

# Memorandum

To: Ernest Martin, Project Manager  
Kate Maguire, PE, Geotechnical  
From: Cody Russell, EI, Geotechnical  
Date: March 12, 2019  
Re: Supplemental Borings at Reinforced Soil Slope  
Route 4 Reconstruction  
Madrid-Phillips, Maine  
WIN: 18247.00

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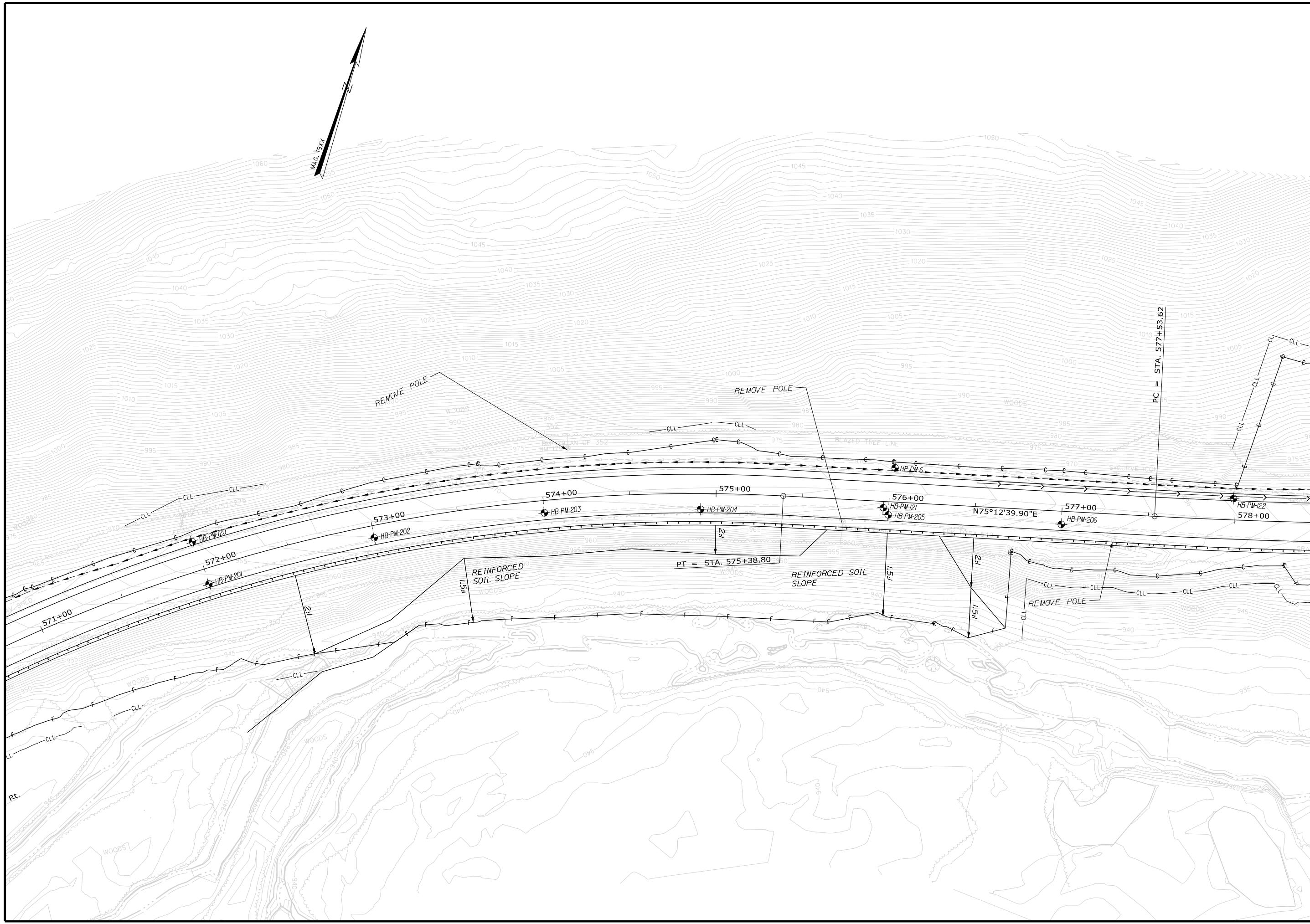
In order to provide more information for construction, the Department has conducted six (6) supplemental borings along Route 4 in Phillips between approximate Stations 572+00 to 577+00. These borings were conducted to gather subsurface information to facilitate construction of the proposed Reinforced Soil Slope shown in the Contract Documents. The MaineDOT and S.W. Cole drill crews drilled the borings (HB-PM-201 through HB-PM-206) in the roadway along the crest of the existing slope. The boring locations are shown on the attached Boring Location Plan. Details on sampling methods used, field data obtained, and soil and groundwater conditions encountered are shown in the attached boring logs. Refer to the Contract Plans and Geotechnical Report on the MaineDOT website for information on the 100-Series borings and probes and details of the proposed construction of the Reinforced Soil Slope.

