

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

GEOTECHNICAL DATA REPORT

For the Rehabilitation of:

**TIBBETTS BRIDGE
LOGGIN ROAD OVER MARSH STREAM
WINTERPORT-FRANKFORT, MAINE**

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Waldo County
PIN 16763.00

Soils Report No. 2011-08
Bridge No. 3344

Fed No. BR-1676(300)X
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1.0 INTRODUCTION

We show Tibbetts Bridge that carries Loggin Road over Marsh Stream in Winterport-Frankfort, Maine, on Sheet 1, Site Location Map found at the end of this data report. The existing single-span structure has painted steel girders, a structural slab, a bituminous wearing surface, and concrete bridge rail. The existing superstructure was built in 1951 over the original abutments presumably built in 1910. The steel superstructure was repainted in 1994 by Maine Department of Transportation (MaineDOT). 2010 MaineDOT Maintenance inspection reports indicate that the bridge substructure is in “serious” condition (rating of 3). Stone abutments are in fair to poor condition with some settlement, missing stones, voids, and undermining from scour. Concrete backwalls and wingwalls are in poor condition with extensive cracking and displacements due to movement of masonry below. The span length is approximately 76 feet.

The bridge substructures have experienced scour and settlement of stone abutments and retaining walls causing cracking and movement of backwalls and wingwalls, cracking in pavement, and the pinning of the steel girders against each backwall. The movements have also caused separation of guardrail from bridge rail. There was a scour repair of southeasterly abutment conducted in 1968 and bridge rail repair in 2001. The bridge had a sufficiency rating of 19.6 in the year 2010.

The initial purpose of our subsurface investigation was to provide subsurface condition data along the existing bridge alignment to help assess alternatives for bridge replacement along that alignment. Since that time, the bridge replacement project has been designated as a rehabilitation project. Thus, the purpose of this Geotechnical Data Report (GDR) is to archive the subsurface conditions in the vicinity of the existing bridge for use in a future bridge replacement project.

2.0 GEOLOGIC SETTING

The Maine Geologic Survey “Surficial Geology of Bucksport Quadrangle, Maine, Open-file No. 86-8” (1986) indicates that surficial soils in the vicinity of Tibbetts Bridge consist primarily of glacial-marine deposits with nearby stream alluvium and glacial till soil unit contacts. Bedrock outcrops and numerous moraine deposits are also mapped near the bridge site. Glacial-marine deposits generally consist of silt, clay, and sand, commonly a clayey silt, but sand is abundant at the surface in some places. The stream alluvium unit is typically made up of sand, gravel and silt. The glacial till is typically a heterogeneous mixture of sand, silt, clay, and stones. Moraines typically consist of narrow ridges of till or sand and gravel deposited at the margin of a glacier.

According to the Bedrock Geologic Map of Maine (1985), the bedrock at the Tibbetts Bridge site consists of Ordovician, interbedded pelite and sandstone. Bedrock cores from the borings consist of biotite, hornblende, quartz, gneiss. The local bedrock is part of the Cape Elizabeth Formation.

3.0 SUBSURFACE INVESTIGATION PROGRAM

The initial purpose of our subsurface investigation was to provide subsurface condition data from the existing bridge site to help assess bridge replacement alternatives. We investigated subsurface conditions in the vicinity of the existing bridge by drilling five test borings, BB-WFMS-101, BB-WFMS-102 and 102A, BB-WFMS-103, and BB-WFMS-104. The boring locations are shown on Sheet 2, Boring Location and Subsurface Interpretive Profile, found at the end of this report. We terminated four of the borings with bedrock cores. The Maine Department of Transportation (MaineDOT) drill rig and crew conducted the borings on April 1, 2 and 5, 2010. We present the details and sampling methods used, field data obtained, and soil and groundwater conditions encountered in the boring logs in Appendix A and on Sheet 3, Boring Logs, provided at the end of this report.

The MaineDOT geotechnical team member selected the boring locations and drilling methods, designated the type and depth of sampling techniques, and identified field and laboratory testing requirements. A consultant inspector logged the subsurface conditions in the borings conducted by the MaineDOT drill rig. The MaineDOT survey crew determined the boring location coordinates in the field when they collected the project survey data.

The borings were drilled using solid stem auger and cased wash boring techniques. Soil samples were obtained, where possible, at 5-foot intervals using Standard Penetration Test (SPT) methods. The standard penetration resistances, or N-values, discussed in this report are corrected for average hammer energy transfer. We compute the corrected or, N_{60} -values, by applying an average hammer energy transfer factor of 0.84 to the raw field N-values obtained with the MaineDOT drill rig. Bedrock was cored using an NQ-2 core barrel producing a 2.0-inch diameter rock core.

4.0 LABORATORY TESTING PROGRAM

We conducted a laboratory soil testing program on selected samples recovered from the test borings to evaluate soil classification and soil properties. We performed the soil laboratory testing at the AASHTO accredited MaineDOT Soils Laboratory in Bangor, Maine. Laboratory testing consisted of nine standard grain size analyses with natural water content. The laboratory performed the soil grain size tests in accordance with AASHTO T 11 and T 27 test standards. The laboratory performed the soil water content tests in accordance with AASHTO test standard T 265.

