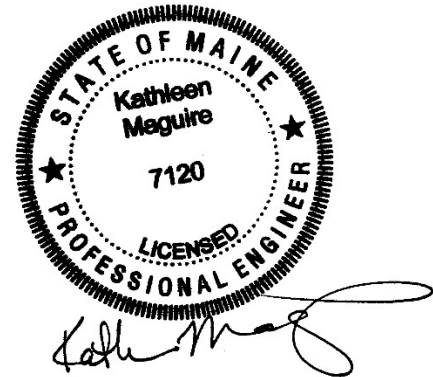


**MAINE DEPARTMENT OF TRANSPORTATION
HIGHWAY PROGRAM
GEOTECHNICAL SECTION
AUGUSTA, MAINE**

GEOTECHNICAL DATA REPORT

For Intersection Improvements on:
**ROUTE 125
DURHAM, MAINE**

Prepared by:
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Androscoggin County
WIN 21780.00

Soils Report 2019-09
March 13, 2019

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Sheet 2 – Boring Location Plan & Boring Logs

Appendices

Appendix A – Boring Logs

Appendix B – Laboratory Test Results

1.0 INTRODUCTION

The purpose of this Geotechnical Data Report is to document subsurface information collected to support intersection improvements at the intersection of Route 125 and Meadow Road in Durham. This report presents the results of a limited geotechnical investigation performed along the project site and the results of a limited laboratory testing program conducted on soil samples recovered during the geotechnical investigation. Route 125 is a Highway Corridor Priority 4 road. Meadow Road is a Highway Corridor Priority 6 road.

2.0 GEOLOGIC SETTING

The project is located at the intersection of Route 125 and Meadow Road as shown on Sheet 1 – Location Map.

The Maine Geologic Survey (MGS) map titled Surficial Geology Lisbon Falls South Quadrangle Maine, Open-File No. 97-49 (1997) indicates the surficial soils at the project site consist of thin drift areas. Thin drift areas generally have less than ten feet of soil covering bedrock with gravel and sand till overlying bedrock on hillslopes and ridge crests; Presumpscot Formation silty clays are present in depressions; and gravel and sand marine nearshore deposits overlying till, Presumpscot Formation, and bedrock on and at the base of hillslopes.

The MGS map “Bedrock Geologic Map of Maine” (1985) cites bedrock at the site as calcareous sandstone; interbedded sandstone and impure limestone of the Vassalboro Formation.

3.0 SUBSURFACE INVESTIGATION

Subsurface conditions were explored by drilling two (2) test borings on Route 125 across from Meadow Road. The New England Boring Contractors drill crew drilled borings HB-DUR-101 and HB-DUR-102 on June 29, 2017 using solid stem and hollow stem auger techniques. The exploration locations are shown on Sheet 2 – Boring Location Plan & Boring Logs.

Soil samples were obtained in the borings using Standard Penetration Test (SPT) methods. Boring HB-DUR-101 was drilled to a depth of approximately 22 feet below ground surface (bgs) without encountering a refusal surface. Boring HB-DUR-102 was drilled to a depth of approximately 14.3 feet bgs, including a 5.6-foot bedrock core. Details and sampling methods used, field data obtained, and soil and bedrock conditions encountered are presented in the boring logs provided in Appendix A – Boring Logs.

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

4.0 LABORATORY TESTING

A laboratory testing program was conducted on selected soil samples recovered from 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 two (2) standard grain size analyses with natural water content and four (4) grain size analyses with hydrometer and natural water content. The results of soil tests are included as Appendix B – Laboratory Test Results. Moisture content information and other soil test results are also shown on the boring logs provided in Appendix A – Boring Logs.

