



## REPORT

# Preliminary Geotechnical Data Report - Addendum 1

*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.**

428 Dow Highway Eliot, Maine 03903

207.865.4024

WIN 027176.00 / WSP US0025840.3905

January 30, 2025



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## 1.0 INTRODUCTION

This Addendum 1 to the Preliminary Geotechnical Data Report (PGDR) summarizes the results of an additional geotechnical subsurface investigation and laboratory testing program of site soils 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 (attached) shows the site location. The goal of this additional investigation was to identify the potential presence of compressible clays in areas not previously evaluated as discussed in the Preliminary Geotechnical Data Report.<sup>1</sup>

## 2.0 BORING PROGRAM

WSP completed four (4) borings (BB-BSA-201, BB-BSA-202, BB-BSA-203, and BB-BSA-204) within the median of I-95 northbound and southbound on either side of Stillwater Avenue on December 16 and December 17, 2024. The boring locations with respect to existing site features are illustrated in the Boring Location Plan in Figure 2 (attached).

The boring program included Standard Penetration Testing (SPT) of fine-grained and coarse-grained soils. 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, to complete the borings. Borings BB-BSA-201, -202, and -203 were advanced using hollow stem augers with continuous SPT sampling to a depth of 4.5 feet to 14.0 bgs. BB-BSA-204 was advanced using solid stem augers to a depth of 10 feet bgs and then with driven casing and wash boring methods to a depth of 19 feet bgs with continuous SPT sampling between 10 feet and 19 feet bgs.

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 continuously, 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 12-inch and 12-inch to 18-inch penetration intervals. WSP used a calibrated hammer energy transfer ratio of 98.5% provided by Seaboard<sup>2</sup> to 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.

The boring logs provided in Appendix A present details of the sampling methods used, field data obtained, and soil conditions encountered during the investigation. A description of the boring log symbols and terms used for the soil 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 general accordance with ASTM D2488.

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<sup>1</sup> WSP USA, Inc., 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, November 4, 2024.

<sup>2</sup> SPT Energy Calibration Report prepared for Seaboard Drilling, LLC by GRL Engineers, Inc., Dated October 23, 2024.

### 3.0 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 are presented in Table 3-1. Soil testing results are included on the boring logs in Appendix A. Complete soil and rock laboratory testing results are provided in Appendix B.

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

Laboratory Test	Test Standard	No. Tests Completed
Grain size analysis (sieve & hydrometer)	AASHTO T88, ASTM D6913 / ASTM D 7928	7
Atterberg limits	AASHTO T89 / T90, ASTM D4318	7

### 4.0 SUBSURFACE CONDITIONS

The boring logs in Appendix A provide detailed descriptions of the soil 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, and sand and gravel interpreted as glacial till. These units are discussed in more detail in the PGDR<sup>1</sup>. Table 4-1 summarizes the major stratigraphic units, the range of thicknesses, and generalized material descriptions for soils encountered in this addendum to the preliminary geotechnical investigation.

**Table 4-1: Summary of Subsurface Fill and Soil Encountered in 200-series Borings**

Stratigraphic Unit	Approximate Range in Encountered Thickness (feet)	Generalized Description <sup>1</sup>
Topsoil	0.2 to 0.3	Topsoil (Encountered in all borings)
Sand	0.3 to 2.0	Brown, dry, medium dense, fine to medium silty SAND, little fine gravel. USCS: SM. AASHTO: A-2-4 (Encountered in BB-BSA-203)
Silt, Clay	4.3 to 11.7	Grey to brown to olive, wet to moist, very stiff to hard, Silty CLAY, trace fine sand USCS: CL. AASHTO: A-6 (13, 14, 15, 16, 17, 18) (Encountered in BB-BSA-201, -202, -203, and -204)  Grey to brown to olive, wet to moist, very stiff to stiff, Clayey SILT, trace fine to medium sand (Encountered in BB-BSA-202 and -204)

Stratigraphic Unit	Approximate Range in Encountered Thickness (feet)	Generalized Description <sup>1</sup>
Glacial Till	6.0 to 7.0 <sup>2</sup>	Grey to brown, wet, very dense to medium dense, fine to medium silty SAND, fine to coarse gravel, trace clay, interbedded with coarse sand seams. USCS: SM. AASHTO: A-4 (Encountered in BB-BSA-201, -203, and -204)

## Notes:

1. 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.
2. Borings terminated within this layer.

**Groundwater:** Groundwater was encountered at the ground surface in BB-BSA-201 and BB-BSA-202 (EL 139.8 feet and EL 140.2 feet, respectively). Groundwater levels were measured in BB-BSA-203 and BB-BSA-204 at 11.1 feet bgs (EL 125.6 feet) and 4.2 feet bgs (EL 122.6 feet), respectively. Groundwater was measured before the augers or casing was withdrawn at the time the boring was completed. Groundwater levels encountered at the time of drilling may have been influenced by the drilling methods used and will also 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.

## 5.0 REPORT AND EXPLORATION LIMITATIONS

This Addendum to the Preliminary Geotechnical Data Report (PGDR) was prepared for the use of MaineDOT 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.

## Signature Page

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DEB/MEL/JDL

[https://wspnlinenam.sharepoint.com/sites/us-win02609500/shared documents/06 deliverables/stillwater supplemental data report/hntb stillwater ave bangor win 027176.00 wsp pgdr addendum 1.docx](https://wspnlinenam.sharepoint.com/sites/us-win02609500/shared%20documents/06%20deliverables/stillwater%20supplemental%20data%20report/hntb%20stillwater%20ave%20bangor%20win%20027176.00%20wsp%20pgdr%20addendum%201.docx)

TABLE



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

As-Drilled Locations <sup>4</sup>					Approximate Strata Thickness (feet)							Approximate Top of Bedrock Depth	Approximate Elevation of Top of Bedrock	Approximate Bottom of Exploration Depth (ft)	Approximate Elevation of Bottom of Exploration
	Test Boring No. <sup>1,2,3</sup>	Northing <sup>4</sup>	Easting <sup>4</sup>	Ground Surface Elevation <sup>4</sup> (feet NAVD88)	Asphalt	Top Soil	Fill	Sand	Silt, Clay	Glacial Till	Weathered Bedrock	(feet bgs <sup>5</sup> )	(feet NAVD88)	(feet bgs <sup>5</sup> )	(feet NAVD88)
I-95 Median	BB-BSA-201	482953.13	1735654.60	139.8	NE <sup>5</sup>	0.2	NR <sup>6</sup>	NR <sup>6</sup>	7.8	3.3	NR <sup>6</sup>	11.3	128.5	11.3	128.5
	BB-BSA-202	482904.38	1735517.56	140.2	NE <sup>5</sup>	0.2	NR <sup>6</sup>	NR <sup>6</sup>	4.3	0.0	NR <sup>6</sup>	4.5	135.7	4.5	135.7
	BB-BSA-203	482750.75	1735245.03	136.7	NE <sup>5</sup>	0.3	NR <sup>6</sup>	1.7	6.0	6.0	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	14.0	122.7
	BB-BSA-204	482665.46	1735086.35	126.8	NE <sup>5</sup>	0.3	NR <sup>6</sup>	NR <sup>6</sup>	11.7	7.0	NE <sup>5</sup>	NE <sup>5</sup>	NE <sup>5</sup>	19.0	107.8

Notes:

1. Boring locations are shown in Figure 2 - Boring Location Plan of the Preliminary Geotechnical Data Report Addendum 1
2. 200-series Borings were performed by Seaboard Drilling, LLC in December, 2024.
3. Boring logs are presented in Appendix A of the Preliminary Geotechnical Data Report Addendum 1
4. Boring locations marked and recorded using cellular telephone mapping application with an on-site accuracy between 1 and 2 feet. Elevations were extrapolated from site survey data provided on the Boring Location Plan.
5. bgs = below ground surface, NE = not encountered

Prepared by: LDN

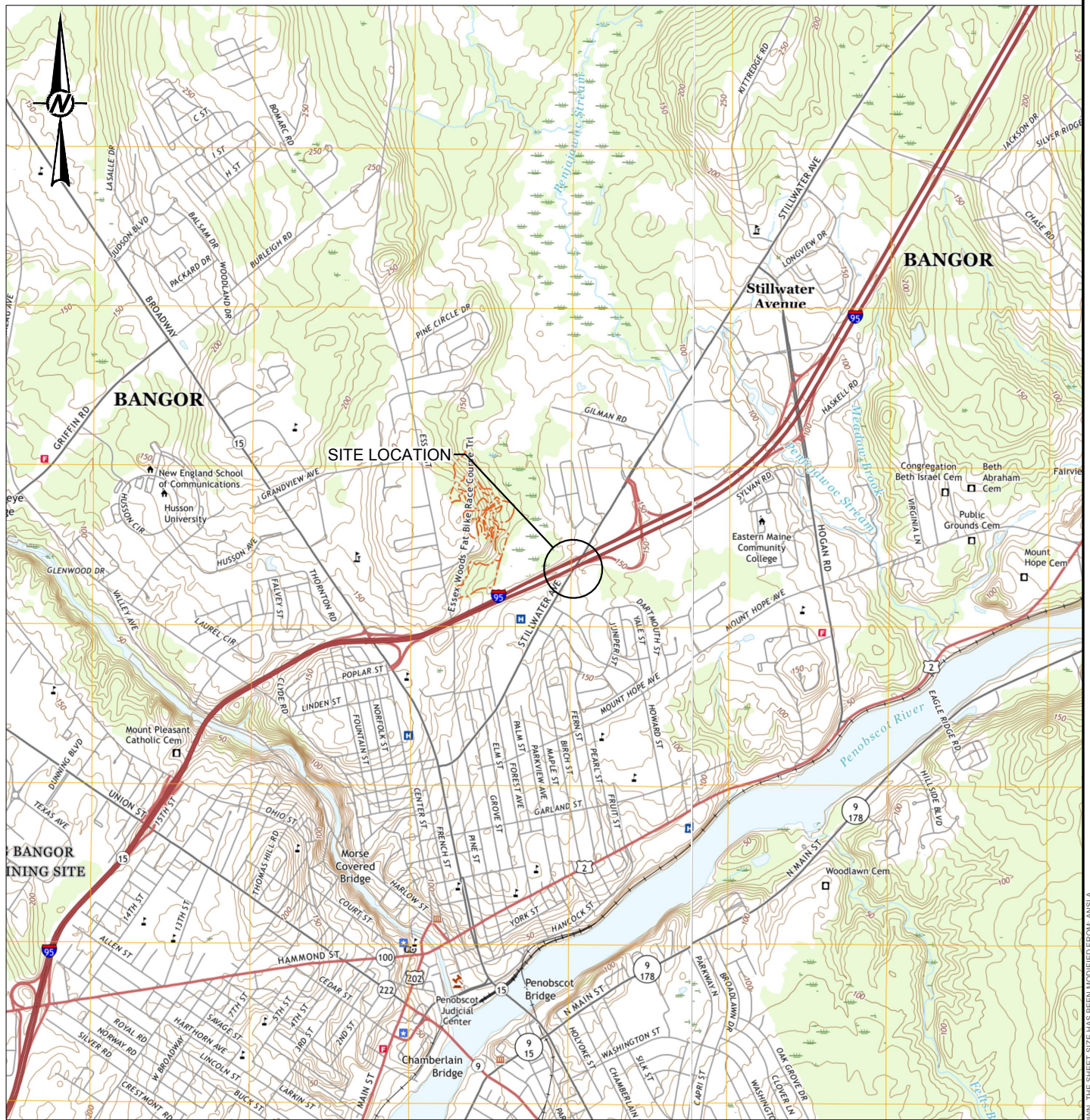
Checked By: DEB

Reviewed By: MEL



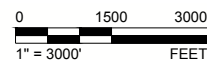
## FIGURES

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Path: \\corp.pbwnet\lucent\central\USAM701004\2024\08\14\001\001.dwg File Name: US0025840.3905 02-001-001.dwg



