.)	gt	÷	pe							Laboratory Testing	
f.)	Š.	Pen./Rec. (i	Dep	6 in (%)	N-uncorrected			n Log	Visual De	scription and Remarks		Results/	
th (f	ble		ble	ar ngth OD	cor		ing /s	atio ohic	·			AASHTO and	
Depth (ft.)	Sample No.	Pen	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	Į Ž	N <sub>60</sub>	Casing Blows	Elevation (ft.) Graphic L				Unified Class.	
0				-			SSA		10" Asphalt Pavement				
	1D	24/13	1.00 - 3.00	14-9-7-5	16	29	+	142.8	Brown, dry, medium dense,	0.8- e fine gravel,			
	ID	24/13	1.00 - 3.00	14-9-7-3	10	29			trace silt (FILL).				
							$\perp$						
	2D	24/19	3.00 - 5.00	11-13-18-20	31	56			Olive with brown, moist, hat fine to coarse gravel, non-p				
_													
- 5 -	3D	24/15	5.00 - 7.00	13-16-37-30	53	96			4	brown, moist, hard, SILT, some fine to medium sand, some rse gravel, non-plastic (FILL)			
									fine to coarse graver, non-p	idstic (FILL)			
	4D	24/0	7.00 - 9.00	25-27-22-23	49	89			No recovery.				
	40	24/0	7.00 - 9.00	23-21-22-23	42	09							
							++/-						
- 10 -							$\perp V$		Oliva with heaven maint he	and CHT come fine to made	lium cond come		
	5D	24/13	10.00 - 12.00	8-9-11-27	20	36	64		Olive with brown, moist, hat fine to coarse gravel, non-p		num sanu, some		
							148						
							133						
							166						
							82						
- 15 -	(D)	24/0	15.00 - 17.00	12 21 20 15		02			Grey, wet, very dense, fine	ne to coarse SAND, flakey fractured rock			
	6D	24/9	15.00 - 17.00	12-31-20-15	51	92	87		fragments (FILL).				
							124		Possible boulder or cobbles	12 to 15" thick			
							OPEN		Tossible bounder of coobles	12 to 15 tines.			
								124.6			19.0		
•								124.0			19.0		
- 20 -	7D	24/22	20.00 - 22.00	5-6-3-4	9	16	24		Olive with grey and orange medium plasticity (CLAY).		AY, trace sand,	WC = 26% Fines = 98.9%	
							26		Pp = $4.0$ to $6.0$ ksf.			LL = 37	
												PL = 19 PI = 18	
							22					LI = 18 $LI = 0.4$	
							34					A-6 (19), CL	
- 25 -							31						
23	8D	24/24	25.00 - 27.00	4-7-8-9	15	27	42		Olive with grey and orange sand, medium plasticity (Cl		LAY, trace	WC = 28% Fines = 99.7%	
							55		Pp = 6.0  to  8.0  ksf.	2.11).		LL = 36	
							61					PL = 19 PI = 17	
							54	<i>V///</i>				LI = 0.5	
												A-6 (18), CL	
30 Bom							35	V///	1				

- 1. Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023.
- 2. As-drilled boring locations and ground surface elevations were provided by HNTB.
- 3. Water level measured during drilling at 20.55'bgs on 7/26/24 at 3:23, 20.55'bgs on 7/28/24 at 20:19. Water level measured at 24.9'bgs on 7/29/24 at 1:08 was made after the rock coring.

\* 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.

Page 1 of 4

I	Main	e Depa	artment	of Transport	atio	n	Project:	Maine	DOT I-	95 Bridges Over Stillwater	Boring No.:	BB-BS	SA-106
		_	Soil/Rock Exp				Locatio	Avenu n: Bang		iine	14/15	0271	74.00
		<u>!</u>	JS CUSTOM/	ARY UNITS							WIN:	0271	76.00
Drille	er:		Seaboard		Ele	evation	(ft.)	143.	5		Auger ID/OD:		
Ope	ator:		Ryan H.		Da	tum:		Mair	ne East	Zone	Sampler:	Standard Split	Spoon
Log	ged By:		D. Burgess		Rig	g Type	:	Died	rich D-	50	Hammer Wt./Fall:	140lb/30in	
	Start/F			9); 7/29/24 (1:56)	-		lethod:		, Cased	Wash	Core Barrel:	NX	
	ng Loca		N: 482611.2, I	E: 1735095.82	-	sing II		4" (I			Water Level*:	Refer to remar	ks note 3
Ham Defini		iciency F	actor: 1.087	R = Rock C		mmer	Type:	Automa S <sub>11</sub> =		Hydraulic □ emolded Field Vane Undrained She	Rope & Cathead $\square$ ear Strength (psf) $T_V = F$	ocket Torvane She	ar Strength (psf)
MD = U = TI MU = V = Fi	nin Wall Tu Unsuccess eld Vane S	sful Split Spo be Sample sful Thin Wa Shear Test,	oon Sample Atten II Tube Sample A PP = Pocket Pe ne Shear Test Att	RC = Rolle $ WOH = We $ $ netrometer WOR/C = V$	ow Sten r Cone eight of 1 Weight o	n Auger 140 lb. Ha of Rods o	r Casing	S <sub>u(la</sub> q <sub>p</sub> = N-und Hamr N <sub>60</sub> =	b) = Lab Unconfir corrected ner Effice SPT N	Vane Undrained Shear Strength (ned Compressive Strength (ksf) d = Raw Field SPT N-value illency Factor = Rig Specific Annual -uncorrected Corrected for Hammener Efficiency Factor/60%)*N-uncorrected Factor/60%)*N-uncorrec	psf) WC =	Water Content, per iquid Limit Plastic Limit lasticity Index rain Size Analysis onsolidation Test	
				Sample Information									Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows	Elevation (ft.)	Graphic Log		scription and Remarks		Testing Results/ AASHTO and Unified Class
30	9D	24/24	30.00 - 32.00	WOH/18"-8			49			Grey, wet, very soft, CLAY Pp < 1.0 tsf.	r, trace sand medium plast	icity (CLAY).	WC = 29% Fines = 98.7%
							42	112.1		•	CANDA OH T	31.5	LL = 26
							56	]		Grey, wet, fine to medium SILT).	SANDY SIL1, some fine g	ravel (SANDY	PL = 15 PI = 11
							100						LI = 1.3 A-6 (9), CL
							57	1					110(), 02
- 35 -	10D	24/12	35.00 - 37.00	4-2-6-7	8	14	43			Grey, wet, stiff, SANDY SI		brounded to	
							40			round gravel (SANDY SIL'	1).		
							42	-					
							51						
- 40 -	115	24/10	40.00 42.00	5077	10	10	42	-		Grey, wet, very stiff, SANI	OY SILT, trace fine to coar	se subrounded to	WC = 11%
	11D	24/10	40.00 - 42.00	5-3-7-7	10	18	59			round gravel (SANDY SIL'	Γ).		Fines = 57.6% LL = 17
							48						PL = 14
							50						PI = 3 $LI = -0.8$
							52						A-4 (0), ML
- 45 -							40			Grey, wet, stiff, SANDY SI	II T trace fine to coope ou	huovudad ta	
	12D	24/18	45.00 - 47.00	3-4-4-6	8	14	53			round gravel (SANDY SIL'	Γ).	brounded to	
							49						
							53						
							61						
- 50 -							43						
- 50 -	13D	24/12	50.00 - 52.00	10-8-6-11	14	25	54			Grey, wet, very stiff, SANI round gravel (SANDY SIL'		se subrounded to	
							42	1		, , , , , , , , , , , , , , , , , , ,			
							96						
							173	90.1		L			
							248	1					
- 55 -	14D	24/15	55.00 - 57.00	14-13-16-19	29	53	61	1		Olive, wet, hard, SANDY S		ibrounded to	WC = 46.5%
			37.00				45	1		rounded gravel, non-plastic	(GLACIAL TILL)		Fines = 48.9% A-4 (0), ML/
							62	1					SM
							108	1					
							112	1					
60 Rem	arks:	1					112	<u> </u>					<u> </u>

- 1. Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023.
- 2. As-drilled boring locations and ground surface elevations were provided by HNTB.
  3. Water level measured during drilling at 20.55'bgs on 7/26/24 at 3:23, 20.55'bgs on 7/28/24 at 20:19. Water level measured at 24.9'bgs on 7/29/24 at 1:08 was made after the rock coring.

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.

Page 2 of 4

N	<b>Iain</b>	e Depa	artment	of Transporta	tion	Proje			95 Bridges Over Stillwater	Boring No.:	BB-BS	SA-106
			Soil/Rock Exp JS CUSTOM			Locat		enue angor, Ma	ine	WIN:	0271	76.00
Drille	r:		Seaboard		Elevati	on (ft.)	14	43.6		Auger ID/OD:		
Oper	ator:		Ryan H.		Datum		M	Iaine East	Zone	Sampler:	Standard Split	Spoon
Logg	ed By:		D. Burgess		Rig Ty	e:	D	iedrich D-	50	Hammer Wt./Fall:	140lb/30in	
Date	Start/F	inish:	7/25/24 (20:1	9); 7/29/24 (1:56)	Drilling	Method	1: S:	SA, Cased	Wash	Core Barrel:	NX	
Borir	ıg Loca	ition:	N: 482611.2,	E: 1735095.82	Casing	ID/OD:	4'	' (ID)		Water Level*:	Refer to remar	ks note 3
Ham	ner Eff	iciency Fa	actor: 1.087		Hamme	r Type:	Auto	matic 🗵	Hydraulic □	Rope & Cathead □		
MD = 1 U = Th MU = 1 V = Fie	lit Spoon Jnsucces: in Wall Tu Jnsucces: eld Vane S	sful Split Spo ube Sample sful Thin Wal Shear Test,	on Sample Atter I Tube Sample A PP = Pocket Pe ne Shear Test At	RC = Roller   WOH = Weight   WOR/C = Wittempt   WO1P = Weight   WO1P = Weigh	Stem Auger w Stem Augo Cone ght of 140 lb. eight of Rod	Hammer or Casing	Si q <sub>p</sub> N- Ha	u(lab) = Lab b = Unconfin uncorrected ammer Effici 60 = SPT N-	molded Field Vane Undrained She Vane Undrained Shear Strength (je ed Compressive Strength (ksf) I = Raw Field SPT N-value iency Factor = Rig Specific Annual uncorrected Corrected for Hamme er Efficiency Factor/60%)*N-uncor	osf)	Pocket Torvane She Water Content, per Liquid Limit Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (pst) or RQD (%)	N-uncorrected	Casing	Blows	(ft.) Graphic Log	Visual De	scription and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.
60	15D	24/16	60.00 - 62.00	31-35-62-50/3"	97 17	6 36			Olive with brown, wet, very course gravel, little silt (GL		ND, some fine to	
						226	5					
						367	7					
	R-1	12/3.6	63.80 - 64.80	RQD = 0%		NX	79	9.8	D 1 1 (22	0.6 .1	63.8	
65	R-2	51.6/51.6	64.80 - 69.10	RQD = 47%			_		Bedrock encountered at 63. Top of Bedrock Elev. 79.8			
									R1 (63.8' - 64.8'): Grey, ver bedded, METAWACKE [m			
									very strong, slightly weather	red to fresh; discontinuiti	es low angle	
									dipping, very close to close [MEDIUM BEDDED FAC			
ĺ									BANGOR FORMATION]. Rock Mass Quality = very	2005		
	R-3	60/60	69.10 - 74.10	RQD = 62%					30% recovery	5001		
70				-					0% RQD Rock Core Rate (min:sec)			
							-		63.8 - 64.8 ft (2:31)	y fine areined thinly to y	ony thinly	
									R2 (64.8' - 69.1'): Grey, ver bedded, METAWACKE [rr	etasandstone] with freque	ent calcite veins,	
						++	$\mathcal{H}$		very strong to strong, fresh sand infilling 67.9 ft to 68.3			
						+V	69	<sub>9.5</sub>	dipping, very close to close	spacing, smooth to rough	, tight to open,	
. 75							_		average 3.3 fractures per fo PENOBSCOT RIVER MEI			
									Rock Mass Quality = poor 100% recovery			
									47% RQD			
									Rock Core Rate (min:sec) 64.8 - 65.8 ft (3:14)			
									65.8 - 66.8 ft (2:05)			
									66.8 - 67.8 ft (2:22) 67.8- 68.8 ft (2:20)			
80									68.8 - 69.1 ft (0:57) R3 (69.1' - 74.1'): Grey, ver	y fine grained thinly to y	ony thinly	
							$\dashv$		bedded, METAWACKE [m	etasandstone] with freque	ent calcite veins,	
							-		weak, fresh; discontinuities close spacing, rough to ver			
							$\dashv$		fractures per foot [MEDIU]	M BEDDED FACIES, PE		
									RIVER MEMBER, BANG Rock Mass Quality = fair	OR FORMATION].		
85									100% recovery 62% RQD			
									Rock Core Rate (min:sec)			
									69.1 - 70.1 ft (2:43) 70.1 - 71.1 ft (2:54)			
									71.1 - 72.1 ft (3:31)			
									72.1 - 73.1 ft (3:12) 73.1 - 74.1 ft (3:13)			
90									Bottom of Exploration	at 74.1 feet below grou	——74.1- nd surface.	
Rem	arks:	1	ı									

- 1. Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023.

  2. As-drilled boring locations and ground surface elevations were provided by HNTB.

  3. Water level measured during drilling at 20.55'bgs on 7/26/24 at 3:23, 20.55'bgs on 7/28/24 at 20:19. Water level measured at 24.9'bgs on 7/29/24 at 1:08 was made after the rock coring.

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.

Page 3 of 4

N	<b>Aain</b>	e Dep	artment	of Transporta	tion	Project:	Maine	DOT I-	95 Bridges Over Stillwater	Boring No.:	BB-BS	SA-106
	Soil/Rock Exploration Log US CUSTOMARY UNITS  Pr: Seaboard					Locatio	Avenu n: Bang		ine	WIN:	0271	76.00
Drille	r:		Seaboard		Elevatio	n (ft.)	143.	5		Auger ID/OD:		
Oper	ator:		Ryan H.		Datum:		Mair	ne East	Zone	Sampler:	Standard Split	Spoon
Logg	ed By:		D. Burgess		Rig Type	e:	Died	rich D-	-50	Hammer Wt./Fal	I: 140lb/30in	
Date	Start/Fi	inish:	7/25/24 (20:1	19); 7/29/24 (1:56)	Drilling	Method:	SSA	, Cased	Wash	Core Barrel:	NX	
Borin	ng Loca	tion:		E: 1735095.82	Casing I	D/OD:	4" (I	D)		Water Level*:	Refer to remark	ks note 3
Hamı	mer Effi	iciency F	actor: 1.087		Hammer	Type:	Automa	tic 🗵	Hydraulic □	Rope & Cathead □		
Definiti	ons:			R = Rock Co	re Sample		S., =	Peak/Re	emolded Field Vane Undrained She	ear Strength (psf)	T <sub>V</sub> = Pocket Torvane Shea	ar Strength (psf)
MD = U U = Th MU = U V = Fie	in Wall Tu Jnsuccess eld Vane S	sful Split Spube Sample sful Thin Wa Shear Test,	oon Sample Atte	RC = Roller (  Attempt WOH = Weig  enetrometer WOR/C = Wo	w Stem Auger Cone ght of 140 lb. Height of Rods	lammer or Casing	q <sub>p</sub> = N-und Hamr N <sub>60</sub> =	Unconfir corrected ner Effic SPT N	Vane Undrained Shear Strength ( ned Compressive Strength (ksf) d = Raw Field SPT N-value iency Factor = Rig Specific Annual -uncorrected Corrected for Hamme	Calibration Value	WC = Water Content, perc LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis	cent
MV = C	Jnsuccess	stui Field Va	ne Shear Test A	Sample Information	ight of One Pe	erson	1N <sub>60</sub> =	= (паппп	ner Efficiency Factor/60%)*N-uncor	rected	C = Consolidation Test	
Depth (ft.)	Sample No. Pen/Rec. (in.) Sample Depth (ft.) Blows (/6 in.) Shear Strength (psf) or ROD (%)			Blows (/6 in.) Shear Strength (pst) or RQD (%)	N-uncorrected N60	Casing Blows	Elevation (ft.)	Graphic Log		scription and Rema		Laboratory Testing Results/ AASHTO and Unified Class.
90									Boring backfilled with bent cuttings and gravel to botto asphalt.			
95 -												
-												
100 -												
105 -												
-							-					
110 -												
· 115 <del>-</del>												
ļ							1					
,,,							1					
120 <b></b>	arks:		1				I	I	1			
								~~			_	

- 1. Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023.

  2. As-drilled boring locations and ground surface elevations were provided by HNTB.

  3. Water level measured during drilling at 20.55'bgs on 7/26/24 at 3:23, 20.55'bgs on 7/28/24 at 20:19. Water level measured at 24.9'bgs on 7/29/24 at 1:08 was made after the rock coring.

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.

Page 4 of 4

N	Aain	_		of Transporta	atio	n	Project:	MaineDO' Avenue	Γ I-9	95 Bridges Over Stillwater	Boring No.:	<u></u>	SA-10/
		_	Soil/Rock Exp US CUSTOM				Location	n: Bangor,	Maiı	ne	WIN:	0271	76.00
Drille	er:		Seaboard		Ele	vation	(ft.)	143.11			Auger ID/OD:		
Oper	ator:		Ryan H.		Dat	tum:		Maine E	ast Z	Zone	Sampler:	Standard Split	Spoon
Logg	ed By:		D. Burgess		Rig	Туре	:	Diedrich	D-5	50	Hammer Wt./Fall:	140lb/30in	
	Start/F			9); 7/24/24 (0:25)			lethod:	SSA, Dr	ive &	& Wash	Core Barrel:	NX	
	ng Loca			E: 1735092.78	_	sing II	_	4"(ID)			Water Level*:	Refer to remar	ks note 3
Ham Definit		iciency F	actor: 1.087	R = Rock C		mmer	Туре:	Automatic I		Hydraulic ☐ nolded Field Vane Undrained She	Rope & Cathead   ar Strength (psf) T	v = Pocket Torvane She	ar Strength (psf)
D = Sp MD = 1 U = Th MU = 1 V = Fie	olit Spoon Jnsuccess in Wall Tu Jnsuccess old Vane S	sful Split Spo ube Sample sful Thin Wa Shear Test,	oon Sample Atten II Tube Sample A PP = Pocket Pe ne Shear Test Att	SSA = Solid   SSA = Hollo   SSA = Hollo   RC = Roller   WOH = Wei   netrometer   WOR/C = W	Stem A ow Stem Cone ight of 1- Veight of	Auger Auger 40lb. Ha f Rods o	r Casing	S <sub>u(lab)</sub> = q <sub>p</sub> = Unco N-uncorre Hammer I N <sub>60</sub> = SP	Lab \ onfine cted : Efficie T N-u	Vane Undrained Shear Strength (p id Compressive Strength (ksf) = Raw Field SPT N-value ency Factor = Rig Specific Annual uncorrected Corrected for Hamme er Efficiency Factor/60%)*N-uncor	osf) V L Calibration Value P r Efficiency G	vC = Water Content, per L = Liquid Limit rL = Plastic Limit rl = Plasticity Index S = Grain Size Analysis E = Consolidation Test	
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (pst) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows	Elevation (ft.)	Glapiiic Log	Visual De:	scription and Remar	ks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/14	0.70 - 2.70	8-10-8-6	18	33	SSA	142.6	×	6" Asphalt Pavement		-0.5	
									$\boxtimes$	Brown, dry, medium dense, gravel, trace silt (FILL).	fine to coarse SAND,	some fine to coarse	
	2D					29				Grayish brown, dry, mediur non-plastic (FILL).	n dense, SANDY SIL	T, trace fine gravel,	
5 -	3D				37	67				Grayish brown, dry, hard, S plastic (FILL).	ANDY SILT, trace fi	ne gravel, non-	Fines = 55.2% A-4 (0), ML
	4D	24/10	6.70 - 8.70	.70 14-7-18-10 25		45				Grayish brown, dry, hard, S plastic (FILL).	ANDY SILT, trace fi	ne gravel, non-	71 4 (0), ME
	5D	24/6	8.70 - 10.70	4-3-4-4	7	13				Grayish brown, dry, stiff, S.	ANDY SILT, trace fin	ne gravel, slightly	
10 -		2.10			4.0		I V		$\otimes$	plastic (FILL).			
	6D	24/9	10.70 - 12.70	6-8-41-50/2"	49	89	64			Olive brown, wet, hard, SIL gravel, slightly plastic, fract Pp = 7.0 ksf			WC = 14.7% Fines = 62.3% A-4 (0), ML
							77 94						(-//
							77		$\boxtimes$				
15 -	7D	24/5	15.00 - 17.00	12-19-20-8	39	71	59 135			Olive brown, wet, very dense rock fragments (FILL).		D, fractured scalty	
							180		$\bowtie$				
									$\boxtimes$				
							91	⊗	$\boxtimes$				
20 -							86		$\boxtimes$				
	8D	24/14	20.00 - 22.00	17-4-7-6	11	20	65	122.6		Grey with orange, mottled,	wet, very stiff, CLAY	, trace sand, medium	WC = 24% Fines = 98.3%
							53			plasticity (CLAY). Pp = 6.0 ksf			LL = 33
							65			1 p = 0.0 KS1			PL = 17 PI = 16
							82						LI = -0.4
25							87						A-6 (15), CL
25 -	9D 24/24 25.00 - 27.00 4-3-6		4-3-6-6	9	16	65			Grey to brown, mottled, we $Pp = 4.5$ to $5.0$ ksf	t, very stiff, CLAY, tr	ace sand (CLAY)	Fines = 99.3% A-6 (37), CL	
							93			F 10 510 KSI			(5.7), CE
							88						
							97						
30							79						

#### Remarks:

- 1. Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023.
- 2. As-drilled boring locations and ground surface elevations were provided by HNTB.
- 3. Water level measured during drilling at 6.45'bgs on 7/23/24 at 3.28, 18.7'bgs on 7/24/24 at 3.22, 19.3'bgs on 7/24/24 at 20:09. Water level measured at 23.9'bgs on 7/24/24 at 23:51 was made after the rock coring.

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.

Page 1 of 4

N	<b>Taine</b>	e Dep	artment	of Transport	tatio	n	Project:	Maine	DOT I-	95 Bridges Over Stillwater	Boring No.:	BB-BS	SA-107
		_	Soil/Rock Exp				Locatio	Avenu n: Ban		iine	NA/INI.	0271	76.00
			US CUSTOM/	ARY UNITS							WIN:	02/1	76.00
Drille			Seaboard		_	levatior	n (ft.)	143.			Auger ID/OD:		
Oper			Ryan H.		_	atum:			ne East		Sampler:	Standard Split	Spoon
	ed By:	minh.	D. Burgess	2), 7/24/24 (0,25)	_	ig Type			lrich D-		Hammer Wt./Fall: Core Barrel:	1401b/30in	
	Start/Fi			9); 7/24/24 (0:25) E: 1735092.78	-	asing II	Method:	4"(II		& Wash	Water Level*:	NX Refer to remar	ks note 3
			actor: 1.087	, E. 1755072.70	_	ammer		Automa		Hydraulic □	Rope & Cathead □	Refer to Terriar	ks note 5
Definiti	ons:		401011 1.007	R = Rock	Core Sa	mple	.,,,,,,	S <sub>u</sub> =	Peak/Re	emolded Field Vane Undrained She	ear Strength (psf) T <sub>V</sub> =	Pocket Torvane She	
MD = l U = Th	in Wall Tu	ful Split Sp be Sample	oon Sample Atten	RC = Rolle	llow Ste er Cone	m Auger	ammer	q <sub>p</sub> = N-un	Únconfir corrected	Vane Undrained Shear Strength ( ned Compressive Strength (ksf) d = Raw Field SPT N-value tiency Factor = Rig Specific Annual	LL = PL =	<ul> <li>Water Content, per Liquid Limit</li> <li>Plastic Limit</li> <li>Plasticity Index</li> </ul>	cent
V = Fie	ld Vane S	hear Test,	PP = Pocket Pe ne Shear Test Att	netrometer WOR/C =	Weight	of Rods o	r Casing	N <sub>60</sub> :	= SPT N	-uncorrected Corrected for Hamme ner Efficiency Factor/60%)*N-uncor	er Efficiency G = 0	Grain Size Analysis Consolidation Test	
			;	Sample Information									Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (pst) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows	Elevation (ft.)	Graphic Log	Visual De	scription and Remarks		Testing Results/ AASHTO and Unified Class.
30	10D	24/17	30.00 - 32.00	3-3-3-3	6	11	70			Greyish brown, moist, med plasticity, interbedded silt s		nd, medium	WC = 28% Fines = 99.1%
							63			Pp < 2.0 ksf	, ,		LL = 28 PL = 16
							56			FV-1: 442psf / 118psf (55n			PI = 12
							390			FV-2: 813psf / 415psf (55n	nmx110mm Vane)		LI = 1 A-6 (11), CL
35							63	108.1				— — — —35.0·	
33	11D	24/0	35.00 - 37.00	12-11-15-10	26	47	104	106.1		No recovery - washed wate	r had fine to coarse grave		
							96			fragments.			
							87						
							78						
. 40							63						****
-0	12D	24/6	40.00 - 42.00	5-7-12-12	19	34	73			Brownish grey, wet, dense, plastic (SILTY SAND)	SILTY SAND, little coar	rse gravel, slightly	WC = 10% Fines = 42.1%
							76						LL = 17 PL = 13
							103						PI = 4 LI = -0.8
							111						A-4 (0), SC/
. ,, ]							81						SM
45	13D	24/4	45.00 - 47.00	9-9-6-9	15	27	105			Brownish grey, wet, mediugravel, slightly plastic (SIL	m dense, SILTY SAND, I TY SAND).	little coarse	
							103						
							111						
Ī							118						
_ [							90						
50	14D	24/8	50.00 - 52.00	6-8-15-8	23	42	81			Greyish brown, wet, dense, plasticity (CLAYEY SANI		gravel, low	WC = 10% Fines = 39.6%
Ī							89			F	- /-		LL = 20 PL = 12
İ							105						PI = 8
ı							113	89.6	NETU-			— — — <del></del> 53.5-	LI = -0.3 A-4 (0), SC
							89						
55	15D	24/14	55.00 - 57.00	26-41-51-50/4"	92	167	60			Olive with brown mottled, gravel, non-plastic (GLAC)		SAND, little	WC = 10.6% Fines = 38.3%
ľ							198		雅	Sand, and promote (SERIE)	·/·		A-4 (0), SM
Ī							171						
							212						
60							196						
Rema	arks.												

- 1. Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023.
- 2. As-drilled boring locations and ground surface elevations were provided by HNTB.
  3. Water level measured during drilling at 6.45'bgs on 7/23/24 at 3:28, 18.7'bgs on 7/24/24 at 3:22, 19.3'bgs on 7/24/24 at 20:09. Water level measured at 23.9'bgs on 7/24/24 at 23:51 was made after the rock coring.

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.

Page 2 of 4

N	<b>Aain</b>	e Depa	artment	of Transporta	tior	ı	Project:	Maine	DOT I-	95 Bridges Over Stillwater Boring No.:	BB-BS	SA-107
		_	Soil/Rock Exp	_			Location	Avenu		ine		
		<u>[</u>	JS CUSTOM	ARY UNITS			Location	. Dang	501, 1110	WIN:	0271	76.00
Drille	er:		Seaboard		Ele	vatior	n (ft.)	143.	11	Auger ID/OD:		
Oper	ator:		Ryan H.		Dat	um:		Mair	ne East	Zone Sampler:	Standard Split	Spoon
Logg	ed By:		D. Burgess		Rig	Туре	:	Died	rich D-	Hammer Wt./Fall:	140lb/30in	
Date	Start/F	inish:	7/22/24 (21:0	9); 7/24/24 (0:25)	Dril	ling N	lethod:	SSA	, Drive	& Wash Core Barrel:	NX	
Borir	ng Loca	tion:	N: 482578.95	, E: 1735092.78	Cas	ing II	D/OD:	4"(II	D)	Water Level*:	Refer to remark	ks note 3
Ham	mer Eff	iciency F	actor: 1.087		Han	nmer	Туре:	Automa	ıtic ⊠	Hydraulic ☐ Rope & Cathead ☐		
MD = I U = Th MU = I V = Fie	olit Spoon Jnsucces: in Wall Tu Jnsucces: eld Vane S	sful Split Spo ube Sample sful Thin Wa Shear Test,	oon Sample Atter II Tube Sample A PP = Pocket Pene Shear Test A	RC = Roller WOH = Weigenetrometer WOR/C = W	Stem A w Stem Cone ght of 14 eight of	uger Auger 10 lb. Hi Rods o	r Casing	S <sub>u(la</sub> q <sub>p</sub> = N-und Hamr N <sub>60</sub> =	b) = Lab Unconfir corrected ner Effic = SPT N	Vane Undrained Shear Strength (psf) WC = W ad Compressive Strength (ksf) LL = Liq = Raw Field SPT N-value PL = Pla ency Factor = Rig Specific Annual Calibration Value uncorrected Corrected for Hammer Efficiency G = Gra	cket Torvane Shea /ater Content, pero- juid Limit astic Limit sticity Index in Size Analysis asolidation Test	
IVIV = C	Jiisucces	siui Fielu Vai		Sample Information	igni oi c	nie rei	5011	1460	- (mamm	El Linicelloy 1 actor/00/70/ 14-unicorrected 0 = 001	Solidation Test	
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (pst) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.
60	16D	8/8	60.00 - 60.67	53-50/2"	R		OPEN			Olive with brown mottled, wet, very dense, SILT, some subround gravel, trace fine to medium sand, weathered		
										(GLACIAL TILL).	course graver	
l												
	R-1	45.6/7.2	63.40 - 67.20	RQD = 0%			R	79.7	THAT		63.4	
ŀ				_			NX			Bedrock encountered at 63.4 feet bgs Top of Bedrock Elev. 80.1 ft		
65							1101			R1 (63.4' - 67.2): Grey, very fine grained, thinly to very		
										METAWACKE [metasandstone], strong, highly weath and sand infilling from 64.2 ft to 67.2; discontinuities lo		
										steep dipping, close spacing, rough to very rough, open fractured [MEDIUM BEDDED FACIES, PENOBSCO		
	R-2	12/2.04	67.20 - 68.20	RQD = 0%						MEMBER, BANGOR FORMATION].	I KIVEK	
	R-3	48/45.6	68.20 - 72.20	RQD = 35%						Rock Mass Quality = very poor 16% recovery		
70										0% RQD		
70										Rock Core Rate (min:sec) 63.4 - 64.2 ft (1:09)		
										64.2 - 65.0 ft (1:29)		
	R-4	60/60	72.20 - 77.20	RQD = 39%						65.0 - 65.3 ft (0:41) 65.3 - 66.3 ft (1:51)		
										66.3 - 67.2 ft (1:13) R2 (67.2' - 68.2'): Grey, very fine grained, thinly to very	v thinly	
										bedded, METAWACKE [metasandstone] strong, highl	y weathered	
75										with clay and sand infilling; discontinuities low angle d spacing, very rough, open, highly fractured [MEDIUM		
							11/			FACIES, PENOBSCOT RIVER MEMBER, BANGOR	,	
							$\bot V$	65.9		FORMATION]. Rock Mass Quality = very poor		
							'	65.9		17% recovery 0% ROD		
										Rock Core Rate (min:sec)		
										67.2 - 68.2 ft (0:29) R3 (68.2' - 72.2): Grey, very fine grained, thinly to very	thinly bedded,	
80										METAWACKE [metasandstone] with calcite veins, strong, slightly weathered, occasional moderate to sever		
										weathering with sand infilling; discontinuities low angle	e to steep	
										dipping, very close to close spacing, rough to very roug open, average 3.5 fractures per foot [MEDIUM BEDDI		
										PENOBSCOT RIVER MEMBER, BANGOR FORMA		
										Rock Mass Quality = poor 95% recovery		
85										35% RQD		
										Rock Core Rate (min:sec) 68.2 - 69.2 ft (1:42)		
										69.2 - 70.2 ft (1:59) 70.2 - 71.2 ft (2:32)		
										71.2 - 72.2 ft (1:28)		
										R4 (72.2' - 77.2): Grey, very fine grained, thinly to very METAWACKE [metasandstone] with calcite veins, stro		
										strong, slightly weathered, occasional moderate to sever	re chemical	
90 Rem	arks:						1			weathering with sand and clay infilling; discontinuities	iow aligie to	
1 H	ammer I	Efficiency 1	factor provided	hv S.W. Cole and taken	from "	2023P	Δ00074 -	SW Col	_ CPT	Report" by GRL Engineers Inc., dated 11/10/2023.		

