Maine Department of Transportation
Highway Program

GEOTECHNICAL SERIES 100 REPORT

Route 1
Dennysville – Pembroke

Prepared by:
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Washington County PIN 17774.10 Soils Report 2010-110

June 14, 2010

Highway Program

Brad Foley, Program Manager
Memorandum

DATE: June 14, 2010

TO: Dennis Lovely **DEPT:** Region 4

FROM: Scott A. Hayden **DEPT:** Highway Program

SUBJECT: Final Soils – Dennysville/Pembroke Route 1, 17774.10
Report # 2010-110

Project Description

A subsurface investigation has been completed for a 2.3 mile portion of Route 1 in the towns of Dennysville and Pembroke. The project begins in Dennysville, 0.03 miles south of the intersection of Cross Road, and extends 2.3 miles northeast ending in Pembroke.

The investigation included the use of a drill rig and falling weight deflectometer (FWD). Stationing was determined by using a distance measuring instrument (DMI). A beginning station of 10+00 was used as identified in the field by Region 4 personnel.

This project is located in the downeast coastal area. The topography undulates slightly with several relatively small knolls present. Depth to bedrock is relatively shallow (<15') throughout the project area but is very shallow (<5') beneath the knolls. Till soils are commonly encountered at the higher elevations associated with these knolls whereas marine clays are encountered in the lower lying areas.

FWD Results

The FWD results are detailed in an attachment following this memo.

The existing pavement performance and subgrade conditions are very poor along this project. The pavement is rough and heavily cracked. Many of these rough areas are associated with existing bedrock cut sections. Other areas along the project are severely rutted. The outside wheel path has been shimmed in many of these areas. This rutting is likely due to a bearing failure in the underlying, moisture sensitive, marine clay/silt. Due to the geologic conditions in this area it is anticipated that bedrock will be relatively shallow throughout the project area. This can result in abnormally high subgrade resilient modulus values (M_r).

The subgrade soil conditions along this project consist of marine clay/silt and sandy silt (till). Based on other Maine highway projects, these soil conditions commonly have a M_r value between 2200psi - 3500psi and 4000psi – 4800psi respectively. However, FWD testing within existing bedrock cut sections produced M_r values as high as 28,557psi. It is obvious that extreme values like this are an indication of the bedrock surface and not the overlying till soil.

However, the affect of a relatively shallow bedrock surface on the subgrade resilient modulus value is not always this obvious. The existing pavement structure along this project generally consists of 4 inches of pavement and 24 inches of base material. This substantial pavement structure has failed (severe rutting) in many areas throughout the project. It would be reasonable to anticipate a M_r value in the range of 2200psi – 3200psi throughout most of these failed areas based upon the marine clay subgrade soil conditions. However, a much higher value, generally in the range of 3600psi-4200psi was encountered. It is anticipated that the presence of a relatively shallow bedrock surface has affected these values. Thus it is probable that the actual subgrade resilient modulus values for the overlying soils are lower than the values presented in the FWD analysis. This possibility should be taken into consideration during the design and construction process.

Lastly, very low (<3000psi) subgrade resilient modulus values were encountered at stations 23+07, 100+00, 105+00, and 110+00. However, these areas of very low subgrade resilent modulus are likely under represented in the FWD analysis due to the reasons described above. As a result it should be noted; any area along this project that is underlain by marine clay/silt or sandy silt could become problematic especially during spring and early summer. Depending on the conditions at the time of construction the use of additional base material and/or geosynthetics may be necessary to support traffic once the existing pavement surface has been removed. Areas of greatest concern are listed below:

Station	**Soil Type**	**Sample #**	**Water Content**	**% Passing # 200**
20+50 – 24+50	Clay	S2	26	96
61+00 – 65+00	Sandy Silt	S5	16	59
71+50 – 74+50	Till/Rock/Water	S5	16	59
78+00 – 115+00	Clay	S9, S11	20 - 23	88 - 94
120+00 – 122+75	Clay/Fill Pocket	S9, S11	20 - 23	88 - 94

Note: The FWD results provided in this memo are calculated using the existing pavement thickness, existing base thickness, and base quality as determined from boring information and sample data results. Thus the FWD results reflect the existing soil conditions and pavement structure.

The FWD information contained in this memo is used in conjunction with subsurface exploration data to identify potential performance disparities along the project area. These areas are determined and illustrated using the attached Performance Data Summary Sheet.

By identifying potential areas of differing performance, specific design and construction options can be considered and developed for each practical area. This can potentially provide greater design flexibility and reduce costs by eliminating the “one design fits all” approach which results in substantial areas being over designed or under designed. See the attached Performance Data Summary Sheet.

Boring Information

The purpose of the subsurface investigation was to obtain subsurface soil, bedrock, and ground water information. Subsurface explorations were conducted by Maine DOT using a CME 45C truck mounted drill rig. Bore hole logging was performed by Maine DOT.

A total of 15 power augers borings were conducted along the project (See Boring Logs). Power auger borings were conducted using 5" solid stem augers. Boring locations were determined based upon FWD deflection results and visual observations made during an on-site visit. Soils were described and sampled from the auger flights. Four test pits were dug in the shoulders by Region 4 personnel.

A total of 20 soil samples were collected from the power auger borings and test pits and tested at the Maine DOT Materials and Testing laboratory, located in Bangor Maine. Grain size and water content testing was conducted on each sample. Based upon laboratory test results, soil samples were classified according to the Unified Classification System, AASHTO Soil Classification and Maine DOT Frost Susceptibility Rating. Testing results are summarized on the attached Laboratory Testing Summary Sheet.

Pavement Conditions

Pavement conditions are poor to fair. Although the existing pavement is rough and relatively thin, no unbound or highly friable pavement layers were encountered. For a complete listing of pavement measurements refer to boring logs and pavement core summary sheet. A pavement thickness summary follows:

Range of Solid Pavement (SP) Thickness:	2.4" – 6.0"
Average Solid Pavement Thickness:	3.8"

Note: Pavement thickness estimates are based upon 15 power auger borings and 4 pavement cores. The maximum sample spacing is 2000 feet with an average spacing of 832 feet. Actual pavement thickness may vary.

Existing Base Material

Existing Base Material Type:	silty sandy Gravel silty gravelly Sand
Percent Passing #200:	8% - 17%
Range of Base Material Thickness:	20" – 27"
Average Thickness:	24"
Quality of Drainage (AASHTO):	Poor to Fair
Permeability:	4' – 44' per day

The existing base generally consists of silty gravelly sand (gravel borrow). Because of the high percentage of fines the quality of drainage is limited. An estimated permeability range of 4 – 44 feet/day has been calculated based upon grain size distribution data obtained from existing base

samples. The marginal quality of the existing base must be taken into consideration when developing performance expectations related to strength and drainage. As a comparison, a base material meeting the "excellent quality of drainage" criteria (AASHTO Guide for Design of Pavement Structures) provides a minimum permeability of 1000 ft/day.

Existing Shoulder Material

Existing Base Material Type:	silty gravelly Sand gravelly silty Sand
Percent Passing #200:	8% - 33%
Average Thickness:	22"
Quality of Drainage (AASHTO):	Poor to Fair
Permeability:	0.2' – 150' per day

Four test pits were dug by Region 4 personnel to examine the existing shoulder conditions. Tests pits were dug in the left and right shoulder at stations 50+70 and 84+60. The existing shoulder material consists of silty gravelly sand and gravelly silty sand. Because of the varying amount of fines the quality of drainage is limited and variable. Shoulder material with fewer fines will have better drainage characteristics. For instance, sample S5 (gravelly silty sand) has 33% passing the # 200 sieve with a corresponding water content of 20. Sample S4 has considerably less fines (8% passing the #200 sieve) and by comparison has a much lower water content of 1.

Subgrade Soils

The subgrade soils underlying this project consist primarily of moist marine silt/clay with areas of sandy silt (till/fill) and silty gravelly sand (fill).

Clay Silt (Glacial Marine): The clay silt soils (S2, S6, S9, S11, S14) have 75% - 96% fines passing the #200 sieve. These soils are classified (AASHTO) as A-4 and A-7-6 soils. The A-7-6 soils have high plasticity indexes in relation to liquid limit and are subject to extremely high volume changes with changing water content. Keeping these soils well drained is critical if these soils are to perform adequately as a subgrade soil. These soils will lose much of their stability if they are not well drained. In addition, these soils may absorb water by capillary action. Because of capillary action, moisture can be held above the ground water table against the force of gravity (capillary fringe). The only way to affect the height of the capillary fringe is by lowering the water table (i.e. deep ditch and/or underdrain) or by providing a capillary break. Due to surface infiltration and capillary action it is anticipated that these soils could be moist to wet well into the early summer months. The presence of these soils and their undesirable engineering characteristics must be considered during the design and construction process.