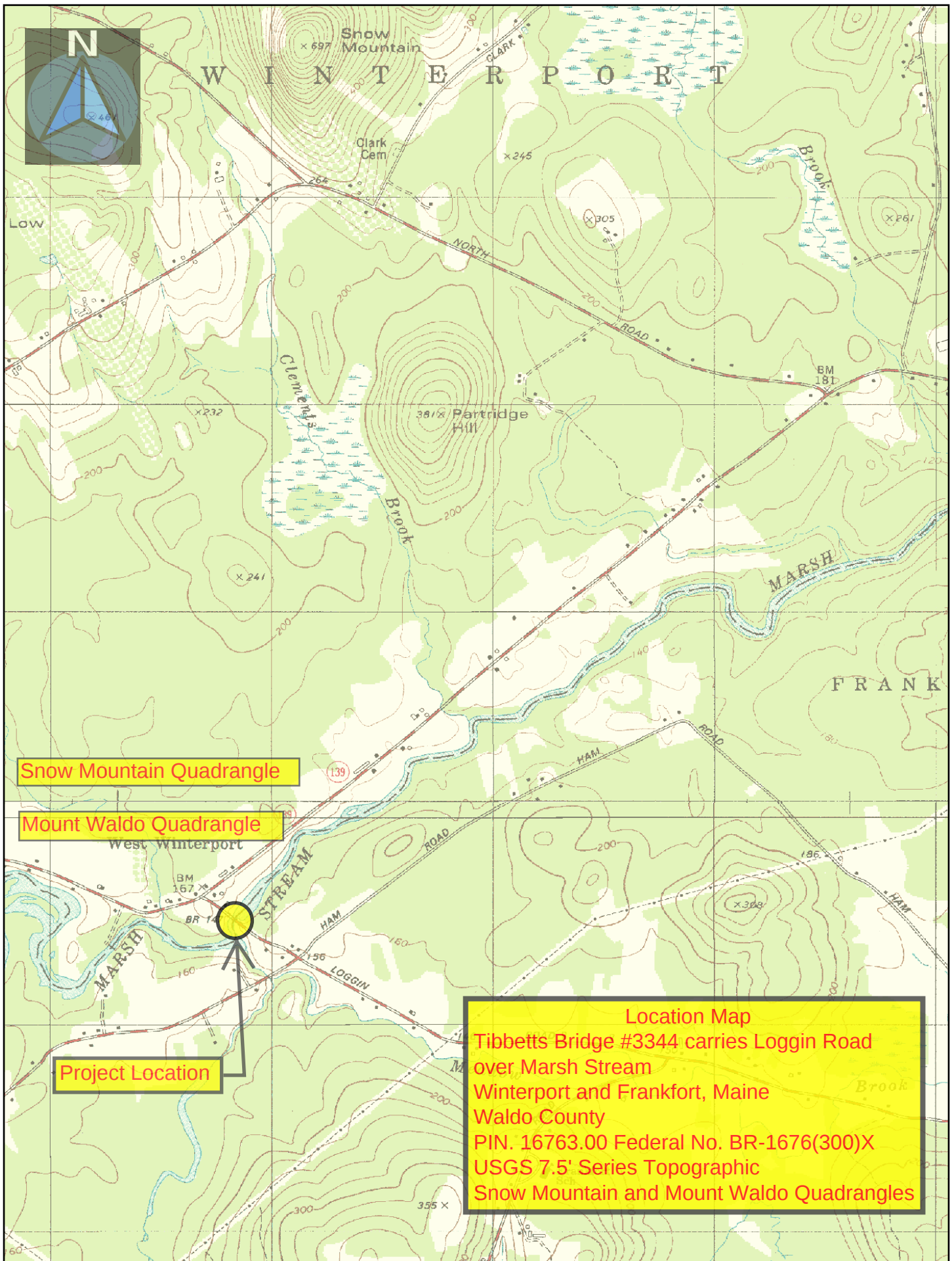
We present results of laboratory testing in Appendix B, Laboratory Test Data. The AASHTO and Unified Soil Classification System (USCS) soil classification and water content data are also presented on the boring logs in Appendix A.

5.0 CLOSURE

This Geotechnical Data Report has been prepared for use by the MaineDOT Bridge Program for specific application to the rehabilitation of the Tibbetts Bridge carrying Loggin Road in Winterport-Frankfort, Maine. We have prepared the report in accordance with generally accepted soil and foundation engineering practices. No other intended use or warranty is expressed or implied.

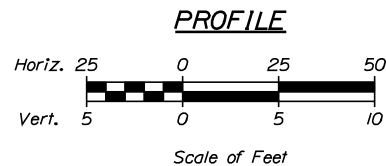
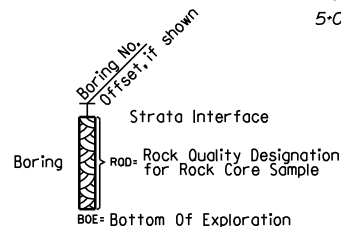
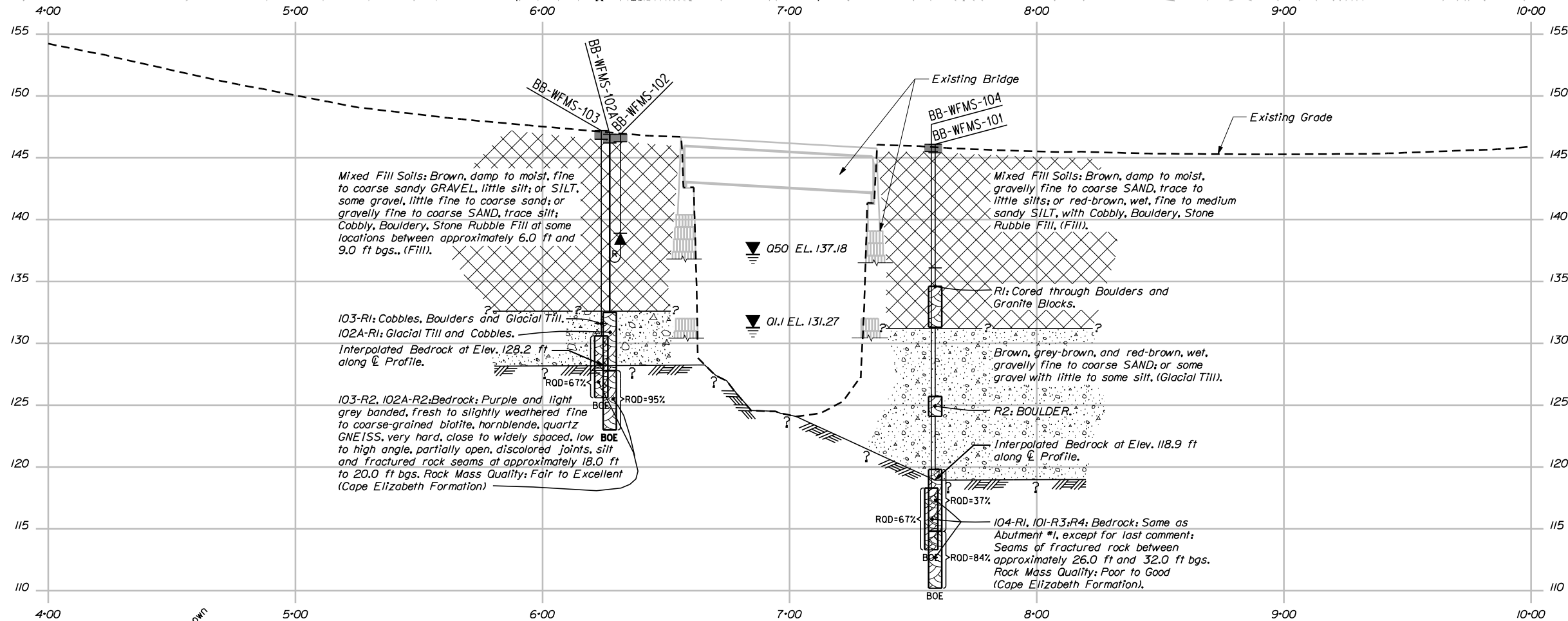
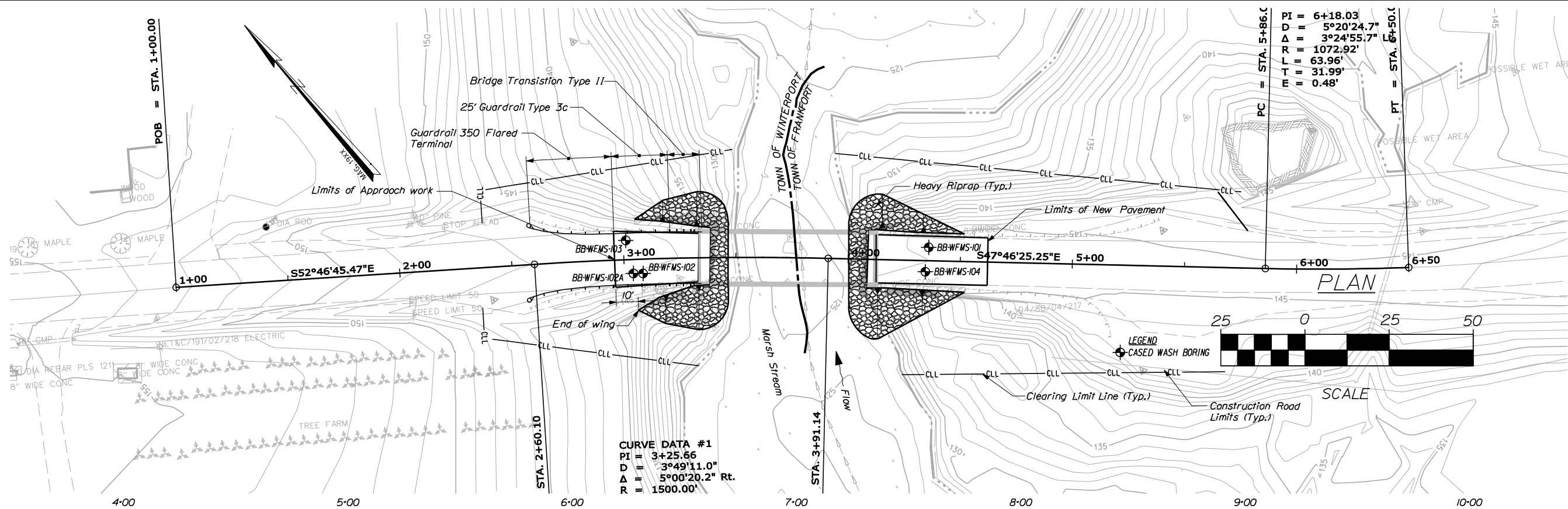
The Department conducted a limited number of soil explorations at discrete locations near the existing bridge and a limited number of laboratory soil tests. The Department shall not be responsible for the bidder's and contractor's interpretations of, or estimates or conclusions drawn from, the geotechnical information. Data provided may not be representative of the subsurface conditions between the boring locations.

