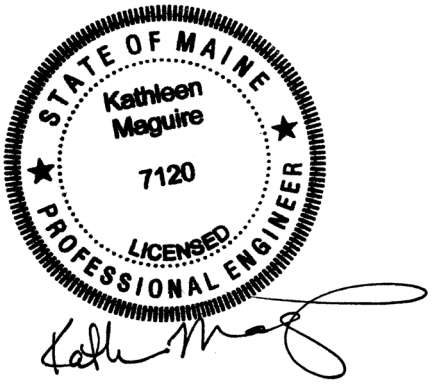
MAINE DEPARTMENT OF TRANSPORTATION
HIGHWAY PROGRAM
GEOTECHNICAL SECTION
AUGUSTA, MAINE

GEOTECHNICAL DESIGN REPORT

For Slope Stabilization on:

ROUTE 102A & SHORE ROAD
TREMONT, MAINE

Prepared by:
Kathleen Maguire, P.E.
Senior Geotechnical Engineer



Reviewed by:
Cody Russell, P.E.
Geotechnical Engineer

Hancock County
WIN 23020.00

Soils Report 2023-30
Federal No. 2302000

October 25, 2023

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Appendices

1.0 INTRODUCTION

The purpose of this Geotechnical Design Report is to present subsurface information and make geotechnical design and construction recommendations for a slope stabilization project along an approximately 0.13-mile portion of Route 102A and Shore Road in Tremont, shown on Sheet 1 – Location Map. The project is needed to address two (2) sections of the slope along Bass Harbor on the west side of the road that have been eroded by tidal action and rainfall. The eroded slopes are steeper than 1.5H:1V and in some areas are steeper than 1H:1V. The crest of the eroded slopes are close to the back of the existing guardrail at the roadway edge in some locations. If left untreated, continued material loss along the slopes could result in loss of the roadway section and closure of Route 102A and Shore Road. The proposed repair scope includes placement of riprap armored slopes. The riprap will be keyed existing ground along the harbor edge at the toe of the proposed slopes. Guardrail will be re-installed along Route 102A where necessary. Route 102A is a Highway Corridor Priority 1 road.

2.0 GEOLOGIC SETTING

According to the Reconnaissance Surficial Geology of the Northern Portion of the Bass Harbor Quadrangle, Maine, Open File No. 16-14 (2016) published by the Maine Geological Survey (MGS), the surficial soils along the project consist of Artificial Fill and Presumpscot Formation consisting of silt and clay with sand layers.

According to the MGS map titled Bedrock Geologic Map of Maine (1985) the bedrock along the project consists of mafic to felsic volcanic rocks of the Castine Formation.

3.0 SUBSURFACE INVESTIGATION

Five (5) borings (HB-TRM-101 through HB-TRM-105) were drilled for this project between October 6 and 8, 2020 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 on the Boring Log in Appendix A.

The borings were drilled using solid stem auger, cased wash boring, and rock core drilling techniques. Soil samples were obtained in all the borings at 5-foot intervals using Standard Penetration Test (SPT) methods. The MaineDOT drill rig is equipped with an automatic hammer to drive the split spoon. The MaineDOT calibrated automatic hammer delivers approximately 48 percent more energy during driving than the standard rope and cathead system. All N-values discussed in this report are corrected values (N_{60}) computed by applying an average energy transfer factor of 0.89 to the raw field N-values. Bedrock was cored in borings HB-TRM-101, HB-TRM-103, HB-TRM-104, and HB-TRM-105 using an NQ 2-inch core barrel and the Rock Core Designation (RQD) of the core was calculated. No refusal surface was encountered in boring HB-TRM-102.

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. A North East Transportation Training and Certification Program (NETTCP) certified Subsurface Investigator logged the subsurface conditions encountered. The boring and probe were located in the field by taping to surveyed site features after completion of the drilling program.

4.0 LABORATORY TESTING

A laboratory testing program was conducted on select soil samples obtained in the test borings to assist in soil classification, evaluation of engineering properties of the soils and geologic assessment of the project site. Laboratory testing consisted of thirteen (13) standard grain size analyses and natural water content, three (3) standard grain size analyses with natural water content and hydrometer, and two (2) Atterberg Limits tests. The results of the laboratory tests are in Appendix B – Laboratory Test Results. Laboratory test results are also summarized on the boring logs in Appendix A.

5.0 SUBSURFACE CONDITIONS

Subsurface conditions encountered at the test borings generally consisted of pavement and fill soils underlain by interbedded layers of clayey silt, sandy silt, and silty clay, underlain by sandy gravel, gravelly sand, and sand underlain by bedrock. The boring locations are shown on Sheet 2 – Boring Location Plan. The boring logs are in Appendix A – Boring Logs.

5.1 Pavement and Fill Soils

The subsurface investigations found areas of pavement and roadway fill soils along the project. The pavement thickness ranged from approximately 6 to 7.5 inches. The fill soils consisted of:

- Brown, damp, fine to coarse sand, some gravel, trace to little silt,
- Brown, damp, gravelly fine to coarse sand, and
- Brown, damp, silty fine to coarse sand, trace gravel.

The thickness of the fill ranged from approximately 1.4 feet to 9.0 feet. Five (5) SPT N_{60}-values obtained the in the fill ranged from 18 to 37 blows per foot (bpf) indicating that the fill is medium dense to dense in consistency.

A water contents from five (5) samples obtained within the fill layer ranged from approximately 6% to 19%. Grain size analyses conducted on five (5) sample of the fill resulted in the soil being classified as an A-1-b or A-4 under the AASHTO Soil Classification System and an SW-SM or SM under then Unified Classification System.

5.2 Interbedded Silt and Clay

The fill layer is underlain by interbedded layers of clayey silt, sandy silt, and silty clay. The layers consisted of:

- Olive brown, damp, clayey silt, trace fine to coarse sand, trace gravel,
- Light brown, moist, fine to coarse sandy silt, trace gravel, and
- Olive, moist, Silty fine to coarse sand, trace gravel.

The thickness of the interbedded layers of clayey silt, sandy silt, and silty clay ranged from approximately 2.5 to 4.5 feet but was not present in all the borings. Three (3) SPT N_{60}-values obtained the in the interbedded layers of clayey silt, sandy silt, and silty clay ranged from 15 and 21 bpf indicating that the interbedded layers of clayey silt, sandy silt, and silty clay are stiff to very stiff in consistency.

Water contents from four (4) samples obtained within the interbedded layers of clayey silt, sandy silt, and silty clay ranged from approximately 15% to 23%. Grain size analyses conducted on four (4) samples of the interbedded layers of clayey silt, sandy silt, and silty clay resulted in the soil being classified as an A-4, A-6 or A-7-6 under the AASHTO Soil Classification System and an CL under the Unified Soil Classification System.

The following table summarizes the results of Atterberg Limits tests done on two (2) samples of the silty clay:

Boring No. and Sample No.	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index
HB-TRM-102 2D	23.3	44	21	23	0.1
HB-TRM-104 2D	23.0	36	20	16	0.2

Interpretation of these results indicate that the silt clay has medium to high plasticity. The silty clay is overconsolidated, meaning it has experienced higher stresses in the past.

5.3 Sandy Gravel, Gravelly Sand, and Sand Layers

The fill layer or interbedded layers of clayey silt, sandy silt, and silty clay, where present, are underlain by layers of sandy gravel, gravelly sand, and sand. These layers consisted of:

- Grey, dry, fine to coarse sandy gravel, trace silt,
- Brown, damp to wet, gravelly fine to coarse sand, trace silt, occasional cobbles, and
- Light brown and brown, moist to wet, fine to coarse sand, trace to some gravel, trace to some silt, occasional cobbles.

The thickness of the sandy gravel, gravelly sand, and sand layers ranged from approximately 2.2 to 17.5 feet. The full thickness of the sandy gravel, gravelly sand, and sand was not penetrated in all borings. Nine (9) SPT N_{60}-values obtained the in the layers of sandy gravel, gravelly sand, and

sand ranged from 16 to 98 bpf indicating that the layers of sandy gravel, gravelly sand, and sand are medium dense to very dense stiff in consistency.

Water contents from seven (7) samples obtained within the layers of sandy gravel, gravelly sand, and sand ranged from approximately 2% to 16%. Grain size analyses conducted on seven (7) samples of the layers of sandy gravel, gravelly sand, and sand resulted in the soil being classified as an A-1-a, A-1-b, A-3, or A-2-4 under the AASHTO Soil Classification System and an SW-SM, SP, SP-SM, SM, or GW-GM under the Unified Soil Classification System.

5.4 Bedrock

The depth to bedrock ranged from approximately 6.7 feet below ground surface (bgs) in boring HB-TRM-105 to greater than approximately 27.0 feet in boring HB-TRM-102 where no refusal surface was encountered. A 5-foot bedrock core was drilled in the borings where bedrock was encountered.

The following table summarizes the bedrock information:

Boring No.	Station	Offset (feet)	Approximate Depth to Bedrock (feet)	Approximate Elevation of Bedrock Surface (feet)	RQD (%)[1]
HB-TRM-101	201+00	7.0 Left	21.0	-5.6	7
HB-TRM-103	12+08	6.5 Left	13.7	-0.4	25
HB-TRM-104	13+50	7.0 Left	15.4	-2.6	28
HB-TRM-105	15+50	7.5 Left	6.7	5.2	15

[1] RQD = Rock Quality Designation

The bedrock in the area is identified as mafic to felsic volcanic rocks of the Castine Formation. The RQD of the bedrock cores ranged from 7% to 28% corresponding to rock quality of very poor to poor.

5.5 Groundwater

Groundwater level was observed in borings HB-TRM-101, HB-TRM-103, and HB-TRM-4. The measured groundwater level in the borings ranged from approximately 6.0 to 7.0 feet bgs. The water level is indicated on the boring log in Appendix A. Groundwater levels can be expected to fluctuate subject to seasonal variations, local soil conditions, topography, precipitation, and construction activity.

6.0 GEOTECHNICAL ANALYSES AND RECOMMENDATIONS

The project scope is to reconstruct the eroded slopes along Bass Harbor on the west side of Route 102A and Shore Road. The crest of the eroded slope is close to the back of the existing guardrail at the roadway edge in many locations. The proposed repair scope includes placement of riprap armored slopes that will be keyed existing ground along the harbor edge at the toe of the proposed slope. The following sections discuss the geotechnical-related analyses and recommendations of the proposed riprap slope.

6.1 Slope Stability Analyses

Four (4) cross sections along the slope were analyzed to evaluate the existing and proposed slope stability. The cross sections were chosen to represent four (4) critical slope locations along the project. Geostudio Slope/W software was used to evaluate the slopes. The stability analyses were based on subsurface conditions encountered in the borings drilled in the roadway shoulder at the crest of the existing slope. In accordance with AASHTO LRFD Bridge Design Specifications 9th Edition 2020 (LRFD) Article 11.6.3.7 evaluation of earth slopes where geotechnical parameters are well defined shall achieve a factor of safety of 1.3 (equivalent to a resistance factor of 0.75).

The southern proposed slopes along Shore Road (approximate stationing labeled 200+00 to 201+50 +/-) turning onto Route 102A (approximate stationing labeled 300+00 to 301+00 +/- and 11+00 to 14+00 +/-) will be reconstructed using 2H:1V riprap slopes. Due to adjacent property owner concerns, the northern proposed slopes along Route 102A (approximate stationing labeled 15+00 to 16+50 +/-) will be reconstructed using 1.5H:1 riprap slopes. Both slope angles have been analyzed and are expected to perform well over time although the 2H:1V slopes are anticipated to perform slightly better than the 1.5H:1V slopes.