Depending on seasonal conditions, it is anticipated that these soils could be problematic throughout the construction season, especially in the spring and early summer. Additional base material and/or geosynthetics may be necessary to support traffic during construction if the existing pavement surface is removed while moist to wet subgrade conditions exist. The areas of greatest concern are between the following stations: 20+50 – 24+50, 78+00 – 115+00, and 120+00 – 122+75. Very low (<3000psi) subgrade resilient modulus values were encountered at stations 23+07, 100+00, 105+00, and 110+00.

Sandy Silt (Till): The sandy silts along this project are represented by sample S5. This material is classified (AASHTO) as an A-4 soil with 59% passing the # 200 sieve. These soils are highly frost susceptible. It is anticipated that the depth to bedrock will be shallow when these soils are encountered.

These soils can perform adequately as a subgrade soil if they are properly compacted and drained. However, these soils will swell and lose much of their stability if they are not properly compacted and drained.

If these soils are not well drained additional base material may be necessary to support traffic during construction once the existing pavement surface is removed. Currently, these soils may not be performing well between stations 61+00 and 74+50. This area could be problematic during construction in the spring and early summer. Additional base material may be necessary to support traffic during construction if the existing pavement surface is removed while moist to wet subgrade conditions exist. It is critical that this area be well drained.

It should be noted that bedrock is near or at subgrade between stations 71+50 – 74+50. In addition, there is an existing underdrain outlet on the right at station 72+60. The outlet is buried but water is percolating up through the soil. The origin of this water may be from spring activity exiting the shallow bedrock surface.

A summary of the anticipated subgrade soils is listed on the next page (Table I) based upon limited subsurface exploration and FWD deflection data. Actual field conditions may vary.

Table 1. Anticipated Subgrade Soil Conditions

Station	Soil Description	AASHTO / Unified	Sample	% #200
10+00 – 19+00	ClSi	A-7-6 / CL	S2	96
19+00 – 22+50	ClSi / Rock	A-7-6 / CL	S2	96
22+50 – 28+00	ClSi	A-7-6 / CL	S2	96
28+00 – 34+50	Bedrock/Till/Fill	A-4 / ML	S5	59
34+50 – 38+00	ClSi	A-7-6 / CL	S2	96
38+00 – 48+00	Bedrock/Till	A-4 / ML	S5	59
48+00 – 50+50	SaClSi / Fill	A-4 / CL-ML	S6	75
50+50– 51+75	GSaSi (Till)	A-4 / ML	S5	59
51+75 – 55+00	SaClSi	A-4 / CL-ML	S6	75
55+00 – 57+50	Bedrock/Till	A-4 / ML	S5	59
57+50 – 70+50	GSaSi (Till)	A-4 / ML	S5	59
70+50 – 74+00	Bedrock/Till	A-4 / ML	S5	59
74+00 – 75+00	GSaSi (Till)	A-4 / ML	S5	59
75+00 – 76+50	ClSi	A-7-6 / CL	S9	94
76+50 – 80+00	Bedrock/ClSi	A-7-6 / CL	S9	94
80+00 – 91+50	ClSi	A-7-6 / CL	S9	94
91+50 – 93+50	Bedrock/Till	A-4 / ML	S5	59
93+50 – 96+50	GSaSi (Till)	A-4 / ML	S5	59
96+50 – 99+50	Bedrock/Till	A-4 / ML	S5	59
99+50 – 102+00	ClSi	A-7-6 / CL	S11	88
102+00 – 104+00	Bedrock?/Till	A-4 / ML	S5	59
104+00 – 114+00	ClSi	A-7-6 / CL	S11	88
114+00 – 117+00	GSaSi (Till)	A-2-4 / SM	S13	26
117+00 – 120+50	Bedrock/Till	A-2-4 / SM	S13	26
120+50 – 122+75	ClSi / Fill	A-7-6 / CL	S11	88
122+75 – 127+00	Bedrock/Till	A-2-4 / SM	S13	26
127+00 – 132+00	ClSi	A-7-6 / CL	S14	78

Bedrock

Relatively shallow bedrock (< 15') is anticipated to underlie the entire project area. In many areas the bedrock will be less than < 5' below the existing ground surface. Multiple bedrock outcrops are present (See Table II). The bedrock in this area consists primarily of basalt belonging to the Edmunds formation. These volcanics vary slightly in texture and mineral assemblage varying from mafic to felsic. Blasting will be required for the removal of this bedrock. It should be noted that the soils in this region may be slightly acidic due to the presense of these volcanics. A pH test of the soils could be taken at different locations along the project if metal drainage structures are to be used.

Table II. Outcropping bedrock and anticipated shallow (< 5') bedrock areas

Station	Source of Information
19+00 – 22+50	FWD, Outcrop@ 22+20
28+00 – 30+70	FWD, Boring, Outcrop@ 28+50 – 30+70
33+75 – 34+40	Outcrop@ 33+75 – 34+40
38+00 – 48+00	FWD, Outcrop@ 39+50 – 42+00
55+00 – 57+50	FWD, Outcrop@ 55+90 – 57+00
70+50 – 74+00	FWD, Outcrop @71+50 – 73+00
76+50 – 80+00	FWD, Outcrop @ 79+35
91+50 – 93+00	FWD, Boring, Outcrop @ 92+00
96+50 – 99+50	FWD
117+00 – 120+50	FWD, Boring
122+75 – 127+00	FWD, Boring, Outcrop @ 125+16 – 126+17

Existing pavement conditions within existing bedrock cut areas is fair to poor. It is anticipated that these poor conditions are due to a lack of drainage.

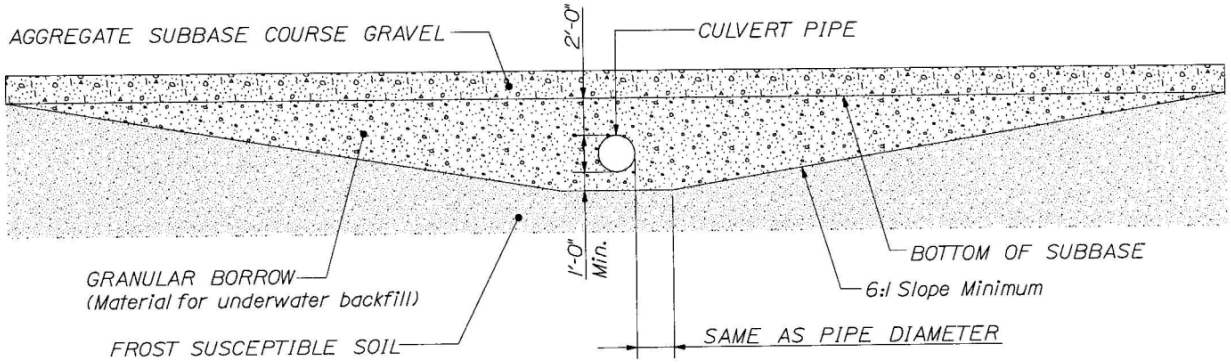
No design information was available prior to the subsurface investigation and subsequent writing of this memo. The Project Manager has indicated that the vertical grade is likely to remain unchanged. At the request of the Project Manager, no borings were conducted to determine the limits of shallow bedrock. However, due to the shallow nature of the bedrock in this region, it is anticipated that bedrock could be encountered at several locations depending on the proposed design and the elevation of the vertical grade.

According to maintenance personnel, differential heaving within existing bedrock cut areas is not a problem. However, if the vertical grade is lowered in any of area where the present depth to bedrock is suspected to be 5' or less, transition zones should be included in the design. (See transition zone schematic in the Recommendation 8).

Recommendations

1. It is recommended that the entire project area be well drained. It is anticipated that the poor pavement performance in existing bedrock cut areas is due to inadequate drainage. Ditching in these areas should be as deep as possible. Furthermore, failure (severe rutting) of the existing pavement structure is likely due to inadequate drainage of moisture sensitive marine clay/silts. Deep ditching is most critical in these areas where marine clay/silt soils are present in order to draw down the water table. In these areas, ditches should be constructed with a minimum depth of 3 feet below finished grade when possible. Refer to Table I for a listing of the anticipated subgrade soil conditions.