#### REFERENCE(S)

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



#### CLIENT

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SOUTH PORTLAND, ME 04106

#### CONSULTANT



YYYY-MM-DD 2024-08-14

DESIGNED DEB

PREPARED AM

REVIEWED

APPROVED

#### PROJECT

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

#### TITLE

**SITE LOCATION MAP**

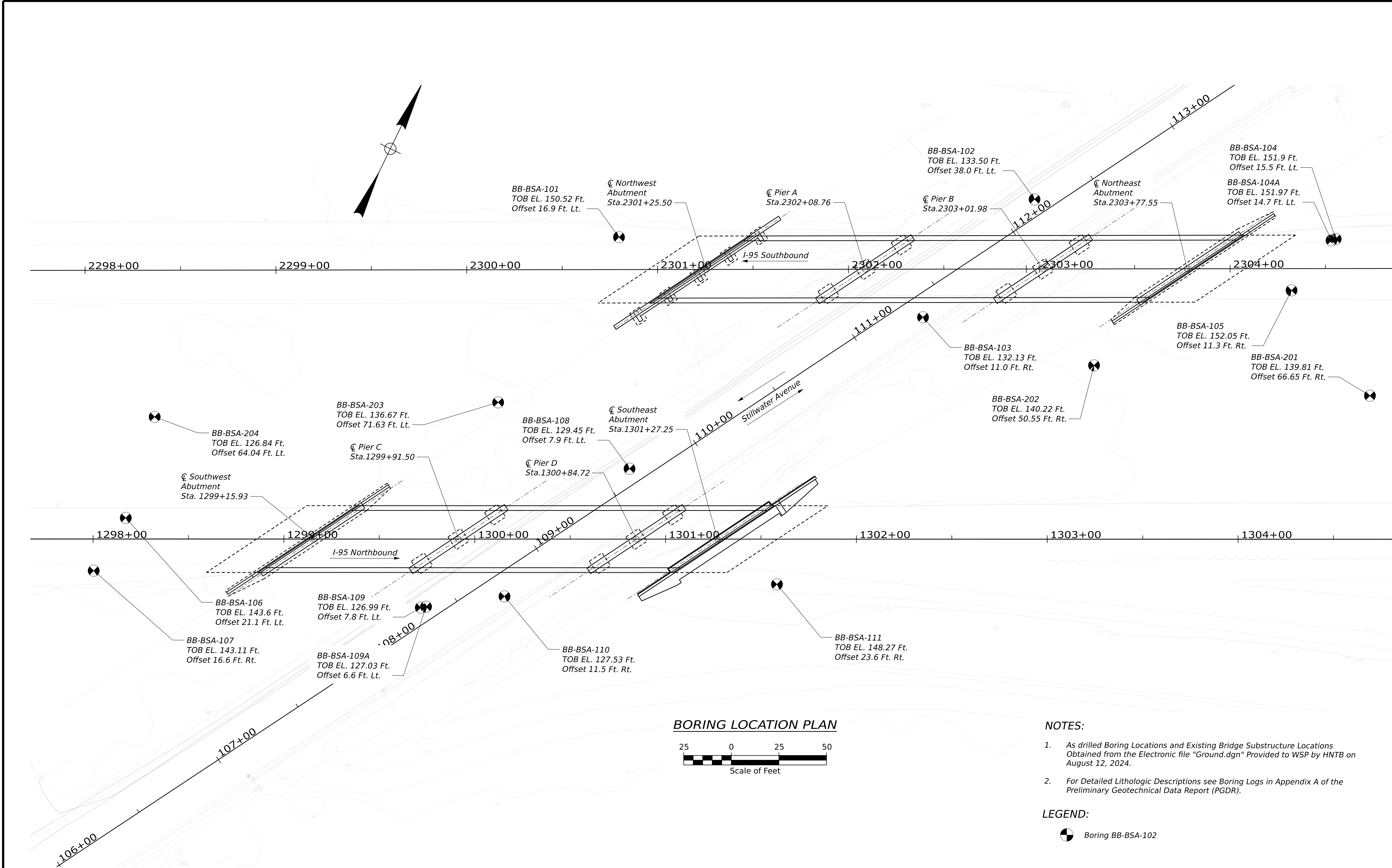
PROJECT NO. US0025840.3905 CONTROL 0001-001

REV. 0

FIGURE 1


IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A





- 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

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

**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				
	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.	some		21 - 35				
			GC	Clayey gravels, gravel-sand-clay mixtures.	adjective (e.g. Sandy, Clayey)		36 - 50				
					TERMS DESCRIBING DENSITY/CONSISTENCY						
					<u>Coarse-grained soils</u> (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).						
					<u>Density of Cohesionless Soils</u>		<u>Standard Penetration Resistance</u> N <sub>60</sub> -Value (blows per foot)				
					Very loose		0 - 4				
					Loose		5 - 10				
					Medium Dense		11 - 30				
					Dense		31 - 50				
					Very Dense		> 50				
					<u>Fine-grained soils</u> (more than half of material is smaller than No. 200 sieve): Includes (1) inorganic and organic silts and clays; (2) Gravelly, Sandy or Silty clays; and (3) Clayey silts. Consistency is rated according to undrained shear strength as indicated.						
					<u>Consistency of Cohesive soils</u>		<u>Approximate Undrained Shear Strength (psf)</u>		<u>Field Guidelines</u>		
					Very Soft		WOH, WOR, WOP, <2		0 - 250		Fist easily penetrates
					Soft		2 - 4		250 - 500		Thumb easily penetrates
					Medium Stiff		5 - 8		500 - 1000		Thumb penetrates with moderate effort
					Stiff		9 - 15		1000 - 2000		Indented by thumb with great effort
					Very Stiff		16 - 30		2000 - 4000		Indented by thumbnail
					Hard		>30		over 4000		Indented by thumbnail with difficulty
					<u>Rock Quality Designation (RQD):</u> RQD (%) = <u>sum of the lengths of intact pieces of core* &gt; 4 inches</u> length of core advance *Minimum NQ rock core (1.88 in. OD of core)						
					<u>Rock Quality Based on RQD</u> <u>Rock Quality</u> Very Poor ≤25 Poor 26 - 50 Fair 51 - 75 Good 76 - 90 Excellent 91 - 100						
					<u>Desired Rock Observations (in this order, if applicable):</u> Color (Munsell color chart) Texture (aphanitic, fine-grained, etc.) Rock Type (granite, schist, sandstone, etc.) Hardness (very hard, hard, mod. hard, etc.) Weathering (fresh, very slight, slight, moderate, mod. severe, severe, etc.) Geologic discontinuities/jointing: -dip (horiz - 0-5 deg., low angle - 5-35 deg., mod. dipping - 35-55 deg., steep - 55-85 deg., vertical - 85-90 deg.) -spacing (very close - <2 inch, close - 2-12 inch, mod. close - 1-3 feet, wide - 3-10 feet, very wide >10 feet) -tightness (tight, open, or healed) -infilling (grain size, color, etc.) Formation (Waterville, Ellsworth, Cape Elizabeth, etc.) RQD and correlation to rock quality (very poor, poor, etc.) ref: ASTM D6032 and FHWA NHI-16-072 GEC 5 - Geotechnical Site Characterization, Table 4-12 Recovery (inch/inch and percentage) Rock Core Rate (X.X ft - Y.Y ft (min:sec))						
<u>Desired Soil Observations (in this order, if applicable):</u> Color (Munsell color chart) Moisture (dry, damp, moist, wet) Density/Consistency (from above right hand side) Texture (fine, medium, coarse, etc.) Name (Sand, Silty Sand, Clay, etc., including portions - trace, little, etc.) Gradation (well-graded, poorly-graded, uniform, etc.) Plasticity (non-plastic, slightly plastic, moderately plastic, highly plastic) Structure (layering, fractures, cracks, etc.) Bonding (well, moderately, loosely, etc., ) Cementation (weak, moderate, or strong) Geologic Origin (till, marine clay, alluvium, etc.) Groundwater level					<u>Sample Container Labeling Requirements:</u> WIN Blow Counts Bridge Name / Town Sample Recovery Boring Number Date Sample Number Personnel Initials Sample Depth						
Maine Department of Transportation Geotechnical Section Key to Soil and Rock Descriptions and Terms Field Identification Information											