- 2. As-drilled boring locations and ground surface elevations were provided by HNTB.

  3. Water level measured during drilling at 6.45'bgs on 7/24/24 at 3:22, 19.3'bgs on 7/24/24 at 20:09. Water level measured at 23.9'bgs on 7/24/24 at 23:51 was made after the rock coring.

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.

Page 3 of 4

N	<b>Main</b>	e Dep	artment	of Transporta	ation	Project:			95 Bridges Over Stillwater	Boring No.:	BB-BS	SA-107
			Soil/Rock Exp US CUSTOM			Locatio	Avenu n: Bang		iine	WIN:	0271	76.00
			03 003 1010	IAINT OINTS						WIIN.	0271	70.00
Drille	er:		Seaboard		Elevatio	n (ft.)	143.	11		Auger ID/OD:		
Oper	ator:		Ryan H.		Datum:		Mair	e East	Zone	Sampler:	Standard Split	Spoon
Logg	ed By:		D. Burgess		Rig Type	<b>:</b>	Died	rich D-	50	Hammer Wt./Fall:	140lb/30in	
Date	Start/Fi	inish:	7/22/24 (21:0	9); 7/24/24 (0:25)	Drilling	Method:	SSA	Drive	& Wash	Core Barrel:	NX	
Borir	ng Loca	tion:	N: 482578.95	5, E: 1735092.78	Casing I	D/OD:	4"(II	))		Water Level*:	Refer to remark	s note 3
		iciency F	actor: 1.087		Hammer	Туре:	Automa		Hydraulic □	Rope & Cathead □		
MD = 1 U = Th MU = 1 V = Fie	olit Spoon Jnsuccess in Wall Tu Jnsuccess old Vane S	sful Split Sp be Sample sful Thin Wa Shear Test,	oon Sample Atte all Tube Sample A PP = Pocket Pe ne Shear Test A	mpt	Stem Auger w Stem Auger	or Casing	S <sub>u(la</sub> q <sub>p</sub> = N-und Hamr N <sub>60</sub> =	o) = Lab Jnconfir corrected ner Effic s SPT N	smolded Field Vane Undrained She Vane Undrained Shear Strength (hed Compressive Strength (ksf) d = Raw Field SPT N-value iency Factor = Rig Specific Annual -uncorrected Corrected for Hamme her Efficiency Factor/60%)*N-uncor	psf) WC LL = PL = I Calibration Value PI = er Efficiency G =	Pocket Torvane Shea = Water Content, pero - Liquid Limit = Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	
- 1				Sample Information			_					Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected N <sub>60</sub>	Casing Blows	Elevation (ft.)	Graphic Log		scription and Remarks		Testing Results/ AASHTO and Unified Class.
90 - 95 100 110 115 115 115 115 110 - 1									steep dipping, very close to open, average 3.2 fractures PENOBSCOT RIVER MEI Rock Mass Quality = poor 100% recovery 39% RQD Rock Core Rate (min:sec) 72.2 - 73.2 ft (2:07) 73.2 - 74.2 ft (1:35) 74.2 - 75.2 ft (1:33) 75.2 - 76.2 ft (1:30)  Bottom of Exploration Boring backfilled with bent cuttings and gravel to botto asphalt.	per foot [MEDIUM BEI MBER, BANGOR FORM n at 77.2 feet below grot onite chips in the rock co	DDED FACIES, MATION].  77.2-  Ind surface.  ore socket, drill	
120												
Rem	arks:					'	•		•			
1. H	ammer E	Efficiency	factor provided	d by S.W. Cole and taken	from "2023I	PA00074 -	SW Col	e - SPT	Report" by GRL Engineers In	nc., dated 11/10/2023.		

- 2. As-drilled boring locations and ground surface elevations were provided by HNTB.
  3. Water level measured during drilling at 6.45'bgs on 7/23/24 at 3:28, 18.7'bgs on 7/24/24 at 3:22, 19.3'bgs on 7/24/24 at 20:09. Water level measured at 23.9'bgs on 7/24/24 at 23:51 was made after the rock coring.

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.

Page 4 of 4

I	Main	e Depa	artment	of Transport	ation		Project			95 Bridges Over Stillwater Boring No.	: BB-B	SA-108
			Soil/Rock Exp				Locatio	Avenu n: Ban		ne		
		<u>l</u>	JS CUSTOMA	ARY UNITS					5.,	WIN:	0271	76.00
Drille	er:		Seaboard		Eleva	tion	(ft.)	129.	45	Auger ID/OD:		
	ator:		Kevin Hansco	m	Datur		(1.1.)		ne East		Standard Split	Spoon
	jed By:		Lina-Maria Pu		Rig T				lrich D-	•		Spoon.
	Start/Fi			55); 05/07/24 (23:30)			ethod:		, Cased		NX	
	ng Loca			E: 1735322.13	Casin	_			3.25 in	Water Level*:	4.8 ft on 05/07	/24 at 22:20
			actor: 1.066	2.1730322.13	Hamn			Automa		Hydraulic ☐ Rope & Cathead ☐		72 : 40 22:20
Definit	ions:		1.000		ore Sample		. , , , , .	S <sub>u</sub> =	Peak/Re	nolded Field Vane Undrained Shear Strength (psf)	T <sub>V</sub> = Pocket Torvane She	
	olit Spoon : Unsuccess		oon Sample Attern	SSA = Solid npt HSA = Holl				S <sub>u(la</sub>	<sub>lb)</sub> = Lab Unconfir	Vane Undrained Shear Strength (psf) ad Compressive Strength (ksf)	WC = Water Content, per LL = Liquid Limit	cent
		be Sample	II Tube Sample A	RC = Rolle	Cone		mmer	N-un	corrected	= Raw Field SPT N-value ency Factor = Rig Specific Annual Calibration Value	PL = Plastic Limit PI = Plasticity Index	
V = Fi	eld Vane S	Shear Test,	PP = Pocket Per	netrometer $WOR/C = V$	Veight of Ro	ds or	Casing	N <sub>60</sub>	= SPT N	uncorrected Corrected for Hammer Efficiency	G = Grain Size Analysis	
IVIV =	Jnsuccess	stul Fleid Var	ne Shear Test Att	Sample Information	eignt of One	Pers	son	N60	= (Hamm	er Efficiency Factor/60%)*N-uncorrected	C = Consolidation Test	1
		 			pe				1			Laboratory Testing
<u>.</u> :	9	; <u>.</u>	Depth	lows (/6 in.) hear trength ssf) r RQD (%)	ecte			_ ا	Log	Visual Description and Ren	narke	Results/
H)	De l	% e	<u> </u>	s (/(	corr		gr s	tio.	hic	visual Description and Itel	iidiks	AASHTO and
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample (ft.)	Blows (/6 in. Shear Strength (psf) or RQD (%)	N-uncorrected	N60	Casing Blows	Elevation (ft.)	Graphic Log			Unified Class
0	0)	ш.	<i>ω</i> ∈	шиизо						7.5" Asphalt Pavement		
							SSA	128.9	$\bowtie$	Brown to yellow, dry, very dense, fine to coars	0.6	MC = 8.0%
	1D	24/16	1.00 - 3.00	22-18-16-20	34	60			$\bowtie$	little fine gravel (FILL).	se salvo, some sin,	Fines = 28.5%
									$\bowtie$			A-2-4 (0), SM
	2D	24/9	3.00 - 5.00	15-14-24-16	38	68		126.3	$\infty \infty$	2DA To 2 in: Brown to yellow, dry, very dens some silt, little fine gravel (FILL).	e, fine to coarse SAND,	
								1	2.0		3.2	-
- 5 -	3D	24/12	5.00 - 7.00	12-12-12-50/2"	24	43		1		2DB Bottom 7 in: Grey, dry, very dense, GRA silt (GRAVEL)	VEL, some sand, little	
					24	43	<del>                                     </del>	-		Brown, wet, dense, GRAVEL, some sand, little		
	R1	60/59	6.70 - 11.70	RQD = 59%			V	122.8		angular GRAVEL with some sand and little si \spoon.	it in the tip of the split	
							NX			Bedrock encountered at 6.7 feet bgs	6.7	
										Top of Bedrock at Elev. 122.8 ft		
								1		R1 (6.7'-11.1'): Grey, very fine to fine grained [metasandstone] with frequent calcite veins, ve		
10 -								1		thinly laminated, slightly weathered; discontin	uities moderate to steep	
	D.O.	10/11	11.50 12.50	DOD 1001				ł		dipping, close to moderately close spacing, rou average 2.6 fractures per foot [MEDIUM BED		
	R2	12/11	11.70 - 12.70	RQD = 40%						PENOBSCOT RIVER MEMBER, BANGOR		
	R3	24/21	12.70 - 14.70	RQD = 19%						Rock Mass Quality = fair 98% Recovery		
										Rock Core Rate (min:sec)		
	R4	24/23	14.70 - 16.70	RQD = 37%						6.7-7.7 ft (2:33) 7.7-8.7 ft (2:46)		
- 15 -							\ /	1		8.7-9.7 ft (3:19)		
							HW			9.7-10.7 ft (2:51) 10.7-11.7 ft (3:17)		
							V	112.8		R2 (11.1'-12.7'): Grey, very fine to fine graine		
										[metasandstone] with some calcite veins, extre laminated, fresh to slightly weathered; discont		
										steep dipping, very close to close spacing, plan		
20										smooth, open. average 1.0 fractures per foot [N FACIES, PENOBSCOT RIVER MEMBER, E		
20 -										FORMATION].		
										Rock Mass Quality = poor 92% Recovery		
								-		Rock Core Rate (min:sec)		
								-		11.7-12.7 ft (3:07) R3 (12.7'-14.7'): Grey, very fine to fine graine		
										[metasandstone] with some calcite veins, extre		
. 25 -										laminated, fresh to slightly weathered; discont steep dipping, very close to close spacing, plan	nar to stepped, rough to	
- 25 -										smooth, open. average 2.5 fractures per foot [N	MEDIUM BEDDEED	
								1		FACIES, PENOBSCOT RIVER MEMBER, E FORMATION].	SANGUK	
								1		Rock Mass Quality = very poor		
								-		88% Recovery Rock Core Rate (min:sec)		
		1	1 1		ı		1	I	1			
								4		12.7-13.7 ft (2:04)		
30										12.7-13.7 ft (2:04) 13.7-14.7 ft (3:25) R4 (14.7'-16.7'): Grey, very fine to fine graine	d, METAWACKE	

- Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023.
   As-drilled boring locations and ground surface elevations were provided by MaineDOT.
   Water level reading taken on 5/7/24 at 22:20 was made before the start of rock coring with bottom of casing at 6.7 ft bgs.

\* 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.

Page 1 of 2

N	Main	e Dep	artment	of Transporta	ation		Project:			-95 Bridges Over Stillwater	Boring No.:	BB-B\$	SA-108
		_	Soil/Rock Exp	ploration Log			Locatio	Avenu		aine			
			US CUSTOM	IARY UNITS		- [	Locatio	II. Dang	301, 141	anic	WIN:	0271	76.00
			~		1		(6: )						
Drille			Seaboard		Elevat		(ft.)	129.4			Auger ID/OD:	G	
Oper			Kevin Hansco		Datum				e East		Sampler:	Standard Split	Spoon
	ed By:		Lina-Maria P		Rig Ty	_			rich D		Hammer Wt./Fall:	140 lbs/30 in	
	Start/Fi			:55); 05/07/24 (23:30)	Drilling	_				l Wash	Core Barrel:	NX	/04 . 22 52
	ng Loca			2, E: 1735322.13	Casing	_			3.25 in		Water Level*:	4.8 ft on 05/07	/24 at 22:20
Ham Definit		iciency l	Factor: 1.066	R = Rock C	Hamm ore Sample	ier i	ype:	Automa S., =		Hydraulic ☐ emolded Field Vane Undrained She	Rope & Cathead   ear Strength (psf) T <sub>v</sub>	= Pocket Torvane She	ar Strength (psf)
D = Sp	olit Spoon		ooon Sample Atte	SSA = Solid	Stem Auge ow Stem Aug			S <sub>u(lal</sub>	o) = Lab	Vane Undrained Shear Strength ( ned Compressive Strength (ksf)	psf) WC	C = Water Content, per = Liquid Limit	
U = Th	nin Wall Tu	ube Sample		RC = Roller	Cone			N-und	correcte	d = Raw Field SPT N-value	PL	= Plastic Limit	
V = Fie	eld Vane S	Shear Test,	all Tube Sample A PP = Pocket Po	enetrometer WOR/C = V	ight of 140 lb /eight of Roo	ds or	Casing	N <sub>60</sub> =	SPT N	ciency Factor = Rig Specific Annua -uncorrected Corrected for Hamme	er Efficiency G =	= Plasticity Index = Grain Size Analysis	
MV = I	Jnsuccess	sful Field V	ane Shear Test A	Sample Information	eight of One	Pers	son	N <sub>60</sub> =	: (Hamn	ner Efficiency Factor/60%)*N-unco	rrected C =	Consolidation Test	
		Ē	<u> </u>		ō								Laboratory
<u></u>	9	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected			_	Log	Viewal Da	agription and Damork	_	Testing Results/
ر (#	Je Z	Rec	] e	s (/6 r gth	SOUT		gc «	tion	hic I	Visual De	scription and Remark	5	AASHTO
Depth (ft.)	Sample No	en./	t.)	llows thea trren trren ssf)	ş	N60	Casing Blows	Elevation (ft.)	Graphic				and Unified Class.
30	S		S £	80050	Z   2	<u>z</u>	0 @	ш	9	[metasandstone] with some	calcite veins, extremely	strong, thinly	
										laminated, fresh to slightly	weathered; discontinuit	es low angle to	
										steep dipping, very close to smooth, open, average 2.0			
										FACIES, PENOBSCOT RI	VER MEMBER, BANG	GOR	
										FORMATION].  Rock Mass Quality = poor			
										96% Recovery			
35 -										Rock Core Rate (min:sec) 14.7-15.7 ft (2:30)			
								ł		15.7-16.7 ft (2:48)		16.7-	
											n at 16.7 feet below gro	und surface.	
										Boring caved in after rock of the cave-in was backfilled			
										patched with cold patch.			
40 -													
			+										
45 -													
13													
								1					
								1					
								1					
- 50 -													
								1					
								1					
- 55 -								1					
		-						-					
								-					
60													
Rem	arks:	1	ı	1									1
1. H	ammer E	Efficiency	factor provide	d by S.W. Cole and taken	from "202	23PA	A00074 -	SW Cole	e - SPT	Report" by GRL Engineers I	nc., dated 11/10/2023.		
2. A	s-drilled	boring lo	cations and gro	ound surface elevations w 4 at 22:20 was made befo	ere provide	ed by	y MaineΓ	OT.					

than those present at the time measurements were made.

\* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other

Page 2 of 2

N	<b>Aain</b>	e Depa	artment	atio	n	Project:	MaineD	OT I-	95 Bridges Over Stillwater	Boring No.:	BB-B	SA-109	
	Soil/Rock Exploration Log US CUSTOMARY UNITS						Locatio	Avenue n: Bango		ine			
		Ţ	JS CUSTOM	ARY UNITS				Dung	, 1, 1, 1,		WIN:	0271	76.00
Drille	.r.		Seaboard		FI	evation	(ft )	126.99	9		Auger ID/OD:	4.0 in/4.5 in	
Oper			Kevin Hansco	om	+-	tum:	(14.)	Maine		Zone	Sampler:	Standard Split	Spoon
	ed By:		Lina-Maria P		Ric	д Туре	:	Diedri			Hammer Wt./Fall:	140 lbs/30 in	~F***
	Start/Fi	nish:	05/07/24 (1:2	0); 05/07/24 (2:30)	+-		lethod:	Hollo	w Ster	n Augers	Core Barrel:	NX	
Bori	ng Loca	tion:	N: 482636.37	, E: 1735255.48	_	sing II					Water Level*:	Not Measured	
Ham	mer Effi	ciency F	actor: 1.066		Ha	mmer	Туре:	Automati	ic 🛛	Hydraulic □	Rope & Cathead		
Definit D = Sr	ions: olit Spoon	Sample		R = Rock C SSA = Solid						molded Field Vane Undrained She Vane Undrained Shear Strength (		= Pocket Torvane She = Water Content, per	
MD = 0	Jnsuccess	sful Split Spo be Sample	on Sample Atter		w Sten			$q_p = Ui$	nconfin	ed Compressive Strength (ksf)  I = Raw Field SPT N-value	LL	= Liquid Limit = Plastic Limit	
MU =	Jnsuccess	sful Thin Wa	II Tube Sample A	Attempt WOH = We	ight of 1			Hamme	er Effic	iency Factor = Rig Specific Annual uncorrected Corrected for Hamme	Calibration Value PI =	= Plasticity Index = Grain Size Analysis	
			ne Shear Test At	ttempt WO1P = W						er Efficiency Factor/60%)*N-uncor		Consolidation Test	
		·		Sample Information	77		Т	$\overline{}$					Laboratory
_	<u>o</u>	. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected				Log				Testing Results/
ر#) ر	Se N	Rec		s (/6 r gth	Sorre		g s	tion	nic L	Visual De	scription and Remarks	5	AASHTO
Depth (ft.)	Sample No.	Pen./Rec.	amp t.)	ilows ihea itren stf) r RC	Ÿ.	09 <sub>N</sub>	Casing Blows	Elevation (ft.)	Graphic I				and Unified Class.
0	0)	ш.	00 €	ш о о э о				ше	U	Asphalt Pavement			
	1D 24/12 1.00 - 3.00 19-16-17-18					SSA	126.3		Brown to yellow, dry, very	dense, fine to coarse SA	ND some gravel		
	1D	24/12	1.00 - 3.00	19-16-17-18	33	59			XX	little silt (FILL).	dense, fine to course st	ave, some graver,	
									XX	D 411 44	int annual CANTON	CDAVEL 1:41-	MC 570/
	2D	24/15.5	3.00 - 5.00	27-22-63-54	85	151			XX	Brown to yellow, dry to mo silt (FILL).	ist, very dense, SAND i	GRAVEL, little	MC = 5.7% Fines = 15.9%
_									XXX				A-1-b (0), GM
5 -	3D	24/13.5	5.00 - 7.00	19-23-16-17	39	69			XX	Brown to yellow, wet, very some silt, poorly-graded (F		AND, some gravel,	
									$\bowtie$	some sin, poorly graded (r	122).		
	4D	24/23	7.00 - 9.00	41-41-67-103	108	192			XXX	4DA Top 19 in: Brown, we		ne to coarse	MC = 11.7%
									XXX	SAND, some gravel, little s	ilt (FILL).	0.7	Fines = 20.3% A-1-b (0), SM
	5D	12/10	9.00 - 10.00	28-63	R		<del>  \                                   </del>	118.3		4DB Bottom 4 in: Brown, r	noist, hard, SILT, some	fine sand, little	
10 -							<del>  V</del>	117.0		gravel (SANDY SILT).  \Brown, moist, SILT, some :	fine sand, little gravel (S	SANDY SILT).	
	6D	1/1	10.00 - 10.08	50/1"	R			116.9		Grey, very dense, PROBAE		10.0-	-
										(WEATHERED BEDROC		10.1-	
											at 10.1 feet below gro	und surface.	
										Boring backfilled with drill patched with cold patch.	cuttings to bottom of pa	ivement and	
15 -													
13													
20 -													
25 -													
د2													
							+						
30 Rem	arks:	<u> </u>											I

- 1. Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023. 2. As-drilled boring locations and ground surface elevations were provided by MaineDOT.

\* 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.

Page 1 of 1

I	<b>Aain</b>	_		of Transporta	tion	Projec			-95 Bridges Over Stillwater	Boring No.:	BB-BS	<u>A-109A</u>
			Soil/Rock Exp JS CUSTOM			Locat	Aven ion: Bar		aine	WIN:	0271	76.00
Drille	er:		Seaboard		Elevatio	n (ft.)	127	.03		Auger ID/OD:	4 in/4.5in	
Oper	ator:		Kevin Hansco	m	Datum:		Ma	ine East	Zone	Sampler:	Standard Split	Spoon
Logg	ed By:		Lina-Maria Pu	ıa	Rig Type	<b>:</b>	Die	drich D	-50	Hammer Wt./Fall:	140 lbs/30 in	
Date	Start/Fi	nish:	05/07/24 (20:1	18); 05/07/24 (21:44)	Drilling	Method	: SS	A, Case	d Wash	Core Barrel:	NX	
Borii	ng Loca	tion:	N: 482637.93,	E: 1735257.73	Casing I			in/4.25	in	Water Level*:	2.8 ft on 05/07	/24 at 21:35
			actor: 1.066		Hammer	Type:	Auton	natic 🖂	Hydraulic □	Rope & Cathead □		
Definit D = Sp MD = U = Th MU = V = Fie	ons: lit Spoon : Jnsuccess in Wall Tu Jnsuccess eld Vane S	Sample sful Split Spo be Sample sful Thin Wa Shear Test,	oon Sample Atten II Tube Sample A PP = Pocket Pe ne Shear Test Att	RC = Roller   WOH = Weignetrometer   WOR/C = Weignetrometer   WO1P = Weignet	re Sample Stem Auger w Stem Auger	ammer or Casing	S <sub>u</sub> : S <sub>u(l</sub> q <sub>p</sub> = N-u Han N <sub>60</sub>	= Peak/R ab) = Lal = Unconfi ncorrecte nmer Effi = SPT N	emolded Field Vane Undrained Sho b Vane Undrained Shear Strength ( ned Compressive Strength (ksf) d = Raw Field SPT N-Value ciency Factor = Rig Specific Annua I-uncorrected Corrected for Hamme mer Efficiency Factor/60%)*N-unco	ear Strength (psf) $T_V = psf$ ) $WC : LL = PL = I$ Calibration Value $PI = proper PI = PI $	Pocket Torvane She = Water Content, per Liquid Limit Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (pst) or RQD (%)	N-uncorrected N <sub>60</sub>	Casing	Elevation (ft.)	Graphic Log	Visual De	scription and Remarks		Laboratory Testing Results/ AASHTO and Unified Class
0						SSA			Offset 2.6 feet from BB-BS	SA-109A towards the brid	ge	
- 10 -	R-1	66/61.5	4.00 - 8.80 8.80 - 14.30	RQD = 33%  RQD = 49%		N <sub>I</sub> X			Driller noted encountering augers. Bedrock encountered at 3.5 Top of Bedrock at Elev. 12 Advanced with augers to 4. R1 (4'-8.8'): Grey, very fine with frequent calcite veins, fresh to slightly weathered; spacing, planar to stepped, fractures per foot [MEDIU] RIVER MEMBER, BANG Rock Mass Quality = fair 90% Recovery Rock Core Rate (min:sec) 4.0-5.0 ft (1:19) 5.0-6.0 ft (2:24) 6.0-7.0 ft (2:56) 7.0-8.0 ft (3:20) 8.0-8.8 ft (4:28) R2 (8.8'-14.0'): Grey, very [metasandstone] with frequ to extremely strong, thinly to steep dipping, very close stepped, rough to smooth, c [MEDIUM BEDDEED FA BANGOR FORMATION]. Rock Mass Quality = poor 93% Recovery Rock Core Rate (min:sec)	probable bedrock at 3.5 for feet bgs 3.5 ft 0 feet bgs 2 grained, METAWACKE very to extremely strong, discontinuities steep diprough to smooth, open. as M BEDDEED FACIES, FOR FORMATION].  fine grained, METAWAC ent calcite veins (0.1 to 0 laminated, fresh; discontinuities of the moderately close space) open. average 1.8 fracture CIES, PENOBSCOT RIV	3.5:  [Elect bgs with the and a seed bgs with the angle bgs with the angl	
- 25 -	arks:								8.8-9.8 ft (2:10) 9.8-10.8 ft (3:07) 10.8-11.8 ft (2:59) 11.8-12.8 ft (3:30) 12.8-14.0 ft (4:19)   Bottom of Exploration Boring backfilled with bent to bottom of pavement and		re socket, gravel	

- 1. Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023.
- As-drilled boring locations and ground surface elevations were provided by MaineDOT.
   Water level reading taken on 5/7/24 at 21:35 was made after rock coring was completed with bottom of casing at 3.5 ft bgs.

\* 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.

Page 1 of 1

N	Main	_		of Transporta	ation		Projec				95 Bridges Over Stillwater	Boring No.:	BB-BS	SA-110
			Soil/Rock Exp JS CUSTOM/				Locati		venue Bang		ine	WIN:	0271	76.00
Drille	er:		Seaboard		Eleva	tion	(ft.)	1	127.5	i3		Auger ID/OD:		
Oper	ator:		Kevin Hansco	m	Datun	n:		1	Main	e East	Zone	Sampler:	Standard Split	Spoon
Logg	ged By:		Lina-Maria Pu	ıa	Rig Ty	ype:		I	Diedı	rich D-	50	Hammer Wt./Fall:	140 lbs/30 in	
Date	Start/F	inish:	05/08/24 (20:0	09); 05/08/24 (21:22)	Drillin	ng M	ethod:	: 5	SSA,	Cased	Wash	Core Barrel:	NX	
Bori	ng Loca	tion:	N: 482660.73,	E: 1735292.34	Casin	g ID	/OD:	3	3.0 in	ı/3.25 i	n	Water Level*:	3.1 ft on 05/08	/24 at 20:34
		iciency F	actor: 1.066		Hamn		уре:		tomat			Rope & Cathead □		
MD = U = Th MU = V = Fig	olit Spoon Unsuccess in Wall Tu Unsuccess eld Vane S	sful Split Spo ube Sample sful Thin Wa Shear Test,	oon Sample Atten II Tube Sample A PP = Pocket Pe ne Shear Test Att	RC = Roller ttempt WOH = We netrometer WOR/C = V	Stem Auge ow Stem Au Cone ight of 140lb Veight of Ro	er iger o. Han ods or	Casing	2 1 1 1	S <sub>u(lab</sub> Ap = U N-unc Hamm N60 =	) = Lab Inconfir orrected ner Effic SPT N	molded Field Vane Undrained She: Vane Undrained Shear Strength (p ed Compressive Strength (ksf) I = Raw Field SPT N-value iency Factor = Rig Specific Annual uncorrected Corrected for Hammer er Efficiency Factor/60%)*N-uncorr	esf) WC =	Pocket Torvane Shea Water Content, perd Liquid Limit Plastic Limit Plasticity Index Grain Size Analysis Consolidation Test	
				Sample Information				_	_					Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows	Elevation	(ft.)	Graphic Log	Visual Des	scription and Remarks		Testing Results/ AASHTO and Unified Class
0							SSA	12	26.9	·×××	Asphalt Pavement		-0.6-	
	1D 2D	24/11	1.00 - 3.00 3.00 - 5.00	16-21-16-20		66 30					Brown, dry, dense, Silty GR Grey, wet, medium dense, S		).	
- 5 -	3D R1	3/3 60/57	5.00 - 5.25 5.30 - 10.30	50/3" RQD = 52%	R		NX	12	22.2		Grey, wet, very dense, angu poorly-graded (FILL).	lar GRAVEL, some silt,	trace sand,	
- 10 -											Bedrock encountered at 5.3 Top of Bedrock at Elev. 122 R1 (5.3'-10.3'): Grey, very fi [metasandstone] with freque strong, thinly laminated, fre dipping, close to moderately polished, open. average 1.0	2.2 ft ine grained, METAWAC ent thick and thin calcite esh; discontinuities horized close spacing, stepped, s	veins, medium ontal to steep smooth to	
- 15 -	R2	60/60	10.30 - 15.30	RQD = 72%				- - - - - - - - - - - - - - - - - - -	12.2		FACIES, PENOBSCOT RI FORMATION]. Rock Mass Quality = fair 95% Recovery Rock Core Rate (min:sec) 5.3-6.3 ft (2:20) 6.3-7.3 ft (2:31) 7.3-8.3 ft (2:21) 8.3-9.3 ft (2:54)	VER MEMBER, BANG	OR	
- 20 -									12.2		9.3-10.3 ft (3:10) R2 (10.3'-15.3'): Grey, very [metasandstone] with freque extremely strong, thinly lam dipping, close to wide spaci- fractures per foot [MEDIUM RIVER MEMBER, BANGO Rock Mass Quality = fair	ent thick and thin calcite valinated, fresh; discontinuing, stepped, smooth, open M BEDDEED FACIES, I	veins, very to ties steep n. average 0.8	
20											100% Recovery Rock Core Rate (min:sec) 10.3-11.3 ft (3:15) 11.3-12.3 ft (2:42) 12.3-13.3 ft (3:30) 13.3-14.3 ft (2:58) 14.3-15.3 ft (3:40)		15.3-	
- 25 -								-			Bottom of Exploration Boring backfilled with bente to bottom of pavement and p		nd surface. re socket, gravel	
20								1						
Rem	arks:			l.										1

- 1. Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023.
- 2. As-drilled boring locations and ground surface elevations were provided by MaineDOT.

  3. Water level reading taken on 5/8/24 at 20:34 was made before the start of rock coring with bottom of casing at 5.3 ft bgs.

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.