The results of these analyses are presented in the following table:

Station	Existing Slope Angle	Existing Slope Factor of Safety	Proposed Slope Angle	Proposed Slope Factor of Safety with 4 feet of Heavy Riprap
201+00	Variable	0.634	2H:1V	1.382
300+50	Variable	0.991	2H:1V	1.354
12+00	Variable	0.936	2H:1V	1.368
15+50	Variable	0.885	1.5H:1V	1.328

Based on these analyses, all of the proposed slopes require riprap keyed in at the toe for stability. This riprap slope treatment will help to protect the slope from future scour and erosion caused by tidal and rainwater runoff forces. Appendix C – Slope Stability Analyses presents the existing and final slope configuration results from these slope stability analyses.

6.2 Riprap Slopes

The proposed riprap slope along the Bass Harbor shall be constructed as shown on the project plans with slopes ranging from 2H:1V to 1.5H:1V. The proposed slopes shall be armored with 4 feet of riprap conforming to MaineDOT Standard Specification Section 703.28 Heavy Riprap underlain by a non-woven Class 1 Erosion Control Geotextile that meets the requirements for MaineDOT Standard Specification 722.03 that is underlain by a 1-foot layer of Protective Aggregate Cushion conforming to MaineDOT Standard Specification 703.19 Granular Borrow Material for Underwater Backfill.

6.3 Additional Construction Considerations

During construction the Contractor shall control groundwater and surface water infiltration using temporary ditches, sumps, granular drainage blankets, stone ditch protection or hand-laid riprap with geotextile underlayment to divert groundwater and surface water to allow construction in the dry.

The construction of the riprap key at the toe of the proposed slope and placement of riprap on the slopes should be done during low tide or with the use of cofferdams to minimize the amount of silt that could potentially impact the Harbor.

7.0 CLOSURE

This report has been prepared for the use of the MaineDOT Highway Program for specific application to the proposed slope stabilization on Route 102A and Shore Road in Tremont, Maine in accordance with generally accepted geotechnical and foundation engineering practices. No other intended use or warranty is expressed or implied.

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.

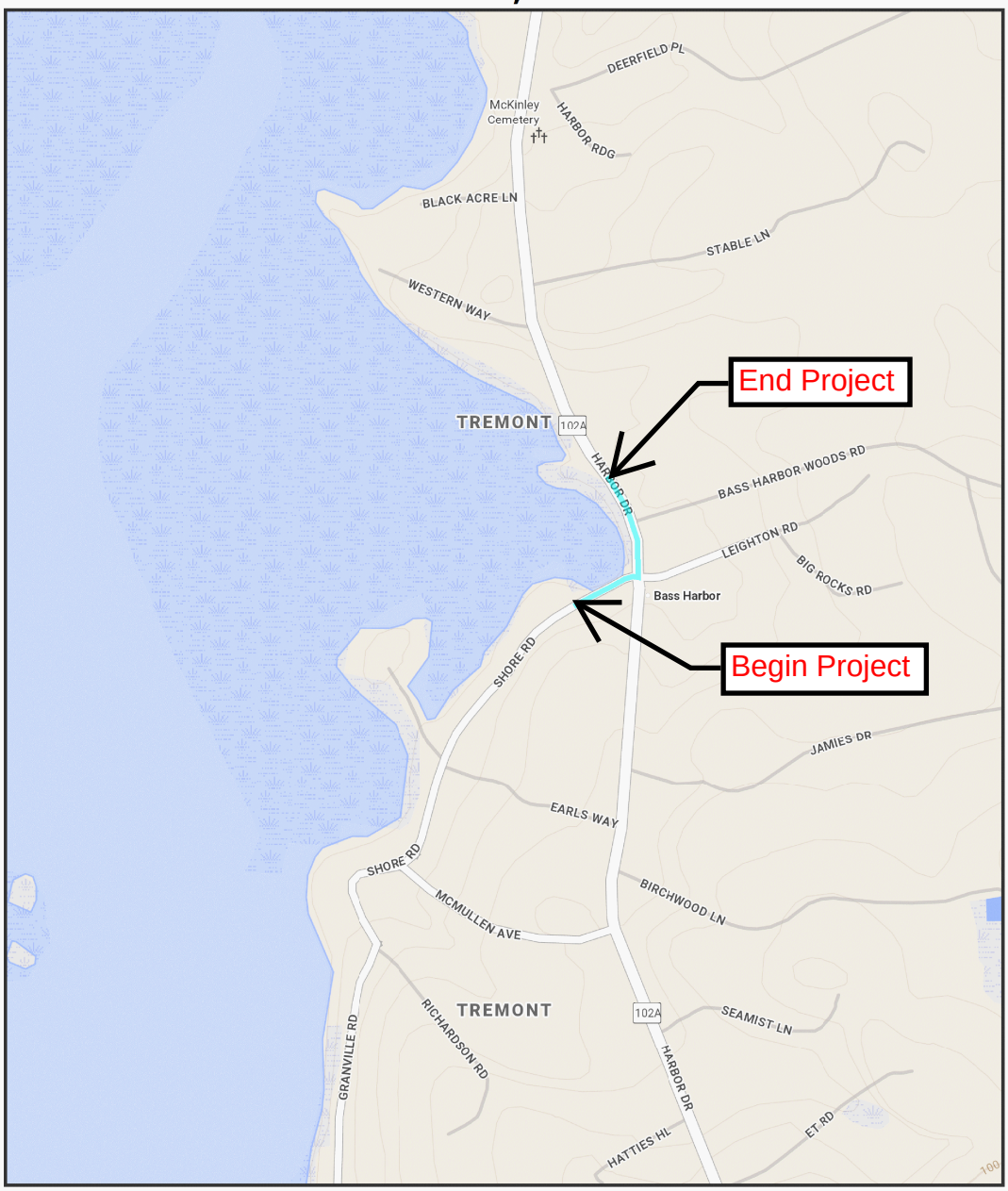
Sheets

Date:10/20/2023

Division: GEOTECH

Username: terry.white

TREMONT, MAINE



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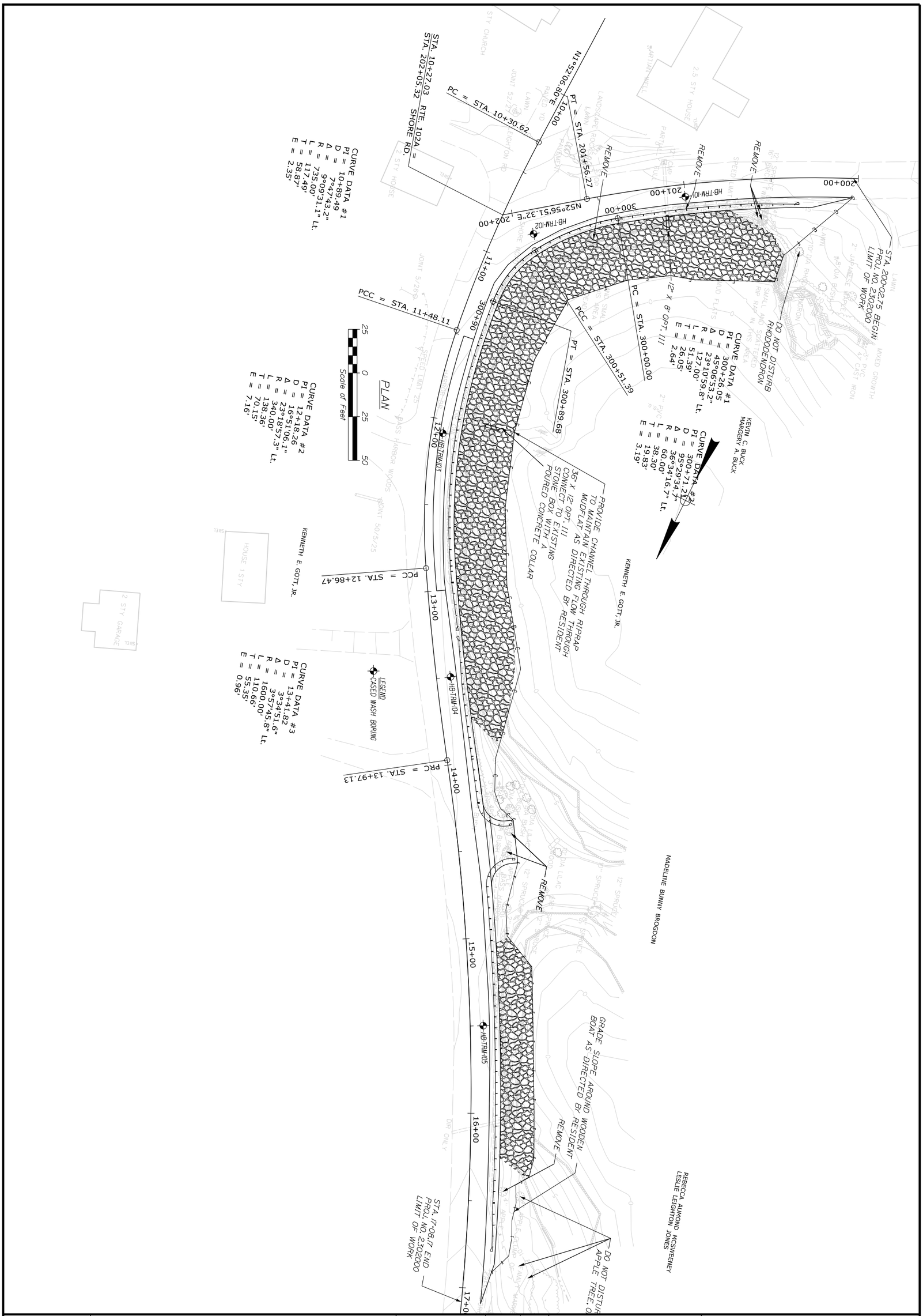
0.09 Miles

1 inch = 0.1 miles

Date: 10/20/2023
Time: 8:34:33 AM

SHEET NUMBER 1 OF 2	TREMONT ROUTE 102A LOCATION MAP	STATE OF MAINE DEPARTMENT OF TRANSPORTATION 2302000 WIN 23020.00 HIGHWAY PLANS

Filename: ...\00\GEOTECH\MSTA\002_BLP1.dgn Division: GEOTECH Username: Kate.Maguire Date:10/25/2023



PROJ. MANAGER		BY	DATE
DESIGN-DETAILED	C.RUSSELL	T.WHITE	NOV 2020
CHECKED-REVIEWED			
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

TREMONT
ROUTE 102A

BORING LOCATION PLAN

SHEET NUMBER 2 OF 2

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2302000

WIN 23020.00 HIGHWAY PLANS

Appendix A

Boring Logs

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS (more than half of material is larger than No. 4 sieve size)	GRAVELS (more than half of coarse fraction is larger than No. 4 sieve size)	CLEAN GRAVELS (little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel sand mixtures, little or no fines.
		GRAVEL WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (more than half of coarse fraction is smaller than No. 4 sieve size)	CLEAN SANDS (little or no fines)	SW	Well-graded sands, Gravelly sands, little or no fines
			SP	Poorly-graded sands, Gravelly sand, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (more than half of material is smaller than No. 200 sieve size)	SILTS AND CLAYS (liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, Silty or Clayey fine sands, or Clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, Gravelly clays, Sandy clays, Silty clays, lean clays.
			OL	Organic silts and organic Silty clays of low plasticity.
	SILTS AND CLAYS (liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine Sandy or Silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
	HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.

