



## REPORT

# Preliminary Geotechnical Data Report REV01

*Interstate 95 Bridges 1427 and 5800 over Stillwater Avenue, Bangor, Maine  
(WIN 027176.00)*

Submitted to:

**Maine Department of Transportation**

Submitted by:

**WSP USA, Inc.**

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WIN 027176.00 / WSP US0025840.3905

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# Table of Contents

1.0 INTRODUCTION .....1

2.0 PROJECT UNDERSTANDING .....1

3.0 GEOLOGIC SETTING .....1

4.0 SUBSURFACE INVESTIGATIONS.....1

    4.1 Geotechnical Borings .....1

    4.2 Geologic Evaluation of Exposed Rock Cuts .....2

5.0 LABORATORY TESTING PROGRAM .....2

6.0 SUBSURFACE CONDITIONS .....3

7.0 CONDITIONS OF EXPOSED ROCK CUTS .....5

8.0 REPORT AND EXPLORATION LIMITATIONS.....5

TABLES

Table 5-1: Number and Type of Laboratory Tests Performed .....3

Table 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



## **APPENDICES**

### **APPENDIX A**

Boring Logs

### **APPENDIX B**

Rock Core Photographs

### **APPENDIX C**

Laboratory Test Results

### **APPENDIX D**

Rock Discontinuity Calculations

### **APPENDIX E**

Rock Cut Discontinuity Photographs

## 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

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<sup>1</sup> 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>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>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  $N_{60}$  values. Uncorrected N-values and  $N_{60}$  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. The general locations of the exposed rock cuts are shown in plan view in Appendix D. During the site visit, WSP measured 37 geologic discontinuities and photographed existing rock cut conditions. Photographs of the existing rock cut conditions and discontinuities evaluated are presented in Appendix E. Our discontinuity measurements and observations are summarized 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

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<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.

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.

**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
pH	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 ( <i>Encountered in all borings</i> )
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) ( <i>Encountered in all borings</i> )
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

Stratigraphic Unit	Approximate Range in Encountered Thickness (feet)	Generalized Description
		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)
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 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. Photographs of the rock cuts evaluated are presented in Appendix E. 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.

## 8.0 REPORT AND EXPLORATION LIMITATIONS

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.

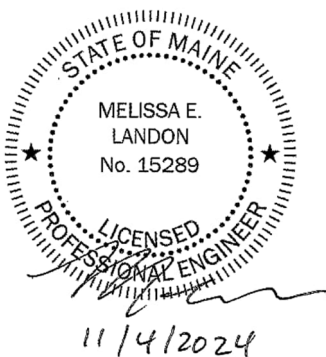
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<sup>5</sup> Bieniawski, Z.T. 1989. Engineering Rock Mass Classifications: A Complete Manual for Engineers and Geologists in Mining, Civil, and Petroleum Engineering. John Wiley & Sons.

<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

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TABLES

**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>				Approximate Strata Thickness (feet)						Approximate	Approximate	Approximate	Approximate
	Test Boring No. <sup>1,2,3</sup>	Northing	Easting	Ground Surface Elevation <sup>4</sup> (feet NAVD88)	Asphalt	Fill	Sand, Silt, Gravel <sup>6</sup>	Clay	Glacial Till	Weathered Bedrock	Top of Bedrock Depth (feet bgs <sup>5</sup> )	Elevation of Top of Bedrock (feet NAVD88)	Bottom of Exploration Depth (ft) (feet bgs <sup>5</sup> )	Elevation of Bottom of Exploration (feet NAVD88)
South bound Bridge #1427	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
	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
	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
	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
	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
	BB-BSA-105	482984.90	1735593.56	152.1	0.8	12.3	11.9	NE <sup>5</sup>	NE <sup>5</sup>	1.4	26.4	125.7	36.2	115.9
North bound Bridge #5800	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
	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
	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
	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
	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
	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
	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:

- Boring locations are shown in Figure 2 - Boring Location Plan of the Preliminary Geotechnical Data Report.
- 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.
- Boring logs are presented in Appendix A of the Preliminary Geotechnical Data Report.
- As drilled Boring Locations Derived from the Electronic file "Ground.dgn" Provided to WSP by HNTB on August 12, 2024.
- bgs = below ground surface, NE = not encountered
- 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

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	Discontinuity		Dip [degrees]	Uncorrected Dip Direction State Plane Grid North	Corrected Dip Direction State Plane Grid North <sup>(1)</sup>	Set <sup>(2)</sup>	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
	ID	Type		[degrees]	[degrees]											
Stillwater Ave Northbound	1	bedding	32	348	333	5	10	0.13	none	-	rough	undulating to stepped	dry	0.2	Quartz veins 0.25" thick in vicinity	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		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
	15	joint	83	133	118	2	5	tight	none	-	smooth	planar	dry	5.1		68
	16	joint	8	124	109	1	10	0.38	broken rock	high	rough	undulating	dry	1.3		67
	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	Blast fragmentation to south	79
	26	joint	59	212	197	-	15	1.50	quartz	high	smooth	planar	dry	2.2		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	Discontinuity		Dip [degrees]	Uncorrected Dip Direction State Plane Grid North [degrees]	Corrected Dip Direction State Plane Grid North <sup>(1)</sup> [degrees]	Set <sup>(2)</sup>	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
	ID	Type														
Stillwater Ave Southbound	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
	34	joint	66	278	263	2	-	0.13	sandy soil	medium	very rough	planar	dry	0.3		40
	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 stereonet.

(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

Test Boring Designation	Core Size	Run						TCR <sup>1</sup>		RQD <sup>2</sup>		Physical Rock Parameters			Lithologic, Rock Mass and Discontinuity Description <sup>5,6</sup>	
		No.	Midpoint Depth Below Bedrock Surface (ft)	Depth Below Ground Surface (ft)			Length (ft)	Length (ft)	%	Length (ft)	%	Designation	Weathering <sup>3</sup>	Estimated Field Strength <sup>3</sup>		Rock Mass Rating [RMR] <sup>4</sup>
				Start	End	Midpoint										
BB-BSA-101	NX (1.88)	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].
		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].
		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].
		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].

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Test Boring Designation	Core Size	Run						TCR <sup>1</sup>		RQD <sup>2</sup>		Physical Rock Parameters				Lithologic, Rock Mass and Discontinuity Description <sup>5,6</sup>
		No.	Midpoint Depth Below Bedrock Surface (ft)	Depth Below Ground Surface (ft)			Length (ft)	Length (ft)	%	Length (ft)	%	Designation	Weathering <sup>3</sup>	Estimated Field Strength <sup>3</sup>	Rock Mass Rating [RMR] <sup>4</sup>	
				Start	End	Midpoint										
BB-BSA-103	NX (1.88)	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	Grey, very fine to fine grained, METAWACKE [metasandstone] with thin calcite veins 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].
		R2	7.5	12.2	17.2	14.7	5.0	5.0	100%	3.50	70%	Fair	Fresh (W1)	Extremely Strong (R6)	62	Grey, very fine to fine grained, METAWACKE [metasandstone] with thin calcite and 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].
BB-BSA-104A	NX (1.88)	R1	3.1	21.0	26.0	23.5	5.0	4.8	95%	2.80	56%	Fair	Slightly Weathered (W2) to Fresh (W1)	Strong (R4) to Very Strong (R5)	41	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 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].
		R2	7.0	26.0	28.8	27.4	2.8	2.1	75%	1.70	61%	Fair	Fresh (W1)	Strong (R4) to Very Strong (R5)	58	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with calcite veins, strong to very strong, fresh; discontinuities low angle to moderate dipping, very close spacing, rough to very rough, tight, average 0.5 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
		R3	9.5	28.8	31.0	29.9	2.2	2.0	91%	0.50	23%	Very Poor	Fresh (W1)	Strong (R4) to Very Strong (R5)	41	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone], strong to very strong, fresh; discontinuities low angle to steep dipping, very close spacing, rough, tight to open, average 3.5 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
BB-BSA-105	NX (1.88)	R1	2.5	26.4	31.4	28.9	5.0	5.0	100%	1.50	30%	Poor	Slightly Weathered (W2) to Fresh (W1)	Strong (R4)	41	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with calcite veins, strong, slightly weathered to fresh; discontinuities low angle to steep dipping, very close to close spacing, rough to very rough, tight to open, average 3.2 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
		R2	7.4	31.4	36.2	33.8	4.8	4.8	100%	3.60	75%	Fair	Fresh (W1)	Very Strong (R5)	58	Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with calcite veins, very strong, fresh; discontinuities low angle to steep dipping, very close spacing, smooth to rough, tight, average 1.6 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].

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MaineDOT WIN 027176.00

Test Boring Designation	Core Size	Run						TCR <sup>1</sup>		RQD <sup>2</sup>		Physical Rock Parameters				Lithologic, Rock Mass and Discontinuity Description <sup>5,6</sup>
		No.	Midpoint Depth Below Bedrock Surface (ft)	Depth Below Ground Surface (ft)			Length (ft)	Length (ft)	%	Length (ft)	%	Designation	Weathering <sup>3</sup>	Estimated Field Strength <sup>3</sup>	Rock Mass Rating [RMR] <sup>4</sup>	
				Start	End	Midpoint										
BB-BSA-106	NX (1.88)	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].
		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)	45	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].
BB-BSA-107	NX (1.88)	R1	2.3	63.4	67.2	65.3	3.8	0.6	16%	0.00	0%	Very Poor	Highly Weathered (W4)	Strong (R4)	26	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].
		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].

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Test Boring Designation	Core Size	Run						TCR <sup>1</sup>		RQD <sup>2</sup>		Physical Rock Parameters				Lithologic, Rock Mass and Discontinuity Description <sup>5,6</sup>
		No.	Midpoint Depth Below Bedrock Surface (ft)	Depth Below Ground Surface (ft)			Length (ft)	Length (ft)	%	Length (ft)	%	Designation	Weathering <sup>3</sup>	Estimated Field Strength <sup>3</sup>	Rock Mass Rating [RMR] <sup>4</sup>	
				Start	End	Midpoint										
BB-BSA-108	NX (1.88)	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].
		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].
		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 (1.88)	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].
		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 (1.88)	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 BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].
		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].



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		No.	Midpoint Depth Below Bedrock Surface (ft)	Depth Below Ground Surface (ft)			Length (ft)	Length (ft)	%	Length (ft)	%	Designation	Weathering <sup>3</sup>	Estimated Field Strength <sup>3</sup>		Rock Mass Rating [RMR] <sup>4</sup>
				Start	End	Midpoint										
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].
		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].

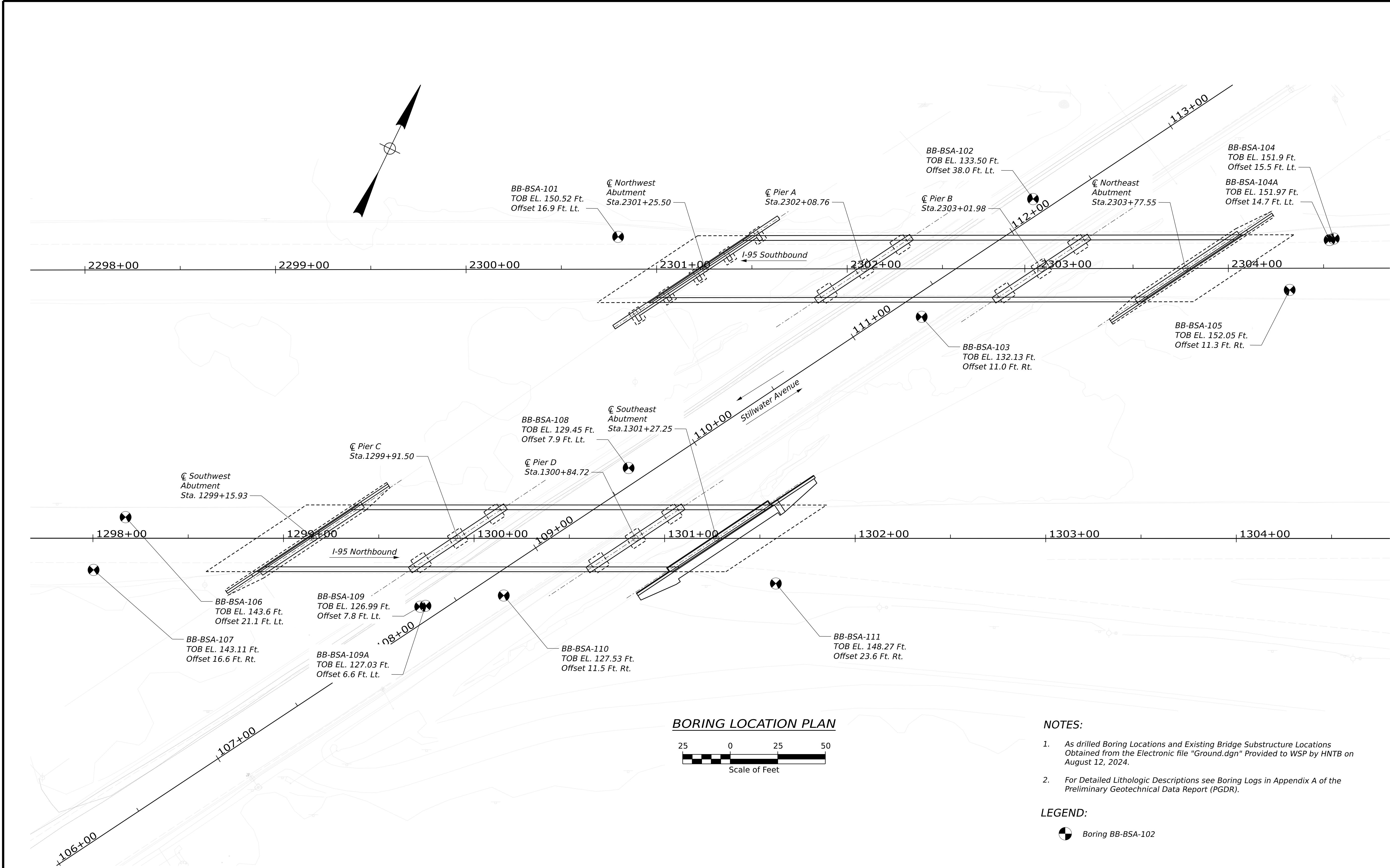
Notes:  
1. TCR = total core recovery. Total core recovery is the length of core recovered divided by the length of the run.  
2. RQD = rock quality designation. RQD is the total length of intact, full diameter core pieces recovered with a length greater than or equal to 4 inches measured along the core 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








- NOTES:
- As drilled Boring Locations and Existing Bridge Substructure Locations Obtained from the Electronic file "Ground.dgn" Provided to WSP by HNTB on August 12, 2024.
  - For Detailed Lithologic Descriptions see Boring Logs in Appendix A of the Preliminary Geotechnical Data Report (PGDR).

LEGEND:

 Boring BB-BSA-102

BANGOR PENOBSCOT COUNTY I-95 NB & SB OVER STILLWATER AVE				PROJ. MANAGER	BY	DATE	STATE OF MAINE DEPARTMENT OF TRANSPORTATION				
BORING LOCATON PLAN				DESIGN-DETAILED			SIGNATURE				
				CHECKED-REVIEWED							
				DESIGN-2 DETAIL ED2							
				DESIGN-3 DETAIL ED3							
				REVISIONS 1							
				REVISIONS 2			P.E. NUMBER				
				REVISIONS 3							
				REVISIONS 4							
				FIELD CHANGES							
SHEET NUMBER				WIN				027176.00			
02				027176.00				BRIDGE PLANS			
OF 02											

**APPENDIX A**

# Boring Logs



UNIFIED SOIL CLASSIFICATION SYSTEM					MODIFIED BURMISTER SYSTEM				
MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES					
COARSE-GRAINED SOILS  (more than half of material is larger than No. 200 sieve size)	GRAVELS  (more than half of coarse fraction is larger than No. 4 sieve size)	CLEAN GRAVELS	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.	<u>Descriptive Term</u>		<u>Portion of Total (%)</u>		
		(little or no fines)	GP	Poorly-graded gravels, gravel sand mixtures, little or no fines.	trace		0 - 10		
					little		11 - 20		
					some		21 - 35		
				adjective (e.g. Sandy, Clayey)		36 - 50			
	SANDS  (more than half of coarse fraction is smaller than No. 4 sieve size)	GRAVEL WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.	<b>TERMS DESCRIBING DENSITY/CONSISTENCY</b>				
		GC	Clayey gravels, gravel-sand-clay mixtures.						
FINE-GRAINED SOILS  (more than half of material is smaller than No. 200 sieve size)		SANDS AND CLAYS  (liquid limit less than 50)	CLEAN SANDS	SW	Well-graded sands, Gravelly sands, little or no fines	<b>Coarse-grained soils</b> (more than half of material is larger than No. 200 sieve): Includes (1) clean gravels; (2) Silty or Clayey gravels; and (3) Silty, Clayey or Gravelly sands. Density is rated according to standard penetration resistance (N-value).			
			(little or no fines)	SP	Poorly-graded sands, Gravelly sand, little or no fines.				
	SANDS AND CLAYS  (liquid limit greater than 50)	SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures	<b>Consistency of Cohesive soils</b>				
		SC	Clayey sands, sand-clay mixtures.	<b>Approximate Undrained Shear Strength (psf)</b>					
									<b>Field Guidelines</b>
</									

**Table A-2****Classification of Rock Material Strengths<sup>1</sup>**

Grade	Description	Field Identification	Approx. Range of Uniaxial Compressive 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>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.

<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine		<b>Boring No.:</b> BB-BSA-101  <b>WIN:</b> 027176.00	
<b>Driller:</b> Seaboard			<b>Elevation (ft.):</b> 150.52		<b>Auger ID/OD:</b>		
<b>Operator:</b> Ryan H.			<b>Datum:</b> Maine East Zone		<b>Sampler:</b> Standard Split Spoon		
<b>Logged By:</b> D. Burgess			<b>Rig Type:</b> Diedrich D-50		<b>Hammer Wt./Fall:</b> 140lb/30in		
<b>Date Start/Finish:</b> 7/29/24 (21:00); 7/30/24 (3:15)			<b>Drilling Method:</b> SSA, Drive & Wash		<b>Core Barrel:</b> NQ/NX		
<b>Boring Location:</b> N: 482856.27, E: 1735264.27			<b>Casing ID/OD:</b> 4" (ID)		<b>Water Level*:</b> 24.8' at 1:47 7/30/24		
<b>Hammer Efficiency Factor:</b> 1.087			<b>Hammer Type:</b> Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>				
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt							
R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person							
S <sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf) S <sub>u(lab)</sub> = Lab Vane Undrained Shear Strength (psf) q <sub>p</sub> = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N <sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency N <sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected							
T <sub>v</sub> = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test							

Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows				
0	1D	24/15	0.70 - 2.70	12-12-12-11	24	43	SSA	149.9		7" Asphalt Pavement  Light Olive Brown, dry, dense, fine to coarse SAND, some gravel, little silt (FILL).  Olive with brown, dry, hard, SILT, some fine to coarse gravel, little fine to coarse sand, non-plastic (FILL).  Olive with brown, dry, hard, SILT, some fine to coarse gravel, little fine to coarse sand, non-plastic (FILL).  Olive with brown, dry to moist (becomes moist at 8.9' bgs), hard, SILT, some fine to coarse sand, little fine to coarse gravel, non-plastic (FILL).  Olive with brown, moist, hard, SILT, some fine to coarse sand, little fine to coarse gravel, non-plastic (FILL).	Fines = 16.8% A-1-b (0), SM
	2D	24/22	2.70 - 4.70	10-21-21-21	42	76					
5	3D	24/22	5.00 - 7.00	15-28-43-42	71	129					
	4D	24/22	7.00 - 9.00	24-16-26-39	42	76					
10	5D	24/22	10.00 - 12.00	11-13-16-17	29	53		182			
								171			
								142			
								85			
								53			
15	6D	22/6	15.00 - 16.83	16-16-10-22	26	47	OPEN		137.0	Olive brown, moist, dense, fine to coarse SAND, some fine to coarse gravel, some silt (SILTY SAND and GRAVEL)  Olive brown, moist, dense, fine to coarse SAND, some fine to coarse gravel, some silt (SILTY SAND and GRAVEL)  Brown, wet, very dense, fine to medium SAND, some fine gravel, some silt (SILTY SAND WITH GRAVEL)  Increased roller bit resistance  Dark grayish brown, wet, very dense, fine to coarse SANDY GRAVEL, little silt (SANDY GRAVEL)	WC = 11.1% Fines = 52.2% A-4 (0), ML
20	7D	24/9	20.00 - 22.00	13-22-30-30	52	94					
25	8D	24/6	25.00 - 27.00	29-33-34-23	67	121					
30											

**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 7/30/24 at 1:47 am 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 3  
  
**Boring No.:** BB-BSA-101

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: MaineDOT I-95 Bridges Over Stillwater Avenue Location: Bangor, Maine		Boring No.: BB-BSA-101							
WIN: 027176.00													
Driller: Seaboard		Elevation (ft.): 150.52		Auger ID/OD:									
Operator: Ryan H.		Datum: Maine East Zone		Sampler: Standard Split Spoon									
Logged By: D. Burgess		Rig Type: Diedrich D-50		Hammer Wt./Fall: 140lb/30in									
Date Start/Finish: 7/29/24 (21:00); 7/30/24 (3:15)		Drilling Method: SSA, Drive & Wash		Core Barrel: NQ/NX									
Boring Location: N: 482856.27, E: 1735264.27		Casing ID/OD: 4" (ID)		Water Level*: 24.8' at 1:47 7/30/24									
Hammer Efficiency Factor: 1.087				Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>									
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt				R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140 lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person				S <sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf) S <sub>u</sub> (lab) = Lab Vane Undrained Shear Strength (psf) q <sub>p</sub> = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N <sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency N <sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected					
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Sample Information													
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 Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class.		
30	9D	8/3	30.00 - 30.67	50/3"	R					Grey, wet, hard, SILT, some fine to coarse sand, some fine to coarse gravel, trace clay, fractured rock fragments (GLACIAL TILL)			
	R-1	10.8/9.6	31.50 - 32.40	RQD = 0%			NQ/NX	119.0					
	R-2	6/6	32.40 - 32.90	RQD = 0%									
	R-3	43.2/43.2	32.90 - 36.50	RQD = 14%									
35													
	R-4	60/60	36.50 - 41.50	RQD = 60%									
40													
45													
50													
55													
60													
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* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.										Boring No.: BB-BSA-101			

<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine				<b>Boring No.:</b> BB-BSA-101  <b>WIN:</b> 027176.00																																																																																														
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<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine		<b>Boring No.:</b> BB-BSA-102  <b>WIN:</b> 027176.00	
<b>Driller:</b> Seaboard			<b>Elevation (ft.):</b> 133.5		<b>Auger ID/OD:</b>		
<b>Operator:</b> Kevin Hanscom			<b>Datum:</b> Maine East Zone		<b>Sampler:</b> Standard Split Spoon		
<b>Logged By:</b> Lina-Maria Pua			<b>Rig Type:</b> Diedrich D-50		<b>Hammer Wt./Fall:</b> 140 lbs/30 in		
<b>Date Start/Finish:</b> 05/07/24 (23:53); 05/08/24 (02:12)			<b>Drilling Method:</b> SSA, Cased Wash		<b>Core Barrel:</b> NX		
<b>Boring Location:</b> N: 482969.08, E: 1735451.57			<b>Casing ID/OD:</b> 3 in/3.25 in		<b>Water Level*:</b> 9.3 ft on 05/08/24 at 01:59		
<b>Hammer Efficiency Factor:</b> 1.066			<b>Hammer Type:</b> Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>				
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt							
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Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows				
0							SSA	132.9		7.5" Asphalt Pavement	
	1D	24/11.5	1.00 - 3.00	14-13-20-38	33	59				Brown, moist, very dense, fine to medium SAND, some fine gravel, little 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 SAND, some fine gravel, non-plastic (FILL). q <sub>p</sub> > 0.9ksf	WC = 8.6% Fines = 38.0% A-4 (0), SM
5	3D	24/11	5.00 - 7.00	47-22-10-12	32	57	40	128.5		Brown to yellow, moist to wet, hard, SILT, some sand, trace gravel, nonplastic to low plasticity (SANDY SILT).	
	4D	24/12	7.00 - 9.00	15-14-9-39	23	41	45			Brown to yellow, wet, hard, SANDY SILT, trace fine gravel, non-plastic to low plasticity (SANDY SILT). q <sub>p</sub> = 0.8ksf, 0.9ksf	Fines = 50.2% A-4 (0), ML
10	5D	24/5	9.00 - 11.00	69-34-27-13	61	108	36	124.5		Brown to yellow, wet, very dense, fine to coarse GRAVEL, some fine to coarse sand, some silt, low to medium plasticity (GRAVEL)	WC = 15.5% Fines = 25.6% A-2-4 (0), GM
	R1	60/54	12.20 - 17.20	RQD = 73%			135	121.3		Bedrock encountered at 12.2 feet bgs Top of Bedrock at Elev. 121.3 ft. R1 (12.2'-17.2'): Grey, very fine to fine grained, thinly to thickly laminated, META WACKE [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, chemical weathering in joints [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION]. Rock Mass Quality = Fair 90% Recovery Rock Core Rate (min:sec) 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) 16.2-17.2 ft (3:19) R2 (17.2'-22.2'): Grey, very fine to fine grained, thinly laminated, META WACKE [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]. Rock Mass Quality = Fair 98% Recovery Rock Core Rate (min:sec) 17.2-18.2 ft (2:54) 18.2-19.2 ft (3:07) 19.2-20.2 ft (2:48) 20.2-21.2 ft (3:15)	
15	R2	60/59	17.20 - 22.20	RQD = 98%				111.3			
20											
25											
30											

**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.

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 2  
  
**Boring No.:** BB-BSA-102

<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine				<b>Boring No.:</b> BB-BSA-102 <b>WIN:</b> 027176.00																																																																																																																																																																																																																																																																
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<b>Boring Location:</b> N: 482969.08, E: 1735451.57				<b>Casing ID/OD:</b> 3 in/3.25 in				<b>Water Level*:</b> 9.3 ft on 05/08/24 at 01:59																																																																																																																																																																																																																																																																
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<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine		<b>Boring No.:</b> BB-BSA-103  <b>WIN:</b> 027176.00					
<b>Driller:</b> Seaboard			<b>Elevation (ft.):</b> 132.13			<b>Auger ID/OD:</b>					
<b>Operator:</b> Kevin Hanscom			<b>Datum:</b> Maine East Zone			<b>Sampler:</b> Standard Split Spoon					
<b>Logged By:</b> Lina-Maria Pua			<b>Rig Type:</b> Diedrich D-50			<b>Hammer Wt./Fall:</b> 140 lbs/30 in					
<b>Date Start/Finish:</b> 05/08/24 (21:32); 05/08/24 (23:30)			<b>Drilling Method:</b> SSA, Cased Wash			<b>Core Barrel:</b> NX					
<b>Boring Location:</b> N: 482888.01, E: 1735425.94			<b>Casing ID/OD:</b> 3 in/3.25 in			<b>Water Level*:</b> 5.2 ft on 05/08/24 at 23:14					
<b>Hammer Efficiency Factor:</b> 1.066			<b>Hammer Type:</b> Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>								
<div style="display: flex; justify-content: space-between; font-size: 0.8em;"> <div>           Definitions:            D = Split Spoon Sample            MD = Unsuccessful Split Spoon Sample Attempt            U = Thin Wall Tube Sample            MU = Unsuccessful Thin Wall Tube Sample Attempt            V = Field Vane Shear Test, PP = Pocket Penetrometer            MV = Unsuccessful Field Vane Shear Test Attempt         </div> <div>           R = Rock Core Sample            SSA = Solid Stem Auger            HSA = Hollow Stem Auger            RC = Roller Cone            WOH = Weight of 140lb. Hammer            WOR/C = Weight of Rods or Casing            WO1P = Weight of One Person         </div> <div>           S<sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf)            S<sub>u</sub>(lab) = Lab Vane Undrained Shear Strength (psf)            q<sub>p</sub> = Unconfined Compressive Strength (ksf)            N-uncorrected = Raw Field SPT N-value            Hammer Efficiency Factor = Rig Specific Annual Calibration Value            N<sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency            N<sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected         </div> <div>           T<sub>v</sub> = Pocket Torvane Shear Strength (psf)            WC = Water Content, percent            LL = Liquid Limit            PL = Plastic Limit            PI = Plasticity Index            G = Grain Size Analysis            C = Consolidation Test         </div> </div>											
Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows				
0							SSA	131.5		Asphalt Pavement Brown, dry, dense, SILTY GRAVEL, some sand, poorly-graded (FILL). 2DA, Top 1 in: Brown, dry, medium dense, SILTY GRAVEL, some sand, poorly-graded (FILL). 2DB, Bottom 11 in: Grey, dry, medium dense, angular GRAVEL, some weathered rock fragments (WEATHERED BEDROCK). Grey, moist to wet, very dense, WEATHERED BEDROCK, some silt, little sand (WEATHERED BEDROCK). Bedrock encountered at 7.2 feet bgs Top of Bedrock at Elev. 124.9 ft R1 (7.2'-12.2'): Grey, very fine to fine grained, METAWACKE [metasandstone] with thin calcite veins 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 BEDDEED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION]. Rock Mass Quality = very poor 100% Recovery Rock Core Rate (min:sec) 7.2-8.2 ft (4:32) 8.2-9.2 ft (4:43) 9.2-10.2 ft (5:32) 10.2-11.2 ft (5:50) 11.2-12.2 ft (6:37) R2 (12.2'-17.2'): Grey, very fine to fine grained, METAWACKE [metasandstone] with thin calcite and 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 BEDDEED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION]. Rock Mass Quality = Excellent 100% Recovery <b>Bottom of Exploration at 17.2 feet below ground surface.</b> Boring backfilled with bentonite chips in the rock core socket, gravel to bottom of pavement and patched with cold patch asphalt.	
	1D	24/16	1.00 - 3.00	21-24-21-21	45	80		129.0			
	2D	24/12	3.00 - 5.00	7-10-6-48	16	28					
5	3D	26.4/15.5	5.00 - 7.20	45-34-45-50/4"	79	140		124.9			
	R1	60/60	7.20 - 12.20	RQD = 31%			NX				
10											
	R2	60/60	12.20 - 17.20	RQD = 71%							
15											
20											
25											
30											

**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 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.




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 1  
  
**Boring No.:** BB-BSA-103



[illegible]

<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine				<b>Boring No.:</b> BB-BSA-104A  <b>WIN:</b> 027176.00				
<b>Driller:</b> Seaboard			<b>Elevation (ft.):</b> 151.97			<b>Auger ID/OD:</b>						
<b>Operator:</b> Ryan H.			<b>Datum:</b> Maine East Zone			<b>Sampler:</b> Standard Split Spoon						
<b>Logged By:</b> D. Burgess			<b>Rig Type:</b> DieDrich D-50			<b>Hammer Wt./Fall:</b> 140lb/30in						
<b>Date Start/Finish:</b> 7/30/24 (23:40); 7/31/24 (2:33)			<b>Drilling Method:</b> SSA, Drive & Wash			<b>Core Barrel:</b> NX						
<b>Boring Location:</b> N: 483017.59, E: 1735600.99			<b>Casing ID/OD:</b> 4" (ID)			<b>Water Level*:</b> Not measured						
<b>Hammer Efficiency Factor:</b> NA			<b>Hammer Type:</b> Automatic <input type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>									
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	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows					
0							SSA	151.3		8" Asphalt pavement		
5												
10												
15										Wood coming up in wash water		
20							NX	131.6		Possible bedrock.		
25	R-1	60/57	21.00 - 26.00	RQD = 56%						Bedrock encountered at 20.4 feet bgs Top of Bedrock at Elev. 131.6 ft R1 (21.0' - 26.0'): 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 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]. Rock Mass Quality = fair 95% recovery 56% RQD Rock Core Rate (min:sec) 21.0 - 22.0 ft (3:06) 22.0 - 23.0 ft (2:42)		
30	R-2	33.6/25.2	26.00 - 28.80	RQD = 61%								
	R-3	26.4/24	28.80 - 31.00	RQD = 23%								
<b>Remarks:</b> 1. As-drilled boring locations and ground surface elevations were provided by HNTB.												
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 2  <b>Boring No.:</b> BB-BSA-104A	

<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine				<b>Boring No.:</b> BB-BSA-104A  <b>WIN:</b> 027176.00																																																																																																																																																																																																																																											
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Shear Strength (psf) or RQD (%)</th><th>N-uncorrected</th><th>N<sub>60</sub></th><th>Casing Blows</th><th>Elevation (ft.)</th></tr></thead><tbody><tr><td>30</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>121.0</td><td rowspan="20"> 23.0 - 24.0 ft (2:08) 24.0 - 25.0 ft (2:14) 25.0 - 26.0 ft (2:50) R2 (26.0' - 28.8'): Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with calcite veins, strong to very strong, fresh; discontinuities low angle to moderate dipping, very close spacing, rough to very rough, tight, average 0.5 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, 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, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] strong to very strong, fresh; discontinuities low angle to steep dipping, very close spacing, rough, tight to open, average 3.5 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION]. 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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, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] strong to very strong, fresh; discontinuities low angle to steep dipping, very close spacing, rough, tight to open, average 3.5 fractures per foot [MEDIUM BEDDED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION]. 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<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine		<b>Boring No.:</b> BB-BSA-105  <b>WIN:</b> 027176.00						
<b>Driller:</b> Seaboard			<b>Elevation (ft.):</b> 152.05		<b>Auger ID/OD:</b>							
<b>Operator:</b> Ryan H.			<b>Datum:</b> Maine East Zone		<b>Sampler:</b> Standard Split Spoon							
<b>Logged By:</b> D. Burgess			<b>Rig Type:</b> Diedrich D-50		<b>Hammer Wt./Fall:</b> 140lb/30in							
<b>Date Start/Finish:</b> 7/31/24 (20:07); 8/1/24 (0:30)			<b>Drilling Method:</b> SSA, Cased Wash		<b>Core Barrel:</b> NX							
<b>Boring Location:</b> N: 482984.9, E: 1735593.56			<b>Casing ID/OD:</b>		<b>Water Level*:</b> 17.0' BGS 11:56 7/31/24							
<b>Hammer Efficiency Factor:</b> 1.087			<b>Hammer Type:</b> Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>									
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person S <sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf) S <sub>u(lab)</sub> = Lab Vane Undrained Shear Strength (psf) q <sub>p</sub> = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N <sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency N <sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected T <sub>v</sub> = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test												
Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.	
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows					
0	1D	24/18	0.90 - 2.90	14-14-15-14	29	53	SSA	151.2		10" Asphalt pavement.	Fines = 16.2% A-1-b (0), SM	
										Olive brown, dry, very dense, fine to coarse SAND, some fine to coarse gravel, little silt (FILL).		
	2D	24/19	2.90 - 4.90	9-11-13-12	24	43					Olive with brown, dry, hard, SILT, some fine to coarse sand, some fine to coarse gravel, non- plastic (FILL).	Fines = 46.4% A-4 (0), ML/ SM
										Dark grayish brown, dry, hard, SANDY SILT, trace gravel (FILL).		
5	3D	8/8	5.00 - 5.67	11-50/2"	R						Dark grayish brown, dry, hard, SANDY SILT, trace gravel (FILL).	
	4D	24/10	7.00 - 9.00	13-23-20-16	43	78					Dark grayish brown, dry, hard, SANDY SILT, trace gravel (FILL).	
10	5D	13.5/7	10.00 - 11.13	11-31-50/1.5"	R						Dark grayish brown, dry, hard, SANDY SILT, trace gravel (FILL).	
15	6D	24/13	15.00 - 17.00	3-4-8-11	12	22				Grayish brown, wet, medium dense, SILT, some fine to coarse sand, little fine to coarse subrounded gravel (SANDY SILT to SILTY SAND).	WC = 20.5% Fines = 55.7% A-4 (0), ML	
20	7D	24/11	20.00 - 22.00	14-11-20-18	31	56				Increased drilling resistance. Olive brown, wet, very dense SILTY SAND, little fine to coarse gravel (SANDY SILT to SILTY SAND).	WC = 11.7% Fines = 40.3% A-4 (0), ML/ SM	
25	8D	14/6	25.00 - 26.17	20-28-30/2"			OPEN			Grey, wet, very dense, fractured rock with fine to coarse sand (WEATHERED ROCK)		
	R-1	60/60	26.40 - 31.40	RQD = 30%			NX			Bedrock encountered at 26.4 feet bgs Top of Bedrock Elev. 125.7 ft R1 (26.4' - 31.4'): Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with calcite veins, strong, slightly weathered to fresh; discontinuities low angle to steep dipping.		
30												
<b>Remarks:</b> 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 7/31/24 at 23:58 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 2  <b>Boring No.:</b> BB-BSA-105		

[illegible]

<div>Maine Department of Transportation</div> <div>Soil/Rock Exploration Log</div> <div>US CUSTOMARY UNITS</div>				<div>Project: MaineDOT I-95 Bridges Over Stillwater Avenue</div> <div>Location: Bangor, Maine</div>				<div>Boring No.: BB-BSA-106</div> <div>WIN: 027176.00</div>					
Driller: Seaboard				Elevation (ft.) 143.6				Auger ID/OD:					
Operator: Ryan H.				Datum: Maine East Zone				Sampler: Standard Split Spoon					
Logged By: D. Burgess				Rig Type: Diedrich D-50				Hammer Wt./Fall: 140lb/30in					
Date Start/Finish: 7/25/24 (20:19); 7/29/24 (1:56)				Drilling Method: SSA, Cased Wash				Core Barrel: NX					
Boring Location: N: 482611.2, E: 1735095.82				Casing ID/OD: 4" (ID)				Water Level*: Refer to remarks note 3					
Hammer Efficiency Factor: 1.087				Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>									
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt				R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person				S <sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf) S <sub>u</sub> (lab) = Lab Vane Undrained Shear Strength (psf) q <sub>0</sub> = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N <sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency N <sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected					
T <sub>v</sub> = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test													
Sample Information													
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.		
0							SSA	142.8		10" Asphalt Pavement			
	1D	24/13	1.00 - 3.00	14-9-7-5	16	29				Brown, dry, medium dense, fine to coarse SAND, some fine gravel, trace silt (FILL).			
	2D	24/19	3.00 - 5.00	11-13-18-20	31	56				Olive with brown, moist, hard, SILT, some fine to medium sand, some fine to coarse gravel, non-plastic (FILL)			
5	3D	24/15	5.00 - 7.00	13-16-37-30	53	96				Olive with brown, moist, hard, SILT, some fine to medium sand, some fine to coarse gravel, non-plastic (FILL)			
	4D	24/0	7.00 - 9.00	25-27-22-23	49	89				No recovery.			
10	5D	24/13	10.00 - 12.00	8-9-11-27	20	36	64			Olive with brown, moist, hard, SILT, some fine to medium sand, some fine to coarse gravel, non-plastic (FILL)			
							148						
							133						
							166						
							82						
15	6D	24/9	15.00 - 17.00	12-31-20-15	51	92	87			Grey, wet, very dense, fine to coarse SAND, flakey fractured rock fragments (FILL).			
							124			Possible boulder or cobbles 12 to 15" thick.			
							OPEN						
20	7D	24/22	20.00 - 22.00	5-6-3-4	9	16	24			Olive with grey and orange mottling,wet, very stiff, CLAY, trace sand, medium plasticity (CLAY). Pp = 4.0 to 6.0 ksf.	WC = 26% Fines = 98.9% LL = 37 PL = 19 PI = 18 LI = 0.4 A-6 (19), CL		
							26						
							22						
							34						
							31						
25	8D	24/24	25.00 - 27.00	4-7-8-9	15	27	42			Olive with grey and orange mottling, wet, very stiff, CLAY, trace sand, medium plasticity (CLAY). Pp = 6.0 to 8.0 ksf.	WC = 28% Fines = 99.7% LL = 36 PL = 19 PI = 17 LI = 0.5 A-6 (18), CL		
							55						
							61						
							54						
30							35						
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 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.													
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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: MaineDOT I-95 Bridges Over Stillwater Avenue Location: Bangor, Maine		Boring No.: BB-BSA-106								
WIN: 027176.00														
Driller: Seaboard		Elevation (ft.): 143.6		Auger ID/OD:										
Operator: Ryan H.		Datum: Maine East Zone		Sampler: Standard Split Spoon										
Logged By: D. Burgess		Rig Type: Diedrich D-50		Hammer Wt./Fall: 140lb/30in										
Date Start/Finish: 7/25/24 (20:19); 7/29/24 (1:56)		Drilling Method: SSA, Cased Wash		Core Barrel: NX										
Boring Location: N: 482611.2, E: 1735095.82		Casing ID/OD: 4" (ID)		Water Level*: Refer to remarks note 3										
Hammer Efficiency Factor: 1.087		Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>												
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt		R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140 lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person		S <sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf) S <sub>u</sub> (lab) = Lab Vane Undrained Shear Strength (psf) q <sub>p</sub> = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N <sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency N <sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected		T <sub>v</sub> = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test								
Depth (ft.)	Sample Information							Visual Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class.					
	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.)				
30	9D	24/24	30.00 - 32.00	WOH/18"-8			49	112.1		Grey, wet, very soft, CLAY, trace sand medium plasticity (CLAY). P <sub>p</sub> < 1.0 tsf.	WC = 29% Fines = 98.7% LL = 26 PL = 15 PI = 11 LI = 1.3 A-6 (9), CL			
							42							
							56							
							100							
							57							
35	10D	24/12	35.00 - 37.00	4-2-6-7	8	14	43					Grey, wet, stiff, SANDY SILT, trace fine to coarse subrounded to round gravel (SANDY SILT).	Grey, wet, stiff, SANDY SILT, trace fine to coarse subrounded to round gravel (SANDY SILT).	WC = 11% Fines = 57.6% LL = 17 PL = 14 PI = 3 LI = -0.8 A-4 (0), ML
							40							
							42							
							51							
							42							
40	11D	24/10	40.00 - 42.00	5-3-7-7	10	18	59							
							48							
							50							
							52							
							40							
45	12D	24/18	45.00 - 47.00	3-4-4-6	8	14	53		Grey, wet, stiff, SANDY SILT, trace fine to coarse subrounded to round gravel (SANDY SILT).	Grey, wet, stiff, SANDY SILT, trace fine to coarse subrounded to round gravel (SANDY SILT).	WC = 46.5% Fines = 48.9% A-4 (0), ML/SM			
							49							
							53							
							61							
							43							
50	13D	24/12	50.00 - 52.00	10-8-6-11	14	25	54							
							42							
							96							
							173							
							248							
55	14D	24/15	55.00 - 57.00	14-13-16-19	29	53	61	90.1	Olive, wet, hard, SANDY SILT, little fine to coarse subrounded to rounded gravel, non-plastic (GLACIAL TILL)	Olive, wet, hard, SANDY SILT, little fine to coarse subrounded to rounded gravel, non-plastic (GLACIAL TILL)	WC = 46.5% Fines = 48.9% A-4 (0), ML/SM			
							45							
							62							
							108							
60							112							
<b>Remarks:</b> 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'bs on 7/26/24 at 3:23, 20.55'bs on 7/28/24 at 20:19. Water level measured at 24.9'bs on 7/29/24 at 1:08 was made after the rock coring.														
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.									Page 2 of 4					
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.									Boring No.: BB-BSA-106					

[illegible]



