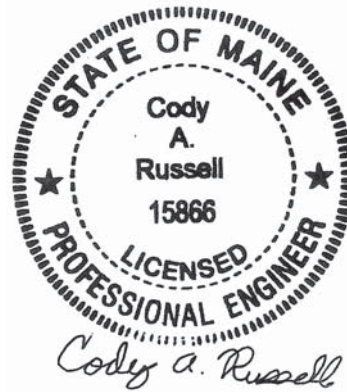


**MAINE DEPARTMENT OF TRANSPORTATION
HIGHWAY PROGRAM
GEOTECHNICAL SECTION
AUGUSTA, MAINE**

GEOTECHNICAL DATA REPORT

For Closed Drainage Improvements on:
**ATLANTIC AVENUE
BOOTHBAY HARBOR, MAINE**

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Lincoln County
WIN 22831.00

Soils Report 2021-02
January 14, 2021

INTRODUCTION

The purpose of this data report is to document subsurface information collected and make geotechnical and construction recommendations for the design and construction of a small retaining wall included in the closed drainage improvements project on Atlantic Avenue in Boothbay Harbor. The project is needed to improve the existing closed drainage system and includes the replacement of a small retaining wall beginning near approximate Station 14+15 (on the left) in front of property currently owned by Clive D. Farrin. This report presents the results of a limited geotechnical investigation performed near the existing retaining wall and the results of a limited laboratory testing program conducted on soils recovered during the geotechnical investigation. Atlantic Avenue is a Highway Corridor Priority 4 road.

SUBSURFACE INVESTIGATION

Two (2) borings were drilled near the ends of an existing retaining wall by the MaineDOT drill crew using a trailer mounted drill rig. Exploration locations are shown on Sheet 2 – Boring Location Plan. Details and sampling methods used, field data obtained, and soil and groundwater conditions encountered are presented in the attached Boring Logs.

The MaineDOT Geotechnical Team member selected the boring locations, drilling methods, designated type and depth of sampling, reviewed field logs for accuracy and identified field and laboratory testing requirements. An experienced Northeast Transportation Training and Certification Program (NETTCP) certified subsurface inspector logged the subsurface conditions encountered. The borings were located in the field by taping to surveyed site features after completion of the drilling program.

LABORATORY TESTING

A laboratory testing program was conducted on select soil samples obtained in the borings to assist in soil classification. Laboratory testing consisted of six (6) standard grain size analyses with natural water content. The results of the laboratory tests are summarized in the attached Laboratory Testing Summary Sheet and Grain Size Distribution Curves. Laboratory test results for the samples obtained in the borings are also summarized on the attached boring logs.

GEOTECHNICAL RECOMMENDATIONS

The existing retaining wall is a small, cast-in-place wall that will be adversely impacted by construction activities. The existing stone wall to the north of the stairs and the existing stairs will not be replaced or reconstructed for this project. The existing sidewalk in front of the retaining wall will be maintained. The cast-in-place wall will be replaced with a wet cast small landscape block wall.

Wet Cast Small Landscape Block Wall – The proposed replacement retaining wall shall be constructed as shown on the Contract Plans and shall meet the requirements of Standard Specification 673 Wet Cast Small Landscape Block Wall. The proposed wall shall be supplier designed in accordance with AASHTO LRFD Bridge Design Specifications (LRFD) 9th

Edition 2020 and Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Slopes (FHWA-NHI-10-024 and FHWA-NHI-10-025, March 2012).

The proposed retaining wall shall be designed to withstand lateral earth pressures. Earth loads may be calculated using an active earth pressure coefficient, K_a , calculated using Rankine or Coulomb Theory. Refer to LRFD Article 3.11.5.3 and Equations 3.11.5.3-1 and -2 for calculating Coulomb active earth pressure coefficient. Lateral earth pressure distributions for design of MSE walls are provided in LRFD Figures 3.11.5.8.1-1, -2 and -3. Passive earth pressure in front of the wall should be neglected in the design.

The factored bearing resistances for the retaining wall bearing on a concrete leveling pad on native soils at the service and strength limit states are presented in the table below. In no instance shall the bearing stress exceed the nominal resistance of the structural concrete which may be taken as $0.3f'_c$.

Limit State	Resistance Factor ϕ_b	AASHTO LRFD Reference	Factored Bearing Resistance (ksf)
Service	1.0	Article 10.5.5.1	5.0
Strength	0.45	Table 10.5.5.2.2-1	3.5

The following additional considerations should be addressed in the wall design:

- No traffic load will be required in the design of the wall.
- Piped drainage shall be included in the design of the wall.
- A minimum embedment of 2.0 feet is required for the wall design.
- The retaining wall design shall include a drainage system (swale) at the top of the wall to carry surface water runoff away from the face of the wall.