Desired Soil Observations (in this order, if applicable):

Color (Munsell color chart)
Moisture (dry, damp, moist, wet)
Density/Consistency (from above right hand side)
Texture (fine, medium, coarse, etc.)
Name (Sand, Silty Sand, Clay, etc., including portions - trace, little, 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

MODIFIED BURMISTER SYSTEM

Descriptive Term	Portion of Total (%)
trace	0 - 10
little	11 - 20
some	21 - 35
adjective (e.g. Sandy, Clayey)	36 - 50

TERMS DESCRIBING DENSITY/CONSISTENCY

Coarse-grained soils (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).

Density of Cohesionless Soils	Standard Penetration Resistance N-Value (blows per foot)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

Fine-grained soils (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.

Consistency of Cohesive soils	SPT N-Value (blows per foot)	Approximate Undrained Shear Strength (psf)	Field Guidelines
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

Rock Quality Designation (RQD):

$$\text{RQD (\%)} = \frac{\text{sum of the lengths of intact pieces of core* > 4 inches}}{\text{length of core advance}}$$

*Minimum NQ rock core (1.88 in. OD of core)

Rock Quality Based on RQD

Rock Quality	RQD (%)
Very Poor	≤25
Poor	26 - 50
Fair	51 - 75
Good	76 - 90
Excellent	91 - 100

Desired Rock Observations (in this order, if applicable):

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))

Maine Department of Transportation
Geotechnical Section
Key to Soil and Rock Descriptions and Terms
Field Identification Information

Sample Container Labeling Requirements:

WIN
Bridge Name / Town
Boring Number
Sample Number
Sample Depth
Blow Counts
Sample Recovery
Date
Personnel Initials

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Slope Stabilization Route 102A (Shore Road)
Location: Tremont, Maine

Boring No.: HB-TRM-101
WIN: 23020.00

Driller:	MaineDOT	**Elevation (ft.)**	15.4	**Auger ID/OD:**	5" Solid Stem
Operator:	Daggett	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/6/2020; 11:30-15:30	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	NQ-2"
Boring Location:	201+00, 7.0 ft Lt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	7.0 ft bgs.
Hammer Efficiency Factor: 0.89		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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_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

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	14.8		7½" HMA (0.6)	
	1D/A	24/17	1.00 - 3.00	4/5/7/7	12	18				1D (1.0-2.0 ft bgs.) Brown, damp, medium dense, fine to coarse SAND, some gravel, trace silt, (Fill).	G#340876 A-1-b, SW-SM WC=11.6%
								13.4		(2.0) 1D/A (2.0-3.0 ft bgs.) Olive brown, damp, stiff Clayey SILT, trace fine to coarse sand, trace gravel.	G#340877 A-4, CL WC=15.1%
								10.9		(4.5)	
5	2D	24/20	5.00 - 7.00	20/20/32/47	52	77				Grey, dry, very dense, fine to coarse Sandy GRAVEL, trace silt.	G#340878 A-1-a, GW-GM WC=1.5%
								6.0		Cobble from 9.1-9.4 ft bgs. (9.4)	
10	3D	24/20	10.00 - 12.00	23/24/27/29	51	76				Brown, damp, very dense, Gravelly fine to coarse SAND, trace silt, occasional cobble.	
								1.4		(14.0)	
15	4D	24/18	15.00 - 17.00	32/32/34/39	66	98	68			Brown, wet, very dense, Gravelly fine to coarse SAND, trace silt, occasional cobble.	G#340879 A-1-a, SW-SM WC=8.4%
							106				
							168				
							92				
							92				
20	5D	12/2	20.00 - 21.00	11/50	---		50			Brown, wet, very dense, Gravelly fine to coarse SAND, trace silt, occasional cobble.	
	R1	60/55	21.20 - 26.20	RQD = 7%			NQ-2	-5.6		(21.0) Top of Bedrock at Elev. -5.6 ft. Roller Coned ahead to 21.2 ft bgs. R1:Bedrock: Mafic to felsic volcanic rocks (Castine Formation). Rock Quality = Very Poor R1:Core Times (min:sec) 21.2-22.2 ft (3:16) 22.2-23.2 ft (3:42) 23.2-24.2 ft (3:48)	
25											

Remarks:

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.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Slope Stabilization Route 102A (Shore Road)
Location: Tremont, Maine

Boring No.: HB-TRM-101
WIN: 23020.00

Driller:	MaineDOT	**Elevation (ft.)**	15.4	**Auger ID/OD:**	5" Solid Stem
Operator:	Daggett	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/6/2020; 11:30-15:30	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	NQ-2"
Boring Location:	201+00, 7.0 ft Lt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	7.0 ft bgs.
Hammer Efficiency Factor: 0.89		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
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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_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

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25											
								-10.8		24.2-25.2 ft (3:48) 25.2-26.2 ft (4:50) 92% Recovery	
										26.2	
										Bottom of Exploration at 26.2 feet below ground surface.	
30											
35											
40											
45											
50											

Remarks:

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.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Slope Stabilization Route 102A (Shore Road)
Location: Tremont, Maine

Boring No.: HB-TRM-102
WIN: 23020.00

Driller:	MaineDOT	**Elevation (ft.)**	16.3	**Auger ID/OD:**	5" Solid Stem
Operator:	Daggett	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/7/2020; 07:00-10:00	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	N/A
Boring Location:	201+90, 14.0 ft Lt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	None Observed
Hammer Efficiency Factor: 0.89		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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_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

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	15.8		6" HMA	
										0.5	
										Brown, damp, Gravelly fine to coarse SAND, (Fill). Cobble from 1.0-1.3 ft bgs.	
	1D	24/18	2.00 - 4.00	3/5/5/5	10	15		13.8		2.5	G#340880 A-4, CL WC=15.8%
										1D (2.5-4.0 ft bgs.) Light brown, moist, stiff, fine to coarse Sandy SILT, trace gravel.	
5	2D	24/24	5.00 - 7.00	3/4/8/9	12	18		11.3		5.0	G#340881 A-7-6, CL WC=23.3% LL=44 PL=21 PI=23
										Olive, moist, very stiff, Silty CLAY, trace fine sand.	
								6.8		9.5	
10	3D	24/18	10.00 - 12.00	8/9/6/8	15	22	15			Light brown, moist, medium dense, fine to coarse SAND, trace gravel, trace silt.	G#340882 A-3, SP WC=4.3%
							26				
							116				
							88				
							141	2.3		14.0	
15	4D	24/4	15.00 - 17.00	8/12/7/8	19	28	12			Brown, wet, medium dense, fine to coarse SAND, some gravel, trace silt, occasional cobble.	
							14				
							32				
							50				
20	5D	24/12	20.00 - 22.00	11/13/13/13	26	39	37			Brown, wet, dense, fine to coarse SAND, little gravel, trace silt.	G#340883 A-1-b, SP-SM WC=13.1%
							61				
							69				
							98				
25							146				

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Slope Stabilization Route 102A (Shore Road)
Location: Tremont, Maine

Boring No.: HB-TRM-102
WIN: 23020.00

Driller:	MaineDOT	**Elevation (ft.)**	16.3	**Auger ID/OD:**	5" Solid Stem
Operator:	Daggett	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/7/2020; 07:00-10:00	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	N/A
Boring Location:	201+90, 14.0 ft Lt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	None Observed
Hammer Efficiency Factor: 0.89		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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_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

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	6D	24/14	25.00 - 27.00	10/12/30/44	42	62				Brown, wet, very dense, fine to coarse SAND, little gravel, trace silt.	
								-10.7		27.0	
										Bottom of Exploration at 27.0 feet below ground surface. NO REFUSAL	
30											
35											
40											
45											
50											

Remarks:

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.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Slope Stabilization Route 102A (Shore Road)
Location: Tremont, Maine

Boring No.: HB-TRM-103
WIN: 23020.00

Driller:	MaineDOT	**Elevation (ft.)**	13.3	**Auger ID/OD:**	5" Solid Stem
Operator:	Daggett	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/7/2020; 10:00-11:30	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	NQ-2"
Boring Location:	12+08, 6.5 ft Lt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	7.0 ft bgs.
Hammer Efficiency Factor: 0.89		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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_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

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	12.8		6" HMA	
										0.5	
	1D	24/17	1.00 - 3.00	4/13/12/14	25	37				Brown, damp, dense, fine to coarse SAND, some gravel, trace silt, (Fill).	G#340884 A-1-b, SW-SM WC=6.6%
5	2D	24/16	5.00 - 7.00	6/9/7/5	16	24				Brown, damp, medium dense, fine to coarse SAND, some gravel, trace silt, (Fill).	
								3.8		9.5	
10	3D	24/15	10.00 - 12.00	5/5/6/14	11	16	16			Brown, wet, medium dense, fine to coarse SAND, some gravel, little silt.	G#340885 A-1-b, SW-SM WC=15.9%
							32				
							57				
	R1	60/57	13.70 - 18.70	RQD = 25%			[a]80 NQ-2			[a]80 blows for 0.7 ft.	
								-0.4		13.7	
15										Top of Bedrock at Elev. -0.4 ft. R1:Bedrock: Mafic to felsic volcanic rocks (Castine Formation). Rock Quality = Very Poor R1:Core Times (min:sec) 13.7-14.7 ft (2:39) 14.7-15.7 ft (3:59) 15.7-16.7 ft (5:17) 16.7-17.7 ft (5:35) 17.7-18.7 ft (6:03) 97% Recovery	
								-5.4		18.7	
20										**Bottom of Exploration at 18.7 feet below ground surface.**	
25											

Remarks:

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.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Slope Stabilization Route 102A (Shore Road)
Location: Tremont, Maine

Boring No.: HB-TRM-104
WIN: 23020.00

Driller:	MaineDOT	**Elevation (ft.)**	12.8	**Auger ID/OD:**	5" Solid Stem
Operator:	Daggett	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/7/2020; 13:00-15:30	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	NQ-2"
Boring Location:	13+50, 7.0 ft Lt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	6.0 ft bgs.
Hammer Efficiency Factor: 0.89		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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_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

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	12.3		6" HMA (0.5)	
	1D	24/19	1.00 - 3.00	3/6/8/5	14	21				Brown, damp, medium dense, Silty fine to coarse SAND, trace gravel, (Fill).	G#340886 A-4, SM WC=16.5%
								8.3		(4.5)	
5	2D	24/24	5.00 - 7.00	2/3/11/11	14	21				Olive, moist, very stiff, Silty CLAY, trace fine to coarse sand, trace gravel.	G#340887 A-6, CL WC=23.0% LL=36 PL=20 PI=16
								5.3		(7.5)	
10	3D	24/18	10.00 - 12.00	3/6/20/21	26	39	4			Brown, wet, dense, fine to coarse SAND, little silt, trace gravel.	G#340888 A-2-4, SM WC=15.7%
							58				
							56				
							63				
							87	-1.2		(14.0)	
15	4D	4.8/4	15.00 - 15.40	50(4.8")	---		a30	-2.6		[a]30 blows for 0.4 ft. Olive, wet, very dense, fine to coarse SAND, little silt, (Till). (15.4)	
	R1	60/57	15.40 - 20.40	RQD = 28%			NQ-2			Top of Bedrock at Elev. -2.6 ft. R1:Bedrock: Mafic to felsic volcanic rocks (Castine Formation). Rock Quality = Poor R1:Core Times (min:sec) 15.4-16.4 ft (1:20) 16.4-17.4 ft (1:27) 17.4-18.4 ft (1:56) 18.4-19.4 ft (2:14) 19.4-20.4 ft (2:22) 97% Recovery	
20								-7.6		(20.4) **Bottom of Exploration at 20.4 feet below ground surface.**	
25											

