

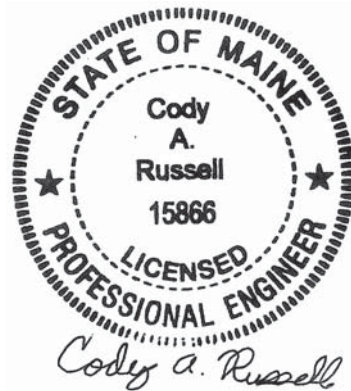
**MAINE DEPARTMENT OF TRANSPORTATION
HIGHWAY PROGRAM
GEOTECHNICAL SECTION
AUGUSTA, MAINE**

GEOTECHNICAL DESIGN REPORT

For the Replacement of:

**LARGE CULVERT #47000
ROUTE 164
PRESQUE ISLE, MAINE**

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Aroostook County
WIN 22964.00

October 10, 2019

Soils Report 2019-41
Federal Project No. 2296400

PROJECT DETAILS

The purpose of this Geotechnical Design Report is to present subsurface information and make geotechnical design and construction recommendations for the replacement of an existing approximately 75-foot long, 72-inch diameter corrugated metal pipe (CMP) large culvert (#47000) on Route 164 in Presque Isle. The existing culvert is in poor condition. The culvert is located approximately 0.16 of a mile south of Chandler Road as shown in the attached Location Map. Route 164 is a Highway Corridor Priority 3 road.

The proposed replacement structure will be a 114-foot long, 96-inch diameter Polymer Coated Steel Pipe (PCSP) culvert on a skew of approximately 11 degrees to the roadway centerline. The invert of the proposed culvert is approximately 15.5 feet below the existing road grade at the roadway centerline. The roadway embankment slopes at the proposed culvert inlet and outlet shall be no steeper than 2H:1V on the inlet outlet to protect against erosion.

SUBSURFACE INVESTIGATION

One (1) boring (HB-PRIS-101) and one (1) probe (HB-PRIS-102) were drilled for this project on October 17, 2017 by the MaineDOT drill crew using a trailer-mounted drill rig. Exploration locations are shown on the attached Boring Location Plan & Interpretive Subsurface Profile with Boring Logs sheet. Details and sampling methods used, field data obtained, and soil and groundwater conditions encountered are shown on the attached boring logs.

Boring HB-PRIS-101 was drilled using solid stem auger and cased washed boring techniques. Soil samples were obtained in boring HB-PRIS-101 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 42 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 0.854 to the raw field N-values. Probe HB-PRIS-102 was drilling using solid stem auger techniques. No soil samples were obtained in the probe.

The MaineDOT Geotechnical Team member selected the boring and probe locations, drilling methods, designated type and depth of sampling, reviewed field logs for accuracy and identified field and laboratory testing requirements. A NorthEast Transportation Training and Certification (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.

LABORATORY TESTING

A laboratory testing program was conducted to assist in soil classification, evaluation of engineering properties of the soils and geologic assessment of the project site. Laboratory testing consisted of five (5) standard grain size analyses with natural water content. The results of the laboratory testing program are discussed in the following section and are shown on the attached boring logs, Laboratory Testing Summary Sheet, and Grain Size Distribution Curve sheet.

SUBSURFACE CONDITIONS

Subsurface conditions encountered at the test boring generally consisted of fill overlying glacial till. An interpretive subsurface profile depicting the generalized soil stratigraphy at the boring location is shown on the attached Boring Location Plan & Interpretive Subsurface Profile with Boring Logs sheet.

Boring HB-PRIS-101 was drilled to a depth of approximately 27.0 feet below ground surface (bgs) and did not encounter a refusal surface. Probe HB-PRIS-102 was drilled to a depth of approximately 25.0 feet bgs and did not encounter a refusal surface.

The table below summarizes the field and laboratory information obtained in boring HB-PRIS-101:

Approx. Depth BGS ¹ (feet)	Soil Description	AASHTO ² Classification	USCS ³	WC% ⁴
0 – 0.4	Pavement	--	--	--
0.4 – 14	Fill: Brown and grey, damp to wet, fine to coarse sand, some gravel, little silt.	A-1-b	SM	7.6 to 8.5
8.0 – 17.0	Glacial Till: Grey to grey-brown, wet, silt, some fine to coarse sand, some gravel.	A-4 or A-2-4	SM	9.6 to 11.2
	Grey-brown, wet, gravel, some fine to coarse sand, trace silt.	A-1-a	GW-GM	7.7

¹BGS = below ground surface

²AASHTO = American Association of State Highway and Transportation Officials

³USCS = Unified Soil Classification System

⁴WC% = Water content in percent

Two (2) corrected N-values obtained in the fill sand were 19 and 44 blows per foot (bpf) indicating that the fill is medium dense to dense in consistency. Two (2) corrected N-values obtained in the silt till were 27 and 64 bpf indicating that the silt till is very dense to hard in consistency. One (1) corrected N-value obtained in the gravel till was 128 bpf indicating that the gravel fill is very dense in consistency.