2. It is recommended that all cross pipes be lowered to allow for an adequate ditching depth. Cross pipes should be installed based upon the following design schematic:



3. Due to the presence of poorly drained moisture sensitive marine clay/silt and silty glacial till, several areas poise a higher risk of future premature pavement failure. In addition, these areas could become problematic throughout the construction season, especially in the spring and early summer. Additional base material may be necessary to support traffic during construction if the existing pavement surface is removed while moist to wet subgrade conditions exist. Furthermore, additional variable depth gravel placement or full construction should be considered in these areas if future pavement performance expectations are to be realized. The areas of greatest concern are between stations:

   20+50 – 24+50, 61+00 - 74+50, 78+00 – 112+00, 120+00 – 122+75

   It is recommended that these areas be aggressively drained prior to removing the existing pavement structure.

4. If new base material is to be placed directly upon the marine clay/silt, a 6 once, non-woven, needle punched separation geotextile should utilized to prevent the intermixing of the new base layer with the underlying marine clay/silt.

5. In addition to the areas of concern listed above in Recommendation 3., any area containing marine clay/silt could become problematic during construction, especially during the spring. The existing pavement surface should not be removed until necessary or until the subgrade

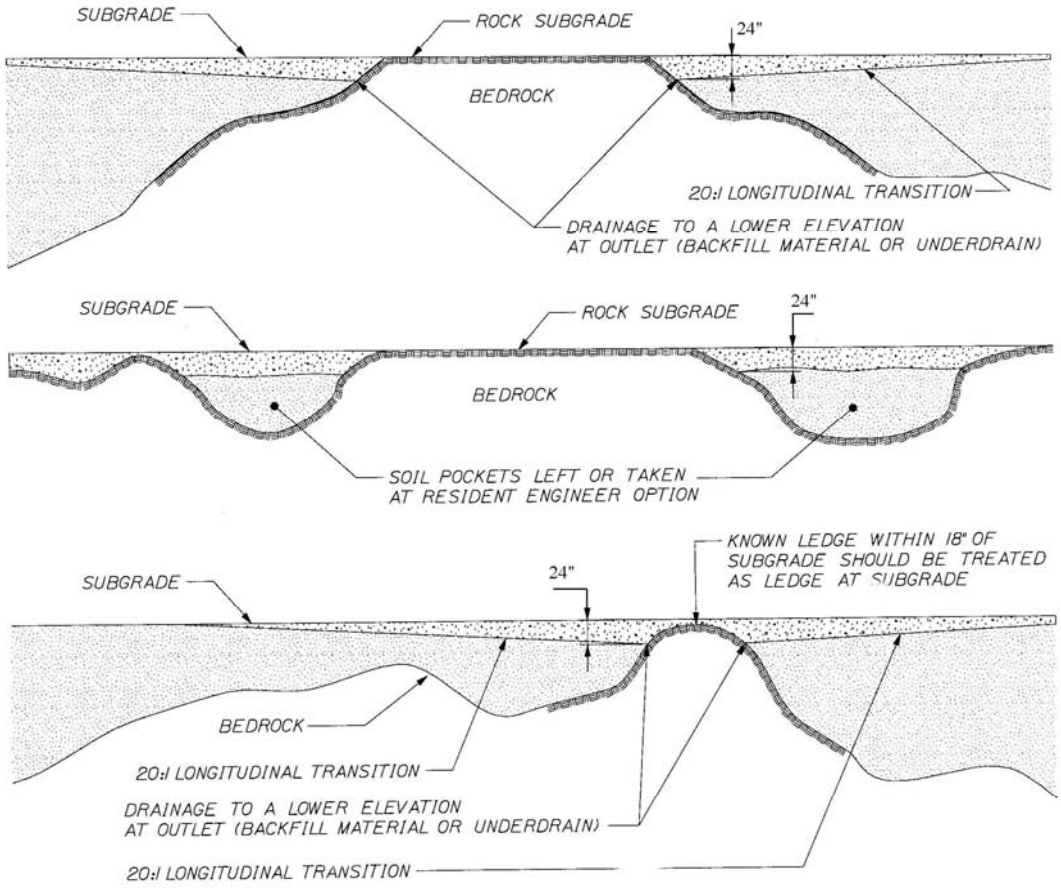
soil conditions have stabilized. The roadway could become unstable or fail under loading if the existing pavement surface is removed during moist to wet subgrade conditions. Additional base material could be required to support traffic during construction if the subgrade soils become unstable. Refer to Table I for a listing of possible areas where marine clay/silt could be encountered.

6. Full reconstruction is recommended between stations 71+50 – 74+50 due to poor existing pavement performance, drainage, and the possible presence of a spring. It is recommended that the existing bedrock surface be exposed and examined for spring activity. An underdrain outlet (buried) is present on the right at station 72+60. At the time of this writing, water was seen percolating up through the surface in the vicinity of this buried UD outlet.

7. Full reconstruction or additional variable depth gravel placement over the existing pavement structure is recommended between stations 78+00 and 112+00 due to the presence of moisture sensitive marine clays, low subgrade resilient modulus values, inadequate drainage, and structural failure of the existing pavement structure.

8. Shallow bedrock is present in many areas along this project. Currently, differential heaving is not an issue according to maintenance personnel. However, if the vertical grade is lowered differential heaving could become an issue along soil/bedrock contacts. Transition zones should be constructed along soil/bedrock contacts to aid in the prevention of differential heaving. It is recommended that a 2 foot undercut be constructed with a 20:1 transition.

PROFILE OF UNDERCUT OF FROST SUSCEPTIBLE SOILS OVER LEDGE



Performance Data Summary

Pembroke Rte. 1
CIP
17774.10

Performance Data Summary

A Performance Data Summary (PDS) is included on the next pages. The purpose of the (PDS) is to identify potential performance differences by station based upon 4 minimal performance criteria (asphalt thickness, base thickness, subgrade resilient modulus, and existing/future structural number comparison. The PDS is color coded and should be printed in color to fully utilize the information

If an area fails to meet 2 or more of the minimal performance criteria the area will be shaded in the deficiency (DEF) column located next to the Station column. Areas having two or more deficiencies have a lower existing performance expectation and are at a higher risk of pavement structure failure.

The presence of shallow bedrock throughout much of this project has caused the subgrade resilient modulus to be abnormally high. In many cases these elevated values have caused the existing structural number to falsely meet or exceed the future structural number. In addition, these elevated values have resulted in fewer low subgrade modulus value (<3000psi) to be identified on the PDS. Because of this, the number in the deficiency column (DEF) on the Performance Data Summary Sheet (PDS) is under estimated. In many instances the value should be increased by one.

* SP = Solid Pavement Layer
* UP = Unbound Pavement Layer
SP+UP = Total Pavement Thickness
* Base Thickness = Red indicates presence of “treated base”

Performance Data Summary

Pembroke Rte. 1
CIP
17774.10

Station (FWD)	D E F	Minimum Performance Data Criteria				Boring Location (Plan View)	Base Material		Subgrade Soils	
							AASHTO Class	% #200	AASHTO Class	% #200
						KEY				
Station		Red – Fail Green - Met				Solid Pave Thick Unbound Pave - UP Base Thickness (inches)	Soil Type AASHTO Sample #	% 200 Frost Moisture	Soil Type AASHTO Sample #	% 200 Frost Moisture
						CL				
12+50	1					4.8 SP - 20.4	SiGSa A-1-a S1	12 0 Damp	ClSi A-7-6 S2	96 III Moist
15+00	1									
17+51	1									
20+00	2						Bedrock Outcrop 22+20			
23+07	3					3.6 SP - 25.2	SiGSa A-1-a S1	12 0 Damp	ClSi A-7-6 S2	96 III Moist
25+00	2									
27+51	2						Bedrock Outcrop 28+50 – 30+70			
30+00	2					3.6 SP - 25.2	SiSaG A-1-a S3	8 0 Damp	Weathered Rock	Ref. 3.8’
32+50	2						Bedrock Outcrop 33+75 – 34+40			
35+00	2									
38+50	2					3.6 SP - 50.4	SiGSa A-1-b S4	9 0 Wet	SiGSa A-1-b S4	9 0 Wet
40+00	2						39+50 – 42+00 Shallow and Outcropping Bedrock			
42+50	2									
43+07	2						Dennysville / Pembroke Townline			
45+00	1					2.4 SP - 27.6	SiSaG A-1-a S3	8 0 Damp	GSaSi A-4 S5	59 IV Wet 2.5’
47+50	1									
50+00	1					3.6 SP - 25.2	SiSaG A-1-a S3	8 0 Damp	SaClSi A-4 S6	75 IV Moist
52+50	1									
55+00	1						Bedrock Outcrop 55+90 – 57+00			
60+00	1									
62+50	1					3.6 SP - 25.2	SiGSa A-1-b S7	17 II Damp	GSaSi A-4 S5	59 IV Damp