Sheets



Map Scale 1:24000

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. Road names used on this map may not match official road names.



Note: This generalized interpretive soil profile is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and have been developed by interpretations of widely spaced explorations and samples. Actual soil transitions may vary and are probably more erratic. For more specific information refer to the exploration logs.

PROJ. MANAGER	BY	DATE	SIGNATURE	P.E. NUMBER	DATE
DESIGN-DETAILED	M. MOREAU	JUN 2010			
CHECKED-REVIEWED					
DESIGN-DETAILED					
REVISIONS 1					
REVISIONS 2					
REVISIONS 3					
REVISIONS 4					
FIELD CHANGES					

Maine Department of Transportation				Project: I-95 Bridge #3344, Logan Rd. over Marsh Stream Location: Winterport-Frankfort, Maine		Boring No.: BB-WFMS-103			
Soil/Bore Exploration Log US CUSTOMARY UNITS						PIN: 16763.00			
Driller: MalmDOT		Elevation (ft.): 147.2		Datum: NAD 1983		Auger ID(s): 3.5" Solid Stem			
Operator: Cioara/Giles		Date: NAD 1983		Rig Type: CM 45C		Sampler: Standard Split Spoon			
Logged By: Be Schoneveld		Bit Type: NM 45C		Auger wt./fall: 150W/30"					
Data Entry/Finalize: KJ/KD on 10/11/00		Drilling Method: Closed Wash Boring		Core Barriers: NONE		Water Level: 12.0' plus			
Boring Location: 6425.6, 12.8 E-W		Coating ID(s): NW		Hammer Type: Automatic B Hydraulic B Rops & Catwalks B					
Hammer Efficiency Factor: 0.84		Hammer Type: Automatic B Hydraulic B Rops & Catwalks B							
Settlements: D = Bell Spoon Sample M = Unconsolidated Split Spoon Sample (approx) S = Thin Wall Tube Sample MI = Unconsolidated Thin Wall Tube Sample (approx) FV = Fully Vane Shear Test FT = Field Penetration Test W = Weight of Soil or Rock		R = Bulk Core Sample SA = Solid Stem Auger SL = Hollow Stem Auger MC = Rotary Core MD = Weight of 140lb. hammer P = Point Penetration Test WT = Weight of Soil or Rock		T _c = Initial Field Cone Shear Strength (psi) T _p = Peak Force from Shear Strength Test U _s = Unconfined Compressive Strength (ksi) W _d = Water Content (%) W _L = Liquid Limit (%) W _P = Plastic Limit (%) W _U = Shrinkage Limit (%) W _N = Natural Moisture Content (%) W _C = Consistency Index (%) W _L = Liquid Limit (%) W _P = Plastic Limit (%) W _U = Shrinkage Limit (%)		T _v = Undrained Shear Strength (psi) U _s = Unconfined Compressive Strength (ksi) W _d = Water Content (%) W _L = Liquid Limit (%) W _P = Plastic Limit (%) W _U = Shrinkage Limit (%) W _N = Natural Moisture Content (%) W _C = Consistency Index (%) W _L = Liquid Limit (%) W _P = Plastic Limit (%) W _U = Shrinkage Limit (%)			
Depth (ft.)	Sample No.	Pen. Rec. (in.)	Sample Depth (ft.)	Notes / Remarks	Elevation (ft.)	Interval (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results and Unified Class
	10	24/9	0.70 - 2.70	1/6/1/1	13	18	24	Brown, damp, medium dense, gravelly fine to coarse SAND, trace silt, (fill).	-0.70
5	20	24/6	5.00 - 7.00	4/2/2/5	4	6		Brown, moist, loose, gravelly fine to coarse SAND, little silt, pieces of granite in tip of spoon. Drop through voids, likely ground granite blocks, of approximately 5.7" dia. Drilling becomes difficult at 5.7". Granite blocks and boulders loaded on drilling behavior, auger cuttings and prior borings. (fill)	-9.00
10	30	24/13	10.70 - 12.10	3/3/16/17	19	27		Brown, moist, medium dense, silty fine to medium SAND, trace coarse sand, trace gravel. (fill)	-12.10
15	R1	24/24	14.60 - 16.60	ROD = N/A/S	NF			Brown, moist, medium dense, gravelly, fine to coarse SAND, trace silt, (fill).	-16.60
	M/D/R	60/49	16.60 - 21.60	ROD = 67%				Filled split-spoon attempt at 16.6' bags, spoon bounce, no penetration.	-21.60
20								Top of Bedrock at Elev. 130.6'. Redbeds Purple to light gray, fine to coarse-grained, biotite, hornblende, quartz, CMSS, very hard, slightly weathered to fresh, with close to moderately spaced, low angle, partially open, discordant joints and seams of highly fractured rock at 17.8' and mud at 18.2 and 19.3' logs. Quartzite and magnetite-rich zones. Foliation varies from low to vertical; vertical appears moderately weathered, pegmatite layer in top 15' of core. Rock Mass Quality is Fair. (Core Elizabeth Formation) R2core times (minutes): 16.6-17.8: 14(45) 17.8-18.6: 14(44) 18.6-19.3: 15(26) 19.3-20.6: 15(22) 20.6-21.6: 13(10) 82% Recovery	-130.6'
25								Bottom of Exploration at 21.60 feet below ground surface.	-21.60
30									
35									
40									
45									
50									
Remarks: Spoon chasing ahead, no blow counts taken.									
Stratigraphic lithology approximates boundaries between soil types. Transitions may be gradual. * Some level readings have been made at times and other conditions noted. Borehole fluctuations may occur due to conditions other than those or extent of the time measurements were made.									
								Page 1 of 1 Boring No.: BB-WFMS-103	