<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-201</div> <div>WIN: 027176.00</div>																																																																																																																																			
Driller: Seaboard			Elevation (ft.) 139.81		Auger ID/OD: 2-1/4 in I.D.																																																																																																																																				
Operator: R. Hackett			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: 12/17/24 (8:12); (8:50)			Drilling Method: HSA		Core Barrel:																																																																																																																																				
Boring Location: N: 482953.126, E: 1735654.604			Casing ID/OD:		Water Level*: 0.0' 7:48 AM 12/17/24																																																																																																																																				
Hammer Efficiency Factor: 0.985			Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>																																																																																																																																						
<div>Definitions:</div> <div>D = Split Spoon Sample</div> <div>MD = Unsuccessful Split Spoon Sample Attempt</div> <div>U = Thin Wall Tube Sample</div> <div>MU = Unsuccessful Thin Wall Tube Sample Attempt</div> <div>V = Field Vane Shear Test, PP = Pocket Penetrometer</div> <div>MV = Unsuccessful Field Vane Shear Test Attempt</div> <div>R = Rock Core Sample</div> <div>SSA = Solid Stem Auger</div> <div>HSA = Hollow Stem Auger</div> <div>RC = Roller Cone</div> <div>WOH = Weight of 140lb. Hammer</div> <div>WOR/C = Weight of Rods or Casing</div> <div>T<sub>V</sub> = Pocket Torvane Shear Strength (psf)</div> <div>S<sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf)</div> <div>S<sub>u</sub>(lab) = Lab Vane Undrained Shear Strength (psf)</div> <div>q<sub>p</sub> = Unconfined Compressive Strength (ksf)</div> <div>N-uncorrected = Raw Field SPT N-value</div> <div>Hammer Efficiency Factor = Rig Specific Annual Calibration Value</div> <div>N<sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency</div> <div>N<sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected</div> <div>LI = Liquidity Index</div> <div>WC = Water Content, percent</div> <div>LL = Liquid Limit</div> <div>PL = Plastic Limit</div> <div>PI = Plasticity Index</div> <div>G = Grain Size Analysis</div> <div>C = Consolidation Test</div>																																																																																																																																									
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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-202</div> <div>WIN: 027176.00</div>																																																																																																							
Driller: Seaboard				Elevation (ft.) 140.22				Auger ID/OD: 2-1/4 in I.D.																																																																																																							
Operator: R. Hackett				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: 12/17/24 (7:48); (8:07)				Drilling Method: HSA				Core Barrel:																																																																																																							
Boring Location: N: 482904.381, E: 1735517.562				Casing ID/OD:				Water Level*: 0.0' 8:12 AM 12/17/24																																																																																																							
Hammer Efficiency Factor: 0.985				Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>																																																																																																											
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Maine Department of Transportation Soil/Rock Exploration Log <u>US CUSTOMARY UNITS</u>							<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine						<b>Boring No.:</b> BB-BSA-203 <b>WIN:</b> 027176.00																																																																																																																																													
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<b>Date Start/Finish:</b> 12/16/24 (10:30); (11:25)							<b>Drilling Method:</b> SSA							<b>Core Barrel:</b>																																																																																																																																												
<b>Boring Location:</b> N: 482750.753, E: 1735245.028							<b>Casing ID/OD:</b>							<b>Water Level*</b> : 11.1' 11:05 AM 12/16/24																																																																																																																																												
<b>Hammer Efficiency Factor:</b> 0.985							<b>Hammer Type:</b> Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/>							Rope & Cathead <input type="checkbox"/>																																																																																																																																												
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<b>Remarks:</b> 1. Hammer Efficiency factor provided by Seaboard and taken from "2024PA00175 - Seaboard - SPT Report" by GRL Engineers Inc., dated 10/23/2024 2. As-drilled boring locations were marked by WSP with an accuracy of 1 to 2 feet and as-drilled ground surface elevations were obtained from electronic file "Ground.dgn" recieved from HNTB on August 12, 2024. 3. Water level reading taken on 12/16/24 at 11:05 and was taken after drilling was completed.																																																																																																																																																										
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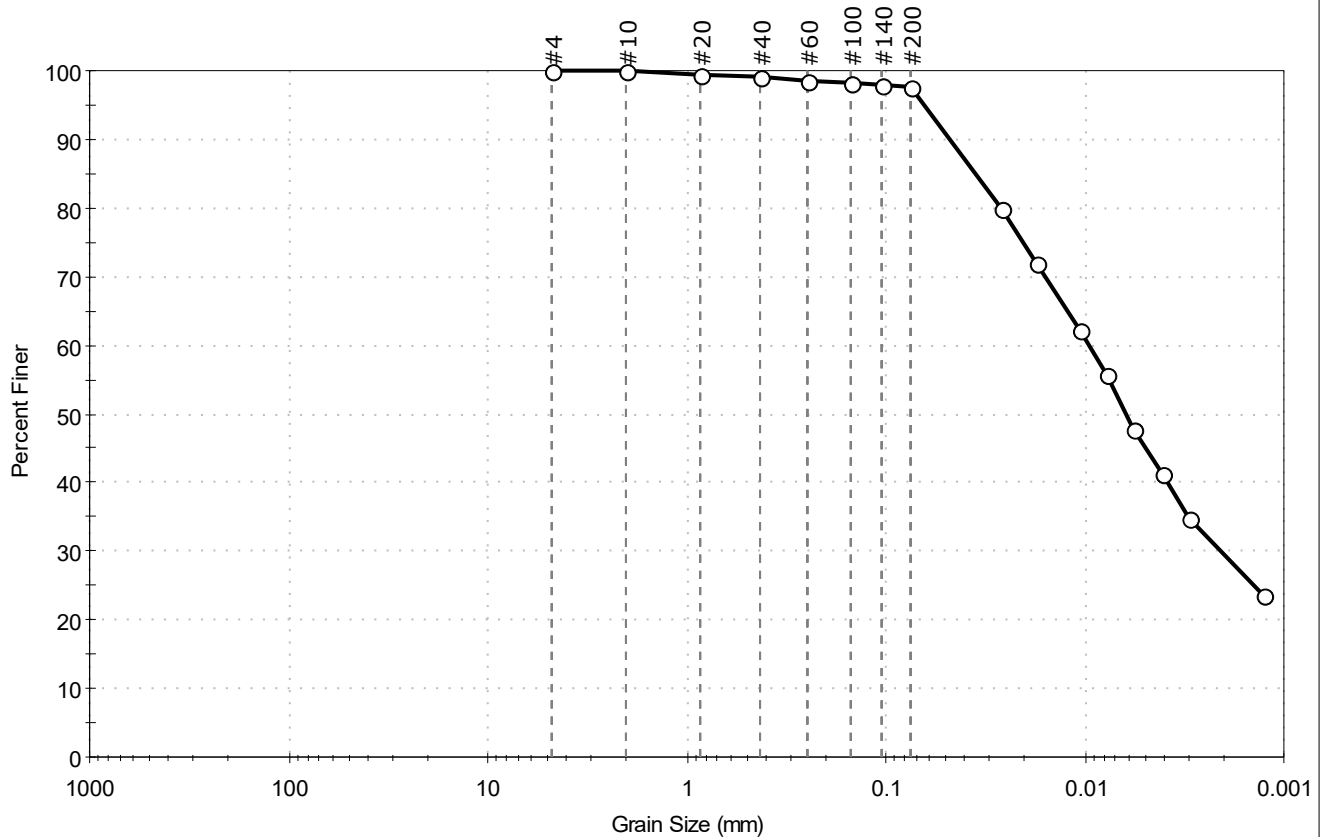
<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> MaineDOT I-95 Bridges Over Stillwater Avenue <b>Location:</b> Bangor, Maine				<b>Boring No.:</b> BB-BSA-204 <b>WIN:</b> 027176.00																																																																																																																																																			
<b>Driller:</b> Seaboard				<b>Elevation (ft.):</b> 126.8				<b>Auger ID/OD:</b> 4-1/2 in O.D.																																																																																																																																																			
<b>Operator:</b> R. Hackett				<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> 12/16/24 (7:53); (9:45)				<b>Drilling Method:</b> SSA, Driven casing and washed methods				<b>Core Barrel:</b>																																																																																																																																																			
<b>Boring Location:</b> N: 482665.455, E: 1735086.352				<b>Casing ID/OD:</b>				<b>Water Level*:</b> 4.2' 9:35 AM 12/16/24																																																																																																																																																			
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15	8D	24/12	15.00 - 17.00	8-13-13-20	26	43				7D: Grey, wet, dense, fine to medium Silty SAND, with fine rounded gravel [GLACIAL TILL]. 8D: Grey with brown, wet, dense, fine to medium Silty SAND, with fine rounded gravel [GLACIAL TILL]. 9D: Grey with brown, wet, dense, fine to medium Silty SAND, with fine rounded gravel [GLACIAL TILL].																																																																																																																																																	
	9D	24/5	17.00 - 19.00	19-20-13-18	33	54																																																																																																																																																					
20										Bottom of Exploration at 19.0 feet below ground surface. Boring backfilled with drill cuttings to surface.																																																																																																																																																	
25																																																																																																																																																											
<b>Remarks:</b> 1. Hammer Efficiency factor provided by Seaboard and taken from "2024PA00175 - Seaboard - SPT Report" by GRL Engineers Inc., dated 10/23/2024 2. As-drilled boring locations were marked by WSP with an accuracy of 1 to 2 feet and as-drilled ground surface elevations were obtained from electronic file "Ground.dgn" recieved from HNTB on August 12, 2024. 3. Water level reading taken on 12/16/24 at 09:35 and was taken after drilling was completed.																																																																																																																																																											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.										Page 1 of 1																																																																																																																																																	
* 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-204																																																																																																																																																	

**APPENDIX B**

# Laboratory Testing Results

Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-201	Sample Type: Jar	Tested By: ajl
Sample ID: 2D (S-2)	Test Date: 01/03/25	Checked By: jsc
Depth: 2-4'	Test Id: 797951	
Test Comment: ---		
Visual Description: Moist, grayish brown clay		
Sample Comment: ---		

## Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	2.4	97.6

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	98		
#140	0.11	98		
#200	0.075	98		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0266	80		
---	0.0175	72		
---	0.0106	62		
---	0.0077	56		
---	0.0057	48		
---	0.0041	41		
---	0.0030	35		
---	0.0013	23		

### Coefficients

$D_{85} = 0.0357$  mm       $D_{30} = 0.0021$  mm  
 $D_{60} = 0.0095$  mm       $D_{15} = \text{N/A}$   
 $D_{50} = 0.0062$  mm       $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