Groundwater was observed in boring HB-PRIS-101 at a depth of approximately 15.0 feet bgs. Groundwater was not observed in the probe. Groundwater levels can be expected to fluctuate subject to seasonal variations, local soil conditions, topography, precipitation, and construction activity.

GEOTECHNICAL DESIGN AND CONSTRUCTION RECOMMENDATIONS

Polymer Coated Steel Pipe (PCSP) Culvert Construction – The proposed replacement structure will be a 114-foot long, 96-inch diameter PCSP culvert on a skew of approximately 11 degrees to the roadway centerline. The proposed PCSP shall be furnished and installed in accordance with MaineDOT Standard Specification 603.

The invert of the proposed PCSP culvert ranges from approximately 432.5 feet at the inlet end to approximately 432.0 feet at the outlet end with a 0.44% slope.

The full nature of the proposed culvert bearing surface will not become evident until the culvert excavation is made. Any cobbles or boulders encountered in excess of 6 inches shall be removed and replaced with compacted Granular Borrow Material for Underwater Backfill or Crushed Stone $\frac{3}{4}$ -Inch. The prepared subgrade shall be proof-rolled using a static roller to visually confirm the prepared subgrade is firm and stable. The exposed subgrade shall be free of ponded water so that bedding material placement and compaction can be completed in the dry.

The proposed structure shall be bedded on a 1-foot thick layer of Granular Borrow, Material for Underwater Backfill meeting the requirements of MaineDOT Standard Specification 703.19. The soil envelope and backfill shall consist of Standard Specification 703.19 - Granular Borrow with a maximum particle size of 4 inches. The granular borrow bedding and backfill material shall be placed in lifts of 6 to 8 inches loose measure and compacted to the manufacturer's specifications or, in the absence of manufacturer's specifications. The bedding and backfill soil shall be compacted to at least 92 percent of the AASHTO T-180 maximum dry density. All subgrade surfaces should be protected from construction traffic in order to limit disturbance.

Settlement – No settlement issues are anticipated at the site. No changes to the existing vertical or horizontal alignment are currently planned for this project. The proposed PCSP culvert is larger than the existing culvert and will result in a net unloading of the site soils at the structure location. Placement of fill soils at the location of the existing structure is not anticipated to exceed the past loading condition of the site soils. Any settlement due to elastic compression of the bedding material will be immediate and negligible.

Scour and Riprap – Both the inlet and outlet of the PCSP culvert shall be protected against scour with riprap conforming to MaineDOT Standard Specification Section 703.26 Plain and Hand Laid Riprap. The roadway embankment slopes at the proposed culvert inlet and outlet shall be no steeper than 2H:1V. No specific scour protection recommendations are needed other than armoring with riprap. The riprap on the slopes shall be underlain by a non-woven, Class 1 Erosion Control Geotextile meeting the requirements of MaineDOT Standard Specification 722.03 that is underlain by a 1-foot layer of protective aggregate cushion consisting of Granular Borrow Material for Underwater Backfill (703.19). The toe of the riprap sections shall be keyed into the existing soils 1 foot below the streambed elevation.

Construction Considerations – Construction activities will include construction of cofferdams and earth support systems to control stream flow during construction. Construction activities will also include common earth excavation. Construction of the PCSP culvert will require soil

excavation. Earth support systems shall be implemented if laying back slopes is not feasible. It is likely that the use of complex (four-sided) braced excavations with dewatering will be necessary due to the depth of the excavation. If this is the case, adequate embedment into the native soils will be necessary to allow for the excavation and maintenance of a stable excavation bottom. All earth support systems shall be designed by a Professional Engineer licensed in the State of Maine. Regardless of the method of excavation, all excavations and earth support systems shall meet all applicable OSHA regulations.

Any cobbles or boulders encountered in excess of 6 inches shall be removed and replaced with compacted Granular Borrow Material for Underwater Backfill (MaineDOT 703.19) or Crushed Stone $\frac{3}{4}$ -Inch (MaineDOT 703.13). All subgrade surfaces shall be proof-rolled using a static roller to provide a firm and stable surface and protected from any unnecessary construction equipment or traffic. If disturbance and rutting occur, the Contractor shall remove and replace disturbed areas with compacted Granular Borrow for Underwater Backfill (703.19) or Crushed Stone $\frac{3}{4}$ -Inch (703.13).