CLOSURE

This Geotechnical Data Report has been prepared for the use of the MaineDOT Highway Program for specific application to the proposed Atlantic Avenue closed drainage improvements in Boothbay Harbor, 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 along the project and a limited number of laboratory tests. 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 boring 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 conclusions and recommendations and to modify the recommendations as appropriate to reflect the changes in design. These analyses and recommendations are 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 recommendations made in this report.

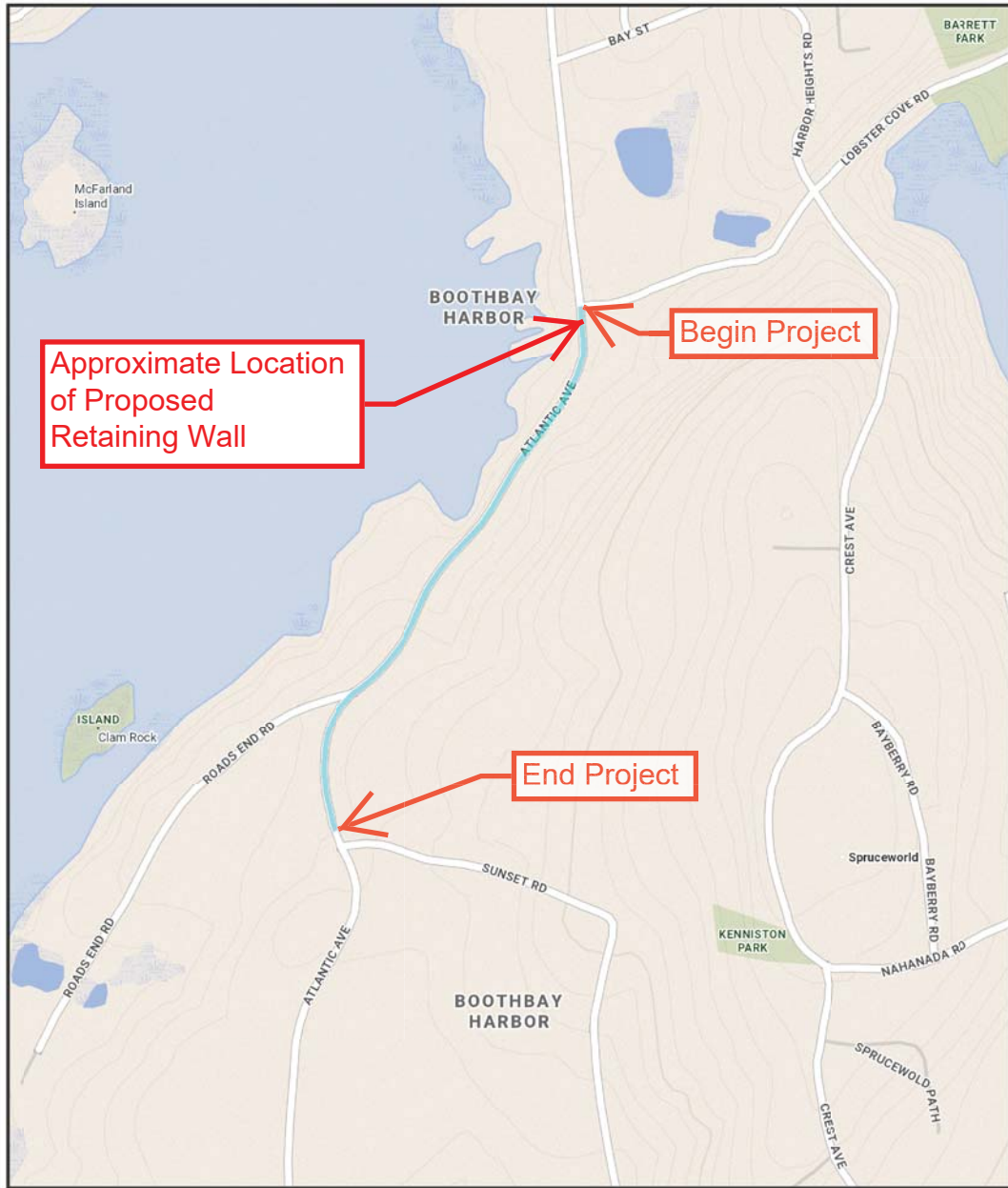
It is recommended that a geotechnical engineer be provided the opportunity for a review of the design and specifications in order that the earthwork and foundation recommendations and construction considerations presented in this report are properly interpreted and implemented in the design and specifications.