Page 1 of 1

I	Main	e Depa	artment	of Transport	atio	n	Project			-95 Bridges Over Stillwater	Boring No.:	<u> BB-BS</u>	SA-111
		_	Soil/Rock Exp US CUSTOM.				Location	Aven on: Bar		nine	WIN:	0271	76.00
Drille	er:		Seaboard		Ele	evation	(ft.)	148	.27		Auger ID/OD:		
	ator:		Ryan H.		$\overline{}$	itum:	. ( )		ne East	Zone	Sampler:	Standard Split	Spoon
	ged By:		D. Burgess		Rie	g Type	:	Die	drich D-	-50	Hammer Wt./Fall:	140lb/30in	
	Start/F	inish:		); 7/25/24 (4:25)	_		lethod:	SSA	, Cased	l Wash	Core Barrel:	NX	
	ng Loca			E: 1735418.07	-	sing II		4" (			Water Level*:	14.75' 4:07 7/2	:5/24
			actor: 1.087	,	_	mmer		Autom		Hydraulic □	Rope & Cathead □		
Definit D = Sp MD = U = Th MU = V = Fie	ions: olit Spoon Unsucces: nin Wall Tu Unsucces: eld Vane S	Sample sful Split Spo ube Sample sful Thin Wa Shear Test,	oon Sample Atter II Tube Sample A PP = Pocket Pe ne Shear Test At	RC = Rolle  woh = We netrometer WOR/C = V	d Stem A low Sten or Cone eight of 1 Weight o	Auger n Auger 140lb. Ha of Rods o	r Casing	S <sub>u(I</sub> q <sub>p</sub> = N-ui Han N <sub>60</sub>	ab) = Lab Unconfir corrected mer Effic = SPT N	emolded Field Vane Undrained She Vane Undrained Shear Strength (Indeed Compressive Strength (ksf) d = Raw Field SPT N-value ciency Factor = Rig Specific Annual -uncorrected Corrected for Hamme ner Efficiency Factor/60%)*N-uncor	ear Strength (psf) T <sub>V</sub> psf) W( LL PL Calibration Value PI pr Efficiency G	= Pocket Torvane She C = Water Content, pen = Liquid Limit = Plastic Limit = Plasticity Index = Grain Size Analysis = Consolidation Test	cent
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	09 <sub>N</sub>	Casing Blows	Elevation (ft.)	Graphic Log	Visual De	scription and Remark	s	Laboratory Testing Results/ AASHTO and Unified Class
0	1D	24/9	0.60 - 2.60	9-11-9-11	20	36	SSA	147.3	××××	7" Ashpalt pavement		0.6	Fines = 13.5%
										Olive brown, moist, dense, GRAVEL, little silt (FILL).			A-1-a (0), GM SM
	2D	24/19	3.00 - 5.00	11-20-22-16	42	76			$\bowtie$	Olive with brown, moist, ha	ard, SILT, some round t	o subround gravel,	
. 5									$\bowtie$	little fine to medium sand, v (FILL).	weathered coarse gravel	, non-plastic	
3 -	3D	13.5/12	5.00 - 6.13	13-21-50/1.5"	R		165		$\bowtie$	Light olive brown, moist, h	ard, SANDY SILT, trac	e gravel, non-	Fines = 61.6% A-4 (0), ML
-							64	1		plastic (FILL).			A-4 (0), ML
	4D	24/12	7.00 - 9.00	12-26-20-13	46	83	47	1	$\bowtie$	Fractured rock fragments, trace organics (roots) (FILL).		ILL).	
	40	24/12	7.00 - 9.00	12-20-20-13	40	63		-	$\bowtie$				
							88	4	$\bowtie$	Olive with dark grey, moist	. hard, SANDY SILT, t	race gravel, non-	
- 10 -							47	138.8		plastic (FILL).	,,	-	was and
10	5D	24/22	10.00 - 12.00	7-9-11-15	20	36	59 73			Olive with orange mottled, plasticity (CLAY). Pp 3.0 to 3.5 tsf	moist, hard, CLAY, tra	— — — ——9.5- ce sand, medium	WC = 21% Fines = 99.4% LL = 32 PL = 17
							146						PI = 15
							210	134.8				13.5-	LI = 0.3 A-6 (15), CL
							119						
- 15 -	6D	24/13	15.00 - 17.00	19-24-16-45	40	72	71	1		Grayish brown, wet, very de	ense, SAND and GRAV	/EL, little silt, and	WC = 13.4%
	OD	24/13	13.00 - 17.00	19-24-10-43	40	12	+	-		fractured rock fragments (G	ELACIAL TILL).		Fines = $20.0\%$ A-1-b (0), SM
							95	-					GM
							208	130.5		D 1 1 1 17	0.6 .1	17.8	
							NX	_		Bedrock encountered at 17. Top of Bedrock at Elev. 130	0.5 ft		
- 20 -	R-1	60/40.8	19.00 - 24.00	RQD = 15%						R1 (19.0' - 24.0'): Grey, ver bedded, METAWACKE [rr strong to very strong, slight weathering; discontinuities close spacing, rough to very	y fine grained, thinly to netasandstone] with free ly weathered with signs low angle to steep dipp	quent calcite veins, s of chemical ing, close to very	
										average from 19 ft to 21.3 f PENOBSCOT RIVER MEI Rock Mass Quality = very p 68% recovery	t [MEDIUM BEDDED MBER, BANGOR FOR	FACIES,	
- 25 -	R-2	60/60	24.00 - 29.00	RQD = 60%				_		15% RQD Rock Core Rate (min:sec)			
- دے										19.0 - 20.0 ft (2:11)			
								1		20.0 - 21.0 ft (1:11) 21.0 - 22.0 ft (1:55)			
								1		22.0 - 23.0 ft (1:49)			
							+\/	1		23.0 - 24.0 ft (1:56) R2 (24.0' - 29.0'): Grey, ver	ry fine grained, thinly to	very thinly	
			-				$+$ $\vee$	119.3	-	bedded, METAWACKE [m	netasandstone] with free	quent calcite veins,	
30										very strong to strong, fresh;	discontinuities low ang	gle dipping, very	
Rem	arke.												

- 1. Hammer Efficiency factor provided by S.W. Cole and taken from "2023PA00074 SW Cole SPT Report" by GRL Engineers Inc., dated 11/10/2023.
- 2. As-drilled boring locations and ground surface elevations were provided by HNTB.

  3. Water level reading taken on 7/25/24 at 4:07 am was made after the rock coring.

\* 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.

Page 1 of 2

Maine Department of Transportatio  Soil/Rock Exploration Log			tion	Avenue				-95 Bridges Over Stillwater	Boring No.:	BB-BS	SA-111			
								Location			nine	\A/I\.	0271	76.00
			US CUSTOM	ARY UNITS								WIN:	0271	76.00
Drille	er:		Seaboard			Eleva	tion	(ft.)	148.2	27		Auger ID/OD:		
Oper	ator:		Ryan H.			Datur	n:		Main	e East	Zone	Sampler:	Standard Split	Spoon
Logg	ed By:		D. Burgess			Rig T	ype:		Died	rich D-	-50	Hammer Wt./Fall:	140lb/30in	
Date	Start/F	inish:	7/25/24 (0:44	4); 7/25/24 (4:25)				lethod:	SSA,	Cased	Wash	Core Barrel:	NX	
	ng Loca			3, E: 1735418.07		Casir	ng ID	/OD:	4" (I	D)		Water Level*:	14.75' 4:07 7/2	5/24
Ham Definit		iciency F	<b>actor:</b> 1.087		= Rock Cor	Hamr		Туре:	Automa		Hydraulic □ emolded Field Vane Undrained She	Rope & Cathead   Topic Strongth (psf) T	= Pocket Torvane She	or Strongth (nof)
D = Sp $MD = U$ $U = Th$ $MU = U$ $V = Fie$	olit Spoon Jnsuccess in Wall Tu Jnsuccess old Vane S	sful Split Sp ube Sample sful Thin Wa Shear Test,	ooon Sample Atte all Tube Sample A PP = Pocket Pe ane Shear Test A	empt H: Ri Attempt W enetrometer W	= ROCK COI SA = Solid S SA = Hollow C = Roller C OH = Weigh OR/C = Weigh	Stem Aug Stem Au Cone ht of 140 ight of Ro	er uger lb. Ha ods or	$ \begin{aligned} &S_{U(lab)}^{\text{U}} = \text{Lab Vane Undrained Shear Streng} \\ q_p &= \text{Unconfined Compressive Strength (ksf} \\ &N\text{-uncorrected} = \text{Raw Field SPT N-value} \\ &\text{Hammer Efficiency Factor} = \text{Rig Specific An} \\ &\text{r Casing} &N_{60} = \text{SPT N-uncorrected Corrected for Har} \end{aligned} $			Vane Undrained Shear Strength ( ned Compressive Strength (ksf) d = Raw Field SPT N-value ciency Factor = Rig Specific Annual -uncorrected Corrected for Hamme	psf) W LL PL Calibration Value Pl er Efficiency G	= Focket Towner She.  = Water Content, perc = Liquid Limit . = Plastic Limit = Plasticity Index = Grain Size Analysis = Consolidation Test	
-				Sample Inforn					ı					Laboratory
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf)	or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows	Elevation (ft.)	Graphic Log		scription and Remark		Testing Results/ AASHTO and Unified Class.
30											close spacing, rough, tight, BEDDED FACIES, PENO			
35 -											BEDDED FACIES, PENO. FORMATION]. Rock Mass Quality = fair 100% recovery 60% RQD Rock Core Rate (min:sec) 24.0 - 25.0 ft (3:39) 25.0 - 26.0 ft (5:35) 26.0 - 27.0 ft (5:39) 27.0 - 28.0 ft (5:10) 28.0 - 29.0 ft (3:51)  Bottom of Exploration Boring backfilled with bent to bottom of pavement and	n at 29.0 feet below gronite chips in the rock	29.0- pund surface. core socket, gravel	
· 45 <del>-</del>														
50 -														
55 -														
Rem	arks:	1						1	I		l			
		Efficiency	factor provide	d by S.W. Cole a	nd taken f	rom "20	23P	A00074 - :	SW Cole	e - SPT	Report" by GRL Engineers In	nc., dated 11/10/2023		
2. A	s-drilled	boring lo	cations and gro	ound surface elev 24 at 4:07 am wa	ations wer	e provid	led b	y HNTB.	201		1	, 2 - 2. 20, 2020.		

\* 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.

Page 2 of 2

**APPENDIX B** 

Rock Core Photographs

# APPENDIX B ROCK CORE PHOTOGRAPHS MAINEDOT I-95 BRIDGE OVER STILLWATER AVENUE BANGOR, MAINE MAINEDOT WIN #027176.00

Boring	Run	Depth Below Surface	Recovery		RQD	Rock Type	Box Row	Date
Borning	IXGII	Feet	Feet	%	Feet %	Kock Type	Box Row	Cored
	R1	31.5 - 32.4	0.8 / 0.9	89	0.0 / 0.9	) Metawacke	3	7/29/2024
BB-BSA-101	R2	32.4 - 32.9	0.5 / 0.5	100	0.0 / 0.5	) Metawacke	3	7/29/2024
DD-D3A-101	R3	32.9 - 36.5	3.6 / 3.6	100	0.5 / 3.6 1	4 Metawacke	3	7/29/2024
	R4	36.5 - 41.5	5.0 / 5.0	100	3.0 / 5.0 6	0 Metawacke	4	7/29/2024
	R1	63.8 - 64.8	0.3 / 1.0	30	0 / 0.3 0	) Metawacke	1	7/28/2024
BB-BSA-106	R2	64.8 - 69.1	4.3 / 4.3	100	2 / 4.3 4	7 Metawacke	1	7/28/2024
	R3	69.1 - 74.1	5.0 / 5.0	100	3.6 / 5.0 6	2 Metawacke	2	7/28/2024



Notes:

- 1. "Box row" indicates the section of the box where the core is contained: 1 = top, 4 = bottom.
- 2. Top of each core run is on the left and increases with depth to the right.

Prepared By: RJN Checked By: LMP

## APPENDIX B ROCK CORE PHOTOGRAPHS MAINEDOT I-95 BRIDGE OVER STILLWATER AVENUE BANGOR, MAINE MAINEDOT WIN #027176.00

Paring	Run	Depth Below Surface	Recovery	Recovery			Rock Type	Box Row	Date
Boring	Kuii	Feet	Feet	%	Feet	%	ROCK Type	DOX ROW	Cored
BB-BSA-102	R1	12.2 - 17.2	4.50 / 5.0	90	3.7 / 5.0	73	Metawacke	3	5/8/2024
DD-D3A-102	R2	17.2 - 22.2	4.9 / 5.0	98	4.9 / 5.0	98	Metawacke	4	5/8/2024
	R1	6.7 - 11.7	4.9 / 5.0	98	3.0 / 5.0	59	Metawacke	1	5/7/2024
BB-BSA-108	R2	11.7 - 12.7	0.9 / 1.0	92	0.4 / 1.0	40	Metawacke	2	5/7/2024
DD-DSA-100	R3	12.7 - 14.7	1.76 / 2.0	88	0.38 / 2.0	19	Metawacke	2	5/7/2024
	R4	14.7 - 16.7	1.92 / 2.0	96	0.74 / 2.0	37	Metawacke	2	5/7/2024



Notes:

1. "Box row" indicates the section of the box where the core is contained: 1 = top, 4 = bottom.

2. Top of each core run is on the left and increases with depth to the right.

Prepared By: RJN Checked By: LMP

## APPENDIX B ROCK CORE PHOTOGRAPHS MAINEDOT I-95 BRIDGE OVER STILLWATER AVENUE BANGOR, MAINE MAINEDOT WIN #027176.00

Boring	Run	<b>Depth Below Surface</b>	Recovery		RQD		Rock Type	Box Row	Date
Borning	Kuli	Feet	Feet	%	Feet	%	ROCK Type	BOX ROW	Cored
BB-BSA-103	R1	7.2 - 12.2	5.0 / 5.0	100	1.6 / 5.0	31	Metawacke	3	5/8/2024
DD-D3A-103	R2	12.2 - 17.2	5.0 / 5.0	100	3.6 / 5.0	71	Metawacke	4	5/8/2024
BB-BSA-110	R1	5.3 - 10.3	4.8 / 5.0	95	2.6 / 5.0	52	Metawacke	1	5/8/2024
DD-D3A-110	R2	10.3 - 15.3	5.0 / 5.0	100	3.6 / 5.0	72	Metawacke	2	5/8/2024



Notes:

- 1. "Box row" indicates the section of the box where the core is contained: 1 = top, 4 = bottom.
- 2. Top of each core run is on the left and increases with depth to the right.

Prepared By: RJN Checked By: LMP

# APPENDIX B ROCK CORE PHOTOGRAPHS MAINEDOT I-95 BRIDGE OVER STILLWATER AVENUE BANGOR, MAINE MAINEDOT WIN #027176.00

Boring	Dun	Depth Below Surface	Recovery		RQD		Rock Type	Box Row	Date
boring	Run	Feet	Feet	%	Feet	%	Rock Type	BOX ROW	Cored
	R1	21.0 - 26.0	4.8 / 5.0	95	2.8 / 5.0	56	Metawacke	1	7/30/2024
BB-BSA-104A	R2	26.0 - 28.8	2.1 / 2.8	75	1.7 / 2.8	61	Metawacke	2	7/30/2024
	R3	28.8 - 31.0	2.0 / 2.2	91	0.5 / 2.2	23	Metawacke	2	7/30/2024
BB-BSA-105	R1	26.4 - 31.4	5.0 / 5.0	100	1.5 / 5.0	30	Metawacke	3	7/31/2024
DD-D3A-103	R2	31.4 - 36.2	4.8 / 4.8	100	3.6 / 4.8	75	Metawacke	4	7/31/2024



Notes:

1. "Box row" indicates the section of the box where the core is contained: 1 = top, 4 = bottom.

2. Top of each core run is on the left and increases with depth to the right.

Prepared By: RJN Checked By: LMP

# APPENDIX B ROCK CORE PHOTOGRAPHS MAINEDOT I-95 BRIDGE OVER STILLWATER AVENUE BANGOR, MAINE MAINEDOT WIN #027176.00

Paring	Run	Depth Below Surface	Recovery	RQD	Pook Type	Box Row Date
Boring	Kuli	Feet	Feet %	Feet %	Rock Type	Cored
	R1	63.4 - 67.2	0.6 / 3.8 23	0.0 / 3.8 0	Metawacke	1 7/23/2024
BB-BSA-107	R2	67.2 - 68.2	0.2 / 1.0 17	0.0 / 1.0 0	Metawacke	1 7/24/2024
DD-D3A-101	R3	68.2 - 72.2	3.8 / 4.0 95	1.4 / 4.0 35	Metawacke	1 7/24/2024
	R4	72.2 - 77.2	5.0 / 5.0 10	2.0 / 5.0 39	Metawacke	2 7/24/2024
BB-BSA-111	R1	19.0 - 24.0	3.4 / 5.0 68	0.8 / 5.0 15	Metawacke	3 7/24/2024
DD-D3A-111	R2	24.0 - 29.0	5.0 / 5.0 10	3.0 / 5.0 60	Metawacke	4 7/24/2024



Notes:

1. "Box row" indicates the section of the box where the core is contained: 1 = top, 4 = bottom.

2. Top of each core run is on the left and increases with depth to the right.

Prepared By: RJN Checked By: LMP Reviewed By: JDL

## APPENDIX B ROCK CORE PHOTOGRAPHS MAINEDOT I-95 BRIDGE OVER STILLWATER AVENUE BANGOR, MAINE

#### **MAINEDOT WIN #027176.00**

Doring	Dun	<b>Depth Below Surface</b>	Recovery		RQD		Rock Type	Day Bay	Date
Boring	Run	Feet	Feet	%	Feet	%	коск гуре	Box Row	Cored
BB-BSA109A	R1	4.0 - 8.8	4.3 / 4.8	90	1.6 / 4.8	33	Metawacke	2	5/7/2024
DD-DOATU9A	R2	8.8 - 13.9	4.8 / 5.1	93	2.5 / 5.1	49	Metawacke	2,3	5/7/2024



Notes:

1. "Box row" indicates the section of the box where the core is contained: 1 = top, 4 = bottom.

2. Top of each core run is on the left and increases with depth to the right.

Prepared By: RJN Checked By: LMP

**APPENDIX C** 

**Laboratory Test Results** 



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No: GTX-319180

Boring ID: --- Sample Type: --- Tested By: ajl Sample ID: --- Test Date: 08/12/24 Checked By: ank

Depth: --- Test Id: 780399

### Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
BB-BSA-101	4D	7-9 ft	Moist, olive brown sandy silt with gravel	11.1
BB-BSA-101	6D	15-17 ft	15-17 ft Moist, olive brown silty sand with gravel	
BB-BSA-101	8D	25-27 ft	Moist, dark grayish brown silty gravel with sand	9.6
BB-BSA-104	4D	7-9 ft	Moist, dark grayish brown silty sand with gravel	6.5
BB-BSA-104	5D	10-12 ft	Moist, grayish brown sandy silt	11.1
BB-BSA-104	7D	20-22 ft	Moist, greenish gray silt with sand	16.4
BB-BSA-105	6D	15-17 ft	Moist, grayish brown sandy silt	20.5
BB-BSA-105	7D	20-22ft	Moist, olive brown silty sand with gravel	11.7
BB-BSA-106	14D	55-57 ft	Moist, gray silty sand	46.5
BB-BSA-107	6D	10.7-12.7 ft	Moist, olive brown silt with sand	14.7

Notes: Temperature of Drying: 110° Celsius



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No: GTX-319180

Boring ID: --- Sample Type: --- Tested By: ajl Sample ID: --- Test Date: 08/14/24 Checked By: ank

Depth: --- Test Id: 780423

### Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Boring ID Sample ID		Description	Moisture Content,%	
BB-BSA-107	15D	55-57 ft	Moist, grayish brown silty sand with gravel	10.6	
BB-BSA-111	6D	15-17 ft	Moist, grayish brown silty sand with gravel	13.4	

Notes: Temperature of Drying: 110° Celsius



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-101 Sample Type: Jar Tested By: ajl Test Date: 08/19/24 Checked By: ank Sample ID: 1D

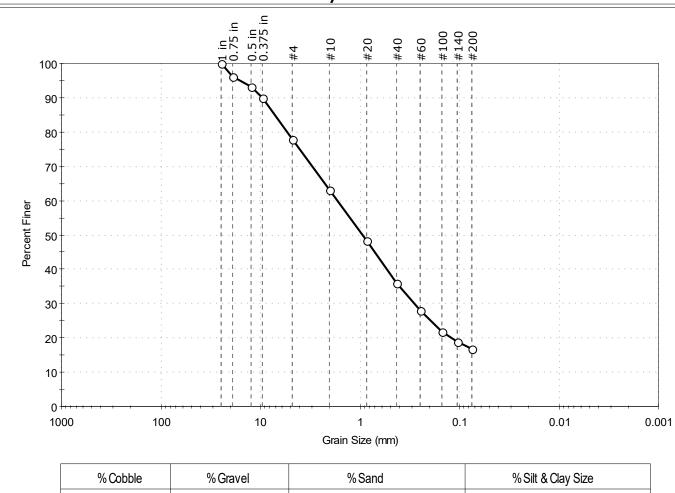
Depth: 0.7-2.7 ft Test Id: 780401

Test Comment:

Visual Description: Moist, light olive brown silty sand with gravel

Sample Comment:

### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
	22.0	61.2	16.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	96		
0.5 in	12.50	93		
0.375 in	9.50	90		
#4	4.75	78		
#10	2.00	63		
#20	0.85	48		
#40	0.42	36		
#60	0.25	28		
#100	0.15	22		
#140	0.11	19		
#200	0.075	17		

<u>Coefficients</u>			
D <sub>85</sub> = 7.1397 mm	$D_{30} = 0.2832 \text{ mm}$		
D <sub>60</sub> = 1.6778 mm	$D_{15} = N/A$		
D <sub>50</sub> = 0.9366 mm	$D_{10} = N/A$		
C <sub>II</sub> =N/A	$C_c = N/A$		

GTX-319180

**ASTM** N/A <u>AASHTO</u> Stone Fragments, Gravel and Sand (A-1-b(0))

Classification

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ANGULAR

Sand/Gravel Hardness: HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-101 Sample Type: Jar Tested By: ajl Sample ID: 4D Test Date: 08/19/24 Checked By: ank

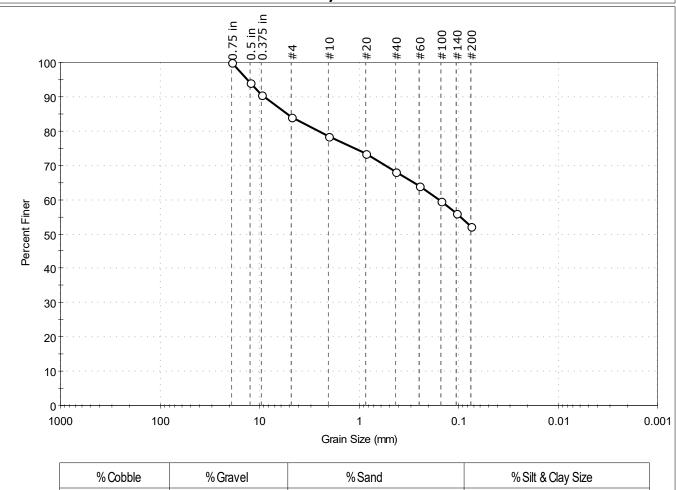
Depth: 7-9 ft Test Id: 780402

Test Comment: ---

Visual Description: Moist, olive brown sandy silt with gravel

Sample Comment: ---

### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
-	15.8	32.0	52.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	94		
0.375 in	9.50	91		
#4	4.75	84		
#10	2.00	79		
#20	0.85	73		
#40	0.42	68		
#60	0.25	64		
#100	0.15	59		
#140	0.11	56		
#200	0.075	52		

<u>Coefficients</u>				
D <sub>85</sub> = 5.2031 mm	$D_{30} = N/A$			
D <sub>60</sub> = 0.1591 mm	$D_{15} = N/A$			
D <sub>50</sub> = N/A	$D_{10} = N/A$			
C <sub>u</sub> =N/A	$C_C = N/A$			

GTX-319180

Classification
ASTM N/A

AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD



Project:

MaineDOT I-95 Bridge over Stillwater Location: Merrimack, NH

Boring ID: BB-BSA-101 Sample Type: Jar Tested By: ajl Test Date: Sample ID: 6D 08/16/24 Checked By: ank

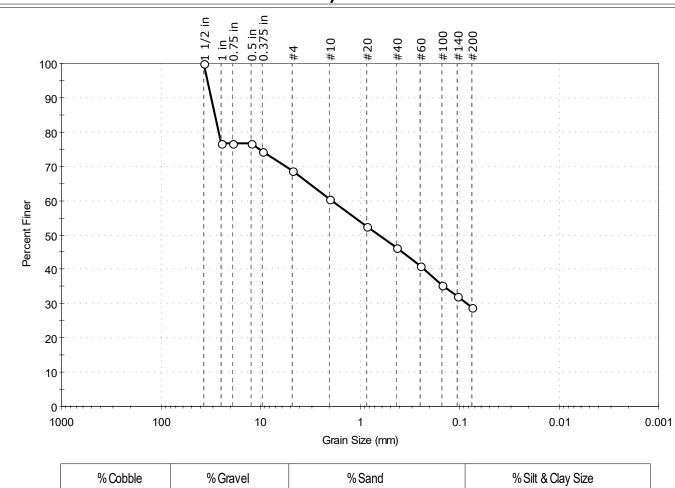
Depth: Test Id: 780403 15-17 ft

Test Comment:

Visual Description: Moist, olive brown silty sand with gravel

Sample Comment:

### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	31.2	40.0	28.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 1/2 in	37.50	100		
1 in	25.00	77		
0.75 in	19.00	77		
0.5 in	12.50	77		
0.375 in	9.50	74		
#4	4.75	69		
#10	2.00	61		
#20	0.85	53		
#40	0.42	46		
#60	0.25	41		
#100	0.15	35		
#140	0.11	32		
#200	0.075	29		

<u>coefficients</u>				
D <sub>85</sub> = 28.9113 mm	$D_{30} = 0.0851 \text{ mm}$			
D <sub>60</sub> = 1.8753 mm	$D_{15} = N/A$			
D <sub>50</sub> = 0.6407 mm	$D_{10} = N/A$			
C <sub>u</sub> =N/A	$C_C = N/A$			

Coefficients

Project No:

GTX-319180

Classification **ASTM** N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness: HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-101 Sample Type: Jar Tested By: ajl Test Date: Sample ID: 8D 08/19/24 Checked By: ank

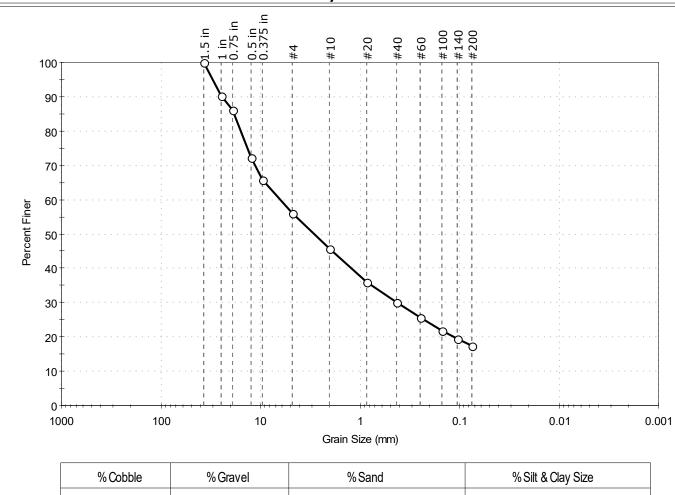
Depth: 25-27 ft Test Id: 780404

Test Comment:

Visual Description: Moist, dark grayish brown silty gravel with sand

Sample Comment:

### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	43.8	38.7	17.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	90		
0.75 in	19.00	86		
0.5 in	12.50	72		
0.375 in	9.50	66		
#4	4.75	56		
#10	2.00	46		
#20	0.85	36		
#40	0.42	30		
#60	0.25	26		
#100	0.15	22		
#140	0.11	19		
#200	0.075	18		

<u>Coet</u>	<u>ficients</u>
D <sub>85</sub> = 18.3264 mm	$D_{30} = 0.4200 \text{ mm}$
D <sub>60</sub> = 6.2648 mm	$D_{15} = N/A$
D <sub>50</sub> = 2.8644 mm	$D_{10} = N/A$
C <sub>II</sub> =N/A	$C_c = N/A$

GTX-319180

Classification **ASTM** N/A <u>AASHTO</u> Stone Fragments, Gravel and Sand (A-1-b(0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ANGULAR Sand/Gravel Hardness: HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No: GTX-319180 Boring ID: BB-BSA-104 Sample Type: Jar Tested By: ajl

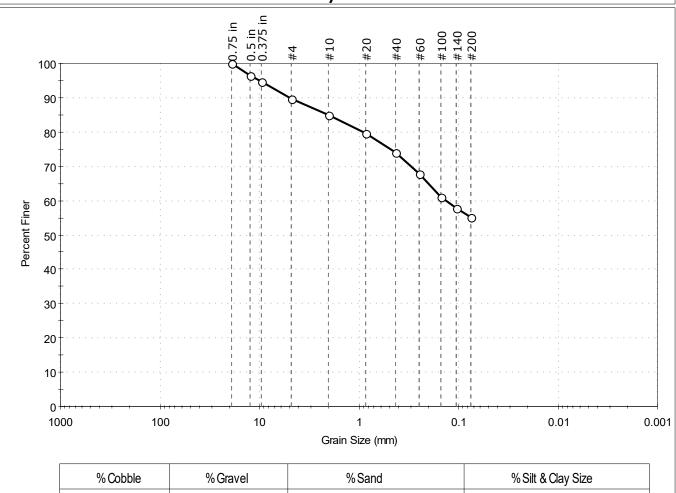
Test Date: Checked By: ank Sample ID: 2D 08/19/24

Depth: 2.8-4.8 ft Test Id: 780405 Test Comment:

Visual Description: Moist, dark grayish brown sandy silt

Sample Comment:

### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	10.4	34.3	55.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	96		
0.375 in	9.50	95		
#4	4.75	90		
#10	2.00	85		
#20	0.85	80		
#40	0.42	74		
#60	0.25	68		
#100	0.15	61		
#140	0.11	58		
#200	0.075	55		

<u>Coefficients</u>				
D <sub>85</sub> = 1.9913 mm	$D_{30} = N/A$			
D <sub>60</sub> = 0.1326 mm	$D_{15} = N/A$			
$D_{50} = N/A$	$D_{10} = N/A$			
$C_u = N/A$	$C_c = N/A$			

Classification **ASTM** N/A AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness: HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-104 Sample Type: Jar Tested By: ajl Test Date: Sample ID: 4D 08/19/24 Checked By: ank