Attachments:  
Boring Location Plan  
Key to Soil and Rock Descriptions and Terms  
Boring Logs HB-PM-201 through HB-PM-206

Date: 3/11/2019

Username: cody.o.russell

Filename: ... \00\GEOTECH\MSTA013\_BLP12.dgn Division: GEOTECH



STATE OF MAINE DEPARTMENT OF TRANSPORTATION STP-1824(700)		P.I.N. 18247.00		HIGHWAY PLANS	
MADRID\PHILLIPS ROUTE 4		BORING LOCATION PLAN			
SHEET NUMBER <b>1</b> OF 1		FIELD CHANGES			
PROJ. MANAGER E. Martin	BY T. WOLFEL	DATE DEC 2018	SIGNATURE C. RUSSELL	P.E. NUMBER T. WHITE	DATE
DESIGN-DETAILED	CHECKED-REVIEWED	DESIGN-DETAILED	DESIGN-DETAILED	REVISIONS 1	REVISIONS 2
DESIGN-DETAILED	DESIGN-DETAILED	DESIGN-DETAILED	DESIGN-DETAILED	REVISIONS 3	REVISIONS 4

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.	<u>trace</u> 0 - 10 <u>little</u> 11 - 20 <u>some</u> 21 - 35 <u>adjective (e.g. sandy, clayey)</u> 36 - 50	<b>TERMS DESCRIBING DENSITY/CONSISTENCY</b> <u>Coarse-grained soils</u> (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="0"> <tr> <td><u>Density of Cohesionless Soils</u></td> <td><u>Standard Penetration Resistance N-Value (blows per foot)</u></td> </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>&gt; 50</td> </tr> </table> <u>Fine-grained soils</u> (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="0"> <tr> <td><u>Consistency of Cohesive soils</u></td> <td><u>SPT N-Value (blows per foot)</u></td> <td><u>Approximate Undrained Shear Strength (psf)</u></td> <td><u>Field Guidelines</u></td> </tr> <tr> <td>Very Soft</td> <td>WOH, WOR, WOP, &lt;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>&gt;30</td> <td>over 4000</td> <td>Indented by thumbnail with difficulty</td> </tr> </table> <u>Rock Quality Designation (RQD):</u> 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="0"> <tr> <td><u>Rock Mass Quality</u></td> <td><u>RQD (%)</u></td> </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> <u>Desired Rock Observations (in this order, if applicable):</u> 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))	<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>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 thumbnail	Hard	>30	over 4000	Indented by thumbnail with difficulty	<u>Rock Mass Quality</u>	<u>RQD (%)</u>	Very Poor	≤25	Poor	26 - 50	Fair	51 - 75	Good	76 - 90	Excellent	91 - 100
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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.																																																							
		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.																																																								
<b>Desired Soil Observations (in this order, if applicable):</b> 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				<b>Sample Container Labeling Requirements:</b> WIN Blow Counts Bridge Name / Town Sample Recovery Boring Number Date Sample Number Personnel Initials Sample Depth																																																					
<b>Maine Department of Transportation            Geotechnical Section            Key to Soil and Rock Descriptions and Terms            Field Identification Information</b>																																																									

