

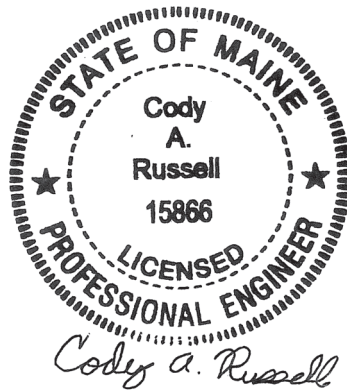
**MAINE DEPARTMENT OF TRANSPORTATION
HIGHWAY PROGRAM
GEOTECHNICAL SECTION
AUGUSTA, MAINE**

GEOTECHNICAL DATA REPORT

For the Rehabilitation of:

**LARGE CULVERT #46462
ROUTE 17
UNION, MAINE**

Prepared by:
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Reviewed by:
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Senior Geotechnical Engineer

Knox County
WIN 24237.00

Soils Report 2022-02
Federal Project No. 2423700

February 16, 2022

INTRODUCTION

The purpose of this Geotechnical Data Report is to document subsurface information collected for the proposed rehabilitation of a 90-inch rise, 84-inch span multiplate pipe culvert (Large Culvert #46462). This report presents the results of a limited geotechnical investigation performed at the existing culvert and the results of a limited laboratory testing program conducted on soil samples recovered during the geotechnical investigation. Large Culvert #46462 is located on Route 17, approximately 0.06 of a mile east of Town House Road, as shown in the attached Location Map. Route 17 is a Highway Corridor Priority 2 road.

SUBSURFACE INVESTIGATION

Subsurface conditions were explored by drilling two (2) test borings (HB-UNI-101 and HB-UNI-104) and two (2) probes (HB-UNI-102 AND HB-UNI-103) at the corners of the existing structure by the MaineDOT drill crew. Exploration locations are presented in the attached Boring Location Plan. The details and sampling methods used, field data obtained, soil conditions encountered, and exploration locations are presented in the attached Boring Logs.

An NETTCP certified Subsurface Inspector logged the subsurface conditions encountered. The MaineDOT geotechnical engineer selected the boring and probe locations and drilling methods, designated type and depth of sampling techniques, reviewed boring and probe logs and identified field and laboratory testing requirements. The borings and probes were located in the field using taped measurements at the completion of the drilling program.

LABORATORY TESTING

A laboratory testing program was conducted on the soil samples recovered from the test boring to assist in soil classification and geologic assessment of the project site. Laboratory testing consisted of six (6) standard grain size analyses with natural water content and one (1) standard grain size analysis with natural water content and hydrometer analysis. The results of soil tests are included in the attached Laboratory Testing Summary Sheet and Grain Size Distribution Curves. Moisture content information and other soil test results are also provided in the attached Boring Logs.

CLOSURE

This Geotechnical Data Report has been prepared to document the geotechnical work conducted at Large Culvert #46462 on Route 17 in Union, Maine in accordance with generally accepted geotechnical and foundation engineering practices. No other intended use or warranty is expressed or implied.

MaineDOT conducted a limited number of soil explorations at discrete locations at the culvert and a limited number of laboratory tests. No interpretations or conclusions have been derived from this geotechnical information. MaineDOT shall not be responsible for the Bidder's or Contractor's interpretations, estimates, or conclusions derived from the geotechnical

information. Data provided may not be representative of the subsurface conditions between exploration locations.

In the event that any changes in the nature, design, or location of the proposed project are planned, this report should be reviewed by a geotechnical engineer to assess the appropriateness of the information presented and to modify the information as appropriate to reflect the changes in design. The information presented is based in part upon a limited subsurface investigation at discrete exploratory locations completed at the site. If variations from the conditions encountered during the investigation appear evident during construction, it may also become necessary to re-evaluate the information presented in this report.