<div>Maine Department of Transportation</div> <div>Soil/Rock Exploration Log</div> <div>US CUSTOMARY UNITS</div>						<div>Project: MaineDOT I-95 Bridges Over Stillwater Avenue</div> <div>Location: Bangor, Maine</div>				<div>Boring No.: BB-BSA-106</div> <div>WIN: 027176.00</div>																																																																																																																																																																																																																																											
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Logged By: D. Burgess						Rig Type: Diedrich D-50				Hammer Wt./Fall: 140lb/30in																																																																																																																																																																																																																																											
Date Start/Finish: 7/25/24 (20:19); 7/29/24 (1:56)						Drilling Method: SSA, Cased Wash				Core Barrel: NX																																																																																																																																																																																																																																											
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<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine		<b>Boring No.:</b> BB-BSA-107  <b>WIN:</b> 027176.00					
<b>Driller:</b> Seaboard			<b>Elevation (ft.):</b> 143.11		<b>Auger ID/OD:</b>						
<b>Operator:</b> Ryan H.			<b>Datum:</b> Maine East Zone		<b>Sampler:</b> Standard Split Spoon						
<b>Logged By:</b> D. Burgess			<b>Rig Type:</b> Diedrich D-50		<b>Hammer Wt./Fall:</b> 140lb/30in						
<b>Date Start/Finish:</b> 7/22/24 (21:09); 7/24/24 (0:25)			<b>Drilling Method:</b> SSA, Drive & Wash		<b>Core Barrel:</b> NX						
<b>Boring Location:</b> N: 482578.95, E: 1735092.78			<b>Casing ID/OD:</b> 4" (ID)		<b>Water Level*:</b> Refer to remarks note 3						
<b>Hammer Efficiency Factor:</b> 1.087			<b>Hammer Type:</b> Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>								
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	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows				
0	1D	24/14	0.70 - 2.70	8-10-8-6	18	33	SSA	142.6		6" Asphalt Pavement	Fines = 55.2% A-4 (0), ML  WC = 14.7% Fines = 62.3% A-4 (0), ML
										Brown, dry, medium dense, fine to coarse SAND, some fine to coarse gravel, trace silt (FILL).	
	2D	24/16	2.70 - 4.70	6-8-8-17	16	29				Grayish brown, dry, medium dense, SANDY SILT, trace fine gravel, non-plastic (FILL).	
5	3D	24/19	4.70 - 6.70	12-19-18-18	37	67				Grayish brown, dry, hard, SANDY SILT, trace fine gravel, non-plastic (FILL).	
	4D	24/10	6.70 - 8.70	14-7-18-10	25	45				Grayish brown, dry, hard, SANDY SILT, trace fine gravel, non-plastic (FILL).	
	5D	24/6	8.70 - 10.70	4-3-4-4	7	13				Grayish brown, dry, stiff, SANDY SILT, trace fine gravel, slightly plastic (FILL).	
10	6D	24/9	10.70 - 12.70	6-8-41-50/2"	49	89				Olive brown, wet, hard, SILT, some fine to coarse sand, trace fine gravel, slightly plastic, fractured rock fragments (FILL). Pp = 7.0 ksf	
15	7D	24/5	15.00 - 17.00	12-19-20-8	39	71				Olive brown, wet, very dense, fine to coarse SAND, fractured scaly rock fragments (FILL).	
20	8D	24/14	20.00 - 22.00	17-4-7-6	11	20			Grey with orange, mottled, wet, very stiff, CLAY, trace sand, medium plasticity (CLAY). Pp = 6.0 ksf		
25	9D	24/24	25.00 - 27.00	4-3-6-6	9	16			Grey to brown, mottled, wet, very stiff, CLAY, trace sand (CLAY) Pp = 4.5 to 5.0 ksf		
30											
<b>Remarks:</b> 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.										Page 1 of 4  <b>Boring No.:</b> BB-BSA-107	

<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine		<b>Boring No.:</b> BB-BSA-107  <b>WIN:</b> 027176.00								
<b>Driller:</b> Seaboard		<b>Elevation (ft.):</b> 143.11		<b>Auger ID/OD:</b>										
<b>Operator:</b> Ryan H.		<b>Datum:</b> Maine East Zone		<b>Sampler:</b> Standard Split Spoon										
<b>Logged By:</b> D. Burgess		<b>Rig Type:</b> Diedrich D-50		<b>Hammer Wt./Fall:</b> 140lb/30in										
<b>Date Start/Finish:</b> 7/22/24 (21:09); 7/24/24 (0:25)		<b>Drilling Method:</b> SSA, Drive & Wash		<b>Core Barrel:</b> NX										
<b>Boring Location:</b> N: 482578.95, E: 1735092.78		<b>Casing ID/OD:</b> 4"(ID)		<b>Water Level*:</b> Refer to remarks note 3										
<b>Hammer Efficiency Factor:</b> 1.087		<b>Hammer Type:</b> Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>												
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	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows							
30	10D	24/17	30.00 - 32.00	3-3-3-3	6	11	70	108.1		Greyish brown, moist, medium stiff, CLAY, trace sand, medium plasticity, interbedded silt seams (CLAY). Pp < 2.0 ksf  FV-1: 442psf / 118psf (55mmx110mm Vane) FV-2: 813psf / 415psf (55mmx110mm Vane)	WC = 28% Fines = 99.1% LL = 28 PL = 16 PI = 12 LI = 1 A-6 (11), CL			
							63							
							56							
							390							
							63							
35	11D	24/0	35.00 - 37.00	12-11-15-10	26	47	104							
							96							
							87							
							78							
							63							
40	12D	24/6	40.00 - 42.00	5-7-12-12	19	34	73							
							76							
							103							
							111							
							81							
45	13D	24/4	45.00 - 47.00	9-9-6-9	15	27	105							
							103							
							111							
							118							
							90							
50	14D	24/8	50.00 - 52.00	6-8-15-8	23	42	81							
							89							
							105							
							113							
							89							
55	15D	24/14	55.00 - 57.00	26-41-51-50/4"	92	167	60							
							198							
							171							
							212							
60							196							
89.6													No recovery - washed water had fine to coarse gravel and clay fragments.	WC = 10% Fines = 42.1% LL = 17 PL = 13 PI = 4 LI = -0.8 A-4 (0), SC/ SM
53.5													Brownish grey, wet, dense, SILTY SAND, little coarse gravel, slightly plastic (SILTY SAND)	WC = 10% Fines = 39.6% LL = 20 PL = 12 PI = 8 LI = -0.3 A-4 (0), SC
53.5													Brownish grey, wet, medium dense, SILTY SAND, little coarse gravel, slightly plastic (SILTY SAND).	WC = 10% Fines = 38.3% A-4 (0), SM
53.5													Greyish brown, wet, dense, CLAYEY SAND, some gravel, low plasticity (CLAYEY SAND).	WC = 10% Fines = 39.6% LL = 20 PL = 12 PI = 8 LI = -0.3 A-4 (0), SC
53.5													Olive with brown mottled, wet, very dense, SILTY SAND, little gravel, non-plastic (GLACIAL TILL).	WC = 10.6% Fines = 38.3% A-4 (0), SM

**Remarks:**

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

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Rock Mass Quality = very poor 16% recovery 0% RQD Rock Core Rate (min:sec) 63.4 - 64.2 ft (1:09) 64.2 - 65.0 ft (1:29) 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 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]. 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Rock Mass Quality = poor 95% recovery 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 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</td><td rowspan="4"></td></tr><tr><td></td><td>R-2</td><td>12/2.04</td><td>67.20 - 68.20</td><td>RQD = 0%</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td>R-3</td><td>48/45.6</td><td>68.20 - 72.20</td><td>RQD = 35%</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>70</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td>R-4</td><td>60/60</td><td>72.20 - 77.20</td><td>RQD = 39%</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>75</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>80</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>85</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>90</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>												Sample Information										Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.	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.)	60	16D	8/8	60.00 - 60.67	53-50/2"	R		OPEN		79.7		Olive with brown mottled, wet, very dense, SILT, some fine round to subround gravel, trace fine to medium sand, weathered coarse gravel (GLACIAL TILL).												R-1	45.6/7.2	63.40 - 67.20	RQD = 0%			R									NX		65									65.9		Bedrock encountered at 63.4 feet bgs Top of Bedrock Elev. 80.1 ft R1 (63.4' - 67.2'): 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]. 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<div>Maine Department of Transportation</div> <div>Soil/Rock Exploration Log</div> <div>US CUSTOMARY UNITS</div>				<div>Project: MaineDOT I-95 Bridges Over Stillwater Avenue</div> <div>Location: Bangor, Maine</div>				<div>Boring No.: BB-BSA-107</div> <div>WIN: 027176.00</div>							
Driller: Seaboard				Elevation (ft.): 143.11				Auger ID/OD:							
Operator: Ryan H.				Datum: Maine East Zone				Sampler: Standard Split Spoon							
Logged By: D. Burgess				Rig Type: Diedrich D-50				Hammer Wt./Fall: 140lb/30in							
Date Start/Finish: 7/22/24 (21:09); 7/24/24 (0:25)				Drilling Method: SSA, Drive & Wash				Core Barrel: NX							
Boring Location: N: 482578.95, E: 1735092.78				Casing ID/OD: 4"(ID)				Water Level*: Refer to remarks note 3							
Hammer Efficiency Factor: 1.087				Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>											
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt				R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140 lb. Hammer WOR/C = Weight of Rods or Casing WQ1P = Weight of One Person				S <sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf) S <sub>u</sub> (lab) = Lab Vane Undrained Shear Strength (psf) q <sub>p</sub> = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N <sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency N <sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected							
T <sub>v</sub> = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test															
Sample Information												Visual Description and Remarks		Laboratory Testing Results/ AASHTO and Unified Class.	
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						
90											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]. 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 (1:53) 75.2 - 76.2 ft (1:32) 76.2 - 77.2 ft (1:30)  Bottom of Exploration at 77.2 feet below ground surface. Boring backfilled with bentonite chips in the rock core socket, drill cuttings and gravel to bottom of pavement and patched with cold patch asphalt.				
120															
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.												Page 4 of 4			
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.												Boring No.: BB-BSA-107			

<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine		<b>Boring No.:</b> BB-BSA-108  <b>WIN:</b> 027176.00						
<b>Driller:</b> Seaboard			<b>Elevation (ft.):</b> 129.45			<b>Auger ID/OD:</b>						
<b>Operator:</b> Kevin Hanscom			<b>Datum:</b> Maine East Zone			<b>Sampler:</b> Standard Split Spoon						
<b>Logged By:</b> Lina-Maria Pua			<b>Rig Type:</b> Diedrich D-50			<b>Hammer Wt./Fall:</b> 140 lbs/30 in						
<b>Date Start/Finish:</b> 05/07/24 (21:55); 05/07/24 (23:30)			<b>Drilling Method:</b> SSA, Cased Wash			<b>Core Barrel:</b> NX						
<b>Boring Location:</b> N: 482749.52, E: 1735322.13			<b>Casing ID/OD:</b> 3 in/3.25 in			<b>Water Level*:</b> 4.8 ft on 05/07/24 at 22:20						
<b>Hammer Efficiency Factor:</b> 1.066			<b>Hammer Type:</b> Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>									
<div style="display: flex; justify-content: space-between; font-size: 0.8em;"> <div>           Definitions:            D = Split Spoon Sample            MD = Unsuccessful Split Spoon Sample Attempt            U = Thin Wall Tube Sample            MU = Unsuccessful Thin Wall Tube Sample Attempt            V = Field Vane Shear Test, PP = Pocket Penetrometer            MV = Unsuccessful Field Vane Shear Test Attempt         </div> <div>           R = Rock Core Sample            SSA = Solid Stem Auger            HSA = Hollow Stem Auger            RC = Roller Cone            WOH = Weight of 140lb. Hammer            WOR/C = Weight of Rods or Casing            WO1P = Weight of One Person         </div> <div>           S<sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf)            S<sub>u</sub>(lab) = Lab Vane Undrained Shear Strength (psf)            q<sub>p</sub> = Unconfined Compressive Strength (ksf)            N-uncorrected = Raw Field SPT N-value            Hammer Efficiency Factor = Rig Specific Annual Calibration Value            N<sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency            N<sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected         </div> <div>           T<sub>v</sub> = Pocket Torvane Shear Strength (psf)            WC = Water Content, percent            LL = Liquid Limit            PL = Plastic Limit            PI = Plasticity Index            G = Grain Size Analysis            C = Consolidation Test         </div> </div>												
Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.	
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows					
0							SSA	128.9		7.5" Asphalt Pavement	MC = 8.0% Fines = 28.5% A-2-4 (0), SM	
	1D	24/16	1.00 - 3.00	22-18-16-20	34	60		126.3		-0.6		Brown to yellow, dry, very dense, fine to coarse SAND, some silt, little fine gravel (FILL).
	2D	24/9	3.00 - 5.00	15-14-24-16	38	68		-3.2		2DA To 2 in: Brown to yellow, dry, very dense, fine to coarse SAND, some silt, little fine gravel (FILL).		
5	3D	24/12	5.00 - 7.00	12-12-12-50/2"	24	43		122.8		-6.7		2DB Bottom 7 in: Grey, dry, very dense, GRAVEL, some sand, little silt (GRAVEL) Brown, wet, dense, GRAVEL, some sand, little silt (GRAVEL). Grey angular GRAVEL with some sand and little silt in the tip of the split spoon.
	R1	60/59	6.70 - 11.70	RQD = 59%			NX			Bedrock encountered at 6.7 feet bgs Top of Bedrock at Elev. 122.8 ft R1 (6.7'-11.1'): 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 BEDDEED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION]. Rock Mass Quality = fair 98% Recovery Rock Core Rate (min:sec) 6.7-7.7 ft (2:33) 7.7-8.7 ft (2:46) 8.7-9.7 ft (3:19) 9.7-10.7 ft (2:51) 10.7-11.7 ft (3:17)		
10								112.8		R2 (11.1'-12.7'): 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 BEDDEED FACIES, PENOBSCOT RIVER MEMBER, BANGOR 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 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 BEDDEED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION]. Rock Mass Quality = very poor 88% Recovery Rock Core Rate (min:sec) 12.7-13.7 ft (2:04) 13.7-14.7 ft (3:25) R4 (14.7'-16.7'): Grey, very fine to fine grained, METAWACKE		
15	R2	12/11	11.70 - 12.70	RQD = 40%								
	R3	24/21	12.70 - 14.70	RQD = 19%								
	R4	24/23	14.70 - 16.70	RQD = 37%								
20												
25												
30												
<b>Remarks:</b> 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 5/7/24 at 22:20 was made before the start of rock coring with bottom of casing at 6.7 ft bgs.												
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.										Page 1 of 2  <b>Boring No.:</b> BB-BSA-108		

<div>Maine Department of Transportation</div> <div>Soil/Rock Exploration Log</div> <div>US CUSTOMARY UNITS</div>						<div>Project: MaineDOT I-95 Bridges Over Stillwater Avenue</div> <div>Location: Bangor, Maine</div>			<div>Boring No.: BB-BSA-108</div> <div>WIN: 027176.00</div>						
Driller: Seaboard				Elevation (ft.): 129.45				Auger ID/OD:							
Operator: Kevin Hanscom				Datum: Maine East Zone				Sampler: Standard Split Spoon							
Logged By: Lina-Maria Pua				Rig Type: Diedrich D-50				Hammer Wt./Fall: 140 lbs/30 in							
Date Start/Finish: 05/07/24 (21:55); 05/07/24 (23:30)				Drilling Method: SSA, Cased Wash				Core Barrel: NX							
Boring Location: N: 482749.52, E: 1735322.13				Casing ID/OD: 3 in/3.25 in				Water Level*: 4.8 ft on 05/07/24 at 22:20							
Hammer Efficiency Factor: 1.066				Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>											
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt				R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140 lb. Hammer WOR/C = Weight of Rods or Casing WQ1P = Weight of One Person				S <sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf) S <sub>u(lab)</sub> = Lab Vane Undrained Shear Strength (psf) q <sub>p</sub> = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N <sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency N <sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected				T <sub>v</sub> = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test			
Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.				
	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.)							
30									<div>[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 BEDDEED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION]. Rock Mass Quality = poor 96% Recovery Rock Core Rate (min:sec) 14.7-15.7 ft (2:30) 15.7-16.7 ft (2:48)  <b>Bottom of Exploration at 16.7 feet below ground surface.</b> Boring caved in after rock coring was completed. The boring above the cave-in was backfilled with gravel to bottom of pavement and patched with cold patch.</div>						
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 MaineDOT. 3. 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.														
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* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.									Boring No.: BB-BSA-108						



<div>Maine Department of Transportation</div> <div>Soil/Rock Exploration Log</div> <div>US CUSTOMARY UNITS</div>						<div>Project: MaineDOT I-95 Bridges Over Stillwater Avenue</div> <div>Location: Bangor, Maine</div>			<div>Boring No.: BB-BSA-109</div> <div>WIN: 027176.00</div>		
Driller: Seaboard				Elevation (ft.) 126.99				Auger ID/OD: 4.0 in/4.5 in			
Operator: Kevin Hanscom				Datum: Maine East Zone				Sampler: Standard Split Spoon			
Logged By: Lina-Maria Pua				Rig Type: Diedrich D-50				Hammer Wt./Fall: 140 lbs/30 in			
Date Start/Finish: 05/07/24 (1:20); 05/07/24 (2:30)				Drilling Method: Hollow Stem Augers				Core Barrel: NX			
Boring Location: N: 482636.37, E: 1735255.48				Casing ID/OD:				Water Level*: Not Measured			
Hammer Efficiency Factor: 1.066				Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>							
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0								126.3		Asphalt Pavement	
	1D	24/12	1.00 - 3.00	19-16-17-18	33	59				Brown to yellow, dry, very dense, fine to coarse SAND, some gravel, little silt (FILL).	
	2D	24/15.5	3.00 - 5.00	27-22-63-54	85	151				Brown to yellow, dry to moist, very dense, SANDY GRAVEL, little silt (FILL).	MC = 5.7% Fines = 15.9% A-1-b (0), GM
5	3D	24/13.5	5.00 - 7.00	19-23-16-17	39	69				Brown to yellow, wet, very dense, fine to coarse SAND, some gravel, some silt, poorly-graded (FILL).	
	4D	24/23	7.00 - 9.00	41-41-67-103	108	192				4DA Top 19 in: Brown, wet to moist, very dense, fine to coarse SAND, some gravel, little silt (FILL).	MC = 11.7% Fines = 20.3% A-1-b (0), SM
10	5D	12/10	9.00 - 10.00	28-63	R			118.3		4DB Bottom 4 in: Brown, moist, hard, SILT, some fine sand, little gravel (SANDY SILT).	
	6D	1/1	10.00 - 10.08	50/1"	R			117.0 116.9		Brown, moist, SILT, some fine sand, little gravel (SANDY SILT).  Grey, very dense, PROBABLE BEDROCK FRAGMENTS, some silt. (WEATHERED BEDROCK).	
										Bottom of Exploration at 10.1 feet below ground surface. Boring backfilled with drill cuttings to bottom of pavement and patched with cold patch.	
15											
20											
25											
30											
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Bedrock encountered at 3.5 feet bgs            Top of Bedrock at Elev. 123.5 ft            Advanced with augers to 4.0 feet bgs            R1 (4'-8.8'): 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 BEDDEED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].            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 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 to stepped, rough to smooth, open. average 1.8 fractures per foot [MEDIUM BEDDEED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION].            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Boring Location: N: 482660.73, E: 1735292.34		Casing ID/OD: 3.0 in/3.25 in		Water Level*: 3.1 ft on 05/08/24 at 20:34																																																																																																																																																		
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Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt		R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person		S <sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf) S <sub>u</sub> (lab) = Lab Vane Undrained Shear Strength (psf) q <sub>0</sub> = Unconfined Compressive Strength (ksf) N <sub>u</sub> -uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N <sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency N <sub>60</sub> = (Hammer Efficiency Factor/60%) * N <sub>u</sub> -uncorrected		T <sub>v</sub> = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test																																																																																																																																																
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Shear Strength (psf) or RQD (%)</th><th>N-uncorrected</th><th>N<sub>60</sub></th><th>Casing Blows</th></tr></thead><tbody><tr><td>0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Asphalt Pavement</td><td rowspan="3">0-6</td></tr><tr><td></td><td>1D</td><td>24/11</td><td>1.00 - 3.00</td><td>16-21-16-20</td><td>37</td><td>66</td><td></td><td></td><td></td><td>Brown, dry, dense, Silty GRAVEL, little sand (FILL).</td></tr><tr><td></td><td>2D</td><td>24/6</td><td>3.00 - 5.00</td><td>10-8-9-21</td><td>17</td><td>30</td><td></td><td></td><td></td><td>Grey, wet, medium dense, Silty angular GRAVEL, trace sand (FILL).</td></tr><tr><td>5</td><td>3D R1</td><td>3/3 60/57</td><td>5.00 - 5.25 5.30 - 10.30</td><td>50/3" RQD = 52%</td><td>R</td><td></td><td></td><td></td><td></td><td>Grey, wet, very dense, angular GRAVEL, some silt, trace sand, poorly-graded (FILL).</td><td rowspan="2">5-15.3</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Bedrock encountered at 5.3 feet bgs Top of Bedrock at Elev. 122.2 ft R1 (5.3'-10.3'): 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 BEDDEED FACIES, PENOBSCOT RIVER MEMBER, BANGOR 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) 9.3-10.3 ft (3:10) R2 (10.3'-15.3'): 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 BEDDEED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION]. 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Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows	0										Asphalt Pavement	0-6		1D	24/11	1.00 - 3.00	16-21-16-20	37	66				Brown, dry, dense, Silty GRAVEL, little sand (FILL).		2D	24/6	3.00 - 5.00	10-8-9-21	17	30				Grey, wet, medium dense, Silty angular GRAVEL, trace sand (FILL).	5	3D R1	3/3 60/57	5.00 - 5.25 5.30 - 10.30	50/3" RQD = 52%	R					Grey, wet, very dense, angular GRAVEL, some silt, trace sand, poorly-graded (FILL).	5-15.3											Bedrock encountered at 5.3 feet bgs Top of Bedrock at Elev. 122.2 ft R1 (5.3'-10.3'): 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 BEDDEED FACIES, PENOBSCOT RIVER MEMBER, BANGOR FORMATION]. 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<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine		<b>Boring No.:</b> BB-BSA-111  <b>WIN:</b> 027176.00						
<b>Driller:</b> Seaboard			<b>Elevation (ft.):</b> 148.27			<b>Auger ID/OD:</b>						
<b>Operator:</b> Ryan H.			<b>Datum:</b> Maine East Zone			<b>Sampler:</b> Standard Split Spoon						
<b>Logged By:</b> D. Burgess			<b>Rig Type:</b> Diedrich D-50			<b>Hammer Wt./Fall:</b> 140lb/30in						
<b>Date Start/Finish:</b> 7/25/24 (0:44); 7/25/24 (4:25)			<b>Drilling Method:</b> SSA, Cased Wash			<b>Core Barrel:</b> NX						
<b>Boring Location:</b> N: 482728.68, E: 1735418.07			<b>Casing ID/OD:</b> 4" (ID)			<b>Water Level*:</b> 14.75' 4:07 7/25/24						
<b>Hammer Efficiency Factor:</b> 1.087			<b>Hammer Type:</b> Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>									
<div style="display: flex; justify-content: space-between; font-size: 0.8em;"> <div>           Definitions:            D = Split Spoon Sample            MD = Unsuccessful Split Spoon Sample Attempt            U = Thin Wall Tube Sample            MU = Unsuccessful Thin Wall Tube Sample Attempt            V = Field Vane Shear Test, PP = Pocket Penetrometer            MV = Unsuccessful Field Vane Shear Test Attempt         </div> <div>           R = Rock Core Sample            SSA = Solid Stem Auger            HSA = Hollow Stem Auger            RC = Roller Cone            WOH = Weight of 140lb. Hammer            WOR/C = Weight of Rods or Casing            WO1P = Weight of One Person         </div> <div>           S<sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf)            S<sub>u(lab)</sub> = Lab Vane Undrained Shear Strength (psf)            q<sub>p</sub> = Unconfined Compressive Strength (ksf)            N-uncorrected = Raw Field SPT N-value            Hammer Efficiency Factor = Rig Specific Annual Calibration Value            N<sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency            N<sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected         </div> <div>           T<sub>v</sub> = Pocket Torvane Shear Strength (psf)            WC = Water Content, percent            LL = Liquid Limit            PL = Plastic Limit            PI = Plasticity Index            G = Grain Size Analysis            C = Consolidation Test         </div> </div>												
Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.	
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows					
0	1D	24/9	0.60 - 2.60	9-11-9-11	20	36	SSA	147.7		7" Asphalt pavement	Fines = 13.5% A-1-a (0), GM-SM	
										Olive brown, moist, dense, fine to coarse SAND AND fine to coarse GRAVEL, little silt (FILL).		
5	2D	24/19	3.00 - 5.00	11-20-22-16	42	76					Olive with brown, moist, hard, SILT, some round to subround gravel, little fine to medium sand, weathered coarse gravel, non-plastic (FILL).	Fines = 61.6% A-4 (0), ML
	3D	13.5/12	5.00 - 6.13	13-21-50/1.5"	R						Light olive brown, moist, hard, SANDY SILT, trace gravel, non-plastic (FILL).	
	4D	24/12	7.00 - 9.00	12-26-20-13	46	83	47				Fractured rock fragments, trace organics (roots) (FILL).	
10	5D	24/22	10.00 - 12.00	7-9-11-15	20	36	59	138.8			Olive with dark grey, moist, hard, SANDY SILT, trace gravel, non-plastic (FILL).	WC = 21% Fines = 99.4% LL = 32 PL = 17 PI = 15 LI = 0.3 A-6 (15), CL
											Olive with orange mottled, moist, hard, CLAY, trace sand, medium plasticity (CLAY). Pp 3.0 to 3.5 tsf	
15	6D	24/13	15.00 - 17.00	19-24-16-45	40	72	71	134.8			Grayish brown, wet, very dense, SAND and GRAVEL, little silt, and fractured rock fragments (GLACIAL TILL).	WC = 13.4% Fines = 20.0% A-1-b (0), SM/GM
20	R-1	60/40.8	19.00 - 24.00	RQD = 15%				130.5		Bedrock encountered at 17.8 feet bgs Top of Bedrock at Elev. 130.5 ft R1 (19.0' - 24.0'): 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]. Rock Mass Quality = very poor 68% recovery 15% RQD		
25	R-2	60/60	24.00 - 29.00	RQD = 60%						Rock Core Rate (min:sec) 19.0 - 20.0 ft (2:11) 20.0 - 21.0 ft (1:11) 21.0 - 22.0 ft (1:55) 22.0 - 23.0 ft (1:49) 23.0 - 24.0 ft (1:56) R2 (24.0' - 29.0'): Grey, very fine grained, thinly to very thinly bedded, METAWACKE [metasandstone] with frequent calcite veins, very strong to strong, fresh; discontinuities low angle dipping, very		
30								119.3				

**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 7/25/24 at 4:07 am 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 2  
  
**Boring No.: BB-BSA-111**

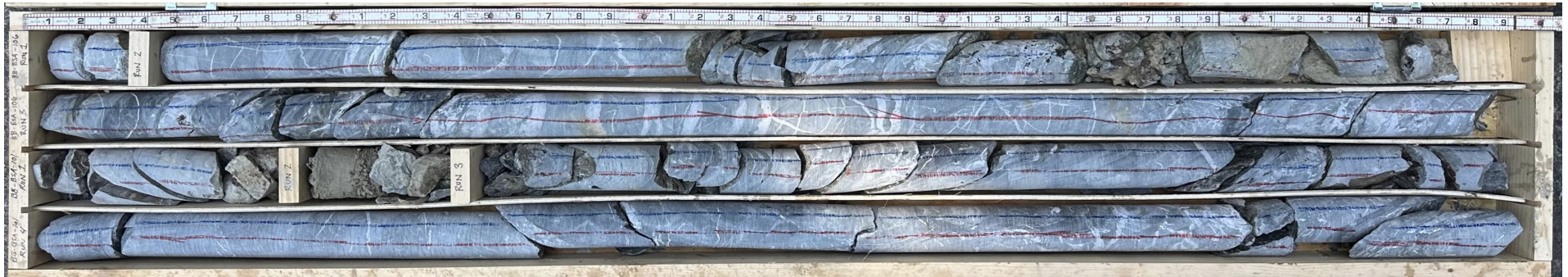
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**APPENDIX B**

# 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 Cored
		Feet		Feet		%	Feet	%			
BB-BSA-101	R1	31.5	- 32.4	0.8	/ 0.9	89	0.0 / 0.9	0	Metawacke	3	7/29/2024
	R2	32.4	- 32.9	0.5	/ 0.5	100	0.0 / 0.5	0	Metawacke	3	7/29/2024
	R3	32.9	- 36.5	3.6	/ 3.6	100	0.5 / 3.6	14	Metawacke	3	7/29/2024
	R4	36.5	- 41.5	5.0	/ 5.0	100	3.0 / 5.0	60	Metawacke	4	7/29/2024
BB-BSA-106	R1	63.8	- 64.8	0.3	/ 1.0	30	0 / 0.3	0	Metawacke	1	7/28/2024
	R2	64.8	- 69.1	4.3	/ 4.3	100	2 / 4.3	47	Metawacke	1	7/28/2024
	R3	69.1	- 74.1	5.0	/ 5.0	100	3.6 / 5.0	62	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

Reviewed By: JDL

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**MAINEDOT WIN #027176.00**

Boring	Run	Depth Below Surface		Recovery		RQD		Rock Type	Box Row	Date Cored	
		Feet		Feet	%	Feet	%				
BB-BSA-102	R1	12.2	- 17.2	4.50	/ 5.0	90	3.7 / 5.0	73	Metawacke	3	5/8/2024
	R2	17.2	- 22.2	4.9	/ 5.0	98	4.9 / 5.0	98	Metawacke	4	5/8/2024
BB-BSA-108	R1	6.7	- 11.7	4.9	/ 5.0	98	3.0 / 5.0	59	Metawacke	1	5/7/2024
	R2	11.7	- 12.7	0.9	/ 1.0	92	0.4 / 1.0	40	Metawacke	2	5/7/2024
	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:

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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



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**BANGOR, MAINE**  
**MAINEDOT WIN #027176.00**

Boring	Run	Depth Below Surface		Recovery			RQD		Rock Type	Box Row	Date Cored
		Feet		Feet		%	Feet	%			
BB-BSA-103	R1	7.2	- 12.2	5.0	/ 5.0	100	1.6 / 5.0	31	Metawacke	3	5/8/2024
	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
	R2	10.3	- 15.3	5.0	/ 5.0	100	3.6 / 5.0	72	Metawacke	2	5/8/2024



## Notes:

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

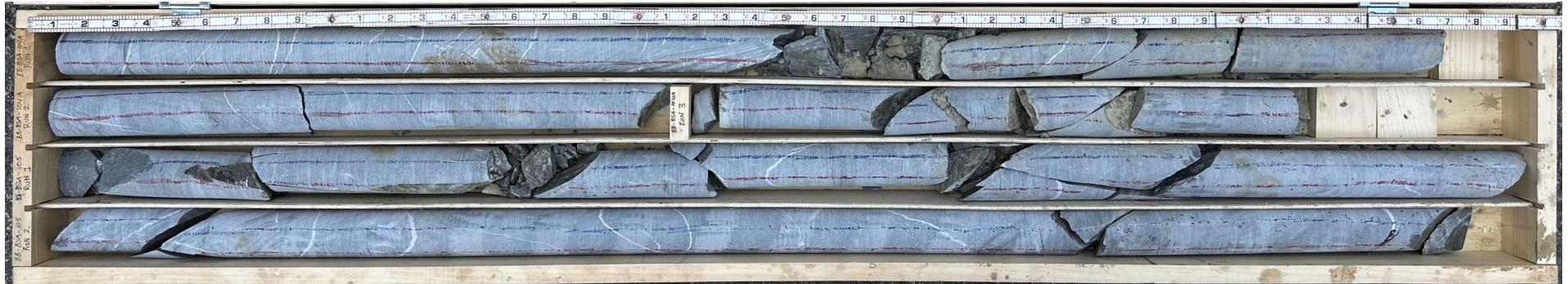
Prepared By: RJN

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**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 Cored
		Feet		Feet		%	Feet		%			
BB-BSA-104A	R1	21.0	- 26.0	4.8	/ 5.0	95	2.8	/ 5.0	56	Metawacke	1	7/30/2024
	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
	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.
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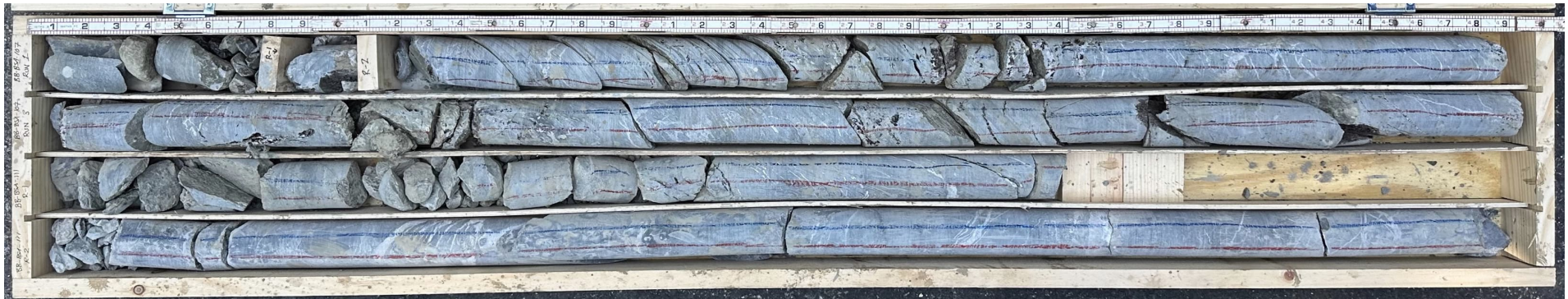
Prepared By: RJN

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**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 Cored
		Feet		Feet		%	Feet	%			
BB-BSA-107	R1	63.4	- 67.2	0.6	/ 3.8	23	0.0 / 3.8	0	Metawacke	1	7/23/2024
	R2	67.2	- 68.2	0.2	/ 1.0	17	0.0 / 1.0	0	Metawacke	1	7/24/2024
	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	100	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
	R2	24.0	- 29.0	5.0	/ 5.0	100	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

Boring	Run	Depth Below Surface		Recovery			RQD		Rock Type	Box Row	Date Cored	
		Feet		Feet		%	Feet					%
BB-BSA109A	R1	4.0	- 8.8	4.3	/ 4.8	90	1.6	/ 4.8	33	Metawacke	2	5/7/2024
	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  
Reviewed By: JDL

**APPENDIX C**

# Laboratory Test Results

Client:	WSP USA, Inc.		
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	Moist, olive brown silty sand with gravel	10.7
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



Client:	WSP USA, Inc.		
Project:	MaineDOT I-95 Bridge over Stillwater		
Location:	Merrimack, NH	Project No:	GTX-319180
Boring ID:	---	Sample Type:	---
Sample ID:	---	Test Date:	08/14/24
Depth :	---	Test Id:	780423
		Tested By:	ajl
		Checked By:	ank

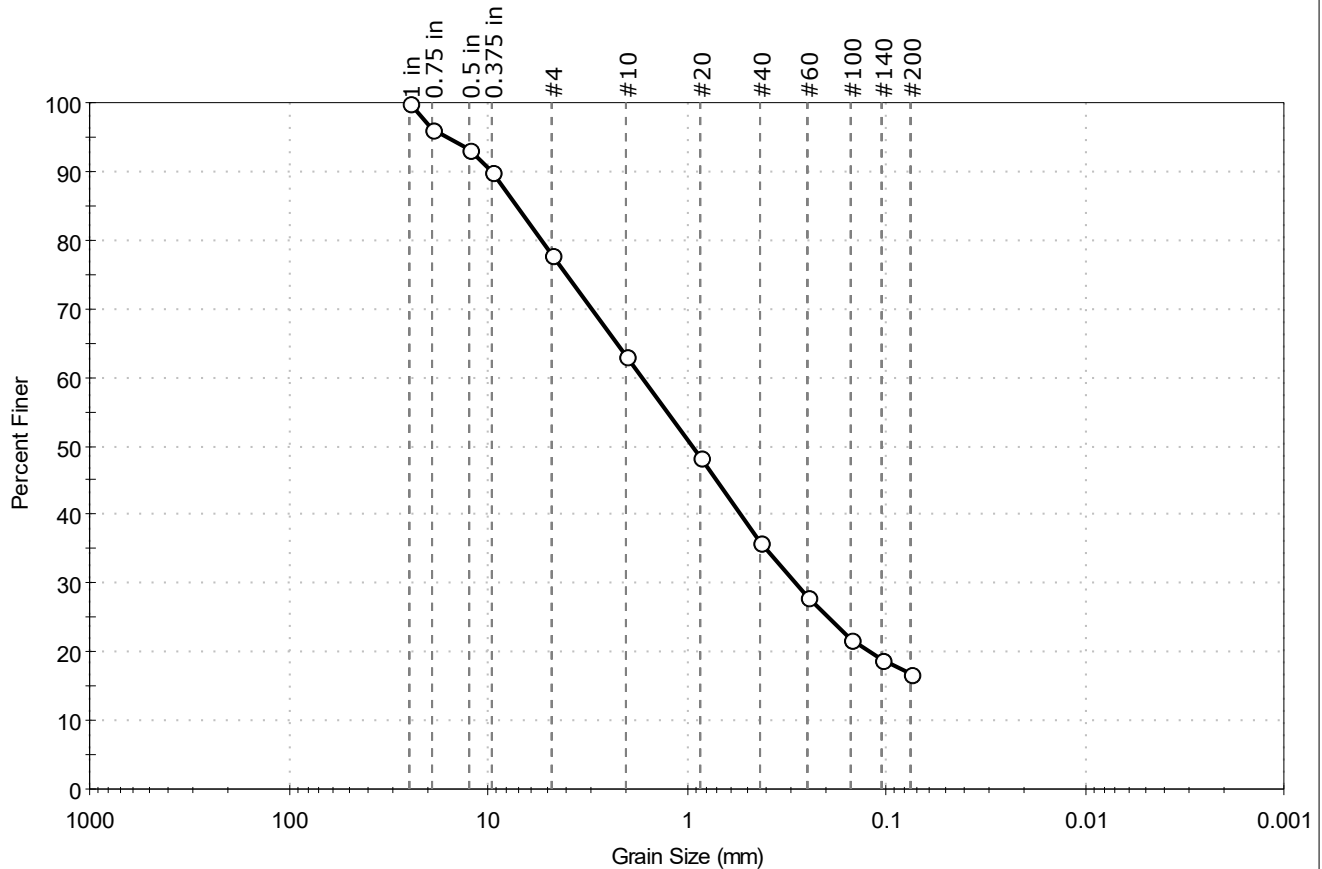
## Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	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

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-101	Sample Type: Jar	Tested By: ajl
Sample ID: 1D	Test Date: 08/19/24	Checked By: ank
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		

### Coefficients

$D_{85} = 7.1397 \text{ mm}$        $D_{30} = 0.2832 \text{ mm}$   
 $D_{60} = 1.6778 \text{ mm}$        $D_{15} = \text{N/A}$   
 $D_{50} = 0.9366 \text{ mm}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM N/A

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

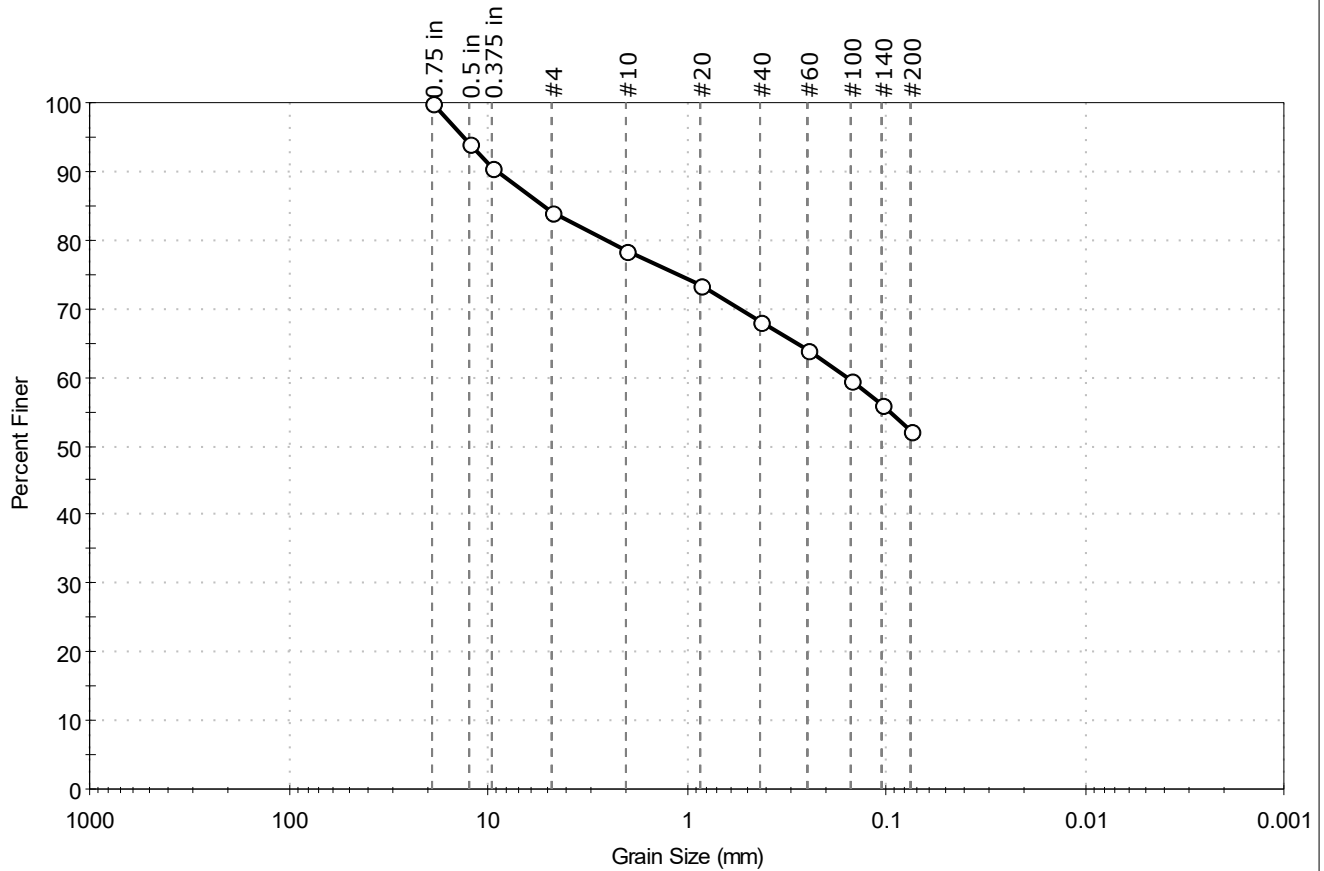
### Sample/Test Description

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:	GTX-319180
Boring ID:	BB-BSA-101	Sample Type:	Jar
Sample ID:	4D	Test Date:	08/19/24
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		

### Coefficients

$D_{85} = 5.2031 \text{ mm}$        $D_{30} = \text{N/A}$   
 $D_{60} = 0.1591 \text{ mm}$        $D_{15} = \text{N/A}$   
 $D_{50} = \text{N/A}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM      N/A