<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				<b>Project:</b> Route 4 Reconstruction <b>Location:</b> Phillips-Madrid, Maine				<b>Boring No.:</b> HB-PM-201 <b>WIN:</b> 18247.00							
<b>Driller:</b> S.W. Cole				<b>Elevation (ft.):</b> 959.8				<b>Auger ID/OD:</b> 2.25"/6" Hollow Stem Auger							
<b>Operator:</b> Kevin/Joe				<b>Datum:</b> NAVD88				<b>Sampler:</b> Standard Split Spoon							
<b>Logged By:</b> C. Russell				<b>Rig Type:</b> Diedrich D-50 Track				<b>Hammer Wt./Fall:</b> 140#/30"							
<b>Date Start/Finish:</b> 3/1/2019; 08:40-11:30				<b>Drilling Method:</b> Cased Wash Boring				<b>Core Barrel:</b> NQ-2"							
<b>Boring Location:</b> 572+00, 9.0 ft Rt.				<b>Casing ID/OD:</b> HW-4"				<b>Water Level*:</b> None Observed							
<b>Hammer Efficiency Factor:</b> 0.918				<b>Hammer Type:</b> 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 <sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf) S <sub>u</sub> (lab) = Lab Vane Undrained Shear Strength (psf) q <sub>p</sub> = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N <sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency N <sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected				T <sub>v</sub> = 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 <sub>60</sub>	Casing Blows								
0									959.0	HSA	9 1/2" HMA	0.8'			
5	1D	24/10	5.00 - 7.00	5/4/4/4	8	12					Reddish brown, damp, medium dense, fine to coarse SAND, some gravel, little silt, (Fill).				
10	2D	24/18	10.00 - 12.00	5/3/7/5	10	15					Reddish brown, damp, medium dense, fine to coarse SAND, little gravel, little silt, (Fill).				
15	3D	24/18	15.00 - 17.00	7/9/22/24	31	47					Reddish brown, damp, dense, fine to coarse SAND, little gravel, little silt, (Fill).				
20	4D	24/20	20.00 - 22.00	16/21/25/41	46	70			939.8		Reddish brown, moist, very dense, fine to coarse SAND, some silt, some gravel, (Till).	20.0'			
25	R1	60/58	23.80 - 28.80	RQD = 100%					936.0	NQ-2	Top of Bedrock at Elev. 936.0 ft. Auger Refusal at 23.8 ft bgs. Pulled HSA and set in HW Casing.	23.8'			

**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.

<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS	<b>Project:</b> Route 4 Reconstruction  <b>Location:</b> Phillips-Madrid, Maine	<b>Boring No.:</b> HB-PM-201  <b>WIN:</b> 18247.00
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<b>Driller:</b> S.W. Cole	<b>Elevation (ft.):</b> 959.8	<b>Auger ID/OD:</b> 2.25"/6" Hollow Stem Auger
<b>Operator:</b> Kevin/Joe	<b>Datum:</b> NAVD88	<b>Sampler:</b> Standard Split Spoon
<b>Logged By:</b> C. Russell	<b>Rig Type:</b> Diedrich D-50 Track	<b>Hammer Wt./Fall:</b> 140#/30"
<b>Date Start/Finish:</b> 3/1/2019; 08:40-11:30	<b>Drilling Method:</b> Cased Wash Boring	<b>Core Barrel:</b> NQ-2"
<b>Boring Location:</b> 572+00, 9.0 ft Rt.	<b>Casing ID/OD:</b> HW-4"	<b>Water Level*:</b> None Observed