Attachments:

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



BOOTHBAY HARBOR

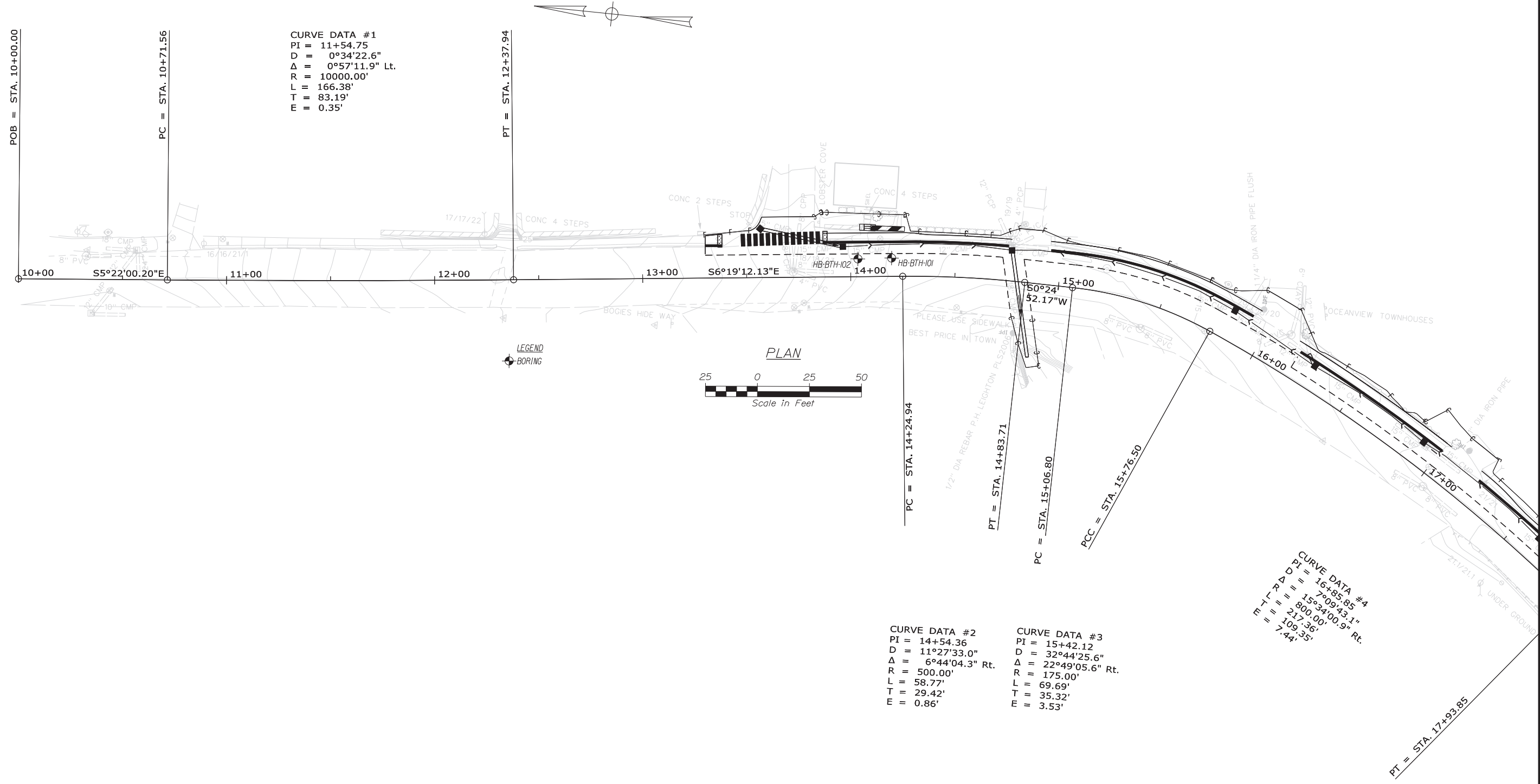


The Maine Department of Transportation provides this publication for information only. Reliance upon this information is at user risk. It is subject to revision and may be incomplete depending upon changing conditions. The Department assumes no liability if injuries or damages result from this information.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

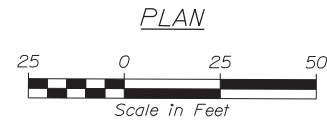
0.095 Miles
1 inch = 0.1 miles

Date: 12/22/2020
Time: 9:02:12 AM

SHEET NUMBER 1	BOOTHBAY HARBOR ATLANTIC AVENUE	STATE OF MAINE DEPARTMENT OF TRANSPORTATION	
		22831.00	
OF 2	LOCATION MAP	WIN	HIGHWAY PLANS
		22831.00	