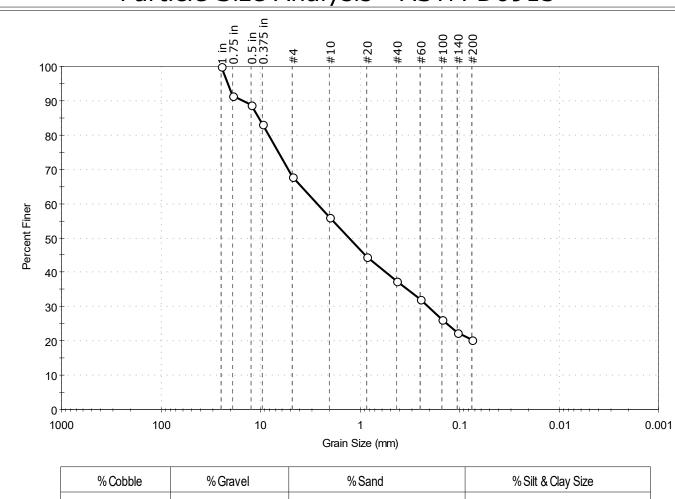
Depth: 7-9 ft Test Id: 780406

Test Comment:

Visual Description: Moist, dark grayish brown silty sand with gravel

Sample Comment:

### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	32.0	47.6	20.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	92		
0.5 in	12.50	89		
0.375 in	9.50	83		
#4	4.75	68		
#10	2.00	56		
#20	0.85	45		
#40	0.42	37		
#60	0.25	32		
#100	0.15	26		
#140	0.11	23		
#200	0.075	20		

<u>Coefficients</u>			
D <sub>85</sub> = 10.3977 mm	$D_{30} = 0.2076 \text{ mm}$		
D <sub>60</sub> = 2.6769 mm	$D_{15} = N/A$		
D <sub>50</sub> = 1.2727 mm	$D_{10} = N/A$		
C <sub>II</sub> =N/A	$C_c = N/A$		

GTX-319180

Classification **ASTM** N/A <u>AASHTO</u> Stone Fragments, Gravel and Sand (A-1-b(0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ANGULAR Sand/Gravel Hardness: HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

Boring ID: BB-BSA-104 Sample Type: Jar Tested By: ajl Test Date: Checked By: ank Sample ID: 5D 08/19/24

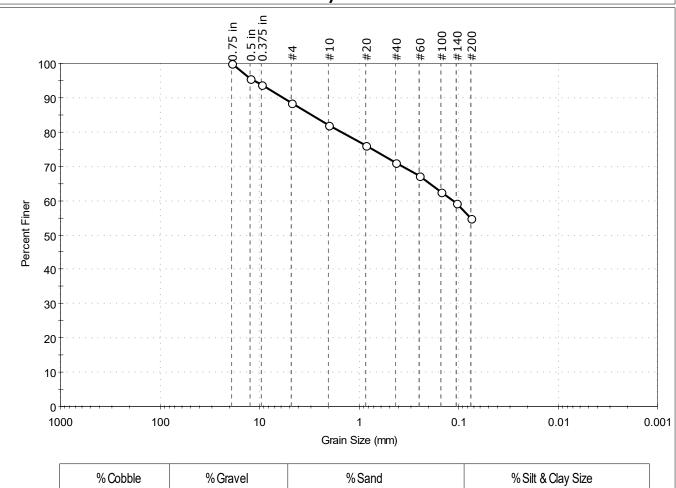
Depth: Test Id: 780407 10-12 ft

Test Comment:

Visual Description: Moist, grayish brown sandy silt

Sample Comment:

### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	11.6	33.5	54.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	96		
0.375 in	9.50	94		
#4	4.75	88		
#10	2.00	82		
#20	0.85	76		
#40	0.42	71		
#60	0.25	67		
#100	0.15	63		
#140	0.11	59		
#200	0.075	55		

<u>Coefficients</u>					
D <sub>85</sub> = 3.0173 mm	$D_{30} = N/A$				
D <sub>60</sub> = 0.1137 mm	$D_{15} = N/A$				
D <sub>50</sub> = N/A	$D_{10} = N/A$				
$C_u = N/A$	$C_c = N/A$				

Project No:

GTX-319180

Classification N/A

AASHTO Silty Soils (A-4 (0))

**ASTM** 

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness: HARD



WSP USA, Inc. Client:

Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

Boring ID: BB-BSA-104 Sample Type: Jar Tested By: ajl Sample ID: 6D Test Date: 08/15/24 Checked By: ank

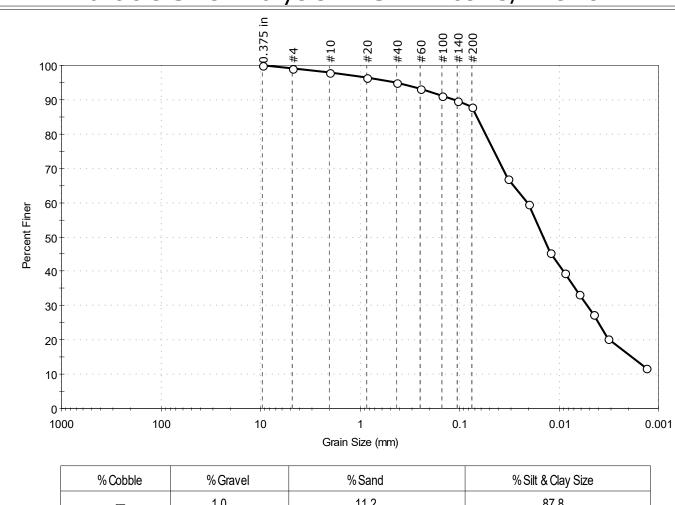
Depth: Test Id: 780410 15-17 ft

Test Comment:

Visual Description: Moist, grayish brown clay

Sample Comment:

### Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	1.0	11.2	87.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	98		
#20	0.85	96		
#40	0.42	95		
#60	0.25	93		
#100	0.15	91		
#140	0.11	90		
#200	0.075	88		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
	0.0324	67		
	0.0201	60		
	0.0122	45		
	0.0088	39		
	0.0063	33		
	0.0045	27		
	0.0032	20		
	0.0013	12		

<u>Coefficients</u>				
D <sub>85</sub> = 0.0670 mm	$D_{30} = 0.0052 \text{ mm}$			
D <sub>60</sub> = 0.0205 mm	$D_{15} = 0.0019 \text{ mm}$			
D <sub>50</sub> = 0.0143 mm	$D_{10} = N/A$			
$C_u = N/A$	$C_C = N/A$			

Project No:

GTX-319180

<u>Classification</u> Lean CLAY (CL) <u>ASTM</u> AASHTO Clayey Soils (A-6 (10))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness: ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period: 1 minute Est. Specific Gravity: 2.65 Separation of Sample: #200 Sieve



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

Boring ID: BB-BSA-104 Sample Type: Jar Tested By: ajl Test Date: 08/19/24 Checked By: ank Sample ID: 7D

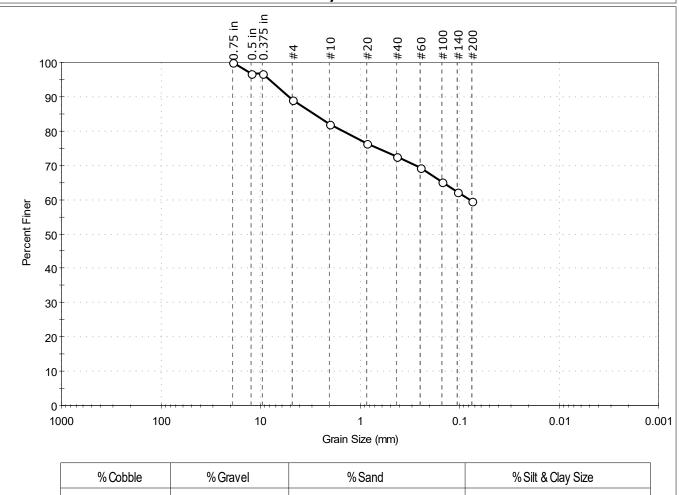
Depth: 20-22 ft Test Id: 780408

Test Comment:

Visual Description: Moist, greenish gray silt with sand

Sample Comment:

### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	10.8	29.7	59.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	97		
0.375 in	9.50	97		
#4	4.75	89		
#10	2.00	82		
#20	0.85	76		
#40	0.42	72		
#60	0.25	69		
#100	0.15	65		
#140	0.11	62		
#200	0.075	59		

<u>Coefficients</u>			
D <sub>85</sub> = 2.8830 mm	$D_{30} = N/A$		
D <sub>60</sub> = 0.0799 mm	$D_{15} = N/A$		
$D_{50} = N/A$	$D_{10} = N/A$		
$C_u = N/A$	$C_c = N/A$		

Project No:

GTX-319180

Classification **ASTM** N/A AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ANGULAR Sand/Gravel Hardness: HARD

printed 8/19/2024 1:30:57 PM



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

Boring ID: BB-BSA-105 Sample Type: Jar Tested By: ajl Sample ID: 1D Test Date: 08/19/24 Checked By: ank

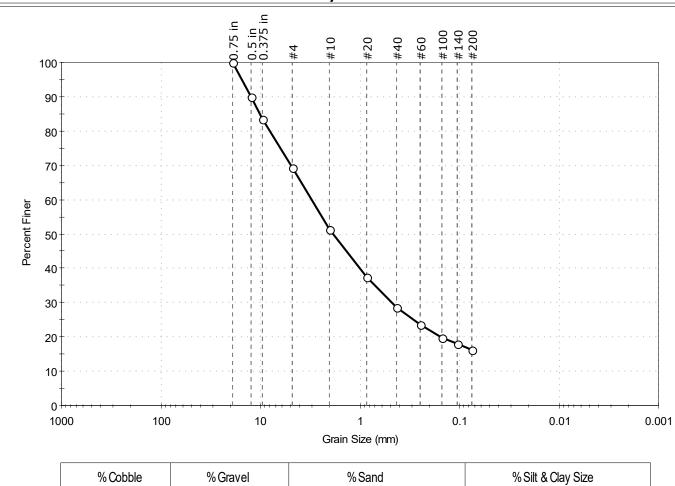
Depth: 0.9-2.9 ft Test Id: 780366

Test Comment: ---

Visual Description: Moist, olive brown silty sand with gravel

Sample Comment: ---

### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	30.7	53.1	16.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	90		
0.375 in	9.50	83		
#4	4.75	69		
#10	2.00	51		
#20	0.85	37		
#40	0.42	29		
#60	0.25	24		
#100	0.15	20		
#140	0.11	18		
#200	0.075	16		

<u>Coefficients</u>		
D <sub>85</sub> = 10.1411 mm	$D_{30} = 0.4740 \text{ mm}$	
D <sub>60</sub> = 3.0347 mm	$D_{15} = N/A$	
D <sub>50</sub> = 1.8370 mm	$D_{10} = N/A$	
$C_u = N/A$	$C_C = N/A$	

Project No:

GTX-319180

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Classification

Sample/Test Description
Sand/Gravel Particle Shape: ANGULAR

Sand/Gravel Hardness : HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-105 Sample Type: Jar Tested By: ajl Test Date: Checked By: ank Sample ID: 3D 08/19/24

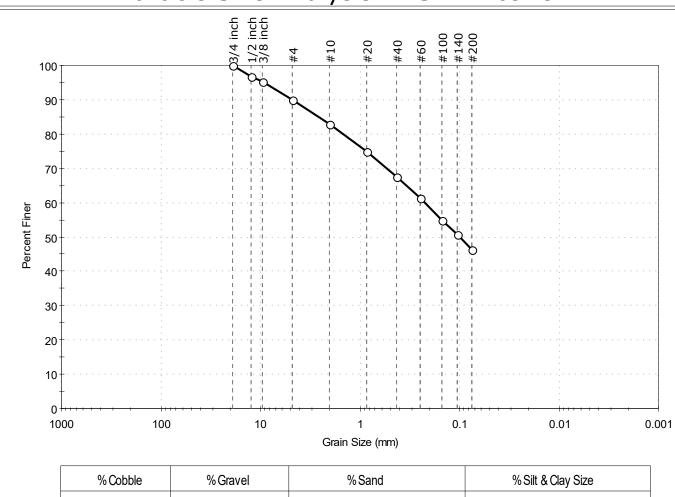
780367

Depth: 5-5.6 ft Test Id: Test Comment:

Visual Description: Moist, dark grayish brown silty sand

Sample Comment:

### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
	10.0	43.6	46.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3/4 inch	19.00	100		
1/2 inch	12.50	97		
3/8 inch	9.50	95		
#4	4.75	90		
#10	2.00	83		
#20	0.85	75		
#40	0.42	67		
#60	0.25	61		
#100	0.15	55		
#140	0.11	51		
#200	0.075	46		

<u>Coefficients</u>		
D <sub>85</sub> = 2.5683 mm	$D_{30} = N/A$	
D <sub>60</sub> = 0.2264 mm	$D_{15} = N/A$	
D <sub>50</sub> = 0.1002 mm	$D_{10} = N/A$	
$C_u = N/A$	$C_C = N/A$	

GTX-319180

Classification **ASTM** N/A AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness: HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No: GTX-319180 Boring ID: BB-BSA-105 Sample Type: Jar Tested By: ajl Test Date: Checked By: ank Sample ID: 6D 08/19/24

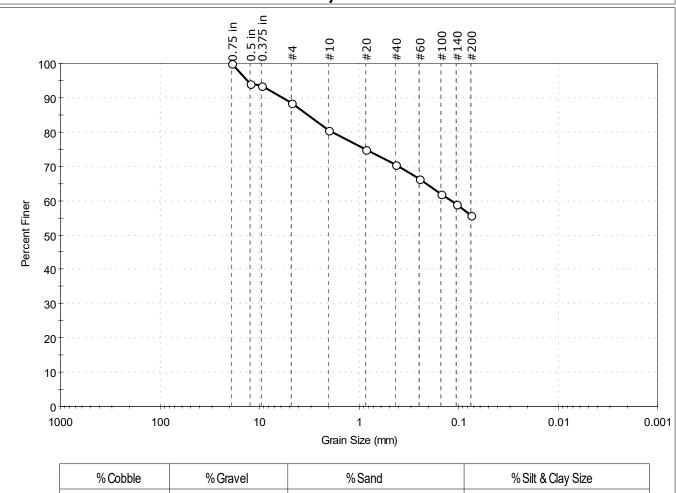
780368 Depth: 15-17 ft Test Id:

Test Comment:

Visual Description: Moist, grayish brown sandy silt

Sample Comment:

### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	11.4	32.9	55.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	94		
0.375 in	9.50	93		
#4	4.75	89		
#10	2.00	81		
#20	0.85	75		
#40	0.42	70		
#60	0.25	67		
#100	0.15	62		
#140	0.11	59		
#200	0.075	56		

<u>Coefficients</u>		
D <sub>85</sub> = 3.2112 mm	$D_{30} = N/A$	
D <sub>60</sub> = 0.1201 mm	$D_{15} = N/A$	
$D_{50} = N/A$	$D_{10} = N/A$	
$C_u = N/A$	$C_C = N/A$	

Classification **ASTM** N/A AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness: HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-105 Sample Type: Jar Tested By: ajl Test Date: Sample ID: 7D 08/19/24 Checked By: ank

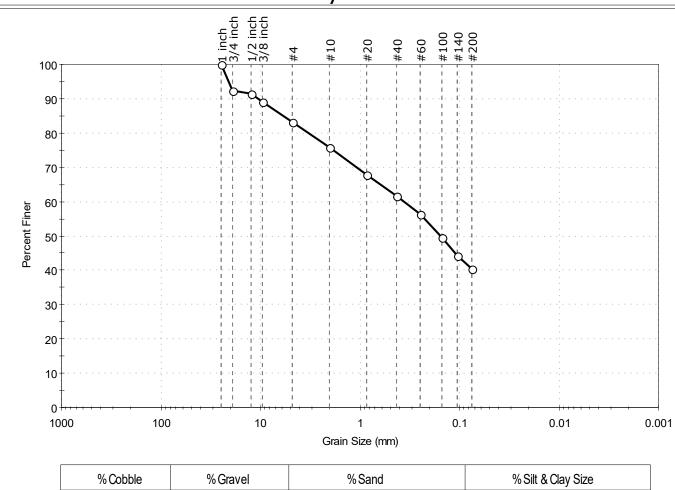
Depth: 20-22ft Test Id: 780369

Test Comment:

Visual Description: Moist, olive brown silty sand with gravel

Sample Comment:

#### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	16.9	42.8	40.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 inch	25.00	100		
3/4 inch	19.00	92		
1/2 inch	12.50	91		
3/8 inch	9.50	89		
#4	4.75	83		
#10	2.00	76		
#20	0.85	68		
#40	0.42	62		
#60	0.25	56		
#100	0.15	49		
#140	0.11	44		
#200	0.075	40		

<u>Coefficients</u>					
D <sub>85</sub> = 5.8920 mm	$D_{30} = N/A$				
D <sub>60</sub> = 0.3574 mm	$D_{15} = N/A$				
D <sub>50</sub> = 0.1564 mm	$D_{10} = N/A$				
$C_u = N/A$	$C_c = N/A$				

GTX-319180

Classification **ASTM** N/A AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ANGULAR Sand/Gravel Hardness: HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No: Boring ID: BB-BSA-106 Sample Type: Jar Tested By:

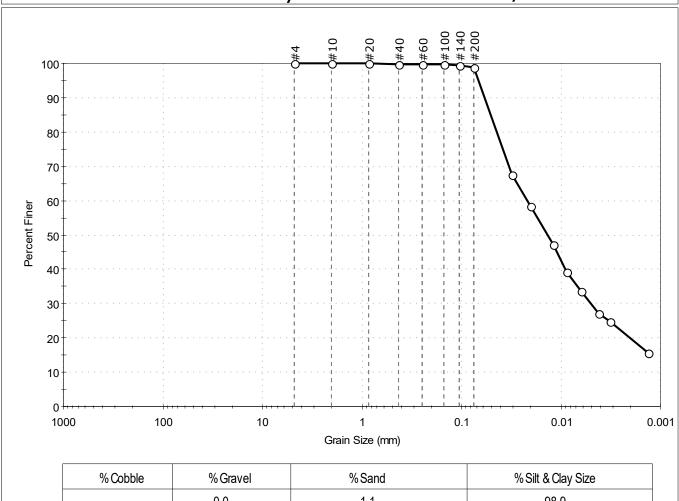
ajl Sample ID: 7D Test Date: 08/15/24 Checked By: ank

Depth: Test Id: 20-22 ft 780382 Test Comment:

Visual Description: Moist, light olive brown clay

Sample Comment:

#### Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
	0.0	1.1	98.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#140	0.11	99		
#200	0.075	99		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
	0.0314	67		
	0.0203	58		
	0.0121	47		
	0.0087	39		
	0.0062	34		
	0.0042	27		
	0.0032	25		
	0.0013	16		

<u>Coefficients</u>			
D <sub>85</sub> =0.0510 mm	$D_{30} = 0.0050 \text{ mm}$		
D <sub>60</sub> = 0.0219 mm	$D_{15} = N/A$		
D <sub>50</sub> = 0.0137 mm	$D_{10} = N/A$		
Cu =N/A	$C_c = N/A$		

GTX-319180

<u>Classification</u> Lean CLAY (CL) <u>ASTM</u> AASHTO Clayey Soils (A-6 (19))

#### <u>Sample/Test Description</u> Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness: ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period: 1 minute Est. Specific Gravity: 2.65

Separation of Sample: #200 Sieve

printed 8/19/2024 1:30:59 PM



Project:

MaineDOT I-95 Bridge over Stillwater Location: Merrimack, NH

Boring ID: BB-BSA-106 Sample Type: Jar Tested By: ajl Sample ID: 8D Test Date: 08/15/24 Checked By: ank

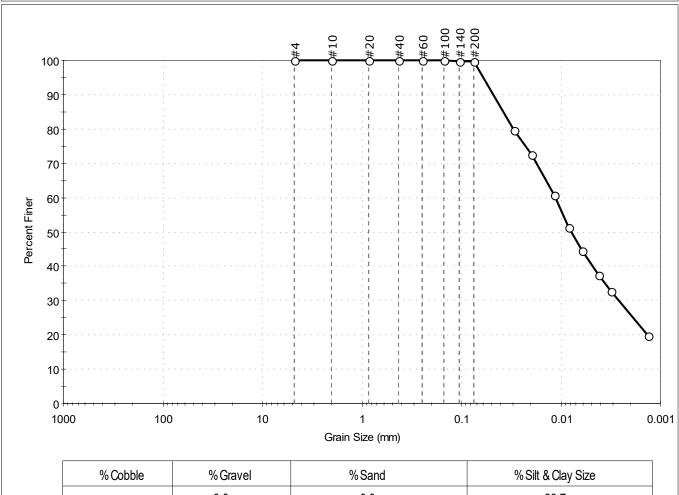
Depth: Test Id: 25-27 ft 780383

Test Comment:

Visual Description: Moist, grayish brown clay

Sample Comment:

#### Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
	0.0	0.3	99.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#140	0.11	100		
#200	0.075	100		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
	0.0298	80		
	0.0196	73		
	0.0117	61		
	0.0084	51		
	0.0061	44		
	0.0042	37		
	0.0031	33		
	0.0013	20		

<u>Coefficients</u>			
D <sub>85</sub> = 0.0383 mm	$D_{30} = 0.0026 \text{ mm}$		
D <sub>60</sub> = 0.0113 mm	$D_{15} = N/A$		
D <sub>50</sub> = 0.0079 mm	$D_{10} = N/A$		
C <sub>II</sub> =N/A	$C_C = N/A$		

GTX-319180

Project No:

<u>Classification</u> Lean CLAY (CL) <u>ASTM</u> AASHTO Clayey Soils (A-6 (18))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness: ---

Dispersion Device: Apparatus A - Mech Mixer

Dispersion Period: 1 minute Est. Specific Gravity: 2.65

Separation of Sample: #200 Sieve



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-106 Sample Type: Jar Tested By: ajl Sample ID: 9D Test Date: 08/15/24 Checked By: ank

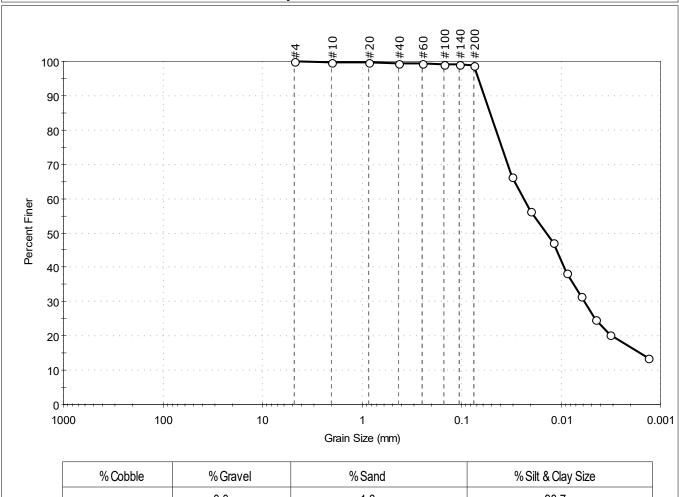
Depth: Test Id: 30-32 ft 780384

Test Comment:

Visual Description: Moist, gray clay

Sample Comment:

## Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
	0.0	1.3	98.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	99		
#100	0.15	99		
#140	0.11	99		
#200	0.075	99		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
	0.0308	66		
	0.0202	56		
	0.0121	47		
	0.0087	38		
	0.0063	32		
	0.0045	25		
	0.0032	20		
	0.0013	14		

<u>cocincients</u>				
D <sub>85</sub> = 0.0515 mm	$D_{30} = 0.0058 \text{ mm}$			
D <sub>60</sub> = 0.0236 mm	$D_{15} = 0.0016 \text{ mm}$			
D <sub>50</sub> = 0.0141 mm	$D_{10} = N/A$			
$C_u = N/A$	$C_c = N/A$			

Coefficients

GTX-319180

<u>Classification</u> Lean CLAY (CL) <u>ASTM</u> AASHTO Clayey Soils (A-6 (9))

#### <u>Sample/Test Description</u> Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness: ---

Dispersion Device : Apparatus A - Mech Mixer



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

Boring ID: BB-BSA-106 Sample Type: Jar Tested By: ajl Sample ID: 11D Test Date: 08/15/24 Checked By: ank

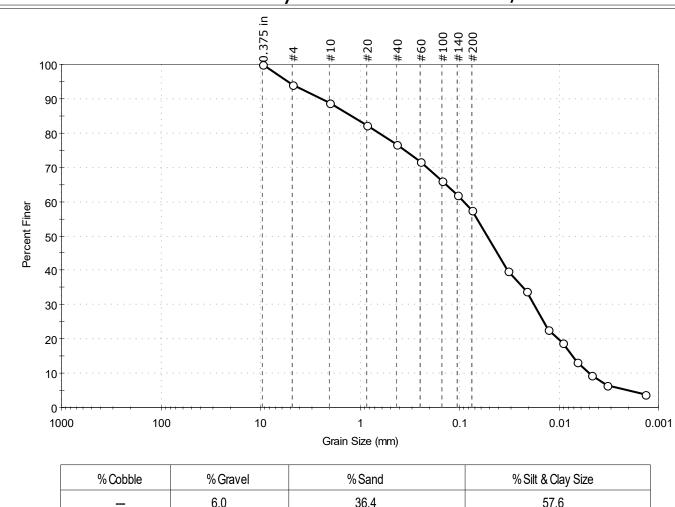
40-42 ft Depth: Test Id: 780385

Test Comment:

Visual Description: Moist, gray sandy silt

Sample Comment:

# Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	6.0	36.4	57.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	94		
#10	2.00	89		
#20	0.85	82		
#40	0.42	77		
#60	0.25	72		
#100	0.15	66		
#140	0.11	62		
#200	0.075	58		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
	0.0327	40		
	0.0212	34		
	0.0128	23		
	0.0091	19		
	0.0065	13		
	0.0047	9		
	0.0033	7		
	0.0014	4		

Coeffic	<u>cients</u>
D <sub>85</sub> = 1.2010 mm	$D_{30} = 0.0177 \text{ mm}$
D <sub>60</sub> = 0.0912 mm	D <sub>15</sub> =0.0073 mm
D <sub>50</sub> = 0.0526 mm	$D_{10} = 0.0049 \text{ mm}$
C <sub>u</sub> =18.612	$C_c = 0.701$

Project No:

GTX-319180

<u>Classification</u> Sandy SILT (ML) <u>ASTM</u>

AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness: HARD

Dispersion Device: Apparatus A - Mech Mixer



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-106 Sample Type: Jar Tested By: ajl Sample ID: 14D Test Date: 08/16/24 Checked By: ank

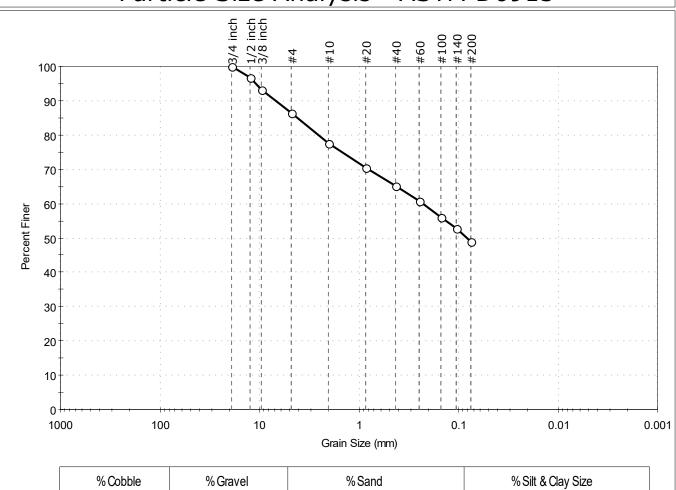
780380

Depth: 55-57 ft Test Id: Test Comment: ---

Visual Description: Moist, gray silty sand

Sample Comment: ---

# Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	13.6	37.5	48.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3/4 inch	19.00	100		
1/2 inch	12.50	97		
3/8 inch	9.50	93		
#4	4.75	86		
#10	2.00	77		
#20	0.85	70		
#40	0.42	65		
#60	0.25	61		
#100	0.15	56		
#140	0.11	53		
#200	0.075	49		

<u>Coeffi</u>	<u>cients</u>
D <sub>85</sub> =4.1627 mm	$D_{30} = N/A$
D <sub>60</sub> = 0.2272 mm	$D_{15} = N/A$
D <sub>50</sub> = 0.0828 mm	$D_{10} = N/A$
C <sub>u</sub> =N/A	$C_C = N/A$

Classification

GTX-319180

ASTM N/A

AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ANGULAR

Sand/Gravel Hardness : HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

Boring ID: BB-BSA-107 Sample Type: Jar Tested By: ajl Sample ID: 3D Test Date: 08/19/24 Checked By: ank

Project No:

GTX-319180

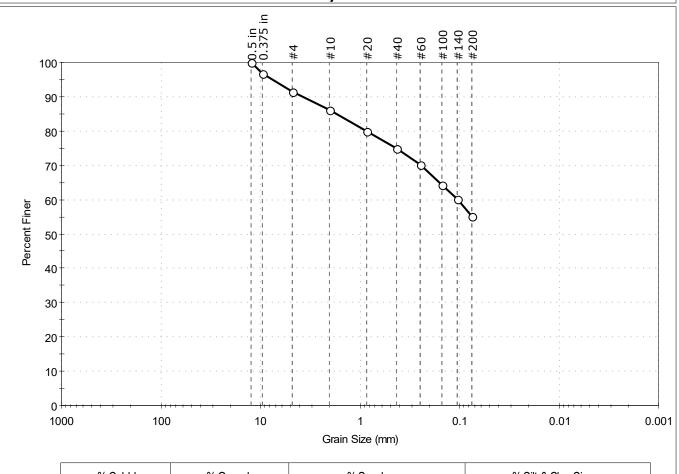
Depth: 4.7-6.7 ft Test Id: 780391

Test Comment: ---

Visual Description: Moist, grayish brown sandy silt

Sample Comment: ---

#### Particle Size Analysis - ASTM D6913



	% Cobbl	е	% Gravel		% Sand		% Silt 8	& Clay Size	
	_		8.5		36.3		Ę	55.2	
Sieve Name	Sieve Size, mm	<b>Percent Finer</b>	Spec. Percent	Complies			<u>Coeffic</u>	<u>cients</u>	
						$D_{85} = 1.69$	52 mm	$D_{30} = N/A$	
0.5 in	12.50	100				$D_{85} = 1.69$ $D_{60} = 0.10$		$D_{30} = N/A$ $D_{15} = N/A$	

0.375 in  $D_{50} = N/A$ 4.75 92 #10 86 2.00  $C_u = N/A$ #20 0.85 80 #40 75 0.42 <u>ASTM</u> #60 0.25 70 64 #100 0.15

60

55

AASHTO Silty Soils (A-4 (0))

N/A

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ANGULAR

 $D_{10} = N/A$ 

 $C_c = N/A$ 

**Classification** 

Sand/Gravel Hardness: HARD

printed 8/19/2024 1:31:02 PM

0.11

0.075

#140

#200



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

Boring ID: BB-BSA-107 Sample Type: Jar Tested By: ajl Test Date: Checked By: ank Sample ID: 6D 08/19/24