Pavement Thickness (4 inches)
Base Thickness (18 inches)
Subgrade Modulus (3000 psi)
Structural Number

* SP = Solid Pavement Layer
* UP = Unbound Pavement Layer
SP+UP = Total Pavement Thickness
* Base Thickness = Red indicates presence of “treated base”

Performance Data Summary

Pembroke Rte. 1
CIP
17774.10

Station (FWD)	D E F	Minimum Performance Data Criteria				Boring Location (Plan View)	Base Material		Subgrade Soils	
							AASHTO Class	% #200	AASHTO Class	% #200
						KEY				
Station		Red – Fail Green - Met				Solid Pave Thick Unbound Pave - UP Base Thickness (inches)	Soil Type AASHTO Sample #	% 200 Frost Moisture	Soil Type AASHTO Sample #	% 200 Frost Moisture
						CL				
62+50	1					3.6 SP - 25.2	SiGSa A-1-b S7	17 II Damp	GSaSi A-4 S5	59 IV Damp
65+00	1									
67+50	1									
70+05	1									
71+50	1						Bedrock Outcrop 71+50 – 73+00 Underdrain Present – Possible Spring?			
72+65	1									
76+05	1									
77+50	1						Bedrock Outcrop 79+35			
81+50	2									
82+50	2					3.6 SP - 24.0	SiGSa A-1-b S8	13 II Damp	ClSi A-7-6 S9	94 III Moist
85+00	3									
87+50	2					3.6 SP - 25.2	SiGSa A-1-b S8	13 II Damp	ClSi A-7-6 S9	94 III Moist
90+50	2						Bedrock Outcrop 92+00			
92+50	1					3.6 SP - 21.6	SiGSa A-1-b S8	13 II Damp	ClSi/Rock A-7-6 S9	94 III Ref 3.2’
95+00	1									
97+75	1									
100+00	3					3.6 SP - 25.2	SiGSa A-1-b S10	15 II Damp	ClSi A-7-6 S11	88 III Damp
102+50	2									
105+00	3									
107+50	2					3.6 SP - 25.2	SiGSa A-1-b S10	15 II Damp	ClSi A-7-6 S11	88 III Damp

Pavement Thickness (4 inches)
Base Thickness (18 inches)
Subgrade Modulus (3000 psi)
Structural Number

* SP = Solid Pavement Layer
* UP = Unbound Pavement Layer
SP+UP = Total Pavement Thickness
* Base Thickness = Red indicates presence of “treated base”

Performance Data Summary

Pembroke Rte. 1
CIP
17774.10

Station (FWD)	D E F	Minimum Performance Data Criteria				Boring Location (Plan View)	Base Material		Subgrade Soils	
							AASHTO Class	% #200	AASHTO Class	% #200
						KEY				
Station		Red – Fail Green - Met				Solid Pave Thick Unbound Pave - UP Base Thickness (inches)	Soil Type AASHTO Sample #	% 200 Frost Moisture	Soil Type AASHTO Sample #	% 200 Frost Moisture
						CL				
107+50	2					3.6 SP - 25.2	SiGSa A-1-b S10	15 II Damp	ClSi A-7-6 S11	88 III Damp
110+00	3									
112+50	2									
115+00	1					3.6 SP - 21.6	SiGSa A-1-b S12	14 II Damp	GSiSa A-2-4 S13	26 II Moist
117+51	1									
120+00	1					3.6 SP - 37.2	SiGSa A-1-b S12	14 II Damp	GSa/Rock A-1-b S12	Ref 3.4’
122+50	1									
125+25	1						Bedrock Outcrop 125+16 – 126+17			
127+50	2									
130+00	2					3.6 SP - 21.6	SiGSa A-1-b S12	14 II Damp	ClSi A-7-6 S14	78 III Damp

Pavement Thickness (4 inches)
Base Thickness (18 inches)
Subgrade Modulus (3000 psi)
Structural Number

* SP = Solid Pavement Layer
* UP = Unbound Pavement Layer
SP+UP = Total Pavement Thickness
* Base Thickness = Red indicates presence of “treated base”

Falling Weight Deflectometer (FWD)
Summary Sheet

Project #: 17774.10
Town(s): Pembroke
Route(s): 1
Date Tested: 05/11/2010
Requested By: S. Hayden
Direction of Testing: South to North

Of FWD tests: 47
Of Power Augers/Spoons - 15
Design Life: 12 Yrs
Future 18-kip ESALs (Design Life): 819,060
Initial Serviceability: 4.5
Terminal Serviceability: 2.5
Reliability Level: 90
Overall Standard Deviation: .45
Functional Class: Minor Arterial

Locations

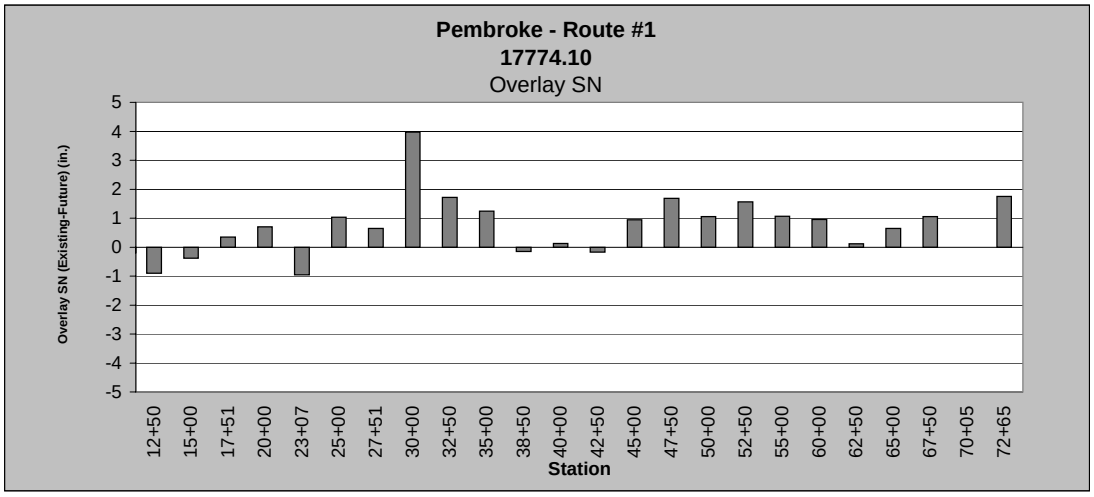
Station (meters)	Description
Project Stationing	

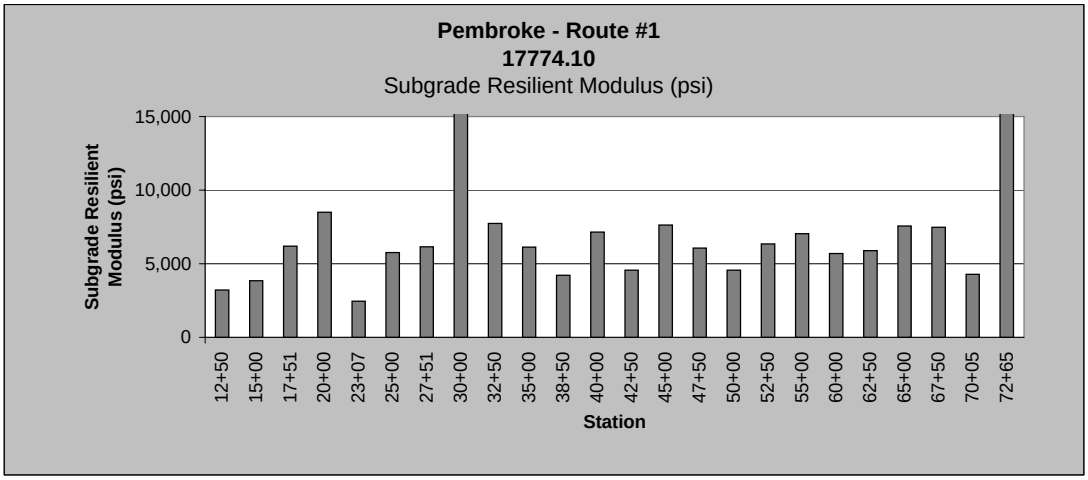
Comments:

Pembroke - Route #1
17774.10

Station (Feet)	Existing Structural Number (in.)	Future Traffic Structural Number (in.)	Overlay Structural Number (Existing - Future)	Recommended Pavement Thickness (in.)	Pavement Modulus (psi)	Subgrade Resilient Modulus (psi)	Pavement Depth (in)	Combined Pavement/Gravel Depth Used for Calculation (in)
12+50	3.5	4.4	**-0.9**	**2.05**	29,492	3,208	4.8	25.2
15+00	3.76	4.14	**-0.38**	**0.86**	36,550	3,840	4.8	25.2
17+51	3.85	3.5	0.35	-	39,211	6,204	4.8	25.2
20+00	3.83	3.13	0.7	-	38,474	8,496	4.8	25.2
23+07	3.83	4.79	**-0.96**	**2.18**	25,907	2,467	3.6	28.8
25+00	4.62	3.59	1.03	-	45,172	5,771	3.6	28.8
27+51	4.16	3.51	0.65	-	33,150	6,163	3.6	28.8
30+00	5.96	1.99	3.97	-	97,489	28,557	3.6	28.8
32+50	4.95	3.23	1.72	-	55,573	7,748	3.6	28.8
35+00	4.76	3.52	1.24	-	49,557	6,133	3.6	28.8
38+50	3.86	4.01	**-0.15**	**0.34**	35,980	4,219	3.6	26
40+00	3.46	3.33	0.13	-	25,967	7,150	3.6	26
42+50	3.73	3.9	**-0.17**	**0.39**	32,476	4,565	3.6	26
45+00	4.19	3.25	0.94	-	29,822	7,631	2.4	30
47+50	5.22	3.53	1.69	-	57,903	6,056	2.4	30
50+00	4.96	3.9	1.06	-	55,901	4,575	3.6	28.8
52+50	5.03	3.47	1.56	-	58,319	6,358	3.6	28.8
55+00	4.42	3.35	1.07	-	39,662	7,042	3.6	28.8
60+00	4.57	3.61	0.96	-	43,834	5,701	3.6	28.8
62+50	3.69	3.57	0.12	-	33,955	5,896	3.6	25.3
65+00	3.91	3.26	0.65	-	40,484	7,558	3.6	25.3
67+50	4.34	3.28	1.06	-	55,406	7,473	3.6	25.3
70+05	3.99	3.99	0	-	42,970	4,273	3.6	25.3
72+65	4.27	2.52	1.75	-	52,929	15,401	3.6	25.3

Possible Weak Soils (<3000)
Possible Shallow Bedrock (>8000)
For actual Gravel Depths, see logdraft forms