Remarks:

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.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Slope Stabilization Route 102A (Shore Road)
Location: Tremont, Maine

Boring No.: HB-TRM-105
WIN: 23020.00

Driller:	MaineDOT	**Elevation (ft.)**	11.9	**Auger ID/OD:**	5" Solid Stem
Operator:	Daggett	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/8/2020; 08:00-10:00	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	NQ-2"
Boring Location:	15+50, 7.5 ft Lt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	None Observed
Hammer Efficiency Factor: 0.89		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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_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

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	11.4		6" HMA (0.5)	
	1D/A	24/19	1.00 - 3.00	12/12/7/4	19	28				1D (1.0-2.0 ft bgs.) Brown, damp, medium dense, fine to coarse SAND, some gravel, little silt, (Fill). 1D/A (2.0-3.0 ft bgs.) Brown, moist, medium dense, Silty fine to coarse SAND, trace gravel, (Fill).	G#340889 A-1-b, SM WC=6.3% G#340890 A-4, SM WC=18.5%
								7.4		(4.5)	
5	2D	14.4/12	5.00 - 6.20	14/28/50(2.4")	---		15			Brown, moist, very dense, fine to coarse SAND, some gravel, some silt, (Till).	G#340891 A-1-b, SM WC=8.7%
	R1	60/60	6.70 - 11.70	RQD = 15%			[a]40 NQ-2	5.2		[a]40 blows for 0.7 ft. Roller Coned ahead from 6.2-6.7 ft bgs. (6.7)	
										Top of Bedrock at Elev. 5.2 ft. R1:Bedrock: Mafic to felsic volcanic rocks (Castine Formation). Rock Quality = Very Poor R1:Core Times (min:sec) 6.7-7.7 ft (3:53) 7.7-8.7 ft (5:46) 8.7-9.7 ft (5:07) 9.7-10.7 ft (4:42) 10.7-11.7 ft (4:46) 100% Recovery	
10								0.2		(11.7)	
										Bottom of Exploration at 11.7 feet below ground surface.	
15											
20											
25											

Remarks:

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Appendix B

Laboratory Test Results

State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

Town(s): Tremont Work Number: 23020.00

Boring & Sample Identification Number	Station (Feet)	Offset (Feet)	Depth (Feet)	Reference Number	G.S.D.C. Sheet	W.C. %	L.L.	P.I.	Classification		
									Unified	AASHTO	Frost
HB-TRM-101, 1D	201+00	7.0 Lt.	1.0-2.0	340876	1	11.6			SW-SM	A-1-b	0
HB-TRM-101, 1D/A	201+00	7.0 Lt.	2.0-3.0	340877	1	15.1			CL	A-4	IV
HB-TRM-101, 2D	201+00	7.0 Lt.	5.0-7.0	340878	1	1.5			GW-GM	A-1-a	0
HB-TRM-101, 4D	201+00	7.0 Lt.	15.0-17.0	340879	1	8.4			SW-SM	A-1-a	0
HB-TRM-102, 1D	201+90	14.0 Lt.	2.5-4.0	340880	2	15.8			CL	A-4	IV
HB-TRM-102, 2D	201+90	14.0 Lt.	5.0-7.0	340881	2	23.3	44	23	CL	A-7-6	III
HB-TRM-102, 3D	201+90	14.0 Lt.	10.0-12.0	340882	2	4.3			SP	A-3	0
HB-TRM-102, 5D	201+90	14.0 Lt.	20.0-22.0	340883	2	13.1			SP-SM	A-1-b	0
HB-TRM-103, 1D	12+08	6.5 Lt.	1.0-3.0	340884	2	6.6			SW-SM	A-1-b	0
HB-TRM-103, 3D	12+08	6.5 Lt.	10.0-12.0	340885	2	15.9			SW-SM	A-1-b	0
HB-TRM-104, 1D	13+50	7.0 Lt.	1.0-3.0	340886	3	16.5			SM	A-4	III
HB-TRM-104, 2D	13+50	7.0 Lt.	5.0-7.0	340887	3	23.0	36	16	CL	A-6	III
HB-TRM-104, 3D	13+50	7.0 Lt.	10.0-12.0	340888	3	15.7			SM	A-2-4	II
HB-TRM-105, 1D	15+50	7.5 Lt.	1.0-2.0	340889	3	6.3			SM	A-1-b	II
HB-TRM-105, 1D/A	15+50	7.5 Lt.	2.0-3.0	340890	3	18.5			SM	A-4	III
HB-TRM-105, 2D	15+50	7.5 Lt.	5.0-6.2	340891	3	8.7			SM	A-1-b	II

Classification of these soil samples is in accordance with AASHTO Classification System M-145-40. This classification is followed by the "Frost Susceptibility Rating" from zero (non-frost susceptible) to Class IV (highly frost susceptible). The "Frost Susceptibility Rating" is based upon the MaineDOT and Corps of Engineers Classification Systems.

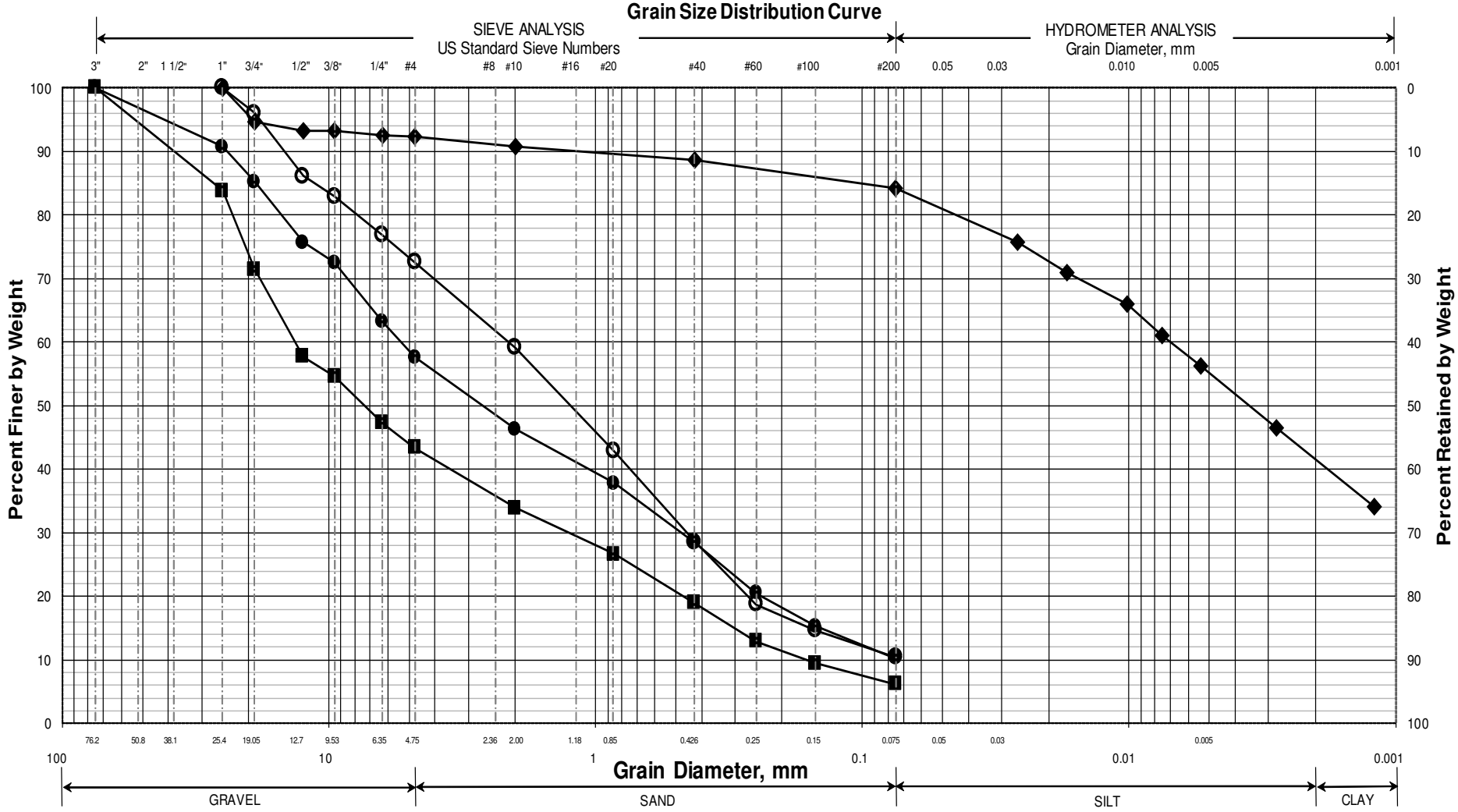
GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-93 (1996) and/or ASTM D 422-63 (Reapproved 1998)

WC = water content as determined by AASHTO T 265-93 and/or ASTM D 2216-98

LL = Liquid limit as determined by AASHTO T 89-96 and/or ASTM D 4318-98 NP = Non Plastic

PI = Plasticity Index as determined by AASHTO 90-96 and/or ASTM D4318-98

Maine Department of Transportation
Grain Size Distribution Curve



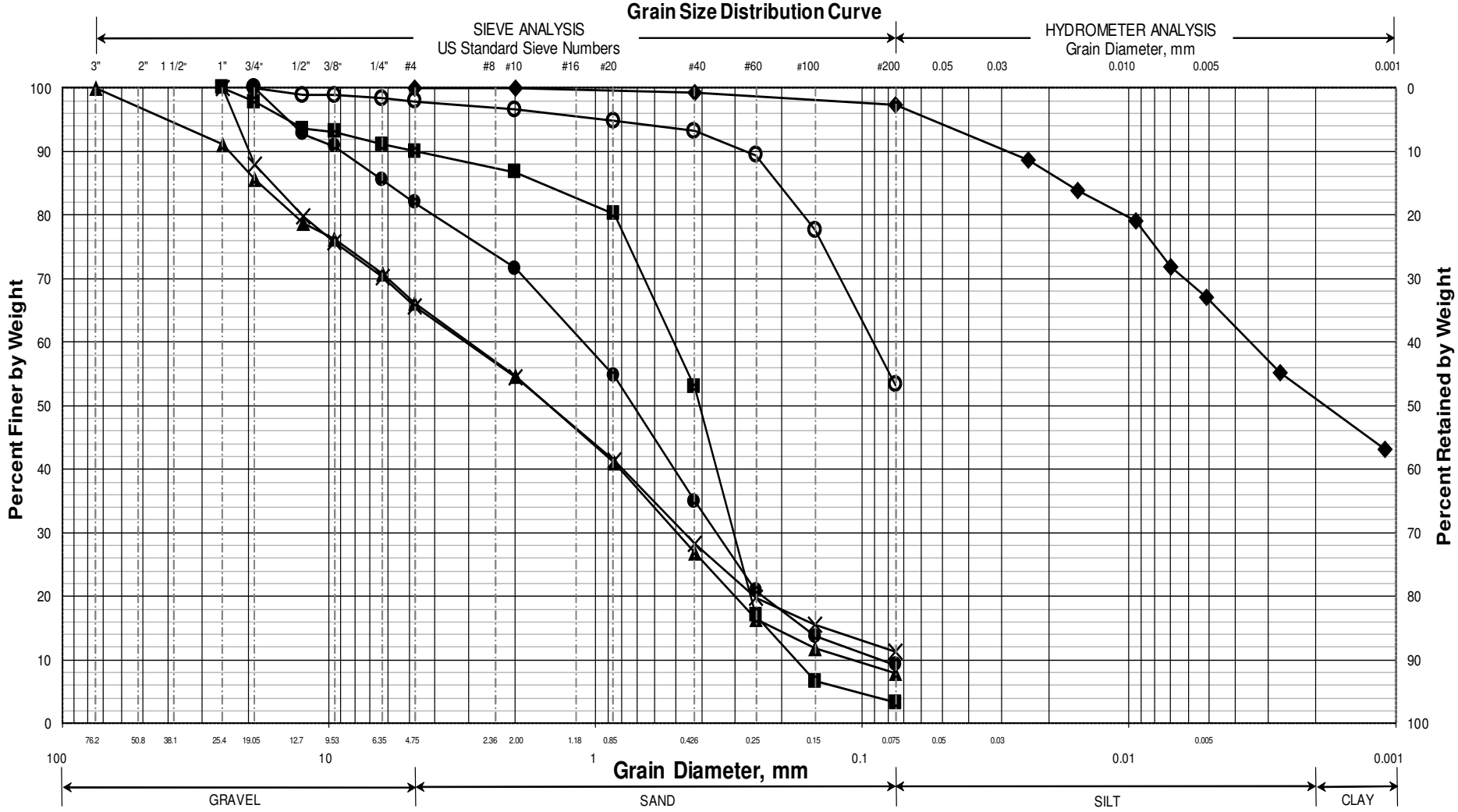
UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-TRM-101/1D	201+00	7.0 LT	1.0-2.0	SAND, some gravel, trace silt.	11.6			
◆	HB-TRM-101/1DA	201+00	7.0 LT	2.0-3.0	Clayey SILT, trace sand, trace gravel.	15.1			
■	HB-TRM-101/2D	201+00	7.0 LT	5.0-7.0	Sandy GRAVEL, trace silt.	1.5			
●	HB-TRM-101/4D	201+00	7.0 LT	15.0-17.0	Gravelly SAND, trace silt.	8.4			
▲									
×									