**ASTM**      Lean CLAY (CL)

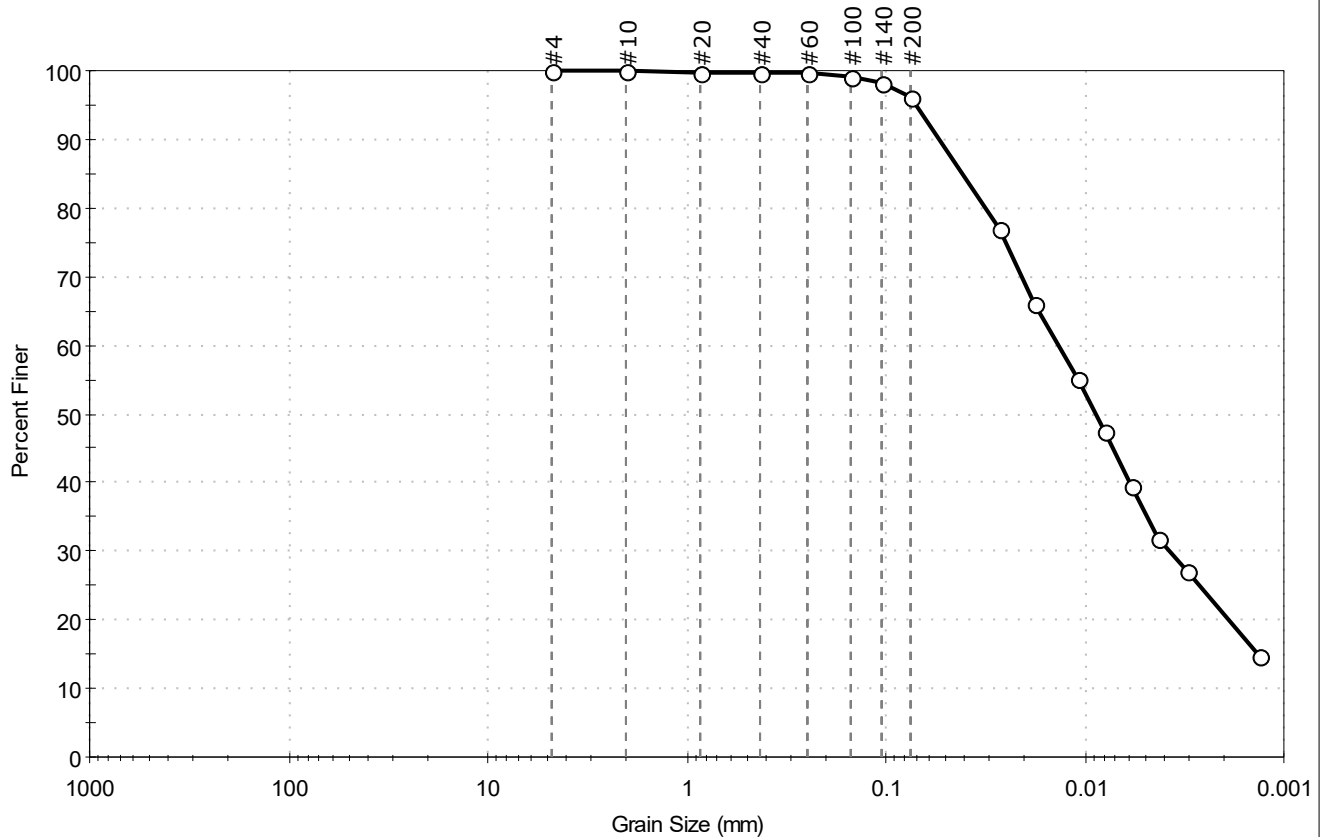
**AASHTO**      Clayey Soils (A-6 (17))

### 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-201	Sample Type: Jar	Tested By: ajl
Sample ID: 4D (S-4)	Test Date: 01/03/25	Checked By: jsc
Depth: 6-8'	Test Id: 797952	
Test Comment: ---		
Visual Description: Moist, grayish brown clay		
Sample Comment: ---		

## Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	3.7	96.3

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	98		
#200	0.075	96		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0267	77		
---	0.0178	66		
---	0.0109	55		
---	0.0080	47		
---	0.0058	40		
---	0.0043	32		
---	0.0031	27		
---	0.0013	15		

### Coefficients

$D_{85} = 0.0412$  mm       $D_{30} = 0.0037$  mm  
 $D_{60} = 0.0135$  mm       $D_{15} = 0.0013$  mm  
 $D_{50} = 0.0088$  mm       $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM Lean CLAY (CL)

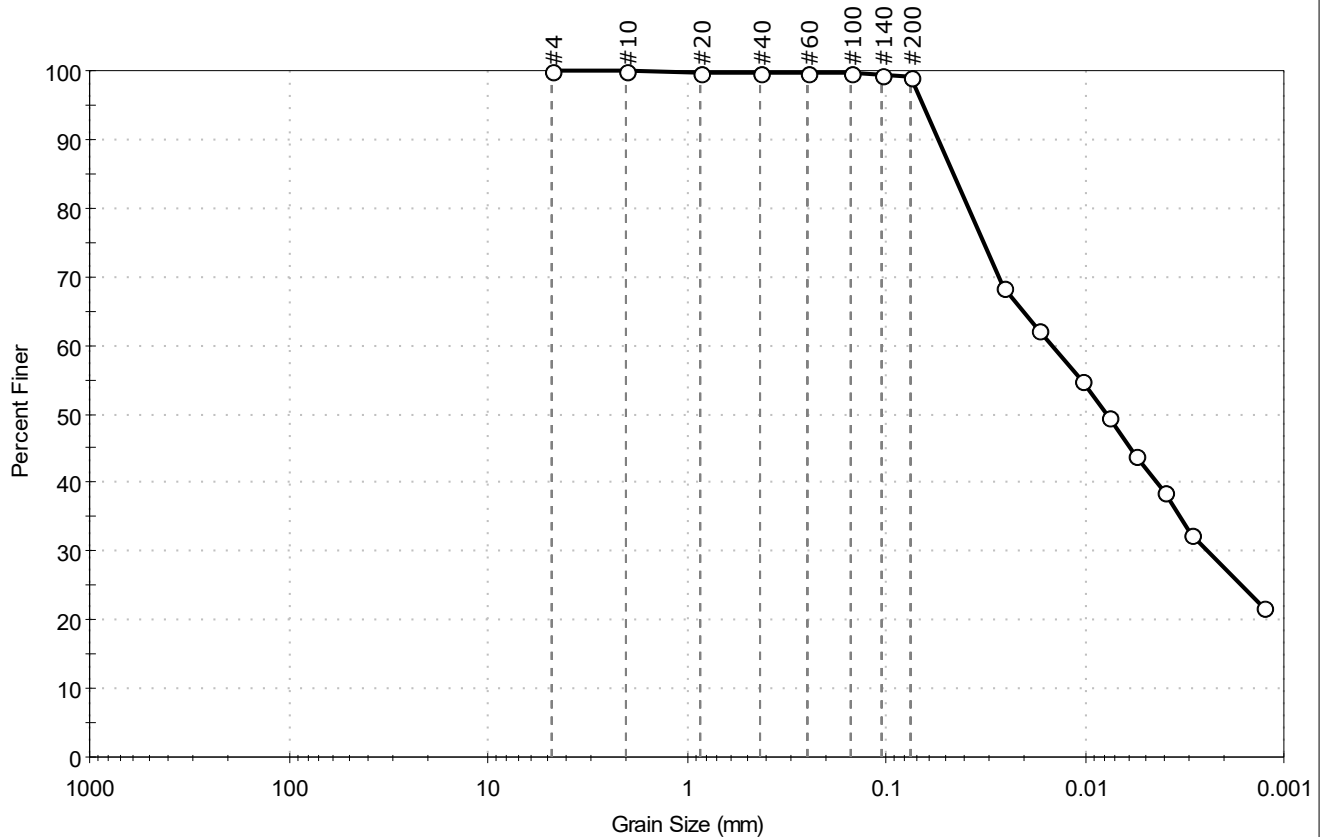
AASHTO Clayey Soils (A-6 (13))

### 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-202	Sample Type: Jar	Tested By: ajl
Sample ID: 1D (S-1)	Test Date: 01/03/25	Checked By: jsc
Depth: 0-2'	Test Id: 797950	
Test Comment: ---		
Visual Description: Moist, grayish brown clay		
Sample Comment: ---		

## Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	0.8	99.2

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
---	0.0258	68		
---	0.0171	62		
---	0.0104	55		
---	0.0076	50		
---	0.0055	44		
---	0.0040	39		
---	0.0029	33		
---	0.0013	22		

### Coefficients

D<sub>85</sub> = 0.0458 mm      D<sub>30</sub> = 0.0024 mm  
 D<sub>60</sub> = 0.0146 mm      D<sub>15</sub> = N/A  
 D<sub>50</sub> = 0.0078 mm      D<sub>10</sub> = N/A  
 C<sub>u</sub> = N/A                  C<sub>c</sub> = N/A

### Classification

ASTM      Lean CLAY (CL)

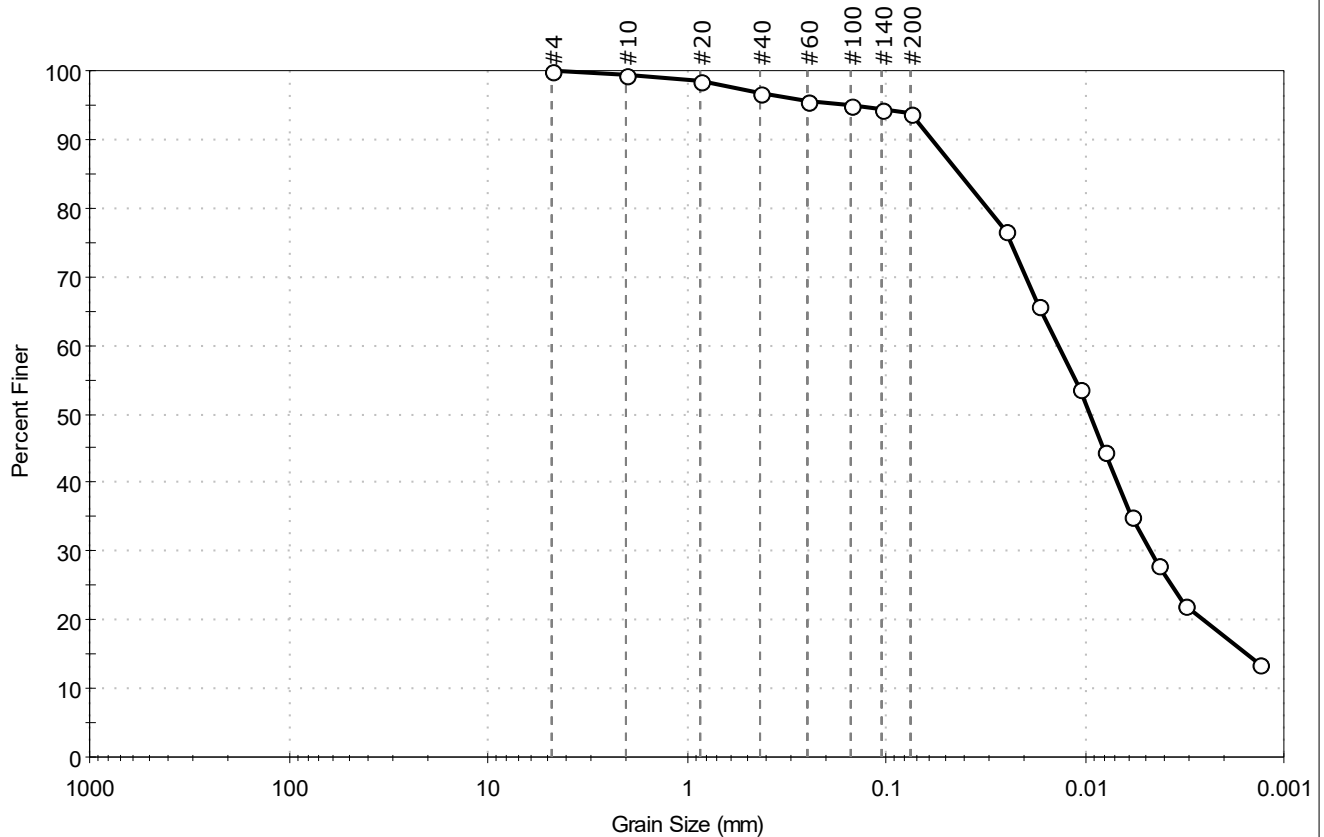
AASHTO      Clayey Soils (A-6 (18))