[illegible]

Maine Department of Transportation										Project: Thetford Bridge #WMS-144, Loggin Rd., over Marsh Stream		Boring No.: BB-WFMS-104	
Soil/Bore Exploration Log										Location: Wintthrop-Frankfort, Maine			
US CUSTOMARY UNITS												P.I.N.: 16763.00	
Drillers		MainDOT		Elevation (ft.)		146.1		Auger ID/OD		3.5" Solid Stem			
Operator		Clayton/Giles		Datum		NAD 1983		Sampler		Standard Split Spoon			
Logged By		Be Schonwald		Rig Type		CME 45C		Hammer wt./fall		140#/30"			
Date Started/Finished		4/5/01 11:10-16:35		Drilling Method		Cased Wash Boring		Core Barrels		RD-2			
Boring Location		+41.3, ± 0 ft.		Coating ID/OD		NE		Water Level/D		None Observed			
Hammer Efficiency Factor 0.84				Hammer Type		Automatic B		Hydraulic C		Rops & Cathead D			
Description:				S = Rock Core Sample		A = Intact Field Note Shear Strength Test		L = Lab Note Shear Strength Test					
D = Drill Spoils Sample				SS = Soft Soil Sample		H = Loose Horizontal Strain		W = Water Content, percent					
MB = Unconsolidated Split Spoon Sample attempt				SL = Hollow Stem Auger		U = Unreported Compactive Strength (psi)		LI = Liquid Limit					
MC = Moisture Content				WD = Weight of 140lb. Hammer		WC = Water Content		PL = Plastic Limit					
MW = Moisture Content				WP = Weight of 140lb. Hammer		WC = Water Content		PI = Plasticity Index					
IS = In Situ Vane Shear Test				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IP = In Situ Penetration Resistance				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IR = In Situ Resistivity				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IT = In Situ Temperature				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IW = In Situ Water				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IX = In Situ X-ray				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IY = In Situ Y-axis				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IZ = In Situ Z-axis				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IA = In Situ Anisotropy				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IB = In Situ Bulk Modulus				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IC = In Situ Compressibility				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
ID = In Situ Density				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IE = In Situ Elasticity				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IF = In Situ Friction				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
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IH = In Situ Hardness				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
II = In Situ Inertia				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IJ = In Situ Jacking				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
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IU = In Situ Ultimate				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
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IA = In Situ Anisotropy				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IB = In Situ Bulk Modulus				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IC = In Situ Compressibility				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
ID = In Situ Density				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IE = In Situ Elasticity				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IF = In Situ Friction				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IG = In Situ Gravity				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IH = In Situ Hardness				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
II = In Situ Inertia				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IJ = In Situ Jacking				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IK = In Situ Kinematics				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IL = In Situ Lateral				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IM = In Situ Magnetic				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IN = In Situ Normal				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IO = In Situ Oscillation				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IP = In Situ Pressure				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IQ = In Situ Quality				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IR = In Situ Resistance				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IS = In Situ Stiffness				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IT = In Situ Tension				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IU = In Situ Ultimate				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IV = In Situ Volume				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IW = In Situ Workability				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IX = In Situ X-ray				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IY = In Situ Y-axis				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IZ = In Situ Z-axis				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
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IJ = In Situ Jacking				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IK = In Situ Kinematics				MD = Weight of 140lb. Hammer		WC = Water Content		PS = Penetration Resistance					
IL = In Situ Lateral				MD = Weight of 140lb. Hammer		WC							

[illegible]

Appendix A

Boring Logs

UNIFIED SOIL CLASSIFICATION SYSTEM					TERMS DESCRIBING DENSITY/CONSISTENCY																														
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	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. Consistency is rated according to standard penetration resistance. Modified Burmister System <table><tr><th><u>Descriptive Term</u></th><th><u>Portion of Total</u></th></tr><tr><td>trace</td><td>0% - 10%</td></tr><tr><td>little</td><td>11% - 20%</td></tr><tr><td>some</td><td>21% - 35%</td></tr><tr><td>adjective (e.g. sandy, clayey)</td><td>36% - 50%</td></tr></table> <table><tr><th><u>Density of Cohesionless Soils</u></th><th><u>Standard Penetration Resistance N-Value (blows per foot)</u></th></tr><tr><td>Very loose</td><td>0 - 4</td></tr><tr><td>Loose</td><td>5 - 10</td></tr><tr><td>Medium Dense</td><td>11 - 30</td></tr><tr><td>Dense</td><td>31 - 50</td></tr><tr><td>Very Dense</td><td>> 50</td></tr></table>				<u>Descriptive Term</u>	<u>Portion of Total</u>	trace	0% - 10%	little	11% - 20%	some	21% - 35%	adjective (e.g. sandy, clayey)	36% - 50%	<u>Density of Cohesionless Soils</u>	<u>Standard Penetration Resistance N-Value (blows per foot)</u>	Very loose	0 - 4	Loose	5 - 10	Medium Dense	11 - 30	Dense	31 - 50	Very Dense	> 50					
		<u>Descriptive Term</u>	<u>Portion of Total</u>																																
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Loose	5 - 10																																		
Medium Dense	11 - 30																																		
Dense	31 - 50																																		
Very Dense	> 50																																		
(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	SW	Well-graded sands, gravelly sands, little or no fines	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 shear strength as indicated. <table><tr><th><u>Consistency of Cohesive soils</u></th><th><u>SPT N-Value blows per foot</u></th><th><u>Approximate Undrained Shear Strength (psf)</u></th><th><u>Field Guidelines</u></th></tr><tr><td>Very Soft</td><td>WOH, WOR, WOP, <2</td><td>0 - 250</td><td>Fist easily Penetrates</td></tr><tr><td>Soft</td><td>2 - 4</td><td>250 - 500</td><td>Thumb easily penetrates</td></tr><tr><td>Medium Stiff</td><td>5 - 8</td><td>500 - 1000</td><td>Thumb penetrates with moderate effort</td></tr><tr><td>Stiff</td><td>9 - 15</td><td>1000 - 2000</td><td>Indented by thumb with great effort</td></tr><tr><td>Very Stiff</td><td>16 - 30</td><td>2000 - 4000</td><td>Indented by thumb nail</td></tr><tr><td>Hard</td><td>>30</td><td>over 4000</td><td>Indented by thumb nail with difficulty</td></tr></table>				<u>Consistency of Cohesive soils</u>	<u>SPT N-Value blows per foot</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 thumb nail	Hard	>30	over 4000	Indented by thumb nail with difficulty
	<u>Consistency of Cohesive soils</u>	<u>SPT N-Value blows per foot</u>	<u>Approximate Undrained Shear Strength (psf)</u>					<u>Field Guidelines</u>																											
	Very Soft	WOH, WOR, WOP, <2	0 - 250					Fist easily Penetrates																											
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Very Stiff	16 - 30	2000 - 4000	Indented by thumb nail																																
Hard	>30	over 4000	Indented by thumb nail with difficulty																																
(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.	Rock Quality Designation (RQD): RQD = $\frac{\text{sum of the lengths of intact pieces of core}^* > 100 \text{ mm}}{\text{length of core advance}}$ *Minimum NQ rock core (1.88 in. OD of core) Correlation of RQD to Rock Mass Quality <table><tr><th><u>Rock Mass Quality</u></th><th><u>RQD</u></th></tr><tr><td>Very Poor</td><td><25%</td></tr><tr><td>Poor</td><td>26% - 50%</td></tr><tr><td>Fair</td><td>51% - 75%</td></tr><tr><td>Good</td><td>76% - 90%</td></tr><tr><td>Excellent</td><td>91% - 100%</td></tr></table> Desired Rock Observations: (in this order) Color (Munsell color chart) Texture (aphanitic, fine-grained, etc.) Lithology (igneous, sedimentary, metamorphic, 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, low angle - 5-35, mod. dipping - 35-55, steep - 55-85, vertical - 85-90) -spacing (very close - <5 cm, close - 5-30 cm, mod. close 30-100 cm, wide - 1-3 m, very wide >3 m) -tightness (tight, open or healed) -infilling (grain size, color, etc.) Formation (Waterville, Ellsworth, Cape Elizabeth, etc.) RQD and correlation to rock mass quality (very poor, poor, etc.) ref: AASHTO Standard Specification for Highway Bridges 17th Ed. Table 4.4.8.1.2A Recovery				<u>Rock Mass Quality</u>	<u>RQD</u>	Very Poor	<25%	Poor	26% - 50%	Fair	51% - 75%	Good	76% - 90%	Excellent	91% - 100%																
		<u>Rock Mass Quality</u>	<u>RQD</u>																																
		Very Poor	<25%																																
	Poor	26% - 50%																																	
	Fair	51% - 75%																																	
	Good	76% - 90%																																	
Excellent	91% - 100%																																		
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) Color (Munsell color chart) Moisture (dry, damp, moist, wet, saturated) Density/Consistency (from above right hand side) 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., if applicable) Cementation (weak, moderate, or strong, if applicable, ASTM D 2488) Geologic Origin (till, marine clay, alluvium, etc.) Unified Soil Classification Designation Groundwater level																																			
Maine Department of Transportation Geotechnical Section Key to Soil and Rock Descriptions and Terms Field Identification Information					Sample Container Labeling Requirements: PIN Blow Counts Bridge Name / Town Sample Recovery Boring Number Date Sample Number Personnel Initials Sample Depth																														