WIN
023020.00
Town
Tremont
Reported by/Date
WHITE, TERRY A 12/17/2020

SHEET 1

Maine Department of Transportation
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-TRM-102/1D	201+90	14.0 LT	2.5-4.0	Sandy SILT, trace gravel.	15.8			
◆	HB-TRM-102/2D	201+90	14.0 LT	5.0-7.0	Silty CLAY, trace sand.	23.3	44	21	23
■	HB-TRM-102/3D	201+90	14.0 LT	10.0-12.0	SAND, trace gravel, trace silt.	4.3			
●	HB-TRM-102/5D	201+90	14.0 LT	20.0-22.0	SAND, little gravel, trace silt.	13.1			
▲	HB-TRM-103/1D	12+08	6.5 LT	1.0-3.0	SAND, some gravel, trace silt.	6.6			
×	HB-TRM-103/3D	12+08	6.5 LT	10.0-12.0	SAND, some gravel, little silt.	15.9			

WIN	
023020.00	
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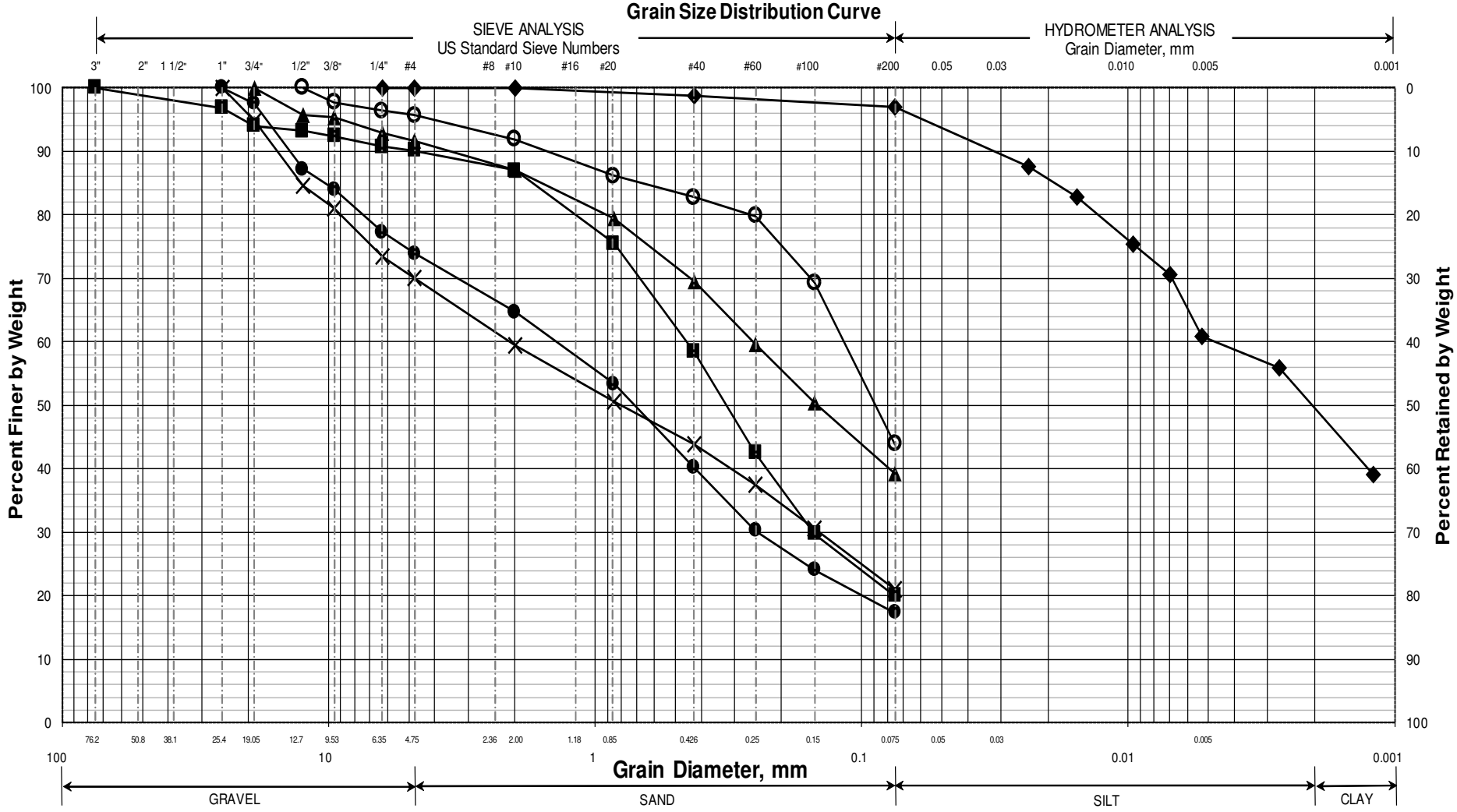
Tremont	
Reported by/Date	
WHITE, TERRY A	12/17/2020

Maine Department of Transportation
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-TRM-104/1D	13+50	7.0 LT	1.0-3.0	Silty SAND, trace gravel.	16.5			
◆	HB-TRM-104/2D	13+50	7.0 LT	5.0-7.0	Silty CLAY, trace sand, trace gravel.	23.0	36	20	16
■	HB-TRM-104/3D	13+50	7.0 LT	10.0-12.0	SAND, little silt, trace gravel.	15.7			
●	HB-TRM-105/1D	15+50	7.5 LT	1.0-2.0	SAND, some gravel, little silt.	6.3			
▲	HB-TRM-105/1DA	15+50	7.5 LT	2.0-3.0	Silty SAND, trace gravel.	18.5			
×	HB-TRM-105/2D	15+50	7.5 LT	5.0-6.2	SAND, some gravel, some silt.	8.7			

WIN
023020.00
Town
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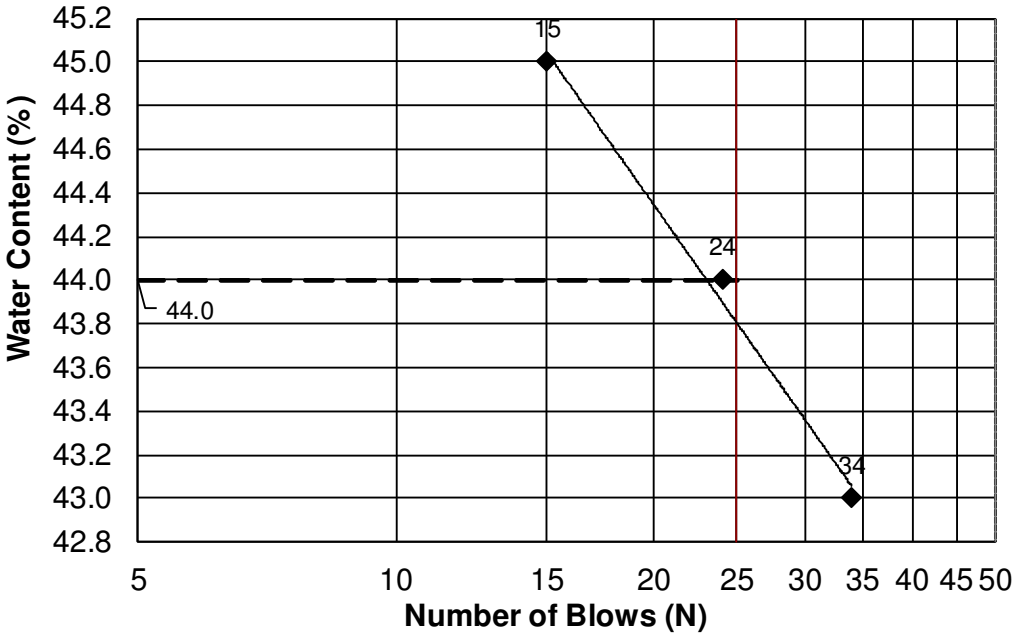
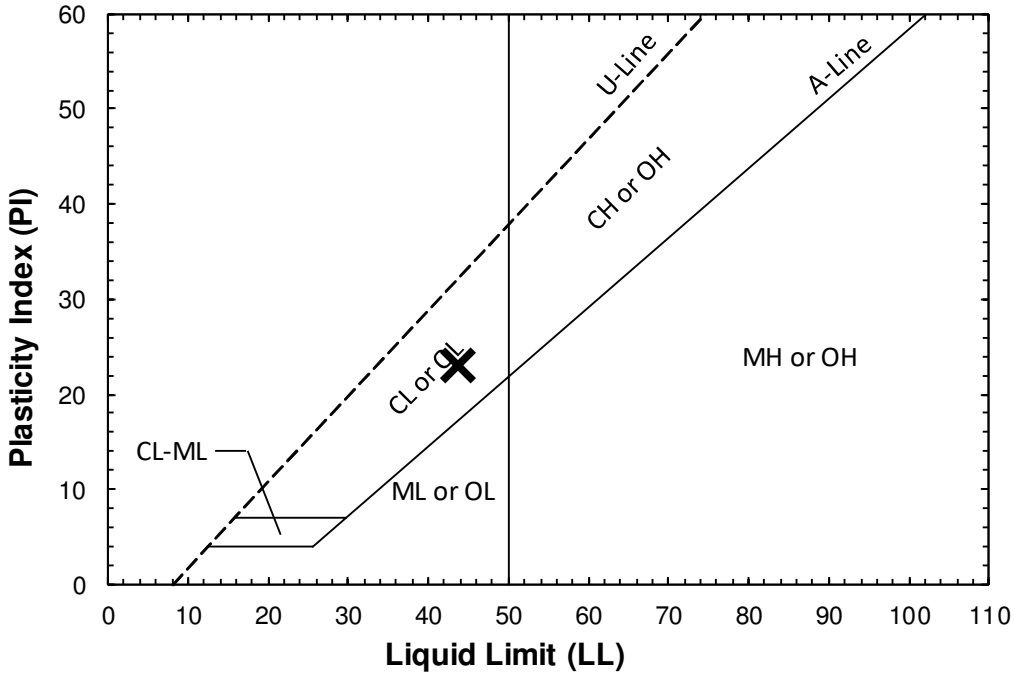
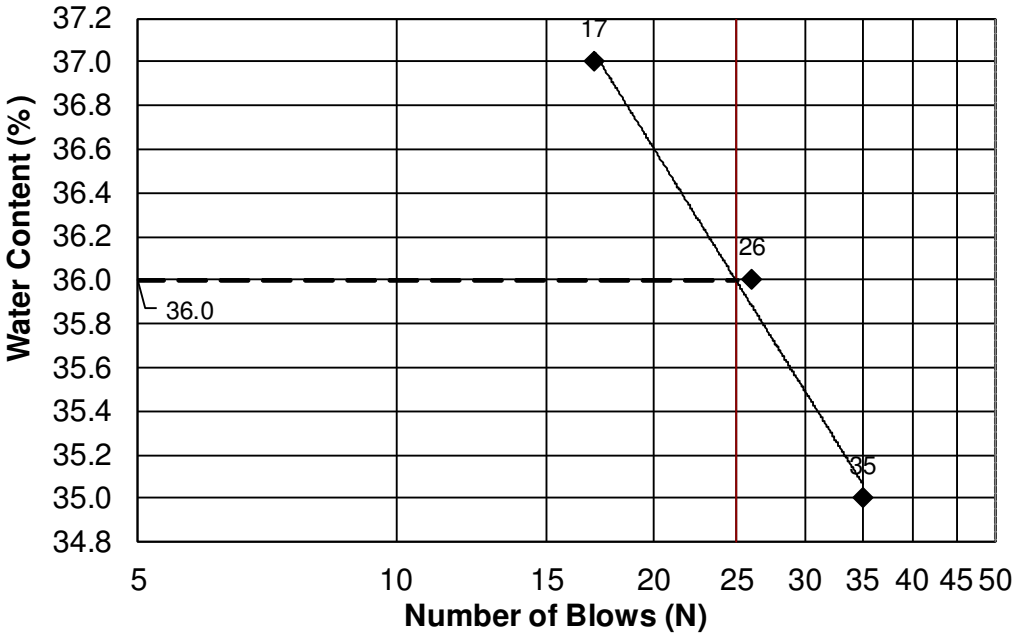
WHITE, TERRY A 12/17/2020