### 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-203	Sample Type: Jar	Tested By: ajl
Sample ID: 2D (S-2)	Test Date: 01/03/25	Checked By: jsc
Depth: 2-4'	Test Id: 797948	
Test Comment: ---		
Visual Description: Moist, grayish brown clay		
Sample Comment: ---		

## Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	6.1	93.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	98		
#40	0.42	97		
#60	0.25	96		
#100	0.15	95		
#140	0.11	94		
#200	0.075	94		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0251	77		
---	0.0171	66		
---	0.0107	54		
---	0.0079	44		
---	0.0059	35		
---	0.0043	28		
---	0.0031	22		
---	0.0013	14		

### Coefficients

D<sub>85</sub> = 0.0427 mm      D<sub>30</sub> = 0.0047 mm  
 D<sub>60</sub> = 0.0136 mm      D<sub>15</sub> = 0.0015 mm  
 D<sub>50</sub> = 0.0095 mm      D<sub>10</sub> = N/A  
 C<sub>u</sub> = N/A                  C<sub>c</sub> = N/A

### Classification

ASTM      Lean CLAY (CL)

AASHTO      Clayey Soils (A-6 (14))

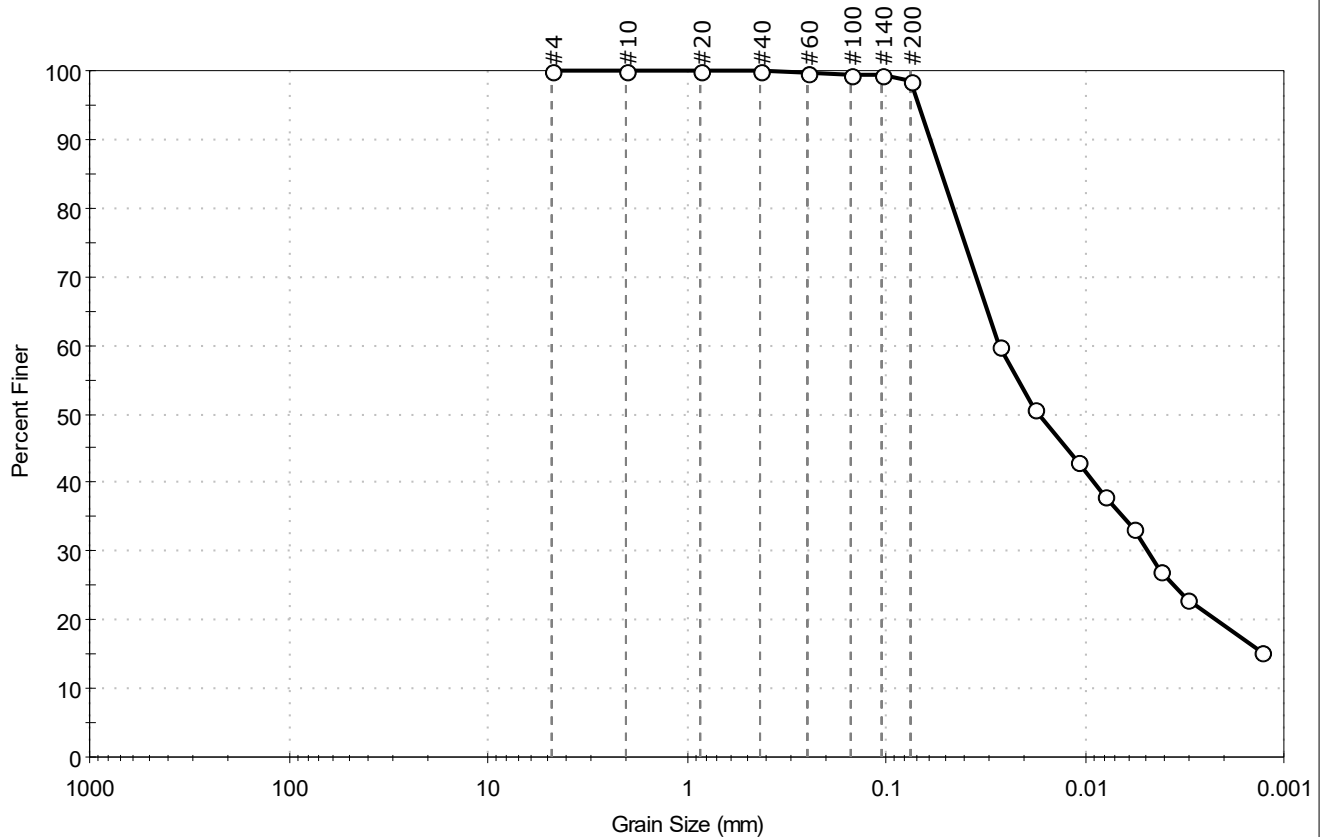
### Sample/Test Description

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-203	Sample Type: Jar	Tested By: ajl
Sample ID: 3D (S-3)	Test Date: 01/03/25	Checked By: jsc
Depth: 4-6'	Test Id: 797949	
Test Comment: ---		
Visual Description: Moist, olive clay		
Sample Comment: ---		

## Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	1.6	98.4

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	99		
#140	0.11	99		
#200	0.075	98		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0267	60		
---	0.0179	51		
---	0.0109	43		
---	0.0079	38		
---	0.0058	33		
---	0.0042	27		
---	0.0030	23		
---	0.0013	15		

### Coefficients

$D_{85} = 0.0523$  mm       $D_{30} = 0.0048$  mm  
 $D_{60} = 0.0268$  mm       $D_{15} = \text{N/A}$   
 $D_{50} = 0.0170$  mm       $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM Lean CLAY (CL)

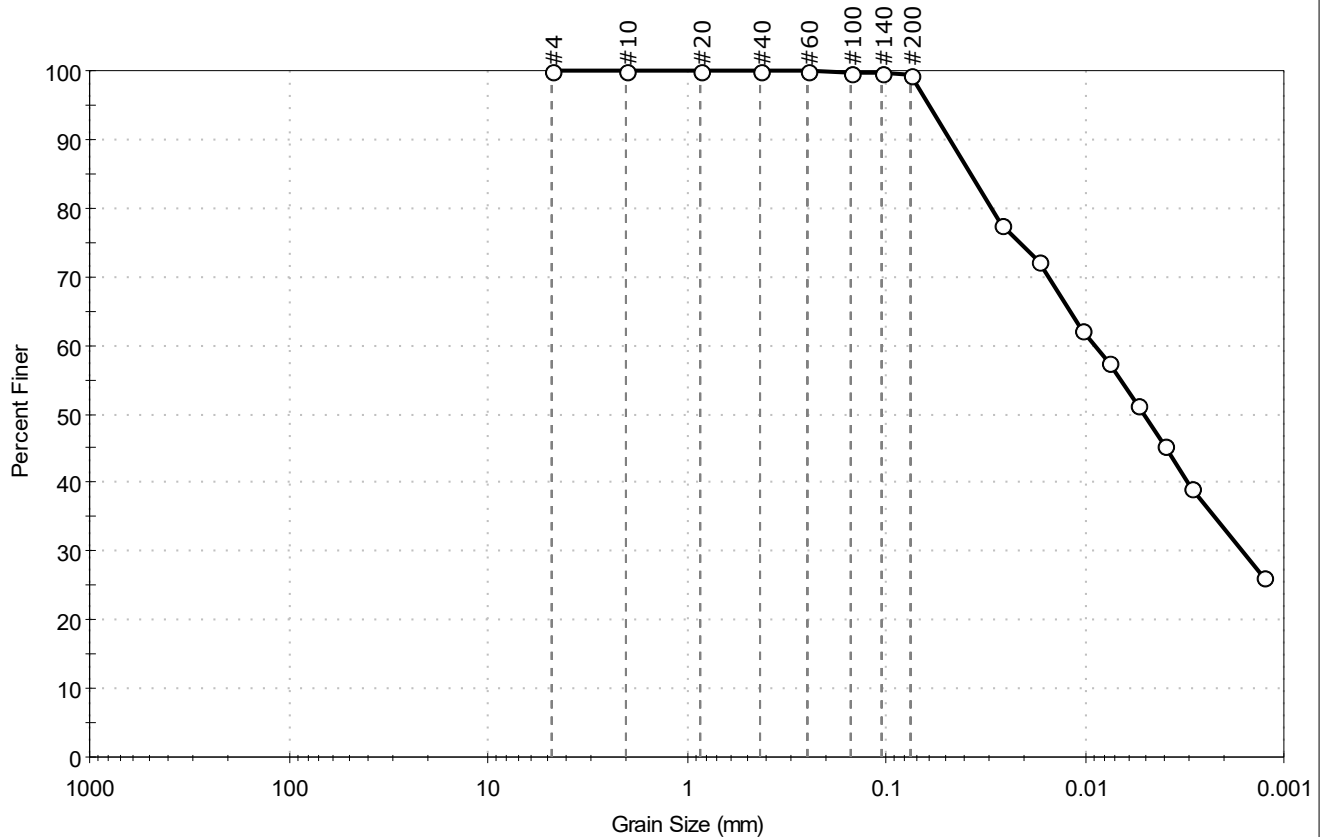
AASHTO Clayey Soils (A-6 (17))