Maine Department of Transportation <u>Soil/Rock Exploration Log</u> US CUSTOMARY UNITS				Project: Tibbetts Bridge #3344, Loggin Rd. over Marsh Stream Location: Winterport-Frankfort, Maine				Boring No.: BB-WFMS-101 PIN: 16763.00																																																																																																																																																																																																																																																																																															
Driller: MaineDOT				Elevation (ft.) 146.1				Auger ID/OD: 3.5" Solid Stem																																																																																																																																																																																																																																																																																															
Operator: Giguere/Giles				Datum: NAD 1983				Sampler: Standard Split Spoon																																																																																																																																																																																																																																																																																															
Logged By: Be Schonewald				Rig Type: CME 45C				Hammer Wt./Fall: 140#/30"																																																																																																																																																																																																																																																																																															
Date Start/Finish: 4/1/10; 08:15-13:15				Drilling Method: Cased Wash Boring				Core Barrel: NQ-2"																																																																																																																																																																																																																																																																																															
Boring Location: 7+58.9, 10.0 Lt.				Casing ID/OD: NW				Water Level*: None Observed																																																																																																																																																																																																																																																																																															
Hammer Efficiency Factor: 0.84				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 = Insitu Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Insitu 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				Su = Insitu Field Vane Shear Strength (psf) Tv = Pocket Torvane Shear Strength (psf) qp = Unconfined Compressive Strength (ksf) N-uncorrected = Raw field SPT N-value Hammer Efficiency Factor = Annual Calibration Value N60 = SPT N-uncorrected corrected for hammer efficiency N60 = (Hammer Efficiency Factor/60%)*N-uncorrected																																																																																																																																																																																																																																																																																															
				Su(lab) = Lab Vane Shear Strength (psf) WC = water content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test																																																																																																																																																																																																																																																																																																			
<table><tr><th colspan="8">Sample Information</th><th rowspan="2">Graphic Log</th><th rowspan="2">Visual Description and Remarks</th><th rowspan="2">Laboratory Testing Results/ AASHTO and Unified Class.</th></tr><tr><th>Depth (ft.)</th><th>Sample No.</th><th>Pen./Rec. (in.)</th><th>Sample Depth (ft.)</th><th>Blows (6 in.) Shear Strength (psf) or RQD (%)</th><th>N-uncorrected</th><th>N60</th><th>Casing Blows</th><th>Elevation (ft.)</th></tr><tr><td>0</td><td>1D</td><td>24/17</td><td>0.60 - 2.60</td><td>12/12/7/6</td><td>19</td><td>27</td><td>SSA</td><td>145.40</td><td rowspan="4"></td><td>PAVEMENT.</td><td rowspan="4">G#238212 A-1-a, SW-SM WC=5.1%</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Brown, moist, medium dense, gravelly fine to coarse SAND, trace silt, well graded, (Fill).</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td>2D</td><td>12/5</td><td>5.00 - 6.00</td><td>33/10</td><td>---</td><td></td><td></td><td>142.10</td><td rowspan="4"></td><td>Brown-grey, moist, gravelly fine to medium SAND, trace coarse sand, little silt, gap-graded, gravel appears to be crushed rock, (Fill). Terminated 2D at 6.0' due to sampler drop from 5.8-6.0', then travelled/ kicked-off. Difficult drilling from 5.0-10.0' bgs, drilling behavior suggests cobbly material.</td><td rowspan="4">G#238213 A-1-b, SM WC=4.8%</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td>3MD</td><td>18/0</td><td>10.00 - 11.50</td><td>8/3/3</td><td>6</td><td>8</td><td></td><td>136.10</td><td rowspan="4"></td><td>Failed spoon attempt, no recovery, highly fractured rock in tip of spoon. Boulders/granite blocks encountered at approximately 10.0' bgs, (Fill) R1: Granite Blocks and Native Boulder. R1:Core Times (min:sec) 11.5-12.5' (1:47) Dropped 12.3' to 12.4'. 12.5-13.5' (1:48) 13.5-14.5' (1:38) Dropped 13.8' to 13.9'. 14.5-14.8' core barrel dropped</td><td rowspan="4">G#238214 A-1-b, SM WC=12.1%</td></tr><tr><td></td><td>R1</td><td>39.6/29</td><td>11.50 - 14.80</td><td>RQD = N/A%</td><td></td><td></td><td>NQ-2</td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>15</td><td>4D</td><td>24/10</td><td>14.80 - 16.80</td><td>2/9/13/23</td><td>22</td><td>31</td><td></td><td>131.30</td><td rowspan="4"></td><td>Brown, wet, dense, gravelly fine to coarse SAND, little silt, gravel rounded, (Till).</td><td rowspan="4">G#238215 A-2-4, SM WC=10.4%</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>20</td><td></td><td></td><td></td><td></td><td></td><td></td><td>54</td><td></td><td rowspan="4"></td><td></td><td rowspan="4"></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>51</td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>79</td><td></td><td></td></tr><tr><td></td><td>R2</td><td></td><td>20.40 - 20.53</td><td></td><td></td><td></td><td>NQ-2</td><td>125.70</td><td>R2:BOULDER.</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td rowspan="4"></td><td></td><td rowspan="4"></td></tr><tr><td></td><td>5D</td><td>24/14</td><td>22.00 - 24.00</td><td>17/19/21/32</td><td>40</td><td>56</td><td></td><td>124.10</td><td>Grey-brown, wet, very dense, fine to coarse SAND, some gravel, some silt, pockets and lenses of rust staining throughout, (Till).</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>25</td><td></td><td></td><td></td><td></td><td></td><td></td><td>113</td><td></td><td></td><td></td><td></td></tr></table>												Sample Information								Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.	Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N60	Casing Blows	Elevation (ft.)	0	1D	24/17	0.60 - 2.60	12/12/7/6	19	27	SSA	145.40		PAVEMENT.	G#238212 A-1-a, SW-SM WC=5.1%										Brown, moist, medium dense, gravelly fine to coarse SAND, trace silt, well graded, (Fill).																					5	2D	12/5	5.00 - 6.00	33/10	---			142.10		Brown-grey, moist, gravelly fine to medium SAND, trace coarse sand, little silt, gap-graded, gravel appears to be crushed rock, (Fill). Terminated 2D at 6.0' due to sampler drop from 5.8-6.0', then travelled/ kicked-off. Difficult drilling from 5.0-10.0' bgs, drilling behavior suggests cobbly material.	G#238213 A-1-b, SM WC=4.8%																															10	3MD	18/0	10.00 - 11.50	8/3/3	6	8		136.10		Failed spoon attempt, no recovery, highly fractured rock in tip of spoon. Boulders/granite blocks encountered at approximately 10.0' bgs, (Fill) R1: Granite Blocks and Native Boulder. R1:Core Times (min:sec) 11.5-12.5' (1:47) Dropped 12.3' to 12.4'. 12.5-13.5' (1:48) 13.5-14.5' (1:38) Dropped 13.8' to 13.9'. 14.5-14.8' core barrel dropped	G#238214 A-1-b, SM WC=12.1%		R1	39.6/29	11.50 - 14.80	RQD = N/A%			NQ-2																							15	4D	24/10	14.80 - 16.80	2/9/13/23	22	31		131.30		Brown, wet, dense, gravelly fine to coarse SAND, little silt, gravel rounded, (Till).	G#238215 A-2-4, SM WC=10.4%																															20							54												51										79				R2		20.40 - 20.53				NQ-2	125.70	R2:BOULDER.														5D	24/14	22.00 - 24.00	17/19/21/32	40	56		124.10	Grey-brown, wet, very dense, fine to coarse SAND, some gravel, some silt, pockets and lenses of rust staining throughout, (Till).																					25							113				
Sample Information								Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.																																																																																																																																																																																																																																																																																													
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0	1D	24/17	0.60 - 2.60	12/12/7/6	19	27	SSA	145.40		PAVEMENT.	G#238212 A-1-a, SW-SM WC=5.1%																																																																																																																																																																																																																																																																																												
										Brown, moist, medium dense, gravelly fine to coarse SAND, trace silt, well graded, (Fill).																																																																																																																																																																																																																																																																																													
5	2D	12/5	5.00 - 6.00	33/10	---			142.10		Brown-grey, moist, gravelly fine to medium SAND, trace coarse sand, little silt, gap-graded, gravel appears to be crushed rock, (Fill). Terminated 2D at 6.0' due to sampler drop from 5.8-6.0', then travelled/ kicked-off. Difficult drilling from 5.0-10.0' bgs, drilling behavior suggests cobbly material.	G#238213 A-1-b, SM WC=4.8%																																																																																																																																																																																																																																																																																												
10	3MD	18/0	10.00 - 11.50	8/3/3	6	8		136.10		Failed spoon attempt, no recovery, highly fractured rock in tip of spoon. Boulders/granite blocks encountered at approximately 10.0' bgs, (Fill) R1: Granite Blocks and Native Boulder. R1:Core Times (min:sec) 11.5-12.5' (1:47) Dropped 12.3' to 12.4'. 12.5-13.5' (1:48) 13.5-14.5' (1:38) Dropped 13.8' to 13.9'. 14.5-14.8' core barrel dropped	G#238214 A-1-b, SM WC=12.1%																																																																																																																																																																																																																																																																																												
	R1	39.6/29	11.50 - 14.80	RQD = N/A%			NQ-2																																																																																																																																																																																																																																																																																																
15	4D	24/10	14.80 - 16.80	2/9/13/23	22	31		131.30		Brown, wet, dense, gravelly fine to coarse SAND, little silt, gravel rounded, (Till).	G#238215 A-2-4, SM WC=10.4%																																																																																																																																																																																																																																																																																												
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	R2		20.40 - 20.53				NQ-2	125.70		R2:BOULDER.																																																																																																																																																																																																																																																																																													
	5D	24/14	22.00 - 24.00	17/19/21/32	40	56		124.10		Grey-brown, wet, very dense, fine to coarse SAND, some gravel, some silt, pockets and lenses of rust staining throughout, (Till).																																																																																																																																																																																																																																																																																													
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Maine Department of Transportation <u>Soil/Rock Exploration Log</u> US CUSTOMARY UNITS				Project: Tibbetts Bridge #3344, Loggin Rd. over Marsh Stream Location: Winterport-Frankfort, Maine				Boring No.: BB-WFMS-101 PIN: 16763.00																																																																																																																																																																																																																					
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Date Start/Finish: 4/1/10; 08:15-13:15				Drilling Method: Cased Wash Boring				Core Barrel: NQ-2"																																																																																																																																																																																																																					
Boring Location: 7+58.9, 10.0 Lt.				Casing ID/OD: NW				Water Level*: None Observed																																																																																																																																																																																																																					
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Spoon fetched up at 26.3' bgs.</td><td rowspan="2">G#238216 A-2-4, SM WC=10.0%</td></tr><tr><td>R3</td><td>60/42</td><td>26.30 - 31.30</td><td>RQD = 37%</td><td></td><td></td><td>NX</td><td></td></tr><tr><td rowspan="4">30</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td rowspan="4">110.20</td><td rowspan="4"></td><td rowspan="4">Top of Bedrock at Elev. 119.8'. R3:Bedrock: Fine-grained, purple and light grey banded biotite, hornblende GNEISS, very hard, fresh to slightly weathered, with numerous quartz veins, with very close to close, low angle, partially open, discolored joints and seams of highly fractured rock in upper 3.5'. Quartzite-rich zones, limited foliation (quartzite) typically moderately dipping. Rock Mass Quality is Poor. [Cape Elizabeth Formation] R3:Core Times (min:sec) 26.3-27.3' (2:48) 27.3-28.3' (1:36) 28.3-29.3' (1:17) 29.3-30.3' (2:03) 30.3-31.3' (2:16) 70% Recovery R4:Bedrock: Fine-grained, purple and light grey banded biotite, hornblende GNEISS, very hard, fresh, with numerous quartz veins, with widely spaced, moderately dipping, partially open, some discolored joints and one seam of highly fractured rock at top of run. Quartzite-rich zones. Limited foliation (quartzite) typically high angle. Rock Mass Quality is Good. 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Boring No.: BB-WFMS-101