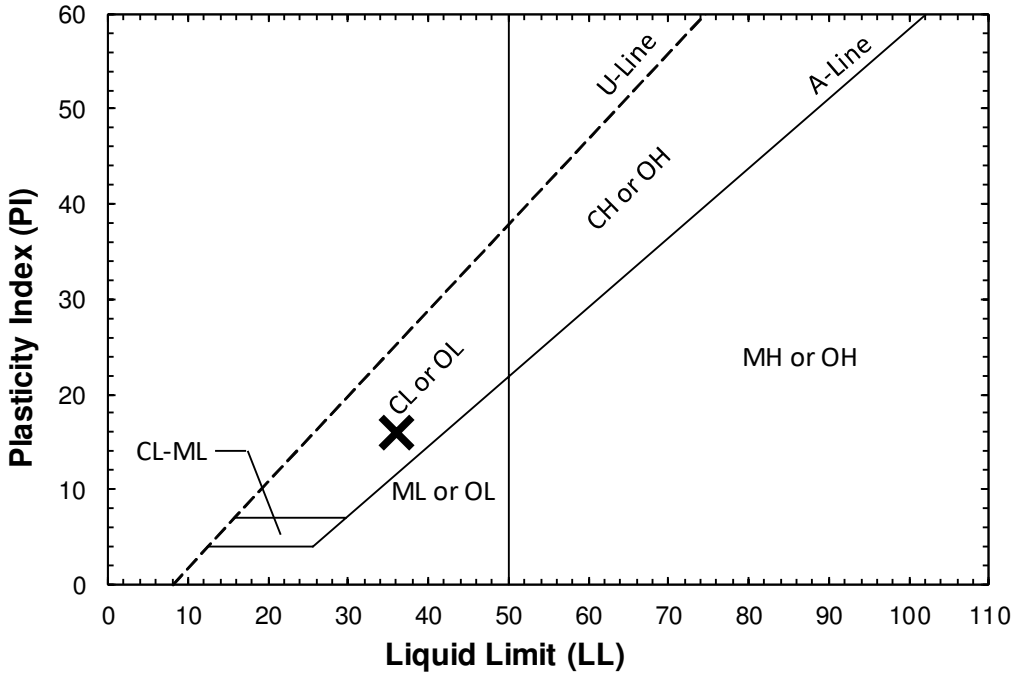
TOWN	Tremont	Reference No.	340881
WIN	023020.00	Water Content, %	23.3
Sampled	10/7/2020	Liquid Limit @ 25 blows (T 89), %	44
Boring No./Sample No.	HB-TRM-102/2D	Plastic Limit (T 90), %	21
Station	201+90	Plasticity Index (T 90), %	23
Depth	5.0-7.0	Tested By	BBURR





TOWN	Tremont	Reference No.	340887
WIN	023020.00	Water Content, %	23
Sampled	10/7/2020	Liquid Limit @ 25 blows (T 89), %	36
Boring No./Sample No.	HB-TRM-104/2D	Plastic Limit (T 90), %	20
Station	13+50	Plasticity Index (T 90), %	16
Depth	5.0-7.0	Tested By	BBURR

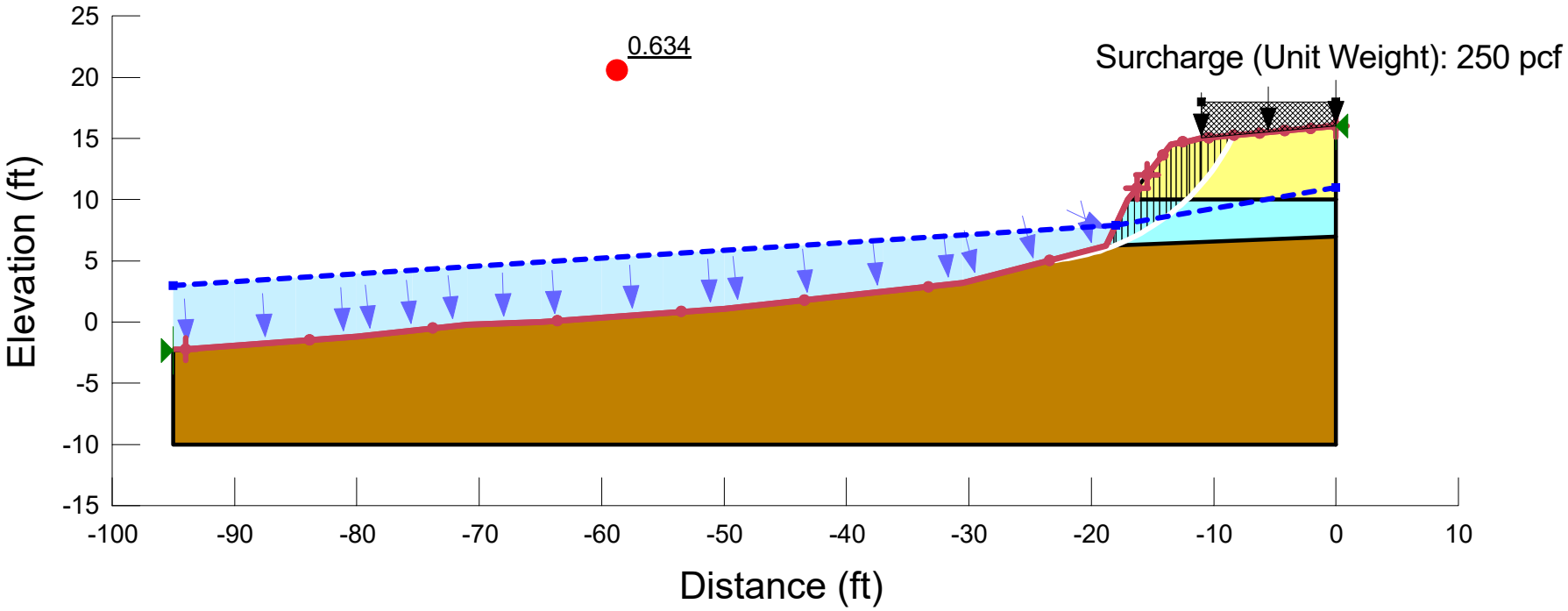




Appendix C

Slope Stability Analyses

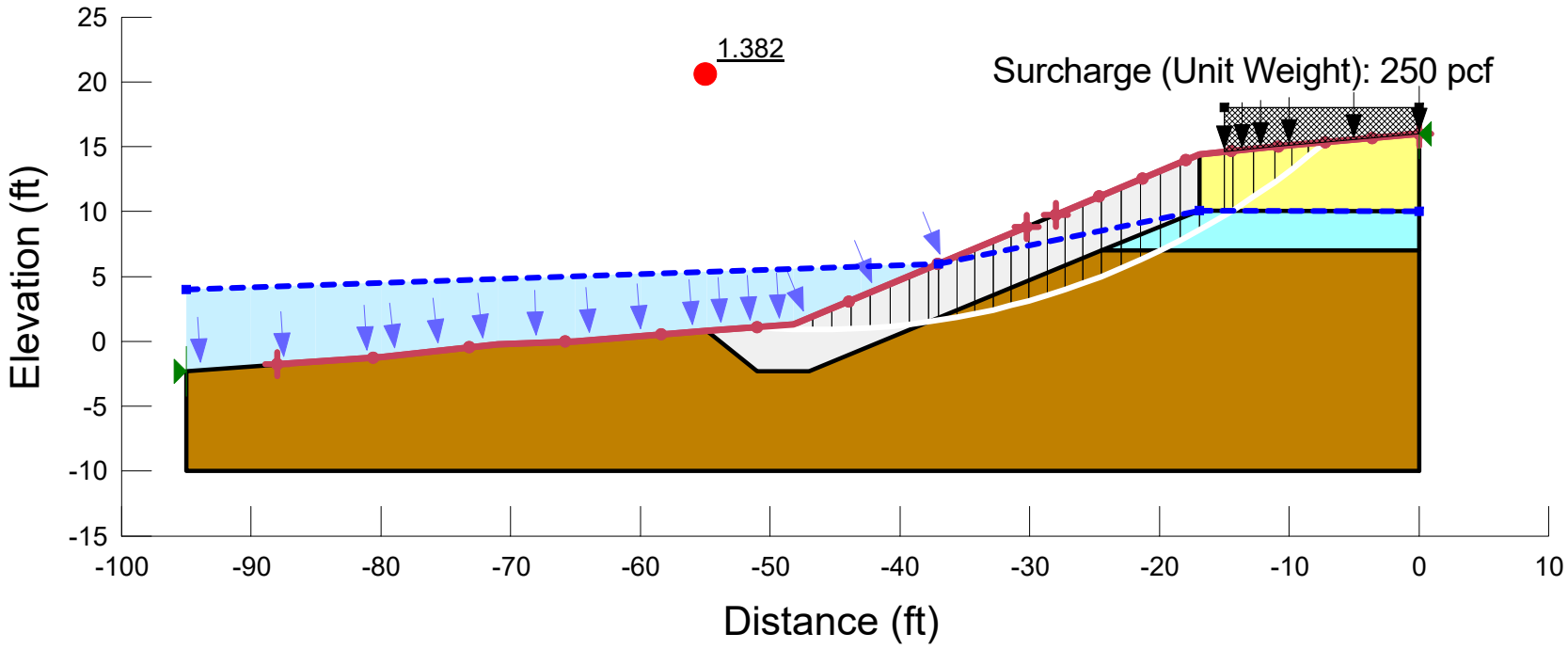
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Native Sand	125	0	34
	Sand/FIll	125	0	32
	Silt	115	0	28