5.0 CLOSURE

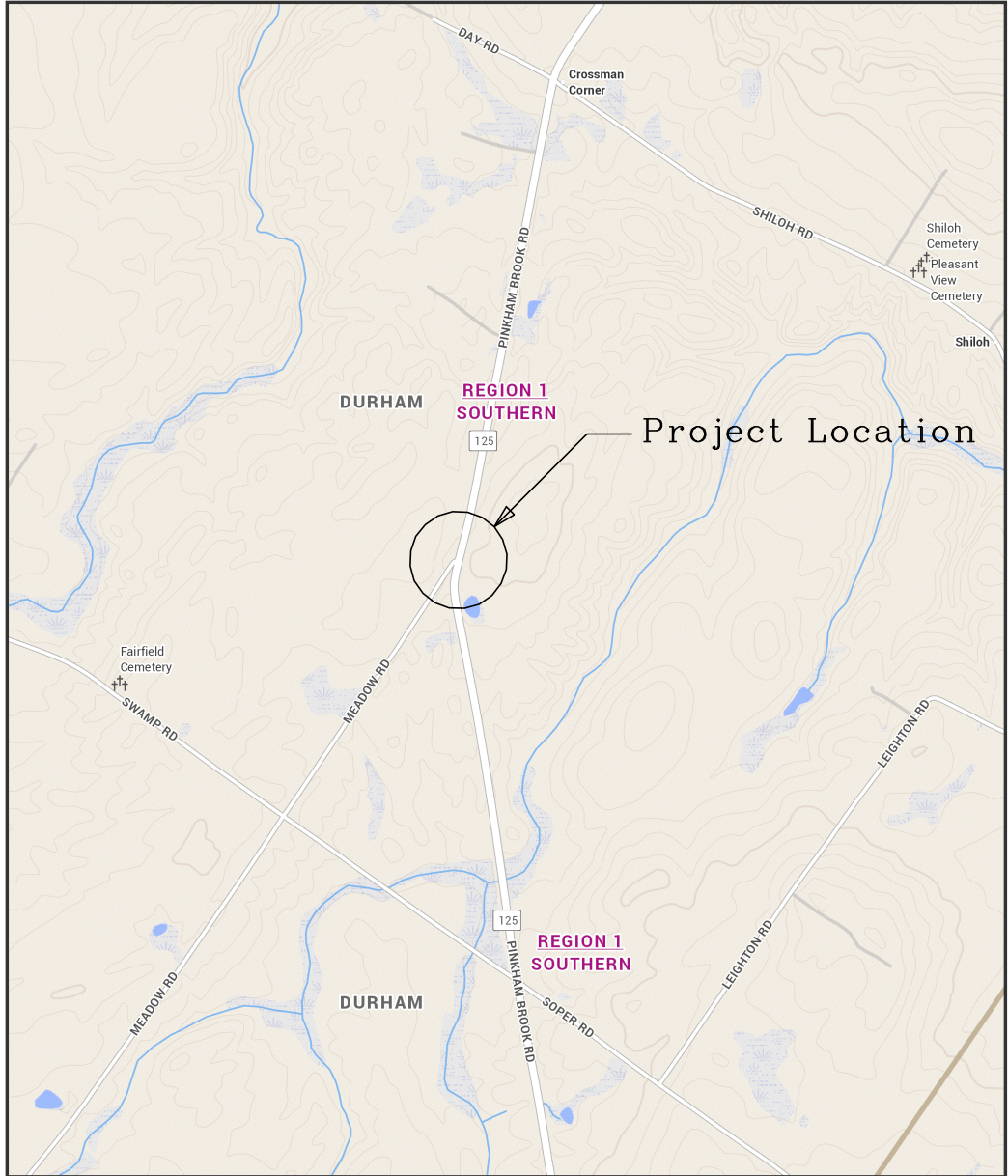
This Geotechnical Data Report has been prepared for the use of the MaineDOT Highway Program for specific application to the proposed intersection improvements on Route 125 in Durham, Maine in accordance with generally accepted geotechnical and foundation engineering practices. No other intended use or warranty is expressed or implied.

MaineDOT conducted a limited number of soil explorations at discrete locations along the project and a limited number of laboratory tests. MaineDOT shall not be responsible for the Bidder's or Contractor's interpretations, estimates, or conclusions derived from the geotechnical information. Data provided may not be representative of the subsurface conditions between boring locations.