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Tibbetts Bridge #3344, Loggin Rd. over Marsh Stream Location: Winterport-Frankfort, Maine		Boring No.: BB-WFMS-102 PIN: 16763.00					
Driller: MaineDOT		Elevation (ft.) 146.9		Auger ID/OD: 3.5" Solid Stem							
Operator: Giguere/Giles		Datum: NAD 1983		Sampler: Standard Split Spoon							
Logged By: Be Schonewald		Rig Type: CME 45C		Hammer Wt./Fall: 140#/30"							
Date Start/Finish: 4/1/10; 13:30-13:50		Drilling Method: Cased Wash Boring		Core Barrel: N/A							
Boring Location: 6+31.5, 2.0 Rt.		Casing ID/OD: N/A		Water Level*: None Observed							
Hammer Efficiency Factor: 0.84		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 = Insitu Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Insitu 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 = Insitu Field Vane Shear Strength (psf) T_v = Pocket Torvane Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N_{uncorrected} = Raw field SPT N-value Hammer Efficiency Factor = Annual Calibration Value N₆₀ = SPT N-uncorrected corrected for hammer efficiency N₆₀ = (Hammer Efficiency Factor/60%)*N_{uncorrected} S_{u(lab)} = Lab Vane Shear Strength (psf) WC = water content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows	Elevation (ft.)			
0	1D	24/13	0.60 - 2.60	7/6/6/7	12	17	SSA	146.30		PAVEMENT.	G#238217 A-1-a, GM WC=6.7%
										0.60 Brown, moist, medium dense, fine to coarse sandy GRAVEL, little silt, (Fill) .	
								142.90		4.00	
5	2D	24/17	5.00 - 7.00	4/3/7/11	10	14				Brown, moist, stiff, SILT, some gravel, little fine to coarse sand, (Reworked and Mixed Fill). Difficult drilling at 5.0' bgs., augers kick-off plumb.	G#238218 A-4, ML WC=15.8%
								138.90		8.00	
										Bottom of Exploration at 8.00 feet below ground surface. AUGER REFUSAL, moved back 4.3' to BB-WFMS-102A.	
10											
15											
20											
25											
Remarks:											
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-WFMS-102	