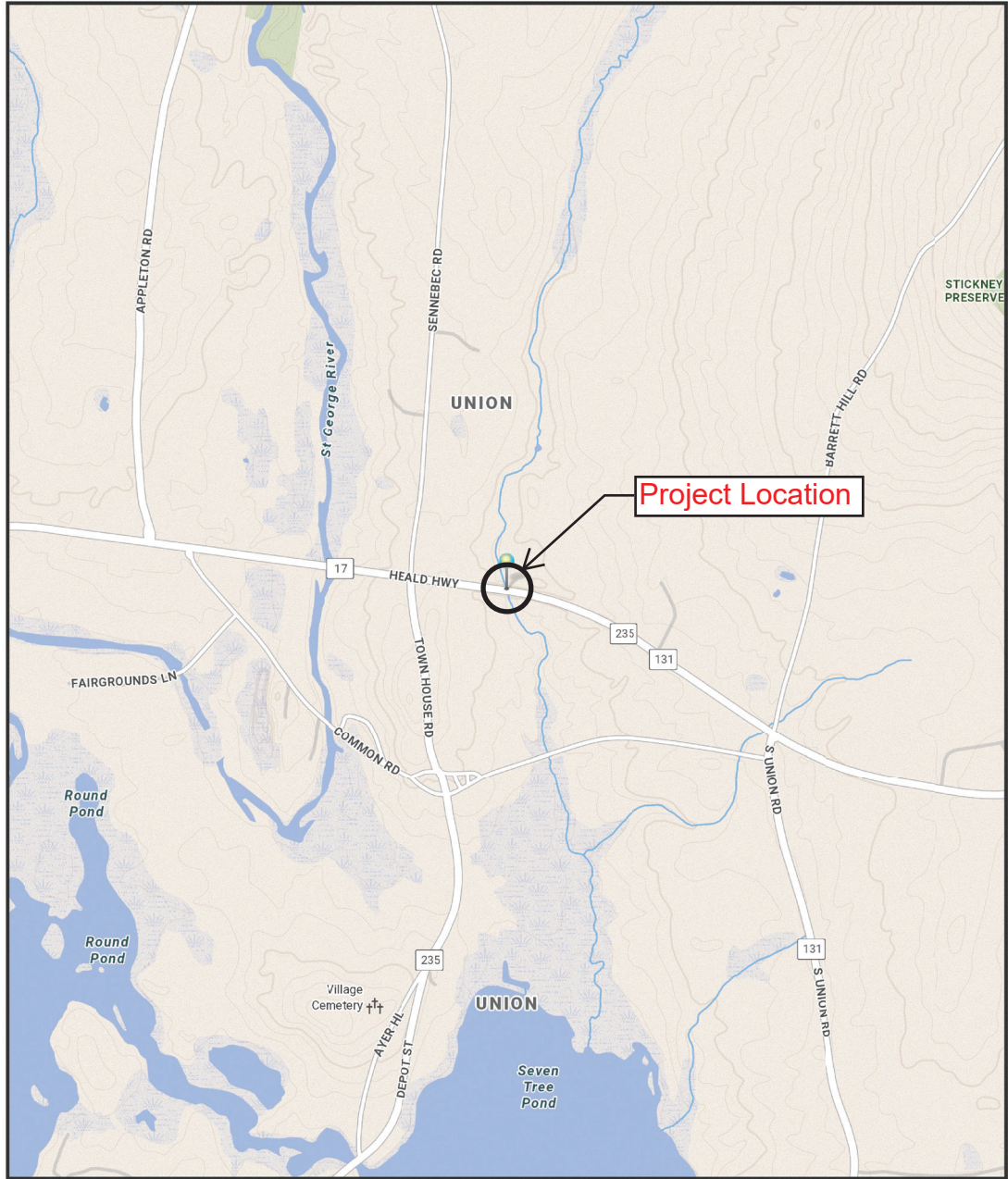
It is recommended that a geotechnical engineer be provided the opportunity for a review of the design and specifications in order that information presented in this report is properly implemented in the design and specifications.