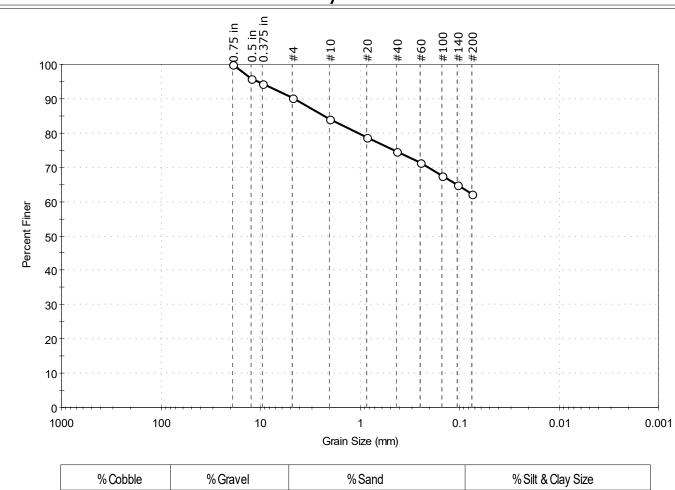
Depth: Test Id: 10.7-12.7 ft 780392

Test Comment:

Visual Description: Moist, olive brown silt with sand

Sample Comment:

#### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	9.7	28.0	62.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	96		
0.375 in	9.50	94		
#4	4.75	90		
#10	2.00	84		
#20	0.85	79		
#40	0.42	75		
#60	0.25	71		
#100	0.15	68		
#140	0.11	65		
#200	0.075	62		

<u>Coefficients</u>		
D <sub>85</sub> = 2.2895 mm	$D_{30} = N/A$	
$D_{60} = N/A$	$D_{15} = N/A$	
$D_{50} = N/A$	$D_{10} = N/A$	
$C_u = N/A$	$C_c = N/A$	

Project No:

GTX-319180

Classification **ASTM** N/A

AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness: HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

Boring ID: BB-BSA-107 Sample Type: Jar Tested By: ajl Sample ID: 8D Test Date: 08/15/24 Checked By: ank

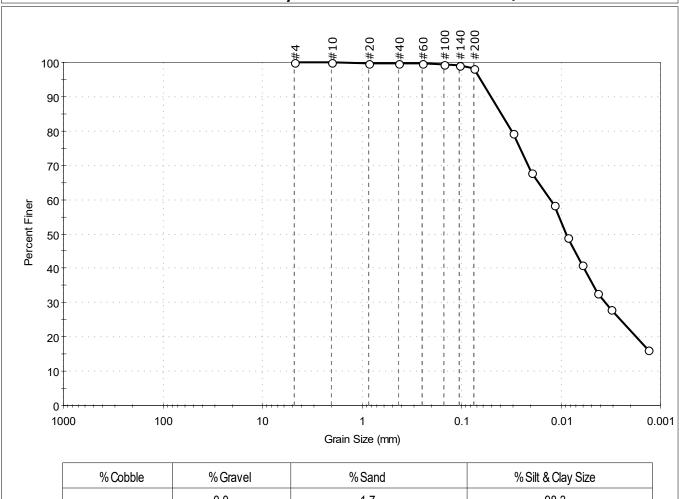
Depth: Test Id: 780395 20-22 ft

Test Comment:

Visual Description: Moist, grayish brown clay

Sample Comment:

#### Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
	0.0	1.7	98.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
	4.75	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	99		
#140	0.11	99		
#200	0.075	98		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
	0.0303	79		
	0.0196	68		
	0.0117	58		
	0.0085	49		
	0.0061	41		
	0.0043	33		
	0.0032	28		
	0.0013	16		

	CHICICHES
D <sub>85</sub> = 0.0395 mm	$D_{30} = 0.0036 \text{ mm}$
D <sub>60</sub> = 0.0127 mm	$D_{15} = N/A$
D <sub>50</sub> = 0.0088 mm	$D_{10} = N/A$
$C_u = N/A$	C <sub>c</sub> =N/A

Coefficients

GTX-319180

Project No:

<u>Classification</u> Lean CLAY (CL) <u>ASTM</u> AASHTO Clayey Soils (A-6 (15))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness: ---

Dispersion Device : Apparatus A - Mech Mixer



Project: MaineDOT I-95 Bridge over Stillwater

Location: Project No: Merrimack, NH Boring ID: BB-BSA-107 Sample Type: Jar Tested By: ajl

Test Id:

780396

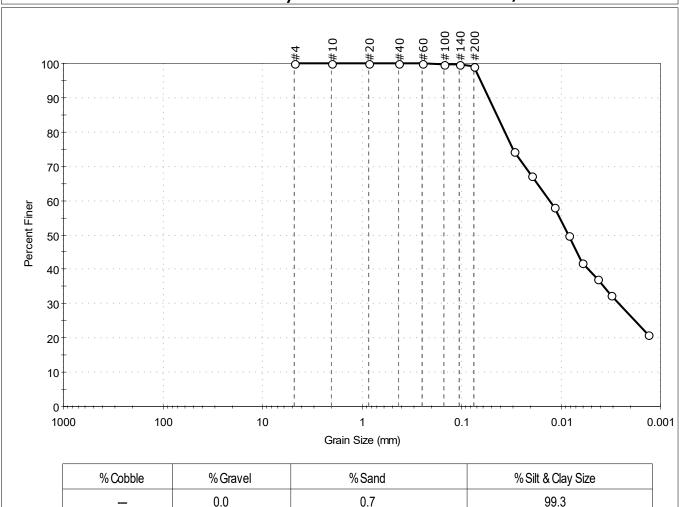
Sample ID: 9D Test Date: 08/15/24 Checked By: ank

Depth: 25-27 ft Test Comment:

Visual Description: Moist, olive brown clay

Sample Comment:

#### Particle Size Analysis - ASTM D6913/D7928



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#140	0.11	100		
#200	0.075	99		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
	0.0295	74		
	0.0198	67		
	0.0117	58		
	0.0083	50		
	0.0061	42		
	0.0043	37		
	0.0031	33		
	0.0013	21		

	<u>Coefficients</u>			
D <sub>85</sub> = 0.0440 mm		$D_{30} = 0.0026 \text{ mm}$		
	D <sub>60</sub> = 0.0131 mm	$D_{15} = N/A$		
	D <sub>50</sub> = 0.0084 mm	$D_{10} = N/A$		
	C <sub>u</sub> =N/A	$C_c = N/A$		

GTX-319180

<u>Classification</u> Lean CLAY (CL) <u>ASTM</u> AASHTO Clayey Soils (A-6 (37))

#### <u>Sample/Test Description</u> Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness: ---

Dispersion Device: Apparatus A - Mech Mixer



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

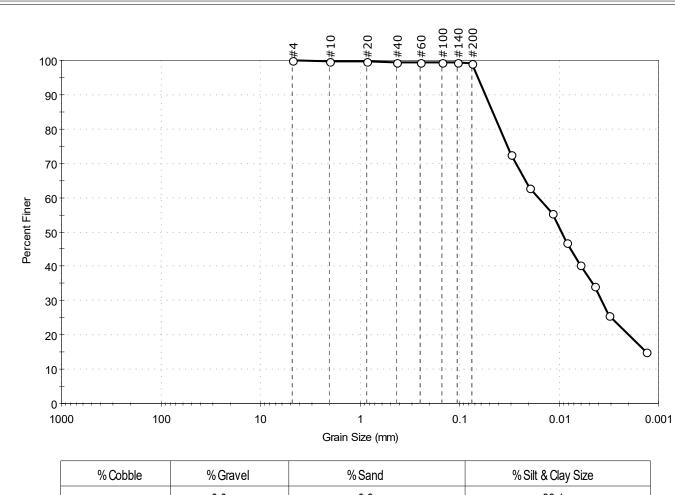
Boring ID: BB-BSA-107 Sample Type: Jar Tested By: ajl Sample ID: 10D Test Date: 08/15/24 Checked By: ank Test Id:

Depth: 30-32 ft Test Comment:

Visual Description: Moist, grayish brown clay

Sample Comment:

#### Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	0.0	0.9	99.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	99		
#100	0.15	99		
#140	0.11	99		
#200	0.075	99		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
	0.0305	73		
	0.0196	63		
	0.0117	55		
	0.0085	47		
	0.0061	41		
	0.0044	34		
	0.0032	26		
	0.0013	15		

<u>Coefficients</u>				
D <sub>85</sub> =0.0465 mm	$D_{30} = 0.0037 \text{ mm}$			
D <sub>60</sub> = 0.0160 mm	$D_{15} = 0.0013 \text{ mm}$			
D <sub>50</sub> = 0.0095 mm	$D_{10} = N/A$			
Cu =N/A	$C_c = N/A$			

GTX-319180

Project No:

780397

<u>Classification</u> Lean CLAY (CL) <u>ASTM</u> AASHTO Clayey Soils (A-6 (11))

#### <u>Sample/Test Description</u> Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness: ---

Dispersion Device: Apparatus A - Mech Mixer



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

Boring ID: BB-BSA-107 Sample Type: Jar Tested By: ajl Sample ID: 12D Test Date: 08/15/24 Checked By: ank

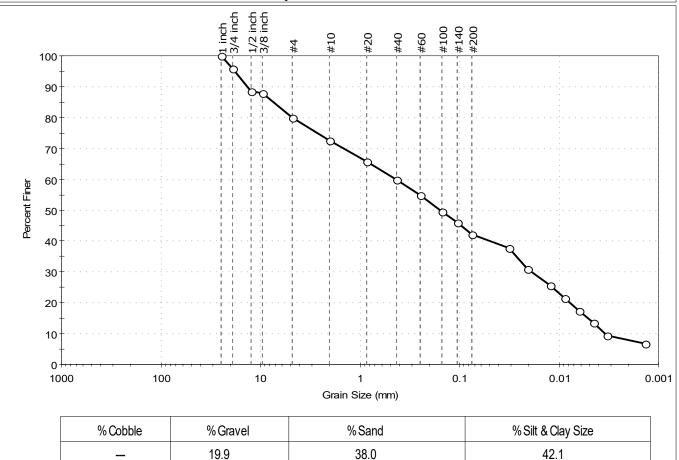
Depth: 40-42 ft Test Id: 781642

Test Comment:

Visual Description: Moist, brownish gray silty clayey sand with gravel

Sample Comment:

## Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	19.9	38.0	42.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 inch	25.00	100		
3/4 inch	19.00	96		
1/2 inch	12.50	88		
3/8 inch	9.50	88		
#4	4.75	80		
#10	2.00	73		
#20	0.85	66		
#40	0.42	60		
#60	0.25	55		
#100	0.15	49		
#140	0.11	46		
#200	0.075	42		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
	0.0320	38		
	0.0207	31		
	0.0122	26		
	0.0088	22		
	0.0063	17		
	0.0045	13		
	0.0033	9		
	0.0014	7		

Coeffic	<u>cients</u>
D <sub>85</sub> = 7.3626 mm	$D_{30} = 0.0188 \text{ mm}$
D <sub>60</sub> = 0.4262 mm	$D_{15} = 0.0052 \text{ mm}$
D <sub>50</sub> = 0.1580 mm	$D_{10} = 0.0034 \text{ mm}$
C <sub>u</sub> =125.353	$C_c = 0.244$

Project No:

GTX-319180

<u>Classification</u> Silty, Clayey SAND with Gravel **ASTM** (SC-SM)

<u>AASHTO</u> Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ANGULAR

Sand/Gravel Hardness: HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period: 1 minute Est. Specific Gravity: 2.65

Separation of Sample: #200 Sieve



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

Boring ID: BB-BSA-107 Sample Type: Jar Tested By: ajl Sample ID: 14D Test Date: 08/15/24 Checked By: ank

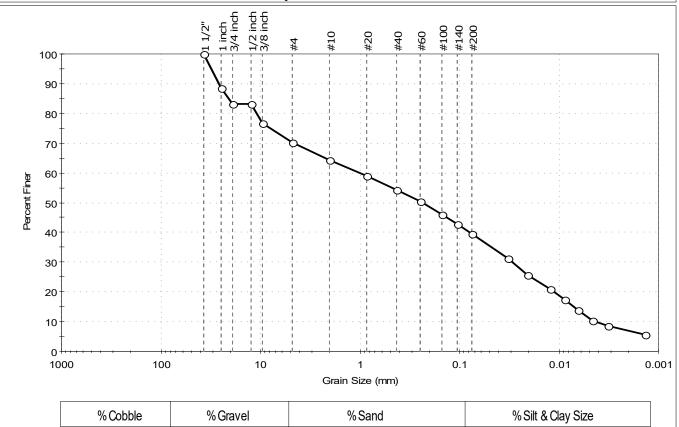
Test Id: Depth: 50-52 ft 780394

Test Comment:

Visual Description: Moist, grayish brown clayey sand with gravel

Sample Comment:

#### Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	29.9	30.5	39.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.1(0)	27.50	100		
1 1/2"	37.50	100		
1 inch	25.00	89		
3/4 inch	19.00	83		
1/2 inch	12.50	83		
3/8 inch	9.50	77		
#4	4.75	70		
#10	2.00	64		
#20	0.85	59		
#40	0.42	54		
#60	0.25	51		
#100	0.15	46		
#140	0.11	43		
#200	0.075	40		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
	0.0325	31		
	0.0209	26		
	0.0123	21		
	0.0088	17		
	0.0064	14		
	0.0046	10		
	0.0033	9		
	0.0014	6		

<u>Coefficients</u>				
D <sub>85</sub> = 20.8858 mm	$D_{30} = 0.0294 \text{ mm}$			
$D_{60} = 0.9990 \text{ mm}$	$D_{15} = 0.0071 \text{ mm}$			
$D_{50} = 0.2343 \text{ mm}$	$D_{10} = 0.0042 \text{ mm}$			
$C_u = 237.857$	$C_c = 0.206$			

Project No:

GTX-319180

<u>Classification</u> Clayey SAND with Gravel (SC) <u>ASTM</u>

AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ANGULAR

Sand/Gravel Hardness: HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period: 1 minute Est. Specific Gravity: 2.65

Separation of Sample: #200 Sieve



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

Boring ID: BB-BSA-107 Sample Type: Jar Tested By: ajl Test Date: Checked By: ank Sample ID: 15D 08/16/24

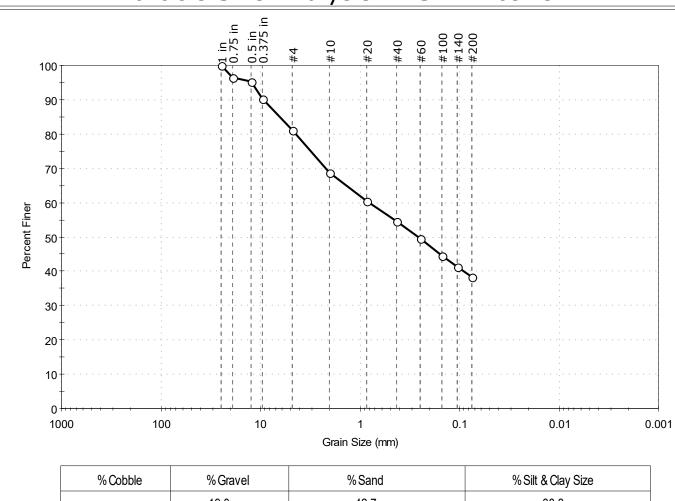
780393 Depth: 55-57 ft Test Id:

Test Comment:

Visual Description: Moist, grayish brown silty sand with gravel

Sample Comment:

#### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
	19.0	42.7	38.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	96		
0.5 in	12.50	95		
0.375 in	9.50	90		
#4	4.75	81		
#10	2.00	69		
#20	0.85	61		
#40	0.42	55		
#60	0.25	50		
#100	0.15	45		
#140	0.11	41		
#200	0.075	38		

<u>Coefficients</u>				
D <sub>85</sub> = 6.3985 mm	$D_{30} = N/A$			
D <sub>60</sub> = 0.7963 mm	$D_{15} = N/A$			
D <sub>50</sub> = 0.2606 mm	$D_{10} = N/A$			
$C_u = N/A$	$C_C = N/A$			

Classification

Project No:

GTX-319180

**ASTM** N/A AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ANGULAR Sand/Gravel Hardness: HARD



Project:

MaineDOT I-95 Bridge over Stillwater Location: Merrimack, NH

Boring ID: BB-BSA-111 Sample Type: Jar Tested By: ajl Test Date: Sample ID: 1D 08/16/24 Checked By: ank

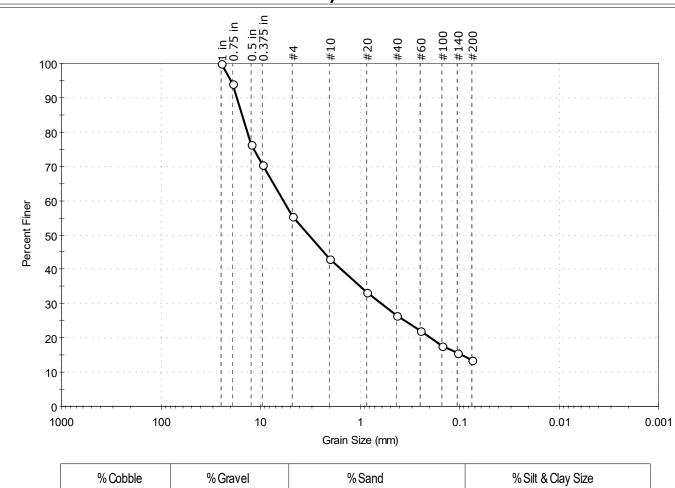
780418 Depth: Test Id: 1-3 ft

Test Comment:

Visual Description: Moist, olive brown silty gravel with sand

Sample Comment:

#### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	44.5	42.0	13.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	94		
0.5 in	12.50	76		
0.375 in	9.50	70		
#4	4.75	55		
#10	2.00	43		
#20	0.85	33		
#40	0.42	27		
#60	0.25	22		
#100	0.15	18		
#140	0.11	16		
#200	0.075	13		

<u>Coefficients</u>				
D <sub>85</sub> = 15.3239 mm	$D_{30} = 0.5991 \text{ mm}$			
D <sub>60</sub> = 5.8553 mm	$D_{15} = 0.0959 \text{ mm}$			
D <sub>50</sub> = 3.2528 mm	$D_{10} = N/A$			
$C_u = N/A$	$C_C = N/A$			

Project No:

GTX-319180

**ASTM** N/A <u>AASHTO</u> Stone Fragments, Gravel and Sand (A-1-a(0))

Classification

Sample/Test Description
Sand/Gravel Particle Shape : ANGULAR Sand/Gravel Hardness: HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location:Merrimack, NHProject No:GTX-319180Boring ID:BB-BSA-111Sample Type: JarTested By:ajlSample ID:3DTest Date:08/19/24Checked By:ank

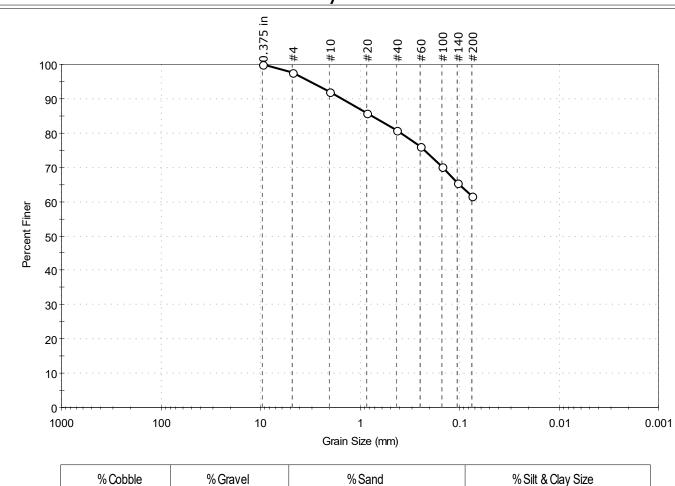
Depth: 5-7 ft Test Id: 780420

Test Comment: ---

Visual Description: Moist, light olive brown sandy silt

Sample Comment: ---

#### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	2.4	36.0	61.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	98		
#10	2.00	92		
#20	0.85	86		
#40	0.42	81		
#60	0.25	76		
#100	0.15	70		
#140	0.11	66		
#200	0.075	62		

<u>Coefficients</u>			
D <sub>85</sub> = 0.7542 mm	$D_{30} = N/A$		
D <sub>60</sub> = N/A	$D_{15} = N/A$		
D <sub>50</sub> = N/A	$D_{10} = N/A$		
C <sub>u</sub> =N/A	$C_C = N/A$		
<u>Classification</u>			

ASTM N/A

AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ANGULAR

 ${\sf Sand/Gravel\; Hardness: HARD}$ 



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-111 Sample Type: Jar Tested By: ajl Sample ID: 5D Test Date: 08/15/24 Checked By: ank

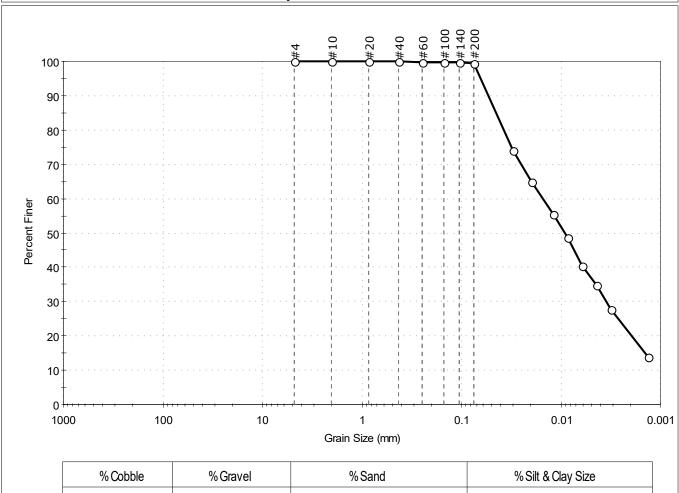
780422

Depth: Test Id: 10-12 ft Test Comment:

Visual Description: Moist, olive brown clay

Sample Comment:

#### Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	0.0	0.6	99.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#140	0.11	100		
#200	0.075	99		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
	0.0305	74		
	0.0196	65		
	0.0118	56		
	0.0085	49		
	0.0061	40		
	0.0044	35		
	0.0032	28		
	0.0013	14		

<u>Coefficients</u>				
D <sub>85</sub> = 0.0450 mm	$D_{30} = 0.0035 \text{ mm}$			
D <sub>60</sub> = 0.0151 mm	$D_{15} = 0.0014 \text{ mm}$			
D <sub>50</sub> = 0.0091 mm	$D_{10} = N/A$			
$C_u = N/A$	$C_{c} = N/A$			

GTX-319180

<u>Classification</u> Lean CLAY (CL) <u>ASTM</u> AASHTO Clayey Soils (A-6 (15))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness: ---

Dispersion Device : Apparatus A - Mech Mixer



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

Boring ID: BB-BSA-111 Sample Type: Jar Tested By: ajl Sample ID: 6D Test Date: 08/16/24 Checked By: ank

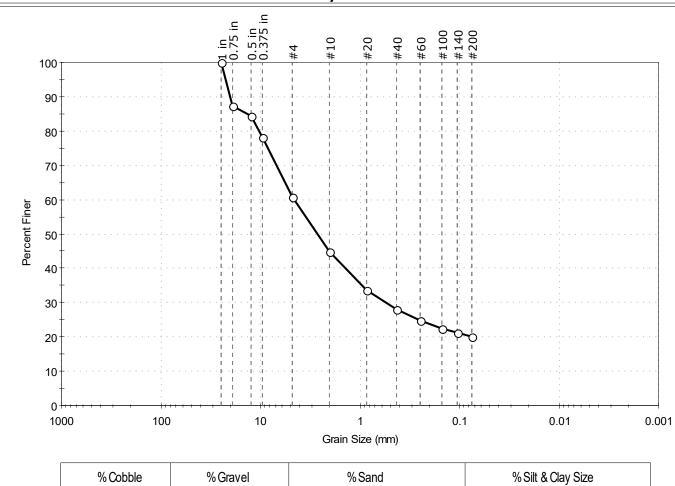
Depth: 15-17 ft Test Id: 780421

Test Comment: ---

Visual Description: Moist, grayish brown silty sand with gravel

Sample Comment: ---

#### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	39.3	40.7	20.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	87		
0.5 in	12.50	84		
0.375 in	9.50	78		
#4	4.75	61		
#10	2.00	45		
#20	0.85	34		
#40	0.42	28		
#60	0.25	25		
#100	0.15	22		
#140	0.11	21		
#200	0.075	20		

COCIII	CICIICS
D <sub>85</sub> = 13.6712 mm	$D_{30} = 0.5440 \text{ mm}$
D <sub>60</sub> =4.5692 mm	$D_{15} = N/A$
D <sub>50</sub> = 2.6581 mm	$D_{10} = N/A$
C <sub>u</sub> =N/A	$C_c = N/A$

Coefficients

GTX-319180

Project No:

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Classification

Sample/Test Description
Sand/Gravel Particle Shape: ANGULAR
Sand/Gravel Hardness: HARD



Project: MaineDOT I-95 Bridge over Stillwater Location: Merrimack, NH

Location:Merrimack, NHProject No:GTX-319180Boring ID:BB-BSA-104Sample Type: JarTested By:camSample ID:6DTest Date:08/16/24Checked By:ank

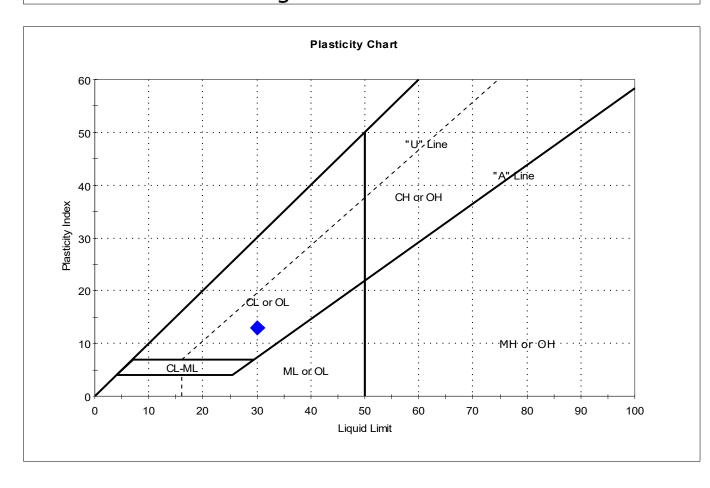
Depth: 15-17 ft Test Id: 780409

Test Comment: ---

Visual Description: Moist, grayish brown clay

Sample Comment: ---

#### Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
<b>•</b>	6D	B-BSA-10	15-17 ft	25	30	17	13	0.6	Lean CLAY (CL)

Sample Prepared using the WET method

5% Retained on #40 Sieve Dry Strength: VERY HIGH



Project: MaineDOT I-95 Bridge over Stillwater

Location:Merrimack, NHProject No:GTX-319180Boring ID:BB-BSA-106Sample Type: JarTested By:camSample ID:7DTest Date:08/19/24Checked By:ank

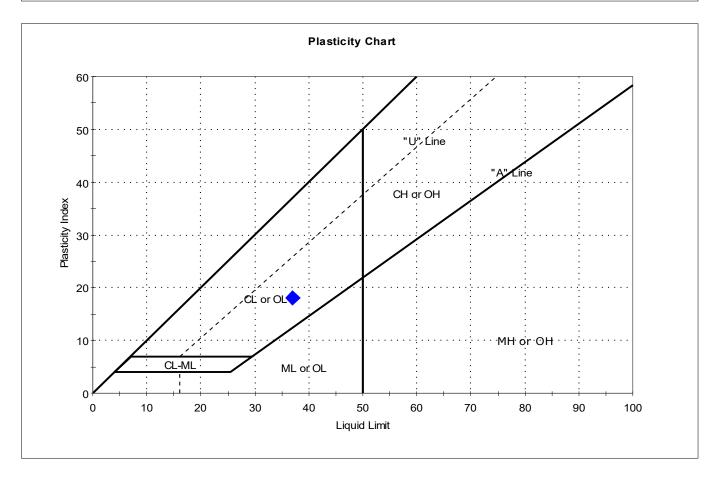
Depth: 20-22 ft Test Id: 780372

Test Comment: ---

Visual Description: Moist, light olive brown clay

Sample Comment: ---

## Atterberg Limits - ASTM D4318



Symbo	I Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	7D	B-BSA-10	20-22 ft	26	37	19	18	0.4	Lean CLAY (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve Dry Strength: VERY HIGH



Project: MaineDOT I-95 Bridge over Stillwater Location: Merrimack, NH

Location:Merrimack, NHProject No:GTX-319180Boring ID:BB-BSA-106Sample Type: JarTested By:camSample ID:8DTest Date:08/19/24Checked By:ank

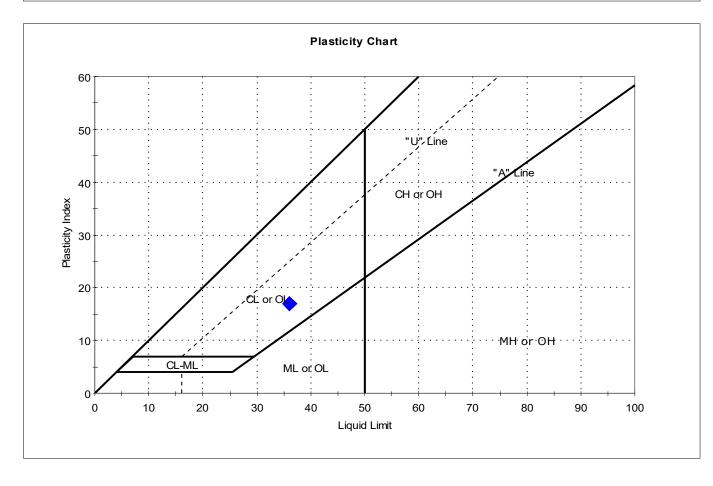
Depth: 25-27 ft Test Id: 780373

Test Comment: ---

Visual Description: Moist, grayish brown clay

Sample Comment: ---

## Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
<b>•</b>	8D	B-BSA-10	25-27 ft	28	36	19	17	0.5	Lean CLAY (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve Dry Strength: VERY HIGH



Project: MaineDOT I-95 Bridge over Stillwater

Location:Merrimack, NHProject No:Boring ID:BB-BSA-106Sample Type: JarTested By:

Boring ID: BB-BSA-106 Sample Type: Jar Tested By: cam Sample ID: 9D Test Date: 08/16/24 Checked By: ank Depth: 30-32 ft Test Id: 780374

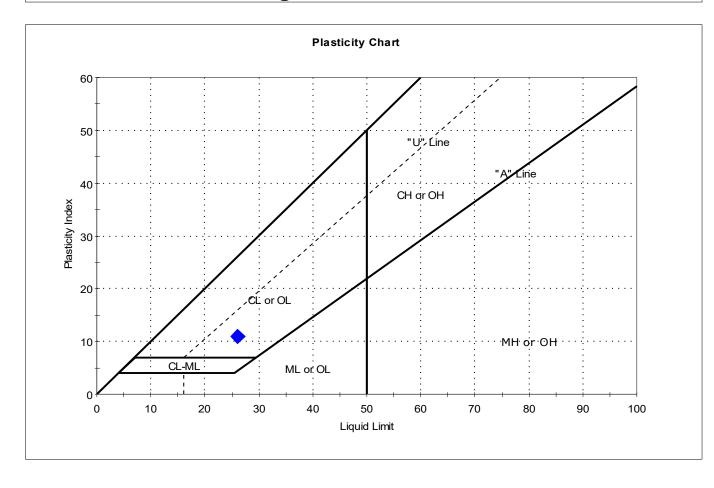
GTX-319180

Depth: 30-32 ft Test Id:
Test Comment: ---

Visual Description: Moist, gray clay

Sample Comment: ---

## Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
<b>•</b>	9D	B-BSA-10	30-32 ft	29	26	15	11	1.3	Lean CLAY (CL)