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Tibbetts Bridge #3344, Loggin Rd. over Marsh Stream Location: Winterport-Frankfort, Maine		Boring No.: BB-WFMS-102A PIN: 16763.00					
Driller: MaineDOT			Elevation (ft.) 146.9		Auger ID/OD: 3.5" Solid Stem						
Operator: Giguere/Giles			Datum: NAD 1983		Sampler: Standard Split Spoon						
Logged By: Be Schonewald			Rig Type: CME 45C		Hammer Wt./Fall: 140#/30"						
Date Start/Finish: 4/1/10-4/2/10			Drilling Method: Cased Wash Boring		Core Barrel: NQ-2						
Boring Location: 6+27.2, 2.0 Rt.			Casing ID/OD: NW		Water Level*: None Observed						
Hammer Efficiency Factor: 0.84			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 = Insitu Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Insitu 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 = Insitu Field Vane Shear Strength (psf) T _v = Pocket Torvane Shear Strength (psf) q _p = Unconfined Compressive Strength (ksf) N _{uncorrected} = Raw field SPT N-value Hammer Efficiency Factor = Annual Calibration Value N ₆₀ = SPT N-uncorrected corrected for hammer efficiency N ₆₀ = (Hammer Efficiency Factor/60%)*N _{uncorrected}		S _{u(lab)} = Lab Vane Shear Strength (psf) WC = water content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test				
Depth (ft.)	Sample Information								Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows	Elevation (ft.)			
0							SSA	146.20			
5											
10											
	3D	24/24	10.00 - 12.00	9/7/9/11	16	22					
15											
	R1	56.4/44	14.40 - 19.10	RQD = N/A%			NX				
20											
	R2	57.6/57.6	19.10 - 23.90	RQD = 95%							
25											
Remarks: Casing blow counts not taken.											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.										Page 1 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.: BB-WFMS-102A	

Maine Department of Transportation <u>Soil/Rock Exploration Log</u> US CUSTOMARY UNITS				Project: Tibbetts Bridge #3344, Loggin Rd. over Marsh Stream Location: Winterport-Frankfort, Maine				Boring No.: BB-WFMS-102A PIN: 16763.00																																																																																																																																																																																																					
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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Tibbetts Bridge #3344, Loggin Rd. over Marsh Stream Location: Winterport-Frankfort, Maine		Boring No.: BB-WFMS-104 PIN: 16763.00																																																																																																																																																																																																																																
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Stratification lines represent approximate boundaries between soil types; transitions may be gradual.										Page 1 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.: BB-WFMS-104																																																																																																																																																																																																																												

[illegible]