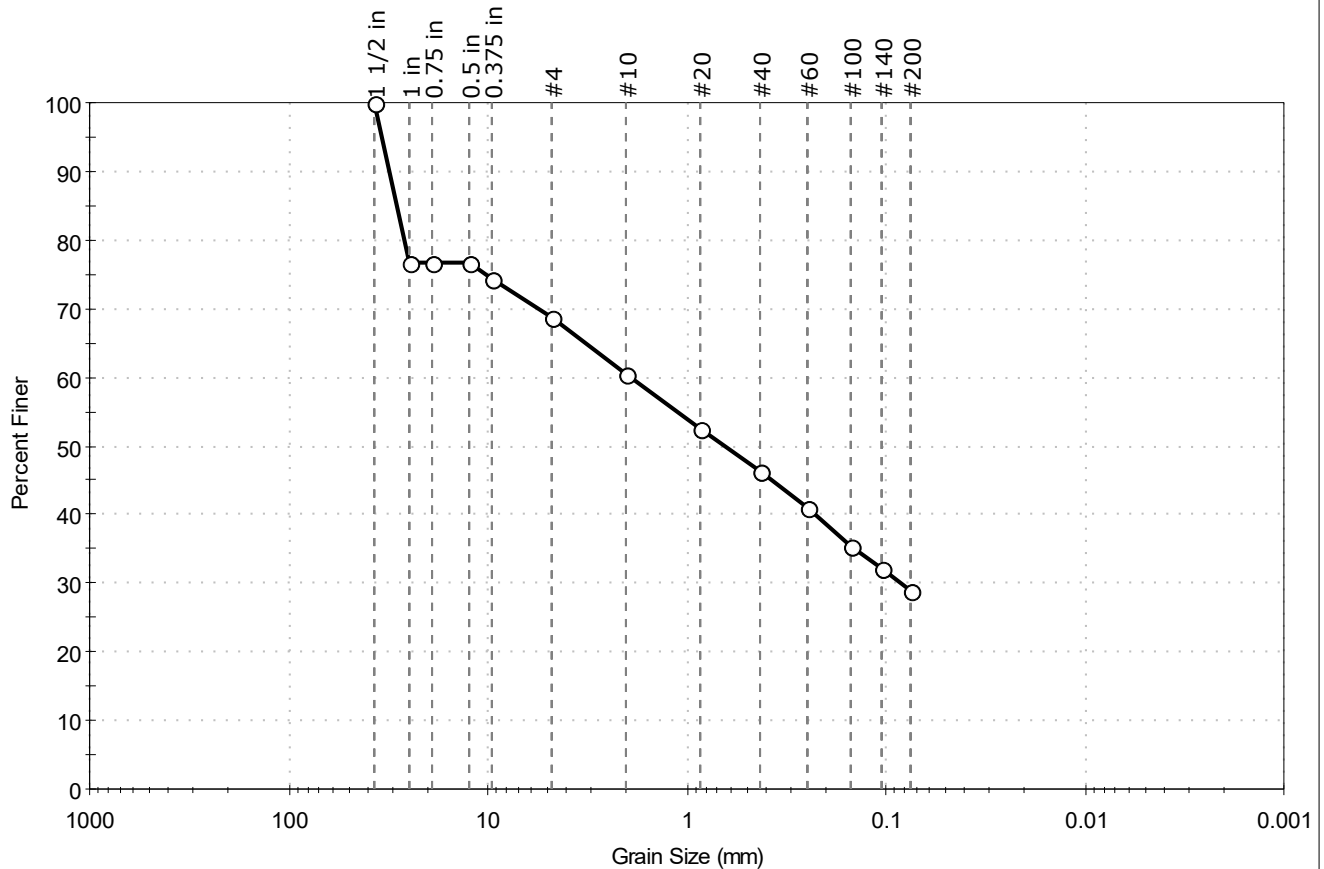
AASHTO      Silty Soils (A-4 (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-101	Sample Type: Jar	Tested By: ajl
Sample ID: 6D	Test Date: 08/16/24	Checked By: ank
Depth: 15-17 ft	Test Id: 780403	
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		

### Coefficients

D<sub>85</sub> = 28.9113 mm      D<sub>30</sub> = 0.0851 mm  
 D<sub>60</sub> = 1.8753 mm      D<sub>15</sub> = N/A  
 D<sub>50</sub> = 0.6407 mm      D<sub>10</sub> = N/A  
 C<sub>u</sub> = N/A      C<sub>c</sub> = N/A

### Classification

ASTM N/A

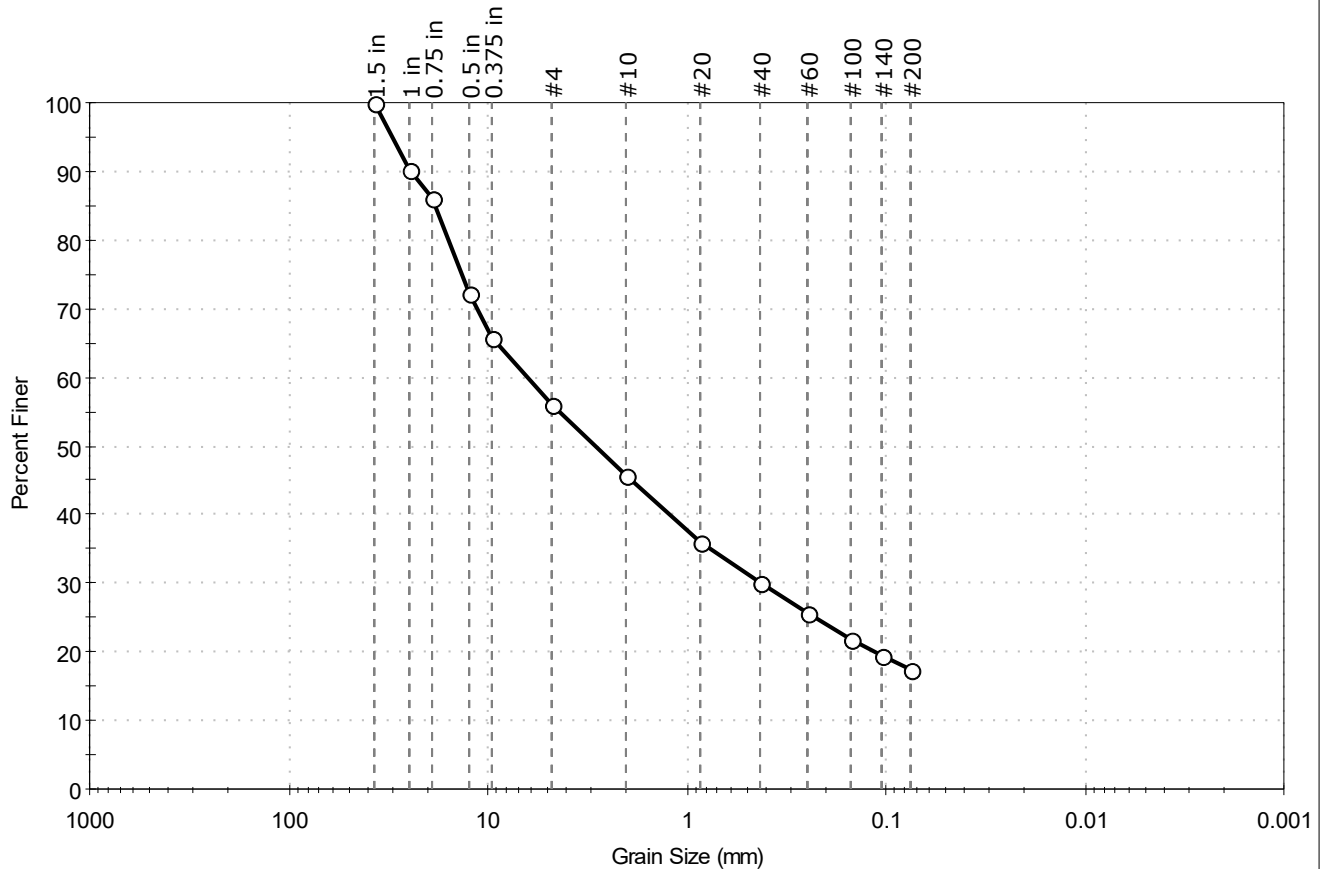
AASHTO Silty Gravel and Sand (A-2-4 (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180
Project: MaineDOT I-95 Bridge over Stillwater	
Location: Merrimack, NH	
Boring ID: BB-BSA-101	Sample Type: Jar
Sample ID: 8D	Test Date: 08/19/24
Depth: 25-27 ft	Test Id: 780404
Test Comment: ---	Tested By: ajl
Visual Description: Moist, dark grayish brown silty gravel with sand	Checked By: ank
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		

### Coefficients

D<sub>85</sub> = 18.3264 mm      D<sub>30</sub> = 0.4200 mm  
 D<sub>60</sub> = 6.2648 mm      D<sub>15</sub> = N/A  
 D<sub>50</sub> = 2.8644 mm      D<sub>10</sub> = N/A  
 C<sub>u</sub> = N/A      C<sub>c</sub> = N/A

### Classification

ASTM N/A

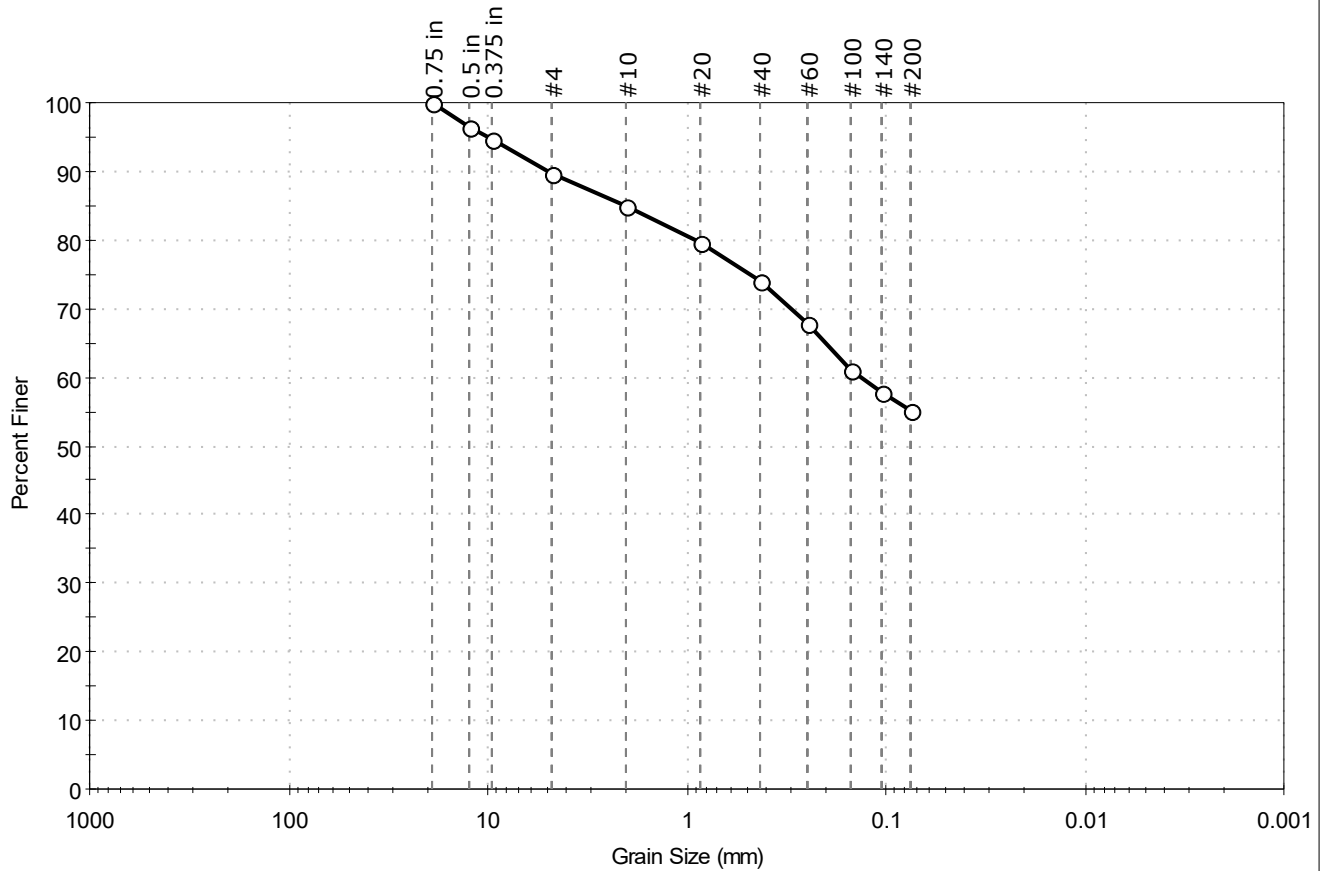
AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-104	Sample Type: Jar	Tested By: ajl
Sample ID: 2D	Test Date: 08/19/24	Checked By: ank
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		

### Coefficients

D <sub>85</sub> = 1.9913 mm	D <sub>30</sub> = N/A
D <sub>60</sub> = 0.1326 mm	D <sub>15</sub> = N/A
D <sub>50</sub> = N/A	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

### Classification

ASTM N/A

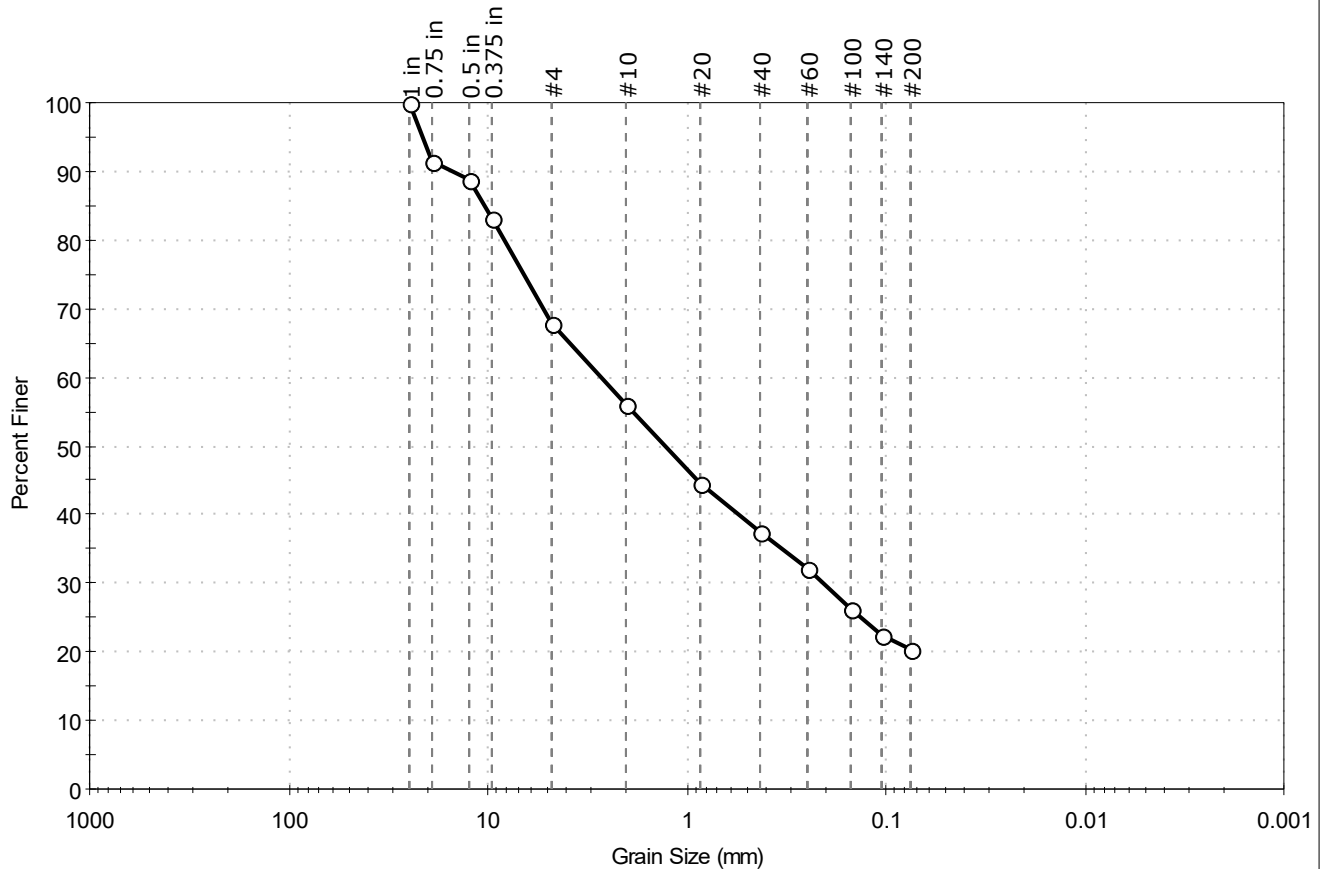
AASHTO Silty Soils (A-4 (0))

### Sample/Test Description

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:	GTX-319180
Boring ID:	BB-BSA-104	Sample Type:	Jar
Sample ID:	4D	Test Date:	08/19/24
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		

### Coefficients

$D_{85} = 10.3977 \text{ mm}$        $D_{30} = 0.2076 \text{ mm}$   
 $D_{60} = 2.6769 \text{ mm}$        $D_{15} = \text{N/A}$   
 $D_{50} = 1.2727 \text{ mm}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM      N/A

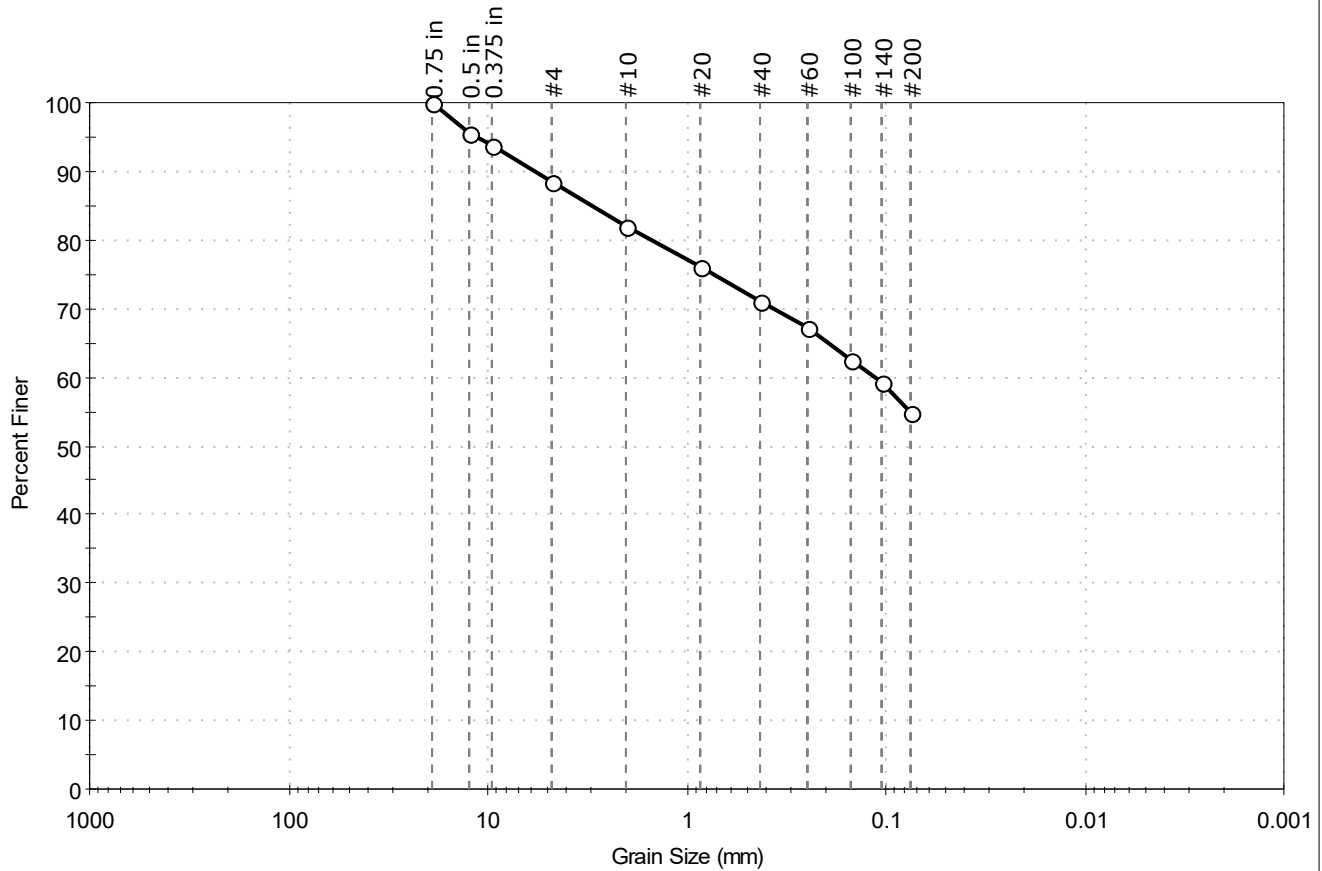
AASHTO      Stone Fragments, Gravel and Sand (A-1-b (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180
Project: MaineDOT I-95 Bridge over Stillwater	
Location: Merrimack, NH	
Boring ID: BB-BSA-104	Sample Type: Jar
Sample ID: 5D	Test Date: 08/19/24
Depth: 10-12 ft	Test Id: 780407
Test Comment: ---	Tested By: ajl
Visual Description: Moist, grayish brown sandy silt	Checked By: ank
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		

### Coefficients

$D_{85} = 3.0173 \text{ mm}$        $D_{30} = \text{N/A}$   
 $D_{60} = 0.1137 \text{ mm}$        $D_{15} = \text{N/A}$   
 $D_{50} = \text{N/A}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM N/A

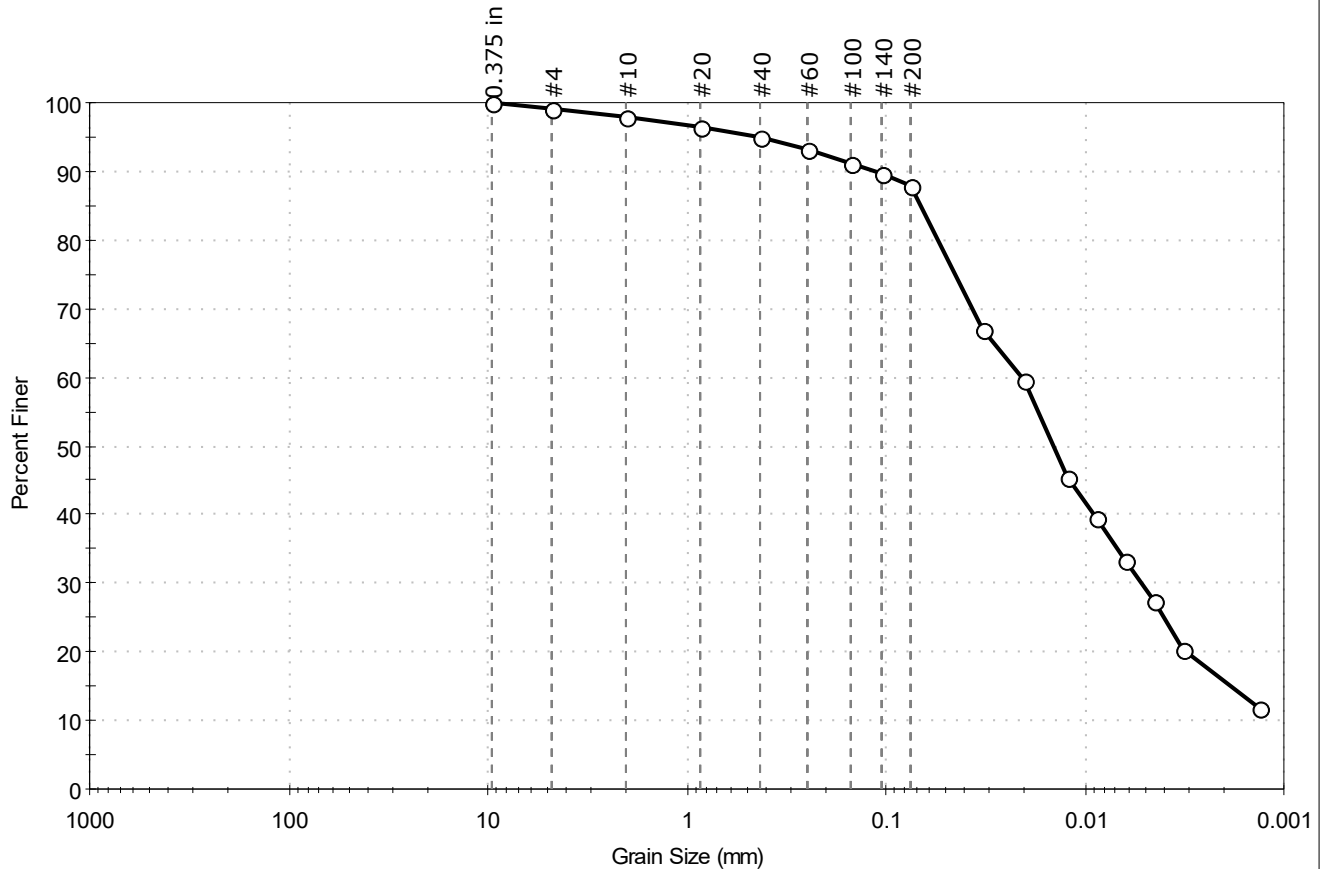
AASHTO Silty Soils (A-4 (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180
Project: MaineDOT I-95 Bridge over Stillwater	
Location: Merrimack, NH	
Boring ID: BB-BSA-104	Sample Type: Jar
Sample ID: 6D	Tested By: ajl
Depth: 15-17 ft	Test Date: 08/15/24
	Checked By: ank
	Test Id: 780410
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		

### Coefficients

$D_{85} = 0.0670$  mm       $D_{30} = 0.0052$  mm  
 $D_{60} = 0.0205$  mm       $D_{15} = 0.0019$  mm  
 $D_{50} = 0.0143$  mm       $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM Lean CLAY (CL)

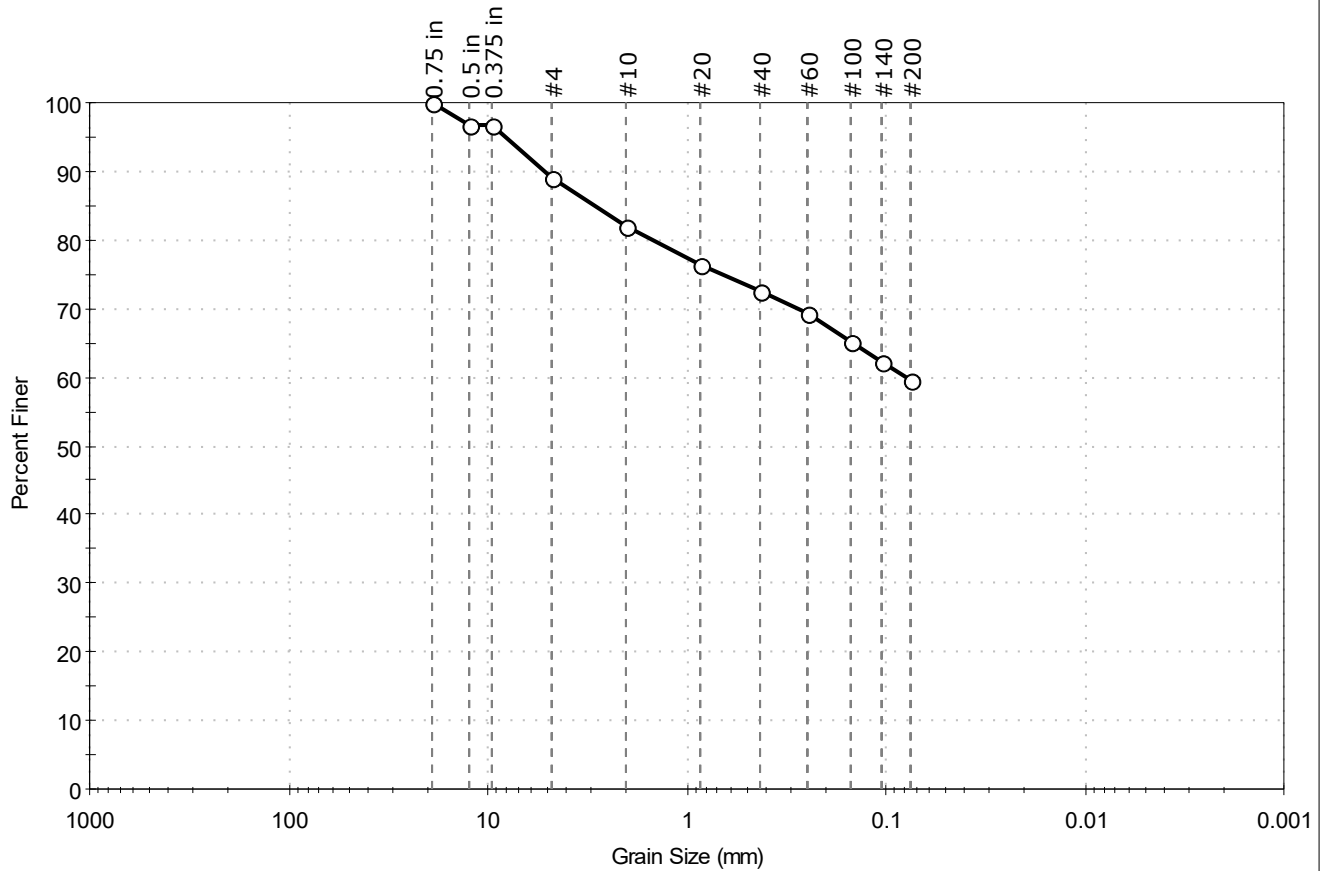
AASHTO Clayey Soils (A-6 (10))

### Sample/Test Description

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

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-104	Sample Type: Jar	Tested By: ajl
Sample ID: 7D	Test Date: 08/19/24	Checked By: ank
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		

### Coefficients

$D_{85} = 2.8830 \text{ mm}$        $D_{30} = \text{N/A}$   
 $D_{60} = 0.0799 \text{ mm}$        $D_{15} = \text{N/A}$   
 $D_{50} = \text{N/A}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

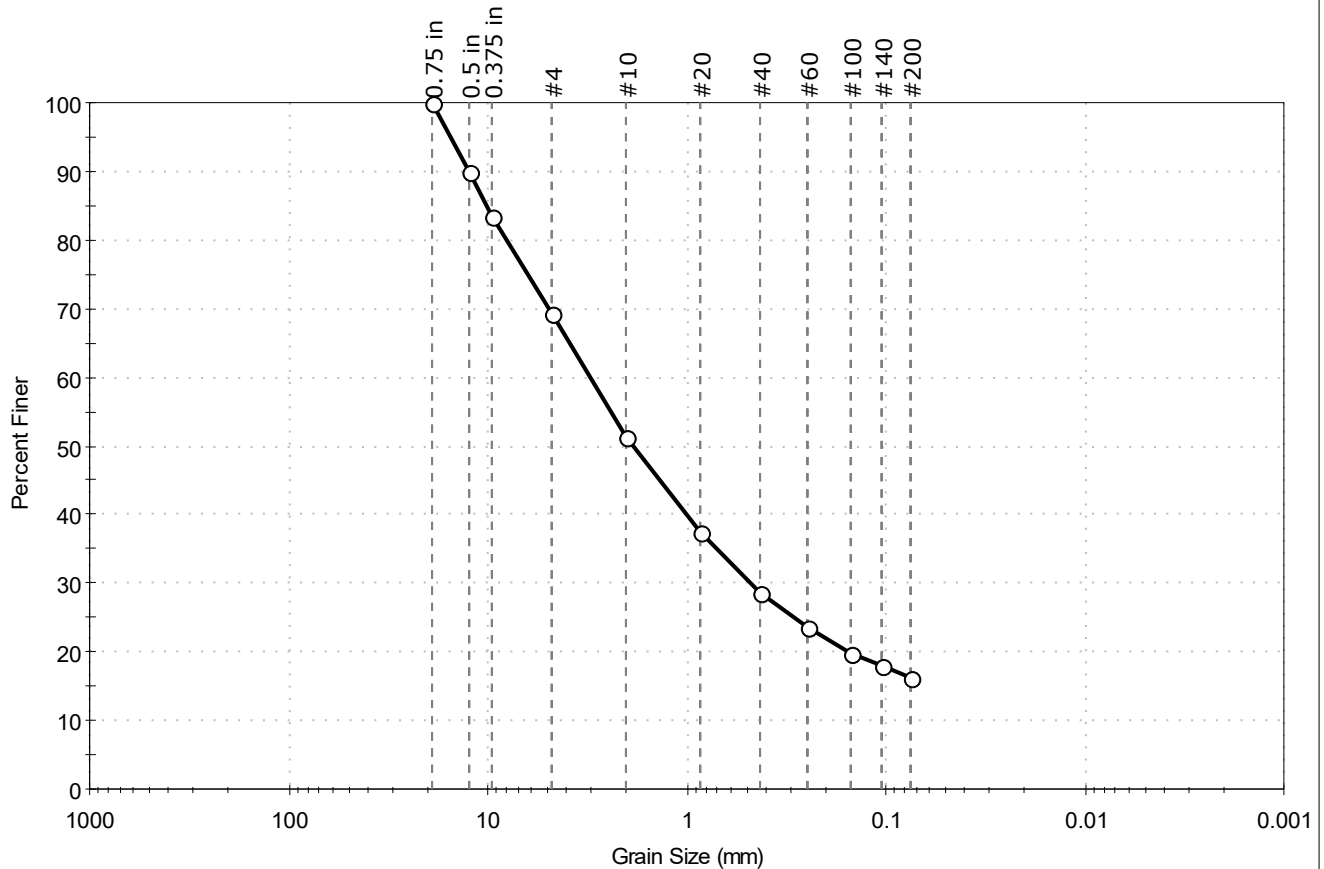
### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD



Client: WSP USA, Inc.	Project No: GTX-319180	
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		

### Coefficients

D<sub>85</sub> = 10.1411 mm      D<sub>30</sub> = 0.4740 mm  
 D<sub>60</sub> = 3.0347 mm      D<sub>15</sub> = N/A  
 D<sub>50</sub> = 1.8370 mm      D<sub>10</sub> = N/A  
 C<sub>u</sub> = N/A      C<sub>c</sub> = N/A

### Classification

ASTM N/A

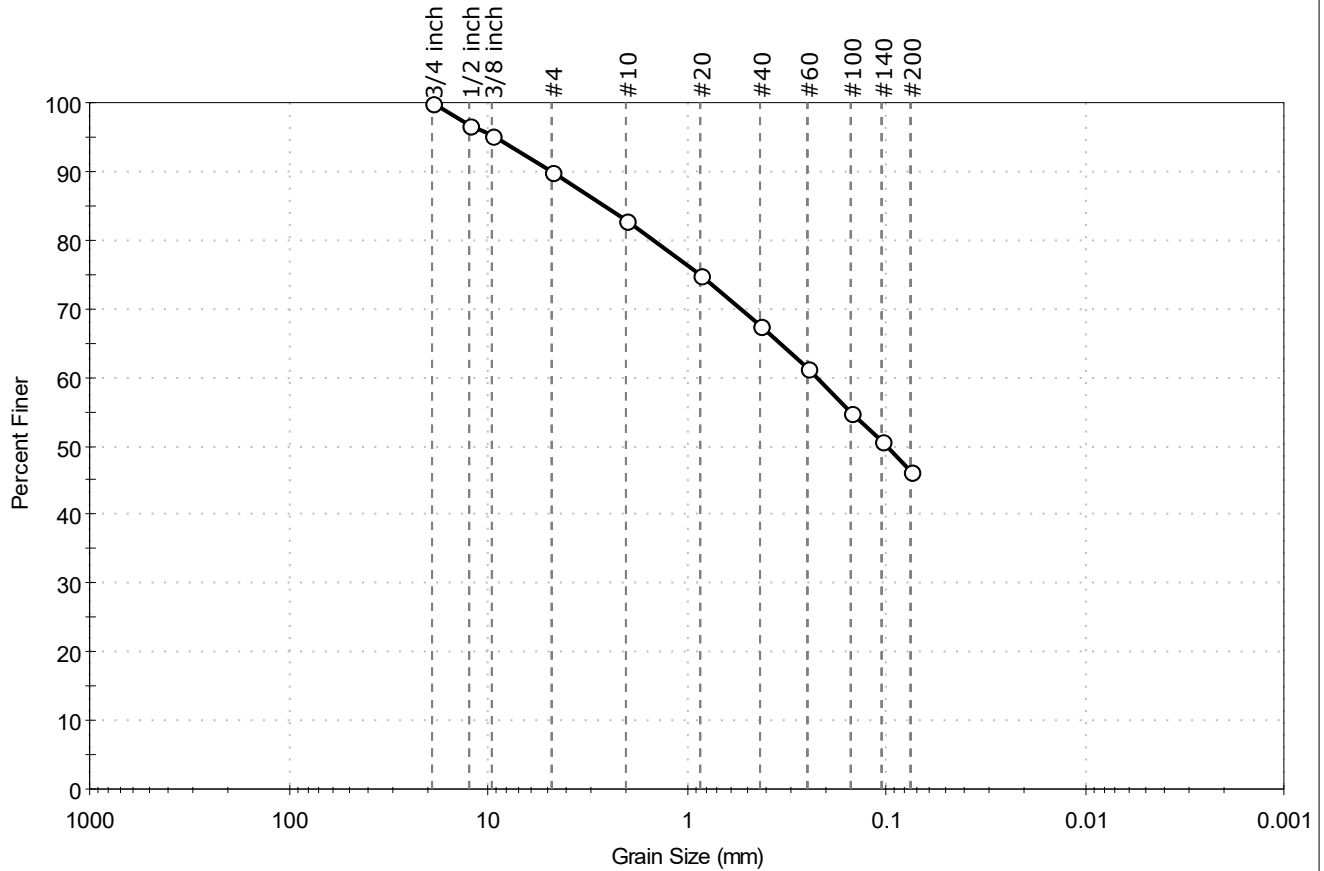
AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

### Sample/Test Description

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:	GTX-319180
Boring ID:	BB-BSA-105	Sample Type:	Jar
Sample ID:	3D	Test Date:	08/19/24
Depth :	5-5.6 ft	Test Id:	780367
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		

### Coefficients

$D_{85} = 2.5683 \text{ mm}$        $D_{30} = \text{N/A}$   
 $D_{60} = 0.2264 \text{ mm}$        $D_{15} = \text{N/A}$   
 $D_{50} = 0.1002 \text{ mm}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM      N/A

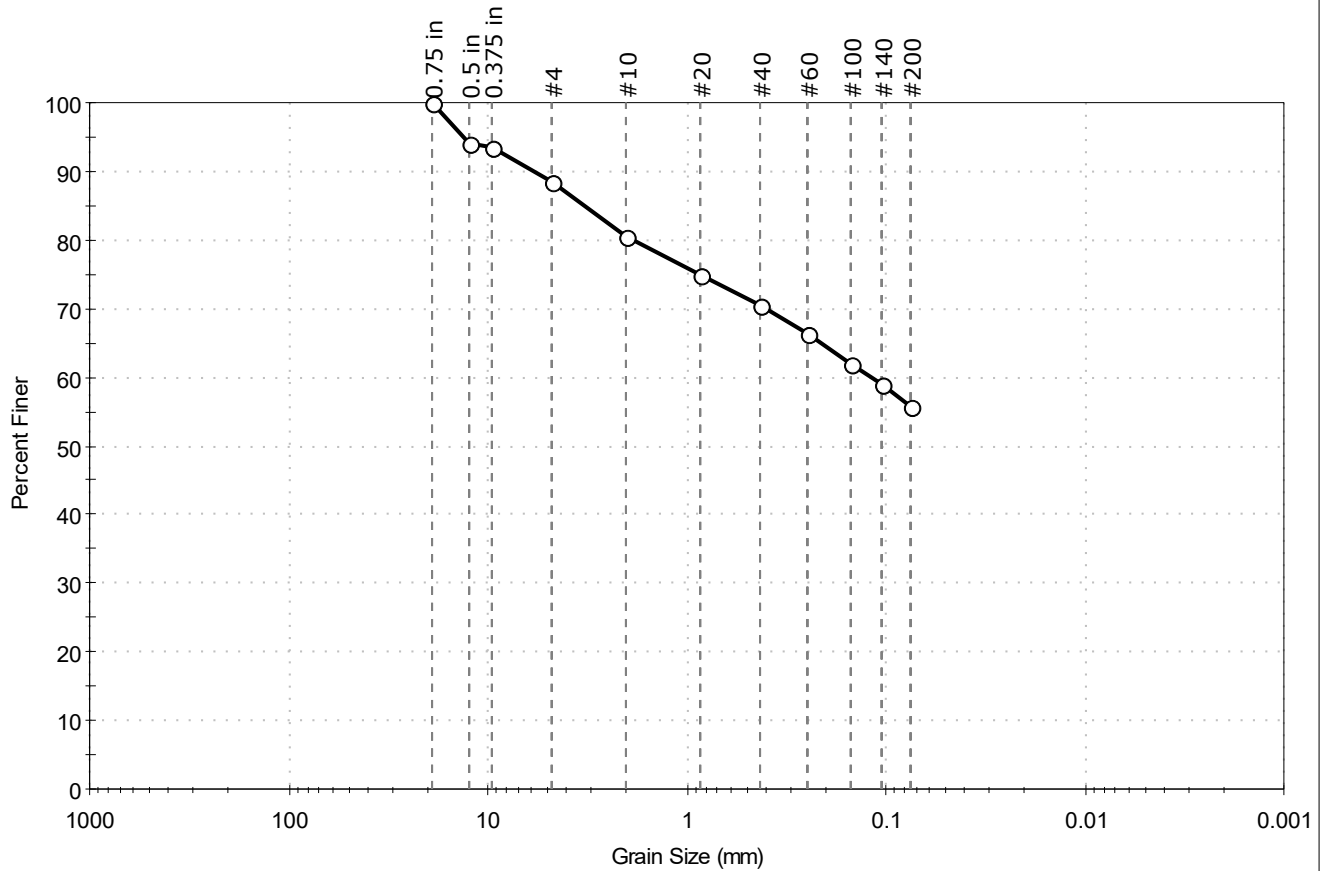
AASHTO      Silty Soils (A-4 (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-105	Sample Type: Jar	Tested By: ajl
Sample ID: 6D	Test Date: 08/19/24	Checked By: ank
Depth : 15-17 ft	Test Id: 780368	
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		

### Coefficients

$D_{85} = 3.2112 \text{ mm}$        $D_{30} = \text{N/A}$   
 $D_{60} = 0.1201 \text{ mm}$        $D_{15} = \text{N/A}$   
 $D_{50} = \text{N/A}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM N/A

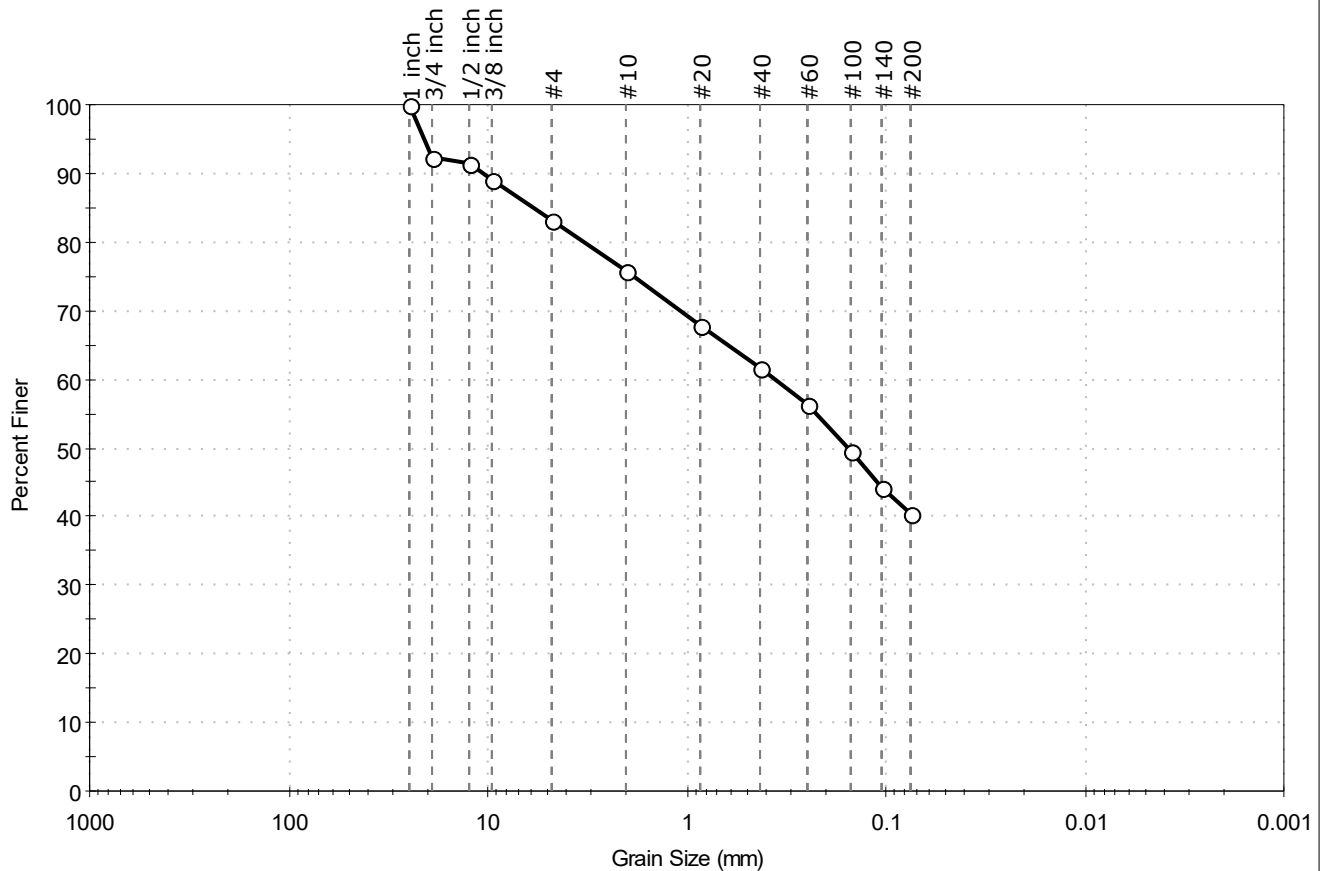
AASHTO Silty Soils (A-4 (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-105	Sample Type: Jar	Tested By: ajl
Sample ID: 7D	Test Date: 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		