Sample Prepared using the WET method

1% Retained on #40 Sieve Dry Strength: VERY HIGH



Project: MaineDOT I-95 Bridge over Stillwater

Location:Merrimack, NHProject No:GBoring ID:BB-BSA-106Sample Type:JarTested By:camSample ID:11DTest Date:08/16/24Checked By:ank

GTX-319180

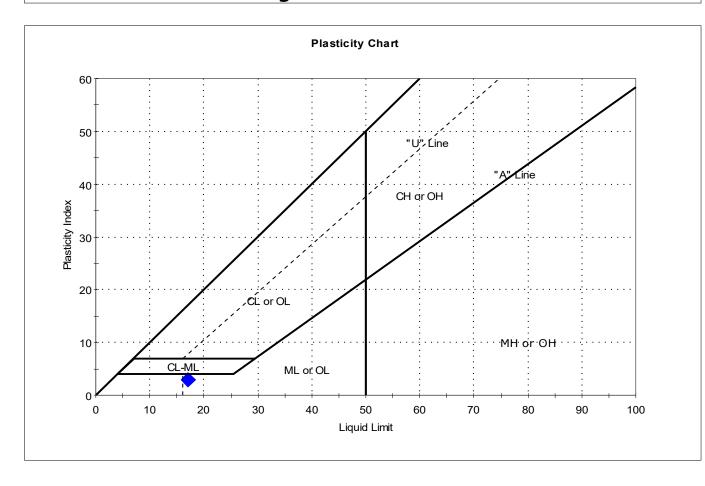
Sample ID: 11D Test Date: 08/16/2
Depth: 40-42 ft Test Id: 780375

Test Comment: ---

Visual Description: Moist, gray sandy silt

Sample Comment: ---

#### Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
<b>•</b>	11D	B-BSA-10	40-42 ft	11	17	14	3	-0.8	Sandy SILT (ML)

Sample Prepared using the WET method

23% Retained on #40 Sieve

Dry Strength: n/a Dilatancy: n/a Toughness: n/a



Project: MaineDOT I-95 Bridge over Stillwater Location: Merrimack, NH

Location:Merrimack, NHProject No:GTX-319180Boring ID:BB-BSA-107Sample Type: JarTested By:camSample ID:8DTest Date:08/19/24Checked By:ank

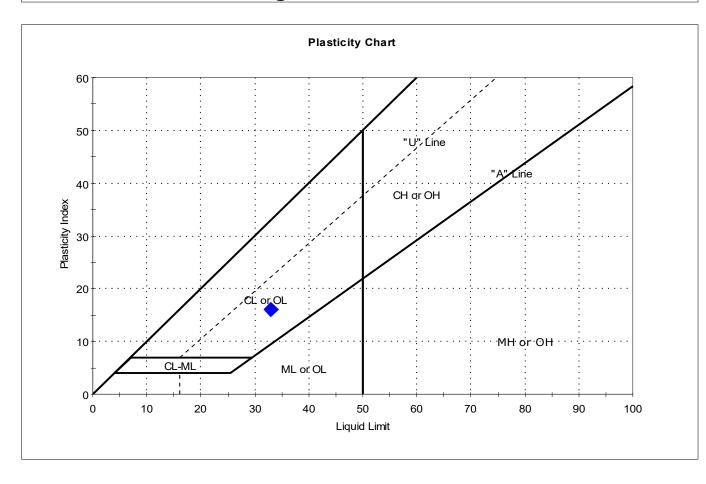
Depth: 20-22 ft Test Id: 780386

Test Comment: ---

Visual Description: Moist, grayish brown clay

Sample Comment: ---

#### Atterberg Limits - ASTM D4318



Sy	mbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
	<b>•</b>	8D	B-BSA-10	20-22 ft	24	33	17	16	0.4	Lean CLAY (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve Dry Strength: VERY HIGH



Project: MaineDOT I-95 Bridge over Stillwater

Location:Merrimack, NHProject No:GBoring ID:BB-BSA-107Sample Type:JarTested By:camSample ID:10DTest Date:08/19/24Checked By:ank

GTX-319180

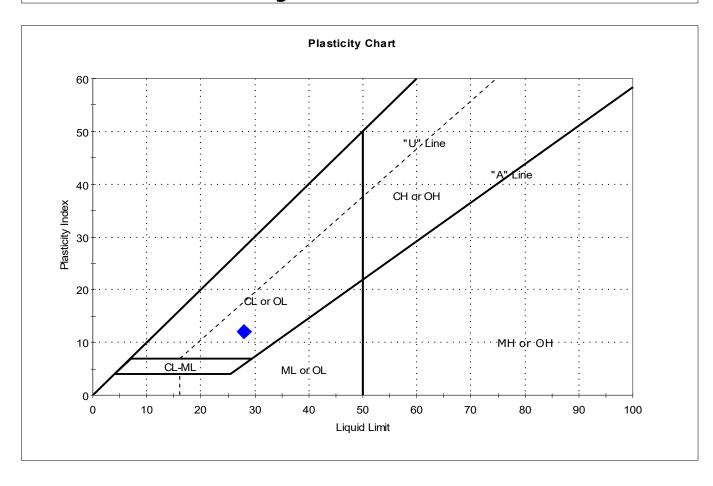
Depth: 30-32 ft Test Id: 780388

Test Comment: ---

Visual Description: Moist, grayish brown clay

Sample Comment: ---

#### Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
<b>•</b>	10D	B-BSA-10	30-32 ft	28	28	16	12	1	Lean CLAY (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve Dry Strength: VERY HIGH



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

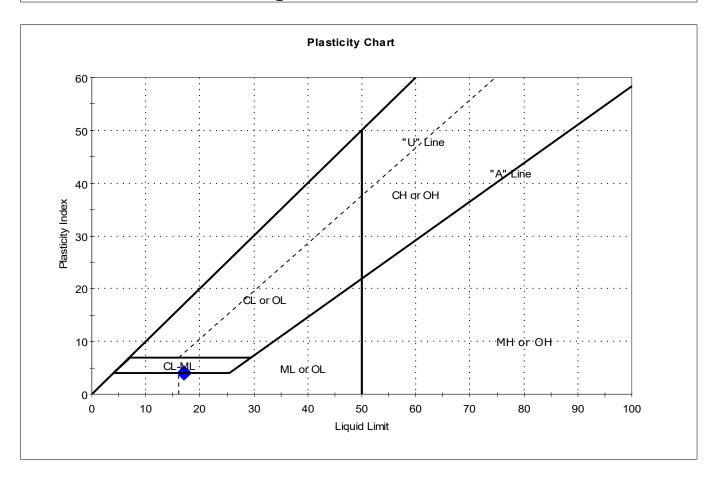
Project No: GTX-319180 Boring ID: BB-BSA-107 Sample Type: Jar Tested By: cam Test Date: Checked By: ank Sample ID: 12D 08/16/24

Depth: 40-42 ft Test Id: 780389

Test Comment:

Visual Description: Moist, brownish gray silty clayey sand with gravel Sample Comment:

#### Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
<b>•</b>	12D	B-BSA-10	40-42 ft	10	17	13	4	-0.8	Silty, Clayey SAND with Gravel (SC-SM)

Sample Prepared using the WET method

40% Retained on #40 Sieve Dry Strength: VERY HIGH



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-107 Sample Type: Jar Tested By: cam Sample ID: 14D Test Date: 08/15/24 Checked By: ank

GTX-319180

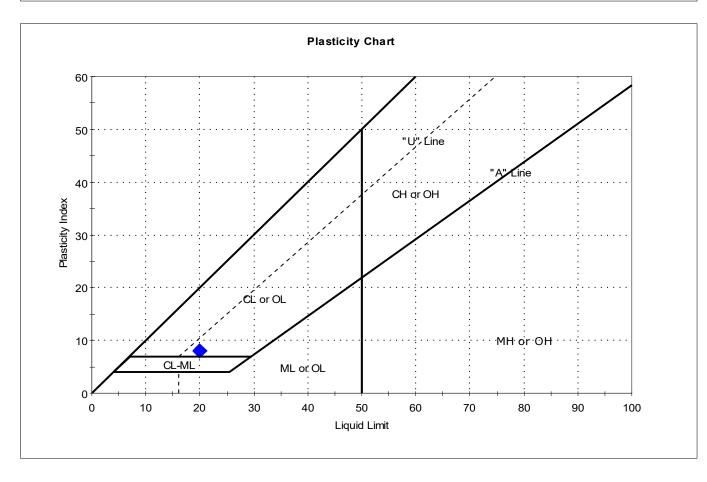
Depth: 50-52 ft Test Id: 780390

Test Comment: ---

Visual Description: Moist, grayish brown clayey sand with gravel

Sample Comment: ---

## Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
<b>•</b>	14D	B-BSA-10	50-52 ft	10	20	12	8	-0.3	Clayey SAND with Gravel (SC)

Sample Prepared using the WET method

46% Retained on #40 Sieve Dry Strength: VERY HIGH



Project: MaineDOT I-95 Bridge over Stillwater

Location:Merrimack, NHProject No:GBoring ID:BB-BSA-111Sample Type:JarTested By:camSample ID:5DTest Date:08/16/24Checked By:ank

GTX-319180

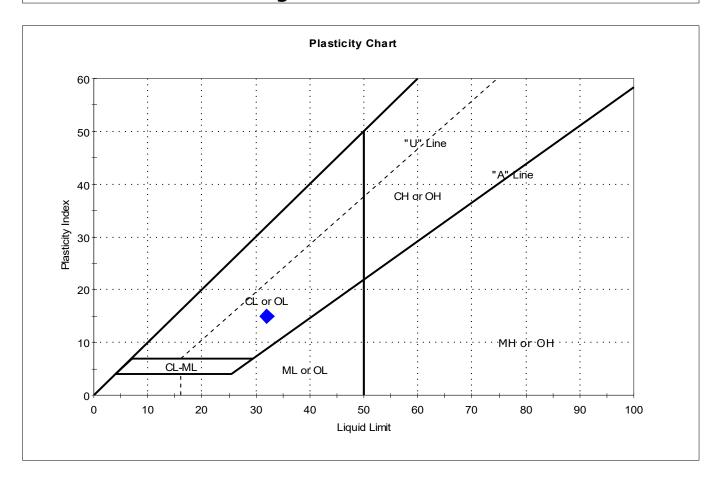
Depth: 10-12 ft Test Id: 780417

Test Comment: ---

Visual Description: Moist, olive brown clay

Sample Comment: ---

#### Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
<b>•</b>	5D	B-BSA-11	10-12 ft	21	32	17	15	0.3	Lean CLAY (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve Dry Strength: VERY HIGH



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No: GTX-319180

Boring ID: --- Sample Type: --- Tested By: ajl Sample ID: --- Test Date: 06/05/24 Checked By: ank

Depth: --- Test Id: 771711

#### Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
BB-BSA-102	1D	1-3ft Moist, brown silty sand with gravel		3.7
BB-BSA-102	2D	3-5ft	3-5ft Moist, brown silty sand with gravel	
BB-BSA-102	5D	9-11ft Moist, light brown silty gravel with sand		15.5
BB-BSA-108	1D	0-2ft	Moist, yellowish brown silty sand with gravel	8.0
BB-BSA-109	2D	3-5ft	Moist, grayish brown silty gravel with sand	5.7
BB-BSA-109	4D	7-9ft	Moist, brown silty sand with gravel	11.7

Notes: Temperature of Drying: 110° Celsius



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No: GTX-319180

Boring ID: --- Sample Type: --- Tested By: ajl Sample ID: --- Test Date: 06/07/24 Checked By: ank

Depth: --- Test Id: 771713

# pH of Soil by ASTM D4972

Boring ID	Sample ID	Depth	Visual Description	pH of Soil in Distilled Water	pH of Soil in Calcium Chloride
BB-BSA-102	1D	1-3ft	Moist, brown silty sand with gravel	7.9	7.2
BB-BSA-109	2D	3-5ft	Moist, grayish brown silty gravel with sand	8.2	7.3

Notes: Sample Preparation: screened through #10 sieve

Method A, pH meter used



Client: WSP USA, Inc. Project: MaineDOT I-95 Bridge Over Stillwater Location: Merrimack, NH GTX#: 319180 Test Date: 06/10/24 Due Date: 06/13/24 Tested By: NMK Checked By: ank

#### Laboratory Measurement of Soil Resistivity Using the Wenner Four-Electrode Method by ASTM G57 (Laboratory Measurement)

Boring ID	Sample ID	Depth, ft.	Sample Description	Electrical Resistivity, ohm-cm	Electrical Conductivity, (ohm-cm) <sup>-1</sup>
BB-BSA-102	1D	1-3 ft	Moist, brown silty gravel	1,202	8.32E-04

Notes: Test Equipment: Nilsson Model 400 Soil Resistance Meter, MC Miller Soil Box

Water added to sample to create a thick slurry prior to testing (saturated condition). Electrical Conductivity is calculated as inverse of Electrical Resistivity (per ASTM G57)

Test conducted in standard laboratory atmosphere: 68-73 F



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-102 Sample Type: Jar Tested By: ajl Sample ID: 1D Test Date: 06/10/24 Checked By: ank

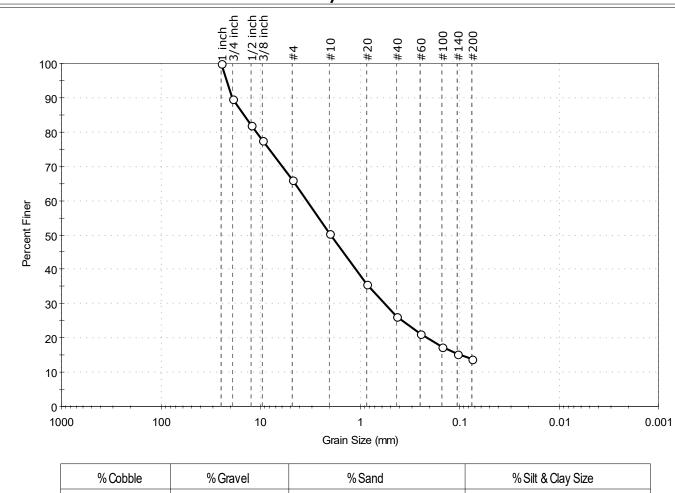
Depth: 1-3ft Test Id: 771699

Test Comment: ---

Visual Description: Moist, brown silty sand with gravel

Sample Comment: ---

## Particle Size Analysis - ASTM D6913



ne	Sieve Size, mm Percen	t Finer Spec. Percent (	Complies	Coefficients	_
		34.0	52.0	14.0	
	% Cobble	% Gravel	%Sand	% Silt & Clay Size	

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 inch	25.00	100		
3/4 inch	19.00	90		
1/2 inch	12.50	82		
3/8 inch	9.50	78		
#4	4.75	66		
#10	2.00	51		
#20	0.85	36		
#40	0.42	26		
#60	0.25	21		
#100	0.15	17		
#140	0.11	15		
#200	0.075	14		

<u></u>	<del></del>
D <sub>85</sub> =14.7631 mm	$D_{30} = 0.5584 \text{ mm}$
D <sub>60</sub> = 3.3977 mm	$D_{15} = 0.0975 \text{ mm}$
D <sub>50</sub> = 1.9370 mm	$D_{10} = N/A$
$C_u = N/A$	$C_c = N/A$

GTX-319180

ASTM N/A

Classification

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ANGULAR

Sand/Gravel Hardness : HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH

Boring ID: BB-BSA-102 Sample Type: Jar Tested By: ajl Sample ID: 2D Test Date: 06/11/24 Checked By: ank

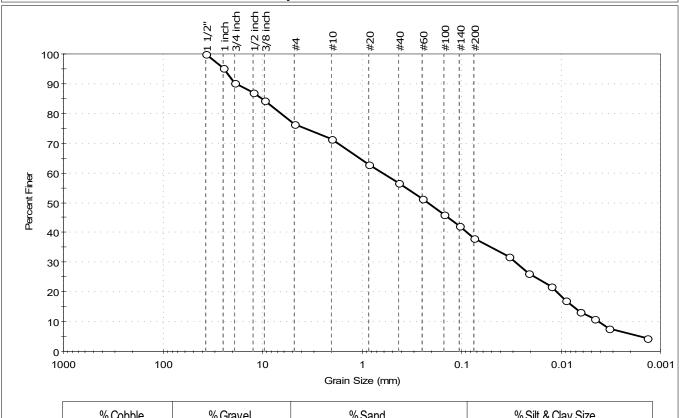
Depth: 3-5ft Test Id: 771725

Test Comment: ---

Visual Description: Moist, brown silty sand with gravel

Sample Comment: ---

# Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	23.6	38.4	38.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 1/2"	37.50	100		
1 inch	25.00	95		
3/4 inch	19.00	90		
1/2 inch	12.50	87		
3/8 inch	9.50	84		
#4	4.75	76		
#10	2.00	71		
#20	0.85	63		
#40	0.42	57		
#60	0.25	51		
#100	0.15	46		
#140	0.11	42		
#200	0.075	38		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
	0.0330	32		
	0.0213	26		
	0.0125	22		
	0.0090	17		
	0.0065	13		
	0.0046	11		
	0.0033	8		
	0.0014	4		
	1			

<u>Coefficients</u>				
D <sub>85</sub> = 10.2078 mm	$D_{30} = 0.0286 \text{ mm}$			
D <sub>60</sub> = 0.6168 mm	$D_{15} = 0.0074 \text{ mm}$			
D <sub>50</sub> = 0.2201 mm	$D_{10} = 0.0042 \text{ mm}$			
Cu =146.857	$C_c = 0.316$			

GTX-319180

Project No:

ASTM N/A Classification

AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ANGULAR

Sand/Gravel Hardness: HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period: 1 minute Est. Specific Gravity: 2.65

Separation of Sample: #200 Sieve



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-102 Sample Type: Jar Tested By: ajl Sample ID: 4D Test Date: 06/11/24 Checked By: ank

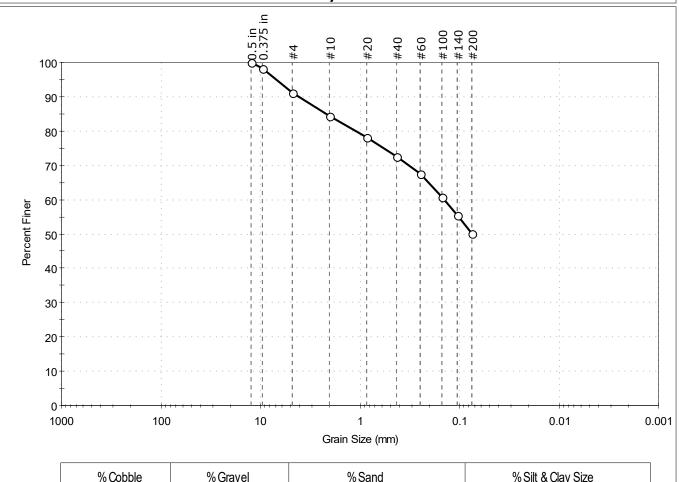
Depth: 7-9ft Test Id: 771701

Test Comment: ---

Visual Description: Moist, brown sandy silt

Sample Comment: ---

#### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
	8.7	41.1	50.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	98		
#4	4.75	91		
#10	2.00	84		
#20	0.85	78		
#40	0.42	73		
#60	0.25	67		
#100	0.15	61		
#140	0.11	55		
#200	0.075	50		

	<u>Coefficients</u>			
D <sub>85</sub> = 2.1488 mm		$D_{30} = N/A$		
D <sub>60</sub> = 0.1431 mm		$D_{15} = N/A$		
	$D_{50} = N/A$	$D_{10} = N/A$		
	$C_u = N/A$	$C_c = N/A$		

GTX-319180

ASTM Sandy SILT (ML)

AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ANGULAR

 ${\sf Sand/Gravel\; Hardness: HARD}$ 



Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-102 Sample Type: Jar Tested By: ajl Sample ID: 5D Test Date: 06/10/24 Checked By: ank

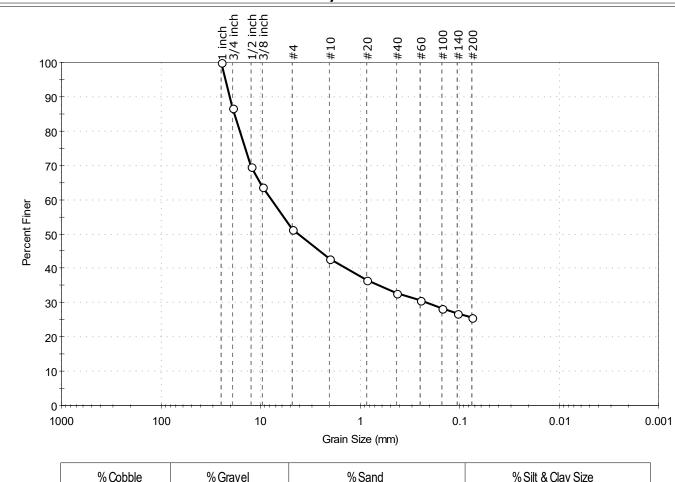
Depth: 9-11ft Test Id: 771702

Test Comment: ---

Visual Description: Moist, light brown silty gravel with sand

Sample Comment: ---

#### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	48.7	25.7	25.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 inch	25.00	100		
3/4 inch	19.00	87		
1/2 inch	12.50	70		
3/8 inch	9.50	64		
#4	4.75	51		
#10	2.00	43		
#20	0.85	36		
#40	0.42	33		
#60	0.25	31		
#100	0.15	28		
#140	0.11	27		
#200	0.075	26		

<u>Coefficients</u>				
D <sub>85</sub> =18.2066 mm	$D_{30} = 0.2200 \text{ mm}$			
D <sub>60</sub> = 7.7553 mm	$D_{15} = N/A$			
D <sub>50</sub> =4.1504 mm	$D_{10} = N/A$			
$C_u = N/A$	$C_C = N/A$			

GTX-319180

ASTM N/A Classification

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description
Sand/Gravel Particle Shape: ANGULAR
Sand/Gravel Hardness: HARD



Project: MaineDOT I-95 Bridge over Stillwater

Location:Merrimack, NHProject No:GTX-319180Boring ID:BB-BSA-108Sample Type: JarTested By: ajl

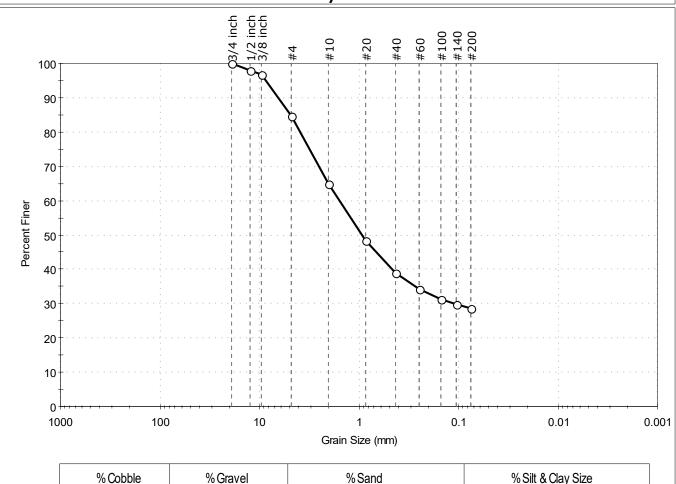
Boring ID: BB-BSA-108 Sample Type: Jar Tested By: ajl Sample ID: 1D Test Date: 06/10/24 Checked By: ank

Depth: 0-2ft Test Id: 771703
Test Comment: ---

Visual Description: Moist, yellowish brown silty sand with gravel

Sample Comment: ---

# Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	15.4	56.1	28.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3/4 inch	19.00	100		
1/2 inch	12.50	98		
3/8 inch	9.50	97		
#4	4.75	85		
#10	2.00	65		
#20	0.85	48		
#40	0.42	39		
#60	0.25	34		
#100	0.15	31		
#140	0.11	30		
#200	0.075	28		

<u>Coefficients</u>			
D <sub>85</sub> =4.8781 mm	$D_{30} = 0.1095 \text{ mm}$		
D <sub>60</sub> = 1.5572 mm	$D_{15} = N/A$		
D <sub>50</sub> = 0.9286 mm	$D_{10} = N/A$		
$C_u = N/A$	$C_C = N/A$		

ASTM N/A Classification

AASHTO Silty Gravel and Sand (A-2-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ANGULAR

Sand/Gravel Hardness : HARD



Client: WSP USA, Inc.

Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-109 Sample Type: Jar Tested By: ajl Sample ID: 2D Test Date: 06/11/24 Checked By: ank

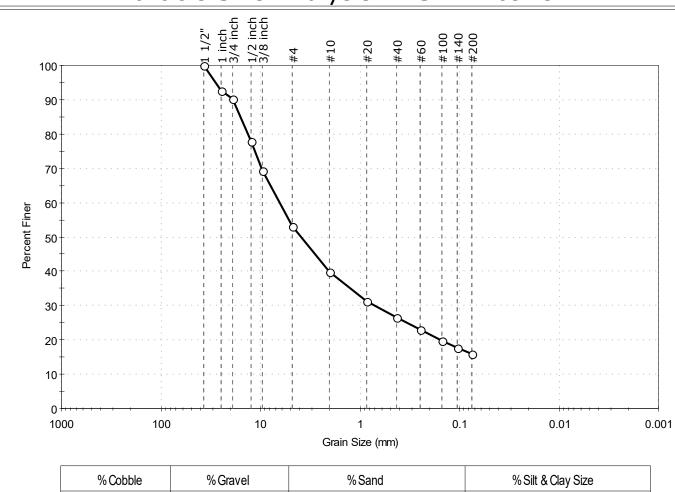
Depth: 3-5ft Test Id: 771704

Test Comment:

Visual Description: Moist, grayish brown silty gravel with sand

Sample Comment:

### Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
_	46.8	37.3	15.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 1/2"	37.50	100		
1 inch	25.00	93		
3/4 inch	19.00	90		
1/2 inch	12.50	78		
3/8 inch	9.50	69		
#4	4.75	53		
#10	2.00	40		
#20	0.85	31		
#40	0.42	26		
#60	0.25	23		
#100	0.15	20		
#140	0.11	18		
#200	0.075	16		

	<u>Coefficients</u>					
D <sub>85</sub> = 15.9069 mm		$D_{30} = 0.7017 \text{ mm}$				
	D <sub>60</sub> = 6.3678 mm	$D_{15} = N/A$				
	D <sub>50</sub> = 3.8773 mm	$D_{10} = N/A$				
	Cu =N/A	$C_c = N/A$				

GTX-319180

<u>ASTM</u>	Classification N/A
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-b (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ANGULAR Sand/Gravel Hardness: HARD



Client: WSP USA, Inc.

Project: MaineDOT I-95 Bridge over Stillwater

Location: Merrimack, NH Project No:

Boring ID: BB-BSA-109 Sample Type: Jar Tested By: ajl Sample ID: 4D Test Date: 06/10/24 Checked By: ank

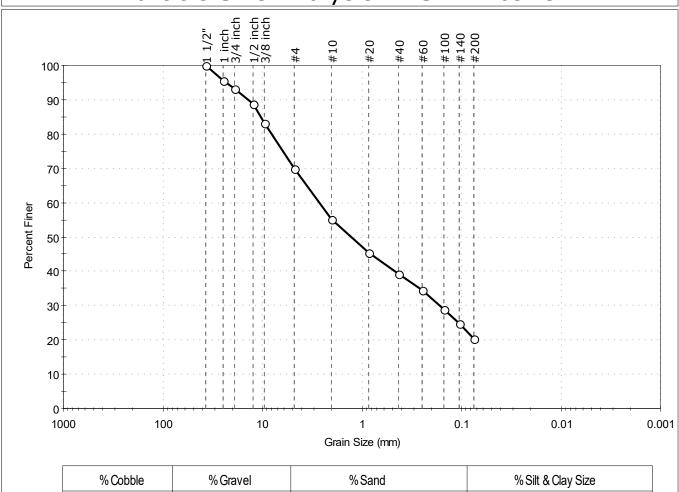
Depth: 7-9ft Test Id: 771705

Test Comment: ---

Visual Description: Moist, brown silty sand with gravel

Sample Comment: ---

### Particle Size Analysis - ASTM D6913



ne	Sieve Size, mm Percen	t Finer Spec. Percent (	Complies	Coefficients	_
	-	30.1	49.6	20.3	
	% Cobble	% Gravel	% Sand	% Silt & Clay Size	

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 1/2"	37.50	100		
1 inch	25.00	96		
3/4 inch	19.00	93		
1/2 inch	12.50	89		
3/8 inch	9.50	83		
#4	4.75	70		
#10	2.00	55		
#20	0.85	45		
#40	0.42	39		
#60	0.25	35		
#100	0.15	29		
#140	0.11	25		
#200	0.075	20		

COCITICICITES					
D <sub>85</sub> = 10.4311 mm	$D_{30} = 0.1670 \text{ mm}$				
D <sub>60</sub> = 2.6443 mm	$D_{15} = N/A$				
D <sub>50</sub> = 1.2721 mm	$D_{10} = N/A$				
$C_u = N/A$	$C_C = N/A$				

GTX-319180

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Classification

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ANGULAR Sand/Gravel Hardness: HARD



Client: WSP USA, Inc.

Project: MaineDOT I-95 Bridge over Stillwater

Location:Merrimack, NHProject No:GTX-319180Boring ID:BB-BSA-102Sample Type: JarTested By:cam

Sample ID: 4D Test Date: 06/10/24 Checked By: ank Depth: 7-9ft Test Id: 771698

Depth: 7-9ft
Test Comment: ---

Visual Description: Moist, brown sandy silt

Sample Comment: ---

### Atterberg Limits - ASTM D4318

### **Sample Determined to be non-plastic**

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
<b>•</b>	4D	B-BSA-10	7-9ft	13	n/a	n/a	n/a	n/a	Sandy SILT (ML)

27% Retained on #40 Sieve

Dry Strength: n/a Dilatancy: n/a Toughness: n/a

The sample was determined to be Non-Plastic





PO Box 572455 / Salt Lake City UT 84157-2455 / USA TEL +1 801 262 2448 · FAX +1 801 262 9870 · www.TEi-TS.com

Analysis No. TS-A2411955 Report Date 14 June 2024

Date Sampled 12 June 2024

Date Received 13 June 2024

Where Sampled Acton, MA USA

Sampled By Client

This is to attest that we have examined: Soil: Project: MaineDOT I-95 Bridge over Stillwater; Site Location: - — -; Job Number: GTX-319180

When examined to the applicable requirements of:

AASHTO T 291-18 "Standard Method of Test for Determining Water-Soluble Chloride Ion

Content in Soil" Method B

AASHTO T 290-20 "Standard Method of Test for Determining Water-Soluble Sulfate Ion

Content in Soil"

#### Results:

AASHTO T 291 – Chloride (Method B)

C.	ample	Res	Minimum	
30	Sample		% <sup>1</sup>	Detection Limit
BB-BSA-102		215.	0.0215	
1D	1D 1 – 3'		0.0213	10
BB-BSA-109		59.	0.0059	10.
2D	3 – 5'	59.	0.0059	

NOTE: <sup>1</sup>Percent by weight after drying and prepared as per the Standard.