Sheets



DURHAM, MAINE



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

0.2 Miles
1 inch = 0.24 miles

Date: 11/27/2018
Time: 12:16:56 PM

SHEET NUMBER 1 OF 2	DURHAM ROUTE 125	STATE OF MAINE DEPARTMENT OF TRANSPORTATION	
		21780.00	
	LOCATION MAP	WIN 21780.00	HIGHWAY PLANS

Appendix A

Boring Logs

UNIFIED SOIL CLASSIFICATION SYSTEM				MODIFIED BURMISTER SYSTEM																																																					
MAJOR DIVISIONS		GROUP SYMBOLS	TYPICAL NAMES	Descriptive Term	Portion of Total (%)																																																				
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. GP Poorly-graded gravels, gravel sand mixtures, little or no fines.	trace little some adjective (e.g. sandy, clayey)	0 - 10 11 - 20 21 - 35 36 - 50																																																				
		GRAVEL WITH FINES (Appreciable amount of fines)	GM Silty gravels, gravel-sand-silt mixtures. GC Clayey gravels, gravel-sand-clay mixtures.	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). <table border="1"> <thead> <tr> <th>Density of Cohesionless Soils</th> <th>Standard Penetration Resistance N-Value (blows per foot)</th> </tr> </thead> <tbody> <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> </tbody> </table> 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. <table border="1"> <thead> <tr> <th>Consistency of Cohesive soils</th> <th>SPT N-Value (blows per foot)</th> <th>Approximate Undrained Shear Strength (psf)</th> <th>Field Guidelines</th> </tr> </thead> <tbody> <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 thumbnail</td></tr> <tr><td>Hard</td><td>>30</td><td>over 4000</td><td>Indented by thumbnail with difficulty</td></tr> </tbody> </table> Rock Quality Designation (RQD): RQD (%) = $\frac{\text{sum of the lengths of intact pieces of core} * > 4 \text{ inches}}{\text{length of core advance}}$ *Minimum NQ rock core (1.88 in. OD of core) Correlation of RQD to Rock Mass Quality <table border="1"> <thead> <tr> <th>Rock Mass Quality</th> <th>RQD (%)</th> </tr> </thead> <tbody> <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> </tbody> </table> 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 mass quality (very poor, poor, etc.) ref: ASTM D6032 and AASHTO Standard Specification for Highway Bridges, 17th Ed. Table 4.4.8.1.2A Recovery (inch/inch and percentage) Rock Core Rate (X.X ft - Y.Y ft (min:sec))			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	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 Mass Quality	RQD (%)	Very Poor	≤25	Poor	26 - 50	Fair	51 - 75	Good	76 - 90	Excellent
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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.	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	Sample Container Labeling Requirements: WIN Blow Counts Bridge Name / Town Sample Recovery Boring Number Date Sample Number Personnel Initials Sample Depth																																																					
		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.																																																									
HIGHLY ORGANIC SOILS	Pt Peat and other highly organic soils.	OH Organic clays of medium to high plasticity, organic silts.																																																							

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Intersection Improvements Route 125 and Meadow Road Location: Durham, Maine				Boring No.: HB-DUR-101 WIN: 21780.00							
Driller: New England Boring Co.				Elevation (ft.): 191.7				Auger ID/OD:							
Operator: Enos/Share				Datum: NAVD88				Sampler: Standard Split Spoon							
Logged By: B. Schonewald				Rig Type: Mobile B-53 (Rubber Track)				Hammer Wt./Fall: 140#/30"							
Date Start/Finish: 6/29/2017; 14:55-16:45				Drilling Method: Hollow/Solid Stem Auger				Core Barrel: N/A							
Boring Location: 10+13, 16.5 ft Rt.				Casing ID/OD: N/A				Water Level*: 7.5 ft bgs. (end)							
Hammer Efficiency Factor: 0.677				Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>											
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								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.			
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows								
0	1D	24/9	0.00 - 2.00	1/1/2/5	3	3	SSA			Grey-brown, damp, very loose, fine to coarse SAND, some silt, little gravel, (Fill).	G#270326 A-2-4, SM WC=10.8%				
	2D	24/16	2.00 - 4.00	7/12/29/23	41	46				Grey-brown, damp, dense, fine to coarse SAND, some silt, little gravel, (Fill).					
5	3D	24/21	4.00 - 6.00	17/13/12/15	25	28	HSA			Olive-brown, damp to moist, medium dense, fine to coarse SAND, some silt, little gravel, (Fill).	G#270327 A-2-4, SM WC=9.7%				
	4D	24/19	6.00 - 8.00	44/30/22/19	52	59				Olive-tan, moist to wet, very dense, fine to coarse SAND, some silt, trace gravel, trace clay, (Fill).	G#270328 A-4, SC-SM WC=10.4%				
	5D	24/22	8.00 - 10.00	7/5/8/6	13	15		183.7		Olive-tan, wet, medium dense, fine to coarse SAND, some silt, some gravel, (Native Till).					
10	6D	24/20	10.00 - 12.00	12/10/12/19	22	25				Olive-tan, wet, medium dense, fine to coarse SAND, some silt, little gravel, trace clay, (Native Till).	G#270329 A-2-4, SC-SM WC=9.8%				
	7D	24/11	15.00 - 17.00	2/5/4/6	9	10				Olive-tan, wet, loose, fine to coarse SAND, some silt, little fine gravel, somewhat layered, (Native Till).					
20	8D	24/21	20.00 - 22.00	12/61/52/48	113	128		169.7		Olive-tan, wet, very dense, fine to coarse SAND, some silt, some gravel, (Native Till).					
25	Bottom of Exploration at 22.0 feet below ground surface. NO REFUSAL.														