### Coefficients

$D_{85} = 5.8920 \text{ mm}$        $D_{30} = \text{N/A}$   
 $D_{60} = 0.3574 \text{ mm}$        $D_{15} = \text{N/A}$   
 $D_{50} = 0.1564 \text{ mm}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM N/A

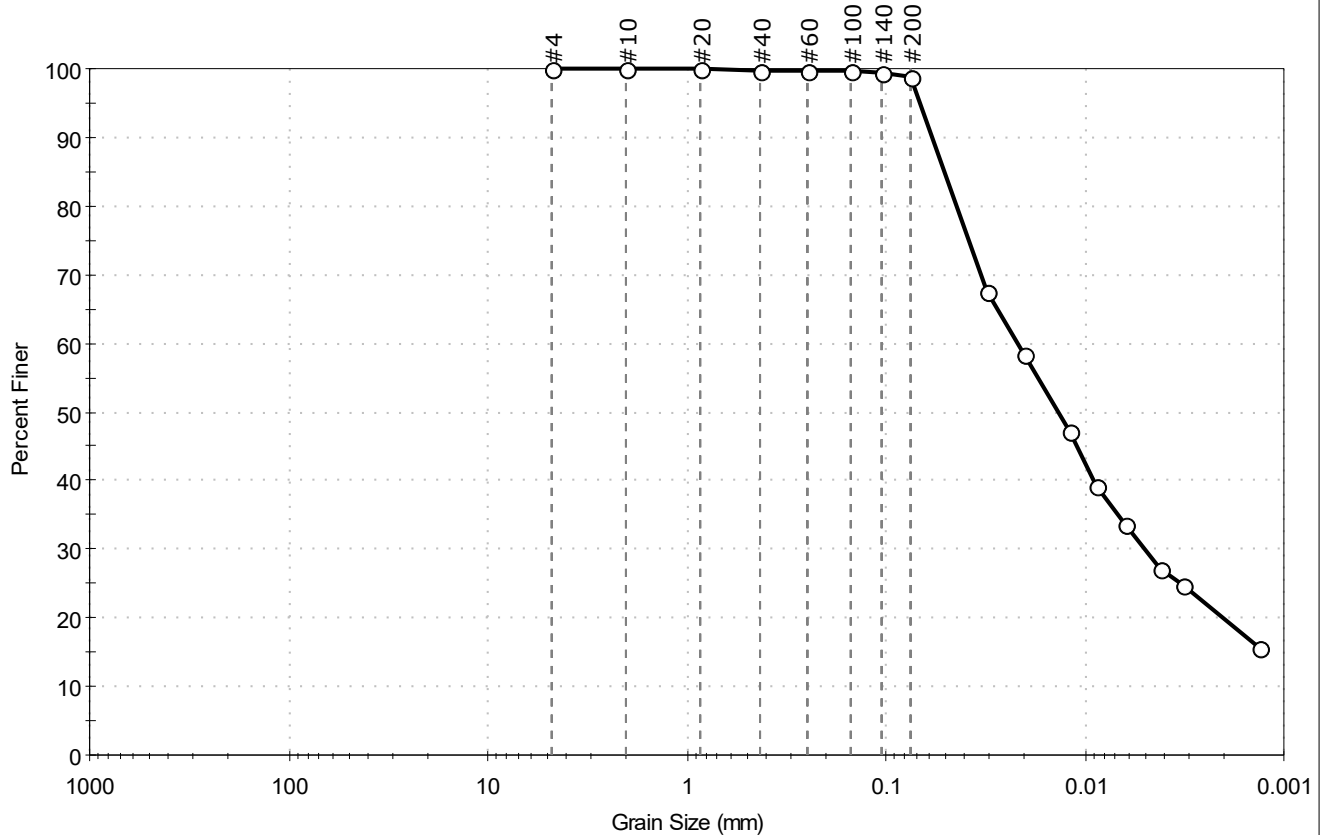
AASHTO Silty Soils (A-4 (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-106	Sample Type: Jar	Tested By: ajl
Sample ID: 7D	Test Date: 08/15/24	Checked By: ank
Depth : 20-22 ft	Test Id: 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		

### Coefficients

$D_{85} = 0.0510$  mm       $D_{30} = 0.0050$  mm  
 $D_{60} = 0.0219$  mm       $D_{15} = \text{N/A}$   
 $D_{50} = 0.0137$  mm       $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM Lean CLAY (CL)

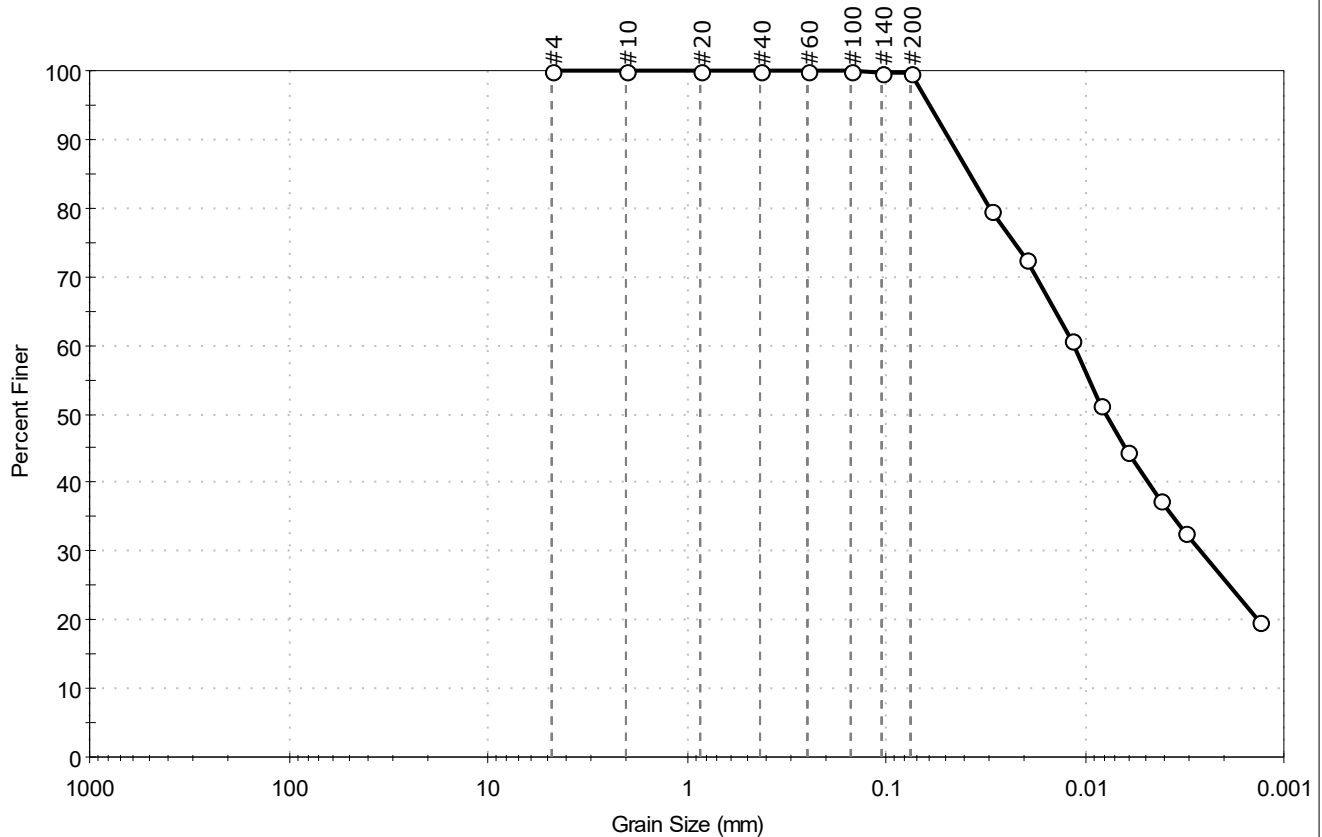
AASHTO Clayey Soils (A-6 (19))

### Sample/Test Description

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

Client: WSP USA, Inc.	Project No: GTX-319180	
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: 25-27 ft	Test Id: 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		

### Coefficients

$D_{85} = 0.0383$  mm       $D_{30} = 0.0026$  mm  
 $D_{60} = 0.0113$  mm       $D_{15} = \text{N/A}$   
 $D_{50} = 0.0079$  mm       $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM Lean CLAY (CL)

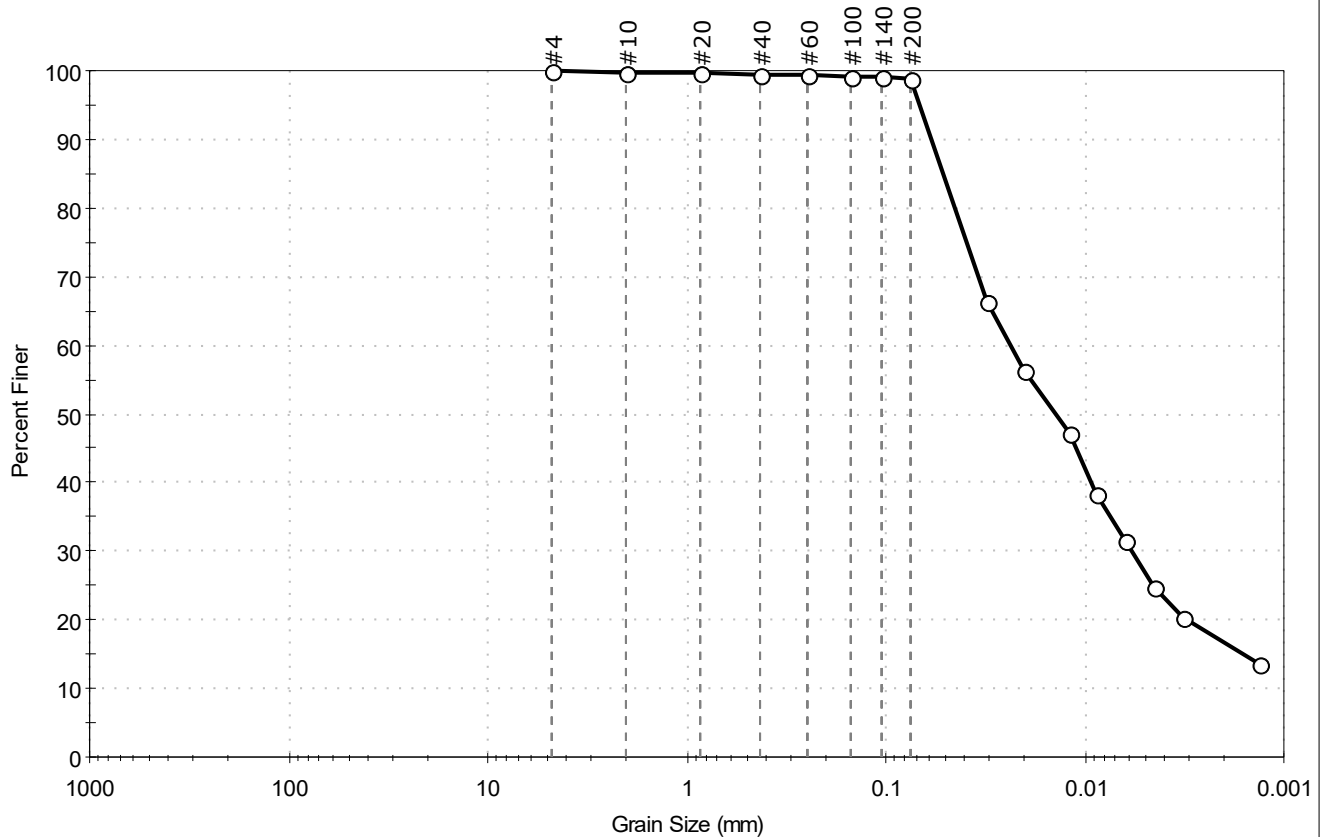
AASHTO Clayey Soils (A-6 (18))

### Sample/Test Description

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

Client: WSP USA, Inc.	Project No: GTX-319180
Project: MaineDOT I-95 Bridge over Stillwater	
Location: Merrimack, NH	
Boring ID: BB-BSA-106	Sample Type: Jar
Sample ID: 9D	Test Date: 08/15/24
Depth: 30-32 ft	Test Id: 780384
Test Comment: ---	Tested By: ajl
Visual Description: Moist, gray clay	Checked By: ank
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		

### Coefficients

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

### Classification

ASTM Lean CLAY (CL)

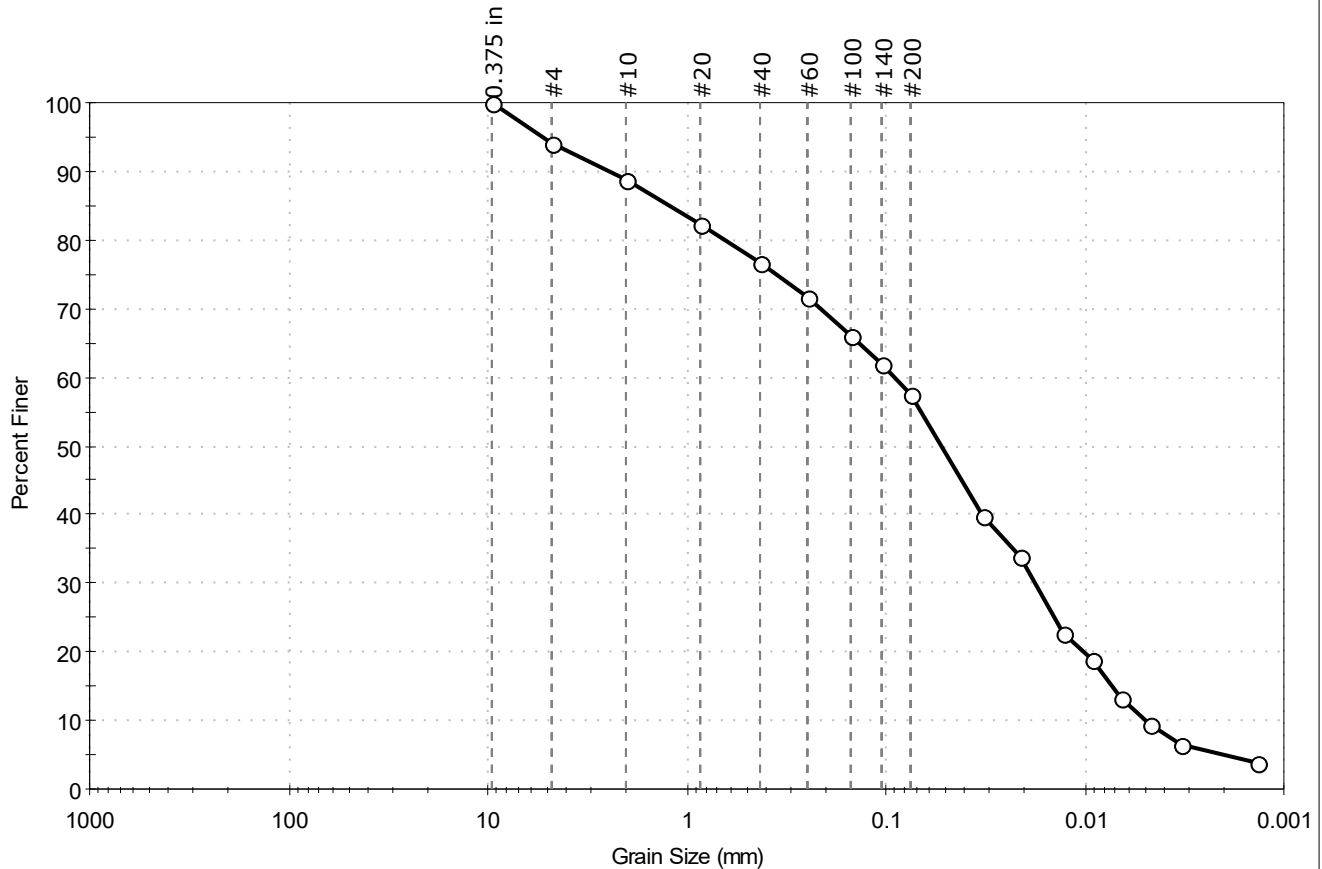
AASHTO Clayey Soils (A-6 (9))

### Sample/Test Description

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

Client: WSP USA, Inc.	Project No: GTX-319180
Project: MaineDOT I-95 Bridge over Stillwater	
Location: Merrimack, NH	
Boring ID: BB-BSA-106	Sample Type: Jar
Sample ID: 11D	Test Date: 08/15/24
Depth: 40-42 ft	Test Id: 780385
Test Comment: ---	Tested By: ajl
Visual Description: Moist, gray sandy silt	Checked By: ank
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		

### Coefficients

$D_{85} = 1.2010 \text{ mm}$        $D_{30} = 0.0177 \text{ mm}$   
 $D_{60} = 0.0912 \text{ mm}$        $D_{15} = 0.0073 \text{ mm}$   
 $D_{50} = 0.0526 \text{ mm}$        $D_{10} = 0.0049 \text{ mm}$   
 $C_u = 18.612$        $C_c = 0.701$

### Classification

ASTM Sandy SILT (ML)

AASHTO Silty Soils (A-4 (0))

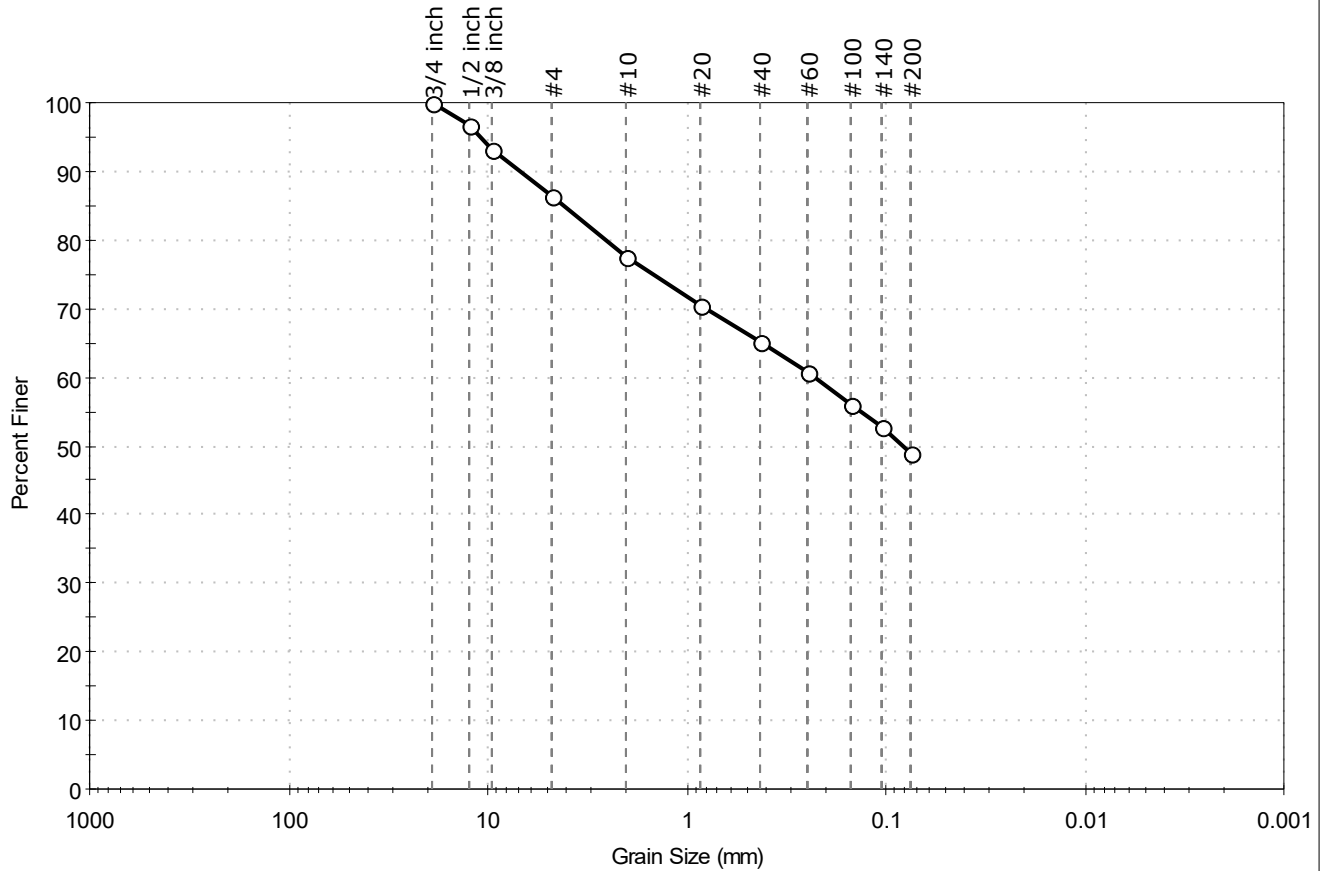
### Sample/Test Description

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



Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-106	Sample Type: Jar	Tested By: ajl
Sample ID: 14D	Test Date: 08/16/24	Checked By: ank
Depth : 55-57 ft	Test Id: 780380	
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		

### Coefficients

$D_{85} = 4.1627 \text{ mm}$        $D_{30} = \text{N/A}$   
 $D_{60} = 0.2272 \text{ mm}$        $D_{15} = \text{N/A}$   
 $D_{50} = 0.0828 \text{ mm}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM N/A

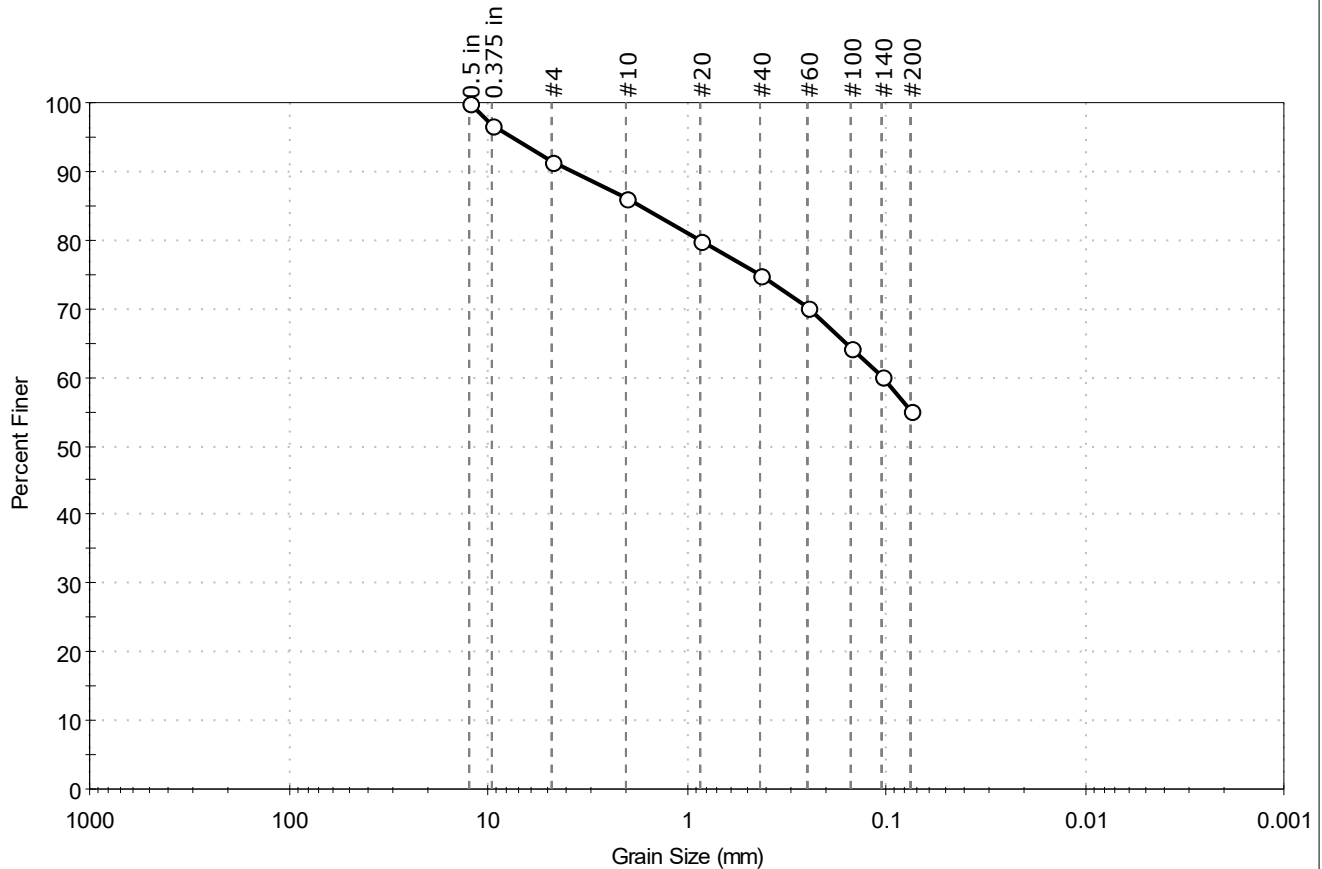
AASHTO Silty Soils (A-4 (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180	
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
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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	8.5	36.3	55.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	97		
#4	4.75	92		
#10	2.00	86		
#20	0.85	80		
#40	0.42	75		
#60	0.25	70		
#100	0.15	64		
#140	0.11	60		
#200	0.075	55		

### Coefficients

$D_{85} = 1.6952 \text{ mm}$        $D_{30} = \text{N/A}$   
 $D_{60} = 0.1052 \text{ mm}$        $D_{15} = \text{N/A}$   
 $D_{50} = \text{N/A}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM N/A

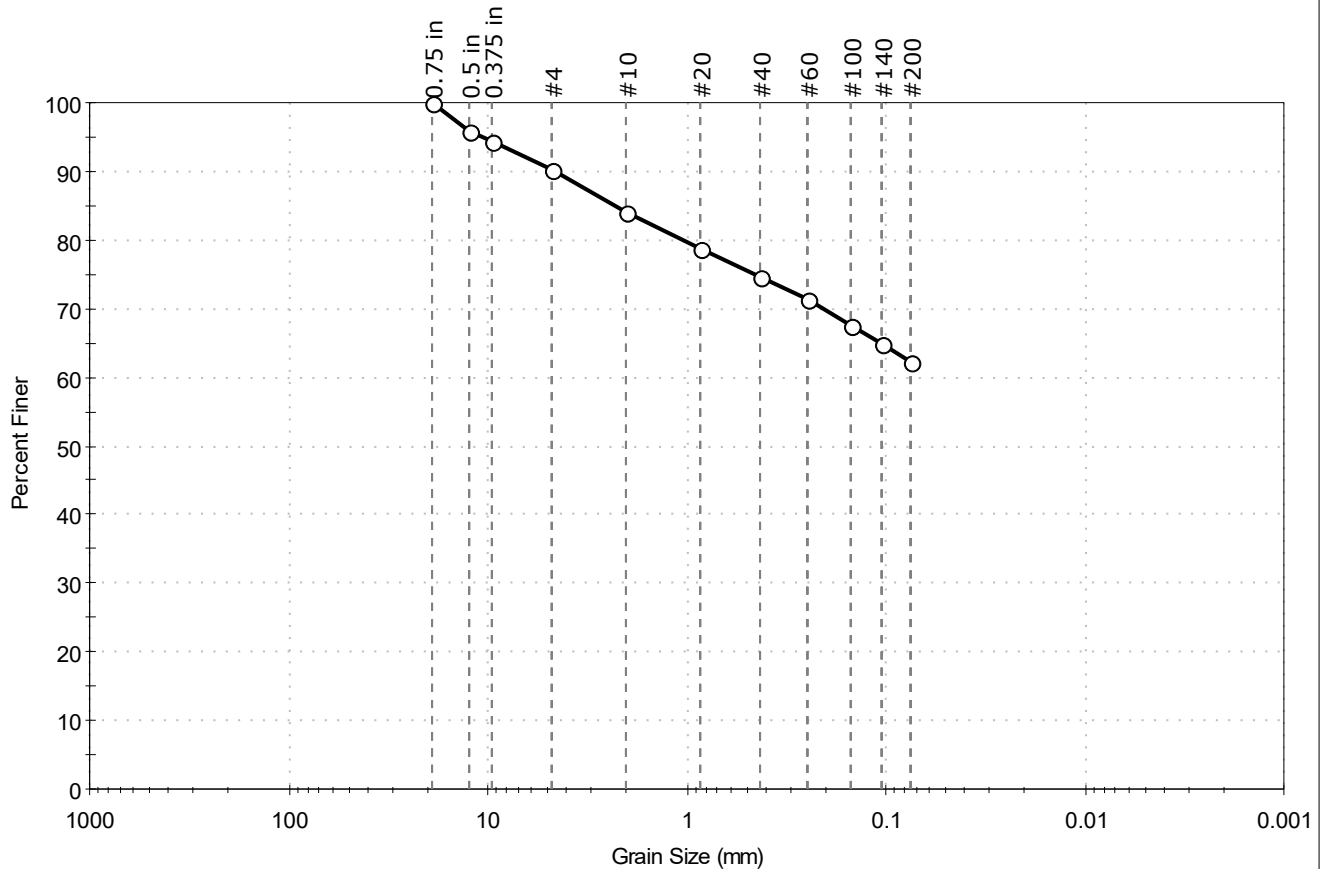
AASHTO Silty Soils (A-4 (0))

### Sample/Test Description

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:	GTX-319180
Boring ID:	BB-BSA-107	Sample Type:	Jar
Sample ID:	6D	Test Date:	08/19/24
Depth :	10.7-12.7 ft	Test Id:	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		

### Coefficients

$D_{85} = 2.2895 \text{ mm}$        $D_{30} = \text{N/A}$   
 $D_{60} = \text{N/A}$        $D_{15} = \text{N/A}$   
 $D_{50} = \text{N/A}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM      N/A

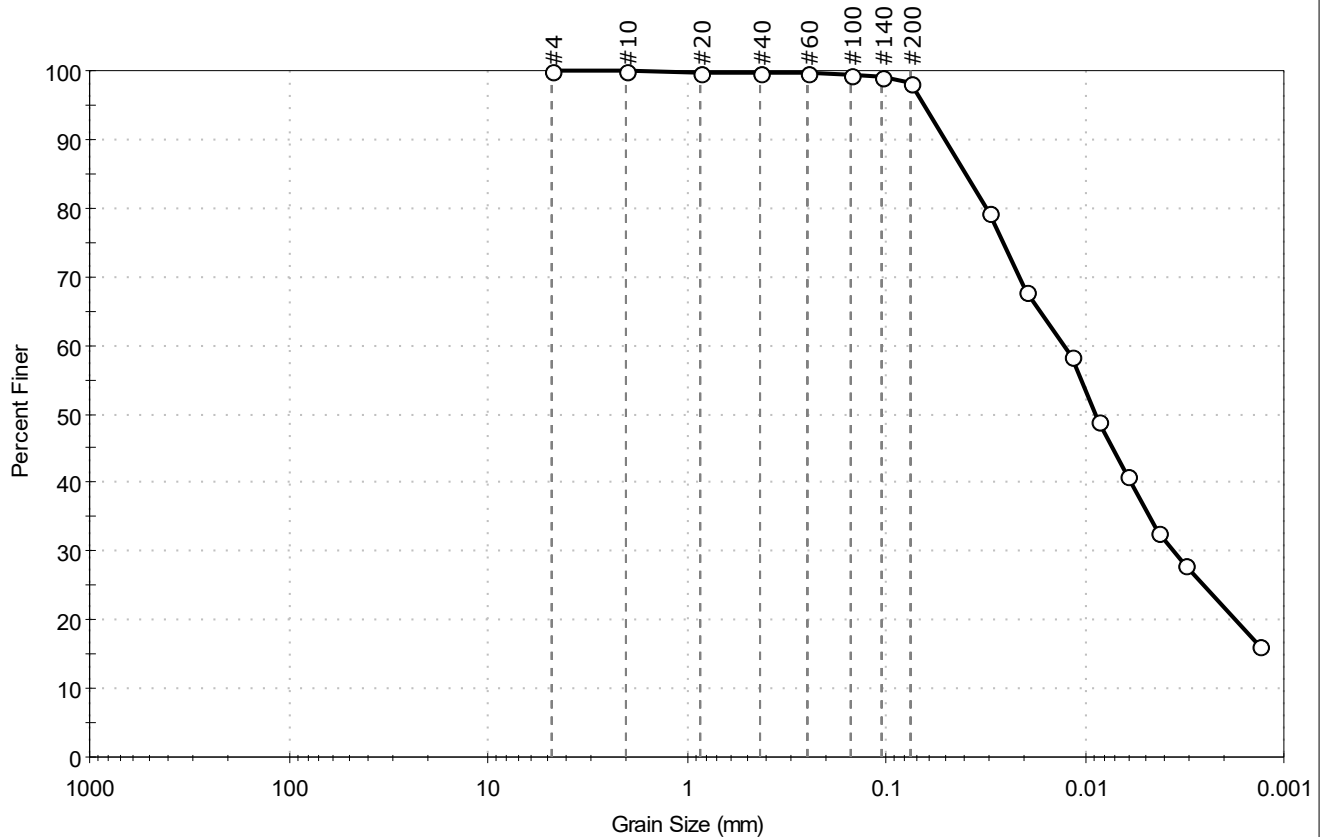
AASHTO      Silty Soils (A-4 (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180	
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: 20-22 ft	Test Id: 780395	
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	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		

### Coefficients

$D_{85} = 0.0395$  mm       $D_{30} = 0.0036$  mm  
 $D_{60} = 0.0127$  mm       $D_{15} = \text{N/A}$   
 $D_{50} = 0.0088$  mm       $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

**ASTM**      Lean CLAY (CL)

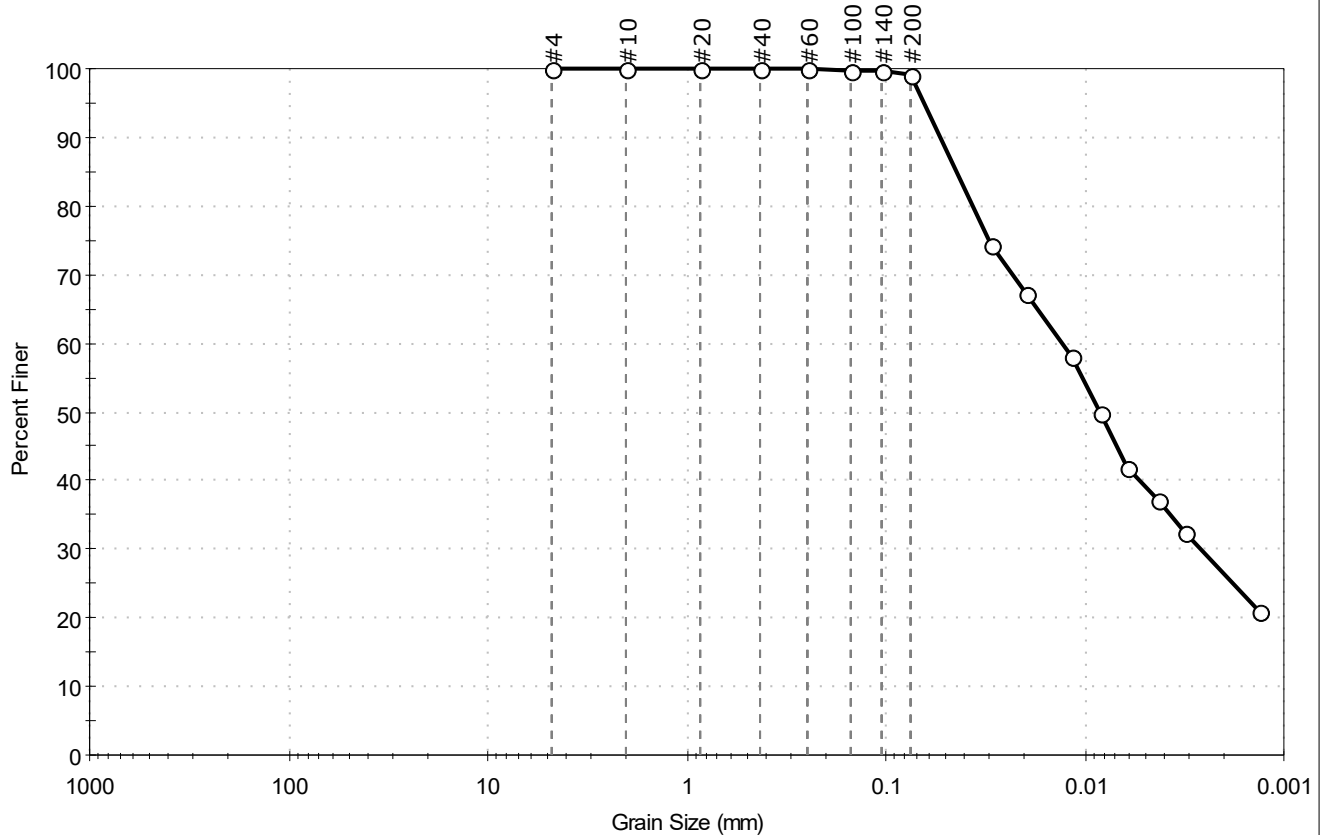
**AASHTO**      Clayey Soils (A-6 (15))

### Sample/Test Description

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

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-107	Sample Type: Jar	Tested By: ajl
Sample ID: 9D	Test Date: 08/15/24	Checked By: ank
Depth: 25-27 ft	Test Id: 780396	
Test Comment: ---		
Visual Description: Moist, olive brown clay		
Sample Comment: ---		

## Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	0.7	99.3

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		

### Coefficients

$D_{85} = 0.0440$  mm       $D_{30} = 0.0026$  mm  
 $D_{60} = 0.0131$  mm       $D_{15} = \text{N/A}$   
 $D_{50} = 0.0084$  mm       $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM Lean CLAY (CL)

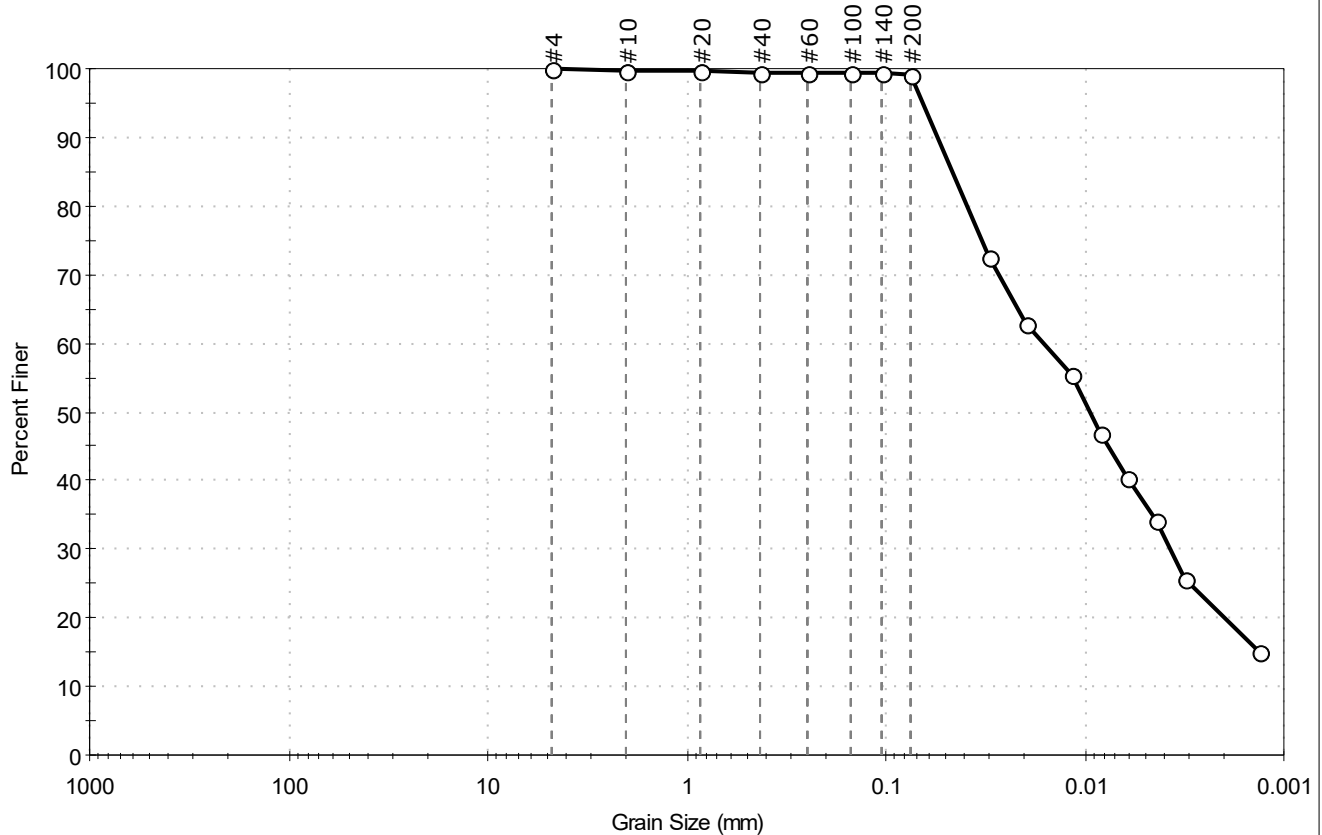
AASHTO Clayey Soils (A-6 (37))

### Sample/Test Description

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

Client: WSP USA, Inc.	Project No: GTX-319180
Project: MaineDOT I-95 Bridge over Stillwater	
Location: Merrimack, NH	
Boring ID: BB-BSA-107	Sample Type: Jar
Sample ID: 10D	Test Date: 08/15/24
Depth: 30-32 ft	Test Id: 780397
Test Comment: ---	Tested By: ajl
Visual Description: Moist, grayish brown clay	Checked By: ank
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		

### Coefficients

$D_{85} = 0.0465$  mm       $D_{30} = 0.0037$  mm  
 $D_{60} = 0.0160$  mm       $D_{15} = 0.0013$  mm  
 $D_{50} = 0.0095$  mm       $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM Lean CLAY (CL)