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 as needed to maintain a stable excavation and allow work in the dry.

Using the excavated native soils as backfill around the culvert shall not be permitted. The native soils may only be used as Common Borrow in accordance with MaineDOT Standard Specifications 203 and 703.

The Contractor will have to excavate the existing subbase and subgrade fill soils in the vicinity of the culvert. These materials should not be used to re-base the roadway. Excavated subbase sand and gravel may be used as fill below roadway subgrade level in fill areas provided all other requirements of MaineDOT Standard Specifications 203 and 703 are met.

CLOSURE

This report has been prepared for the use of the MaineDOT Highway Program and their project design consultant for specific application to the proposed replacement of a Large Culvert #47000 under Route 164 in Presque Isle, 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 location completed at the site. If variations from the conditions encountered during the investigation appear evident during construction, it may also become necessary to re-evaluate the recommendations made in this report.

It is recommended that a geotechnical engineer be provided the opportunity for a review of the design and specifications in order that the earthwork and foundation recommendations and

construction considerations presented in this report are properly interpreted and implemented in the design and specifications.

Attachments:

Location Map

Boring Location Plan & Interpretive Subsurface Profile with Boring Logs

Key to Soil and Rock Descriptions and Terms

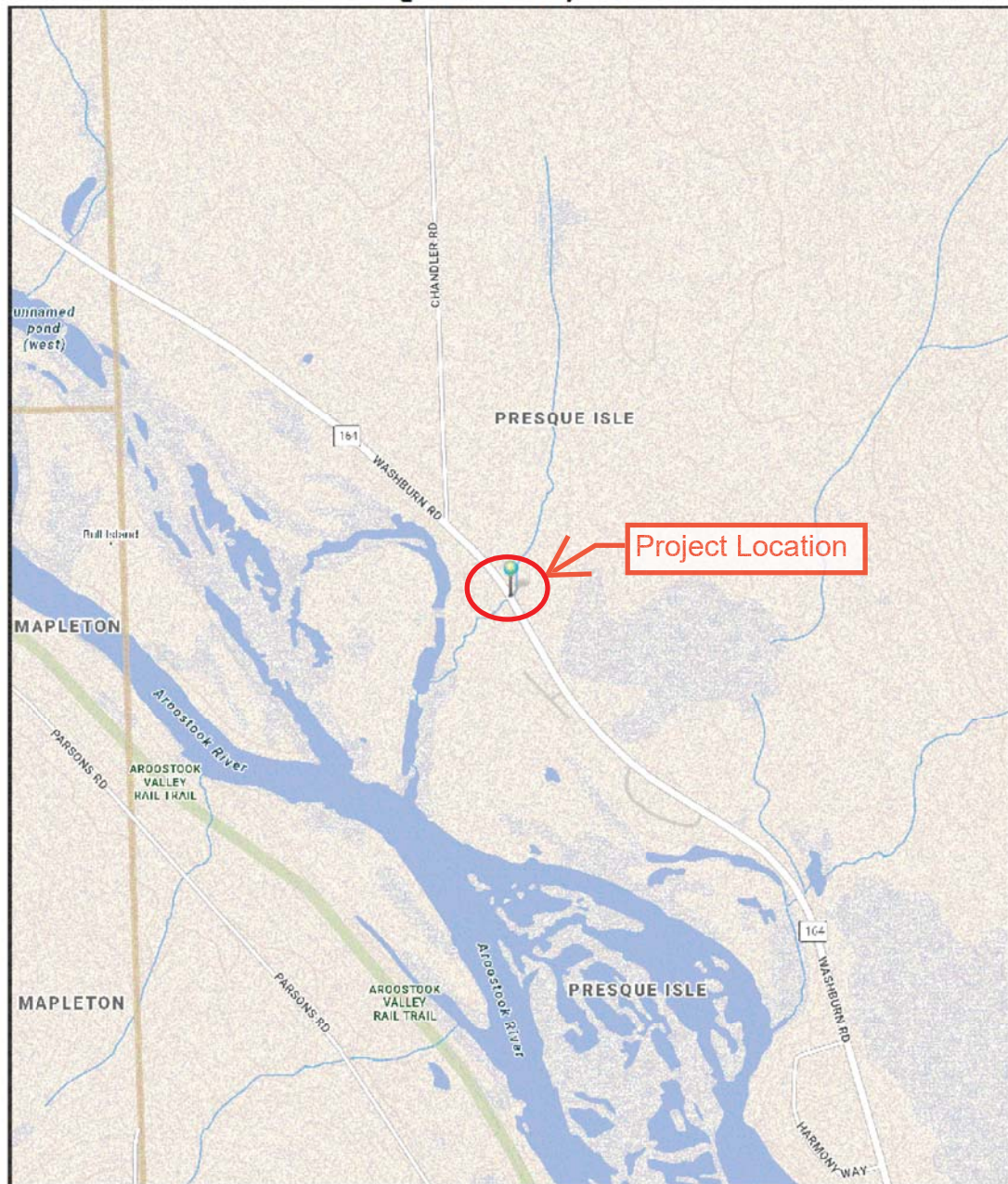
Boring Logs

Laboratory Testing Summary Sheet

Grain Size Distribution Curves



PRESQUE ISLE, MAINE



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

0.25 Miles
1 inch = 0.28 miles

Date: 9/10/2019
Time: 10:31:41 AM

SHEET NUMBER

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OF 3

PRESQUE ISLE
ROUTE 164

LOCATION MAP

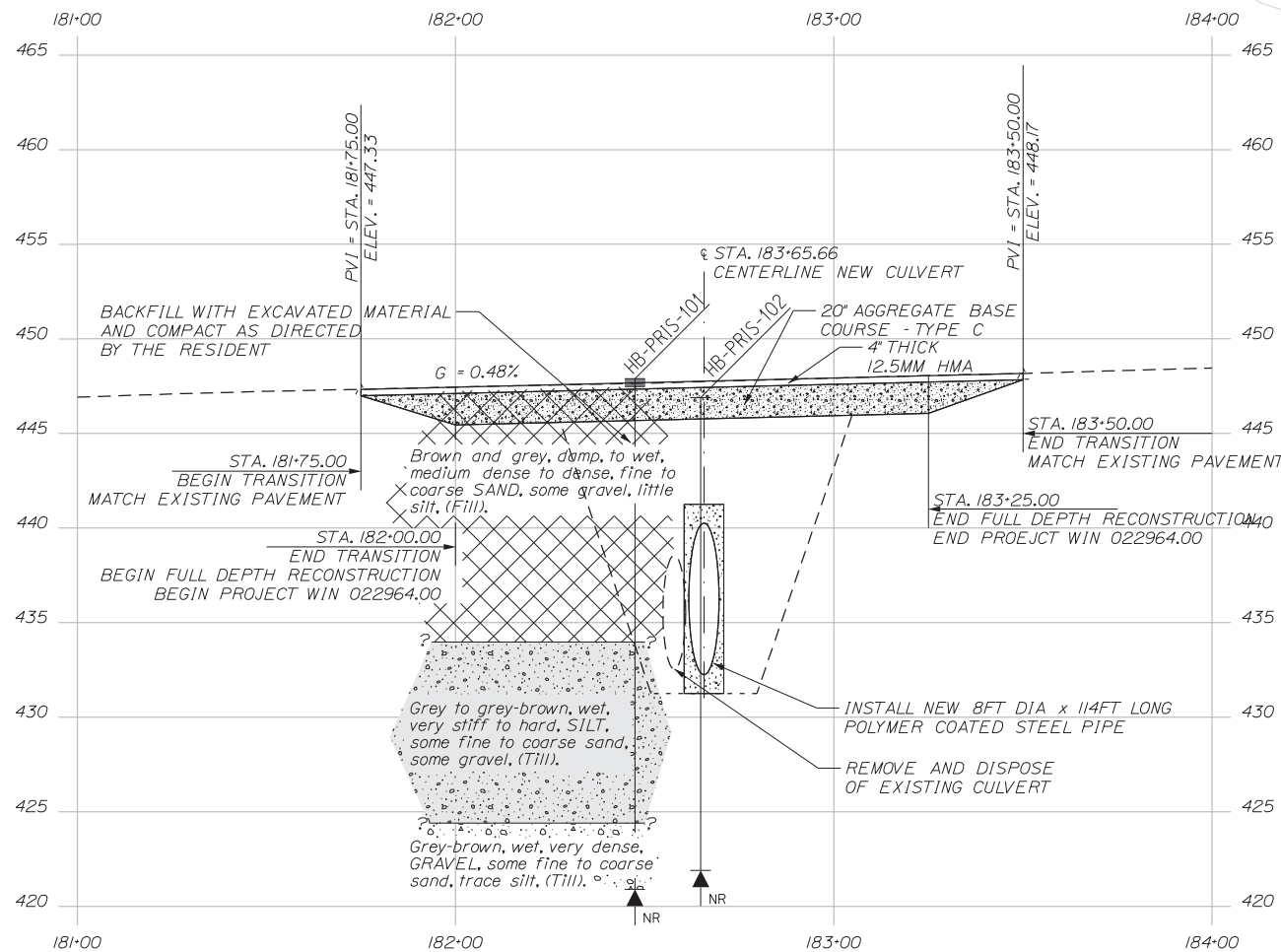
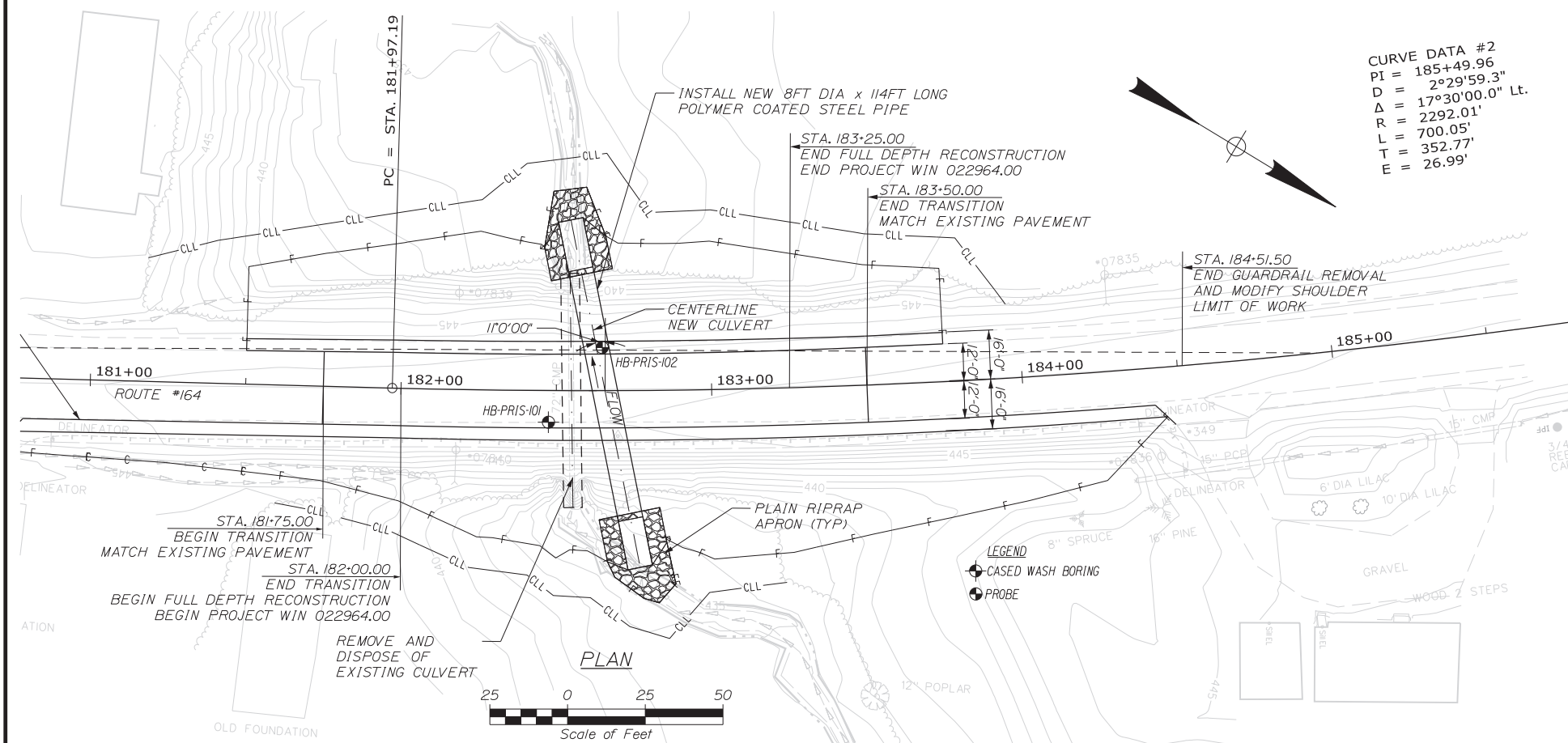
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

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HIGHWAY PLANS



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 and bedrock transitions may vary and are probably more erratic. For more specific information refer to the exploration logs.