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: Intersection Improvements Route 125 and Meadow Road Location: Durham, Maine				Boring No.: HB-DUR-102 WIN: 21780.00							
Driller: New England Boring Co.				Elevation (ft.): 191.2				Auger ID/OD:							
Operator: Enos/Share				Datum: NAVD88				Sampler: Standard Split Spoon							
Logged By: B. Schonewald				Rig Type: Mobile B-53 (Rubber Track)				Hammer Wt./Fall: 140#/30"							
Date Start/Finish: 6/29/2017; 13:50-14:45				Drilling Method: NW-3" Hollow/Solid Stem Auger				Core Barrel: NQ-2"							
Boring Location: 10+97, 26.5 ft Rt.				Casing ID/OD: N/A				Water Level*: 5.6 ft bgs. (open)							
Hammer Efficiency Factor: 0.677				Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>											
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								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.			
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in. Shear Strength (psf) or RQD (%))	N-uncorrected	N ₆₀	Casing Blows								
0															
	1D	24/24	1.00 - 3.00	1 1/2/4	3	3		189.9		Brown, (Topsoil). 1D (1.3-3.0 ft bgs) Olive brown, mottled, damp, soft, SILT, some clay, little sand, trace gravel.	G#270330 A-4, CL WC=23.7%				
5	2D	24/24	4.00 - 6.00	2 3/4/4	7	8	HSA			Olive brown, mottled, moist to wet, medium stiff, SILT, some clay, trace sand.	G#270331 A-4, CL WC=24.9%				
	R1	34.8/34.8	8.70 - 11.60	RQD = 43%				182.5		Auger Refusal at 8.7 ft bgs, set in NW Casing to core. Top of Bedrock at Elev. 182.5 ft. R1: Bedrock: Hard, typically fresh, coarse to very coarse grained, white to light grey, PEGMATITE with interbeds of slightly weathered, fine to medium grained, dark colored pelitic SCHIST and fresh, fine to medium grained, light colored, calcisilicate GRANOFELS. Close, low angle breaks; undulating, rough, discolored to slightly weathered, open to moderately wide, with occasional mud infilling. Rock Mass Quality = Poor R1: Core Times (min:sec) 8.7-9.0 ft (---) 9.0-10.0 ft (1:55) 10.0-11.0 ft (1:25) 11.0-11.6 ft (---) 100% Recovery					
10	R2	31.2/31.2	11.70 - 14.30	RQD = 97%				176.9		R2: Bedrock: Similar to R1. Rock Mass Quality = Excellent R2: Core Times (min:sec) 11.7-12.0 ft (---) 12.0-13.0 ft (1:15) 13.0-14.0 ft (1:15) 14.0-14.3 ft (---) 100% Recovery					
20										Bottom of Exploration at 14.3 feet below ground surface.					
25															

Remarks:

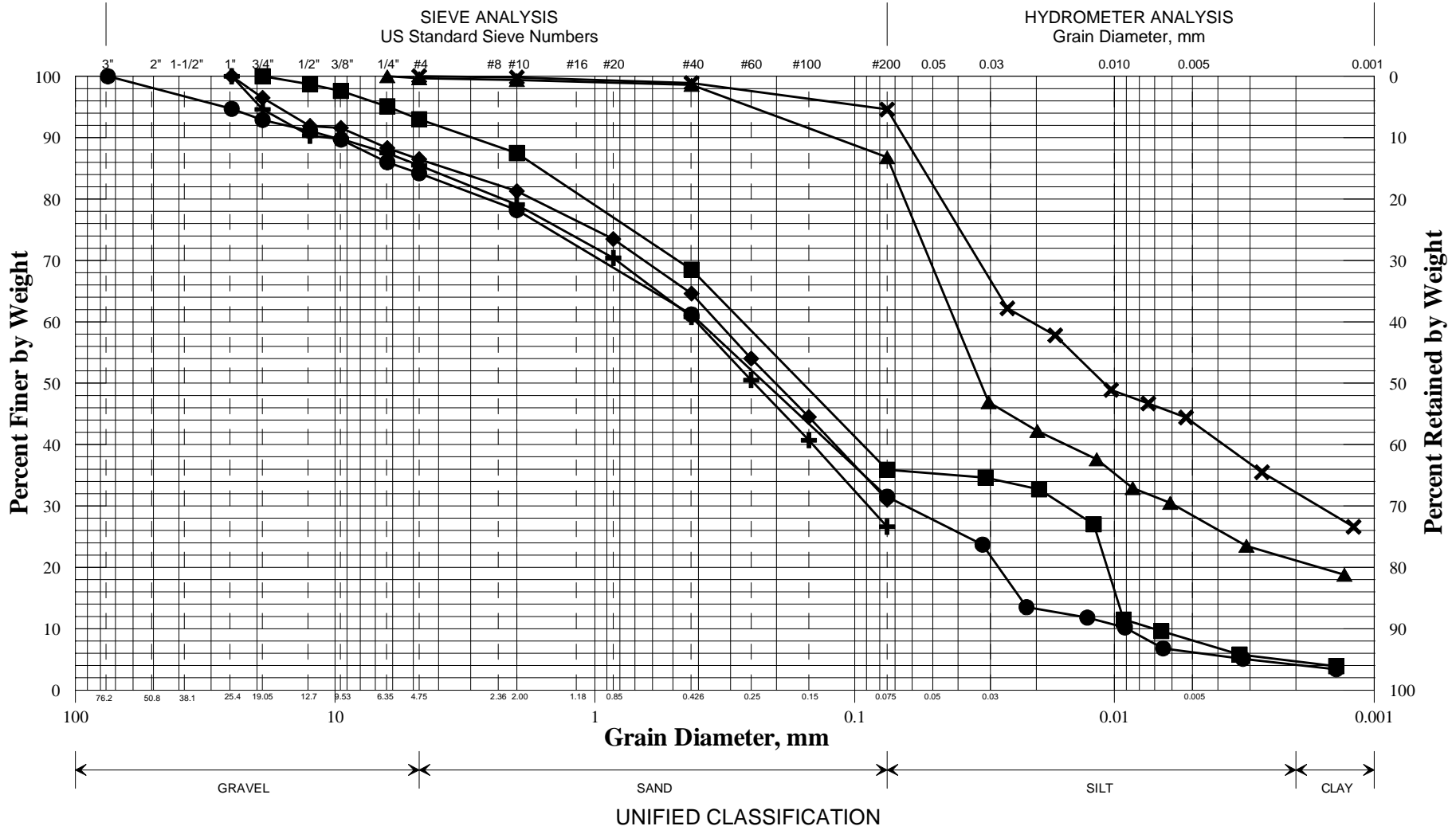
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* 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.

Appendix B

Laboratory Test Results

State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
+	HB-DUR-101/1D	10+13	16.5 RT	0.0-2.0	SAND, some silt, little gravel.	10.8			
◆	HB-DUR-101/3D	10+13	16.5 RT	4.0-6.0	SAND, some silt, little gravel.	9.7			
■	HB-DUR-101/4D	10+13	16.5 RT	6.0-8.0	SAND, some silt, trace gravel, trace clay.	10.4			
●	HB-DUR-101/6D	10+13	16.5 RT	10.0-12.0	SAND, some silt, little gravel, trace clay.	9.8			
▲	HB-DUR-102/1D	10+97	26.5 RT	1.0-3.0	SILT, some clay, little sand, trace gravel.	23.7			
×	HB-DUR-102/2D	10+97	26.5 RT	4.0-6.0	SILT, some clay, trace sand.	24.9			

WIN	
021780.00	
Town	
Durham	
Reported by/Date	
WHITE, TERRY A	7/28/2017