### 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-204	Sample Type: Jar	Tested By: ajl
Sample ID: 4D (S-4)	Test Date: 01/03/25	Checked By: jsc
Depth: 6-8'	Test Id: 797946	
Test Comment: ---		
Visual Description: Moist, olive gray clay		
Sample Comment: ---		

## Particle Size Analysis - ASTM D6913/D7928



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

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#140	0.11	100		
#200	0.075	99		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0264	78		
---	0.0171	72		
---	0.0104	62		
---	0.0075	58		
---	0.0055	51		
---	0.0040	45		
---	0.0029	39		
---	0.0013	26		

### Coefficients

$D_{85} = 0.0377$  mm       $D_{30} = 0.0016$  mm  
 $D_{60} = 0.0089$  mm       $D_{15} = \text{N/A}$   
 $D_{50} = 0.0051$  mm       $D_{10} = \text{N/A}$   
 $C_u = \text{N/A}$        $C_c = \text{N/A}$

### Classification

ASTM Lean CLAY (CL)

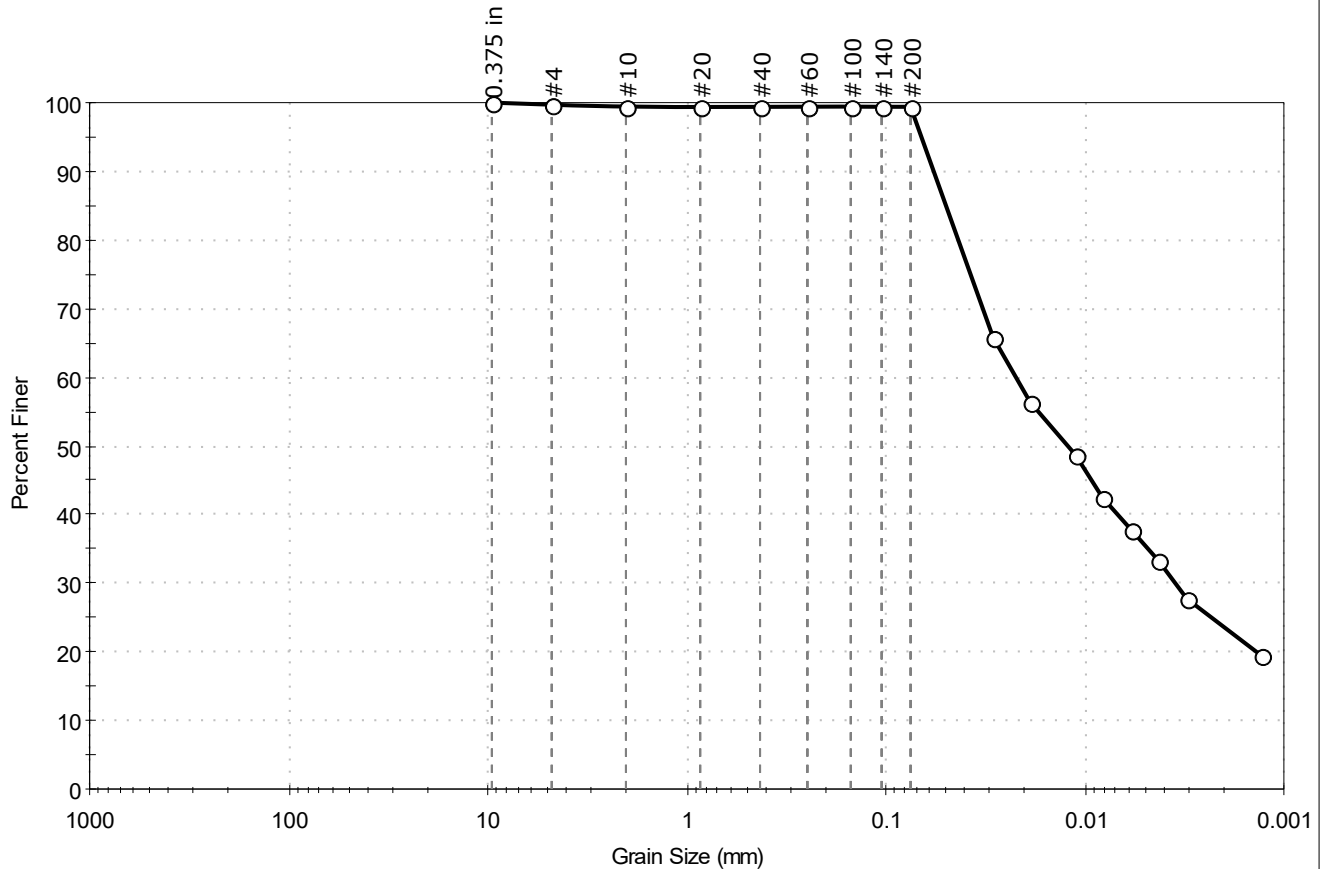
AASHTO Clayey Soils (A-6 (14))

### 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-204	Sample Type: Jar	Tested By: ajl
Sample ID: 6D (S-6)	Test Date: 01/03/25	Checked By: jsc
Depth: 10-12'	Test Id: 797947	
Test Comment: ---		
Visual Description: Moist, dark greenish gray clay		
Sample Comment: ---		

## Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.4	0.3	99.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#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
---	0.0289	66		
---	0.0187	56		
---	0.0112	49		
---	0.0082	43		
---	0.0059	38		
---	0.0042	33		
---	0.0031	28		
---	0.0013	19		

### Coefficients

D<sub>85</sub> = 0.0500 mm      D<sub>30</sub> = 0.0035 mm  
 D<sub>60</sub> = 0.0222 mm      D<sub>15</sub> = N/A  
 D<sub>50</sub> = 0.0122 mm      D<sub>10</sub> = N/A  
 C<sub>u</sub> = N/A                  C<sub>c</sub> = N/A

### Classification

ASTM      Lean CLAY (CL)

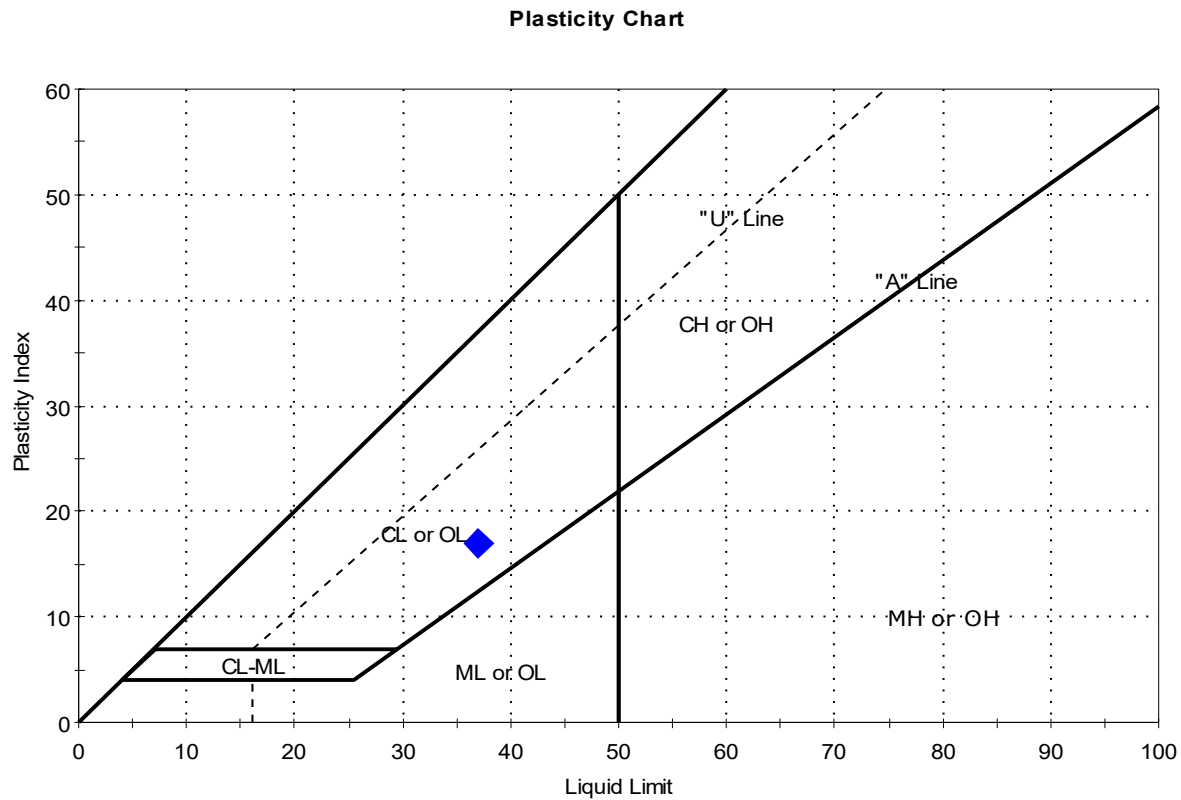
AASHTO      Clayey Soils (A-6 (15))

### 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-201	Sample Type: Jar	Tested By: cam
Sample ID: 2D (S-2)	Test Date: 01/06/25	Checked By: jsc
Depth: 2-4'	Test Id: 797940	
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
◆	2D (S-2)	B-BSA-20	2-4'	26	37	20	17	0.4	Lean CLAY (CL)