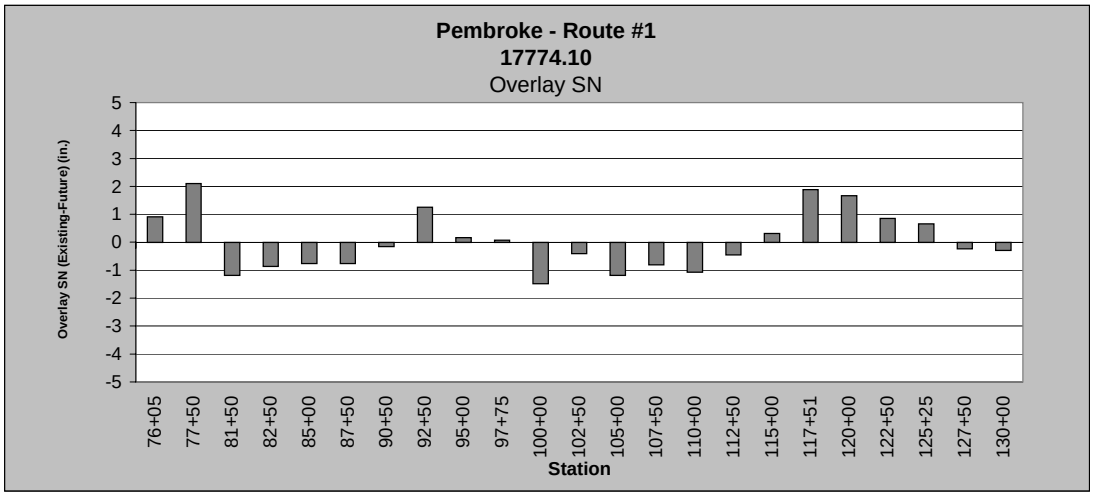


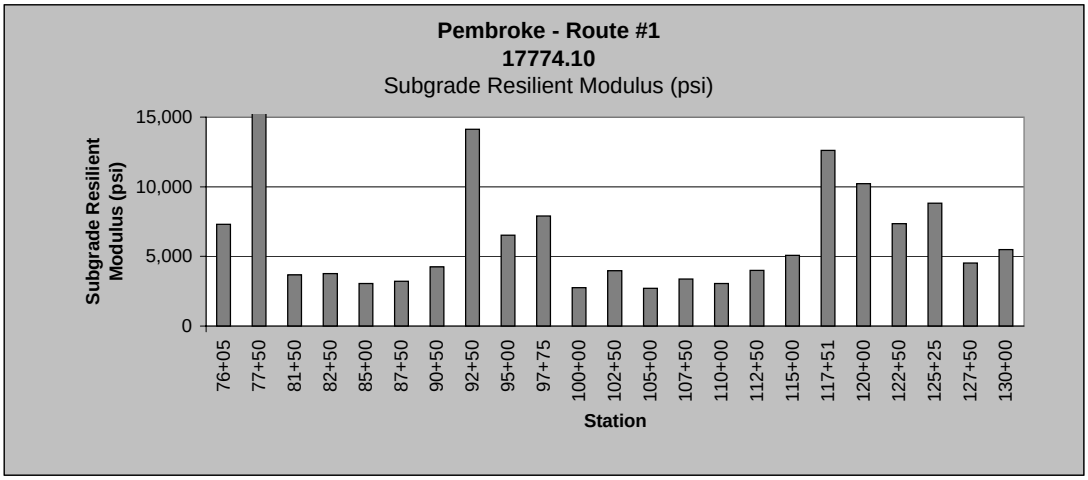


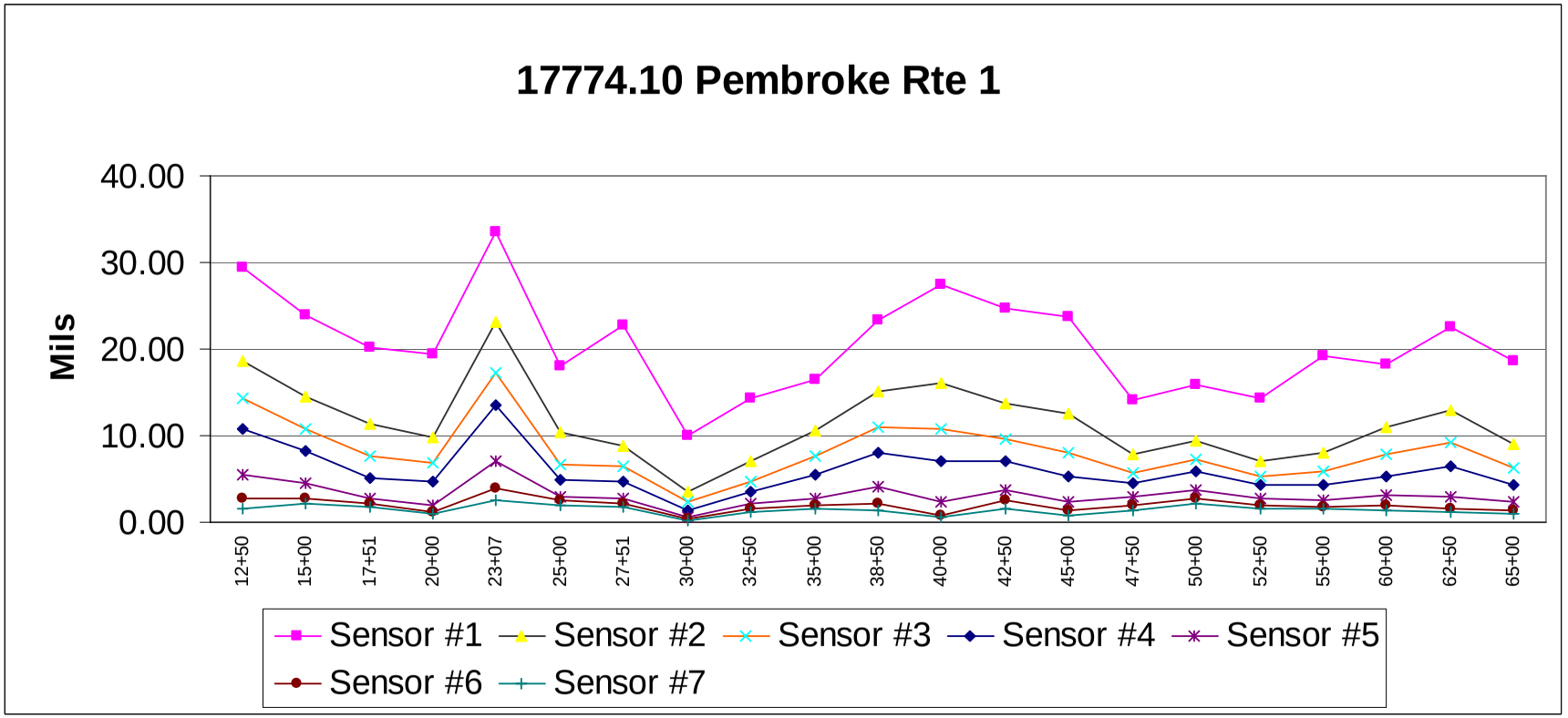
Pembroke - Route #1
17774.10

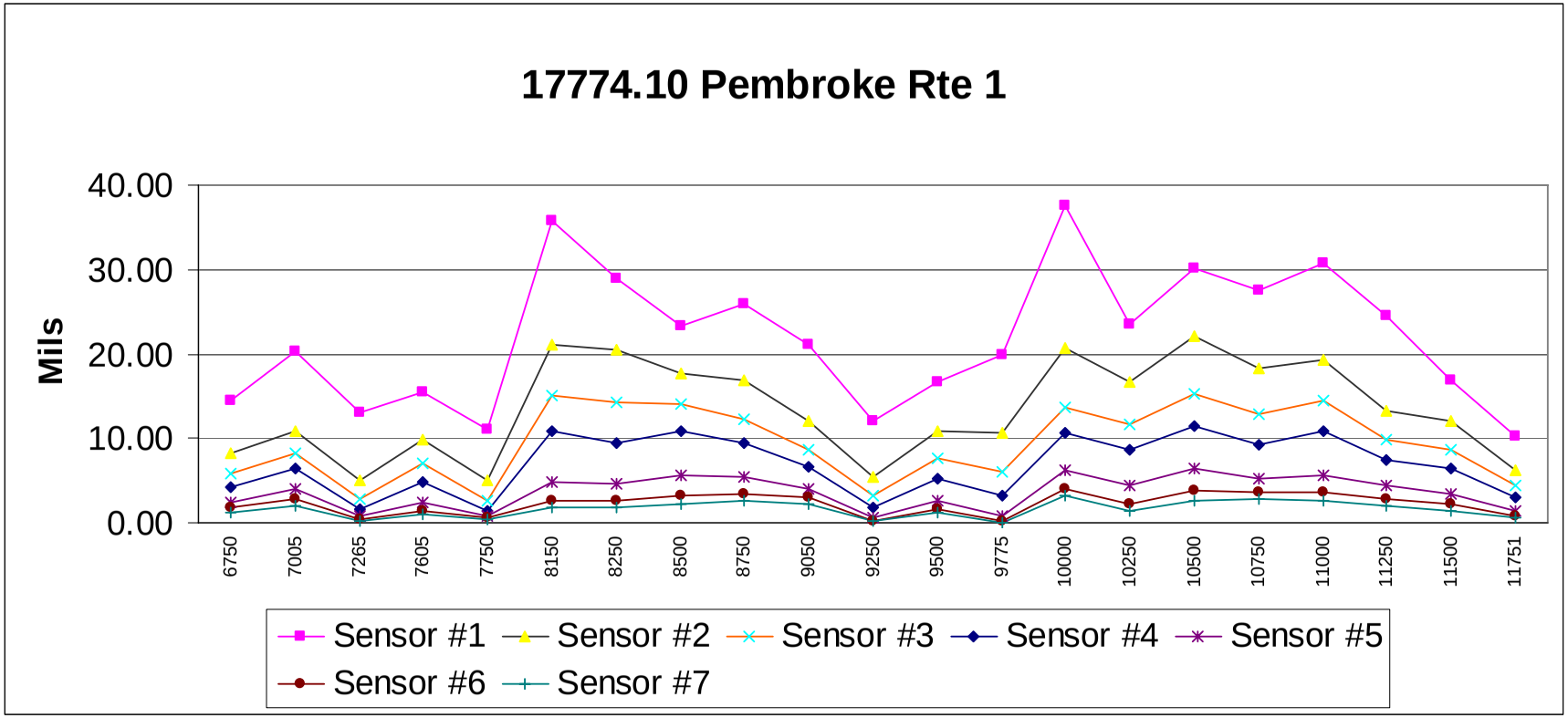
Station (Feet)	Existing Structural Number (in.)	Future Traffic Structural Number (in.)	Overlay Structural Number (Existing - Future)	Recommended Pavement Thickness (in.)	Pavement Modulus (psi)	Subgrade Resilient Modulus (psi)	Pavement Depth (in)	Combined Pavement/Gravel Depth Used for Calculation (in)
76+05	4.21	3.3	0.91	-	50,492	7,298	3.6	25.3
77+50	4.49	2.39	2.1	-	61,480	17,712	3.6	25.3
81+50	3.01	4.2	**-1.19**	**2.7**	21,598	3,677	3.6	24
82+50	3.29	4.16	**-0.87**	**1.98**	28,244	3,775	3.6	24
85+00	3.71	4.47	**-0.76**	**1.73**	40,682	3,051	3.6	24
87+50	3.63	4.39	**-0.76**	**1.73**	33,683	3,225	3.6	25
90+50	3.85	4	**-0.15**	**0.34**	40,220	4,252	3.6	25
92+50	3.86	2.6	1.26	-	59,402	14,120	3.6	22
95+00	3.61	3.44	0.17	-	48,365	6,534	3.6	22
97+75	3.29	3.21	0.08	-	36,795	7,904	3.6	22
100+00	3.14	4.62	**-1.48**	**3.36**	21,658	**2,763**	3.6	25
102+50	3.68	4.09	**-0.41**	**0.93**	34,923	3,967	3.6	25
105+00	3.47	4.65	**-1.18**	**2.68**	29,322	**2,714**	3.6	25
107+50	3.51	4.32	**-0.81**	**1.84**	30,395	3,386	3.6	25
110+00	3.39	4.46	**-1.07**	**2.43**	27,348	3,066	3.6	25
112+50	3.63	4.08	**-0.45**	**1.02**	33,565	4,000	3.6	25
115+00	4.07	3.76	0.31	-	50,950	5,084	3.6	24.4
117+51	4.59	2.71	1.88	-	73,239	12,618	3.6	24.4
120+00	4.59	2.92	1.67	-	60,454	10,233	3.6	26
122+50	4.14	3.29	0.85	-	44,243	7,360	3.6	26
125+25	3.75	3.09	0.66	-	54,352	8,821	3.6	22
127+50	3.68	3.91	**-0.23**	**0.52**	51,488	4,529	3.6	22
130+00	3.37	3.66	**-0.29**	**0.66**	39,378	5,490	3.6	22