Attachments:

Location Map
Boring Location Plan
Key to Soil and Rock Descriptions and Terms
Boring Logs
Laboratory Testing Summary Sheet
Grain Size Distribution Curves



UNION, MAINE

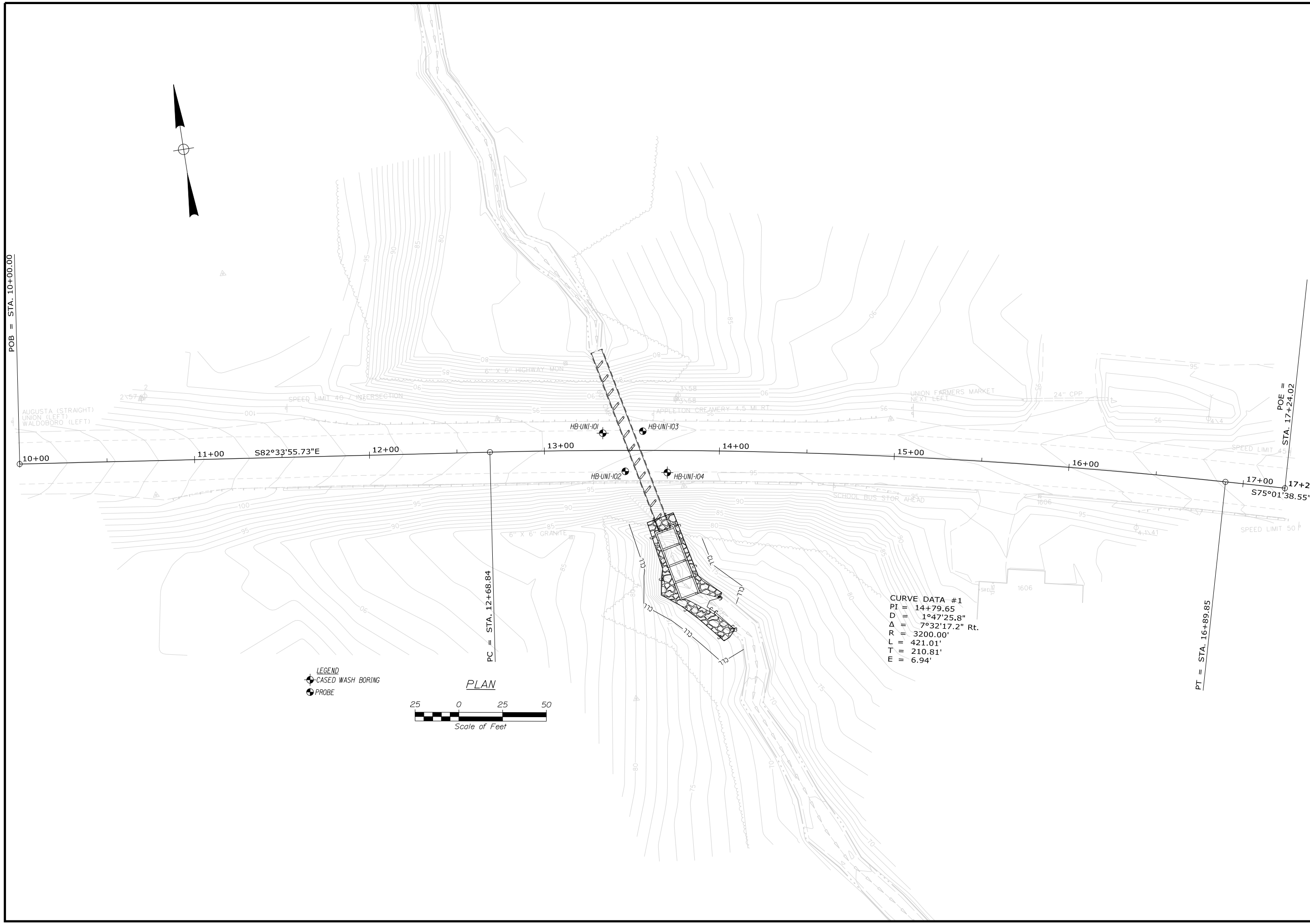


The Maine Department of Transportation provides this publication for information only. Reliance upon this information is at user risk. It is subject to revision and may be incomplete depending upon changing conditions. The Department assumes no liability if injuries or damages result from this information. This map is not intended to support emergency dispatch.