Moine Department of Transportation				Project Route 164 Large Culvert Replacement				Boring No.: HB-PR15-101			
Soil/Bore Exploration Log US CUSTOMARY UNITS				Location Presque Isle, Maine				WIN: 22964.00			
Driller		MaineDOT		Elevation (ft.)		447.9		Auger (ft./min)		5" Dia. Solid Stem	
Operator		Francis Tyson		Datum		NAVD83		Corrections		Standard Split Spoon	
Logged By		B. Wilbur		Rig Type		RDC 45C		Home: Wt./Fall:1		140w/30"	
Date Start/Finish		10/17/2011 12:30-14:00		Drilling Method		Cased Wash Boring		Core Barrel:		N/A	
Boring Location		182+47.4, 10.2 ft Br.		Casing (ft./min)		WB-3"		Water Level:		15.0 ft bgs.	
Home: Efficiency Factor: 0.854				Home: Type		Automatic ☒ Hydraulic ☐		Rope & Cathead			
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Maine Department of Transportation Soil/Borehole Exploration Log				Project Route 164 Large Culvert Reinforcement Location: Presque Isle, Maine		Boring No.: HB-PRIS-10
US CUSTOMARY UNITS						WIN: 22964.00
Drilling Contractor/Main/DOT		Elevation (ft.): 446.9			Auger ID/DDI: S' Dia:	
Operator: Trivoli/Tyson		Cuttings: MWD/S			Sampler: N/A	
Logged By: B. Wither		Rig Type: CMC 45C			Hammer #1/#D/I1	N/A
Date Start/Finish: 10/17/2017-10/17/2017		Drilling Method(s): Solid Stem Auger			Cone Barrel(s): N/A	
Boring Location(s): 182+64.8, 13.9 ft L.T.		Coating ID/DDI: N/A			Water Level(ft): None Observed	
DFI/Triplog = Split Spoon Sample MC = unconsolidated Thin Wall Tube Sampler Attached RSP = Weight of 1 Period S = Spore off Auger Flights TS = Thin Core Sample LS = Non-Mechanized First Spike Unrecorded Shear Strength (psi) SA = Bucket Sample off Auger Flights STA = Solid Stem Auger T _{u(1g)} = Lab vane unrecorded Shear Strength (psi) MB = unconsolidated Split Spoon Sample Arranged STA = Hollow Stem Auger CS = Unconfined Compressive Strength (psi) ST = Thin Wall Tube Sample MC = Roller Cone T _{u(ave)} = Raw Field SPI Triaxial MS = unconsolidated Fine-grain Sample Test Arranged MD = Weight of solids, number TS = Roller Torque Shear Strength (psi) F = Field Spike Shear Test RSC = Weight of Rocks or Coating RC = Roller Conment, percent S = Siegel or Equal top						
Sample Information						
Depth (ft.)	Sample No.	Sample Depth (ft.)	Pen./R.C. (in)	Cap(s) & Diam (in)	Blow(s) /S (in)	Visual Description and Remarks
					Shower Length (ft.)	
					UP ROD (ft.)	
					US	
					In-situ	
					Coating	
					Blow(s)	
					Elevation (ft.)	
					F-1-F-1	
					Grain(s) Log	
0					55.4	Probe, no material descriptions given.
5						
10						
15						
20						
25					421.9	Bottom of Exploration at 25.0 feet below ground surface. NO RECORD
Remarks:						

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

* Water level readings have been noted on times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present in the time measurements were made.

Page 1 of 1

 Boring No.: HB-PRIS-102

UNIFIED SOIL CLASSIFICATION SYSTEM					MODIFIED BURMISTER SYSTEM					
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.	Descriptive Term		Portion of Total (%)			
		(little or no fines)	GP	Poorly-graded gravels, gravel sand mixtures, little or no fines.	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):					
					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					
					Rock Mass 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 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))					
					Sample Container Labeling Requirements:					
					WIN		Blow Counts			
					Bridge Name / Town		Sample Recovery			
					Boring Number		Date			
					Sample Number		Personnel Initials			
					Sample Depth					
Maine Department of Transportation Geotechnical Section Key to Soil and Rock Descriptions and Terms Field Identification Information										