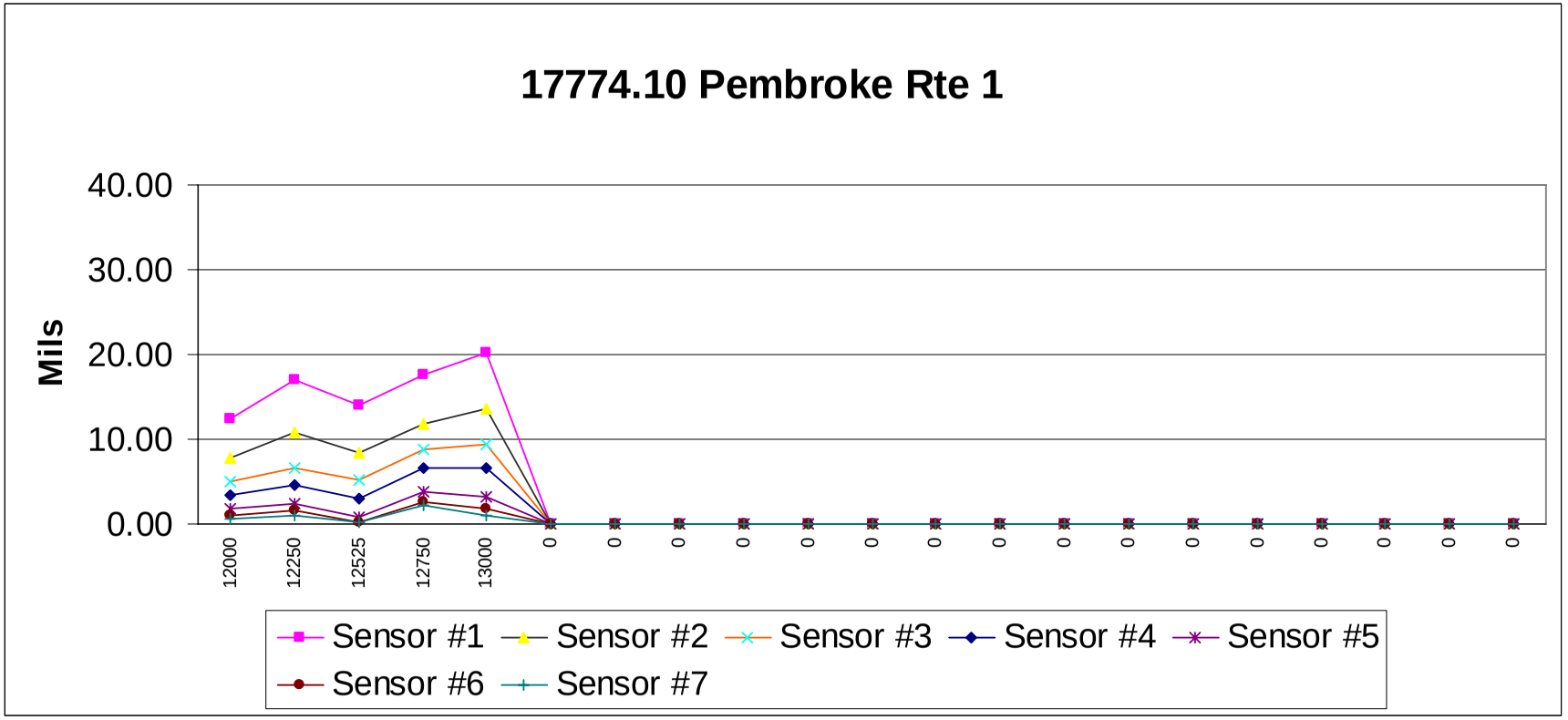
Possible Weak Soils (<3000)
Possible Shallow Bedrock (>8000)
For actual Gravel Depths, see logdraft forms






17774.10 Pembroke Rte 1
Mils
40.00
30.00
20.00
10.00
0.00
12+50
15+00
17+51
20+00
23+07
25+00
27+51
30+00
32+50
35+00
38+50
40+00
42+50
45+00
47+50
50+00
52+50
55+00
60+00
62+50
65+00
Sensor #1
Sensor #2
Sensor #3
Sensor #4
Sensor #5
Sensor #6
Sensor #7


17774.10 Pembroke Rte 1
Mils
40.00
30.00
20.00
10.00
0.00
6750
7005
7265
7605
7750
8150
8250
8500
8750
9050
9250
9500
9775
10000
10250
10500
10750
11000
11250
11500
11751
Sensor #1
Sensor #2
Sensor #3
Sensor #4
Sensor #5
Sensor #6
Sensor #7


17774.10 Pembroke Rte 1
Mils
40.00
30.00
20.00
10.00
0.00
12000
12250
12525
12750
13000
0
Sensor #1
Sensor #2
Sensor #3
Sensor #4
Sensor #5
Sensor #6
Sensor #7

STATE OF MAINE

FILE: RTE 1

INTERDEPARTMENTAL MEMORANDUM

Date of Request: 4/27/2010 Return: 4/29/2010

Latest Date Needed By ASAP

To: **Mike Morgan** Dept.: MDOT, Bureau of Planning

From: **Carmen Forzetting** Dept.: Highway

Subject: **Request for Traffic Information** Project Manager: **Denis Lovely**

TOWN(S): PEMBROKE P.I.N. **17774.00** Consultant Proj ☐

COUNTY: WASHINGTON ROUTE: U.S. Route 1

LOCATION/ DESCRIPTION: Reconstruction on U.S. Route 1: Begin 0.03 miles S of the intersection of Cross Road and U.S. Route 1 and extends 2.49 miles to 0.02 miles S of the intersection of Old County Road and U.S. Route 1.

	Roadway Changes or Relocation (Attach Sketch)	Turning Movement needed (Provide Locations under Comments)	Other Please Describe Under Comments
Please Check Box if Applicable:	☐	☐	☐

Prep By: MAM

Description of Sections	Sec. 1	Sec. 2	Sec. 3	Sec. 4	Sec. 5
	Pembroke - US 1 SW/O IR 1231 (Old County Rd)				
1 Latest AADT (Year)	2520 (2009)				
2 Current **2010** AADT	2520				
3 Future **2022** AADT	2820				
4 Future _____ AADT					
5 DHV - % of AADT	11%	%	%	%	%
6 Design Hourly Volume	310				
7 % Heavy Trucks (AADT)	12%	%	%	%	%
8 % Heavy Trucks (DHV)	12%	%	%	%	%
9 Direct.Dist. (DHV)	53%	%	%	%	%
10 18-KIP Equivalent P 2.0	196				
11 18-KIP Equivalent P 2.5	187				

Notes or Remarks: 18-Kip ESALS is based on 12 year life

PLEASE PROVIDE: (1) PIN NUMBER, (2) THE CURRENT & FUTURE YEARS FOR WHICH YOU WANT AADT CALCULATED, AND SEND TO MIKE MORGAN. (A LOCATION MAP IS NO LONGER NEEDED.)

TRAFFIC REQUESTS WILL BE FILLED ON A FIRST COME / SERVE BASIS. PLEASE SEND WHEN PROJECT KICKS OFF!!!

Need Only Data Items Numbered ALL

Comments: Reconstruction project.

State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

Town(s): Pembroke Project Number: 17774.10

Boring & Sample Identification Number	Station (Feet)	Offset (Feet)	Depth (Feet)	Reference Number	G.S.D.C. Sheet	W.C.	% Passing 200 Sieve	Classification		
								Unified	AASHTO	Frost
HB-PEMB-101, S1	12+50	7.0 Rt.	0.35-2.1	237489	1	5.1	12.1	SW-SM	A-1-a	0
HB-PEMB-101, S2	12+50	7.0 Rt.	2.1-5.0	237490	1	25.7	95.8	CL	A-7-6	III
HB-PEMB-103, S3	30+00	8.5 Rt.	0.3-2.4	237491	1	3.0	8.0	GW-GM	A-1-a	0
HB-PEMB-104, S4	38+50	8.0 Rt.	0.3-4.5	237492	1	8.8	9.2	SW-SM	A-1-b	0
HB-PEMB-105, S5	45+00	8.0 Rt.	2.5-5.0	237493	1	16.4	59.4	ML	A-4	IV
HB-PEMB-106, S6	48+50	8.0 Rt.	2.4-5.0	237494	2	23.4	75.0	CL-ML	A-4	IV
HB-PEMB-107, S7	62+50	8.0 Rt.	0.3-2.4	237495	2	2.1	17.2	SM	A-1-b	II
HB-PEMB-108, S8	82+50	8.0 Rt.	0.25-2.3	237496	2	5.4	13.3	SM	A-1-b	II
HB-PEMB-108, S9	82+50	8.0 Rt.	2.3-5.0	237497	2	23.0	94.1	CL	A-7-6	III
HB-PEMB-111, S10	101+00	8.0 Rt.	0.3-2.4	237498	2	5.7	15.4	SM	A-1-b	II
HB-PEMB-111, S11	101+00	8.0 Rt.	2.4-5.0	237499	2	20.2	87.8	CL	A-7-6	III
HB-PEMB-113, S12	114+00	7.5 Rt.	0.25-2.1	237500	3	4.9	13.7	SM	A-1-b	II
HB-PEMB-113, S13	114+00	7.5 Rt.	2.1-5.0	237526	3	1.0	26.1	SM	A-2-4	II
HB-PEMB-115, S14	129+00	8.0 Rt.	2.1-5.0	237527	3	22.3	78.1	CL	A-6	III
TP-1, S3	50+70	14.0 Lt.	0.17-2.0	238249	4	0.6	4.7	SW	A-1-a	0
TP-2, S2	50+70	14.0 Rt.	0.17-2.0	238248	4	1.3	8.2	SW-SM	A-1-a	0
TP-2, S1	50+70	14.0 Rt.	2.0	238247	4	24.2	79.6	CL-ML	A-4	IV
TP-3, S6	84+60	14.0 Lt.	0.17-2.0	238211	4	1.6	11.6	SW-SM	A-1-a	0
TP-3, S5	84+60	14.0 Lt.	2.0	238210	4	20.1	32.5	SC-SM	A-2-4	II
TP-4, S4	84+60	14.0 Rt.	0.17-2.0	238250	4	1.4	8.2	SW-SM	A-1-a	0

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 MDOT and Corps of Engineers Classification Systems.