0.25 Miles
1 inch = 0.28 miles

Date: :2/21/2021
Time: 10:51:38 AM

SHEET NUMBER 1	UNION ROUTE 17	STATE OF MAINE DEPARTMENT OF TRANSPORTATION	
		2423700	
OF 2	LOCATION MAP	WIN	24237.00 HIGHWAY PLANS



STATE OF MAINE
 DEPARTMENT OF TRANSPORTATION
2423700
 WIN
 024237.00
 HIGHWAY PLANS

PROJ. MANAGER	BY	DATE	SIGNATURE
DESIGN-DETAILED			
CHECKED-REVIEWED			
DESIGN-DETAILED	C. RUSSELL	DEC 2021	
DESIGN-DETAILED	T. WHITE		
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

UNION ROUTE 17
BORING LOCATION PLAN

SHEET NUMBER
2
 OF 2

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 17 Large Culvert Rehabilitation				Boring No.: HB-UNI-101							
				Location: Union, Maine				WIN: 24237.00							
Driller: MaineDOT				Elevation (ft.): 96.5				Auger ID/OD: 5" Solid Stem							
Operator: Daggett/Niles				Datum: NAVD88				Sampler: Standard Split Spoon							
Logged By: C. Russell				Rig Type: CME 45C				Hammer Wt./Fall: 140#/30"							
Date Start/Finish: 5/7/2019; 08:30-11:45				Drilling Method: Cased Wash Boring				Core Barrel: NQ-2"							
Boring Location: 13+33.4, 9.8 ft Lt.				Casing ID/OD: NW-3"				Water Level*: None Observed							
Hammer Efficiency Factor: 0.928				Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>											
<small>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</small>				<small>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</small>				<small>S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_{u(lab)} = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N₆₀ = SPT N-uncorrected Corrected for Hammer Efficiency N₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected</small>				<small>T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test</small>			
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 ₆₀	Casing Blows	Elevation (ft.)							
25										Core Blocked, bit broke off in borehole. Blocked advancement of core barrel. REFUSAL					
30															
35															
40															
45															
50															
Remarks:															
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.										Page 2 of 2					
* 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.: HB-UNI-101					

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Route 17 Large Culvert Rehabilitation Location: Union, Maine	Boring No.: HB-UNI-102 WIN: 24237.00
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Drilling Contractor: MaineDOT	Elevation (ft.): 95.7	Auger ID/OD: 5" Dia.
Operator: Daggett/Niles	Datum: NAVD88	Sampler: N/A
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: N/A
Date Start/Finish: 5/7/2019-5/7/2019	Drilling Method: Solid Stem Auger	Core Barrel: N/A
Boring Location: 13+46.2, 12.0 ft Rt.	Casing ID/OD: N/A	Water Level*: None Observed

Definitions: D = Split Spoon Sample MU = Unsuccessful Thin Wall Tube Sample Attempt WO1P = Weight of 1 Person
 S = Sample off Auger Flights R = Rock Core Sample S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
 B = Bucket Sample off Auger Flights SSA = Solid Stem Auger S_{u(lab)} = Lab Vane Undrained Shear Strength (psf) LL = Liquid Limit
 MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q_p = Unconfined Compressive Strength (ksf) PL = Plastic Limit
 U = Thin Wall Tube Sample RC = Roller Cone N-value = Raw Field SPT N-value PI = Plasticity Index
 MV = Unsuccessful Field Vane Shear Test Attempt WOH = Weight of 140lb. Hammer T_v = Pocket Torvane Shear Strength (psf) G = Grain Size Analysis
 V = Field Vane Shear Test, PP= Pocket Penetrometer WOR/C = Weight of Rods or Casing WC = Water Content, percent ≡ = Similar or Equal too 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-value	Casing Blows	Elevation (ft.)	Graphic Log			
0						SSA				Probe, no material descriptions taken.	
5											
10											
15											
20											
25								72.0		Bottom of Exploration at 23.7 feet below ground surface. REFUSAL	23.7