**Hammer Efficiency Factor:** 0.918      **Hammer Type:** Automatic  Hydraulic  Rope & Cathead

Definitions: R = Rock Core Sample      S<sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf)      T<sub>v</sub> = Pocket Torvane Shear Strength (psf)  
 D = Split Spoon Sample      SSA = Solid Stem Auger      S<sub>u(lab)</sub> = Lab Vane Undrained Shear Strength (psf)      WC = Water Content, percent  
 MD = Unsuccessful Split Spoon Sample Attempt      HSA = Hollow Stem Auger      q<sub>u</sub> = Unconfined Compressive Strength (ksf)      LL = Liquid Limit  
 U = Thin Wall Tube Sample      RC = Roller Cone      N-uncorrected = Raw Field SPT N-value      PL = Plastic Limit  
 MU = Unsuccessful Thin Wall Tube Sample Attempt      WOH = Weight of 140 lb. Hammer      Hammer Efficiency Factor = Rig Specific Annual Calibration Value      PI = Plasticity Index  
 V = Field Vane Shear Test, PP = Pocket Penetrometer      WOR/C = Weight of Rods or Casing      N<sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency      G = Grain Size Analysis  
 MV = Unsuccessful Field Vane Shear Test Attempt      WO1P = Weight of One Person      N<sub>60</sub> = (Hammer Efficiency Factor/60%)\*N-uncorrected      C = Consolidation Test

Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows				
25								931.0		R1: Bedrock: Grey, GRANODIORITE. R1: Core Times (min:sec) 23.8-24.8 ft (2:09) 24.8-25.8 ft (2:15) 25.8-26.8 ft (2:24) 26.8-27.8 ft (2:03) 27.8-28.8 ft (2:04) 97% Recovery	
										Bottom of Exploration at 28.8 feet below ground surface.	
30											
35											
40											
45											
50											

**Remarks:**



<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS	<b>Project:</b> Route 4 Reconstruction  <b>Location:</b> Phillips-Madrid, Maine	<b>Boring No.:</b> HB-PM-202  <b>WIN:</b> 18247.00
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<b>Driller:</b> MaineDOT	<b>Elevation (ft.):</b> 966.9	<b>Auger ID/OD:</b> 5" Solid Stem
<b>Operator:</b> Daggett	<b>Datum:</b> NAVD88	<b>Sampler:</b> Standard Split Spoon
<b>Logged By:</b> B. Wilder	<b>Rig Type:</b> CME 45C	<b>Hammer Wt./Fall:</b> 140#/30"
<b>Date Start/Finish:</b> 3/1/2019; 10:00-15:30	<b>Drilling Method:</b> Cased Wash Boring	<b>Core Barrel:</b> NQ-2"
<b>Boring Location:</b> 573+00, 7.0 ft Rt.	<b>Casing ID/OD:</b> NW-3"	<b>Water Level*:</b> None Observed

<b>Hammer Efficiency Factor:</b> 0.92	<b>Hammer Type:</b> Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>	
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Definitions: 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  
 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  
 S<sub>p</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf), S<sub>u(lab)</sub> = Lab Vane Undrained Shear Strength (psf), q<sub>u</sub> = Unconfined Compressive Strength (ksf), N-uncorrected = Raw Field SPT N-value, Hammer Efficiency Factor = Rig Specific Annual Calibration Value, N<sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency, N<sub>60</sub> = (Hammer Efficiency Factor/60%)\*N-uncorrected  
 T<sub>v</sub> = 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 <sub>60</sub>	Casing Blows				
25	5D	3.6/3.6	25.00 - 25.30	50(3.6")	---	70			Set in NW Casing at 25.0 ft bgs. Grey, damp, very dense, fine to coarse SAND, some gravel, some silt. Roller Coned ahead to 29.8 ft bgs. OH = Open Hole		
						OH					
						OH					
						OH					
30	R1	28.8/15	29.80 - 32.20			OH NQ-2	937.1		R1: Cobbles and Till. R1: Core Times (min:sec) 29.8-30.8 ft (1:06) 30.8-31.8 ft (0:59) 31.8-32.2 ft (0:25) 52% Recovery	29.8	
							934.7				
35											
40											
45											
50											

**Remarks:**




<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS	<b>Project:</b> Route 4 Reconstruction  <b>Location:</b> Phillips-Madrid, Maine	<b>Boring No.:</b> HB-PM-203  <b>WIN:</b> 18247.00
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<b>Driller:</b> MaineDOT	<b>Elevation (ft.):</b> 968.9	<b>Auger ID/OD:</b> 5" Solid Stem
<b>Operator:</b> Daggett	<b>Datum:</b> NAVD88	<b>Sampler:</b> Standard Split Spoon
<b>Logged By:</b> B. Wilder	<b>Rig Type:</b> CME 45C	<b>Hammer Wt./Fall:</b> 140#/30"
<b>Date Start/Finish:</b> 2/28/2019; 09:00-10:00	<b>Drilling Method:</b> Cased Wash Boring	<b>Core Barrel:</b> NQ-2"
<b>Boring Location:</b> 574+00, 7.0 ft Rt.	<b>Casing ID/OD:</b> NW-3"	<b>Water Level*:</b> None Observed