Appendix B

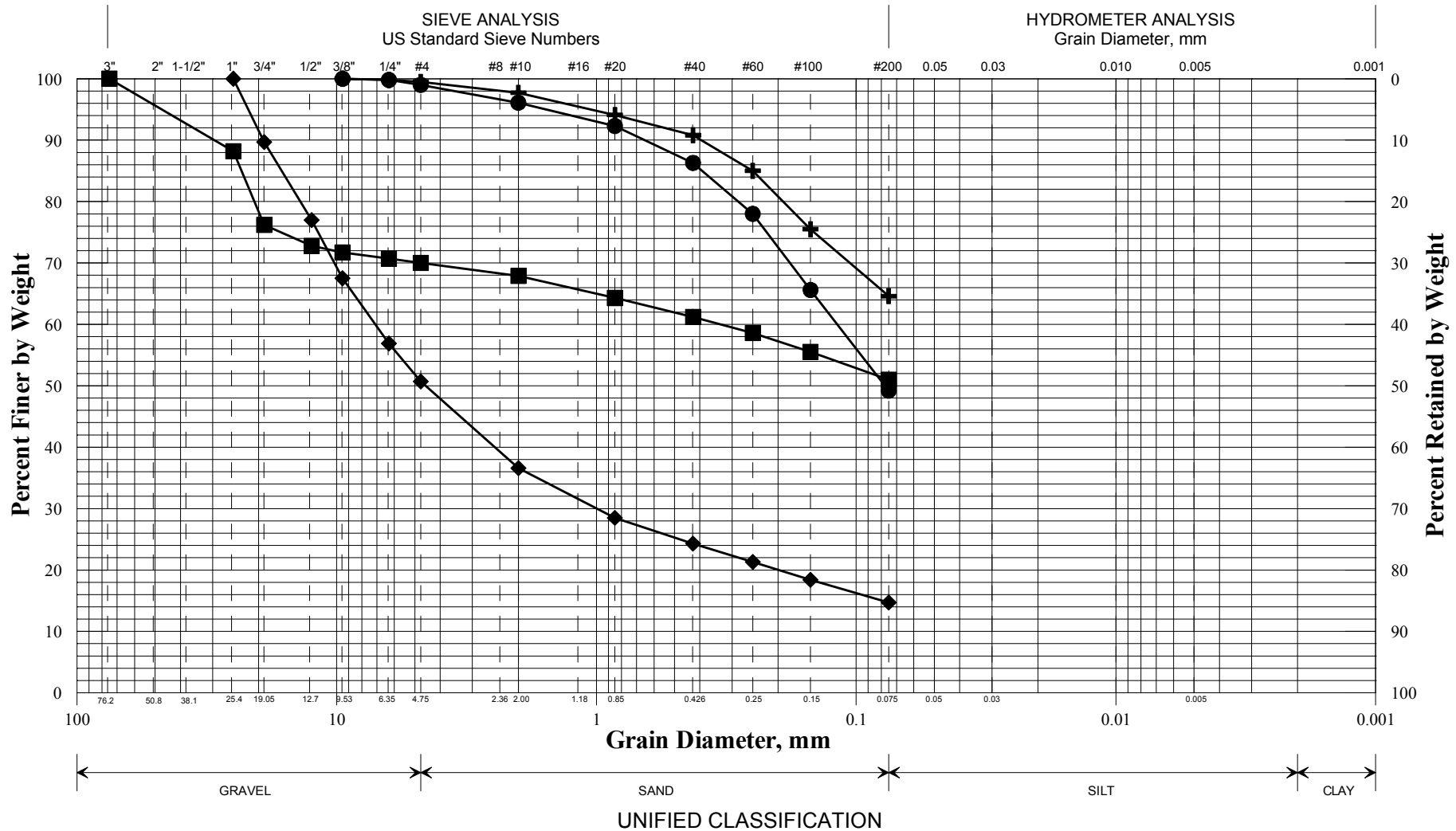
Laboratory Test Data

Town(s): Winterport-Frankfort Project Number: 16763.00

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.

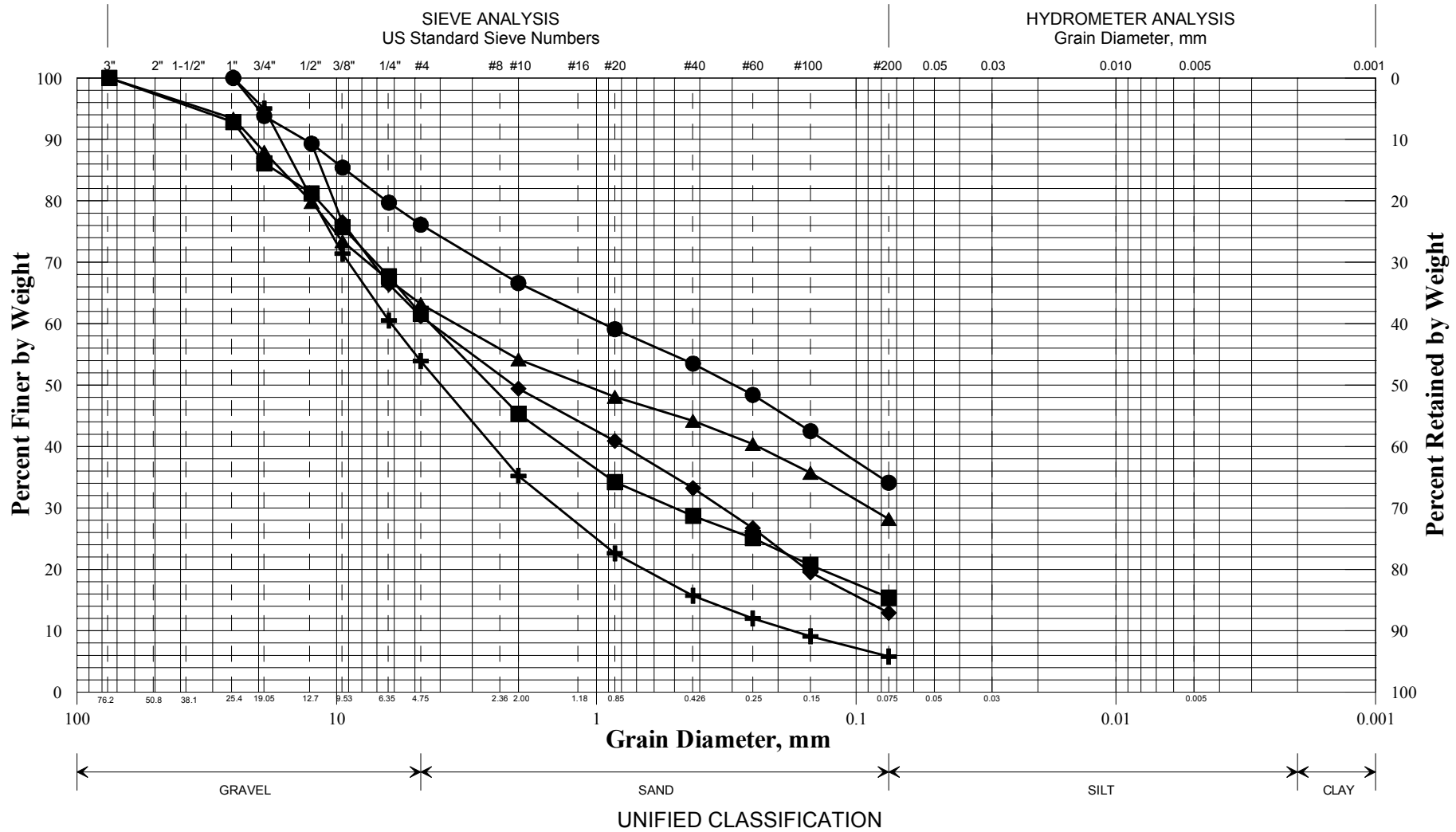
PI = Plasticity Index as determined by AASHTO 90-96 and/or ASTM D4318-98

State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE

[illegible]

PIN	
016763.00	
Town	
Winterport, Frankfort	
Reported by/Date	
WHITE, TERRY A	6/7/2010

State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
+	BB-WFMS-101/1D	7+58.9	10.0 LT	0.6-2.6	Gravelly SAND, trace silt.	5.1			
◆	BB-WFMS-101/2D	7+58.9	10.0 LT	5.0-6.0	Gravelly SAND, little silt.	4.8			
■	BB-WFMS-101/4D	7+58.9	10.0 LT	14.8-16.8	Gravelly SAND, little silt.	12.1			
●	BB-WFMS-101/5D	7+58.9	10.0 LT	22.0-24.0	SAND, some silt, some gravel.	10.4			
▲	BB-WFMS-101/6D	7+58.9	10.0 LT	25.0-26.3	GRAVEL, some sand, some silt.	10.0			
×									

PIN
016763.00
Town
Winterport, Frankfort
Reported by/Date
WHITE, TERRY A 6/7/2010