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 164 Large Culvert Replacement Location: Presque Isle, Maine				Boring No.: HB-PRIS-101 WIN: 22964.00				
Driller: MaineDOT				Elevation (ft.): 447.9				Auger ID/OD: 5" Dia. Solid Stem				
Operator: Travis/Tyson				Datum: NAVD88				Sampler: Standard Split Spoon				
Logged By: B. Wilder				Rig Type: CME 45C				Hammer Wt./Fall: 140#/30"				
Date Start/Finish: 10/17/2017; 12:30-14:00				Drilling Method: Cased Wash Boring				Core Barrel: N/A				
Boring Location: 182+47.4, 10.2 ft Rt.				Casing ID/OD: NW-3"				Water Level*: 15.0 ft bgs.				
Hammer Efficiency Factor: 0.854				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								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows					
0							SSA	447.5		5" HMA	0.4	
5	1D	24/24	5.00 - 7.00	12/17/14/14	31	44				Brown, damp, dense, fine to coarse SAND, some gravel, little silt, (Fill).	G#302638 A-1-b, SM WC=7.6%	
10	2D/A	24/22	10.00 - 12.00	6/6/7/6	13	19	13			2D (10.0-11.5 ft bgs.) Brown, wet, medium dense, fine to coarse SAND, some gravel, little silt, (Fill).	G#302639 A-1-b, SM WC=8.5%	
							27			2D/A (11.5-12.0 ft bgs.) Grey, wet, medium dense, fine to coarse SAND, little silt.	combined w/ 2D	
							26					
							18					
15	3D	24/18	15.00 - 17.00	6/8/11/20	19	27	32	433.9		Grey, wet, very stiff, SILT, some fine to coarse sand, some gravel, (Till).	G#302641 A-4, SM WC=11.2%	
							49					
							73					
							117					
20	4D	24/19	20.00 - 22.00	8/20/25/24	45	64	28			Grey brown, wet, hard, SILT, some fine to coarse sand, some gravel, (Till).	G#302642 A-2-4, SM WC=9.6%	
							27					
							36			Roller Coned ahead to 25.0 ft bgs.		
							49					
25							55	424.4			23.5	
Remarks:												
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.: HB-PRIS-101		

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS						Project: Route 164 Large Culvert Replacement Location: Presque Isle, Maine				Boring No.: HB-PRIS-101 WIN: 22964.00															
Driller: MaineDOT			Elevation (ft.): 447.9			Auger ID/OD: 5" Dia. Solid Stem																			
Operator: Travis/Tyson			Datum: NAVD88			Sampler: Standard Split Spoon																			
Logged By: B. Wilder			Rig Type: CME 45C			Hammer Wt./Fall: 140#/30"																			
Date Start/Finish: 10/17/2017; 12:30-14:00			Drilling Method: Cased Wash Boring			Core Barrel: N/A																			
Boring Location: 182+47.4, 10.2 ft Rt.			Casing ID/OD: NW-3"			Water Level*: 15.0 ft bgs.																			
Hammer Efficiency Factor: 0.854						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							
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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.	
25		5D		24/18		25.00 - 27.00		27/35/55/53		90		128				420.9				Grey brown, wet, very dense, GRAVEL. some fine to coarse sand, trace silt, (Till).				G#302643 A-1-a, GW-GM WC=7.7%	
																				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.																									
Page 2 of 2																									
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Boring No.: HB-PRIS-101																									