<b>Hammer Efficiency Factor:</b> 0.92	<b>Hammer Type:</b> Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>	
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Definitions: R = Rock Core Sample S<sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf) T<sub>v</sub> = Pocket Torvane Shear Strength (psf)  
 D = Split Spoon Sample SSA = Solid Stem Auger S<sub>u</sub>(lab) = Lab Vane Undrained Shear Strength (psf) WC = Water Content, percent  
 MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q<sub>u</sub> = Unconfined Compressive Strength (ksf) LL = Liquid Limit  
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 MU = Unsuccessful Thin Wall Tube Sample Attempt WOH = Weight of 140 lb. Hammer Hammer Efficiency Factor = Rig Specific Annual Calibration Value PI = Plasticity Index  
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 MV = Unsuccessful Field Vane Shear Test Attempt WO1P = Weight of One Person N<sub>60</sub> = (Hammer Efficiency Factor/60%)\*N-uncorrected C = Consolidation Test

Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows				
25	MD	24/0	25.00 - 27.00	50						Failed sample attempt, soils similar to above. (Off Auger Flights) Cobble from 25.2-25.3 ft bgs.	
30	R1	60/60	30.00 - 35.00	RQD = 100%				938.9		a50 blows for 0.5 ft.  Top of Bedrock at Elev. 938.9 ft. R1: Bedrock: Grey, GRANODIORITE. R1: Core Times (min:sec) 30.0-31.0 ft (1:42) 31.0-32.0 ft (1:45) 32.0-33.0 ft (1:40) 33.0-34.0 ft (1:48) 34.0-35.0 ft (1:50) 100% Recovery	
35								933.9		Bottom of Exploration at 35.0 feet below ground surface.	
40											
45											
50											

**Remarks:**



<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS	<b>Project:</b> Route 4 Reconstruction  <b>Location:</b> Phillips-Madrid, Maine	<b>Boring No.:</b> HB-PM-204  <b>WIN:</b> 18247.00
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<b>Driller:</b> S.W. Cole	<b>Elevation (ft.):</b> 970.2	<b>Auger ID/OD:</b> 2.25"/6" Hollow Stem Auger
<b>Operator:</b> Kevin/Joe	<b>Datum:</b> NAVD88	<b>Sampler:</b> Standard Split Spoon
<b>Logged By:</b> C. Russell	<b>Rig Type:</b> Diedrich D-50 Track	<b>Hammer Wt./Fall:</b> 140#/30"
<b>Date Start/Finish:</b> 2/28/2019; 12:40-15:00	<b>Drilling Method:</b> Hollow Stem Auger	<b>Core Barrel:</b> N/A
<b>Boring Location:</b> 574+91, 9.0 ft Rt.	<b>Casing ID/OD:</b> N/A	<b>Water Level*:</b> None Observed

**Hammer Efficiency Factor:** 0.918      **Hammer Type:** Automatic     Hydraulic     Rope & Cathead

Definitions: R = Rock Core Sample      S<sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf)      T<sub>v</sub> = Pocket Torvane Shear Strength (psf)  
 D = Split Spoon Sample      SSA = Solid Stem Auger      S<sub>u(lab)</sub> = Lab Vane Undrained Shear Strength (psf)      WC = Water Content, percent  
 MD = Unsuccessful Split Spoon Sample Attempt      HSA = Hollow Stem Auger      q<sub>u</sub> = Unconfined Compressive Strength (ksf)      LL = Liquid Limit  
 U = Thin Wall Tube Sample      RC = Roller Cone      N-uncorrected = Raw Field SPT N-value      PL = Plastic Limit  
 MU = Unsuccessful Thin Wall Tube Sample Attempt      WOH = Weight of 140 lb. Hammer      Hammer Efficiency Factor = Rig Specific Annual Calibration Value      PI = Plasticity Index  
 V = Field Vane Shear Test, PP = Pocket Penetrometer      WOR/C = Weight of Rods or Casing      N<sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency      G = Grain Size Analysis  
 MV = Unsuccessful Field Vane Shear Test Attempt      WO1P = Weight of One Person      N<sub>60</sub> = (Hammer Efficiency Factor/60%)\*N-uncorrected      C = Consolidation Test

Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class.	
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows					
25	5D	21.6/21.6	25.00 - 26.80	23/34/41/100(3")	75	115		945.2		25.0	Grey, wet, very dense, Silty fine to coarse SAND, trace gravel, (Till).	
30	6D	6/6	30.00 - 30.50	72	---		940.2	30.0		Grey, wet, very dense, fine to coarse SAND, some silt, little gravel, (Till).		
35	7D	6/6	35.00 - 35.50	77	---		933.2	37.0		Grey, wet, very dense, fine to coarse SAND, some silt, little gravel, (Till).		
40												<b>Bottom of Exploration at 37.0 feet below ground surface. NO REFUSAL</b>
45												
50												

**Remarks:**

Driller: S.W. Cole	Elevation (ft.): 969.2	Auger ID/OD: 2.25"/6" Hollow Stem Auger
Operator: Kevin/Joe	Datum: NAVD88	Sampler: Standard Split Spoon
Logged By: C. Russell	Rig Type: Diedrich D-50 Track	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 2/28/2019; 09:50-12:15	Drilling Method: Hollow Stem Auger	Core Barrel: N/A
Boring Location: 576+00, 7.5 ft Rt.	Casing ID/OD: N/A	Water Level*: 28.5 ft, caved at 30.1 ft.

**Hammer Efficiency Factor:** 0.918      **Hammer Type:** Automatic  Hydraulic  Rope & Cathead

Definitions:      R = Rock Core Sample      S<sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf)      T<sub>v</sub> = Pocket Torvane Shear Strength (psf)  
 D = Split Spoon Sample      SSA = Solid Stem Auger      S<sub>u(lab)</sub> = Lab Vane Undrained Shear Strength (psf)      WC = Water Content, percent  
 MD = Unsuccessful Split Spoon Sample Attempt      HSA = Hollow Stem Auger      q<sub>p</sub> = Unconfined Compressive Strength (ksf)      LL = Liquid Limit  
 U = Thin Wall Tube Sample      RC = Roller Cone      N-uncorrected = Raw Field SPT N-value      PL = Plastic Limit  
 MU = Unsuccessful Thin Wall Tube Sample Attempt      WOH = Weight of 140lb. Hammer      Hammer Efficiency Factor = Rig Specific Annual Calibration Value      PI = Plasticity Index  
 V = Field Vane Shear Test, PP = Pocket Penetrometer      WOR/C = Weight of Rods or Casing      N<sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency      G = Grain Size Analysis  
 MV = Unsuccessful Field Vane Shear Test Attempt      WO1P = Weight of One Person      N<sub>60</sub> = (Hammer Efficiency Factor/60%)\*N-uncorrected      C = Consolidation Test

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows					
0								HSA	968.5	9" HMA.	0.8'	
5	1D	12/12	5.00 - 6.00	55/63	---					Brown, damp, very dense, Gravelly fine to coarse SAND, little silt, (Fill).		
10	2D	6/6	10.00 - 10.50	66	---					Brown, damp, very dense, fine to coarse Sandy GRAVEL, little silt, (Fill).		
15	3D	12/12	15.00 - 16.00	45/74					956.2	Grey-brown, damp, very dense, fine to coarse SAND, some gravel, little silt, (Till).	13.0'	
20	4D	6/6	20.00 - 20.50	61	---					Grey, damp, very dense, fine to coarse SAND, some gravel, little silt, (Till).		
25												