Remarks:

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Route 17 Large Culvert Rehabilitation Location: Union, Maine	Boring No.: HB-UNI-104 WIN: 24237.00
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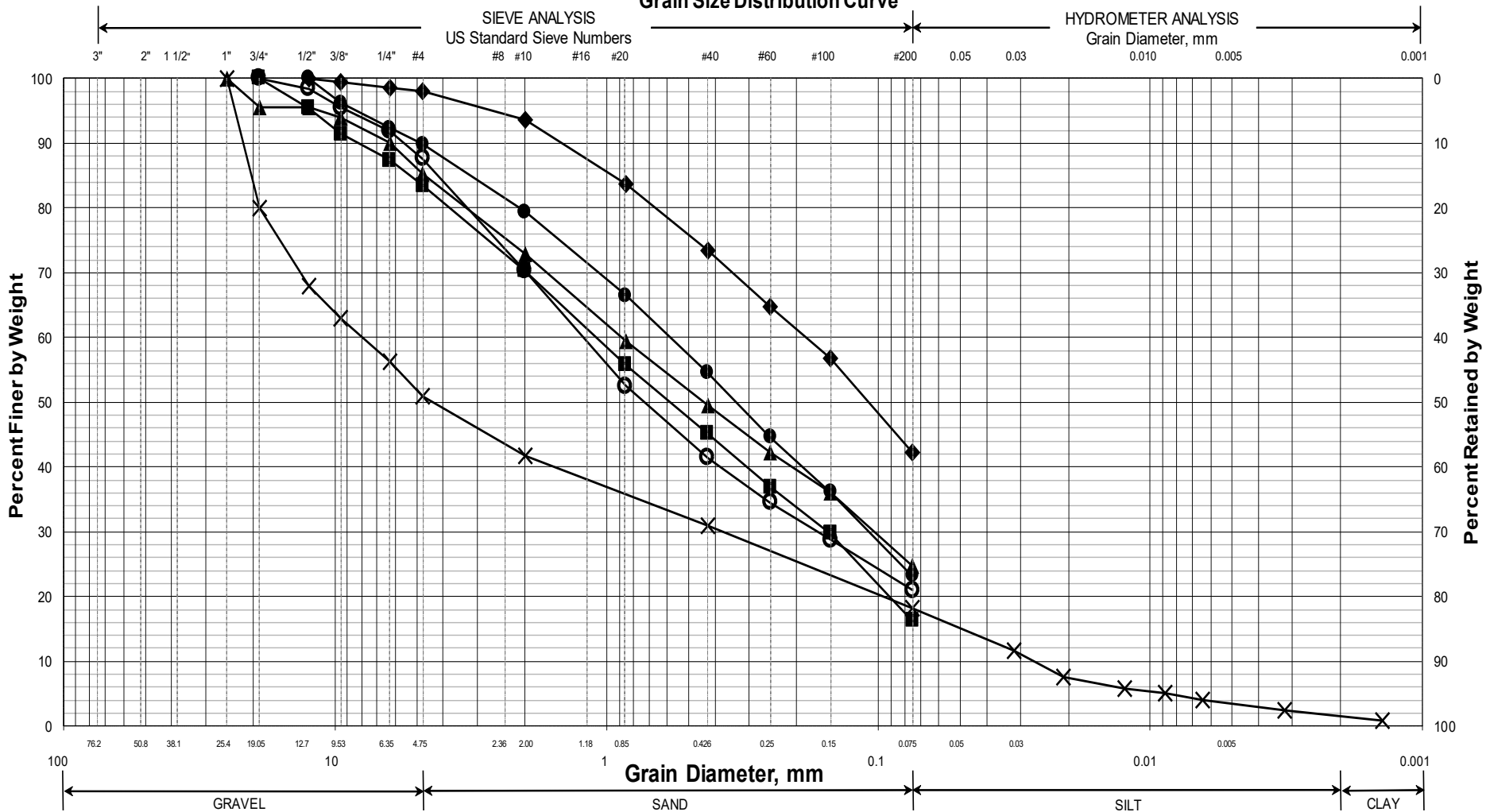
Driller: MaineDOT Operator: Daggett/Niles Logged By: C. Russell Date Start/Finish: 5/7/2019-5/8/2019 Boring Location: 13+70.3, 12.6 ft Rt.	Elevation (ft.): 95.4 Datum: NAVD88 Rig Type: CME 45C Drilling Method: Cased Wash Boring Casing ID/OD: NW-3"	Auger ID/OD: 5" Solid Stem Sampler: Standard Split Spoon Hammer Wt./Fall: 140#/30" Core Barrel: NQ-2" Water Level*: None Observed
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Hammer Efficiency Factor: 0.928 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	Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/> R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140 lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person	S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S _u (lab) = Lab Vane Undrained Shear Strength (psf) q _p = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N ₆₀ = SPT N-uncorrected Corrected for Hammer Efficiency N ₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected T _v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test
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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 ₆₀	Casing Blows					
25	1D R1	3.6/3 60/60	25.00 - 25.30 25.30 - 30.30	50(3.6") RQD - 33%	---		NQ-2	70.1		Reddish brown, damp, fine to coarse SAND, some gravel, little silt. Weathered Rock in tip of Spoon.	G#337161 A-1-b, SM WC=10.3%	
								65.1		Top of Bedrock at Elev. 70.1 ft. R1: Bedrock: Sulfidic/carbonaceous PELITE of the Penobscot Formation. R1: Core Times (min:sec) 25.3-26.3 ft (1:50) 26.3-27.3 ft (1:27) 27.3-28.3 ft (1:44) 28.3-29.3 ft (1:49) 29.3-30.3 ft (1:48) 100% Recovery		
											Bottom of Exploration at 30.3 feet below ground surface.	
30												
35												
40												
45												
50												