Analysis Type: Spencer

File Name: 201+00 Existing Condition.gsz

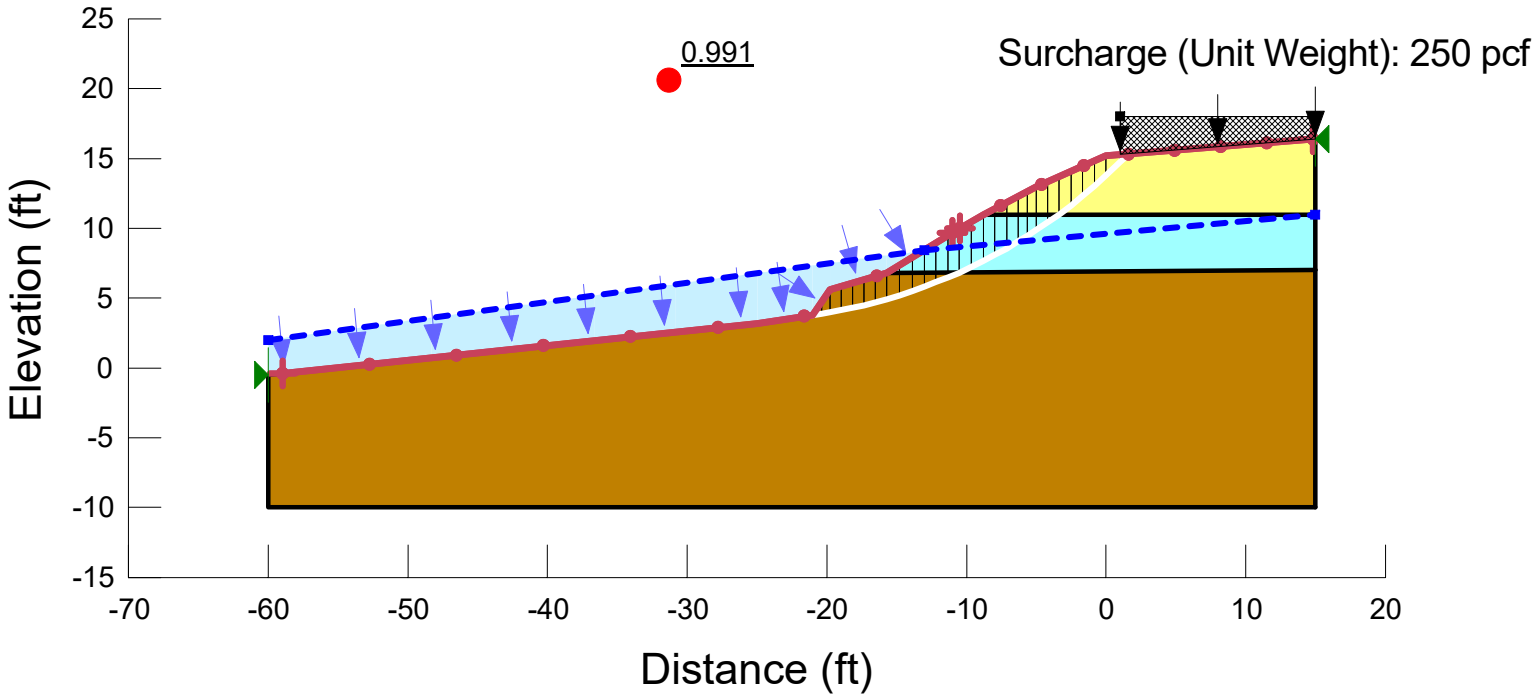
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Native Sand	125	0	34
	Riprap	145	0	42
	Sand/Fill	125	0	32
	Silt	115	0	28



Analysis Type: Spencer

File Name: 201+00 with 4 ft Riprap.gsz

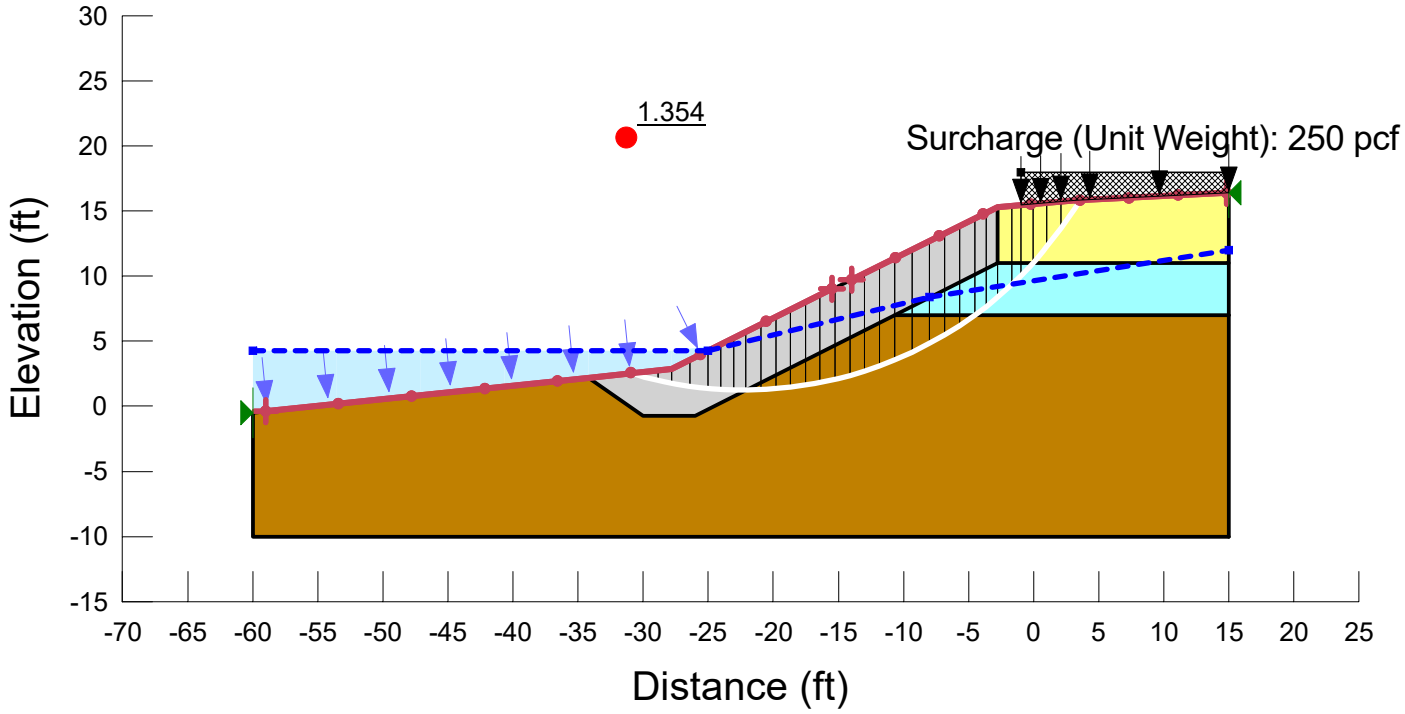
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Native Sand	125	0	34
	Sand/Fill	125	0	32
	Silt	115	0	28



Analysis Type: Spencer

File Name: 300+50 Existing Condition.gsz

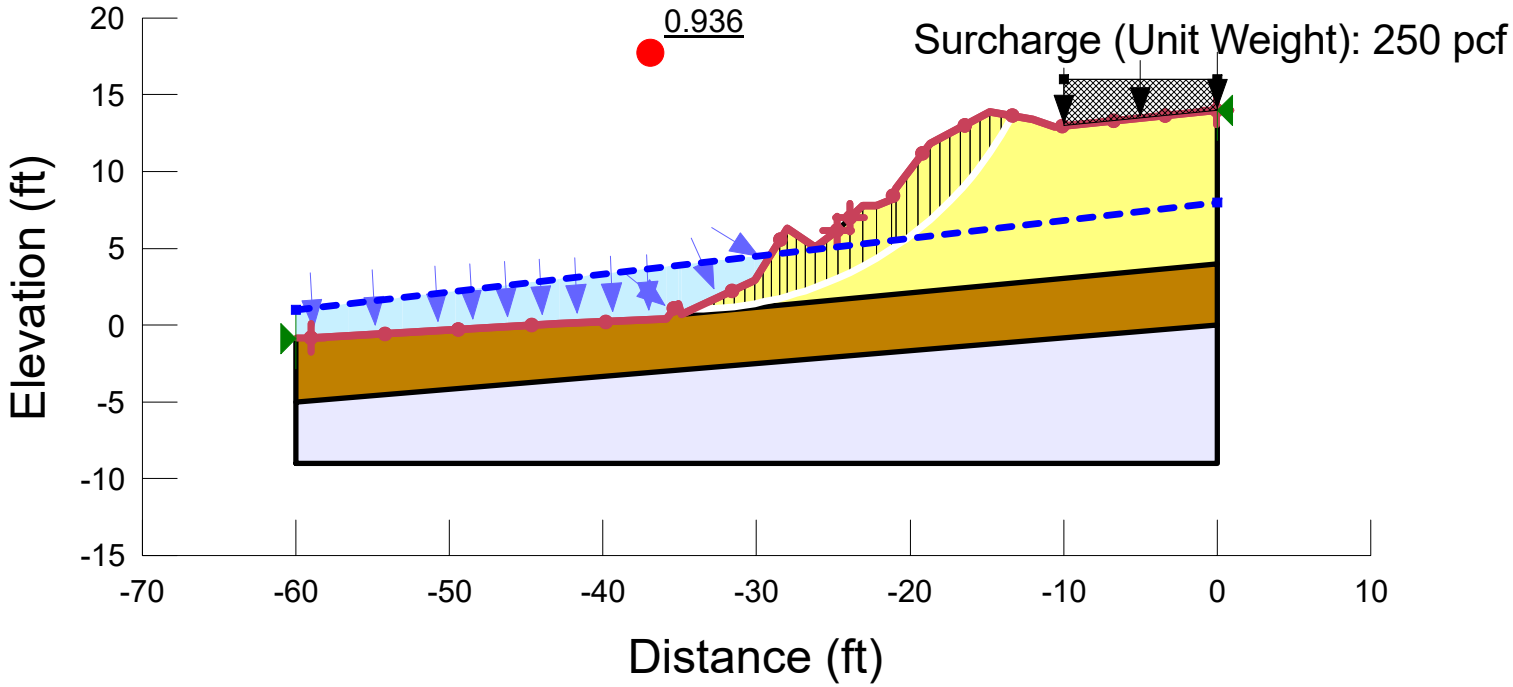
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Native Sand	125	0	34
	Riprap	145	0	42
	Sand/Fill	125	0	32
	Silt	115	0	28