#### AASHTO T 290 – Sulfates (Soluble)

2 1 200 Canates (Colasie)				
Sample		Res	Minimum	
Sa	mpie	ppm (mg/kg)	% <sup>1</sup>	Detection Limit
BB-BSA-102		< 10.	. 0.0010	
1D	1D 1 – 3'		< 0.0010	10
BB-BSA-109 2D 3 – 5'		- 10	- 0.0010	10.
		< 10.	< 0.0010	

NOTE: <sup>1</sup>Percent by weight after drying and prepared as per the Standard.

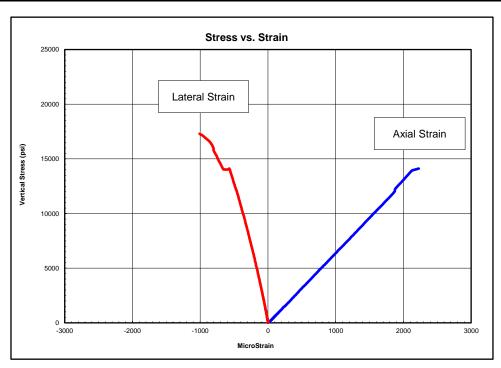
Merrill Gee P.E. - Engineer in Charge

© 2024 by Testing Engineers International, Inc. CAVEAT: This certificate may not be reproduced except in full, without the expressed written consent of TEi-Testing Services, LLC. Note: The values in this certificate are the values obtained under standard test conditions as reported in the appropriate Report of Test and thus may be used for purposes of demonstrating compliance or for comparison with other units tested under the same standard. The results do not indicate the function of the sample(s) under nonstandard or field conditions. Statement of Risk: Client understands and agrees that declarations of conformity are made by directly comparing the measurement results against the test limits given in the standard without consideration to factors that may contribute to measurement uncertainty and accepts the shared risk that arises from this approach. This certificate gives the characteristics of the sample(s) submitted for testing only. It does not and may not be used to certify the characteristics of the product, nor to imply that the product in general meets the requirements of any standard, nor its acceptability in the marketplace. TEi stylized lettering and logo are registered trademarks and use is by contract and/or written permission only. USEPA Laboratory ID UT00930 TEi-Testing Services is a wholly owned LLC of Testing Engineers International, Inc.



Client:	WSP USA, Inc.
Project Name:	MaineDOT I-95 Bridge over Stillwater
Project Location:	Merrimack, NH
GTX #:	319180
Test Date:	6/13/2024
Tested By:	gp
Checked By:	jsc
Boring ID:	BB-BSA-102
Sample ID:	R1
Depth, ft:	14.87-15.25
Sample Type:	rock core
Sample Description:	See photographs Intact material failure Best Effort end preparation performed

## Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 17,296 psi

The axial strain gauges failed before the peak value was attained. Young's Modulus and Poisson's Ratio could not be determined within the third stress range for this test.

Stress Range, psi		Young's Modulus, psi	Poisson's Ratio
	1700-6300	6,470,000	0.23
	6300-11000	6,460,000	0.27
	11000-15600		

Notes:

Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.

Calculations assume samples are isotropic, which is not necessarily the case.

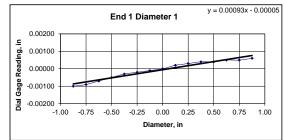


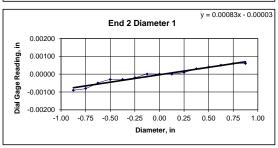
Client:	WSP USA, Inc.	Test Date:	6/12/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By:	gp
Project Location:	Merrimack, NH	Checked By:	smd
GTX #:	319180		
Boring ID:	BB-BSA-102		
Sample ID:	R1		
Depth (ft):	14.87-15.25		
Visual Description:	See photographs		

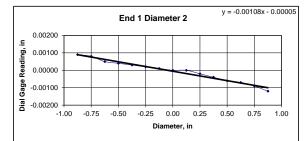
### UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

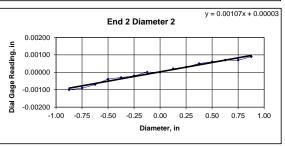
				DEVIATION FROM STRAIGHTNESS (Procedure S1)
1	2	Average		
4.38	4.38	4.38		Maximum gap between side of core and reference surface plate:
1.97	1.97	1.97		Is the maximum gap ≤ 0.02 in.? YES
593.5				
169	Minimum Diameter Tolerence M	1et?	YES	Maximum difference must be < 0.020 in.
2.2	Length to Diameter Ratio Tolera	ance Met?	YES	Straightness Tolerance Met? YES
	1.97 593.5	1.97 1.97 593.5 169 <b>Minimum Diameter Tolerence N</b>	1.97 1.97 1.97 593.5	4.38 4.38 4.38 1.97 1.97 1.97 593.5 169 Minimum Diameter Tolerence Met? YES

END FLATNESS AND PARALL	ELISM (Proced	lure FP1)													
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00100	-0.00090	-0.00070	-0.00050	-0.00030	-0.00020	-0.00010	0.00000	0.00020	0.00030	0.00040	0.00040	0.00050	0.00050	0.00060
Diameter 2, in (rotated 90°)	0.00090	0.00080	0.00050	0.00040	0.00030	0.00020	0.00010	0.00000	0.00000	-0.00020	-0.00040	-0.00060	-0.00070	-0.00090	-0.00120
											Difference between	een max and m	in readings, in:		
											0° =	0.00160	90° =	0.00210	
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00090	-0.00080	-0.00050	-0.00030	-0.00030	-0.00020	0.00000	0.00000	0.00000	0.00010	0.00030	0.00040	0.00050	0.00060	0.00060
Diameter 2, in (rotated 90°)	-0.00100	-0.00090	-0.00070	-0.00040	-0.00030	-0.00020	0.00000	0.00000	0.00020	0.00030	0.00050	0.00060	0.00070	0.00070	0.00090
											Difference between	een max and m	in readings, in:		
											0° =	0.0015	90° =	0.0019	
											Maximum differe	ence must be <	0.0020 in.	Difference = $\pm$	_ 0.00105
												Flatness T	olerance Met?	NO	









DIAMETER 1			
End 1:	Slope of Best Fit Line	0.00093 0.05337	
End 2:	Slope of Best Fit Line	0.00083 0.04764	
Maximum Angı	ılar Difference:	0.00573	
	Parallelism Tolerance Met?	NO	
	Spherically Seated		
DIAMETER 2	Spherically Seated		
DIAMETER 2 End 1:		0.00108 0.06204	
	Slope of Best Fit Line Angle of Best Fit Line:		
End 1:	Slope of Best Fit Line Angle of Best Fit Line: Slope of Best Fit Line	0.06204	

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)											
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?	Maximum angle of departure must be $\leq$ 0.25°					
Diameter 1, in	0.00160	1.970	0.00081	0.047	YES						
Diameter 2, in (rotated 90°)	0.00210	1.970	0.00107	0.061	YES	Perpendicularity Tolerance Met?	YES				
END 2											
Diameter 1, in	0.00150	1.970	0.00076	0.044	YES						
Diameter 2, in (rotated 90°)	0.00190	1.970	0.00096	0.055	YES						



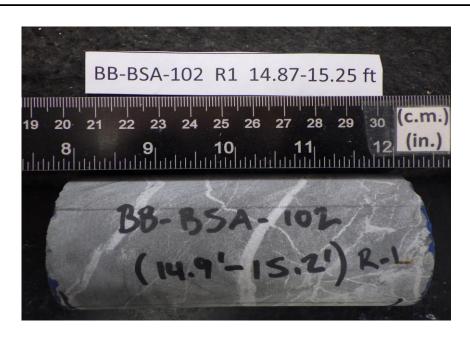
Client:	WSP USA, Inc.	Test Date: 6/12/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By: gp
Project Location:	Merrimack, NH	Checked By: smd
GTX #:	319180	
Boring ID:	BB-BSA-102	Reliable dial gauge measurements could not be
Sample ID:	R1	performed on this rock type. Tolerance
Depth (ft):	14.87-15.25	measurements were performed using a machinist straightedge and feeler gauges to
Visual Description:	See photographs	ASTM specifications.

## BEST EFFORT END FLATNESS TOLERANCES OF ROCK CORE SPECIMENS TO ASTM D4543

END FLATNESS											
END 1											
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES									
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES									
END 2											
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES									
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES									
	End Flatness Tolerance Met? YES										



Client: WSP USA, Inc. Project Name: MaineDOT I-95 Bridge over Stillwater Project Location: Merrimack, NH GTX #: 319180 Test Date: 6/13/2024 Tested By: smd Checked By: jsc Boring ID: BB-BSA-102 Sample ID: R1



14.87-15.25

Depth, ft:

After cutting and grinding

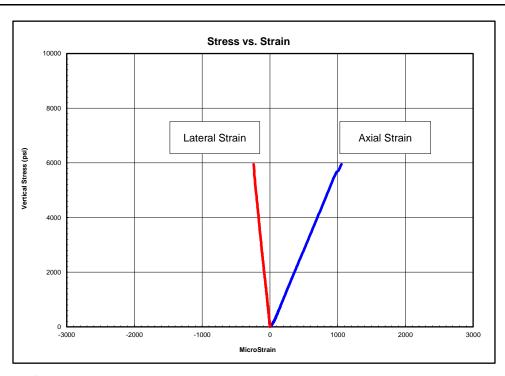


After break



Client:	WSP USA, Inc.
Project Name:	MaineDOT I-95 Bridge over Stillwater
Project Location:	Merrimack, NH
GTX #:	319180
Test Date:	6/13/2024
Tested By:	gp
Checked By:	jsc
Boring ID:	BB-BSA-110
Sample ID:	R1
Depth, ft:	5.93-6.31
Sample Type:	rock core
Sample Description:	See photographs Intact material and discontinuity failure Best Effort end preparation performed

## Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 5,948 psi

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
600-2200	6,020,000	0.26
2200-3800	5,880,000	0.25
3800-5400	6,000,000	0.25

Notes:

Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.

Calculations assume samples are isotropic, which is not necessarily the case.

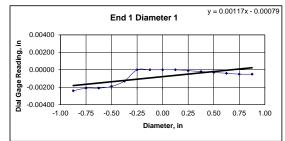


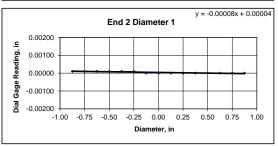
Client:	WSP USA, Inc.	Test Date:	6/12/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By:	gp
Project Location:	Merrimack, NH	Checked By:	smd
GTX #:	319180		
Boring ID:	BB-BSA-110		
Sample ID:	R1		
Depth (ft):	5.93-6.31		
Visual Description:	See photographs		

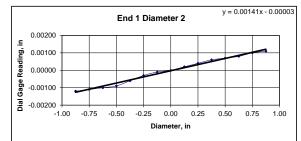
### UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

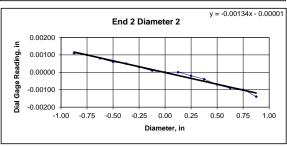
BULK DENSITY					DEVIATION FROM STRAIGHTNESS (Procedure S1)
	1	2	Average		
Specimen Length, in:	4.41	4.41	4.41		Maximum gap between side of core and reference surface plate:
Specimen Diameter, in:	1.97	1.97	1.97		Is the maximum gap ≤ 0.02 in.? YES
Specimen Mass, g:	604.37				
Bulk Density, lb/ft3	171	Minimum Diameter Tolerence Met?	?	YES	Maximum difference must be $< 0.020$ in.
Length to Diameter Ratio:	2.2	Length to Diameter Ratio Tolerance	e Met?	YES	Straightness Tolerance Met? YES

END FLATNESS AND PARALL	ELISM (Proced	lure FP1)													
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00240	-0.00210	-0.00210	-0.00190	-0.00130	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00040	-0.00050	-0.00050
Diameter 2, in (rotated 90°)	-0.00120	-0.00110	-0.00100	-0.00090	-0.00060	-0.00030	-0.00010	0.00000	0.00020	0.00040	0.00060	0.00070	0.00080	0.00100	0.00110
											Difference between	een max and m	in readings, in:		
											0° =	0.00240	90° =	0.00230	
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00110	0.00100	0.00080	0.00060	0.00050	0.00030	0.00010	0.00000	0.00000	-0.00020	-0.00040	-0.00070	-0.00090	-0.00100	-0.00140
											Difference between	een max and m	in readings, in:		
											0° =	0.0001	90° =	0.0025	
											Maximum differe	ence must be <	0.0020 in.	Difference = $\pm$	0.00125









: Line: C	0.00117 0.06695 0.00008 0.00442 0.06253
: Line C : Line C : Line C : Line: C	0.06695 0.00008 0.00442 0.06253
: Line C : Line C : Line C : Line: C	0.06695 0.00008 0.00442 0.06253
: Line C : Line C : Line C : Line: C	0.06695 0.00008 0.00442 0.06253
: Line (Ciline: Ciline: Ciline	0.00442 0.06253
Line: (	0.00442 0.06253
Line: (	0.00442 0.06253
olerance Met?	
elerance Met?	
	NO
	NO
	0.00141
: Line: (	0.08087
	0.00134
: Line: (	0.07694
C	0.00393
	Line: (Line: (Li

Flatness Tolerance Met?

PERPENDICULARITY (Procedu	ure P1) (Calculated from End Flatness	and Parallelism me	easurements al	oove)		
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?	Maximum angle of departure must be $\leq 0.25^{\circ}$
Diameter 1, in	0.00240	1.970	0.00122	0.070	YES	
Diameter 2, in (rotated 90°)	0.00230	1.970	0.00117	0.067	YES	Perpendicularity Tolerance Met? YES
END 2						
Diameter 1, in	0.00010	1.970	0.00005	0.003	YES	
Diameter 2, in (rotated 90°)	0.00250	1.970	0.00127	0.073	YES	



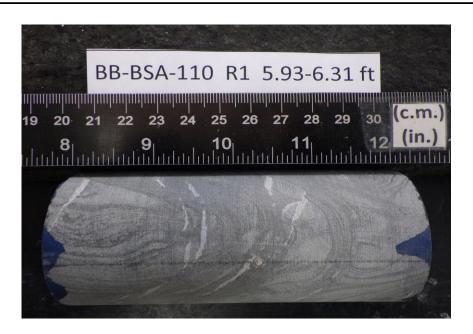
Client:	WSP USA, Inc.	Test Date: 6/12/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By: gp
Project Location:	Merrimack, NH	Checked By: smd
GTX #:	319180	
Boring ID:		Reliable dial gauge measurements could not be
Sample ID:	K1	performed on this rock type. Tolerance measurements were performed using a
Depth (ft):	F 02 6 21	machinist straightedge and feeler gauges to
Visual Description:	See photographs	ASTM specifications.

## BEST EFFORT END FLATNESS TOLERANCES OF ROCK CORE SPECIMENS TO ASTM D4543

END FLATNESS							
END 1							
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES					
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES					
END 2							
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES					
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES					
End Flatness Tolerance Met? YES							



Client: WSP USA, Inc. Project Name: MaineDOT I-95 Bridge over Stillwater Project Location: Merrimack, NH GTX #: 319180 Test Date: 6/13/2024 Tested By: gp Checked By: smd Boring ID: BB-BSA-110 Sample ID: R1



5.93-6.31

Depth, ft:

After cutting and grinding

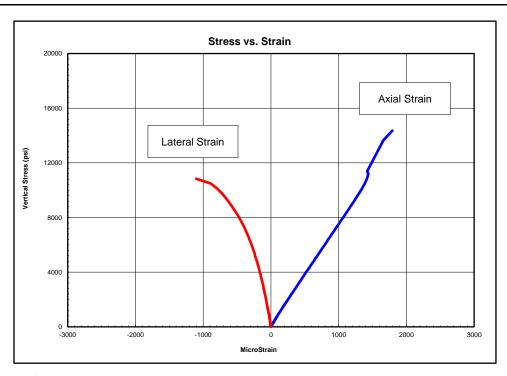


After break



Client:	WSP USA, Inc.
Project Name:	MaineDOT I-95 Bridge over Stillwater
Project Location:	Merrimack, NH
GTX #:	319180
Test Date:	8/29/2024
Tested By:	gp
Checked By:	jsc
Boring ID:	BB-BSA-101
Sample ID:	R-4
Depth, ft:	37-37.3
Sample Type:	rock core
Sample Description:	See photographs Intact material failure Best Effort end preparation performed

## Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 14,361 ps

The lateral strain gauges failed before the peak value was attained. Poisson's Ratio could not be determined within the second and third stress ranges.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
1400-5300	7,410,000	0.34
5300-9100	7,340,000	
9100-12900	11,000,000	

Notes:

Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.

Calculations assume samples are isotropic, which is not necessarily the case.

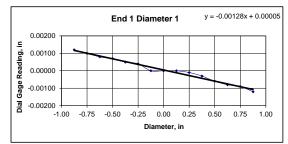


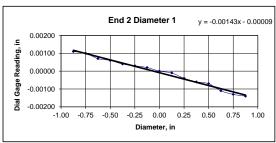
Client:	WSP USA, Inc.	Test Date:	8/28/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By:	gp
Project Location:	Merrimack, NH	Checked By:	smd
GTX #:	319180		
Boring ID:	BB-BSA-101		
Sample ID:	R-4		
Depth (ft):	37-37.3		
Visual Description:	See photographs		

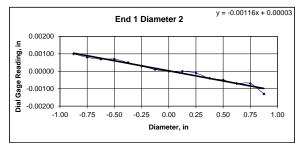
### UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

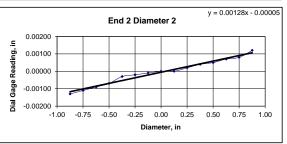
				DEVIATION FROM STRAIGHTNESS (Procedure S1)
1	2	Average		
4.33	4.33	4.33		Maximum gap between side of core and reference surface plate:
1.97	1.97	1.97		Is the maximum gap $\leq$ 0.02 in.? YES
589.14				
170	Minimum Diameter Tolerence Met	t?	YES	Maximum difference must be < 0.020 in.
2.2	Length to Diameter Ratio Tolerand	ce Met?	YES	Straightness Tolerance Met? YES
	1.97 589.14	1.97 1.97 589.14 170 Minimum Diameter Tolerence Me	4.33 4.33 4.33 1.97 1.97 1.97 589.14	1.97 1.97 1.97 589.14 170 Minimum Diameter Tolerence Met? YES

END FLATNESS AND PARALL	ELISM (Proced	lure FP1)													
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00120	0.00100	0.00080	0.00070	0.00050	0.00040	0.00000	0.00000	0.00000	-0.00010	-0.00030	-0.00060	-0.00080	-0.00090	-0.00120
Diameter 2, in (rotated 90°)	0.00100	0.00080	0.00070	0.00070	0.00050	0.00030	0.00010	0.00000	0.00000	-0.00010	-0.00040	-0.00050	-0.00070	-0.00070	-0.00130
											Difference between	en max and m	in readings, in:		
											0° =	0.00240	90° =	0.00230	
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00110	0.00100	0.00070	0.00060	0.00040	0.00030	0.00020	0.00000	-0.00010	-0.00040	-0.00060	-0.00070	-0.00110	-0.00130	-0.00140
Diameter 2, in (rotated 90°)	-0.00130	-0.00110	-0.00090	-0.00070	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00020	0.00040	0.00050	0.00070	0.00080	0.00120
											Difference between	en max and m	in readings, in:		
											0° =	0.0025	90° =	0.0025	
											Maximum differe	nce must be <	0.0020 in.	Difference = +	0.00125









.00128 .07334 .00143 .08218
.07334 .00143 .08218
.07334 .00143 .08218
.07334 .00143 .08218
.00143 .08218
.08218
.08218
.00884
NO
.00116
.06630
.00128
.07317
.00688
NO

Flatness Tolerance Met?

PERPENDICULARITY (Procedu	re P1) (Calculated from End Flatness	and Parallelism m	easurements a	bove)		
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?	Maximum angle of departure must be $\leq 0.25^{\circ}$
Diameter 1, in	0.00240	1.970	0.00122	0.070	YES	
Diameter 2, in (rotated 90°)	0.00230	1.970	0.00117	0.067	YES	Perpendicularity Tolerance Met? YES
END 2						
Diameter 1, in	0.00250	1.970	0.00127	0.073	YES	
Diameter 2, in (rotated 90°)	0.00250	1.970	0.00127	0.073	YES	



Client:	WSP USA, Inc.	Test Date: 8/28/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By: gp
Project Location:	Merrimack, NH	Checked By: smd
GTX #:	319180	
Boring ID:		Reliable dial gauge measurements could not be
Sample ID:	R-4	performed on this rock type. Tolerance measurements were performed using a
Depth (ft):	37-37.3	machinist straightedge and feeler gauges to
Visual Description:	See photographs	ASTM specifications.

## BEST EFFORT END FLATNESS TOLERANCES OF ROCK CORE SPECIMENS TO ASTM D4543

END FLATNESS							
END 1							
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES					
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES					
END 2							
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES					
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES					
End Flatness Tolerance Met? YES							



Client: WSP USA, Inc. Project Name: MaineDOT I-95 Bridge over Stillwater Project Location: Merrimack, NH GTX #: 319180 Test Date: 8/29/2024 Tested By: gp Checked By: smd Boring ID: BB-BSA-101 Sample ID: R-4



Depth, ft:

After cutting and grinding

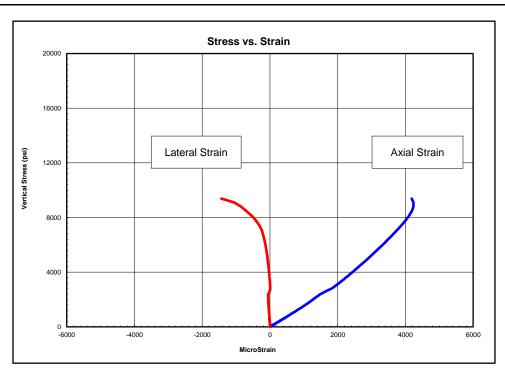


After break



Client:	WSP USA, Inc.
Project Name:	MaineDOT I-95 Bridge over Stillwater
Project Location:	Merrimack, NH
GTX #:	319180
Test Date:	8/29/2024
Tested By:	gp
Checked By:	jsc
Boring ID:	BB-BSA-105
Sample ID:	R-1
Depth, ft:	28.8-29.1
Sample Type:	rock core
Sample Description:	See photographs Intact material failure Best Effort end preparation performed

## Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 9,458 ps

Poisson's Ratio within the first and third stress ranges could not be determined.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
900-3500	1,610,000	
3500-6000	2,190,000	0.10
6000-8500	2,730,000	

Notes:

Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.

Calculations assume samples are isotropic, which is not necessarily the case.

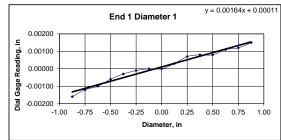


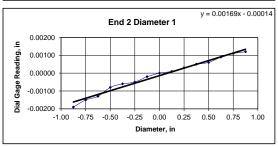
Client:	WSP USA, Inc.	Test Date:	8/28/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By:	gp
Project Location:	Merrimack, NH	Checked By:	smd
GTX #:	319180		
Boring ID:	BB-BSA-105		
Sample ID:	R-1		
Depth (ft):	28.8-29.1		
Visual Description:	See photographs		

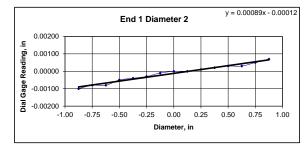
### UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

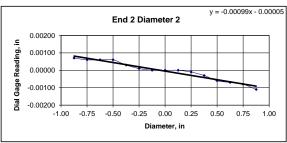
BULK DENSITY					DEVIATION FROM STRAIGHTNESS (Procedure S1)
	1	2	Average		
Specimen Length, in:	4.30	4.30	4.30		Maximum gap between side of core and reference surface plate:
Specimen Diameter, in:	1.96	1.96	1.96		Is the maximum gap ≤ 0.02 in.? YES
Specimen Mass, g:	582.84				
Bulk Density, lb/ft3	171	Minimum Diameter Tolerence Met?	Y	'ES	Maximum difference must be < 0.020 in.
Length to Diameter Ratio:	2.2	Length to Diameter Ratio Tolerance	Met?	'ES	Straightness Tolerance Met? YES

<b>END FLATNESS AND PARALL</b>	ELISM (Proced	lure FP1)													
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00160	-0.00120	-0.00100	-0.00060	-0.00030	-0.00010	0.00000	0.00000	0.00030	0.00070	0.00080	0.00080	0.00110	0.00120	0.00150
Diameter 2, in (rotated 90°)	-0.00100	-0.00080	-0.00080	-0.00050	-0.00040	-0.00030	-0.00010	0.00000	0.00000	0.00010	0.00020	0.00030	0.00030	0.00050	0.00070
											Difference between	en max and m	in readings, in:		
											0° =	0.00310	90° =	0.00170	
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00190	-0.00150	-0.00130	-0.00080	-0.00060	-0.00050	-0.00020	0.00000	0.00010	0.00030	0.00050	0.00060	0.00090	0.00110	0.00120
Diameter 2, in (rotated 90°)	0.00070	0.00060	0.00060	0.00060	0.00030	0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00030	-0.00060	-0.00070	-0.00080	-0.00110
											Difference between	en max and m	in readings, in:		
											0° =	0.0031	90° =	0.0018	
											Maximum differe	ence must be <	0.0020 in.	Difference = $\pm$	0.00155









DIAMETER 1			
End 1	:		
	Slope of Best Fit Line	0.00164	
	Angle of Best Fit Line:	0.09396	
End 2			
	Slope of Best Fit Line	0.00169	
	Angle of Best Fit Line:	0.09675	
Maximum Ang	ular Difference:	0.00278	
		VEC	
	Parallelism Tolerance Met? Spherically Seated	123	
DIAMETER 2		123	
DIAMETER 2 End 1	Spherically Seated		
	Spherically Seated  Slope of Best Fit Line	0.00089	
	Spherically Seated		
DIAMETER 2 End 1 End 2	Spherically Seated  Slope of Best Fit Line Angle of Best Fit Line:	0.00089 0.05091	
End 1	Spherically Seated  Slope of Best Fit Line Angle of Best Fit Line: Slope of Best Fit Line	0.00089 0.05091 0.00099	
End 1	Spherically Seated  Slope of Best Fit Line Angle of Best Fit Line:	0.00089 0.05091	
End 1	Spherically Seated  Slope of Best Fit Line Angle of Best Fit Line: Slope of Best Fit Line	0.00089 0.05091 0.00099	

Flatness Tolerance Met?

NO

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)								
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?	Maximum angle of departure must be $\leq$ 0.25°		
Diameter 1, in	0.00310	1.960	0.00158	0.091	YES			
Diameter 2, in (rotated 90°)	0.00170	1.960	0.00087	0.050	YES	Perpendicularity Tolerance Met?	YES	
END 2								
Diameter 1, in	0.00310	1.960	0.00158	0.091	YES			
Diameter 2, in (rotated 90°)	0.00180	1.960	0.00092	0.053	YES			



Client:	WSP USA, Inc.	Test Date: 8/28/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By: gp
Project Location:	Merrimack, NH	Checked By: smd
GTX #:	319180	
Boring ID:		Reliable dial gauge measurements could not be
Sample ID:	V-1	performed on this rock type. Tolerance measurements were performed using a
Depth (ft):	28.8-29.1	machinist straightedge and feeler gauges to
Visual Description:	See photographs	ASTM specifications.

## BEST EFFORT END FLATNESS TOLERANCES OF ROCK CORE SPECIMENS TO ASTM D4543

END FLATNESS							
END 1							
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES					
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES					
END 2							
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES					
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES					
End Flatness Tolerance Met? YES							



Client: WSP USA, Inc. Project Name: MaineDOT I-95 Bridge over Stillwater Project Location: Merrimack, NH GTX #: 319180 Test Date: 8/29/2024 Tested By: gp Checked By: smd Boring ID: BB-BSA-105 Sample ID: R-1



28.8-29.1

Depth, ft:

After cutting and grinding

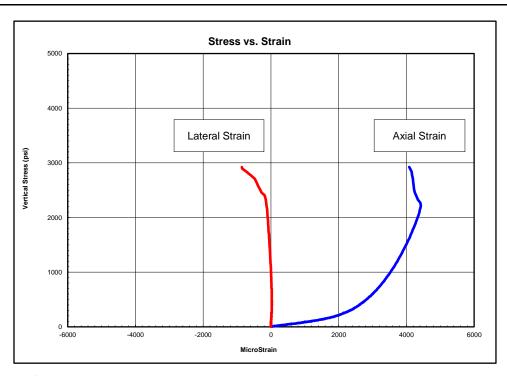


After break



Client:	WSP USA, Inc.
Project Name:	MaineDOT I-95 Bridge over Stillwater
Project Location:	Merrimack, NH
GTX #:	319180
Test Date:	8/29/2024
Tested By:	gp
Checked By:	jsc
Boring ID:	BB-BSA-106
Sample ID:	R-3
Depth, ft:	69.3-69.6
Sample Type:	rock core
Sample Description:	See photographs Intact material failure Best Effort end preparation performed

## Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress:

3,226 psi

The strain gauges failed before the peak value was attained. Young's Modulus and Poisson's Ratio could not be determined within the third stress range.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
300-1200	626,000	0.03
1200-2000	1,310,000	0.14
2000-2900		

Notes:

Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.

Calculations assume samples are isotropic, which is not necessarily the case.