**Remarks:**

<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS	<b>Project:</b> Route 4 Reconstruction  <b>Location:</b> Phillips-Madrid, Maine	<b>Boring No.:</b> HB-PM-205  <b>WIN:</b> 18247.00
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<b>Driller:</b> S.W. Cole	<b>Elevation (ft.):</b> 969.2	<b>Auger ID/OD:</b> 2.25"/6" Hollow Stem Auger
<b>Operator:</b> Kevin/Joe	<b>Datum:</b> NAVD88	<b>Sampler:</b> Standard Split Spoon
<b>Logged By:</b> C. Russell	<b>Rig Type:</b> Diedrich D-50 Track	<b>Hammer Wt./Fall:</b> 140#/30"
<b>Date Start/Finish:</b> 2/28/2019; 09:50-12:15	<b>Drilling Method:</b> Hollow Stem Auger	<b>Core Barrel:</b> N/A
<b>Boring Location:</b> 576+00, 7.5 ft Rt.	<b>Casing ID/OD:</b> N/A	<b>Water Level*:</b> 28.5 ft, caved at 30.1 ft.

**Hammer Efficiency Factor:** 0.918      **Hammer Type:** Automatic     Hydraulic     Rope & Cathead

Definitions: R = Rock Core Sample      S<sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf)      T<sub>v</sub> = Pocket Torvane Shear Strength (psf)  
 D = Split Spoon Sample      SSA = Solid Stem Auger      S<sub>u</sub>(lab) = Lab Vane Undrained Shear Strength (psf)      WC = Water Content, percent  
 MD = Unsuccessful Split Spoon Sample Attempt      HSA = Hollow Stem Auger      q<sub>p</sub> = Unconfined Compressive Strength (ksf)      LL = Liquid Limit  
 U = Thin Wall Tube Sample      RC = Roller Cone      N-uncorrected = Raw Field SPT N-value      PL = Plastic Limit  
 MU = Unsuccessful Thin Wall Tube Sample Attempt      WOH = Weight of 140 lb. Hammer      Hammer Efficiency Factor = Rig Specific Annual Calibration Value      PI = Plasticity Index  
 V = Field Vane Shear Test, PP = Pocket Penetrometer      WOR/C = Weight of Rods or Casing      N<sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency      G = Grain Size Analysis  
 MV = Unsuccessful Field Vane Shear Test Attempt      WO1P = Weight of One Person      N<sub>60</sub> = (Hammer Efficiency Factor/60%)\*N-uncorrected      C = Consolidation Test

Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows				
25	5D	6/6	25.00 - 25.50	75	---					Grey, damp, very dense, fine to coarse SAND, some gravel, little silt, (Till).	
30	6D	6/6	30.00 - 30.50	72	---					Grey, damp, very dense, fine to coarse SAND, some gravel, little silt, (Till).	
35	7D	4.8/4.8	35.80 - 36.20	100(4.8")	---			933.4		Cobble at 35.0 ft bgs, augered to 35.8 ft bgs.	
								931.7		Grey, moist, Silty fine to coarse SAND, little gravel. Wet auger cuttings at 36.5 ft bgs.	
										<b>Bottom of Exploration at 37.5 feet below ground surface. NO REFUSAL</b>	

**Remarks:**

<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 4 Reconstruction Location: Phillips-Madrid, Maine				Boring No.: HB-PM-206 WIN: 18247.00							
Driller: S.W. Cole				Elevation (ft.): 967.2				Auger ID/OD: 5" Solid Stem							
Operator: Kevin/Joe				Datum: NAVD88				Sampler: Standard Split Spoon							
Logged By: B. Wilder/Daggett				Rig Type: Diedrich D-50 Track				Hammer Wt./Fall: 140#/30"							
Date Start/Finish: 2/11/2019; 09:00-15:00				Drilling Method: Cased Wash Boring				Core Barrel: N/A							
Boring Location: 577+00, 7.5 ft Rt.				Casing ID/OD: NW-3"				Water Level*: None Observed							
Hammer Efficiency Factor: 0.918				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 <sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf) S <sub>u(lab)</sub> = Lab Vane Undrained Shear Strength (psf) q <sub>p</sub> = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N <sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency N <sub>60</sub> = (Hammer Efficiency Factor/60%)*N-uncorrected				T <sub>v</sub> = 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 <sub>60</sub>	Casing Blows								
0								SSA	966.7	6" HMA. (3.0 ft Frost depth).					
	1D	2.4/2.4	2.50 - 2.70	50(2.4")	---				964.2	Brown, frozen, fine to coarse SAND, little gravel, little silt.					
5	2D	15.6/15.6	5.00 - 6.30	18/35/50(3.6")	---					Brown, moist, very dense, fine to coarse SAND, some silt, little gravel.					
10	3D	18/18	10.00 - 11.50	37/36/50	86	132			957.7	Grey, damp, very dense, Silty fine to coarse SAND, little gravel, (Till).					
15	4D	6/6	15.00 - 15.50	70	---		OPEN HOLE			Similar to above. Set in NW Casing at 15.0 ft bgs.					
20	5D	9.6/9.6	20.00 - 20.80	31/50(3.6")	---					Grey, moist, very dense, Silty fine to coarse SAND, little gravel, (Till). (Broke Auto Hammer)					
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.