CURVE DATA #1
 PI = 11+54.75
 D = 0°34'22.6"
 Δ = 0°57'11.9" Lt.
 R = 10000.00'
 L = 166.38'
 T = 83.19'
 E = 0.35'



CURVE DATA #2
 PI = 14+54.36
 D = 11°27'33.0"
 Δ = 6°44'04.3" Rt.
 R = 500.00'
 L = 58.77'
 T = 29.42'
 E = 0.86'

CURVE DATA #3
 PI = 15+42.12
 D = 32°44'25.6"
 Δ = 22°49'05.6" Rt.
 R = 175.00'
 L = 69.69'
 T = 35.32'
 E = 3.53'

CURVE DATA #4
 PI = 16+85.85
 D = 7°09'43.1"
 R = 800.00'
 L = 1534.00.9" Rt.
 T = 217.36'
 E = 7.44'

STATE OF MAINE DEPARTMENT OF TRANSPORTATION		CAPITAL PROJECTS	
BOOTHBAY HARBOR ATLANTIC AVENUE		WIN 22831.00	
BORING LOCATION PLAN		HIGHWAY PLANS	
SHEET NUMBER		DATE	
2		MAR 2019	
OF 2		P.E. NUMBER	
BY		SIGNATURE	
T. WHITE		C. RUSSELL	
DESIGN-DETAILED		DESIGN-REVIEWED	
DESIGNS-DETAILED3		DESIGNS-DETAILED1	
REVISIONS 1		REVISIONS 2	
REVISIONS 2		REVISIONS 3	
REVISIONS 3		REVISIONS 4	
REVISIONS 4		FIELD CHANGES	

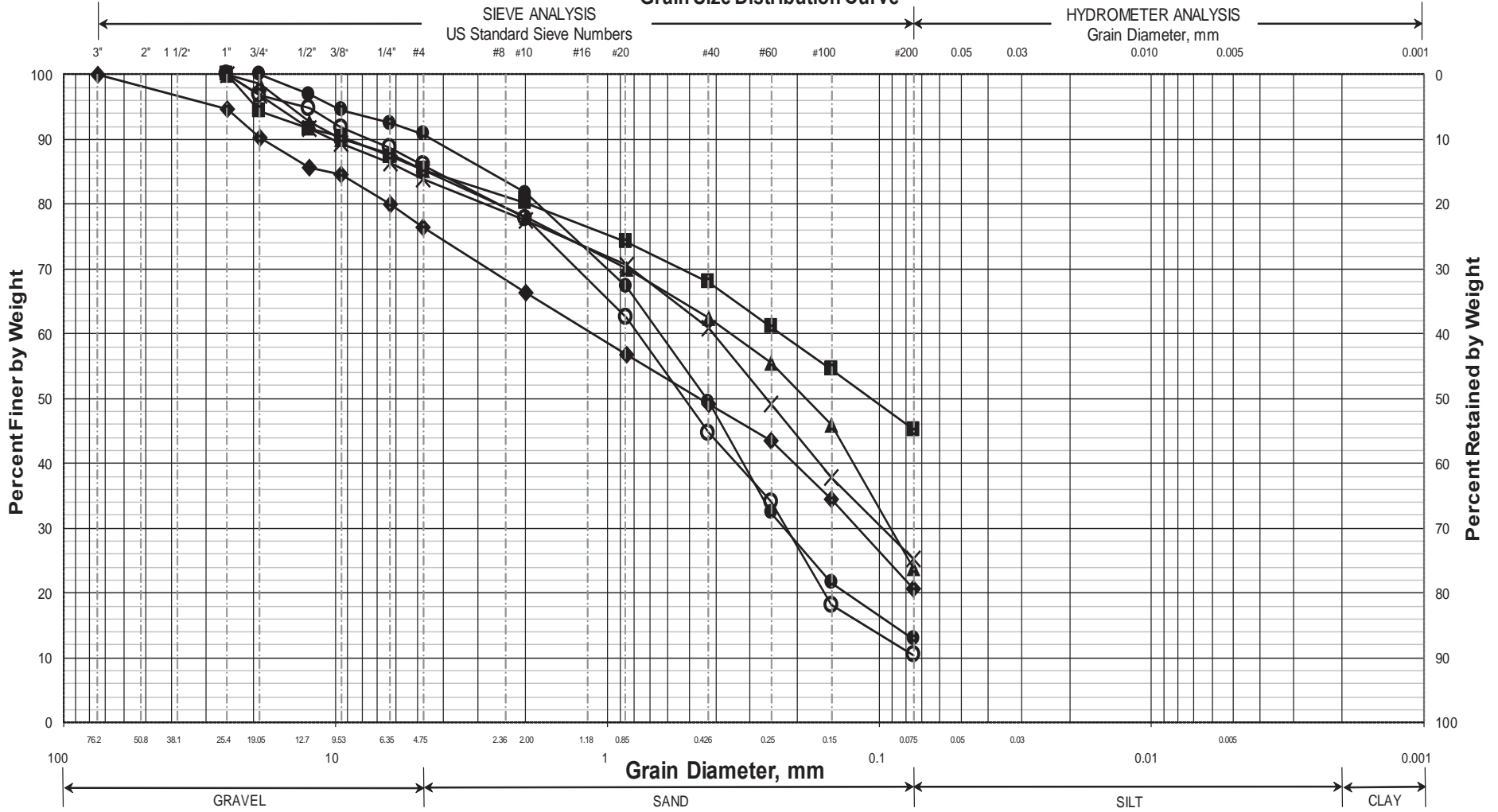
Driller: MaineDOT	Elevation (ft.): 15.8	Auger ID/OD: 5" Dia.
Operator: Daggett/Niles	Datum: NAVD88	Sampler: Standard Split Spoon
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 12/12/2018; 11:00-12:00	Drilling Method: Solid Stem Auger	Core Barrel: N/A
Boring Location: 14+03.5, 8.6 ft Lt.	Casing ID/OD: N/A	Water Level*: 8.3 ft bgs.