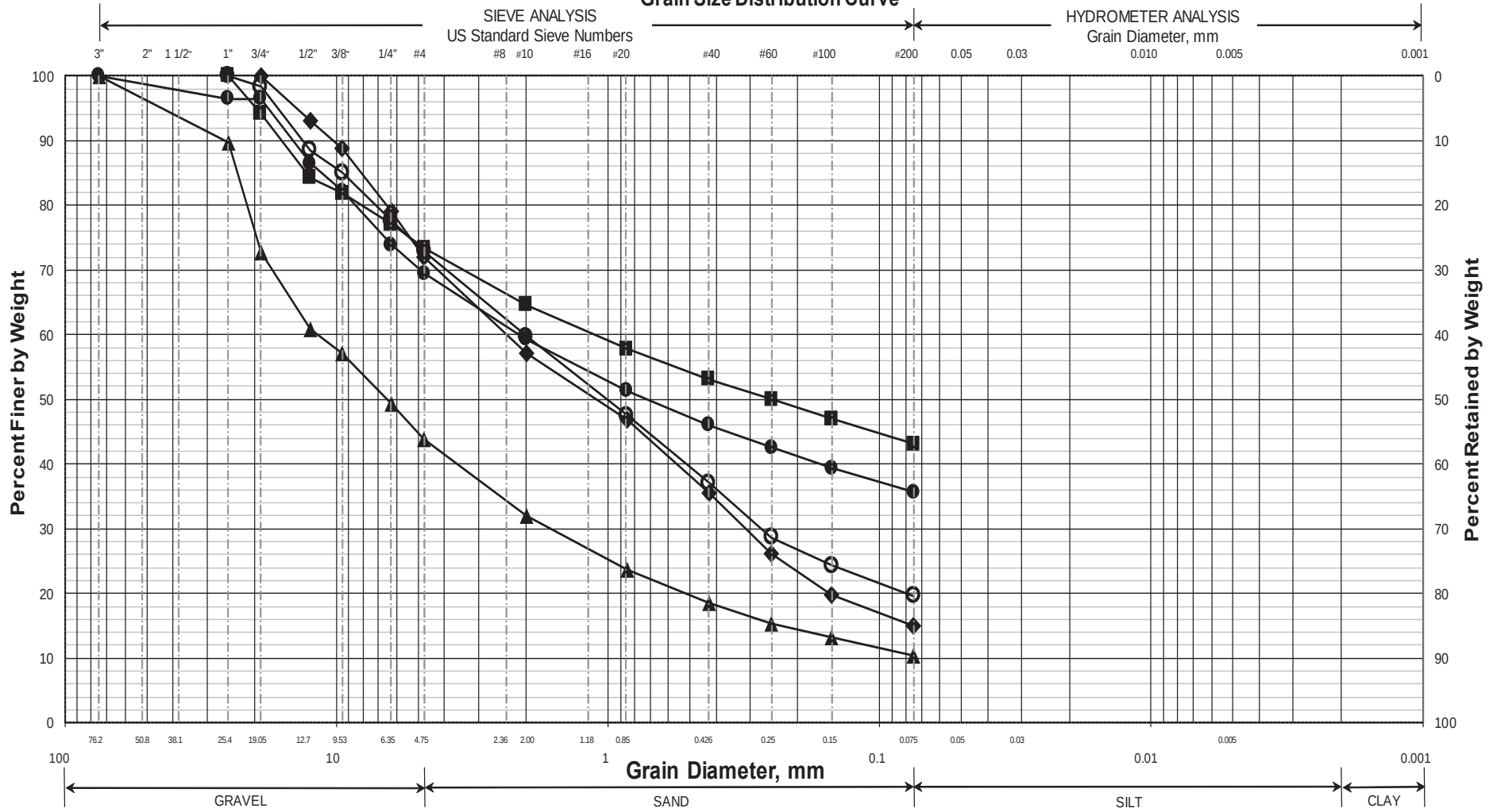
Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS						Project: Route 164 Large Culvert Replacement Location: Presque Isle, Maine				Boring No.: HB-PRIS-102 WIN: 22964.00			
Driller: MaineDOT			Elevation (ft.): 446.9			Auger ID/OD: 5" Dia.							
Operator: Travis/Tyson			Datum: NAVD88			Sampler: N/A							
Logged By: B. Wilder			Rig Type: CME 45C			Hammer Wt./Fall: N/A							
Date Start/Finish: 10/17/2017-10/17/2017			Drilling Method: Soild Stem Auger			Core Barrel: N/A							
Boring Location: 182+64.8, 13.8 ft Lt.			Casing ID/OD: N/A			Water Level*: None Observed							
Hammer Efficiency Factor:			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 Stern Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person			Su = Peak/Remolded Field Vane Undrained Shear Strength (psf) Su(lab) = Lab Vane Undrained Shear Strength (psf) qp = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N60 = SPT N-uncorrected Corrected for Hammer Efficiency N60 = (Hammer Efficiency Factor/60%)*N-uncorrected			Tv = 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				
Sample Information													
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.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.		
0							SSA			Probe, no material descriptions given.			
5													
10													
15													
20													
25													
Remarks:													
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.													
Page 1 of 2													
Boring No.: HB-PRIS-102													

Maine Department of Transportation <u>Soil/Rock Exploration Log</u> <u>US CUSTOMARY UNITS</u>				Project: Route 164 Large Culvert Replacement Location: Presque Isle, Maine				Boring No.: HB-PRIS-102 WIN: 22964.00																																																																																																																																																																																																																																																																
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Work Number: 22964.00

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-PRIS-101/1D	182+47.4	10.2 RT	5.0-7.0	SAND, some gravel, little silt.	7.6			
◆	HB-PRIS-101/2D	182+47.4	10.2 RT	10.0-12.0	SAND, some gravel, little silt.	8.5			
■	HB-PRIS-101/3D	182+47.4	10.2 RT	15.0-17.0	SILT, some sand, some gravel.	11.2			
●	HB-PRIS-101/4D	182+47.4	10.2 RT	20.0-22.0	SILT, some sand, some gravel.	9.6			
▲	HB-PRIS-101/5D	182+47.4	10.2 RT	25.0-27.0	GRAVEL, some sand, trace silt.	7.7			
X									

WIN
022964.00
Town
Presque Isle
Reported by/Date
WHITE, TERRY A 9/10/2019