Analysis Type: Spencer

File Name: 300+50 with 4 ft Riprap.gsz

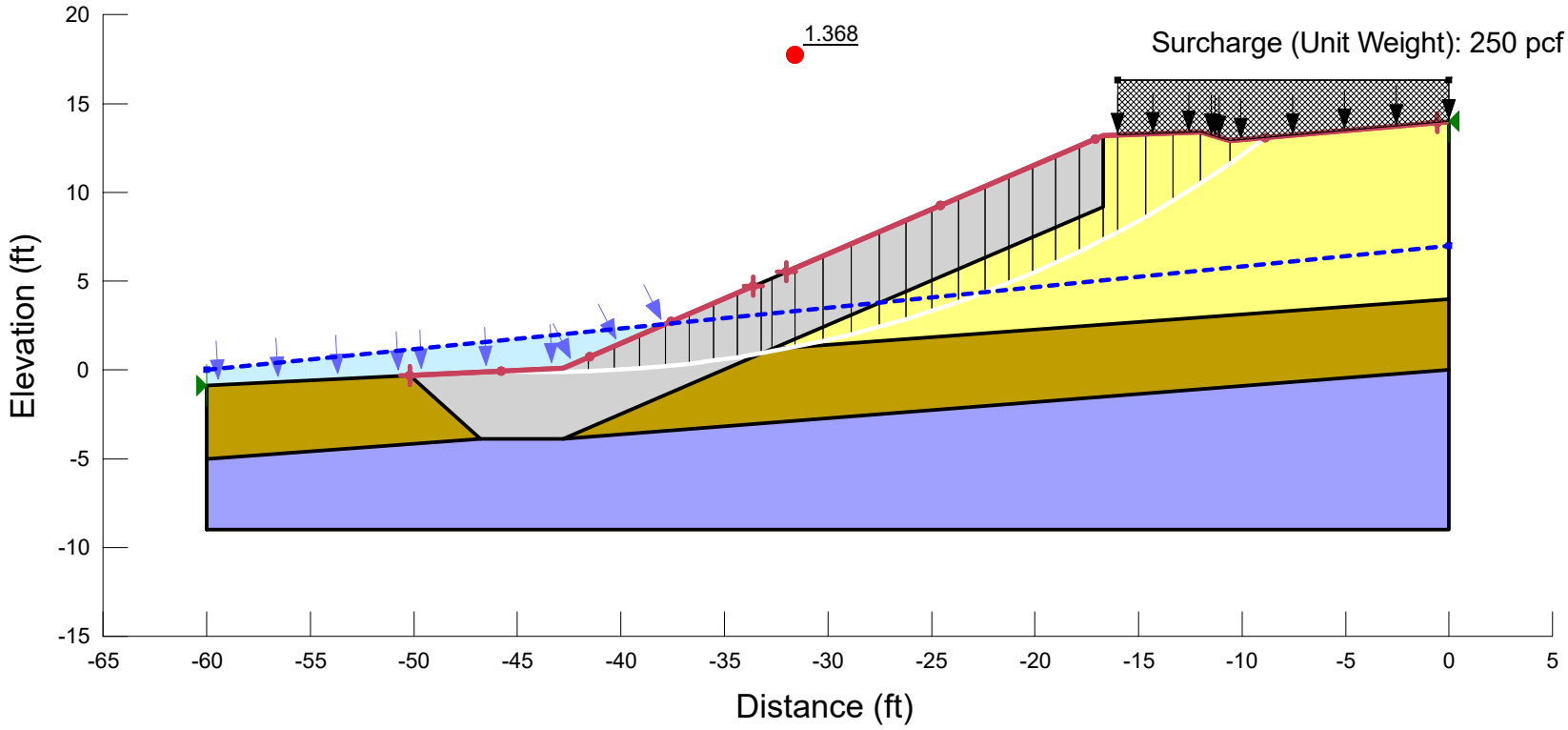
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Bedrock			
	Native Sand	125	0	34
	Sand/Fill	125	0	32



Analysis Type: Spencer

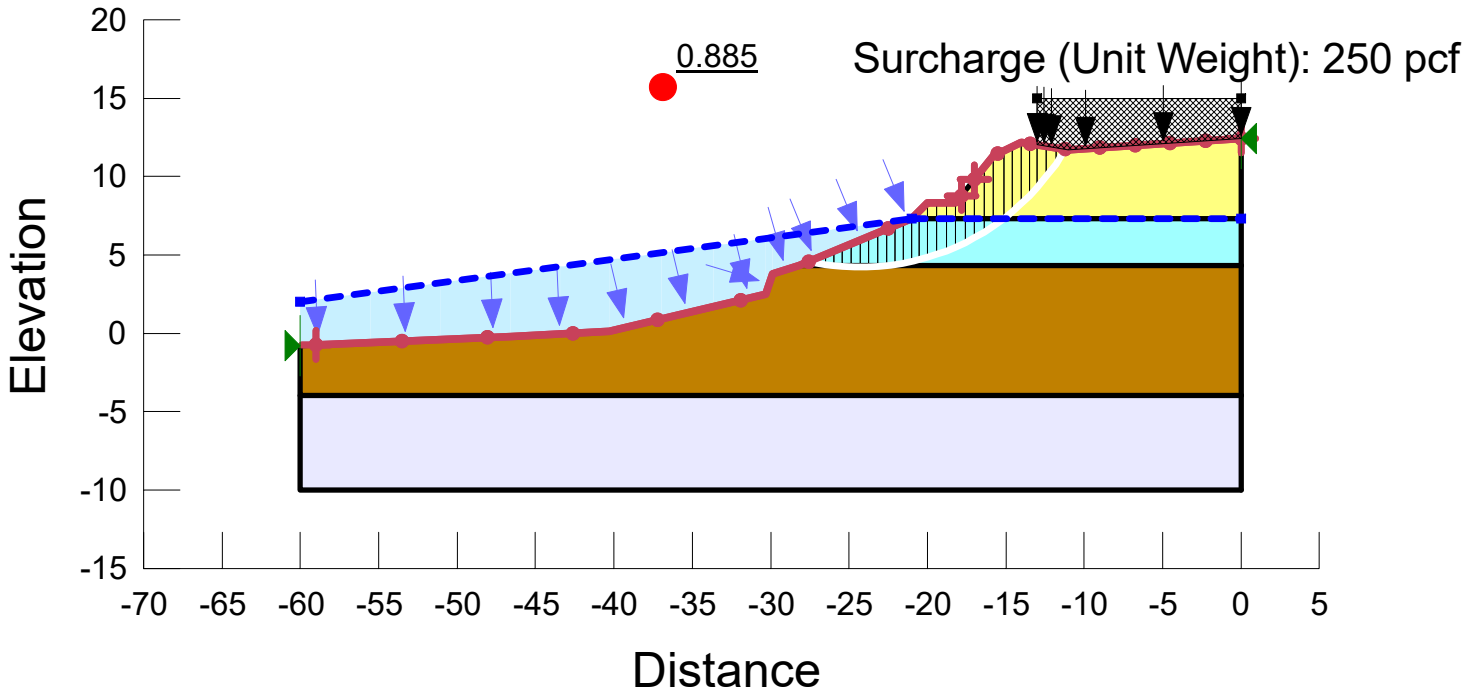
File Name: 12+00 Existing Conditions.gsz

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Bedrock			
	Native Sand	125	0	34
	Riprap	145	0	42
	Sand/Fill	125	0	32



Method: Spencer
File Name: 12+00 with 4 ft Riprap.gsz

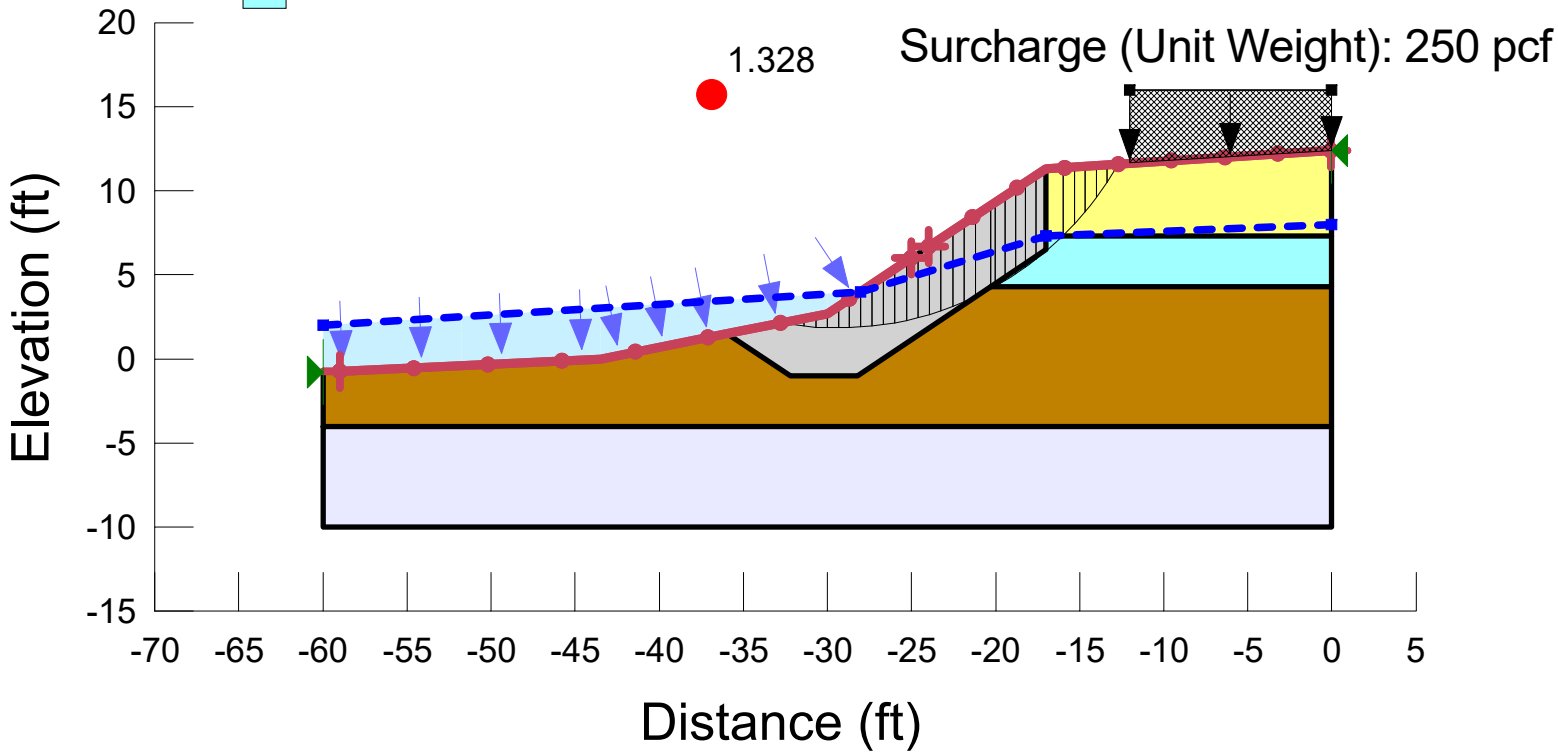
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Bedrock			
	Native Sand	125	0	34
	Sand/FIll	125	0	32
	Silt	115	0	28



Analysis Type: Spencer

File Name: 15+50 Existing Condition.gsz

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Bedrock			
	Native Sand	125	0	34
	Riprap	145	0	42
	Sand/Fill	125	0	32
	Silt	115	0	28



Analysis Type: Spencer

File Name: 15+50 with 4 ft Riprap.gsz