<b>Maine Department of Transportation</b> Soil/Rock Exploration Log US CUSTOMARY UNITS	<b>Project:</b> Route 4 Reconstruction  <b>Location:</b> Phillips-Madrid, Maine	<b>Boring No.:</b> HB-PM-206  <b>WIN:</b> 18247.00
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<b>Driller:</b> S.W. Cole	<b>Elevation (ft.):</b> 967.2	<b>Auger ID/OD:</b> 5" Solid Stem
<b>Operator:</b> Kevin/Joe	<b>Datum:</b> NAVD88	<b>Sampler:</b> Standard Split Spoon
<b>Logged By:</b> B. Wilder/Daggett	<b>Rig Type:</b> Diedrich D-50 Track	<b>Hammer Wt./Fall:</b> 140#/30"
<b>Date Start/Finish:</b> 2/11/2019; 09:00-15:00	<b>Drilling Method:</b> Cased Wash Boring	<b>Core Barrel:</b> N/A
<b>Boring Location:</b> 577+00, 7.5 ft Rt.	<b>Casing ID/OD:</b> NW-3"	<b>Water Level*:</b> None Observed

<b>Hammer Efficiency Factor:</b> 0.918	<b>Hammer Type:</b> Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>	
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Definitions: R = Rock Core Sample    S<sub>u</sub> = Peak/Remolded Field Vane Undrained Shear Strength (psf)    T<sub>v</sub> = Pocket Torvane Shear Strength (psf)  
 D = Split Spoon Sample    SSA = Solid Stem Auger    S<sub>u</sub>(lab) = Lab Vane Undrained Shear Strength (psf)    WC = Water Content, percent  
 MD = Unsuccessful Split Spoon Sample Attempt    HSA = Hollow Stem Auger    q<sub>p</sub> = Unconfined Compressive Strength (ksf)    LL = Liquid Limit  
 U = Thin Wall Tube Sample    RC = Roller Cone    N-uncorrected = Raw Field SPT N-value    PL = Plastic Limit  
 MU = Unsuccessful Thin Wall Tube Sample Attempt    WOH = Weight of 140 lb. Hammer    Hammer Efficiency Factor = Rig Specific Annual Calibration Value    PI = Plasticity Index  
 V = Field Vane Shear Test, PP = Pocket Penetrometer    WOR/C = Weight of Rods or Casing    N<sub>60</sub> = SPT N-uncorrected Corrected for Hammer Efficiency    G = Grain Size Analysis  
 MV = Unsuccessful Field Vane Shear Test Attempt    WO1P = Weight of One Person    N<sub>60</sub> = (Hammer Efficiency Factor/60%)\*N-uncorrected    C = Consolidation Test

Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows /6 in. Shear Strength (psf) or RQD (%)	N-uncorrected	N <sub>60</sub>	Casing Blows				
25										Bore hole didn't stay open, slight bend in casing.	
30										Similar to above in wash water at 30.0 ft bgs. Possible Weathered Rock in wash at 31.2 ft bgs.	
	MD	1.2/0	32.00 - 32.10	75(1.2")	---		935.1			Failed Sample attempt. <b>Bottom of Exploration at 32.1 feet below ground surface.</b> Spoon REFUSAL	
35											
40											
45											
50											

**Remarks:**