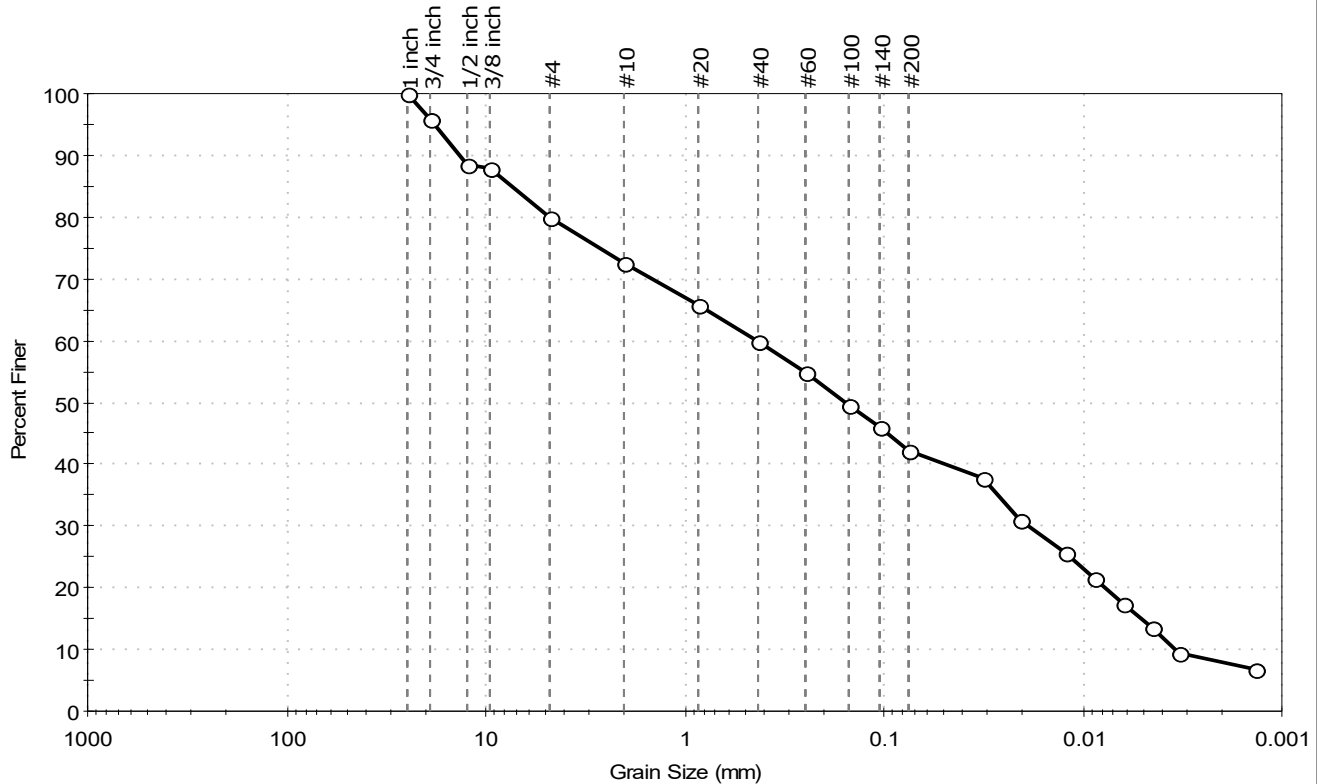
AASHTO Clayey Soils (A-6 (11))

### Sample/Test Description

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

Client: WSP USA, Inc.	Project No: GTX-319180	
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		

### Coefficients

D<sub>85</sub> = 7.3626 mm      D<sub>30</sub> = 0.0188 mm  
 D<sub>60</sub> = 0.4262 mm      D<sub>15</sub> = 0.0052 mm  
 D<sub>50</sub> = 0.1580 mm      D<sub>10</sub> = 0.0034 mm  
 C<sub>u</sub> = 125.353      C<sub>c</sub> = 0.244

### Classification

**ASTM** Silty, Clayey SAND with Gravel (SC-SM)

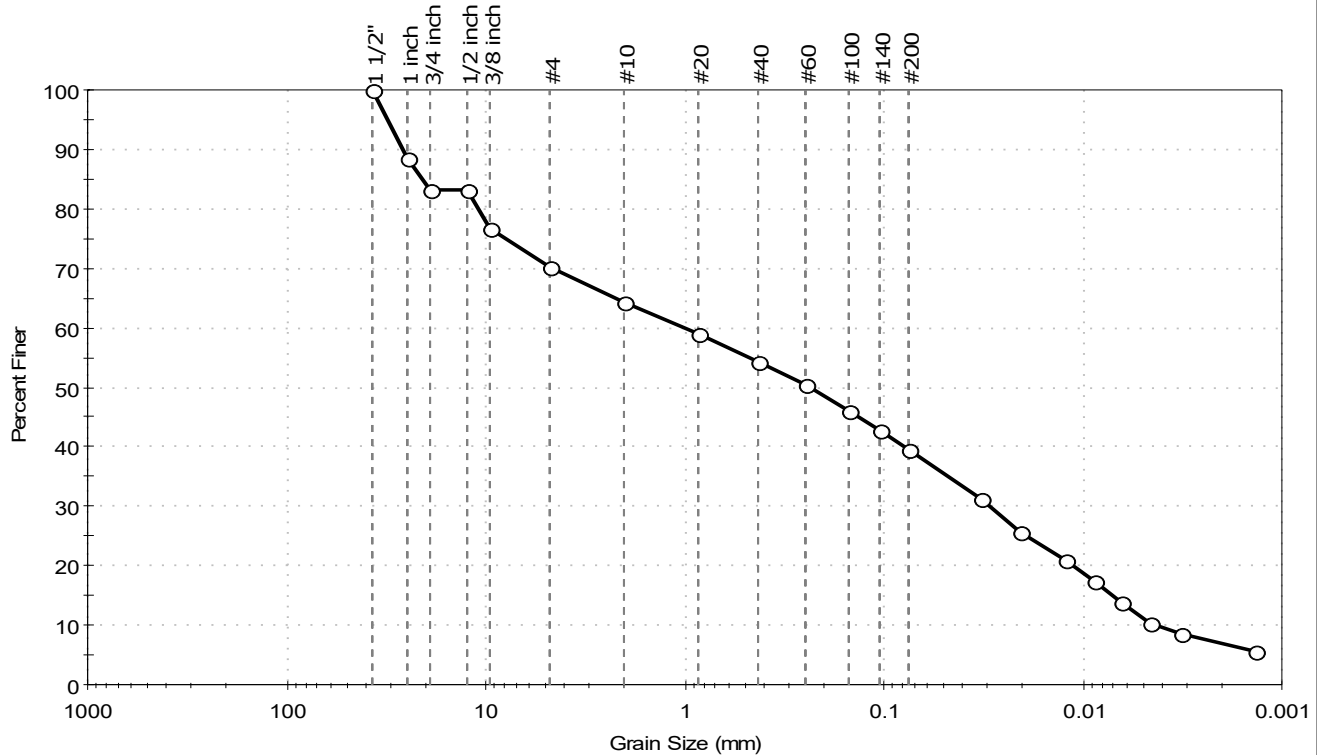
**AASHTO** Silty Soils (A-4 (0))

### Sample/Test Description

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

Client: WSP USA, Inc.	Project No: GTX-319180
Project: MaineDOT I-95 Bridge over Stillwater	
Location: Merrimack, NH	
Boring ID: BB-BSA-107	Sample Type: Jar
Sample ID: 14D	Test Date: 08/15/24
Depth: 50-52 ft	Test Id: 780394
Test Comment: ---	Tested By: ajl
Visual Description: Moist, grayish brown clayey sand with gravel	Checked By: ank
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 1/2"	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		

### Coefficients

$D_{85} = 20.8858 \text{ mm}$        $D_{30} = 0.0294 \text{ mm}$   
 $D_{60} = 0.9990 \text{ mm}$        $D_{15} = 0.0071 \text{ mm}$   
 $D_{50} = 0.2343 \text{ mm}$        $D_{10} = 0.0042 \text{ mm}$   
 $C_u = 237.857$        $C_c = 0.206$

### Classification

ASTM Clayey SAND with Gravel (SC)

AASHTO Silty Soils (A-4 (0))

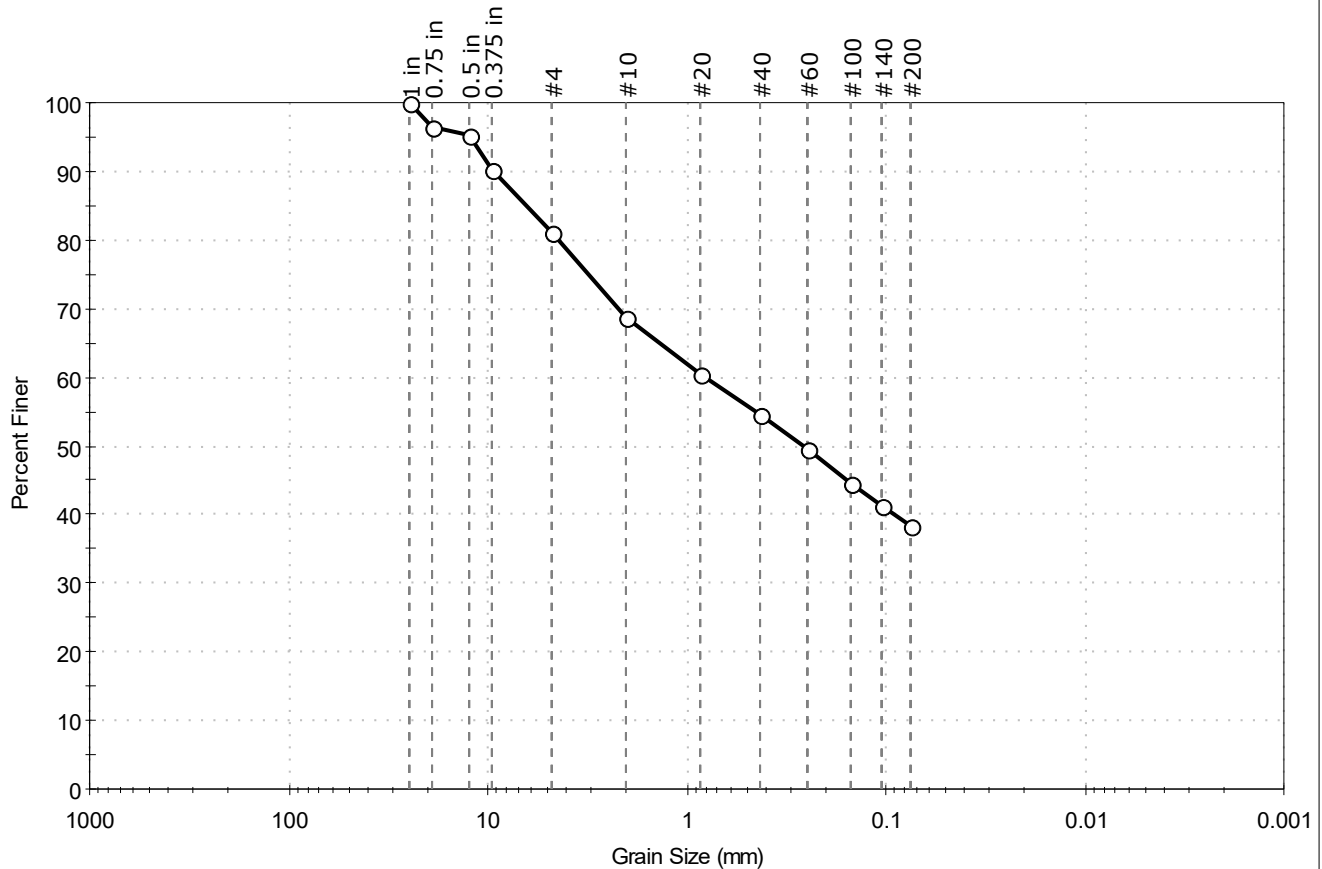
### Sample/Test Description

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



Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-107	Sample Type: Jar	Tested By: ajl
Sample ID: 15D	Test Date: 08/16/24	Checked By: ank
Depth : 55-57 ft	Test Id: 780393	
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		

### Coefficients

$D_{85} = 6.3985 \text{ mm}$        $D_{30} = \text{N/A}$   
 $D_{60} = 0.7963 \text{ mm}$        $D_{15} = \text{N/A}$   
 $D_{50} = 0.2606 \text{ mm}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM N/A

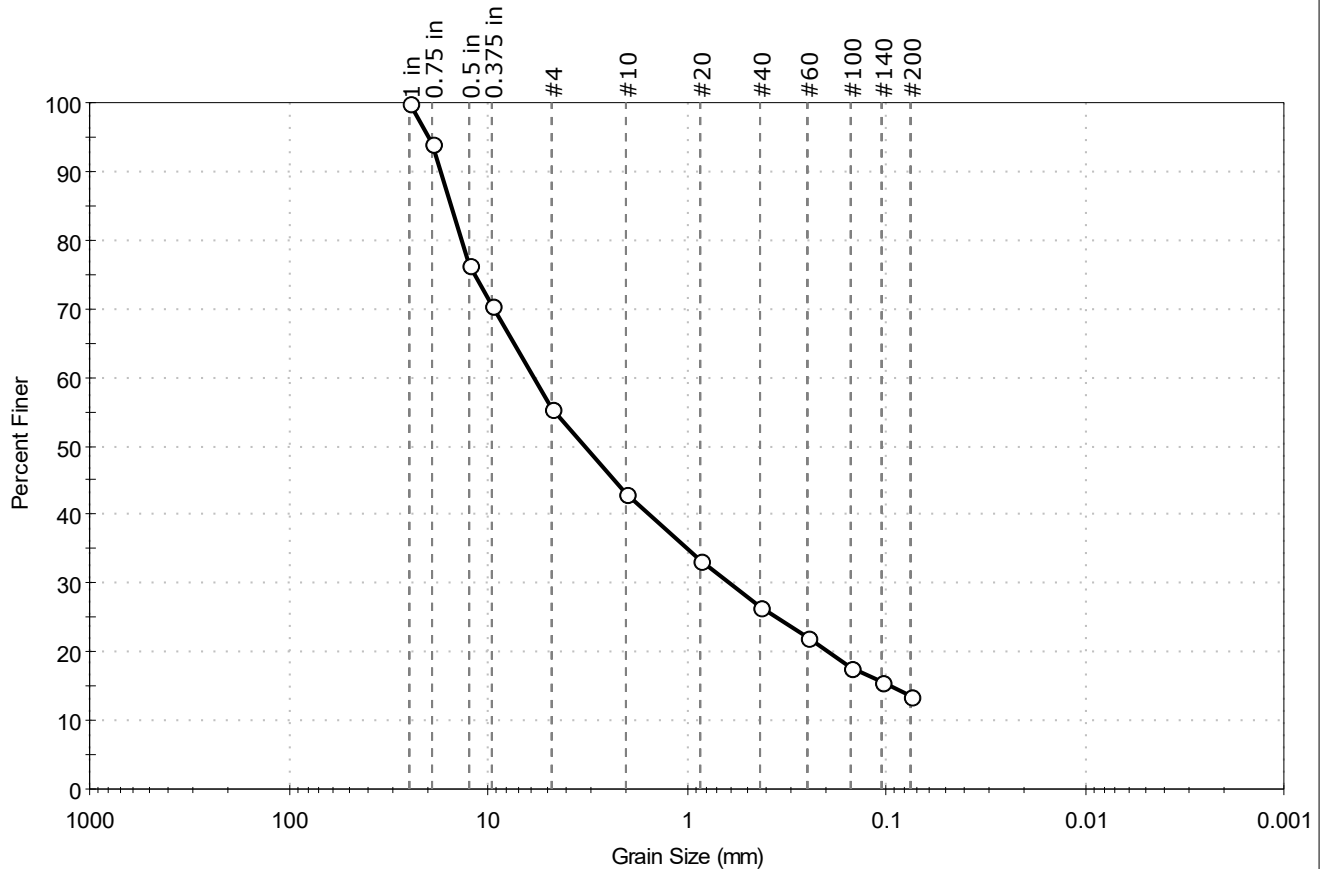
AASHTO Silty Soils (A-4 (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-111	Sample Type: Jar	Tested By: ajl
Sample ID: 1D	Test Date: 08/16/24	Checked By: ank
Depth: 1-3 ft	Test Id: 780418	
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		

### Coefficients

$D_{85} = 15.3239 \text{ mm}$        $D_{30} = 0.5991 \text{ mm}$   
 $D_{60} = 5.8553 \text{ mm}$        $D_{15} = 0.0959 \text{ mm}$   
 $D_{50} = 3.2528 \text{ mm}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM N/A

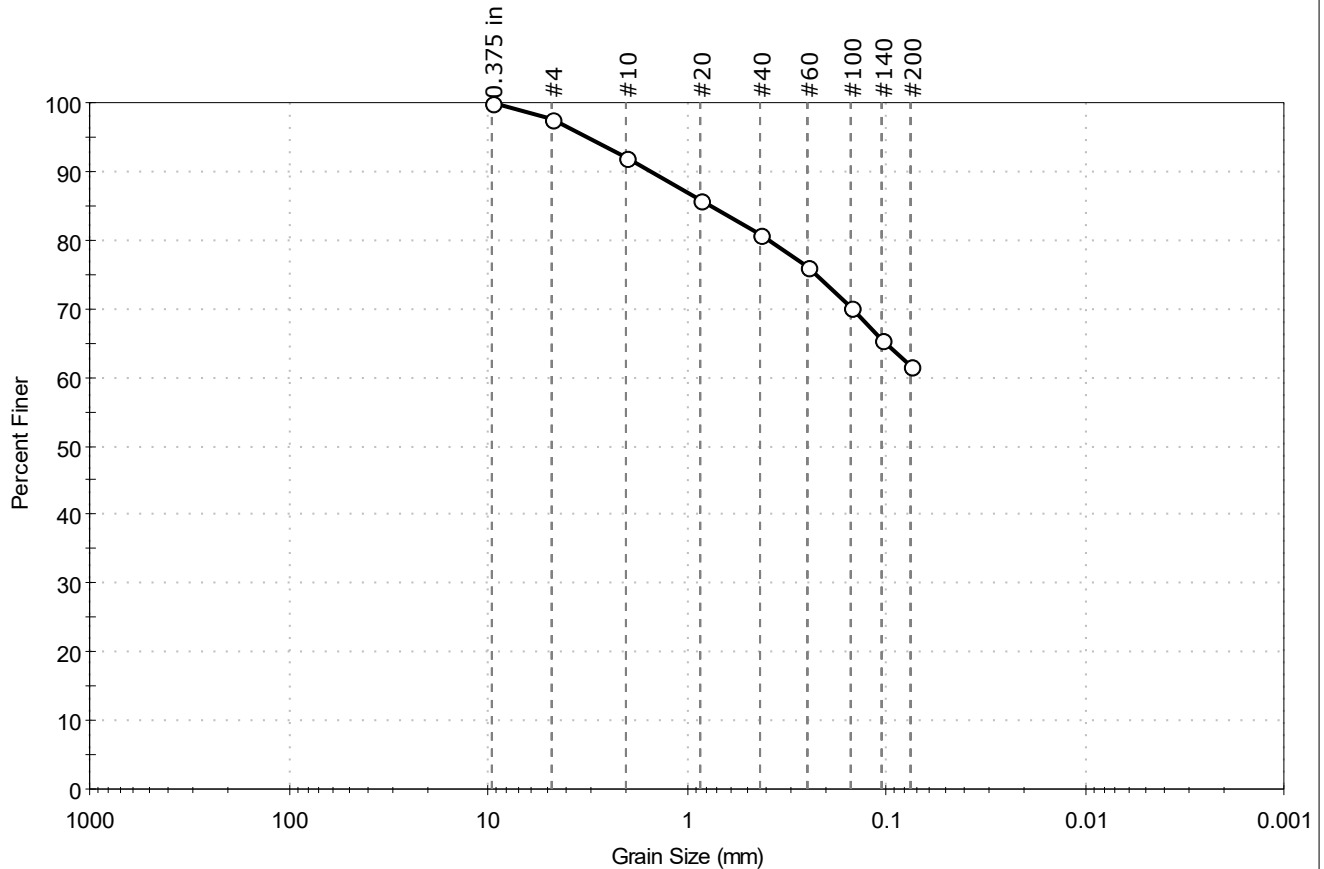
AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-111	Sample Type: Jar	Tested By: ajl
Sample ID: 3D	Test Date: 08/19/24	Checked 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		

### Coefficients

$D_{85} = 0.7542 \text{ mm}$        $D_{30} = \text{N/A}$   
 $D_{60} = \text{N/A}$        $D_{15} = \text{N/A}$   
 $D_{50} = \text{N/A}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM N/A

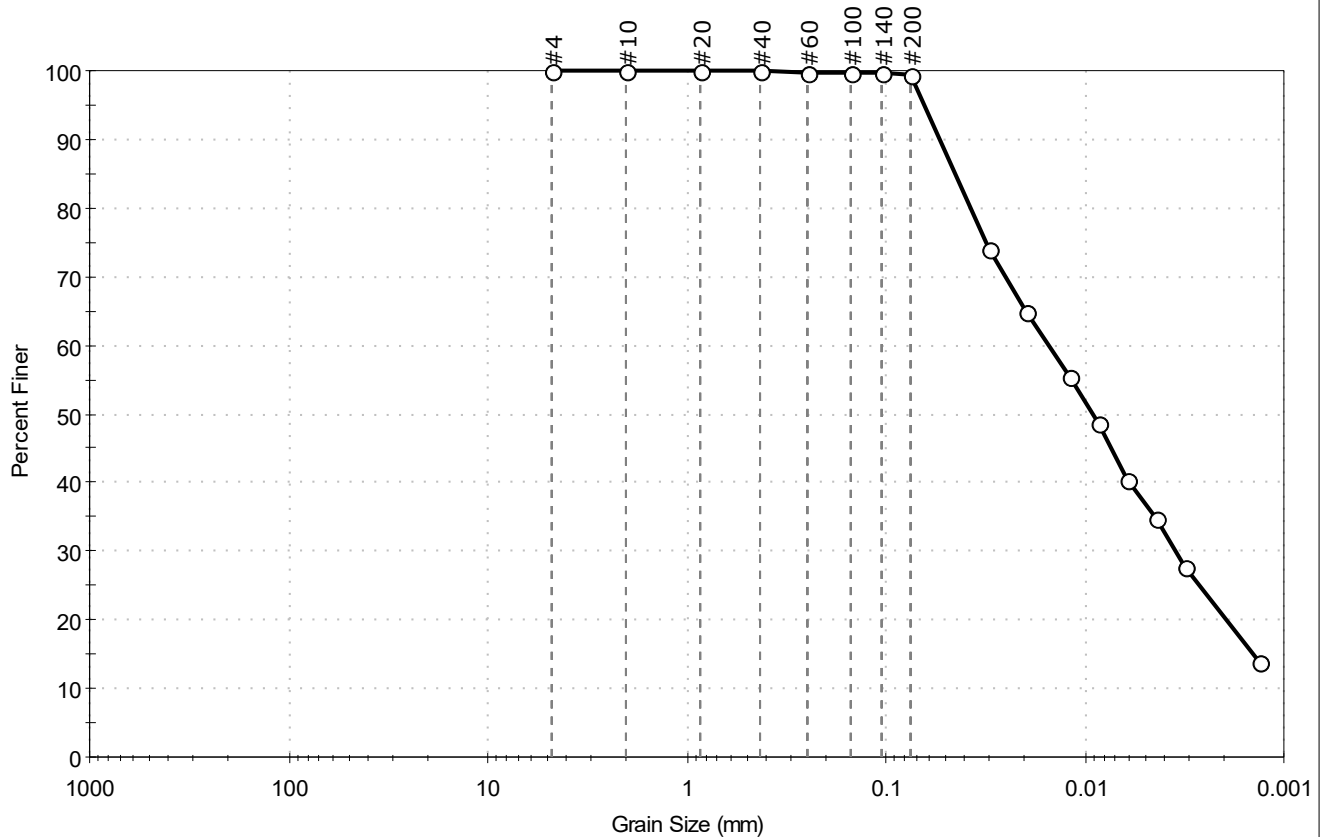
AASHTO Silty Soils (A-4 (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180
Project: MaineDOT I-95 Bridge over Stillwater	
Location: Merrimack, NH	
Boring ID: BB-BSA-111	Sample Type: Jar
Sample ID: 5D	Test Date: 08/15/24
Depth: 10-12 ft	Test Id: 780422
Test Comment: ---	Tested By: ajl
Visual Description: Moist, olive brown clay	Checked By: ank
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		

### Coefficients

$D_{85} = 0.0450$  mm       $D_{30} = 0.0035$  mm  
 $D_{60} = 0.0151$  mm       $D_{15} = 0.0014$  mm  
 $D_{50} = 0.0091$  mm       $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM Lean CLAY (CL)

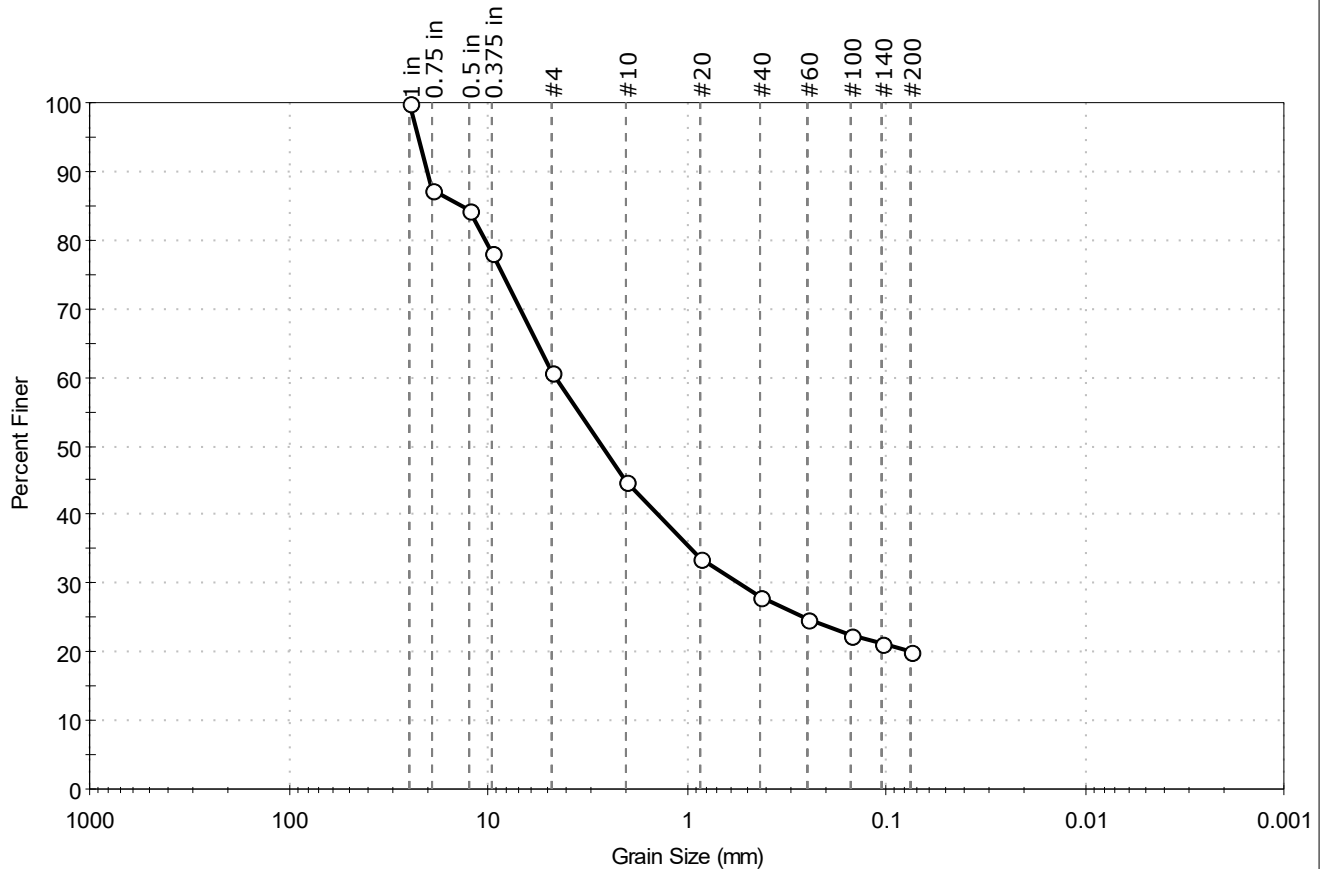
AASHTO Clayey Soils (A-6 (15))

### Sample/Test Description

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

Client: WSP USA, Inc.	Project No: GTX-319180
Project: MaineDOT I-95 Bridge over Stillwater	
Location: Merrimack, NH	
Boring ID: BB-BSA-111	Sample Type: Jar
Sample ID: 6D	Test Date: 08/16/24
Depth: 15-17 ft	Test Id: 780421
Test Comment: ---	Tested By: ajl
Visual Description: Moist, grayish brown silty sand with gravel	Checked By: ank
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		

### Coefficients

D<sub>85</sub> = 13.6712 mm      D<sub>30</sub> = 0.5440 mm  
 D<sub>60</sub> = 4.5692 mm      D<sub>15</sub> = N/A  
 D<sub>50</sub> = 2.6581 mm      D<sub>10</sub> = N/A  
 C<sub>u</sub> = N/A                  C<sub>c</sub> = N/A

### Classification

ASTM N/A

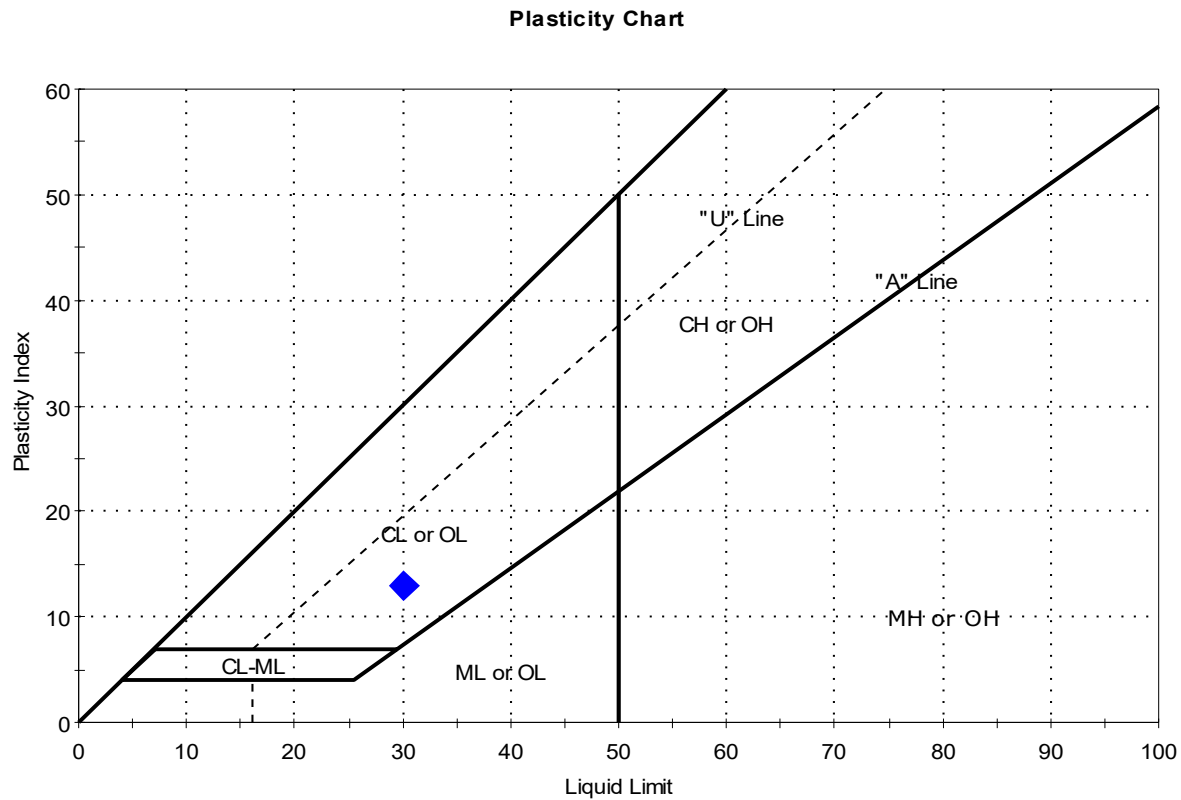
AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-104	Sample Type: Jar	Tested By: cam
Sample ID: 6D	Test Date: 08/16/24	Checked By: ank
Depth: 15-17 ft	Test Id: 780409	
Test Comment: ---		
Visual Description: Moist, grayish brown clay		
Sample Comment: ---		

## Atterberg Limits - ASTM D4318

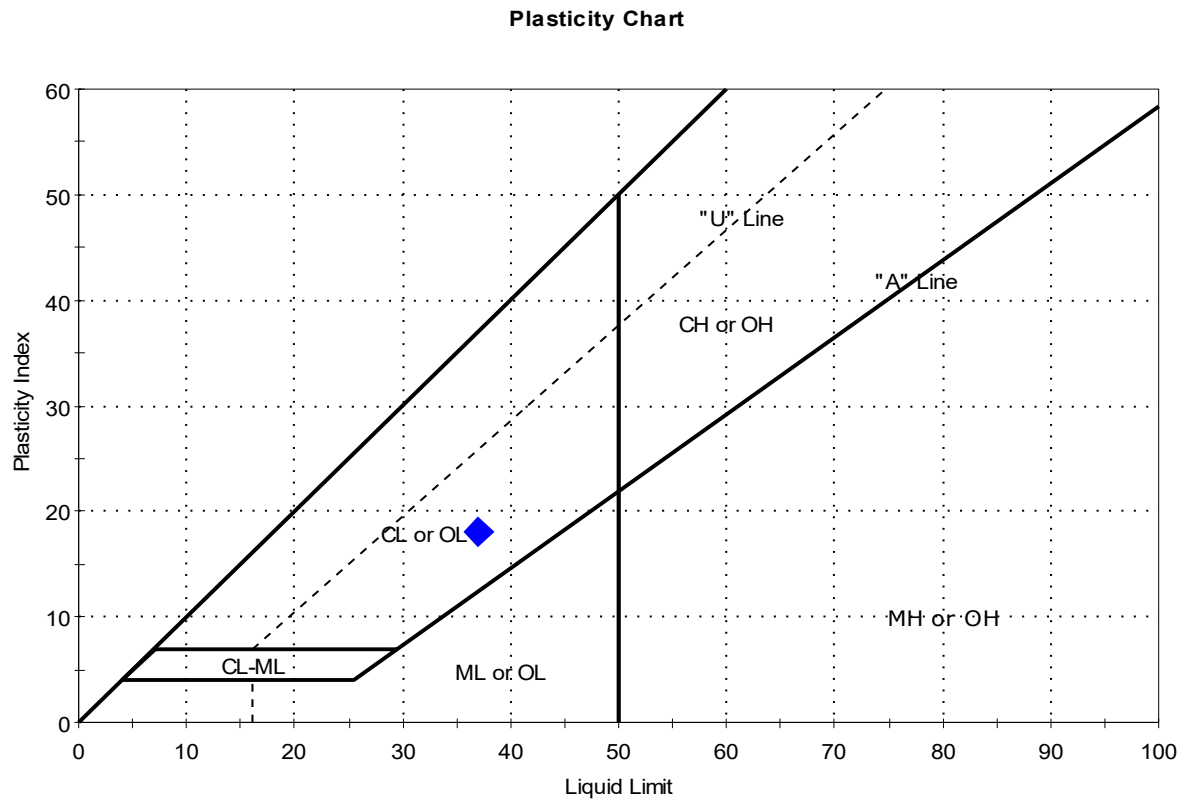


Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	6D	B-BSA-10	15-17 ft	25	30	17	13	0.6	Lean CLAY (CL)

Sample Prepared using the WET method  
 5% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: LOW

Client:	WSP USA, Inc.		
Project:	MaineDOT I-95 Bridge over Stillwater		
Location:	Merrimack, NH	Project No:	GTX-319180
Boring ID:	BB-BSA-106	Sample Type:	Jar
Sample ID:	7D	Test Date:	08/19/24
Depth :	20-22 ft	Test Id:	780372
Test Comment:	---		
Visual Description:	Moist, light 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
◆	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

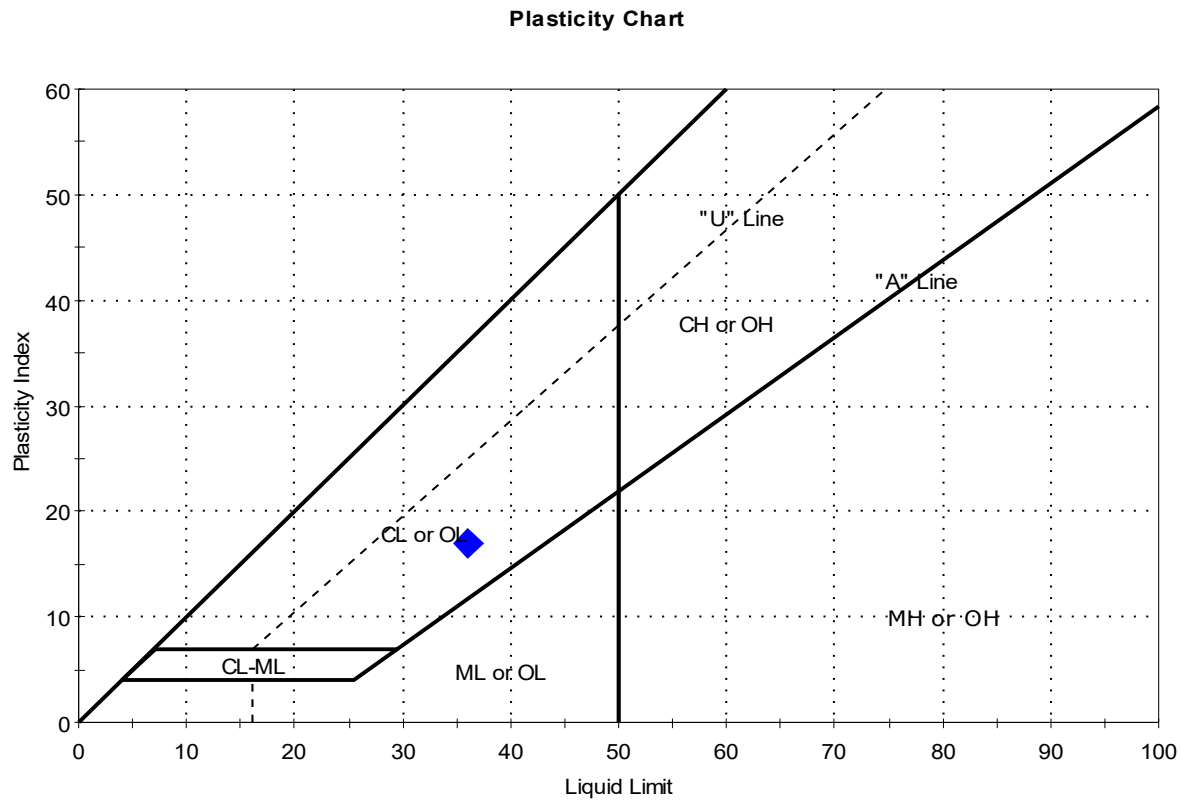
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	WSP USA, Inc.		
Project:	MaineDOT I-95 Bridge over Stillwater		
Location:	Merrimack, NH	Project No:	GTX-319180
Boring ID:	BB-BSA-106	Sample Type:	Jar
Sample ID:	8D	Test Date:	08/19/24
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
◆	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

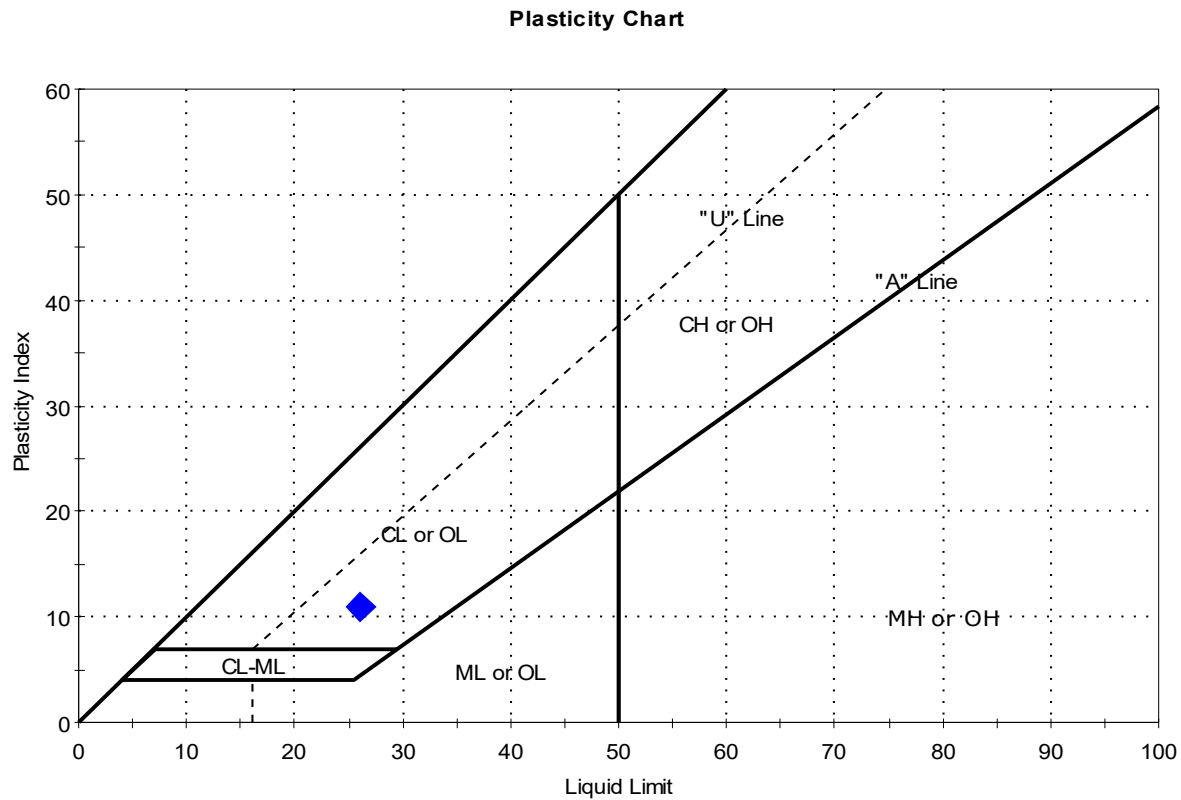
Dilatancy: SLOW

Toughness: LOW



Client:	WSP USA, Inc.		Project No:	GTX-319180
Project:	MaineDOT I-95 Bridge over Stillwater			
Location:	Merrimack, NH			
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	
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
◆	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