Sample Prepared using the WET method

1% Retained on #40 Sieve

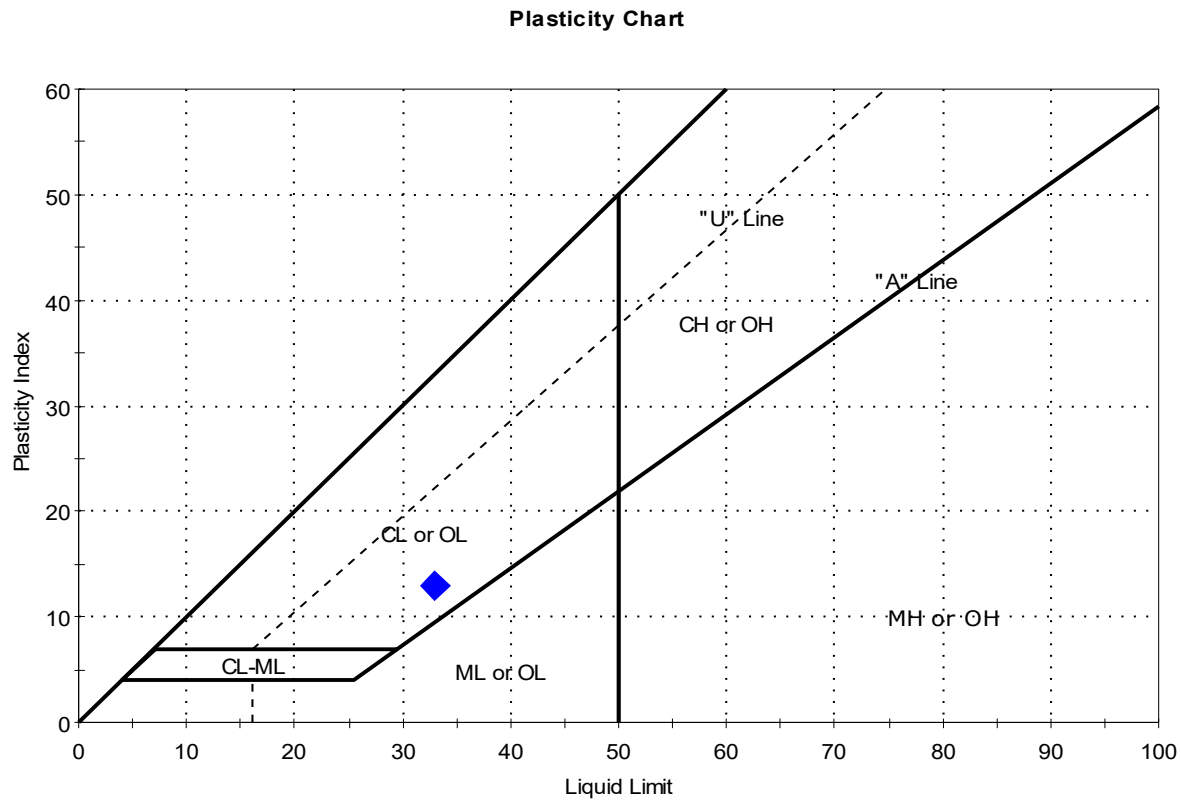
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	WSP USA, Inc.				
Project:	MaineDOT I-95 Bridge over Stillwater				
Location:	Merrimack, NH			Project No:	GTX-319180
Boring ID:	BB-BSA-201	Sample Type:	Jar	Tested By:	cam
Sample ID:	4D (S-4)	Test Date:	01/03/25	Checked By:	jsc
Depth :	6-8'	Test Id:	797941		
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
◆	4D (S-4)	B-BSA-20	6-8'	25	33	20	13	0.4	Lean CLAY (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

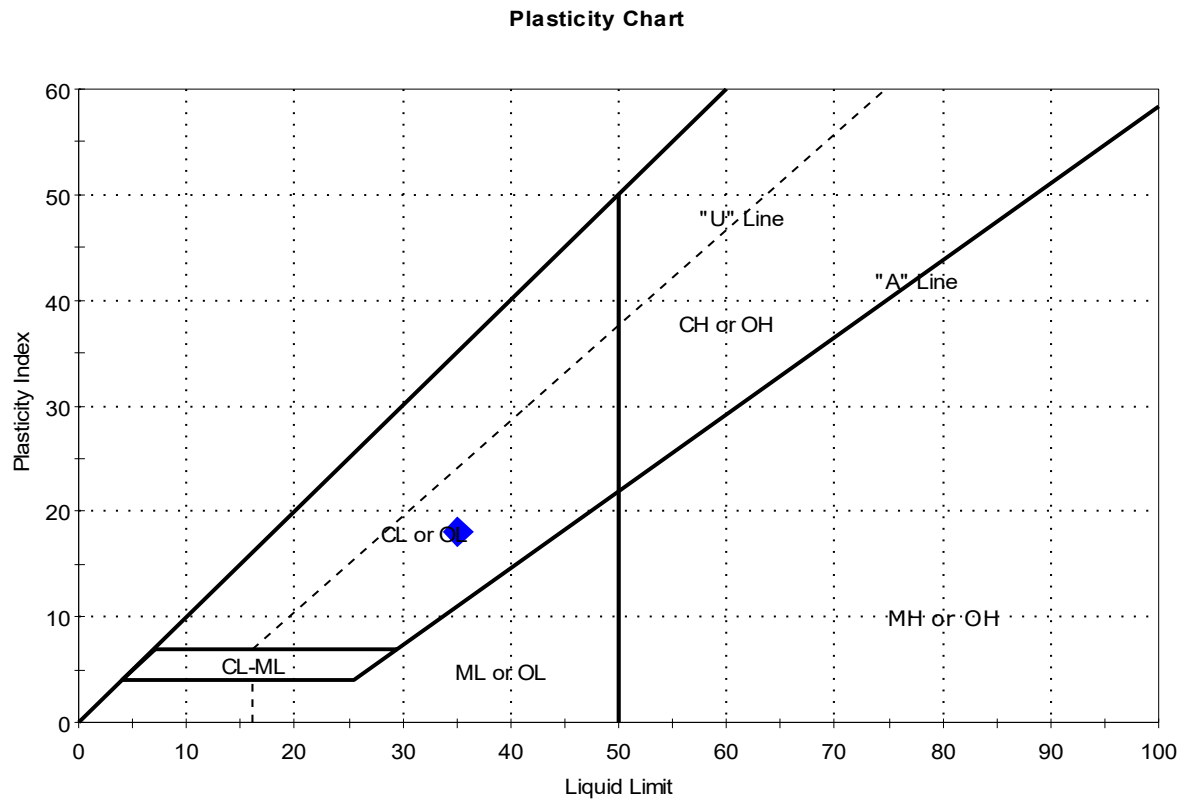
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	WSP USA, Inc.	Project No:	GTX-319180
Project:	MaineDOT I-95 Bridge over Stillwater		
Location:	Merrimack, NH		
Boring ID:	BB-BSA-202	Sample Type:	Jar
Sample ID:	1D (S-1)	Test Date:	01/03/25
Depth :	0-2'	Test Id:	797939
Test Comment:	---	Tested By:	cam
Visual Description:	Moist, grayish brown clay	Checked By:	jsc
Sample Comment:	---		

## Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	1D (S-1)	B-BSA-20	0-2'	23	35	17	18	0.3	Lean CLAY (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

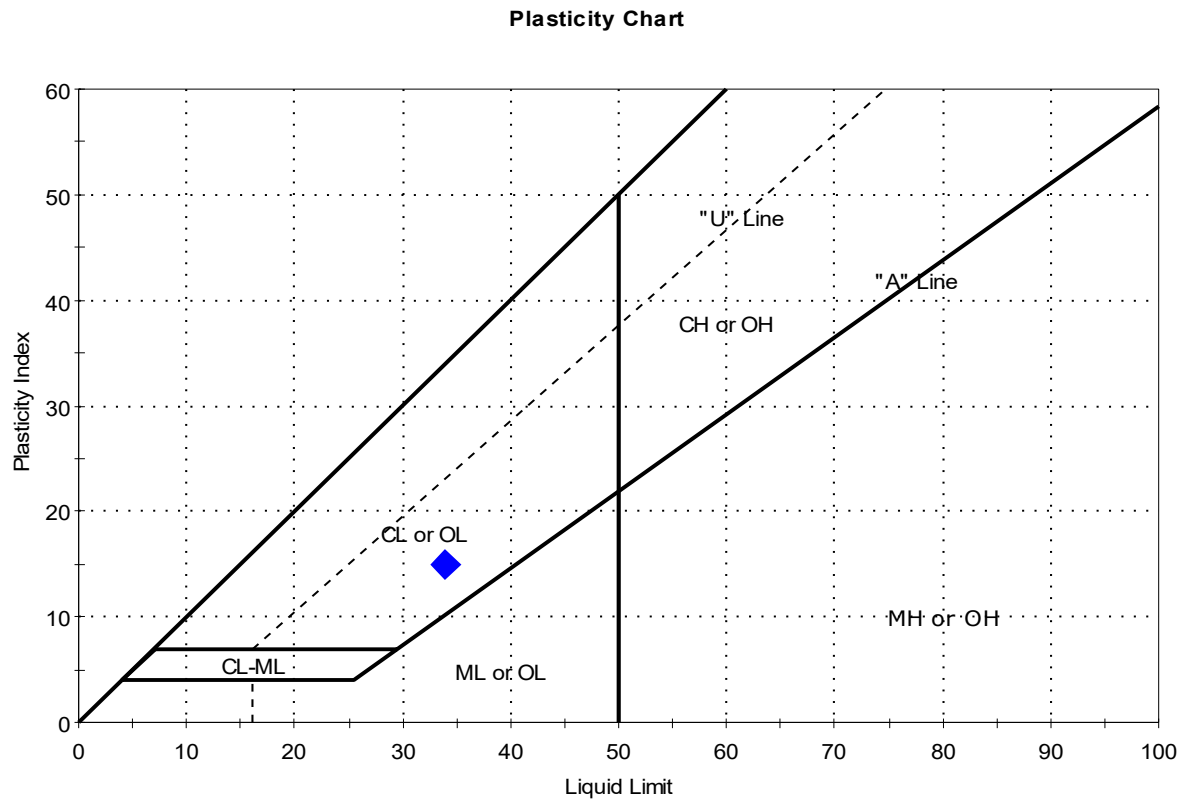
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	WSP USA, Inc.			
Project:	MaineDOT I-95 Bridge over Stillwater			
Location:	Merrimack, NH	Project No:	GTX-319180	
Boring ID:	BB-BSA-203	Sample Type:	Jar	Tested By: cam
Sample ID:	2D (S-2)	Test Date:	01/03/25	Checked By: jsc
Depth :	2-4'	Test Id:	797937	
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
◆	2D (S-2)	B-BSA-20	2-4'	15	34	19	15	-0.3	Lean CLAY (CL)