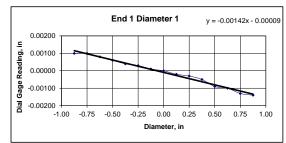


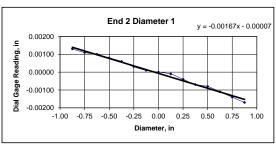
Client:	WSP USA, Inc.	Test Date:	8/28/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By:	gp
Project Location:	Merrimack, NH	Checked By:	smd
GTX #:	319180		
Boring ID:	BB-BSA-106		
Sample ID:	R-3		
Depth (ft):	69.3-69.6		
Visual Description:	See photographs		

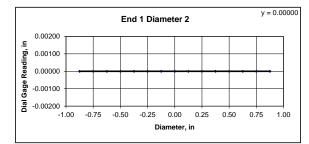
### UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

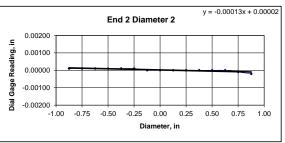
BULK DENSITY					DEVIATION FROM STRAIGHTNESS (Procedure S1)
	1	2	Average		
Specimen Length, in:	4.40	4.40	4.40		Maximum gap between side of core and reference surface plate:
Specimen Diameter, in:	1.96	1.96	1.96		Is the maximum gap $\leq$ 0.02 in.?
Specimen Mass, g:	603.87				
Bulk Density, lb/ft3	173	Minimum Diameter Tolerence Met?	?	YES	Maximum difference must be $< 0.020$ in.
Length to Diameter Ratio:	2.2	Length to Diameter Ratio Toleranc	e Met?	YES	Straightness Tolerance Met? NO

END FLATNESS AND PARALL	END FLATNESS AND PARALLELISM (Procedure FP1)														
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00100	0.00100	0.00080	0.00060	0.00040	0.00030	0.00010	0.00000	-0.00020	-0.00030	-0.00050	-0.00090	-0.00100	-0.00130	-0.00140
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
											Difference between	een max and m	in readings, in:		
											0° =	0.00240	90° =	0.00000	
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00130	0.00110	0.00100	0.00080	0.00060	0.00030	0.00010	0.00000	-0.00010	-0.00040	-0.00070	-0.00080	-0.00110	-0.00140	-0.00170
Diameter 2, in (rotated 90°)	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020
											Difference between	een max and m	in readings, in:		
											0° =	0.003	90° =	0.0003	
											Maximum differe	ence must be <	0.0020 in.	Difference = +	0.00150









DIAMETER 1			
End 1:	Slope of Best Fit Line	0.00142	
	Angle of Best Fit Line:	0.08152	
End 2:			
	Slope of Best Fit Line Angle of Best Fit Line:	0.00167 0.09560	
Maximum Angu	ular Difference:	0.01408	
	Parallelism Tolerance Met? Spherically Seated	NO	
	Parallelism Tolerance Met? Spherically Seated	NO	
DIAMETER 2		NO	
DIAMETER 2 End 1:	Spherically Seated		
	Spherically Seated  Slope of Best Fit Line	0.00000 0.00000	
	Spherically Seated  Slope of Best Fit Line Angle of Best Fit Line:	0.00000	
End 1:	Slope of Best Fit Line Angle of Best Fit Line: Slope of Best Fit Line	0.00000	
End 1:	Slope of Best Fit Line Angle of Best Fit Line: Slope of Best Fit Line	0.00000 0.00000 0.00013	

Flatness Tolerance Met?

PERPENDICULARITY (Procedure	PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)										
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?	Maximum angle of departure must be $\leq 0.25^{\circ}$					
Diameter 1, in	0.00240	1.960	0.00122	0.070	YES						
Diameter 2, in (rotated 90°)	0.00000	1.960	0.00000	0.000	YES	Perpendicularity Tolerance Met? YES					
END 2											
Diameter 1, in	0.00300	1.960	0.00153	0.088	YES						
Diameter 2, in (rotated 90°)	0.00030	1.960	0.00015	0.009	YES						
İ											



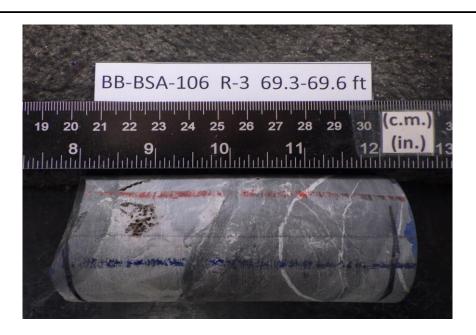
Client:	WSP USA, Inc.	Test Date: 8/28/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By: gp
Project Location:	Merrimack, NH	Checked By: smd
GTX #:	319180	
Boring ID:		Reliable dial gauge measurements could not be
Sample ID:	K-2	performed on this rock type. Tolerance measurements were performed using a
Depth (ft):	69.3-69.6	machinist straightedge and feeler gauges to
Visual Description:	See photographs	ASTM specifications.

## BEST EFFORT END FLATNESS TOLERANCES OF ROCK CORE SPECIMENS TO ASTM D4543

END FLATNESS												
END 1												
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES										
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES										
END 2												
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES										
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES										
	End Flatness Tolerance Met? YES											



Client: WSP USA, Inc. Project Name: MaineDOT I-95 Bridge over Stillwater Project Location: Merrimack, NH GTX #: 319180 Test Date: 8/29/2024 Tested By: gp Checked By: smd Boring ID: BB-BSA-106 Sample ID: R-3



69.3-69.6

Depth, ft:

After cutting and grinding

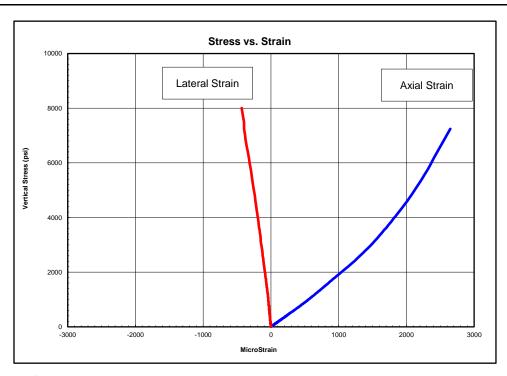


After break



Client:	WSP USA, Inc.
Project Name:	MaineDOT I-95 Bridge over Stillwater
Project Location:	Merrimack, NH
GTX #:	319180
Test Date:	8/29/2024
Tested By:	gp
Checked By:	jsc
Boring ID:	BB-BSA-111
Sample ID:	R-1
Depth, ft:	21.4-21.7
Sample Type:	rock core
Sample Description:	See photographs Intact material and discontinuity failure Best Effort end preparation performed

## Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 8,006 psi

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
800-2900	2,080,000	0.10
2900-5100	3,070,000	0.17
5100-7200	4,360,000	0.29

Notes:

Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.

Calculations assume samples are isotropic, which is not necessarily the case.

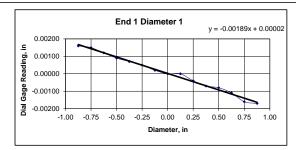


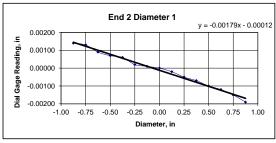
Client:	WSP USA, Inc.	Test Date:	8/28/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By:	gp
Project Location:	Merrimack, NH	Checked By:	smd
GTX #:	319180		
Boring ID:	BB-BSA-111		
Sample ID:	R-1		
Depth (ft):	21.4-21.7		
Visual Description:	See photographs		

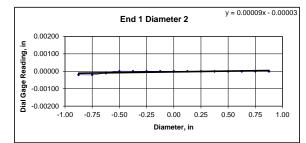
### UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

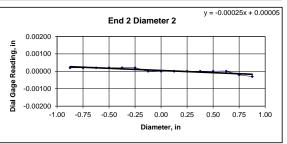
BULK DENSITY				DEVIATION FROM STRAIGHTNESS (Procedure S1)
	1	2	Average	
Specimen Length, in:	4.52	4.52	4.52	Maximum gap between side of core and reference surface plate:
Specimen Diameter, in:	1.96	1.96	1.96	Is the maximum gap ≤ 0.02 in.? NO
Specimen Mass, g:	619.07			
Bulk Density, lb/ft3	173	Minimum Diameter Tolerence Met?	YES	Maximum difference must be < 0.020 in.
Length to Diameter Ratio:	2.3	Length to Diameter Ratio Tolerance Me	et? YES	Straightness Tolerance Met? NO

END FLATNESS AND PARALL	ND FLATNESS AND PARALLELISM (Procedure FP1)														
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00160	0.00150	0.00120	0.00090	0.00070	0.00050	0.00020	0.00000	0.00000	-0.00040	-0.00070	-0.00080	-0.00110	-0.00160	-0.00170
Diameter 2, in (rotated 90°)	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
											Difference between	en max and m	in readings, in:		
											0° =	0.00330	90° =	0.00020	
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00140	0.00130	0.00090	0.00070	0.00060	0.00020	0.00010	0.00000	-0.00020	-0.00050	-0.00070	-0.00100	-0.00120	-0.00150	-0.00190
Diameter 2, in (rotated 90°)	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00020	-0.00030
											Difference between	en max and m	in readings, in:		
											0° =	0.0033	90° =	0.0005	
											Maximum differe	ence must be <	0.0020 in.	Difference = +	0.00165









maxiiiiuiii uiiiei	Flatness Tolerance Met?	_
	riatiless Tolerance Metr	NO
DIAMETER 1		
End 1:		
	Slope of Best Fit Line Angle of Best Fit Line:	0.00189 0.10837
End 2:		
	Slope of Best Fit Line Angle of Best Fit Line:	0.00179 0.10280
Maximum Angu	ılar Difference:	0.00557
	Parallelism Tolerance Met? Spherically Seated	NO
DIAMETER 2		
End 1:		
	Slope of Best Fit Line Angle of Best Fit Line:	0.00009 0.00507
End 2:		
	Slope of Best Fit Line Angle of Best Fit Line:	0.00025 0.01424
Maximum Angu	ılar Difference:	0.00917
	Parallelism Tolerance Met? Spherically Seated	NO

PERPENDICULARITY (Procedu	re P1) (Calculated from End Flatness	and Parallelism m	easurements a	bove)		
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?	Maximum angle of departure must be $\leq 0.25^{\circ}$
Diameter 1, in	0.00330	1.960	0.00168	0.096	YES	
Diameter 2, in (rotated 90°)	0.00020	1.960	0.00010	0.006	YES	Perpendicularity Tolerance Met? YES
END 2						
Diameter 1, in	0.00330	1.960	0.00168	0.096	YES	
Diameter 2, in (rotated 90°)	0.00050	1.960	0.00026	0.015	YES	



Client:	WSP USA, Inc.	Test Date: 8/28/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By: gp
Project Location:	Merrimack, NH	Checked By: smd
GTX #:	319180	
Boring ID:		Reliable dial gauge measurements could not be
Sample ID:	R-1	performed on this rock type. Tolerance measurements were performed using a
Depth (ft):	21.4-21.7	machinist straightedge and feeler gauges to
Visual Description:	See photographs	ASTM specifications.

## BEST EFFORT END FLATNESS TOLERANCES OF ROCK CORE SPECIMENS TO ASTM D4543

END FLATNESS									
END 1									
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES							
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES							
END 2									
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES							
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES							
End Flatness Tolerance Met? YES									



Client: WSP USA, Inc. Project Name: MaineDOT I-95 Bridge over Stillwater Project Location: Merrimack, NH GTX #: 319180 Test Date: 8/29/2024 Tested By: gp Checked By: smd Boring ID: BB-BSA-111 Sample ID: R-1



21.4-21.7

Depth, ft:

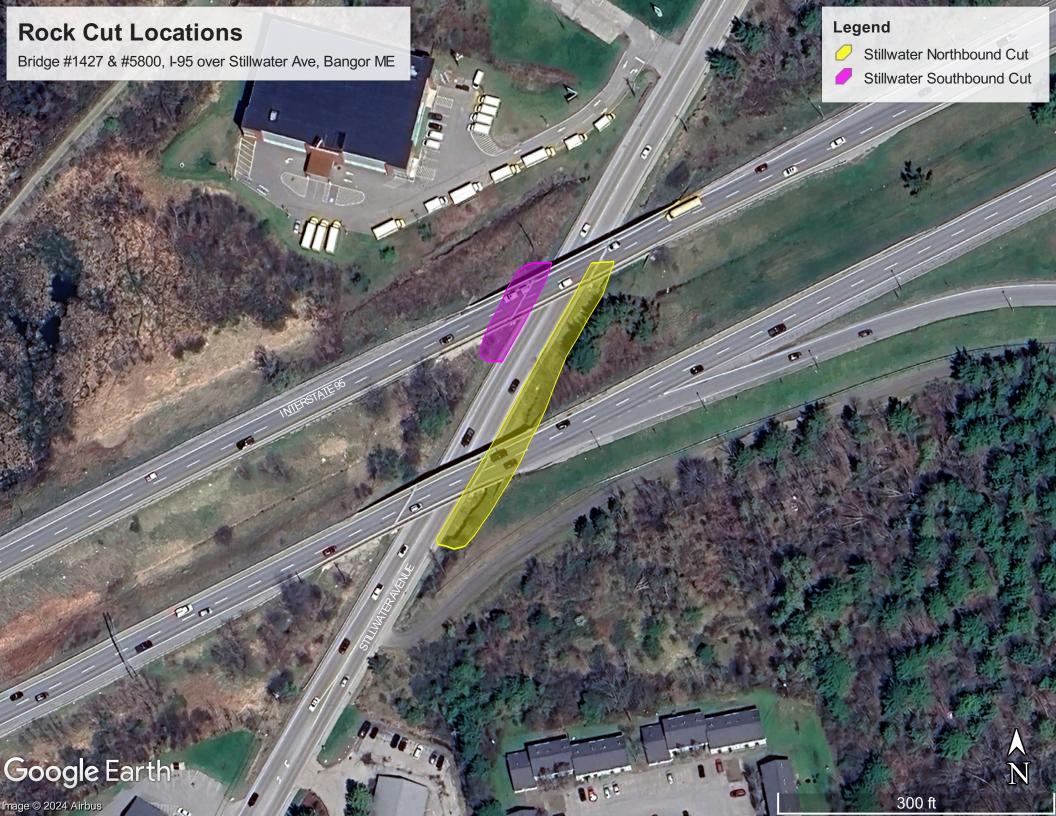
After cutting and grinding

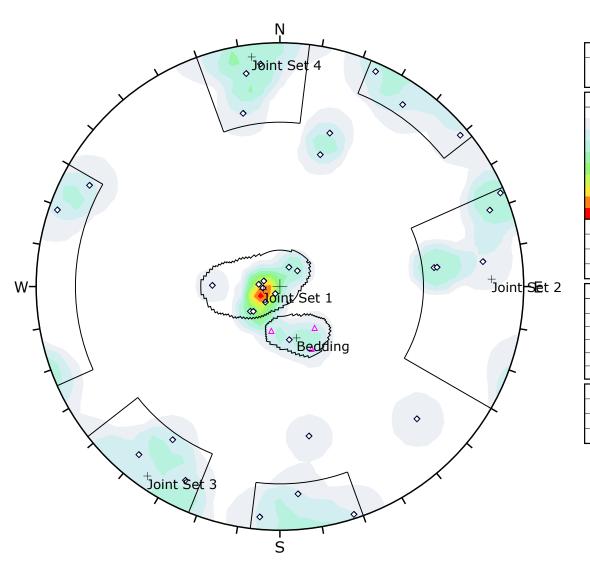


After break

**APPENDIX D** 

**Rock Discontinuity Calculations** 





Symbol	TYPE	Quantity
Δ	bedding	3
<b>♦</b>	joint	34

Color	Dens	ity Co	once	entrations
	0.	.00	-	1.40
	1.	40	-	2.80
	2.	.80	-	4.20
	4.	20	-	5.60
	5.	60	-	7.00
	7.	.00	-	8.40
	8.	40	-	9.80
	9.	.80	-	11.20
	11.	20	-	12.60
	12.	60	-	14.00
	Contour Data	Pol	e Ve	ctors
Ma	ximum Density	13.	44%	
Conto	ur Distribution	Fisl	ner	
Count	ing Circle Size	1.0	%	

	Color	Dip	Dip Direction	Label											
	Mean Set Planes														
1m		8	80	Joint Set 1											
2m		82	268	Joint Set 2											
3m		87	35	Joint Set 3											
4m		87	173	Joint Set 4											
5m		25	342	Bedding											

Plot Mode	Pole Vectors
Vector Count	37 (37 Entries)
Hemisphere	Lower
Projection	Equal Angle



Project		I-95 Bridge	#1427 & #580	over Stillwa	ater Ave, Bango	or ME, MaineDO	T WIN 027176.00							
Analysis D	Analysis Description Outcrops along Stillwater Ave Northbound and Southbound													
Drawn By	KAR	Checked By BK	Review	ed By JDL	Scale	N/A	Annondiv D 1							
Date	5/21/2024	File Name	Stillwa	Appendix D.1										

September 2024 Project No. US0025840.3905

# Appendix D.2: Calculation of Rock Mass Rating Preliminary Geotechnical Design Report Bridge #1427 & #5800, I-95 over Stillwater Ave, Bangor, Maine MaineDOT WIN 027176.00

#### References:

1. Bieniawski, Z.T. 1989. Engineering Rock Mass Classifications: A Complete Manual for Engineers and Geologists in Mining, Civil, and Petroleum Engineering. John Wiley & Sons.

- 2. Wyllie, Duncan C. 1999. Foundations on Rock, 2nd Edition. E&FN Spon.
- 3. Hoek, Evert. 2006. Practical Rock Engineering. Rocscience Inc.

### Notes:

- 1. The RMR ratings for parameter 1 (intact rock strength), parameter 2 (drill core quality RQD), and parameter 3 (discontinuity spacing) are selected using Charts A, B, and C, respectively, from Bieniawski 1989 (Ref. 1). For core runs on which UCS lab testing was not performed, the intact strength rating is selected based on field strength estimates using Table 3.5 from Wyllie 1999 (Ref. 2).
- 2. The RMR ratings for parameter 4 (discontinuity condition) are selected using Section E of Table 4 from Hoek 2006 (Ref. 3).
- 3. The RMR ratings for parameter 5 (groundwater) are selected using Table 3.5 from Wyllie 1999 (Ref. 2).
- 4. For the outcrop discontinuities, the RQD is correlated from discontinuity spacing based on Chart D from Bieniawski 1989 (Ref. 1).
- 5. For the boring core runs, the persistence rating is based on an average of the persistence measurements at the outcrops.
- 6. The rating adjustment for joint orientation (parameter B) is selected from Bieniawski 1989 (Ref. 1), using an orientation adjustment of -15 ("unfavorable" for foundations) for the bedding set based on the kinematic possibility of toppling. Since the boring rock core was collected unoriented, an average of all outcrop orientation adjustments is used for the boring core runs.

Prepared by: KAR Checked by: BK Reviewed by: JDL

Overall average RMR = 54

= 54

Davis	Run Number			Intact Strength		Fracture Spacing			A. Classification Parameters									B. Rating		
Boring or	or	1100	1100		RQD	Average	Average	Average	1	2	3			4				5	adjustment	RMR
Outcrop	Discontinuity	UCS (psi)	UCS (MPa)	Field Strength Estimate	(%)	fractures	spacing		Strength	RQD	Spacing			Condition of	f Joints			Ground	for joint	T COUNTY
	ID	(601)	(Wii G)			per foot	(ft)	(mm)	of rock	NQD	of joints	Persistence	Aperture	Roughness	Infilling	Weathering	Total	water	orientation	
	R1	-	-	Very Strong (R5)	0	broken	-	-	12	3	5	2	0	1	0	5	8	7	-4	31
BB-BSA-101	R2	-	-	Strong (R4) to Very Strong (R5)	0	broken	-	-	7	3	5	2	0	5	0	5	12	7	-4	30
DD-D3A-101	R3	-	-	Strong (R4) to Very Strong (R5)	14	3.5	0.3	87	7	5	6	2	0	5	6	5	18	7	-4	39
	R4	-	-	Strong (R4)	60	1.6	0.6	191	9	12	8	2	5	5	6	6	24	7	-4	56
BB-BSA-102	R1	17,296	119	Strong (R4) to Extremely Strong (R6)	52	3.2	0.3	95	11	10	6	2	0	1	2	5	10	7	-4	40
DD-DOA-102	R2	-	-	Extremely Strong (R6)	88	0.2	5.0	1524	15	18	16	2	0	6	6	6	20	7	-4	72
BB-BSA-103	R1	-	-	Extremely Strong (R6)	31	4.0	0.3	76	15	7	6	2	1	1	4	5	13	7	-4	44
DD-DOA-103	R2	-	-	Extremely Strong (R6)	70	2.0	0.5	152	15	14	7	2	4	5	6	6	23	7	-4	62
	R1	-	-	Strong (R4) to Very Strong (R5)	56	1.6	0.6	191	7	11	8	2	0	5	0	5	12	7	-4	41
BB-BSA-104A	R2	-	-	Strong (R4) to Very Strong (R5)	61	0.5	2.0	610	7	12	12	2	5	5	6	6	24	7	-4	58
	R3	-	-	Strong (R4) to Very Strong (R5)	23	3.5	0.3	87	7	6	6	2	0	5	6	6	19	7	-4	41
BB-BSA-105	R1	-	-	Strong (R4)	30	3.2	0.3	95	7	7	6	2	0	5	6	5	18	7	-4	41
DD-DOA-103	R2	-	-	Very Strong (R5)	75	1.6	0.6	191	12	15	8	2	5	1	6	6	20	7	-4	58
	R1	-	-	Strong (R4) to Very Strong (R5)	0	broken	-	-	7	3	5	2	0	5	6	5	18	7	-4	36
BB-BSA-106	R2	-	-	Strong (R4) to Very Strong (R5)	47	3.3	0.3	92	7	10	6	2	0	1	0	6	9	7	-4	35
	R3	-	-	Weak (R2)	62	1.4	0.7	218	3	12	8	2	0	5	6	6	19	7	-4	45
	R1	-	-	Strong (R4)	0	broken	-	-	7	3	5	2	0	5	0	1	8	7	-4	26
BB-BSA-107	R2	-	-	Strong (R4)	0	broken	-	-	7	3	5	2	0	6	0	1	9	7	-4	27
DD-D3A-107	R3	-	-	Strong (R4) to Very Strong (R5)	35	3.5	0.3	87	7	8	6	2	0	5	0	5	12	7	-4	36
	R4	-	-	Strong (R4) to Very Strong (R5)	39	3.2	0.3	95	7	8	6	2	0	5	0	5	12	7	-4	36



September 2024 Project No. US0025840.3905

	Run Number			Intact Strength		Frac	cture Spa	cing	A. Classification Parameters									B. Rating		
Boring or	or				RQD	Average	Average	Average	1	2	3			4				5	adjustment	RMR
Outcrop	Discontinuity	UCS	UCS	Field Strength Estimate	(%)	fractures	spacing	spacing	Strength		Spacing			Condition o	f Joints			Ground	for joint	KIVIK
	ID	(psi)	(MPa)	-		per foot	(ft)	(mm)	of rock	RQD	of joints	Persistence	Aperture	Roughness	Infilling	Weathering	Total	water	orientation	
	R1	_	_	Very Strong (R5) to Extremely Strong (R6)	58	2.6	0.4	117	12	11	7	2	0	5	6	5	18	7	-4	51
	R2	_	_	Extremely Strong (R6)	42	1.0	1.0	305	15	9	9	2	1	1	6	5	15	7	-4	51
BB-BSA-108	R3	-	-	Extremely Strong (R6)	17	2.5	0.4	122	15	5	7	2	1	1	6	5	15	7	-4	45
	R4	-	_	Extremely Strong (R6)	35	2.0	0.5	152	15	8	7	2	1	1	6	5	15	7	-4	48
	R1	-	-	Very Strong (R5) to Extremely Strong (R6)	30	1.8	0.6	169	12	7	7	2	0	1	6	5	14	7	-4	43
BB-BSA-109A	R2	-	-	Very Strong (R5) to Extremely Strong (R6)	49	1.6	0.6	191	12	10	8	2	1	1	6	6	16	7	-4	49
	R1	5,948	41	Medium Strong (R3)	49	1.0	1.0	305	5	10	9	2	1	1	6	6	16	7	-4	43
BB-BSA-110	R2	-	-	Very Strong (R5) to Extremely Strong (R6)	71	0.8	1.3	381	12	14	10	2	0	1	6	6	15	7	-4	54
55 504 444	R1	_	-	Strong (R4) to Very Strong (R5)	15	broken	-	-	6	5	5	2	0	5	6	5	18	7	-4	37
BB-BSA-111	R2	_	-	Strong (R4) to Very Strong (R5)	60	1.6	0.6	191	7	12	8	2	5	5	6	6	24	7	-4	54
	Disc. 1	-	-	-	20	-	0.2	61	15	5	6	2	1	5	6	5	19	10	-15	40
	Disc. 2	-	_	-	93	-	1.5	457	15	19	10	2	0	3	0	5	10	10	0	64
	Disc. 3	-	-	-	99	-	2.8	853	15	20	13	6	0	3	6	5	20	10	0	78
	Disc. 4	-	-	-	85	-	0.9	274	15	17	9	4	0	1	0	5	10	10	-15	46
	Disc. 5	-	-	-	100	-	5.9	1798	15	20	16	4	1	1	6	5	17	10	0	78
	Disc. 6	-	-	-	95	-	1.6	488	15	19	11	2	1	3	6	5	17	10	0	72
	Disc. 7	_	-	R6	41	-	0.3	91	15	9	6	2	6	5	6	5	24	10	-15	49
	Disc. 8	-	-	-	100	-	5.9	1798	15	20	16	6	0	1	0	5	12	10	0	73
	Disc. 9	-	-	-	88	-	1.1	335	4	18	9	2	1	3	6	5	17	10	0	58
	Disc. 10	_	-	-	86	-	1.0	305	4	17	9	2	0	3	2	5	12	10	0	52
	Disc. 11	-	-	R3	100	-	3.7	1128	4	20	14	4	0	5	2	5	16	10	0	64
	Disc. 12	-	-	-	100	-	4.5	1372	4	20	15	2	1	3	6	5	17	10	0	66
	Disc. 13	-	-	-	100	-	5.4	1646	4	20	16	4	1	3	6	5	19	10	-15	54
	Disc. 14	-	-	-	85	-	0.9	274	15	17	9	2	0	3	2	5	12	10	0	63
Outcrop along	Disc. 15	-	-	R6	100	-	5.1	1554	15	20	16	4	6	1	6	5	22	10	-15	68
Stillwater Ave	Disc. 16	-	-	-	91	-	1.3	396	15	18	10	2	0	5	2	5	14	10	0	67
Northbound	Disc. 17	-	-	-	99	-	2.5	762	15	20	13	2	1	3	2	5	13	10	0	71
	Disc. 18	-	-	-	99	-	2.5	762	15	20	13	2	6	1	6	5	20	10	0	78
	Disc. 19	-	-	-	96	-	1.8	549	12	19	11	2	1	5	6	5	19	10	0	71
	Disc. 20	-	-	-	96	-	1.7	518	12	19	11	2	0	3	0	5	10	10	-15	47
	Disc. 21	-	-	-	56	-	0.4	122	12	11	7	4	1	1	6	5	17	10	-15	42
	Disc. 22	-	-	-	96	-	1.8	549	12	19	11	2	1	3	6	5	17	10	-15	54
	Disc. 23	-	-	R5	98	-	2.0	610	12	20	12	2	0	1	2	5	10	10	0	64
	Disc. 24	-	-	-	92	-	1.4	427	12	18	10	2	6	3	6	5	22	10	0	72
	Disc. 25	-	-	R6	99	-	2.3	701	15	20	12	2	6	3	6	5	22	10	0	79
	Disc. 26	-	-	-	99	-	2.2	671	15	20	12	2	0	1	2	5	10	10	0	67
	Disc. 27	-	-	-	100	-	4.0	1219	15	20	15	2	0	1	0	5	8	10	0	68
	Disc. 28	-	-	-	96	-	1.8	549	15	19	11	2	0	5	2	5	14	10	0	69
	Disc. 29	-	-	R6	99	-	2.2	671	15	20	12	2	1	5	4	5	17	10	0	74
	Disc. 30	-	-	R6	95	-	1.6	488	15	19	11	2	0	3	2	5	12	10	0	67
	Disc. 31	-	-	R6	99	-	2.3	701	15	20	12	4	0	3	0	5	12	10	0	69



September 2024 Project No. US0025840.3905

	Run Number			Intact Strength		Fracture Spacing			A. Classification Parameters									B. Rating		
Boring or	or	LICC	UCS		RQD	Average fractures	Average	Average	1	2	3			4				5	adjustment	RMR
ID	Discontinuity	UCS (psi)	(MPa)	Field Strength Estimate	(%)		spacing	spacing	Strength		Spacing			Condition of				Ground	for joint	TXIVITX
	ID	( /	( 4.)			per foot		(mm)	of rock	NQD	of joints	Persistence	Aperture	Roughness	Infilling	Weathering	Total	water	orientation	
	Disc. 32	-	-	-	85	-	0.9	274	15	17	9	4	0	6	0	5	15	10	0	66
0	Disc. 33	-	-	-	20	-	0.2	61	15	5	6	4	1	5	2	5	17	10	0	53
Outcrop along Stillwater Ave	Disc. 34	-	-	-	41	-	0.3	91	12	9	6	4	1	6	2	5	18	10	-15	40
Southbound	Disc. 35	-	-	-	98	-	2.0	610	12	20	12	4	0	5	6	5	20	10	0	74
	Disc. 36	-	-	R5	76	-	0.6	183	12	15	8	6	1	1	2	5	15	10	0	60
	Disc. 37	-	-	-	56	-	0.4	122	12	11	7	4	0	1	6	5	16	10	-15	41

Appendix D.3: Calculation of Geological Strength Index

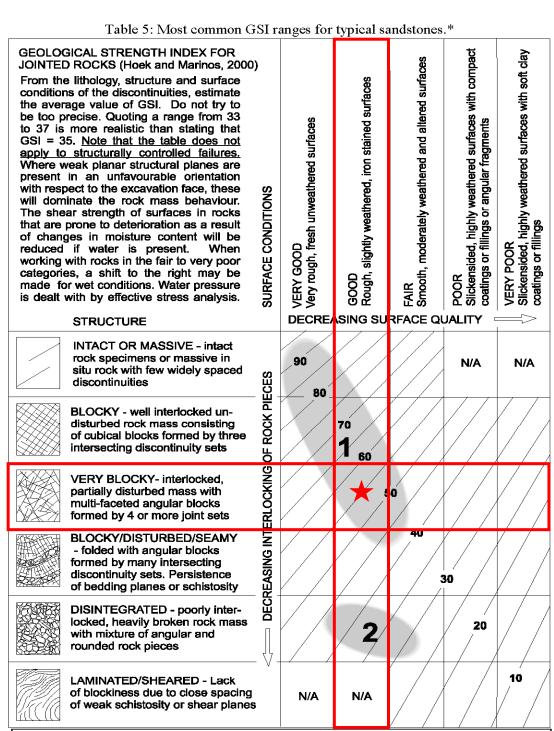
**Preliminary Geotechnical Design Report** 

Bridge #1427 & #5800, I-95 over Stillwater Ave, Bangor, Maine

**MaineDOT WIN 027176.00** 

Prepared by: KAR Checked by: BK Reviewed by: JDL

GSI = 55



### \*WARNING:

The shaded areas are indicative and may not be appropriate for site specific design purposes. Mean values are not suggested for indicative characterisation; the use of ranges is recommended

- 1. Massive or bedded (no clayey cement present)
- 2. Brecciated (no clayey cement present)

GSI chart from: Marinos, Paul, and Hoek, Evert. November 2000. GSI: a geologically friendly tool for rock mass strength estimation. ISRM International Symposium, Melbourne, Australia, paper number ISRM-IS-2000-035.