Hammer Efficiency Factor: 0.928 **Hammer Type:** Automatic Hydraulic Rope & Cathead
 Definitions: R = Rock Core Sample S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) T_v = Pocket Torvane Shear Strength (psf)
 D = Split Spoon Sample SSA = Solid Stem Auger S_u(lab) = Lab Vane Undrained Shear Strength (psf) WC = Water Content, percent
 MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q_p = Unconfined Compressive Strength (ksf) LL = Liquid Limit
 U = Thin Wall Tube Sample RC = Roller Cone N-uncorrected = Raw Field SPT N-value PL = Plastic Limit
 MU = Unsuccessful Thin Wall Tube Sample Attempt WOH = Weight of 140lb. Hammer Hammer Efficiency Factor = Rig Specific Annual Calibration Value PI = Plasticity Index
 V = Field Vane Shear Test, PP = Pocket Penetrometer WOR/C = Weight of Rods or Casing N₆₀ = SPT N-uncorrected Corrected for Hammer Efficiency G = Grain Size Analysis
 MV = Unsuccessful Field Vane Shear Test Attempt WO1P = Weight of One Person N₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected 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 ₆₀	Casing Blows				
0							SSA	15.2		7" HMA.	
	1D	24/16	1.00 - 3.00	15/21/24/24	45	70				Brown, moist, very dense, fine to coarse SAND, little silt, trace gravel.	G#337245 A-1-b, SM WC=10.6%
5								11.3		Olive brown, moist, dense, fine to coarse SAND, some silt, little gravel.	G#337246 A-2-4, SM WC=13.7%
	2D	24/18	5.00 - 7.00	3/6/19/15	25	39					
10								7.3		Olive brown, moist, very dense, fine to coarse SAND, some silt, little gravel.	G#337247 A-2-4, SM WC=11.2%
	3D	24/17	10.00 - 12.00	12/28/8/18	36	56					
								3.8		Bottom of Exploration at 12.0 feet below ground surface. NO REFUSAL	
15											
20											
25											

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-BTH-101/1D	14+19.7	8.8 LT	1.0-3.0	SAND, little gravel, little silt.	5.4			
◆	HB-BTH-101/2D	14+19.7	8.8 LT	5.0-7.0	SAND, some gravel, some silt.	10.7			
■	HB-BTH-101/3D	14+19.7	8.8 LT	10.0-11.4	Sandy SILT, little gravel.	12.9			
●	HB-BTH-102/1D	14+03.5	8.6 LT	1.0-3.0	SAND, little silt, trace gravel.	10.6			
▲	HB-BTH-102/2D	14+03.5	8.6 LT	5.0-7.0	SAND, some silt, little gravel.	13.7			
×	HB-BTH-102/3D	14+03.5	8.6 LT	10.0-12.0	SAND, some silt, little gravel.	11.2			

WIN
022831.00
Town
Boothbay Harbor
Reported by/Date
WHITE, TERRY A 4/8/2019