Sample Prepared using the WET method

3% Retained on #40 Sieve

Dry Strength: VERY HIGH

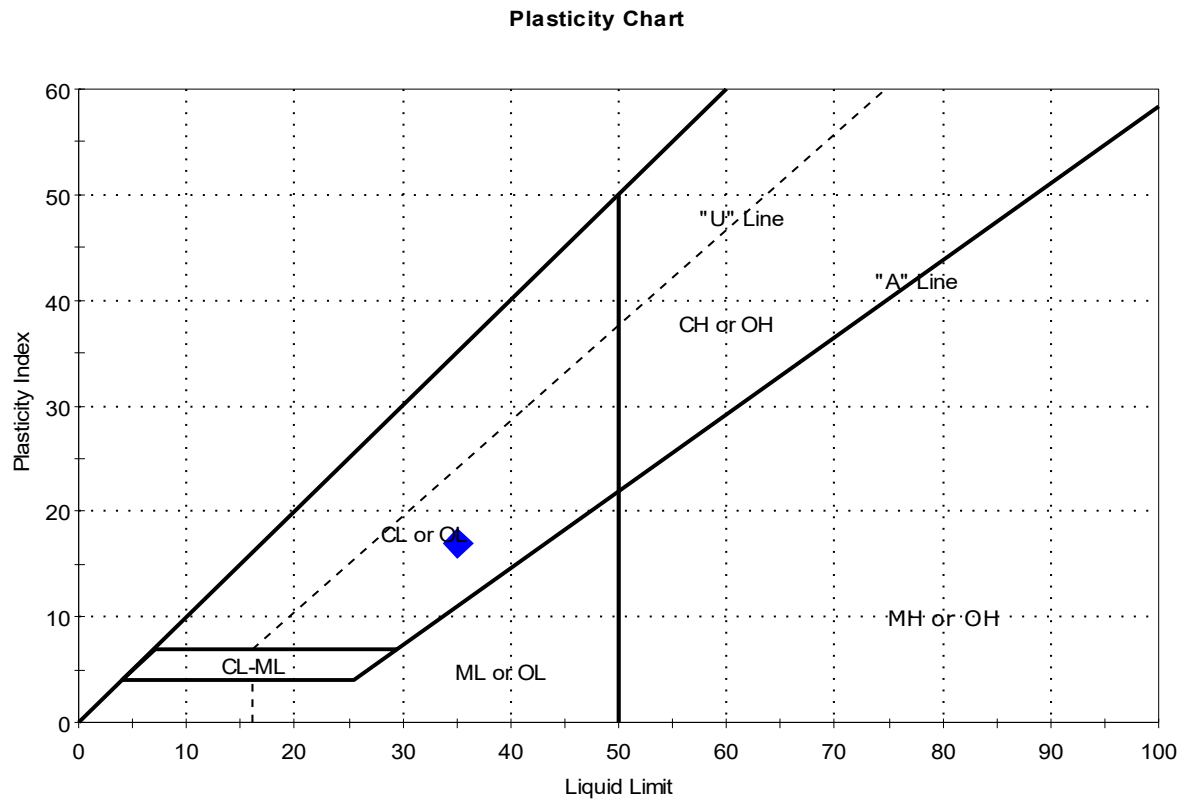
Dilatancy: SLOW

Toughness: LOW



Client: WSP USA, Inc.	Project No: GTX-319180	
Project: MaineDOT I-95 Bridge over Stillwater		
Location: Merrimack, NH		
Boring ID: BB-BSA-203	Sample Type: Jar	Tested By: cam
Sample ID: 3D (S-3)	Test Date: 01/03/25	Checked By: jsc
Depth: 4-6'	Test Id: 797938	
Test Comment: ---		
Visual Description: Moist, olive 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
◆	3D (S-3)	B-BSA-20	4-6'	22	35	18	17	0.3	Lean CLAY (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

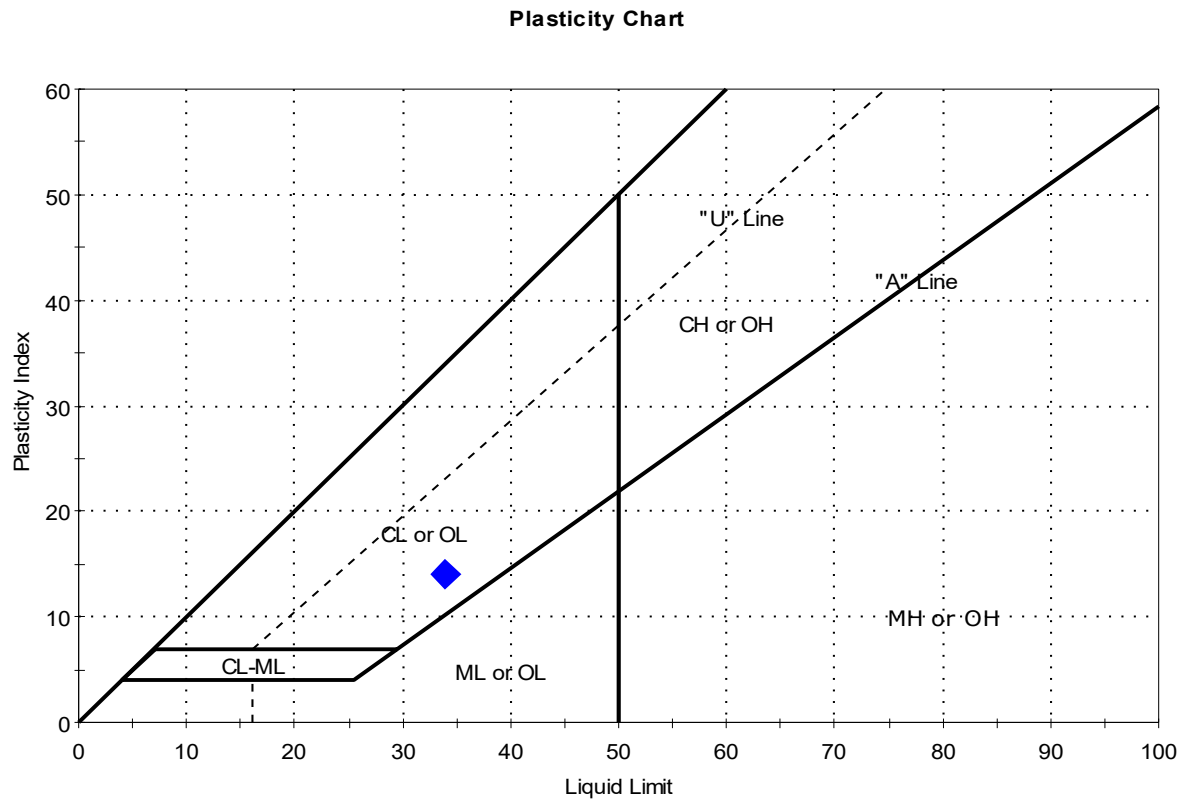
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	WSP USA, Inc.		
Project:	MaineDOT I-95 Bridge over Stillwater		
Location:	Merrimack, NH	Project No:	GTX-319180
Boring ID:	BB-BSA-204	Sample Type:	Jar
Sample ID:	4D (S-4)	Test Date:	01/06/25
Depth :	6-8'	Test Id:	797935
Test Comment:	---		
Visual Description:	Moist, olive 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
◆	4D (S-4)	B-BSA-20	6-8'	27	34	20	14	0.5	Lean CLAY (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

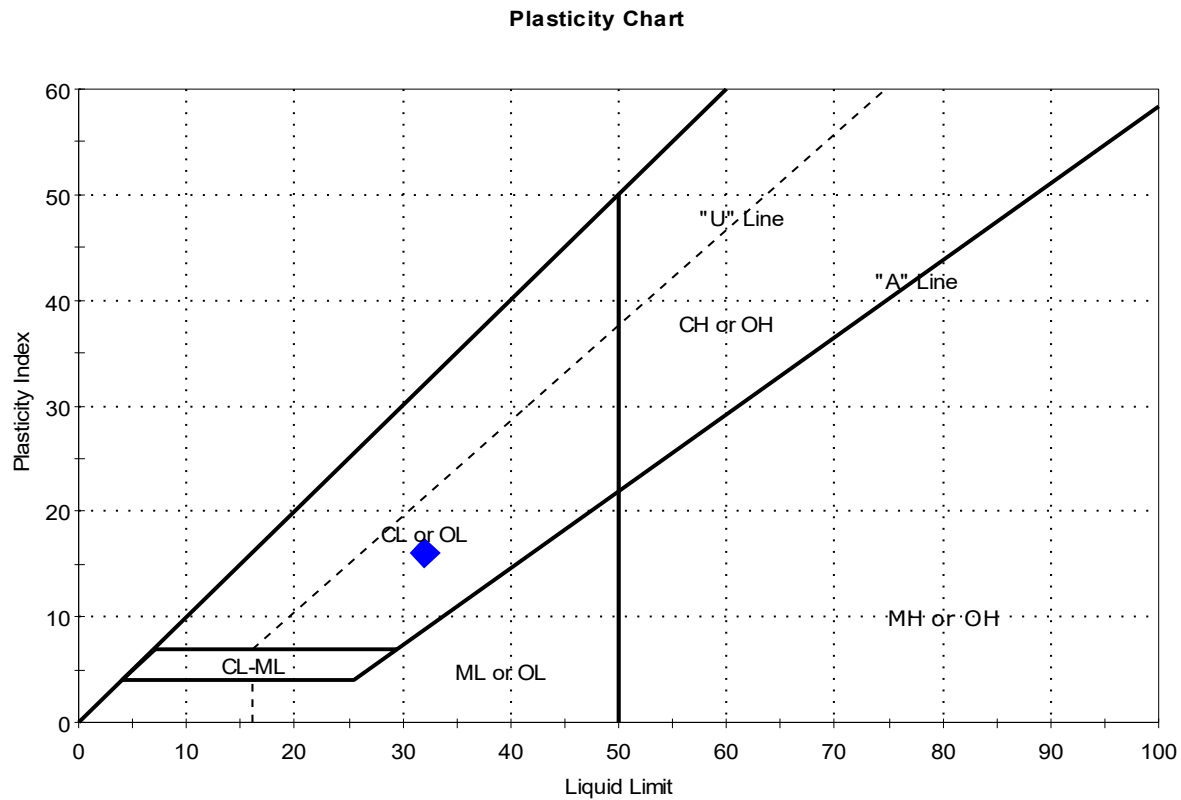
Dry Strength: VERY HIGH

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-204	Sample Type: Jar	Tested By: cam
Sample ID: 6D (S-6)	Test Date: 01/03/25	Checked By: jsc
Depth: 10-12'	Test Id: 797936	
Test Comment: ---		
Visual Description: Moist, dark greenish 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
◆	6D (S-6)	B-BSA-20	10-12'	25	32	16	16	0.6	Lean CLAY (CL)

Sample Prepared using the WET method

1% Retained on #40 Sieve

Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