Remarks:

Maine Department of Transportation Grain Size Distribution Curve

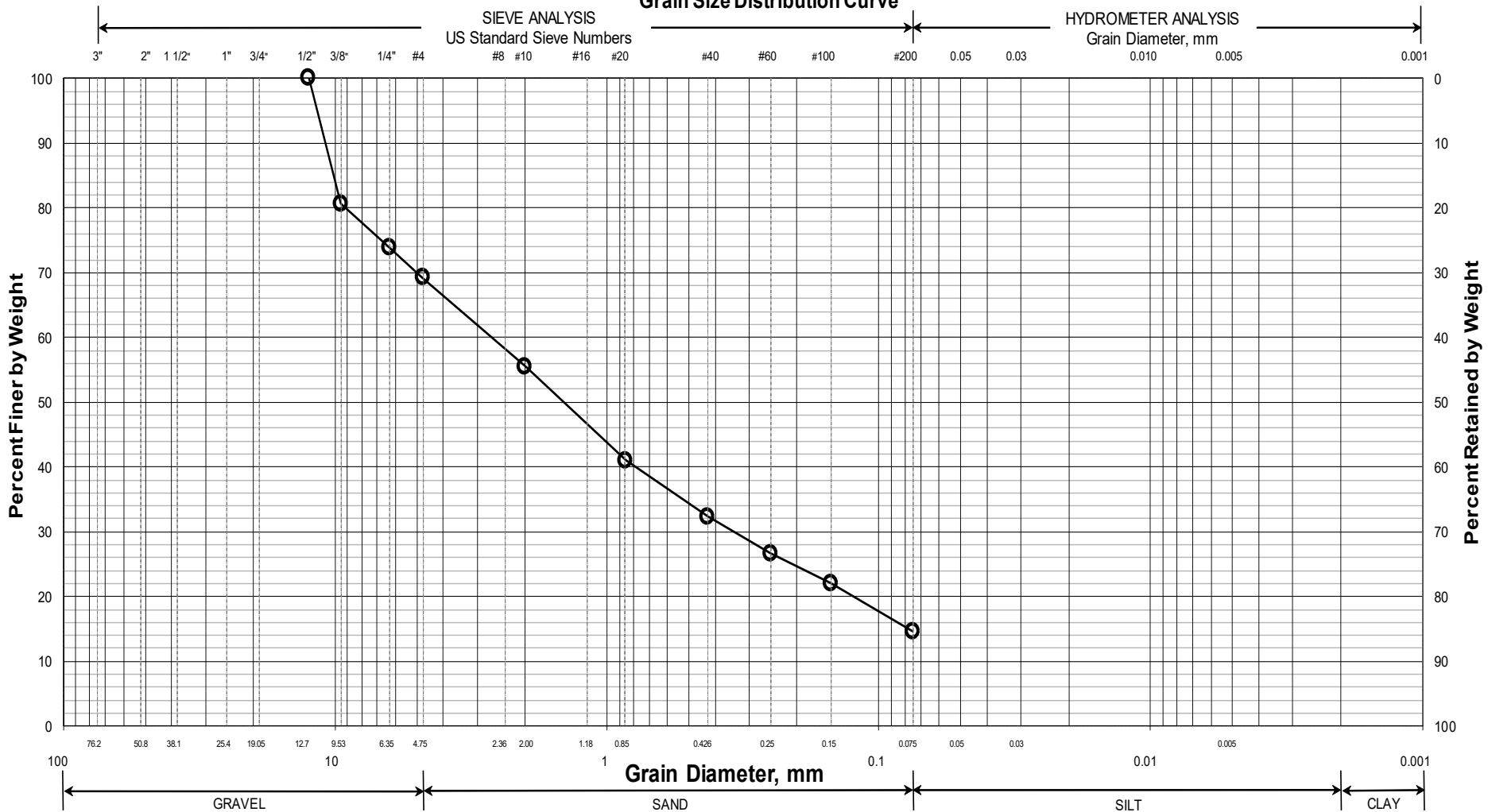


UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-UNI-101/1D	13+33.4	9.8 LT	1.0-3.0	SAND, some silt, little gravel.	6.3			
◆	HB-UNI-101/2D	13+33.4	9.8 LT	5.0-7.0	Silty SAND, trace gravel.	11.4			
■	HB-UNI-101/3D	13+33.4	9.8 LT	10.0-12.0	SAND, little silt, little gravel.	7.4			
●	HB-UNI-101/4D	13+33.4	9.8 LT	15.0-17.0	SAND, some silt, trace gravel.	8.2			
▲	HB-UNI-101/5D	13+33.4	9.8 LT	20.0-21.5	SAND, some silt, little gravel.	7.3			
×	HB-UNI-101/5DA	13+33.4	9.8 LT	21.5-22.0	GRAVEL, some sand, little silt, trace clay.	10.2			

WIN
024237.00
Town
Union
Reported by/Date
WHITE, TERRY A 12/21/2021

Maine Department of Transportation Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-UNI-104/1D	13+70.3	12.6 RT	25.0-25.3	SAND, some gravel, little silt.	10.3			
◆									
■									
●									
▲									
X									

WIN
024237.00
Town
Union
Reported by/Date
WHITE, TERRY A 12/21/2021