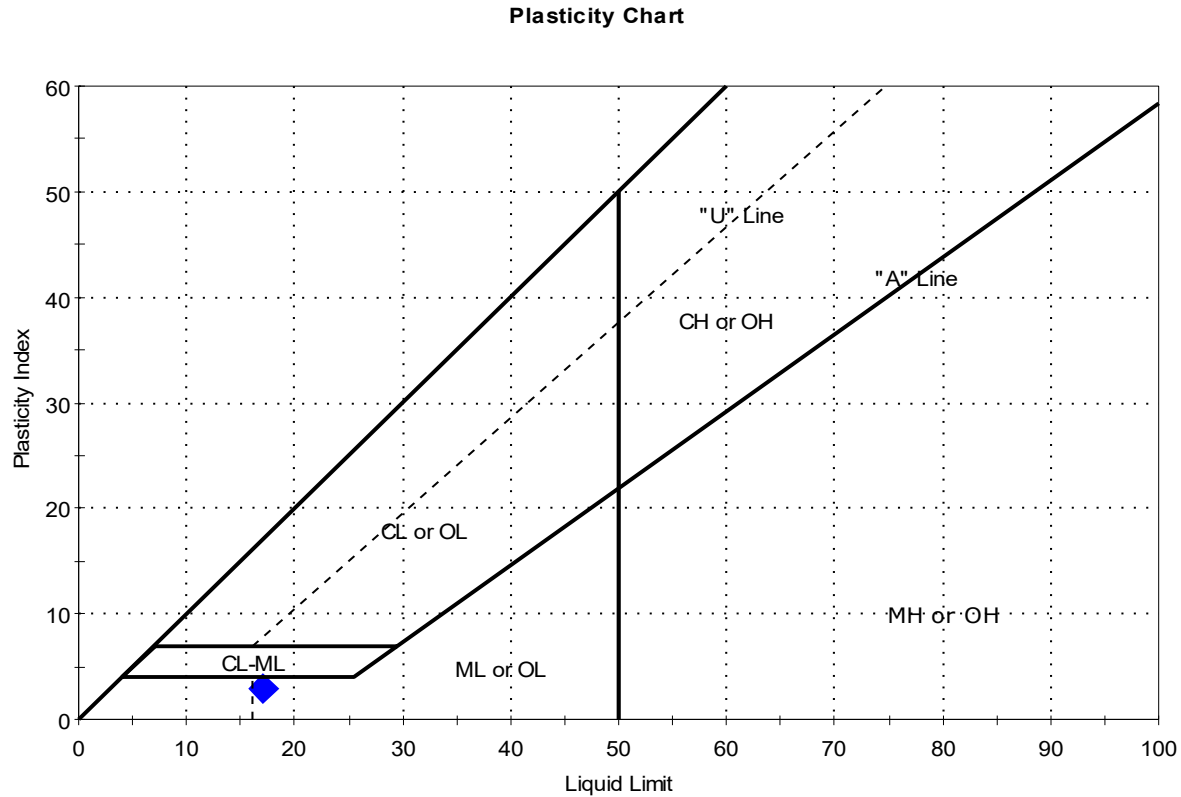
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-106	Sample Type: Jar	Tested By: cam
Sample ID: 11D	Test Date: 08/16/24	Checked By: ank
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
◆	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

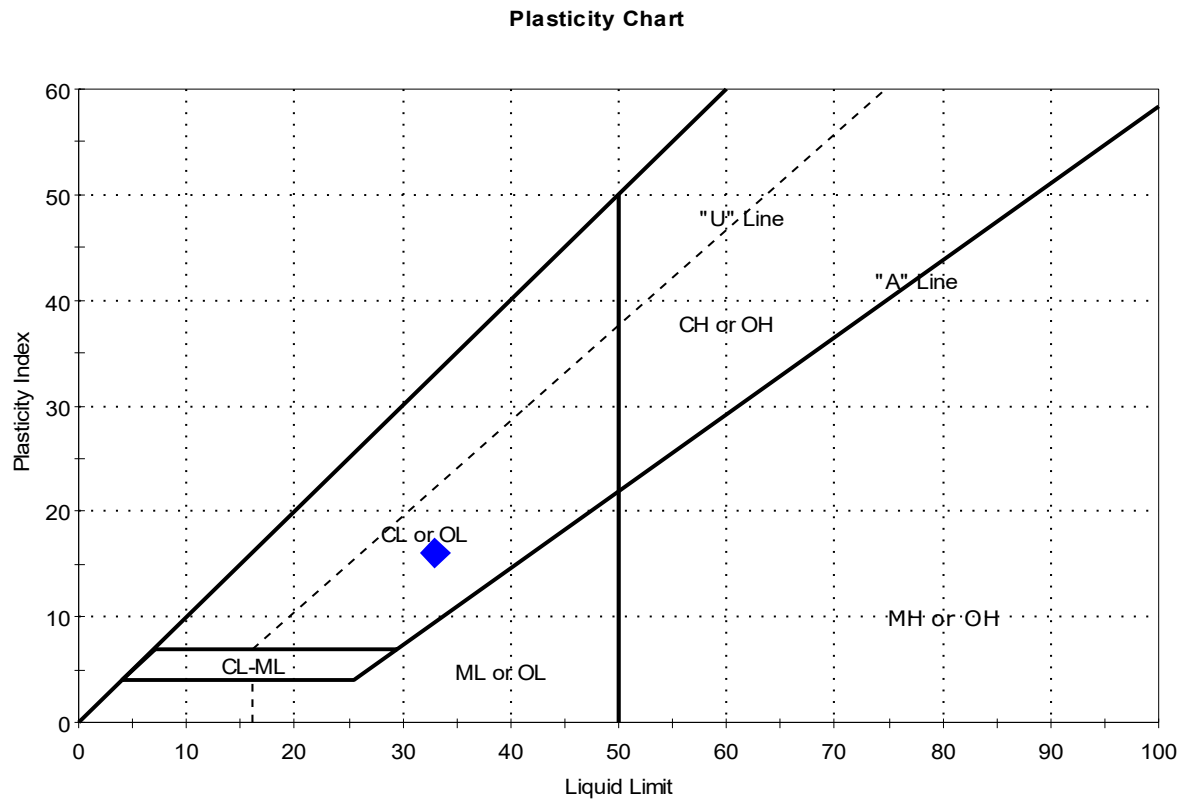
Dry Strength: n/a

Dilatancy: n/a

Toughness: n/a

Client:	WSP USA, Inc.		
Project:	MaineDOT I-95 Bridge over Stillwater		
Location:	Merrimack, NH	Project No:	GTX-319180
Boring ID:	BB-BSA-107	Sample Type:	Jar
Sample ID:	8D	Test Date:	08/19/24
Depth :	20-22 ft	Test Id:	780386
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
◆	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

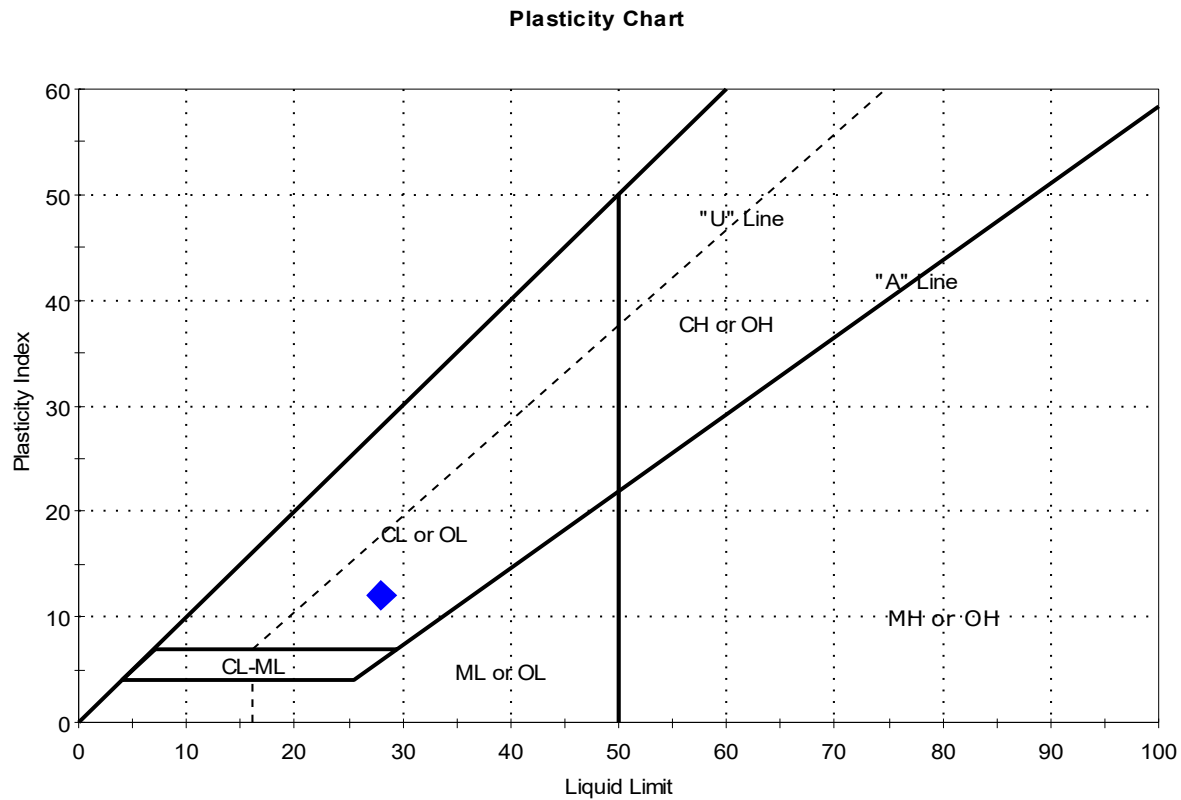
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	WSP USA, Inc.		
Project:	MaineDOT I-95 Bridge over Stillwater		
Location:	Merrimack, NH	Project No:	GTX-319180
Boring ID:	BB-BSA-107	Sample Type:	Jar
Sample ID:	10D	Test Date:	08/19/24
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
◆	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

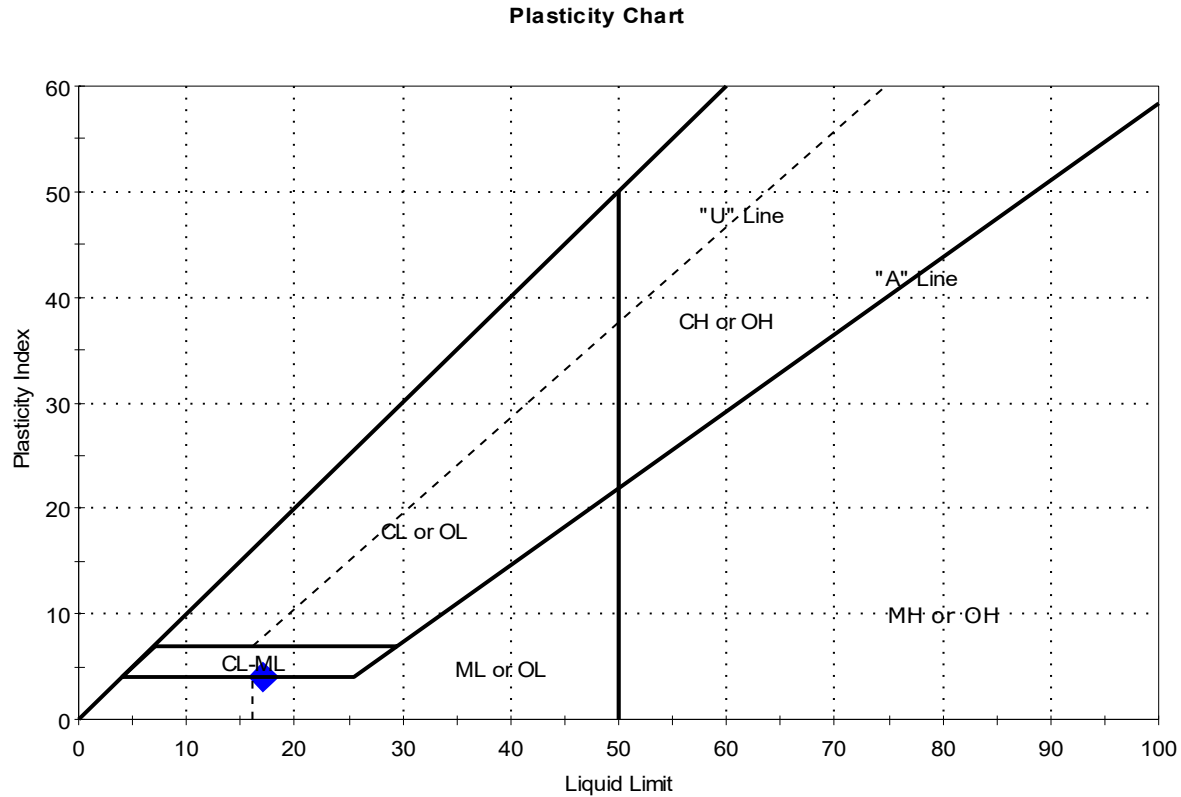
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	WSP USA, Inc.		
Project:	MaineDOT I-95 Bridge over Stillwater		
Location:	Merrimack, NH	Project No:	GTX-319180
Boring ID:	BB-BSA-107	Sample Type:	Jar
Sample ID:	12D	Test Date:	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

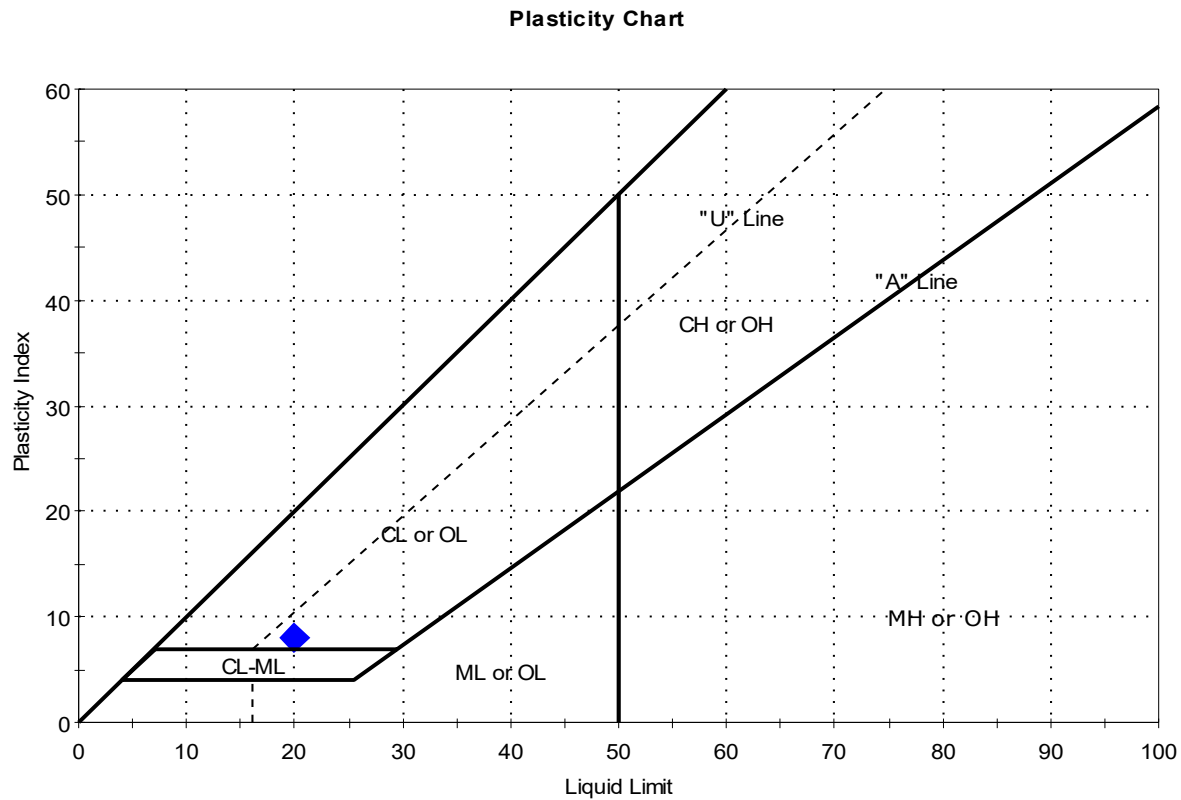


Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	12D	B-BSA-10	40-42 ft	10	17	13	4	-0.8	Silty, Clayey SAND with Gravel (SC-SM)

Sample Prepared using the WET method  
 40% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: LOW

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-107	Sample Type: Jar	Tested By: cam
Sample ID: 14D	Test Date: 08/15/24	Checked By: ank
Depth : 50-52 ft	Test Id: 780390	
Test Comment: ---		
Visual Description: Moist, grayish brown clayey sand with gravel		
Sample Comment: ---		

## Atterberg Limits - ASTM D4318

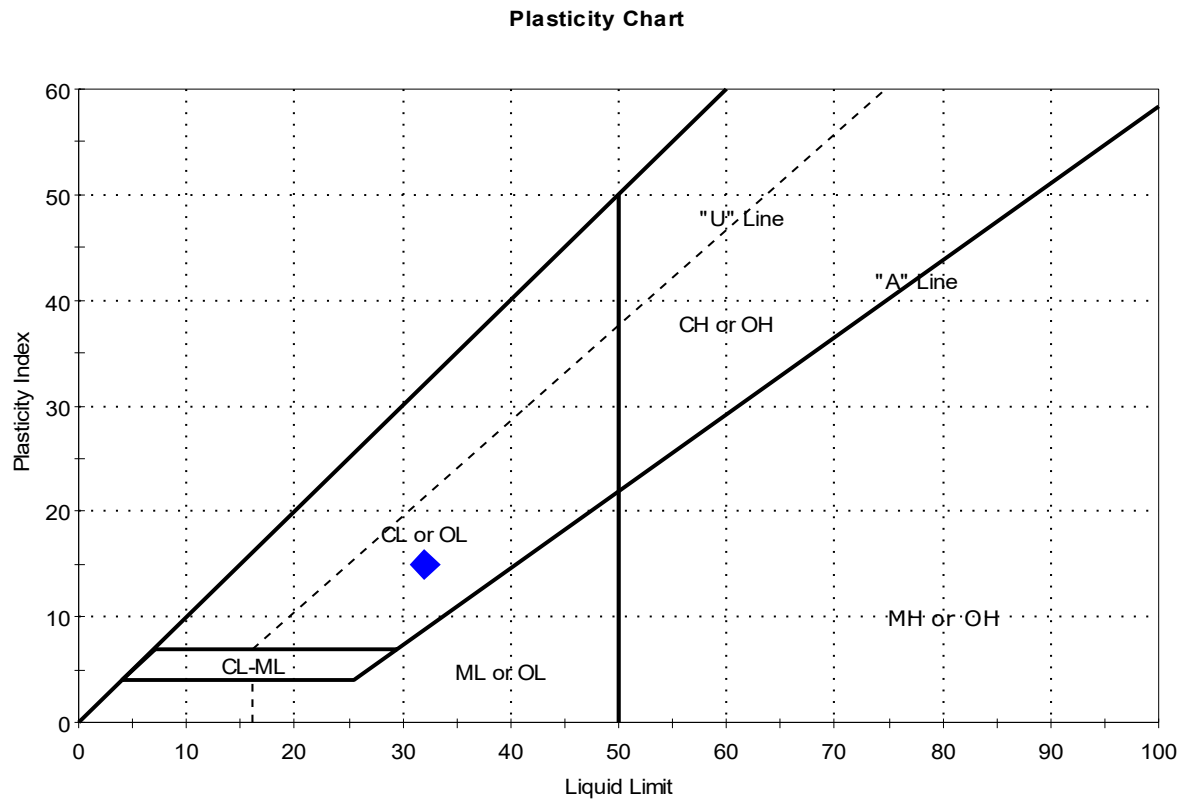


Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	14D	B-BSA-10	50-52 ft	10	20	12	8	-0.3	Clayey SAND with Gravel (SC)

Sample Prepared using the WET method  
 46% Retained on #40 Sieve  
 Dry Strength: VERY HIGH  
 Dilatancy: SLOW  
 Toughness: LOW

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH	Boring ID: BB-BSA-111	Sample Type: Jar
	Sample ID: 5D	Test Date: 08/16/24
	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
◆	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

Dilatancy: SLOW

Toughness: LOW

Client:	WSP USA, Inc.		
Project:	MaineDOT I-95 Bridge over Stillwater		
Location:	Merrimack, NH	Project No:	GTX-319180
Boring ID:	---	Sample Type:	---
Sample ID:	---	Test Date:	06/05/24
Depth :	---	Test Id:	771711
		Tested By:	ajl
		Checked By:	ank

## 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	Moist, brown silty sand with gravel	8.6
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





Client:	WSP USA, Inc.		Project No:	GTX-319180
Project:	MaineDOT I-95 Bridge over Stillwater			
Location:	Merrimack, NH			
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

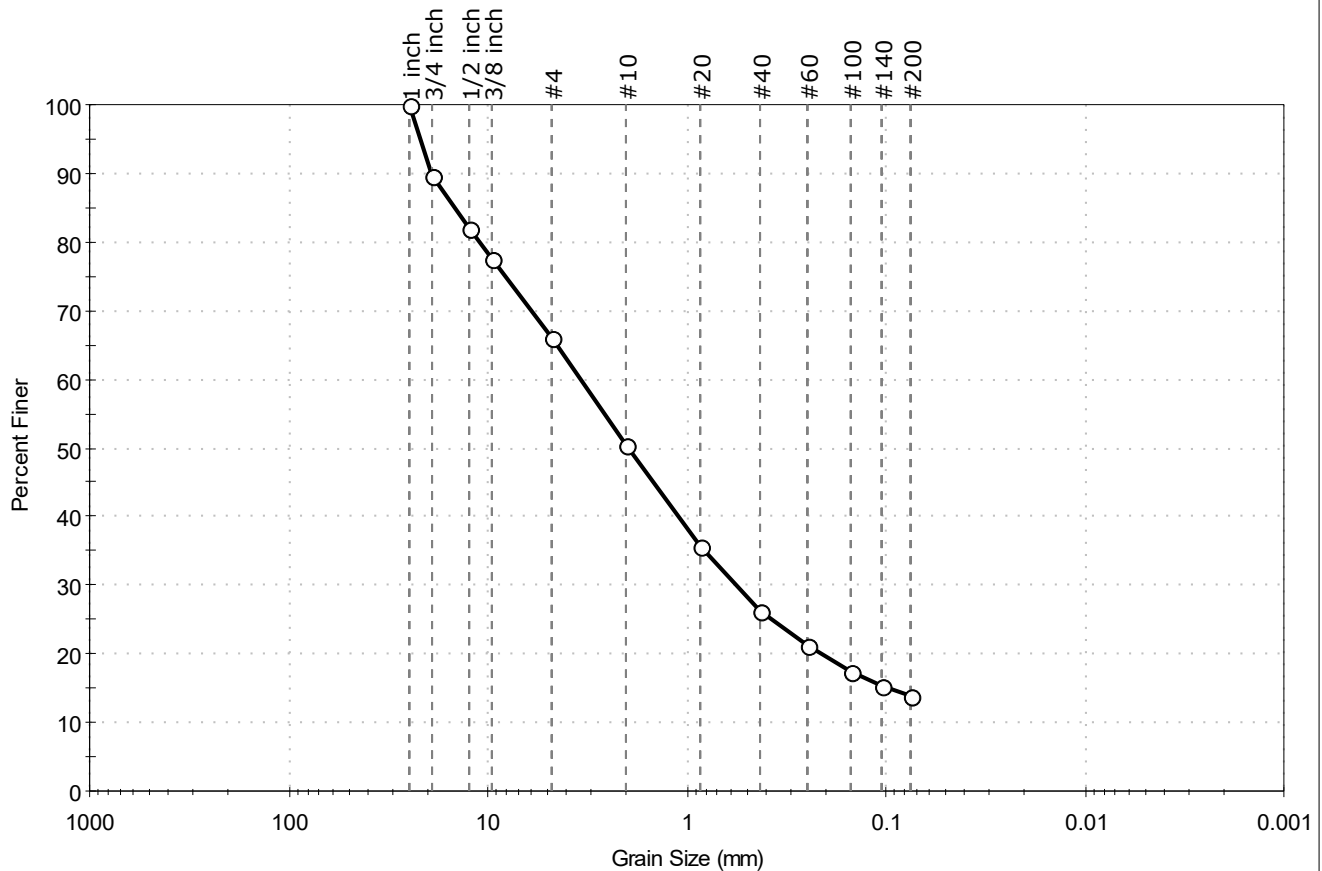
## Laboratory Measurement of Soil Resistivity Using the Wenner Four-Electrode Method by ASTM G57 (Laboratory Measurement)

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

Client:	WSP USA, Inc.	Project No:	GTX-319180
Project:	MaineDOT I-95 Bridge over Stillwater		
Location:	Merrimack, NH		
Boring ID:	BB-BSA-102	Sample Type:	Jar
Sample ID:	1D	Test Date:	06/10/24
Depth :	1-3ft	Test Id:	771699
Test Comment:	---	Tested By:	ajl
Visual Description:	Moist, brown silty sand with gravel	Checked By:	ank
Sample Comment:	---		

## Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	34.0	52.0	14.0

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		

### Coefficients

D <sub>85</sub> = 14.7631 mm	D <sub>30</sub> = 0.5584 mm
D <sub>60</sub> = 3.3977 mm	D <sub>15</sub> = 0.0975 mm
D <sub>50</sub> = 1.9370 mm	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

### Classification

ASTM N/A

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

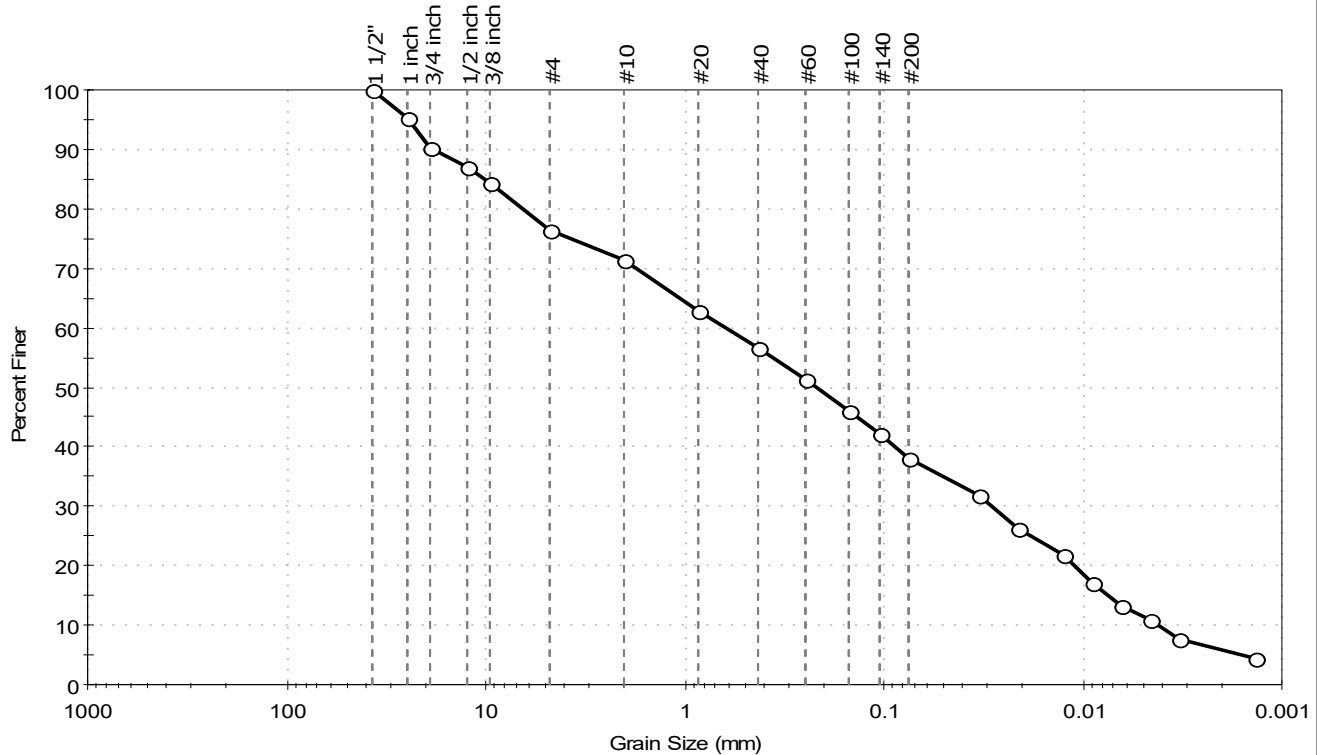
### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180	
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		

### Coefficients

$D_{85} = 10.2078 \text{ mm}$        $D_{30} = 0.0286 \text{ mm}$   
 $D_{60} = 0.6168 \text{ mm}$        $D_{15} = 0.0074 \text{ mm}$   
 $D_{50} = 0.2201 \text{ mm}$        $D_{10} = 0.0042 \text{ mm}$   
 $C_u = 146.857$        $C_c = 0.316$

### Classification

ASTM N/A

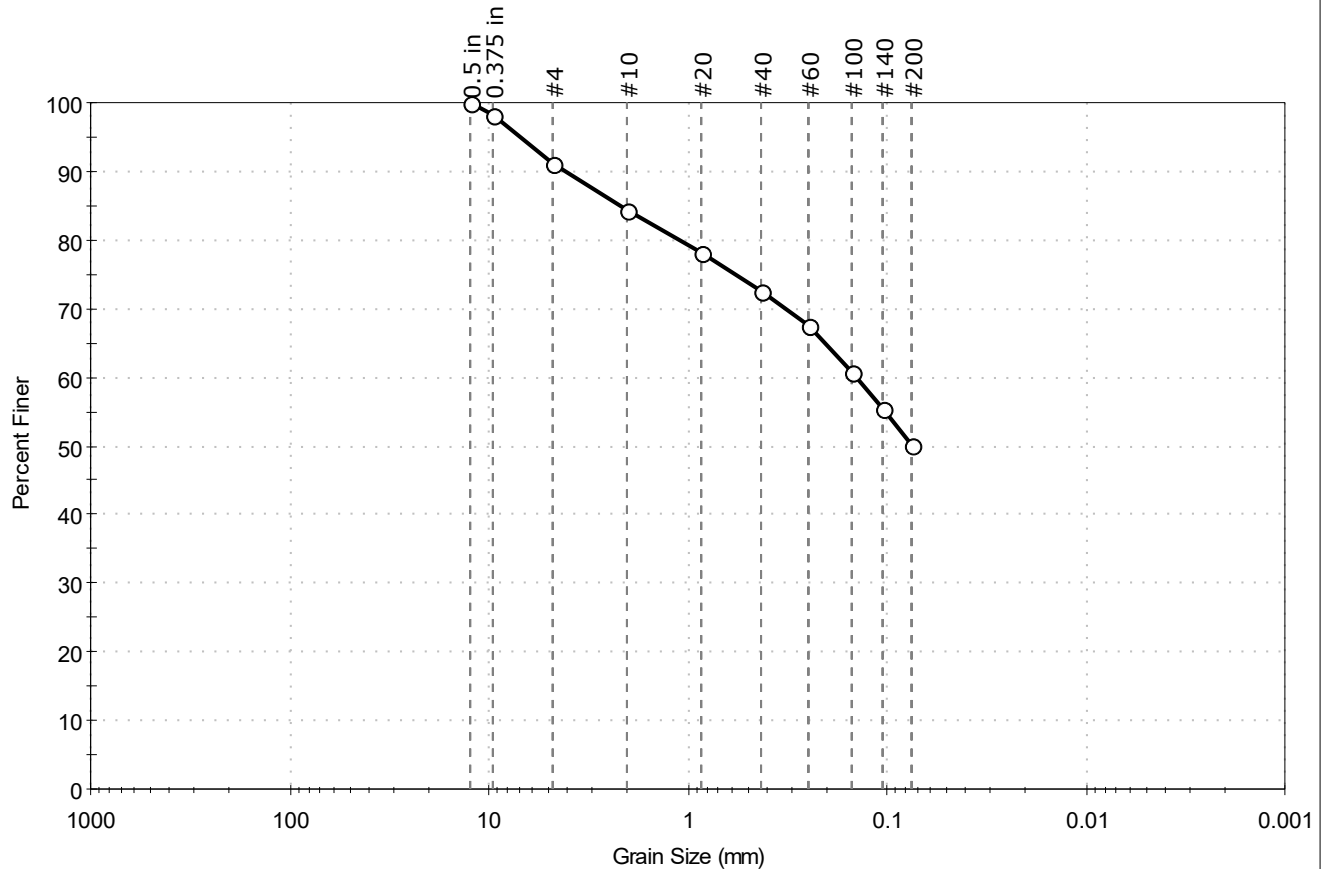
AASHTO Silty Soils (A-4 (0))

### Sample/Test Description

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

Client:	WSP USA, Inc.	Project No:	GTX-319180
Project:	MaineDOT I-95 Bridge over Stillwater		
Location:	Merrimack, NH		
Boring ID:	BB-BSA-102	Sample Type:	Jar
Sample ID:	4D	Test Date:	06/11/24
Depth :	7-9ft	Test Id:	771701
Test Comment:	---	Tested By:	ajl
Visual Description:	Moist, brown sandy silt	Checked By:	ank
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		

### Coefficients

D <sub>85</sub> = 2.1488 mm	D <sub>30</sub> = N/A
D <sub>60</sub> = 0.1431 mm	D <sub>15</sub> = N/A
D <sub>50</sub> = N/A	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

### Classification

ASTM Sandy SILT (ML)

AASHTO Silty Soils (A-4 (0))

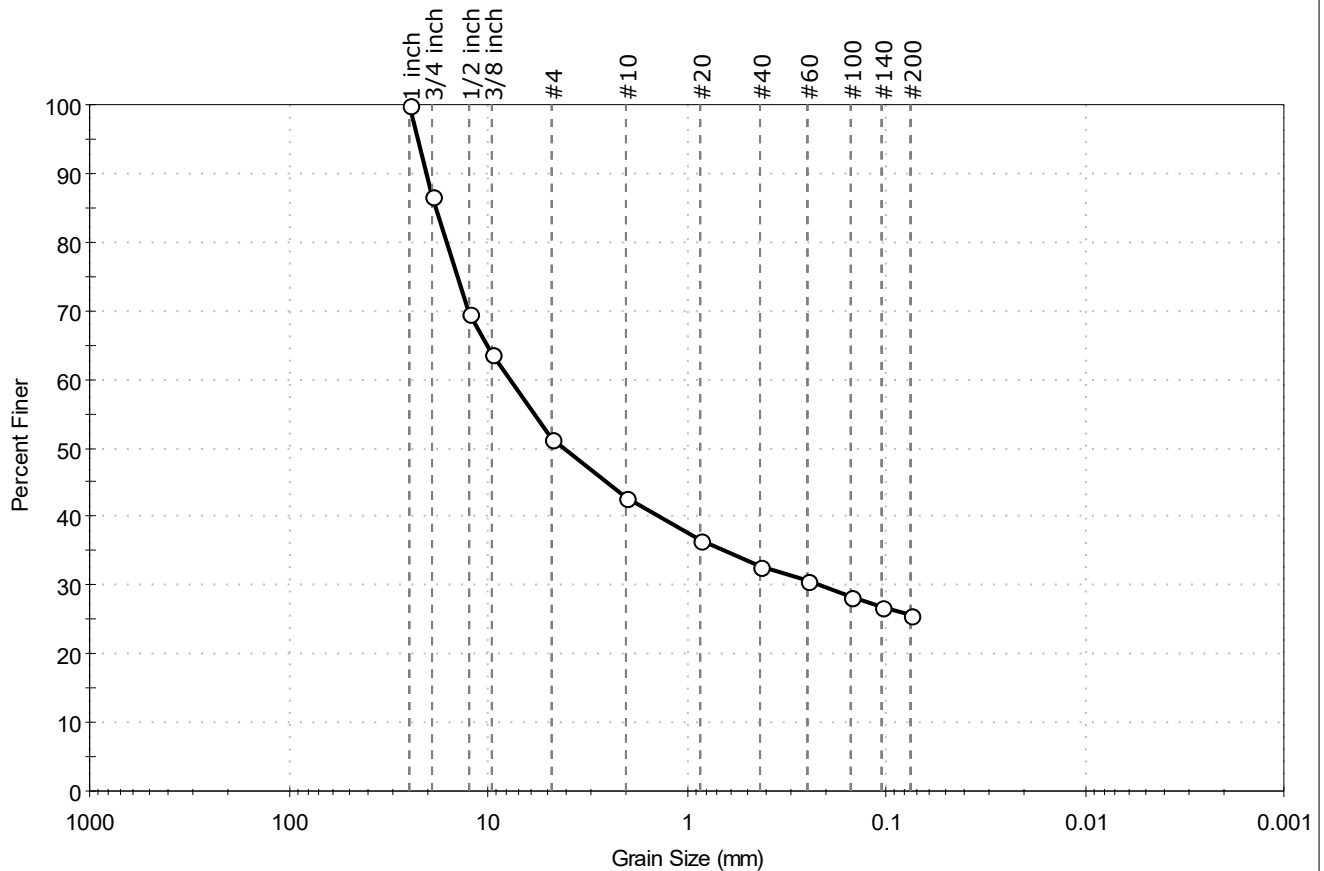
### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
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		

### Coefficients

$D_{85} = 18.2066 \text{ mm}$        $D_{30} = 0.2200 \text{ mm}$   
 $D_{60} = 7.7553 \text{ mm}$        $D_{15} = \text{N/A}$   
 $D_{50} = 4.1504 \text{ mm}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM N/A

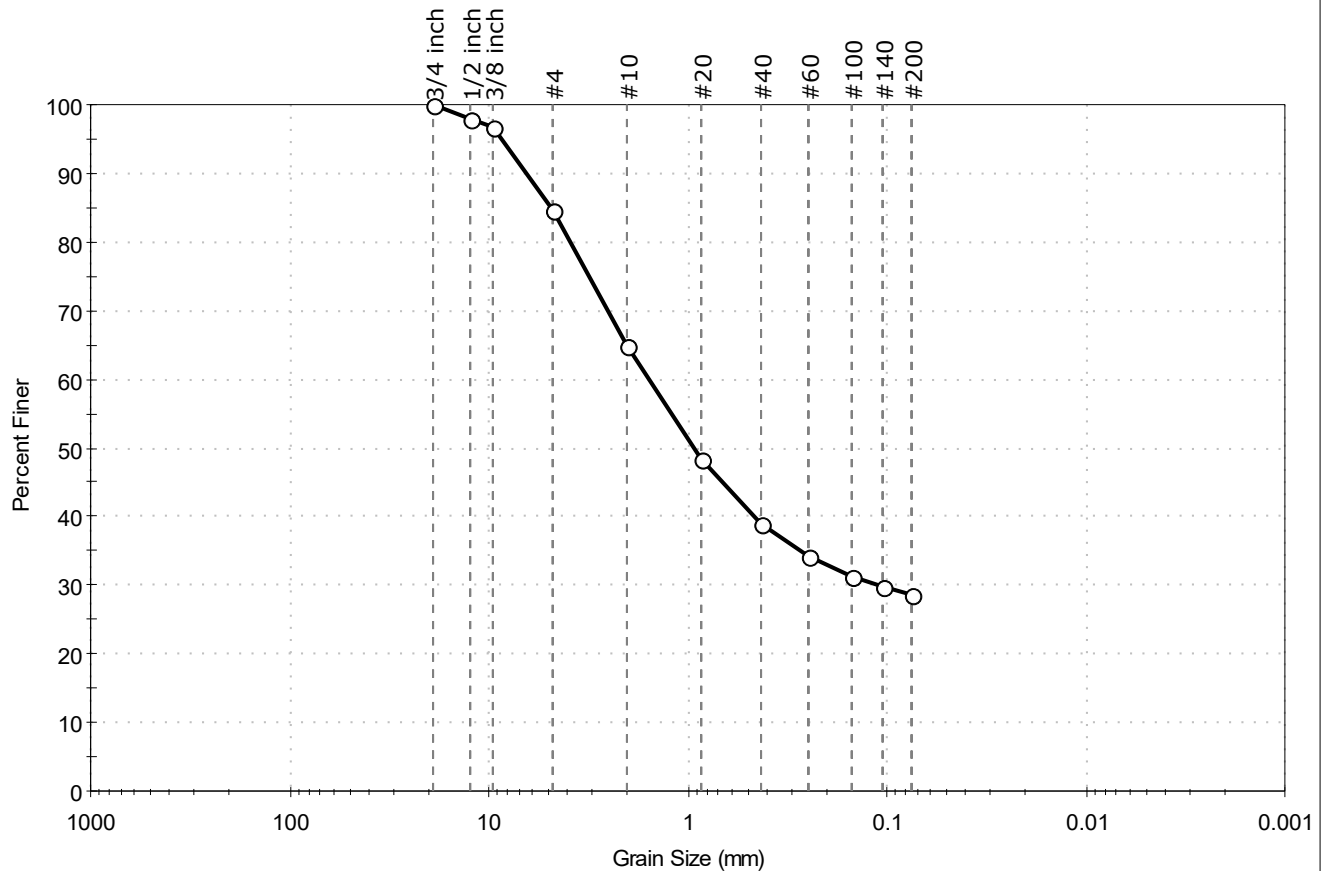
AASHTO Silty Gravel and Sand (A-2-4 (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD

Client:	WSP USA, Inc.	Project No:	GTX-319180
Project:	MaineDOT I-95 Bridge over Stillwater		
Location:	Merrimack, NH		
Boring ID:	BB-BSA-108	Sample Type:	Jar
Sample ID:	1D	Test Date:	06/10/24
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		

### Coefficients

D <sub>85</sub> = 4.8781 mm	D <sub>30</sub> = 0.1095 mm
D <sub>60</sub> = 1.5572 mm	D <sub>15</sub> = N/A
D <sub>50</sub> = 0.9286 mm	D <sub>10</sub> = N/A
C <sub>u</sub> = N/A	C <sub>c</sub> = N/A

### Classification

ASTM N/A

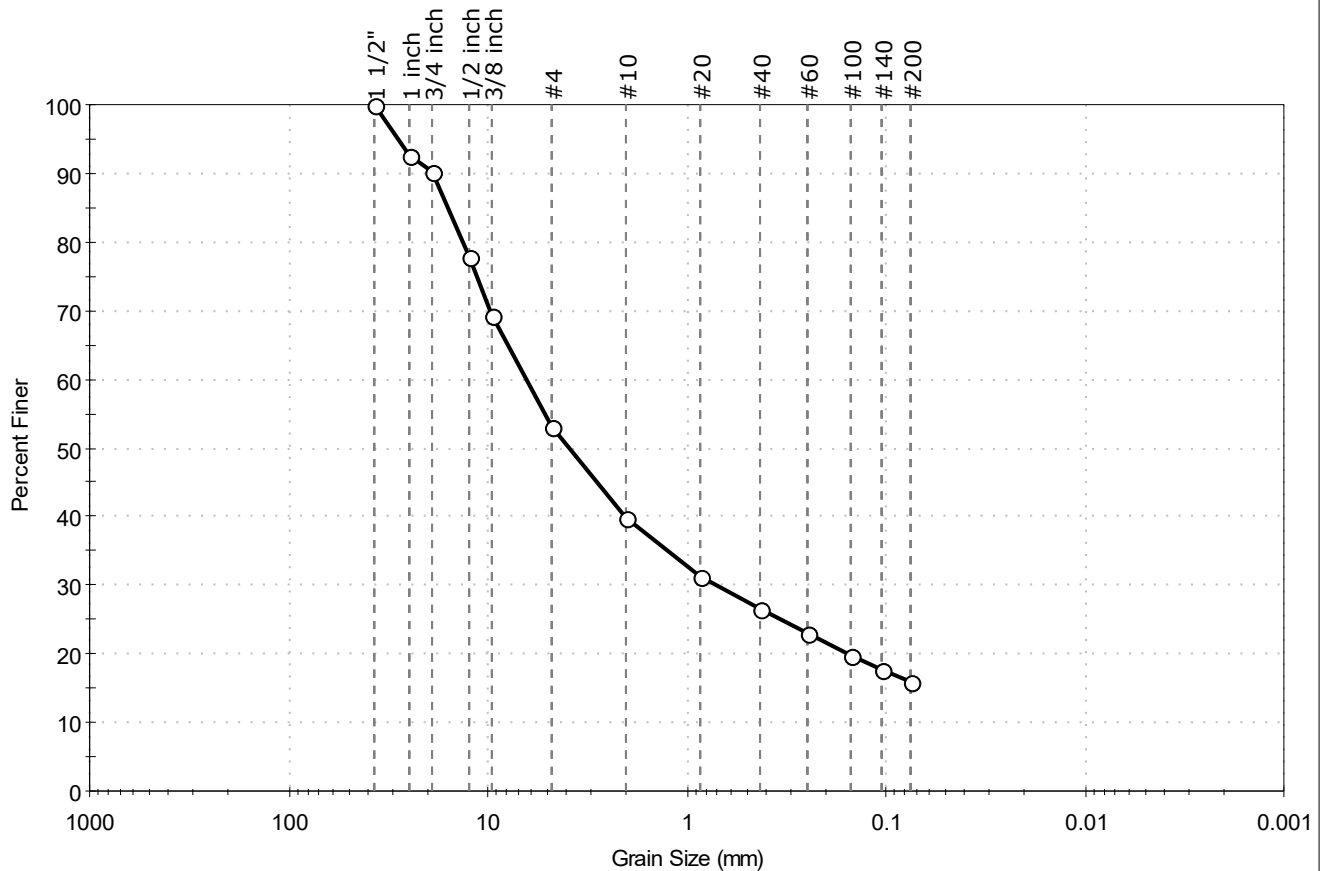
AASHTO Silty Gravel and Sand (A-2-4 (0))

### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
Sand/Gravel Hardness : HARD

Client: WSP USA, Inc.	Project No: GTX-319180
Project: MaineDOT I-95 Bridge over Stillwater	
Location: Merrimack, NH	
Boring ID: BB-BSA-109	Sample Type: Jar
Sample ID: 2D	Test Date: 06/11/24
Depth: 3-5ft	Test Id: 771704
Test Comment: ---	Tested By: ajl
Visual Description: Moist, grayish brown silty gravel with sand	Checked By: ank
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		

### Coefficients

D<sub>85</sub> = 15.9069 mm      D<sub>30</sub> = 0.7017 mm  
 D<sub>60</sub> = 6.3678 mm      D<sub>15</sub> = N/A  
 D<sub>50</sub> = 3.8773 mm      D<sub>10</sub> = N/A  
 C<sub>u</sub> = N/A      C<sub>c</sub> = N/A

### Classification

ASTM N/A

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

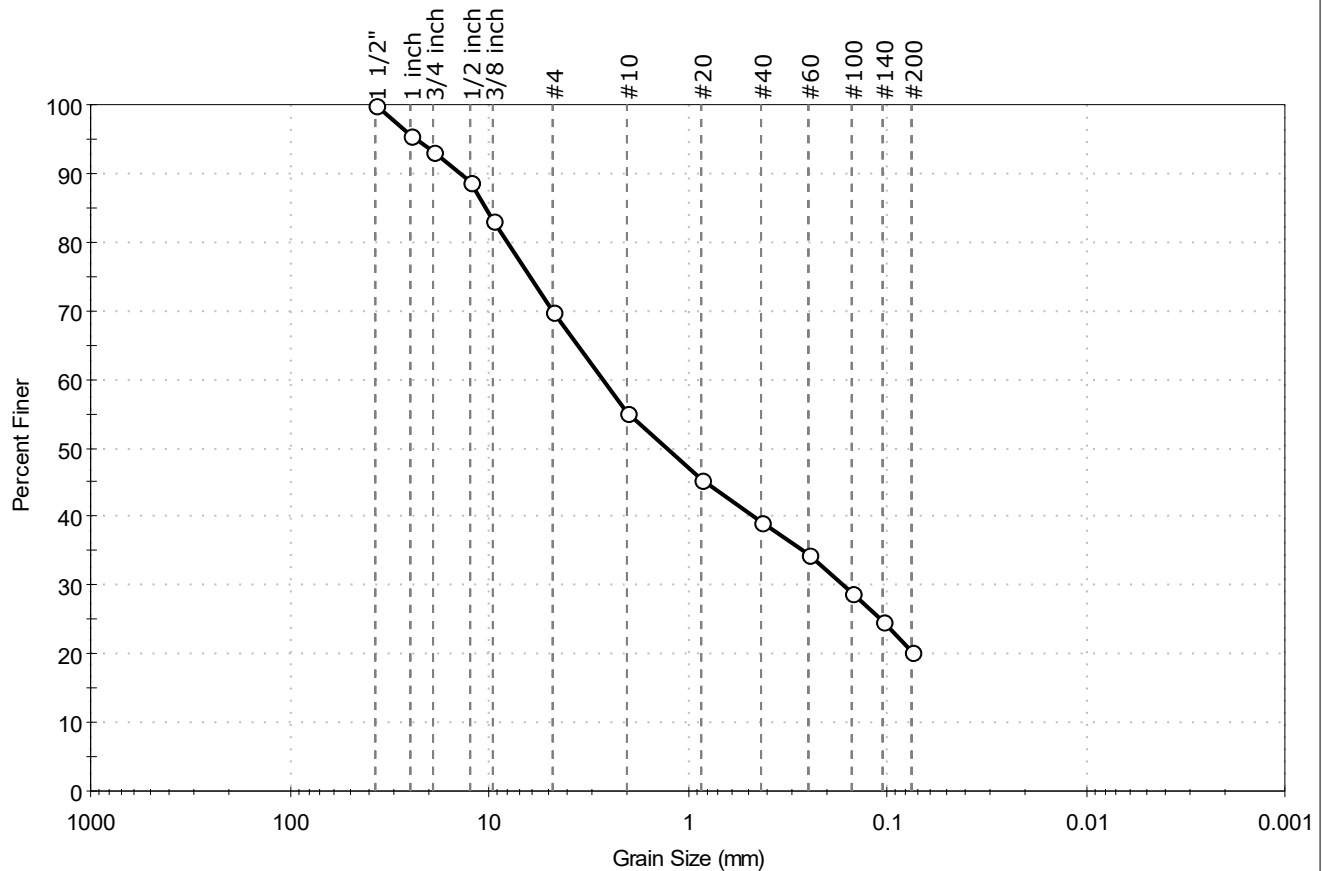
### Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR  
 Sand/Gravel Hardness : HARD



Client: WSP USA, Inc.	Project No: GTX-319180
Project: MaineDOT I-95 Bridge over Stillwater	
Location: Merrimack, NH	
Boring ID: BB-BSA-109	Sample Type: Jar
Sample ID: 4D	Test Date: 06/10/24
Depth: 7-9ft	Test Id: 771705
Test Comment: ---	Tested By: ajl
Visual Description: Moist, brown silty sand with gravel	Checked By: ank
Sample Comment: ---	

## Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	30.1	49.6	20.3

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		

### Coefficients

$D_{85} = 10.4311 \text{ mm}$        $D_{30} = 0.1670 \text{ mm}$   
 $D_{60} = 2.6443 \text{ mm}$        $D_{15} = \text{N/A}$   
 $D_{50} = 1.2721 \text{ mm}$        $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM N/A

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

### Sample/Test Description

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:	GTX-319180
Boring ID:	BB-BSA-102	Sample Type:	Jar
Sample ID:	4D	Test Date:	06/10/24
Depth :	7-9ft	Test Id:	771698
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
◆	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



GEOTESTING EXPRESS INCORPORATED  
125 NAGOG PARK  
ACTON MA 01720-3451  
USA

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

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”

## AASHTO T 291 – Chloride (Method B)

Sample		Results		Minimum Detection Limit
		ppm (mg/kg)	% <sup>1</sup>	
BB-BSA-102		215.	0.0215	10.
1D	1 – 3'			
BB-BSA-109		59.	0.0059	
2D	3 – 5'			

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

## AASHTO T 290 – Sulfates (Soluble)

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

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

END OF ANALYSIS

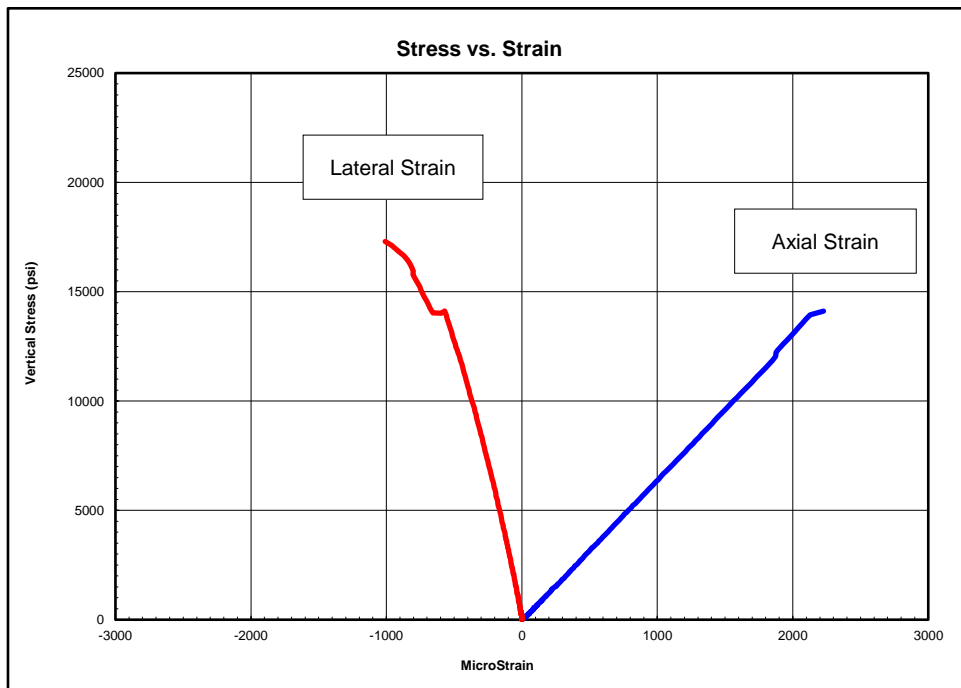
**Merrill Gee P.E. – Engineer in Charge**

Page 1 of 1



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.

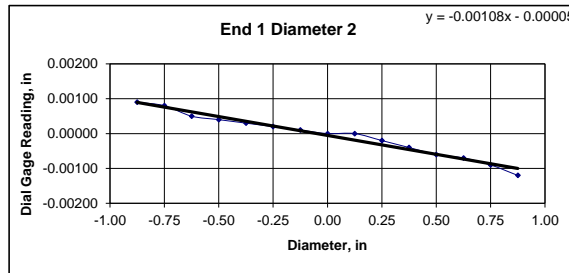
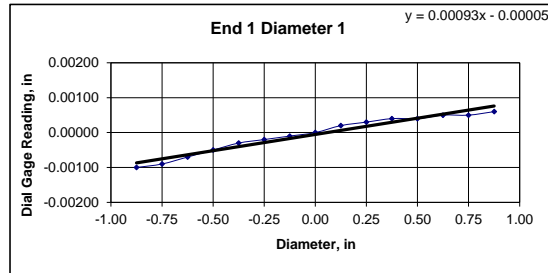


Client:	WSP USA, Inc.	Test Date:	6/12/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By:	gp
Project Location:	Merrimack, NH	Checked By:	smd
GTX #:	319180		
Boring ID:	BB-BSA-102		
Sample ID:	R1		
Depth (ft):	14.87-15.25		
Visual Description:	See photographs		

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

BULK DENSITY				DEVIATION FROM STRAIGHTNESS (Procedure S1)	
	1	2	Average	Maximum gap between side of core and reference surface plate: Is the maximum gap $\leq 0.02$ in.?	
Specimen Length, in:	4.38	4.38	4.38	YES	
Specimen Diameter, in:	1.97	1.97	1.97	Maximum difference must be $< 0.020$ in.	
Specimen Mass, g:	593.5			Straightness Tolerance Met?	
Bulk Density, lb/ft <sup>3</sup> :	169			YES	
Length to Diameter Ratio:	2.2	Minimum Diameter Tolerance Met?	YES	Length to Diameter Ratio Tolerance Met?	
			YES		

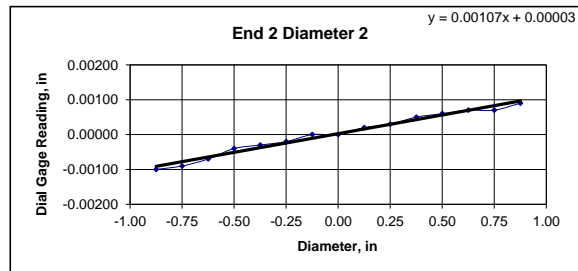
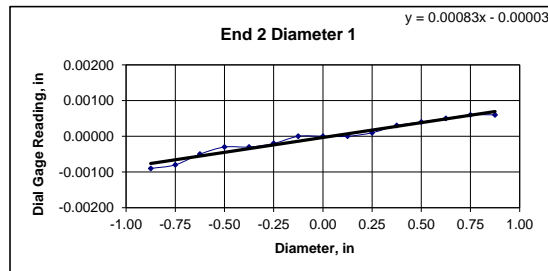
END FLATNESS AND PARALLELISM (Procedure FP1)													
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625
Diameter 1, in	-0.00100	-0.00090	-0.00070	-0.00050	-0.00030	-0.00020	-0.00010	0.00000	0.00020	0.00030	0.00040	0.00040	0.00050
Diameter 2, in (rotated 90°)	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
Difference between max and min 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
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
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
Difference between max and min readings, in:													
0° = 0.0015 90° = 0.0019													
Maximum difference must be $< 0.0020$ in. Difference = $\pm 0.00105$													
Flatness Tolerance Met?													
NO													



### DIAMETER 1

End 1:		
Slope of Best Fit Line	0.00093	
Angle of Best Fit Line:	0.05337	
End 2:		
Slope of Best Fit Line	0.00083	
Angle of Best Fit Line:	0.04764	
Maximum Angular Difference:	0.00573	

Parallelism Tolerance Met? NO  
Spherically Seated



### DIAMETER 2

End 1:		
Slope of Best Fit Line	0.00108	
Angle of Best Fit Line:	0.06204	
End 2:		
Slope of Best Fit Line	0.00107	
Angle of Best Fit Line:	0.06139	
Maximum Angular Difference:	0.00065	

Parallelism Tolerance Met? YES  
Spherically Seated

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	0.00160	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 performed on this rock type. Tolerance measurements were performed using a machinist straightedge and feeler gauges to ASTM specifications.	
Sample ID:	R1		
Depth (ft):	14.87-15.25		
Visual Description:	See photographs		

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

**END FLATNESS**

**END 1**

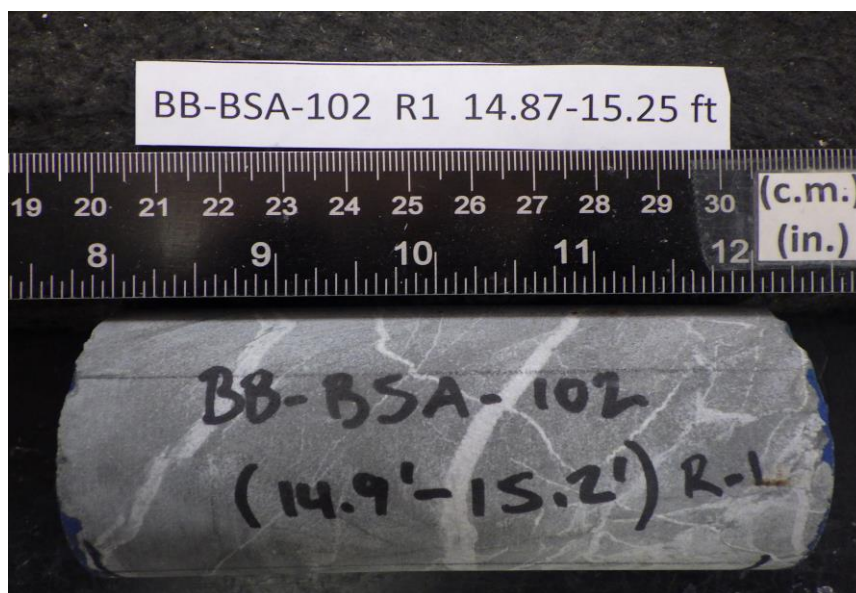
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES

**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
Depth, ft:	14.87-15.25



After cutting and grinding

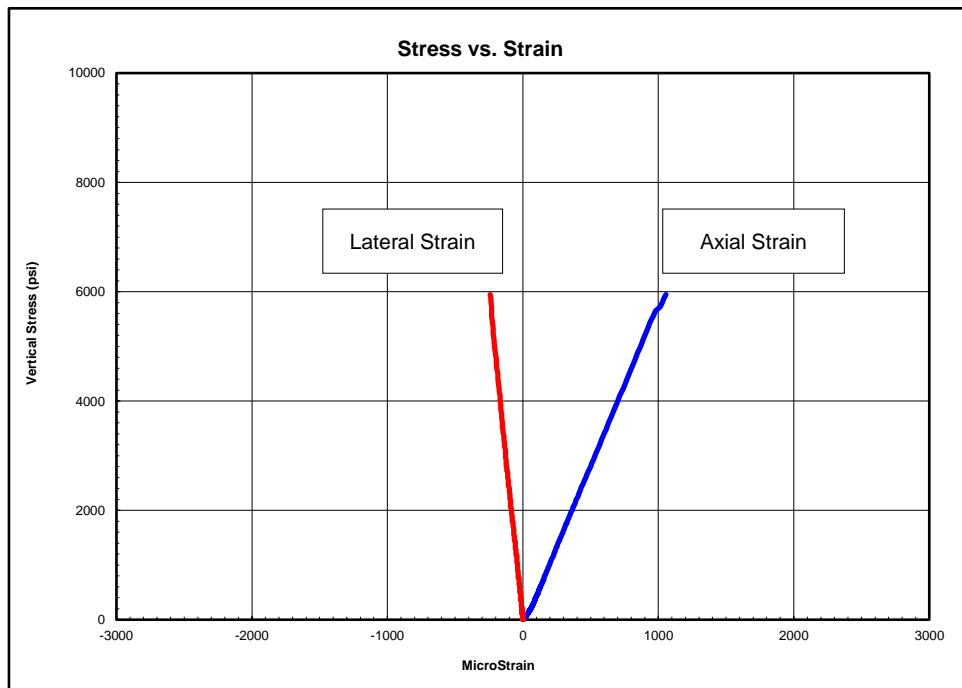


After break



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.



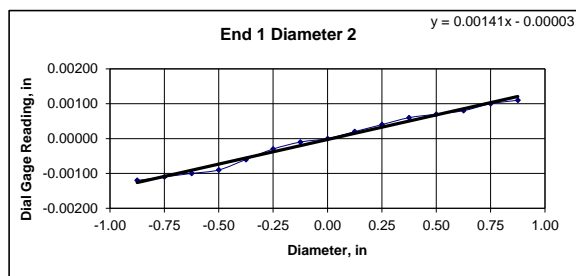
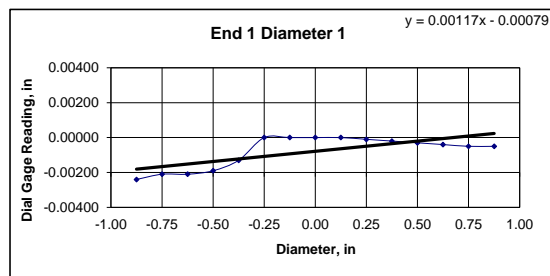


Client:	WSP USA, Inc.	Test Date:	6/12/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By:	gp
Project Location:	Merrimack, NH	Checked By:	smd
GTx #:	319180		
Boring ID:	BB-BSA-110		
Sample ID:	R1		
Depth (ft):	5.93-6.31		
Visual Description:	See photographs		

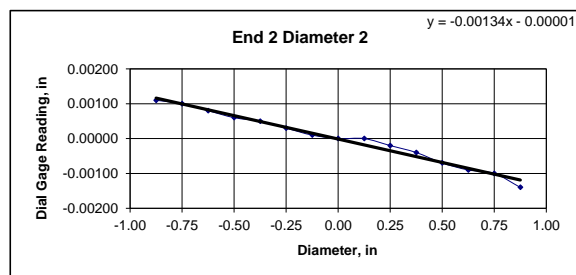
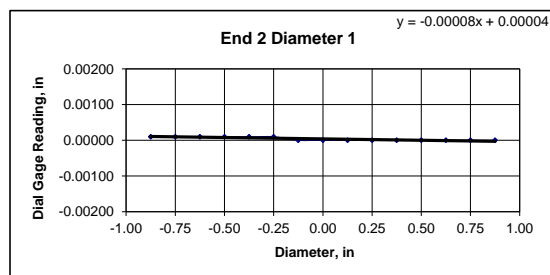
## UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY				DEVIATION FROM STRAIGHTNESS (Procedure S1)	
	1	2	Average	Maximum gap between side of core and reference surface plate: Is the maximum gap $\leq$ 0.02 in.? YES	
Specimen Length, in:	4.41	4.41	4.41	Maximum difference must be $<$ 0.020 in. <b>Straightness Tolerance Met? YES</b>	
Specimen Diameter, in:	1.97	1.97	1.97		
Specimen Mass, g:	604.37				
Bulk Density, lb/ft <sup>3</sup>	171				
Length to Diameter Ratio:	2.2	<b>Minimum Diameter Tolerance Met? YES</b>	<b>Length to Diameter Ratio Tolerance Met? YES</b>		

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	-0.00240	-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 max and min 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 max and min readings, in: 0° = 0.0001 90° = 0.0025 Maximum difference must be $<$ 0.0020 in. Difference = $\pm$ 0.00125 <b>Flatness Tolerance Met? NO</b>															



DIAMETER 1	
End 1:	
Slope of Best Fit Line	0.00117
Angle of Best Fit Line:	0.06695
End 2:	
Slope of Best Fit Line	0.00008
Angle of Best Fit Line:	0.00442
Maximum Angular Difference:	0.06253
<b>Parallelism Tolerance Met? Spherically Seated</b>	<b>NO</b>



DIAMETER 2	
End 1:	
Slope of Best Fit Line	0.00141
Angle of Best Fit Line:	0.08087
End 2:	
Slope of Best Fit Line	0.00134
Angle of Best Fit Line:	0.07694
Maximum Angular Difference:	0.00393
<b>Parallelism Tolerance Met? Spherically Seated</b>	<b>YES</b>

PERPENDICULARITY (Procedure P1)						Perpendicularity Tolerance Met?	Maximum angle of departure must be $\leq 0.25^\circ$
END 1	(Calculated from End Flatness and Parallelism measurements above)						
	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°			
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	<b>Perpendicularity Tolerance Met? YES</b>	
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:	BB-BSA-110	Reliable dial gauge measurements could not be performed on this rock type. Tolerance measurements were performed using a machinist straightedge and feeler gauges to ASTM specifications.	
Sample ID:	R1		
Depth (ft):	5.93-6.31		
Visual Description:	See photographs		

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

**END FLATNESS**

END 1

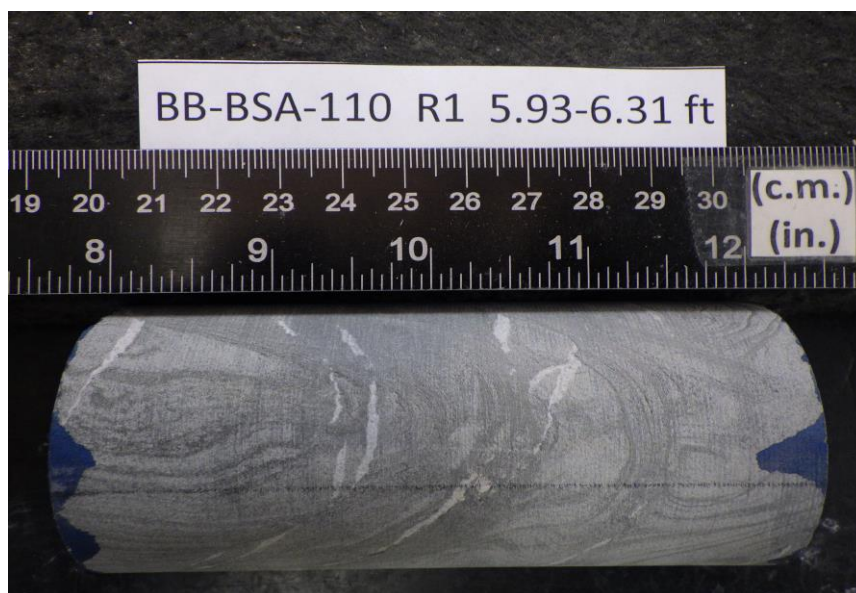
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES

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
Depth, ft:	5.93-6.31



After cutting and grinding

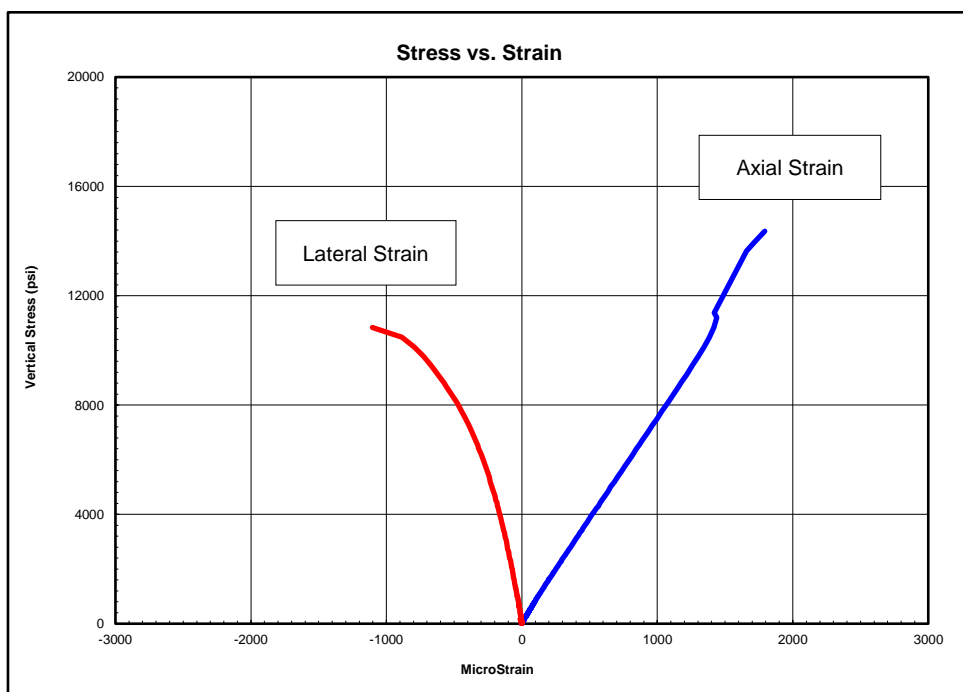


After break



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 psi

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.

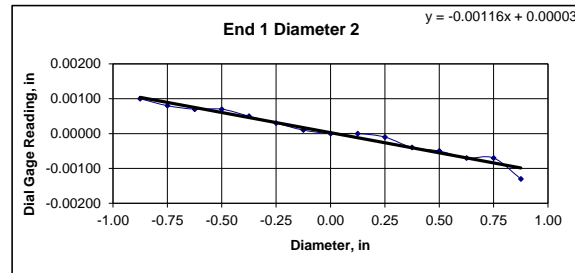
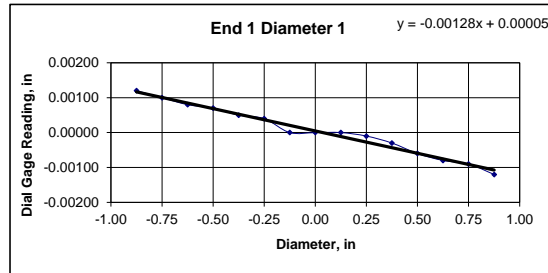


Client:	WSP USA, Inc.	Test Date:	8/28/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By:	gp
Project Location:	Merrimack, NH	Checked By:	smd
GTX #:	319180		
Boring ID:	BB-BSA-101		
Sample ID:	R-4		
Depth (ft):	37-37.3		
Visual Description:	See photographs		

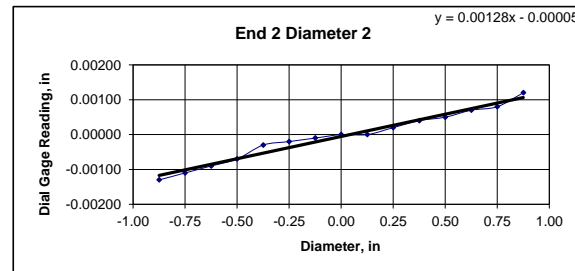
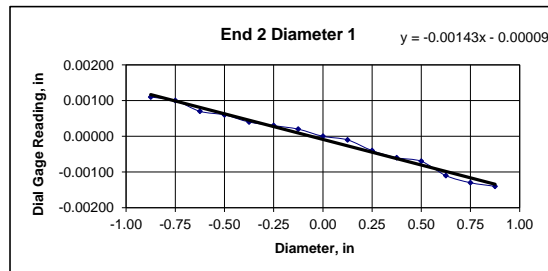
## UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY				DEVIATION FROM STRAIGHTNESS (Procedure S1)	
	1	2	Average	Maximum gap between side of core and reference surface plate: Is the maximum gap $\leq 0.02$ in.?	
Specimen Length, in:	4.33	4.33	4.33	YES	
Specimen Diameter, in:	1.97	1.97	1.97	Maximum difference must be $< 0.020$ in.	
Specimen Mass, g:	589.14			Straightness Tolerance Met?	
Bulk Density, lb/ft <sup>3</sup> :	170			YES	
Length to Diameter Ratio:	2.2	Minimum Diameter Tolerance Met?	YES	Length to Diameter Ratio Tolerance Met?	
			YES		

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
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
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
Difference between max and min 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
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
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
Difference between max and min readings, in:													
0° = 0.0025 90° = 0.0025													
Maximum difference must be $< 0.0020$ in. Difference = $\pm 0.00125$													
Flatness Tolerance Met? NO													



DIAMETER 1	
End 1:	
Slope of Best Fit Line	0.00128
Angle of Best Fit Line:	0.07334
End 2:	
Slope of Best Fit Line	0.00143
Angle of Best Fit Line:	0.08218
Maximum Angular Difference:	0.00884
Parallelism Tolerance Met?	NO
Spherically Seated	



DIAMETER 2	
End 1:	
Slope of Best Fit Line	0.00116
Angle of Best Fit Line:	0.06630
End 2:	
Slope of Best Fit Line	0.00128
Angle of Best Fit Line:	0.07317
Maximum Angular Difference:	0.00688
Parallelism Tolerance Met?	NO
Spherically Seated	

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	1.970	0.00122	0.070	YES	Perpendicularity Tolerance Met?	
Diameter 2, in (rotated 90°)	0.00230	1.970	0.00117	0.067	YES	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:	BB-BSA-101	Reliable dial gauge measurements could not be performed on this rock type. Tolerance measurements were performed using a machinist straightedge and feeler gauges to ASTM specifications.	
Sample ID:	R-4		
Depth (ft):	37-37.3		
Visual Description:	See photographs		

**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:	37-37.3



After cutting and grinding



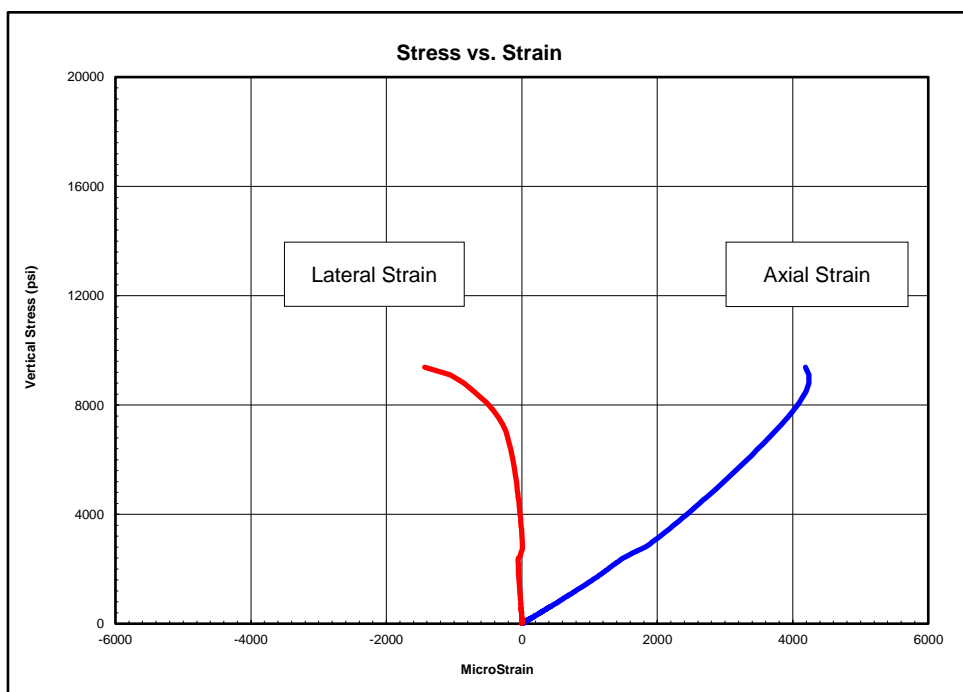
After break





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 psi

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.



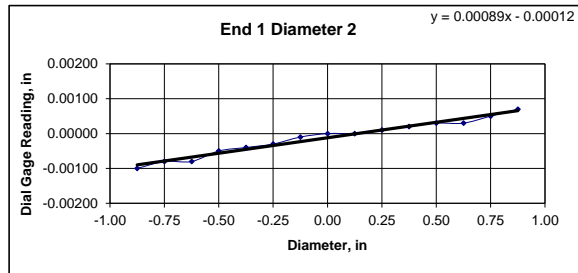
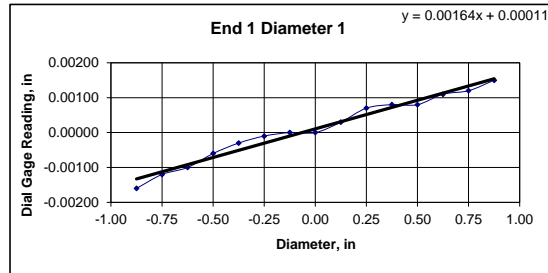


Client:	WSP USA, Inc.	Test Date:	8/28/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By:	gp
Project Location:	Merrimack, NH	Checked By:	smd
GTX #:	319180		
Boring ID:	BB-BSA-105		
Sample ID:	R-1		
Depth (ft):	28.8-29.1		
Visual Description:	See photographs		

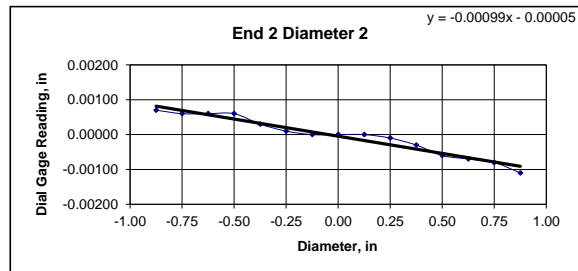
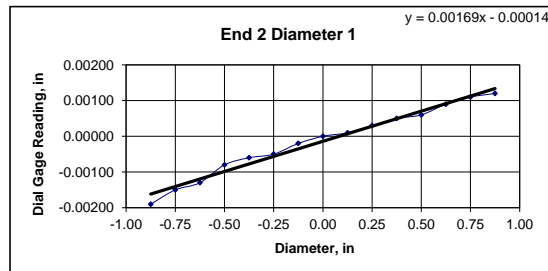
## UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY				DEVIATION FROM STRAIGHTNESS (Procedure S1)	
	1	2	Average	Maximum gap between side of core and reference surface plate: Is the maximum gap $\leq$ 0.02 in.? YES	
Specimen Length, in:	4.30	4.30	4.30	Maximum difference must be $<$ 0.020 in.	
Specimen Diameter, in:	1.96	1.96	1.96	Straightness Tolerance Met? YES	
Specimen Mass, g:	582.84				
Bulk Density, lb/ft <sup>3</sup>	171				
Length to Diameter Ratio:	2.2	Minimum Diameter Tolerance Met? YES			
		Length to Diameter Ratio Tolerance Met? YES			

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
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
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
Difference between max and min 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
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
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
Difference between max and min readings, in: 0° = 0.0031 90° = 0.0018 Maximum difference must be $<$ 0.0020 in. Difference = $\pm$ 0.00155													
Flatness Tolerance Met? NO													



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 Angular Difference:	0.00278
Parallelism Tolerance Met? Spherically Seated	YES



DIAMETER 2	
End 1:	
Slope of Best Fit Line	0.00089
Angle of Best Fit Line:	0.05091
End 2:	
Slope of Best Fit Line	0.00099
Angle of Best Fit Line:	0.05648
Maximum Angular Difference:	0.00557
Parallelism Tolerance Met? Spherically Seated	NO

PERPENDICULARITY (Procedure P1)						Maximum angle of departure must be $\leq$ 0.25°	
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?		
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:	BB-BSA-105	Reliable dial gauge measurements could not be performed on this rock type. Tolerance measurements were performed using a machinist straightedge and feeler gauges to ASTM specifications.	
Sample ID:	R-1		
Depth (ft):	28.8-29.1		
Visual Description:	See photographs		

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

**END FLATNESS**

END 1

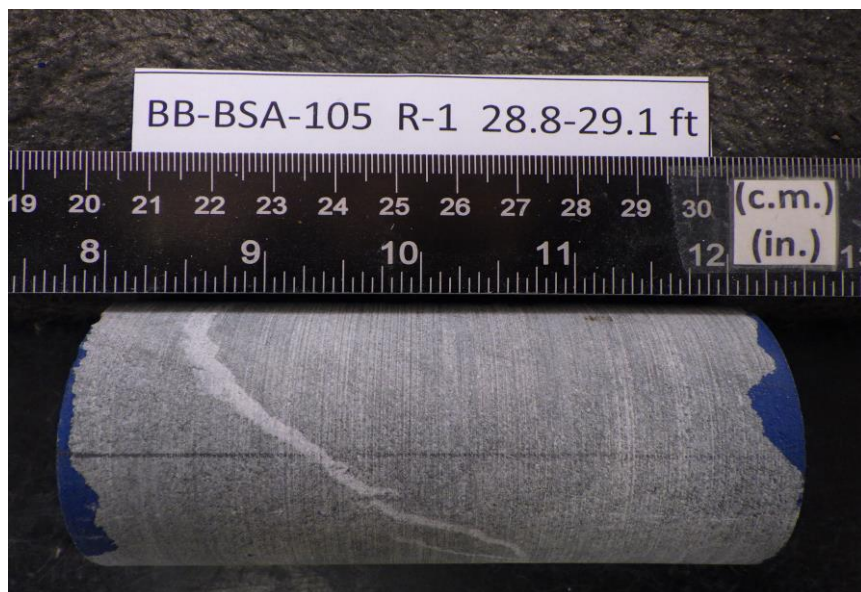
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES

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
Depth, ft:	28.8-29.1



After cutting and grinding

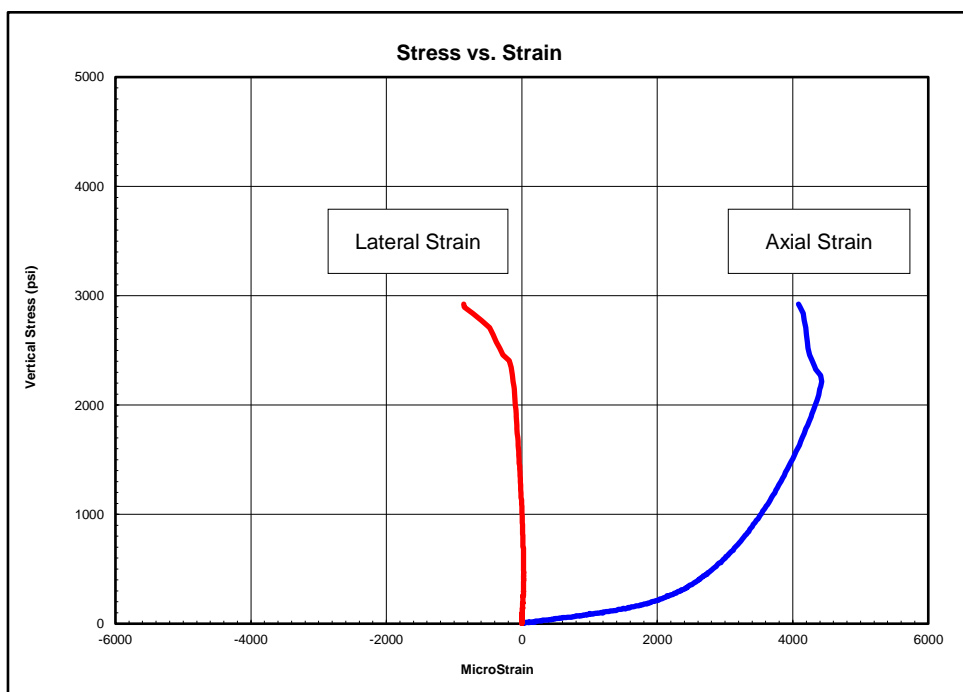


After break



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.

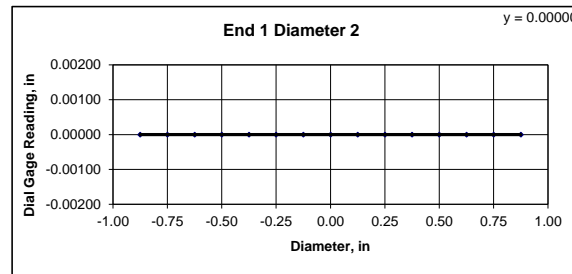
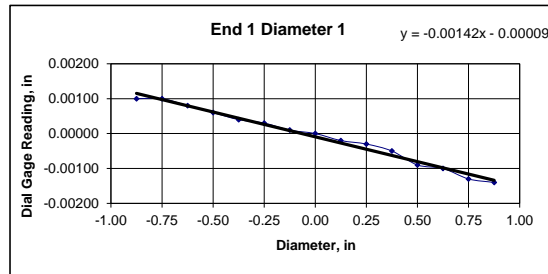


Client:	WSP USA, Inc.	Test Date:	8/28/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By:	gp
Project Location:	Merrimack, NH	Checked By:	smd
GTX #:	319180		
Boring ID:	BB-BSA-106		
Sample ID:	R-3		
Depth (ft):	69.3-69.6		
Visual Description:	See photographs		

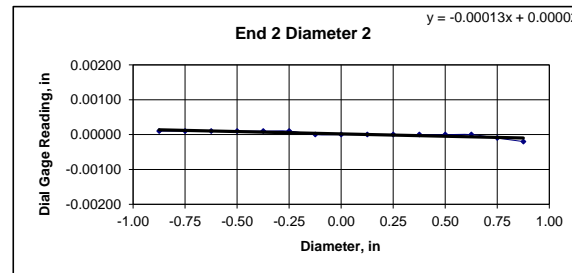
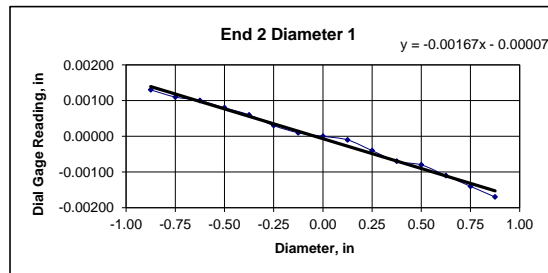
## UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY				DEVIATION FROM STRAIGHTNESS (Procedure S1)	
	1	2	Average	Maximum gap between side of core and reference surface plate: Is the maximum gap $\leq 0.02$ in.? NO	
Specimen Length, in:	4.40	4.40	4.40	Maximum difference must be $< 0.020$ in. <b>Straightness Tolerance Met?</b> NO	
Specimen Diameter, in:	1.96	1.96	1.96		
Specimen Mass, g:	603.87				
Bulk Density, lb/ft <sup>3</sup>	173				
Length to Diameter Ratio:	2.2	<b>Minimum Diameter Tolerance Met?</b> YES	<b>Length to Diameter Ratio Tolerance Met?</b> YES		

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
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
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
Difference between max and min 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
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
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
Difference between max and min readings, in: 0° = 0.003 90° = 0.0003 Maximum difference must be $< 0.0020$ in. Difference = $\pm 0.00150$ <b>Flatness Tolerance Met?</b> NO													



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	0.00167
Angle of Best Fit Line:	0.09560
Maximum Angular Difference:	0.01408
<b>Parallelism Tolerance Met?</b> Spherically Seated	NO



DIAMETER 2	
End 1:	
Slope of Best Fit Line	0.00000
Angle of Best Fit Line:	0.00000
End 2:	
Slope of Best Fit Line	0.00013
Angle of Best Fit Line:	0.00769
Maximum Angular Difference:	0.00769
<b>Parallelism Tolerance Met?</b> Spherically Seated	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 $\leq 0.25^\circ$	
Diameter 1, in	0.00240	1.960	0.00122	0.070	YES	<b>Perpendicularity Tolerance Met?</b> YES	
Diameter 2, in (rotated 90°)	0.00000	1.960	0.00000	0.000	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		



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	Reliable dial gauge measurements could not be performed on this rock type. Tolerance measurements were performed using a machinist straightedge and feeler gauges to ASTM specifications.	
Sample ID:	R-3		
Depth (ft):	69.3-69.6		
Visual Description:	See photographs		

**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

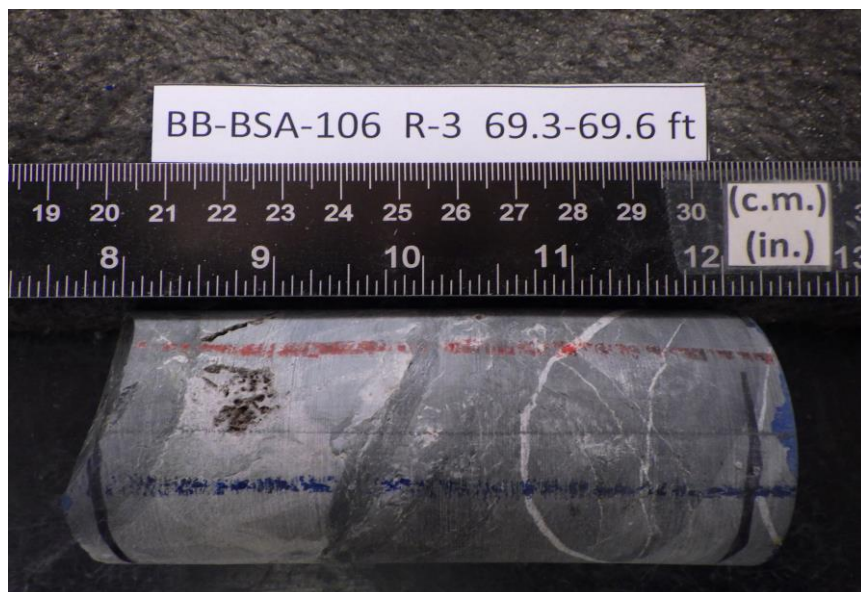
END 2

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
Depth, ft:	69.3-69.6



After cutting and grinding

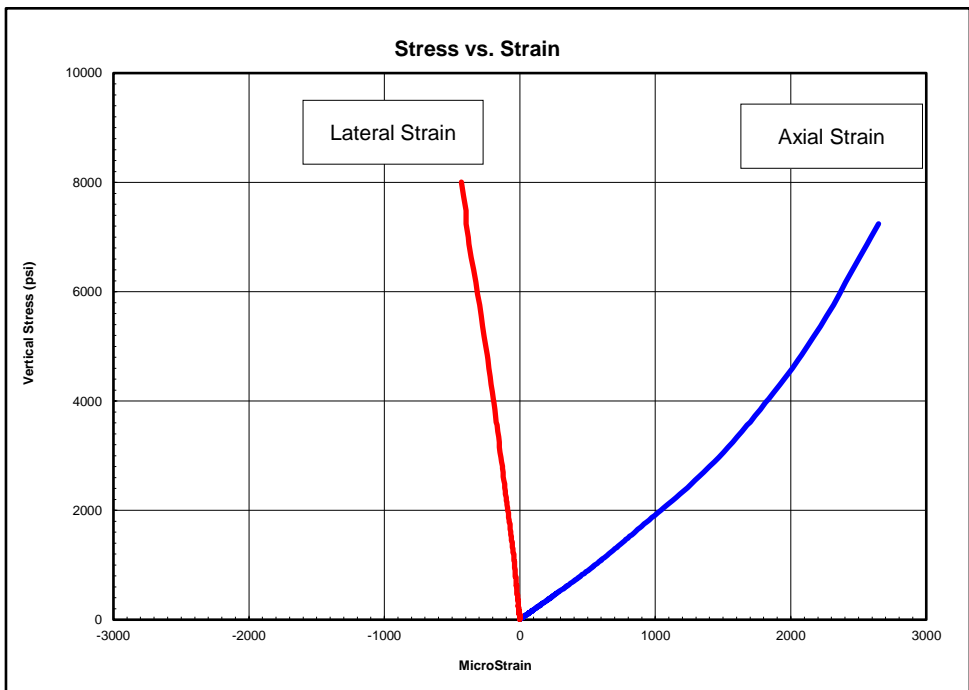


After break



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.



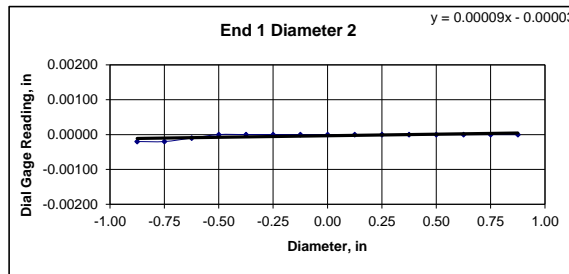
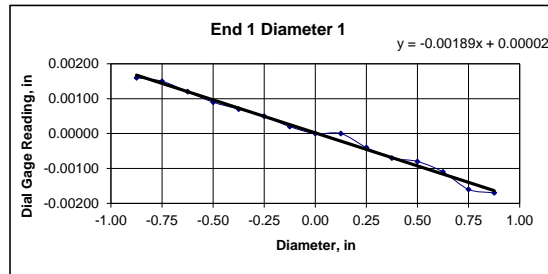


Client:	WSP USA, Inc.	Test Date:	8/28/2024
Project Name:	MaineDOT I-95 Bridge over Stillwater	Tested By:	gp
Project Location:	Merrimack, NH	Checked By:	smd
GTx #:	319180		
Boring ID:	BB-BSA-111		
Sample ID:	R-1		
Depth (ft):	21.4-21.7		
Visual Description:	See photographs		

## 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	Maximum gap between side of core and reference surface plate: Is the maximum gap $\leq$ 0.02 in.?	
Specimen Length, in:	4.52	4.52	4.52	NO	
Specimen Diameter, in:	1.96	1.96	1.96	Maximum difference must be $< 0.020$ in.	
Specimen Mass, g:	619.07			Straightness Tolerance Met?	
Bulk Density, lb/ft <sup>3</sup>	173			NO	
Length to Diameter Ratio:	2.3				
		Minimum Diameter Tolerance Met?	YES		
		Length to Diameter Ratio Tolerance Met?	YES		

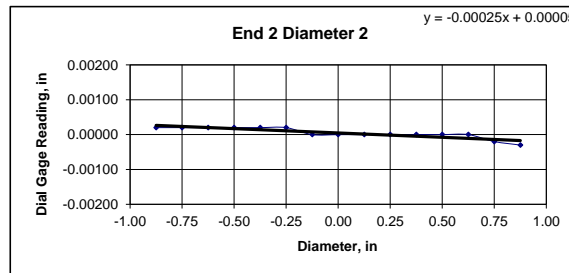
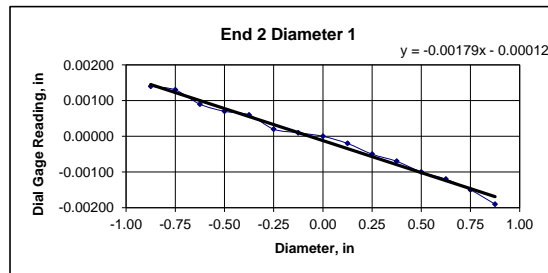
END FLATNESS AND PARALLELISM (Procedure FP1)														
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750
Diameter 1, in	0.00160	0.00150	0.00120	0.00090	0.00070	0.00050	0.00020	0.00000	0.00000	-0.00040	-0.00070	-0.00080	-0.00110	-0.00160
Diameter 2, in (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
Difference between max and min 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
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
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	-0.00030
Difference between max and min readings, in:														
0° = 0.0033 90° = 0.0005														
Maximum difference must be $< 0.0020$ in. Difference = $\pm 0.00165$														
Flatness Tolerance Met?														
NO														



### DIAMETER 1

End 1:		
Slope of Best Fit Line	0.00189	
Angle of Best Fit Line:	0.10837	
End 2:		
Slope of Best Fit Line	0.00179	
Angle of Best Fit Line:	0.10280	
Maximum Angular Difference:	0.00557	

Parallelism Tolerance Met? NO  
Spherically Seated



### DIAMETER 2

End 1:		
Slope of Best Fit Line	0.00009	
Angle of Best Fit Line:	0.00507	
End 2:		
Slope of Best Fit Line	0.00025	
Angle of Best Fit Line:	0.01424	
Maximum Angular Difference:	0.00917	

Parallelism Tolerance Met? NO  
Spherically Seated

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	0.00330	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:	BB-BSA-111	Reliable dial gauge measurements could not be performed on this rock type. Tolerance measurements were performed using a machinist straightedge and feeler gauges to ASTM specifications.	
Sample ID:	R-1		
Depth (ft):	21.4-21.7		
Visual Description:	See photographs		

**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

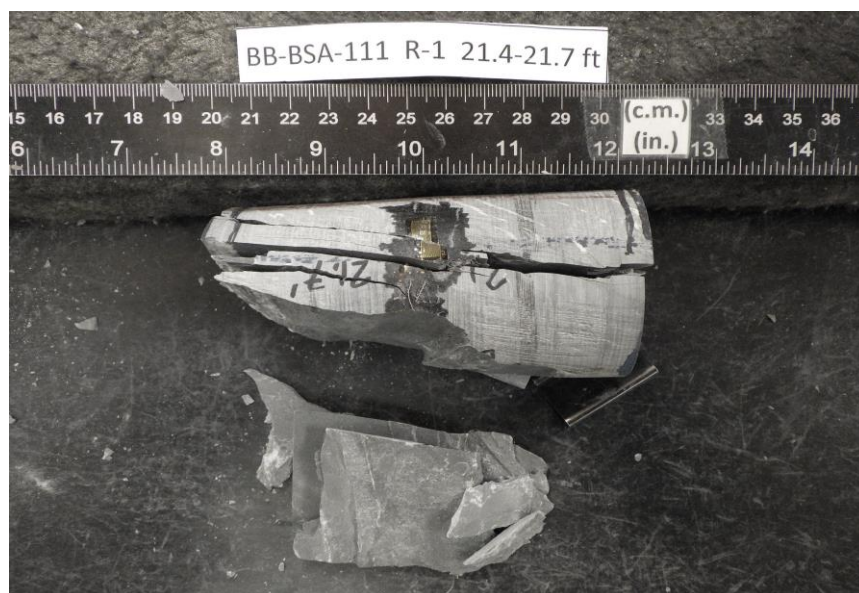
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES

**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
Depth, ft:	21.4-21.7



After cutting and grinding



After break

**APPENDIX D**

# Rock Discontinuity Calculations



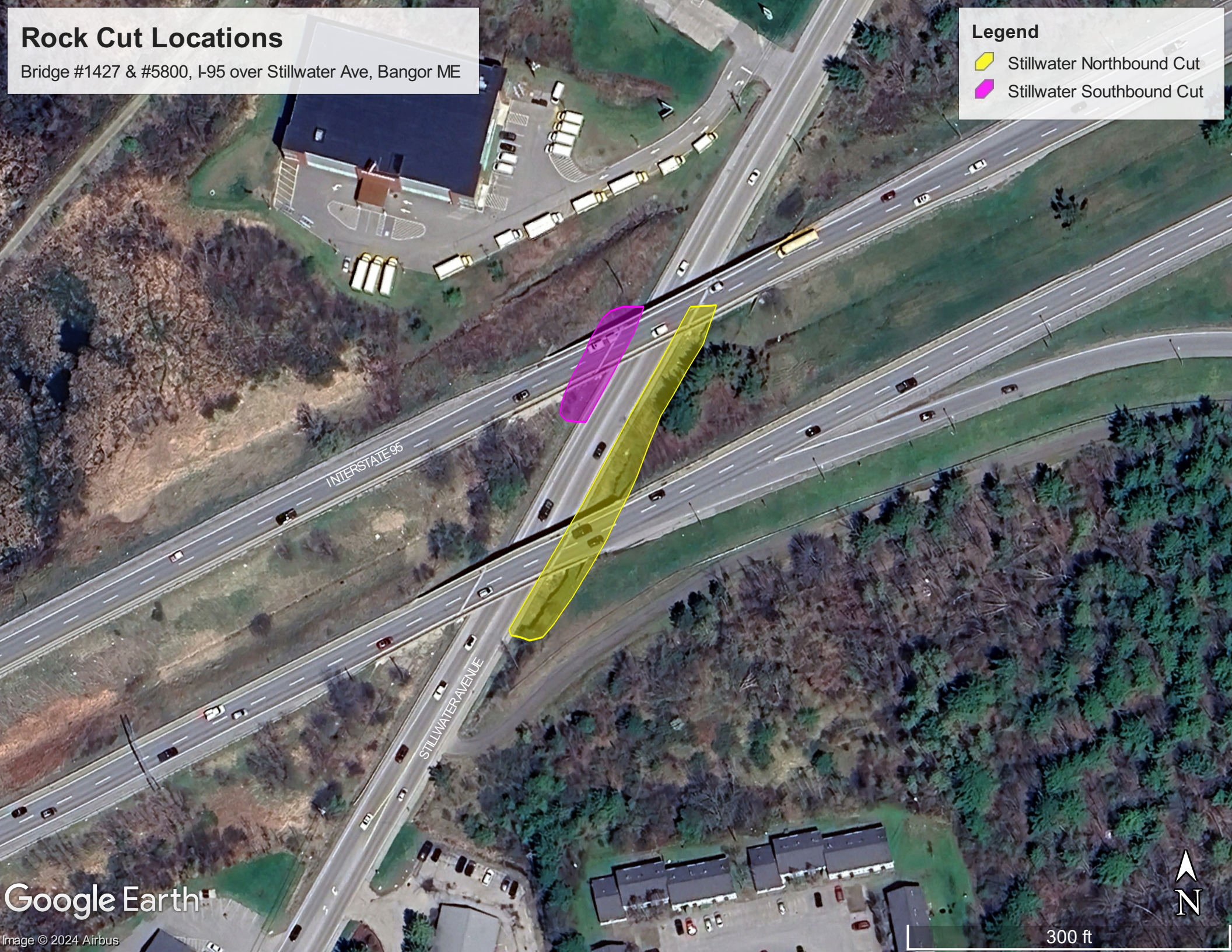
# Rock Cut Locations

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

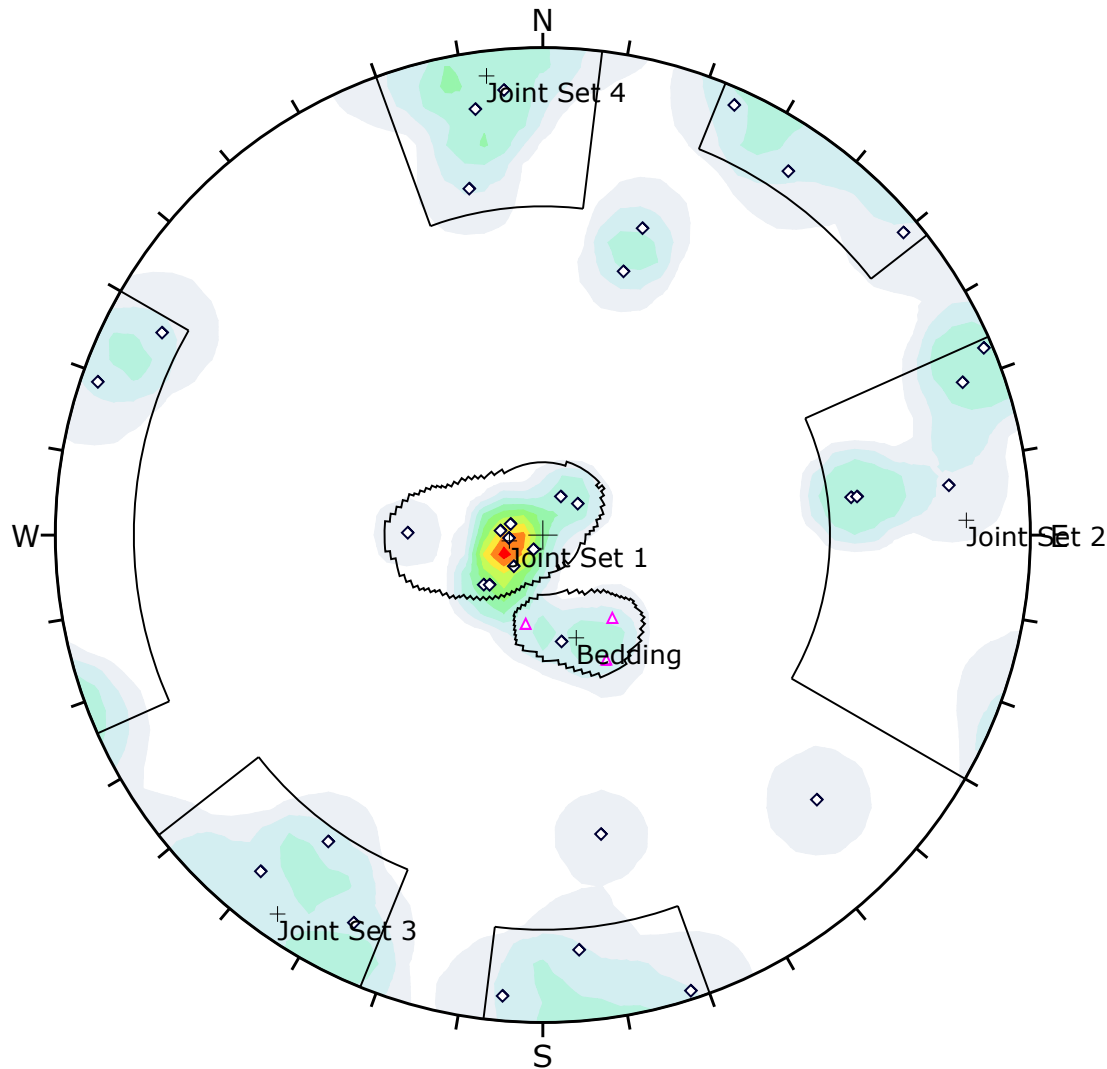
Legend

Stillwater Northbound Cut

Stillwater Southbound Cut







Symbol	TYPE	Quantity
▲	bedding	3
◆	joint	34

Color	Density Concentrations
	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	
Maximum Density	
Contour Distribution	
Counting Circle Size	
Pole Vectors	
13.44%	
Fisher	
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 & #5800 over Stillwater Ave, Bangor ME, MaineDOT WIN 027176.00

Analysis Description

Outcrops along Stillwater Ave Northbound and Southbound

Drawn By

KAR

Checked By

BK

Reviewed By

JDL

Scale

N/A

Date

5/21/2024

File Name

Stillwater-outcrop-data.dips8

**Appendix D.1**

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 planar sliding and for joint set 2 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

Boring or Outcrop	Run Number or Discontinuity ID	Intact Strength			RQD (%)	Fracture Spacing			A. Classification Parameters										B. Rating adjustment for joint orientation	RMR
		UCS (psi)	UCS (MPa)	Field Strength Estimate		Average fractures per foot	Average spacing (ft)	Average spacing (mm)	1	2	3	4						5		
									Strength of rock	RQD	Spacing of joints	Condition of Joints						Ground water		
												Persistence	Aperture	Roughness	Infilling	Weathering	Total			
BB-BSA-101	R1	-	-	Very Strong (R5)	0	broken	-	-	12	3	5	2	0	1	0	5	8	7	-4	31
	R2	-	-	Strong (R4) to Very Strong (R5)	0	broken	-	-	7	3	5	2	0	5	0	5	12	7	-4	30
	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
	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
	R2	-	-	Extremely Strong (R6)	70	2.0	0.5	152	15	14	7	2	4	5	6	6	23	7	-4	62
BB-BSA-104A	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
	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
	R2	-	-	Very Strong (R5)	75	1.6	0.6	191	12	15	8	2	5	1	6	6	20	7	-4	58
BB-BSA-106	R1	-	-	Strong (R4) to Very Strong (R5)	0	broken	-	-	7	3	5	2	0	5	6	5	18	7	-4	36
	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
BB-BSA-107	R1	-	-	Strong (R4)	0	broken	-	-	7	3	5	2	0	5	0	1	8	7	-4	26
	R2	-	-	Strong (R4)	0	broken	-	-	7	3	5	2	0	6	0	1	9	7	-4	27
	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

Boring or Outcrop	Run Number or Discontinuity ID	Intact Strength			RQD (%)	Fracture Spacing			A. Classification Parameters										B. Rating adjustment for joint orientation	RMR
		UCS (psi)	UCS (MPa)	Field Strength Estimate		Average fractures per foot	Average spacing (ft)	Average spacing (mm)	1	2	3	4						5		
									Strength of rock	RQD	Spacing of joints	Condition of Joints						Ground water		
												Persistence	Aperture	Roughness	Infilling	Weathering	Total			
BB-BSA-108	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
	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
BB-BSA-109A	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
	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
BB-BSA-110	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
	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
BB-BSA-111	R1	-	-	Strong (R4) to Very Strong (R5)	15	broken	-	-	6	5	5	2	0	5	6	5	18	7	-4	37
	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
Outcrop along Stillwater Ave Northbound	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
	Disc. 15	-	-	R6	100	-	5.1	1554	15	20	16	4	6	1	6	5	22	10	-15	68
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	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
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	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	0	3	0	5	12	10	0



Boring or Outcrop	Run Number or Discontinuity ID	Intact Strength			RQD (%)	Fracture Spacing			A. Classification Parameters										B. Rating adjustment for joint orientation	RMR
		UCS (psi)	UCS (MPa)	Field Strength Estimate		Average fractures per foot	Average spacing (ft)	Average spacing (mm)	1	2	3	4						5		
									Strength of rock	RQD	Spacing of joints	Condition of Joints						Ground water		
												Persistence	Aperture	Roughness	Infilling	Weathering	Total			
Outcrop along Stillwater Ave Southbound	Disc. 32	-	-	-	85	-	0.9	274	15	17	9	4	0	6	0	5	15	10	0	66
	Disc. 33	-	-	-	20	-	0.2	61	15	5	6	4	1	5	2	5	17	10	0	53
	Disc. 34	-	-	-	41	-	0.3	91	12	9	6	4	1	6	2	5	18	10	-15	40
	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

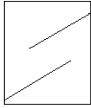
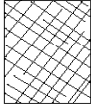




Appendix D.3: Calculation of Geological Strength Index  
Preliminary Geotechnical Design Report  
Bridge #1427 & #5800, I-95 over Stillwater Ave, Bangor, Maine  
MaineDOT WIN 027176.00

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

GSI =

55

Table 5: Most common GSI ranges for typical sandstones.\*

<p><b>GEOLOGICAL STRENGTH INDEX FOR JOINTED ROCKS (Hoek and Marinos, 2000)</b></p> <p>From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. <u>Note that the table does not apply to structurally controlled failures.</u> Where weak planar structural planes are present in an unfavourable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.</p>		<p><b>SURFACE CONDITIONS</b></p> <p><b>VERY GOOD</b> Very rough, fresh unweathered surfaces</p> <p><b>GOOD</b> Rough, slightly weathered, iron stained surfaces</p> <p><b>FAIR</b> Smooth, moderately weathered and altered surfaces</p> <p><b>POOR</b> Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments</p> <p><b>VERY POOR</b> Slackensided, highly weathered surfaces with soft clay coatings or fillings</p>				
<p><b>STRUCTURE</b></p>		<p><b>DECREASING SURFACE QUALITY</b> →</p>				
	<p><b>INTACT OR MASSIVE</b> - intact rock specimens or massive in situ rock with few widely spaced discontinuities</p>	90	80		N/A	N/A
	<p><b>BLOCKY</b> - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets</p>		70	60		
	<p><b>VERY BLOCKY</b>- interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets</p>		1	50		
	<p><b>BLOCKY/DISTURBED/SEAMY</b> - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity</p>			40		
	<p><b>DISINTEGRATED</b> - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces</p>				30	
	<p><b>LAMINATED/SHEARED</b> - Lack of blockiness due to close spacing of weak schistosity or shear planes</p>				20	
			2			10
		N/A	N/A			

**\*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.

**APPENDIX E**

# Rock Cut Discontinuity Photographs



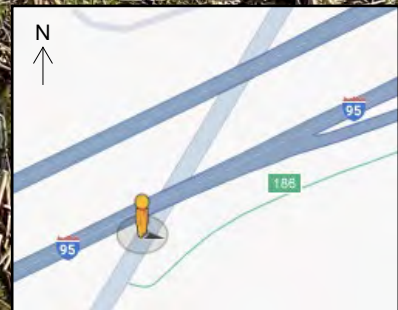
ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



SOUTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00





ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



NORTH



SOUTH

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Reviewed: MEL

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SHEET NUMBER

02

OF 54



NORTH

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ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

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**03**

OF 54





ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



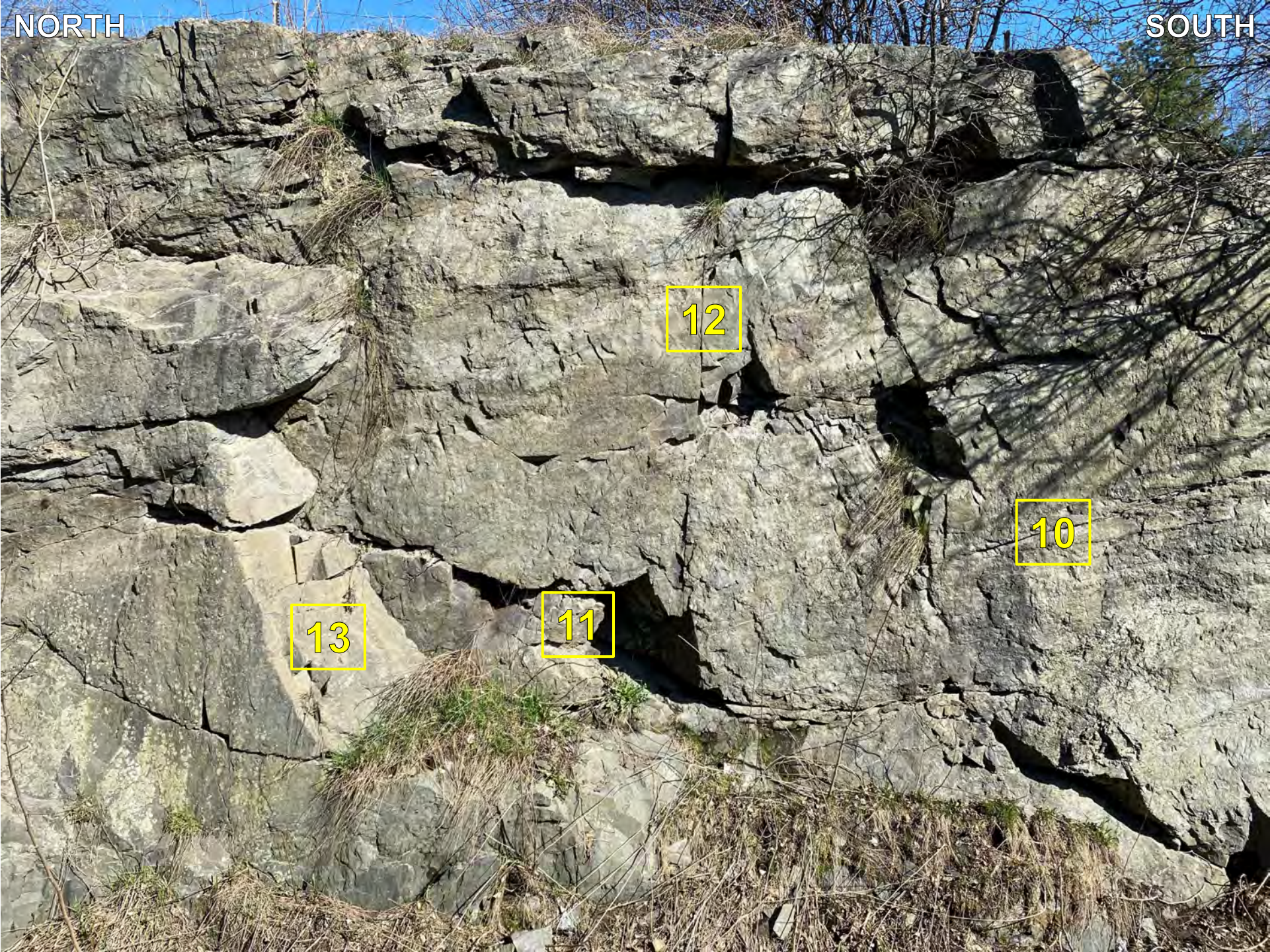
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SHEET NUMBER

**04**  
OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
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ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
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**06**

OF 54



NORTH

SOUTH

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ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
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**07**

OF 54





ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



NORTH

SOUTH

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Checked: LMP  
Reviewed: MEL



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

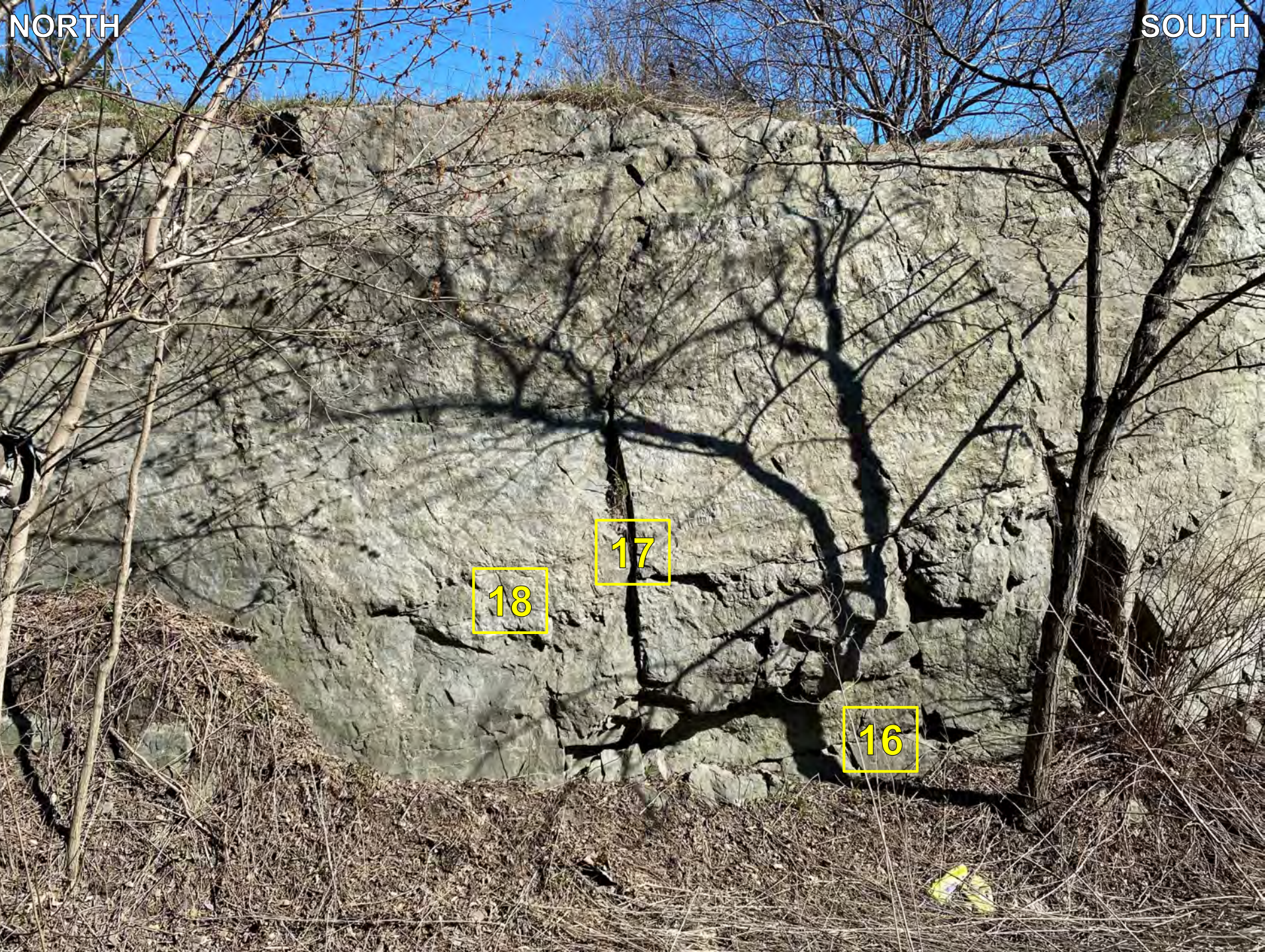
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OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00



NORTH

SOUTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND

19

18

17

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

10  
OF 54





ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



NORTH



SOUTH

Date: 11/4/2024  
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BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

11

OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



NORTH

SOUTH

Date: 11/4/2024  
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BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

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**12**  
OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



NORTH



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Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

13

OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



NORTH



SOUTH

Date: 11/4/2024  
Prepared: KAR  
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Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
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SHEET NUMBER

14

OF 54

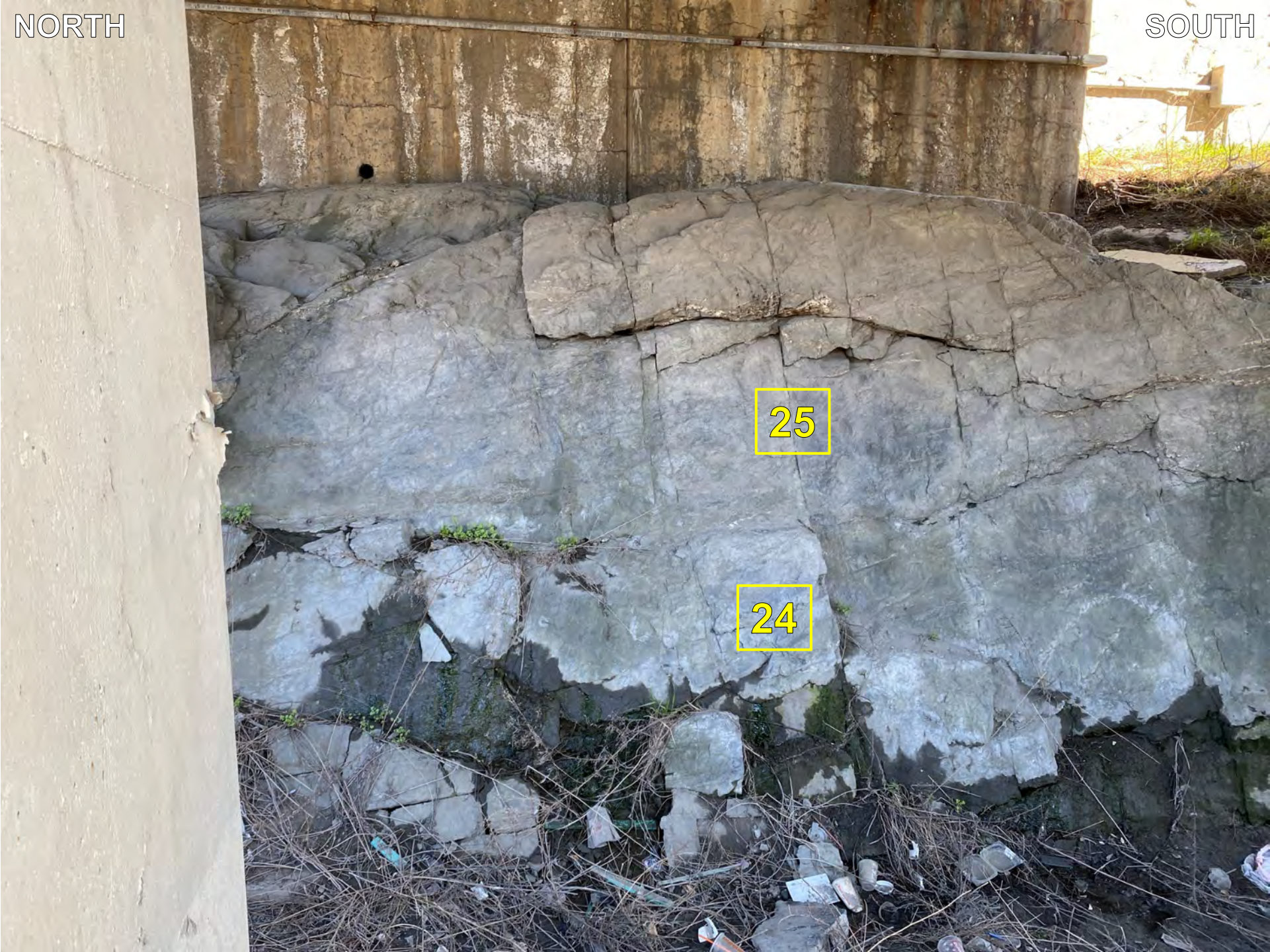




ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND

WIN 027176.00  
Project No.  
US0025840.3905

NORTH



SOUTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

15  
OF 54





WIN 027176.00  
Project No.  
US0025840.3905

**ROCK CUT DISCONTINUITY ID LOCATIONS**  
**STILLWATER AVENUE NORTHBOUND**

**NORTH**



**SOUTH**

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

**BRIDGE #1427 & #5800**  
**I-95 OVER STILLWATER AVE, BANGOR, MAINE**  
**MAINEDOT WIN 027176.00**

SHEET NUMBER

**16**  
OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

17

OF 54





WIN 027176.00  
Project No.  
US0025840.3905

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
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SHEET NUMBER

18  
OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



NORTH

SOUTH



Date: 11/4/2024  
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Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

19  
OF 54



NORTH

SOUTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**20**  
OF 54





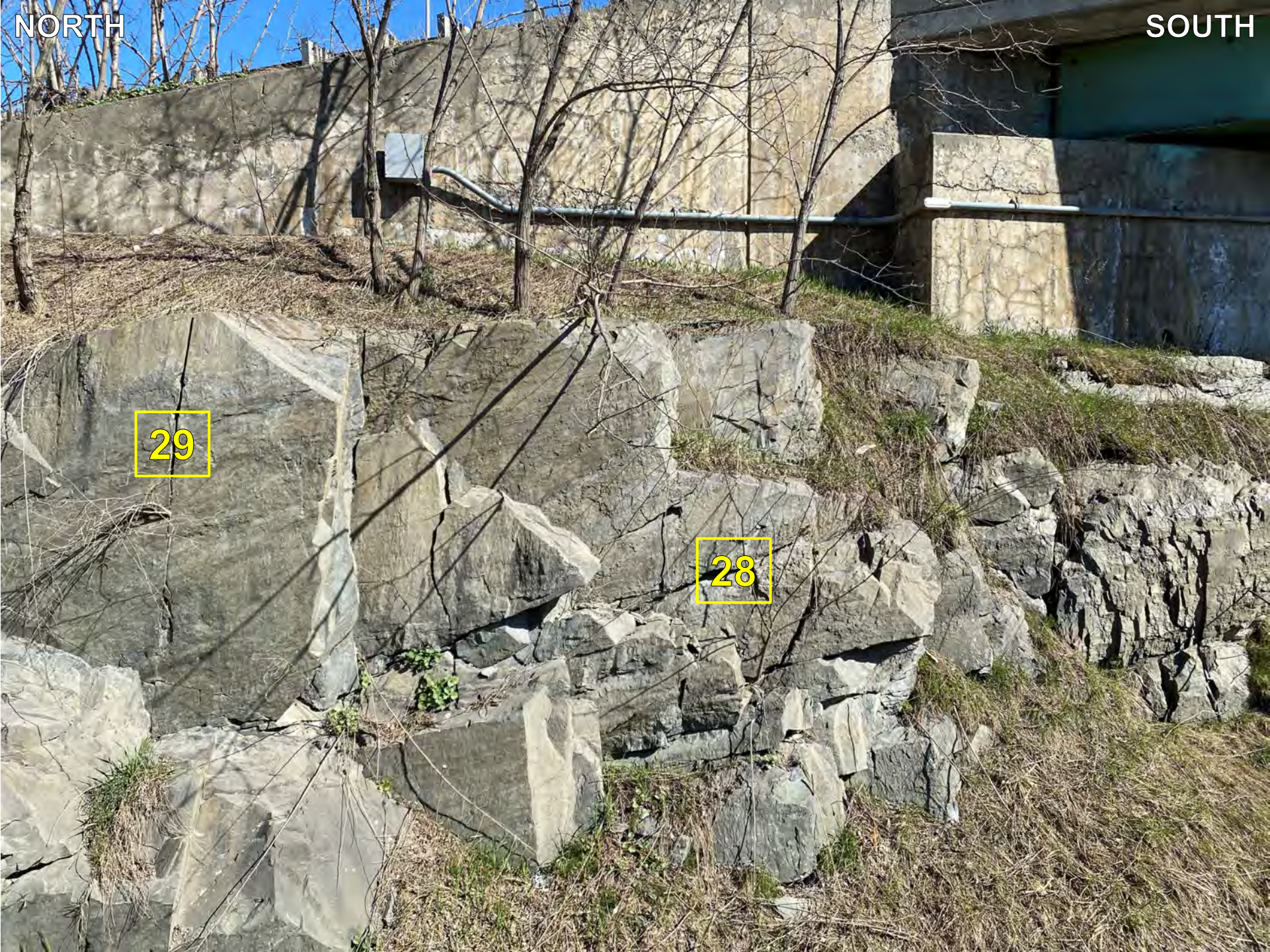
ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**23**  
OF 54



NORTH

SOUTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

24

OF 54





**ROCK CUT DISCONTINUITY ID LOCATIONS**  
**STILLWATER AVENUE NORTHBOUND**



**BRIDGE #1427 & #5800**  
**I-95 OVER STILLWATER AVE, BANGOR, MAINE**  
**MAINEDOT WIN 027176.00**



NORTH

SOUTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**26**  
OF 54





NORTH

SOUTH

Date: 11/4/2024  
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Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**27**

OF 54





NORTH

SOUTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**28**  
OF 54





ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00



NORTH

SOUTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**30**

OF 54





NORTH

SOUTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

31

OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



NORTH



SOUTH



Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**32**  
OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**33**  
OF 54



NORTH

SOUTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**34**

OF 54





NORTH

SOUTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**35**  
OF 54





ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



NORTH



SOUTH



Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

36  
OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**37**  
OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



NORTH

SOUTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**38**  
OF 54



NORTH

SOUTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**39**  
OF 54



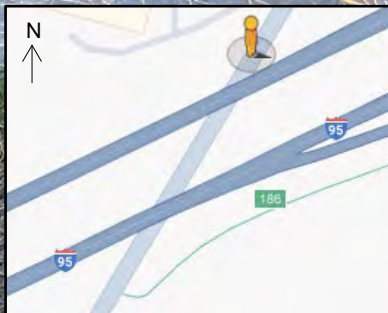


ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE NORTHBOUND



NORTH

SOUTH



Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**40**  
OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



SOUTH

NORTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

41

OF 54





SOUTH

NORTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**42**  
OF 54





SOUTH

NORTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**43**  
OF 54



SOUTH

NORTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

44

OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

45

OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



SOUTH



NORTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

46  
OF 54



SOUTH

NORTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

47

OF 54





ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



SOUTH



NORTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

48

OF 54



ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



SOUTH



NORTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**49**  
OF 54



SOUTH

NORTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**50**

OF 54





SOUTH

NORTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

51

OF 54





SOUTH

NORTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**52**  
OF 54





SOUTH

NORTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

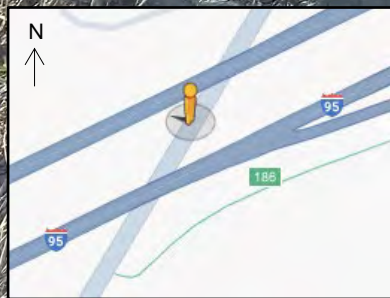
**53**

OF 54





ROCK CUT DISCONTINUITY ID LOCATIONS  
STILLWATER AVENUE SOUTHBOUND



SOUTH

NORTH

Date: 11/4/2024  
Prepared: KAR  
Checked: LMP  
Reviewed: MEL

BRIDGE #1427 & #5800  
I-95 OVER STILLWATER AVE, BANGOR, MAINE  
MAINEDOT WIN 027176.00

SHEET NUMBER

**54**  
OF 54