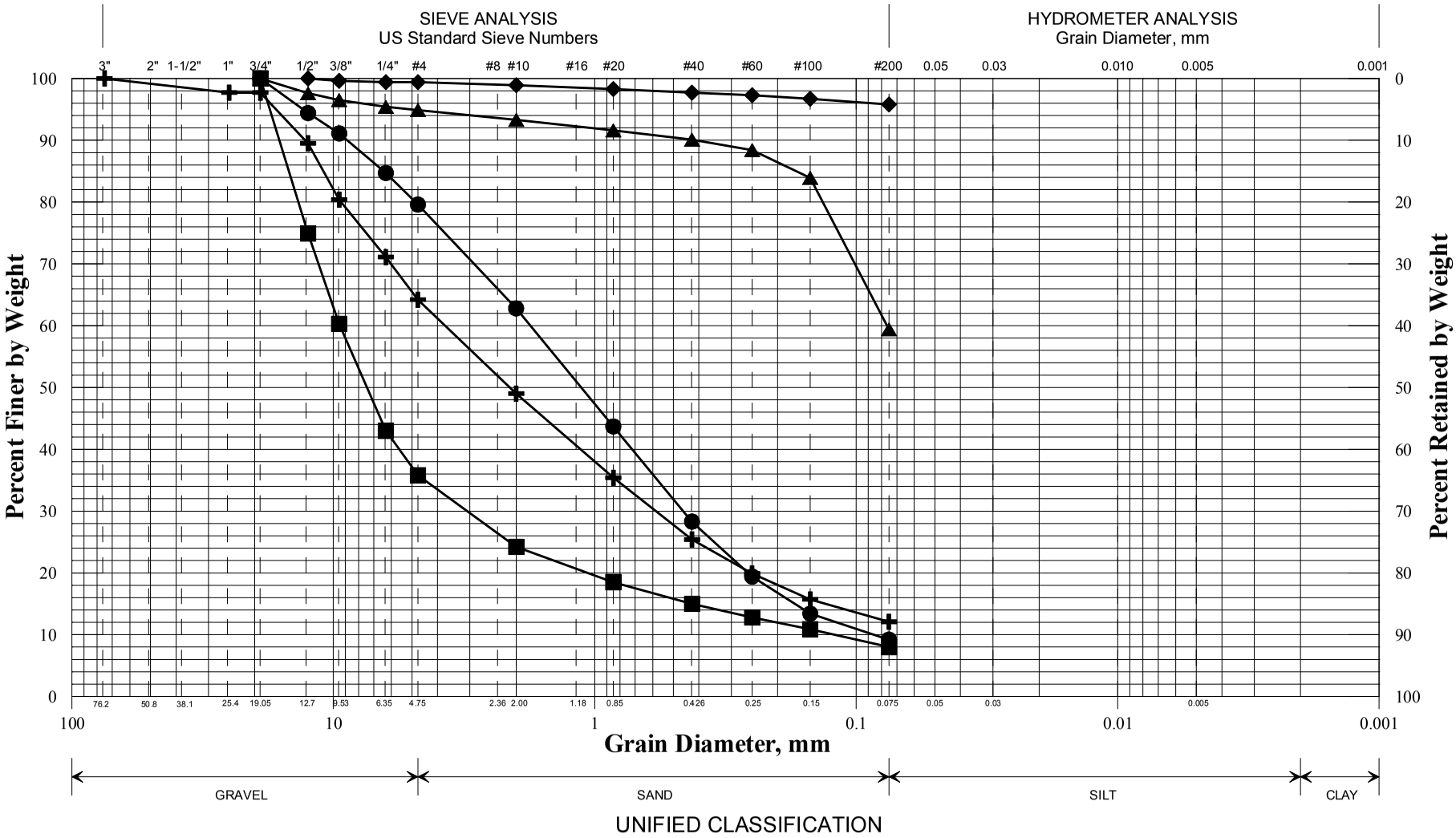
GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-93 (1996) and/or ASTM D 422-63 (Reapproved 1998)

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

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

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

State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE

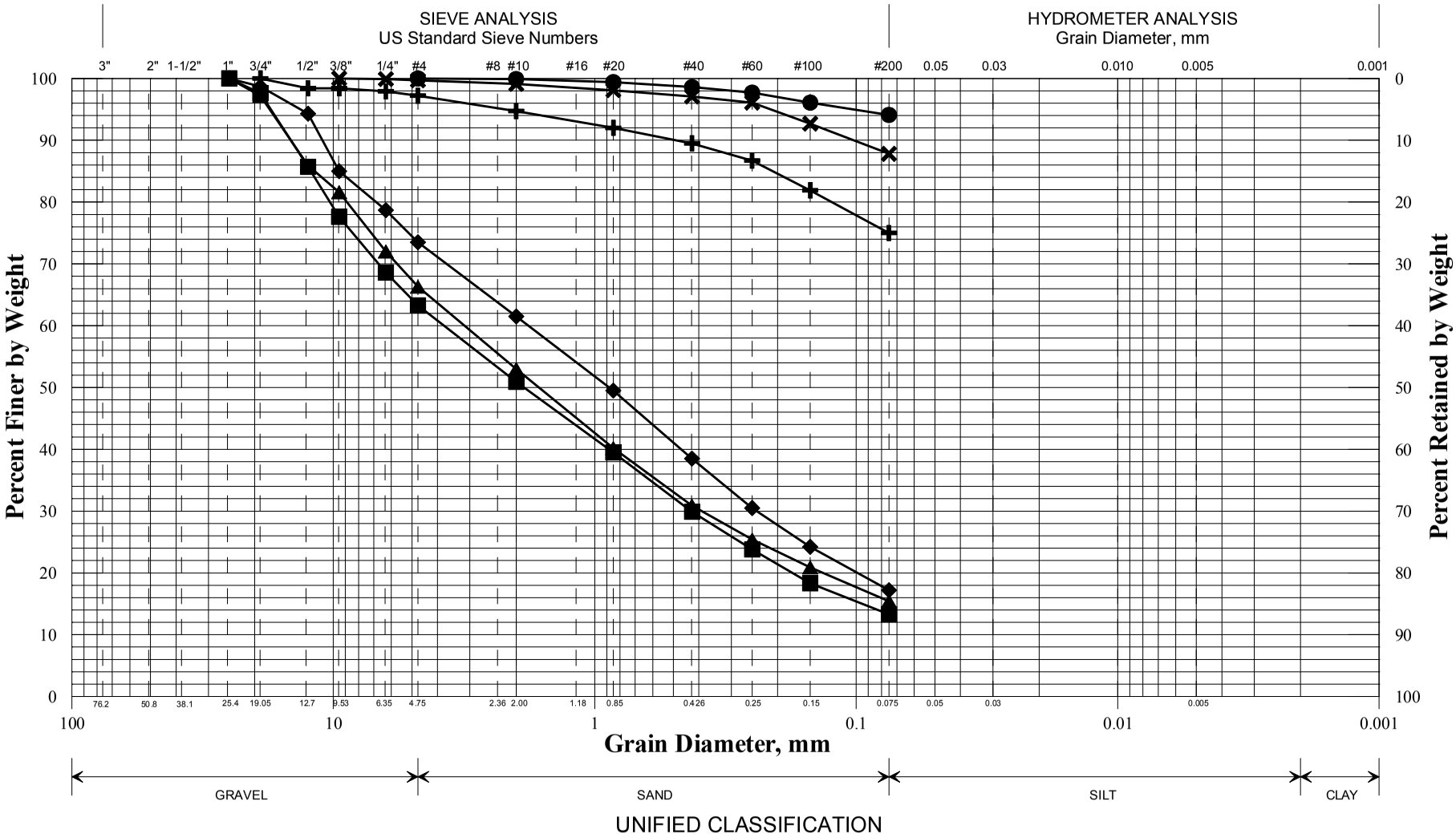


	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-PEMB-101/S1	12+50	7.0 RT	0.35-2.1	Gravelly SAND, little silt.	5.1			
◆	HB-PEMB-101/S2	12+50	7.0 RT	2.1-5.0	SILT with clay, trace sand, trace gravel.	25.7	45	22	23
■	HB-PEMB-103/S3	30+00	8.5 RT	0.3-2.4	GRAVEL, some sand, trace silt.	3.0			
●	HB-PEMB-104/S4	38+50	8.0 RT	0.3-4.5	SAND, some gravel, trace silt.	8.8			
▲	HB-PEMB-105/S5	45+00	8.0 RT	2.5-5.0	Sandy SILT, trace gravel.	16.4			
✖									

PIN
17774.10
Town
Dennysville,Pembroke,Whiting
Reported by/Date
WHITE, TERRY A 6/3/2010

SHEET 1

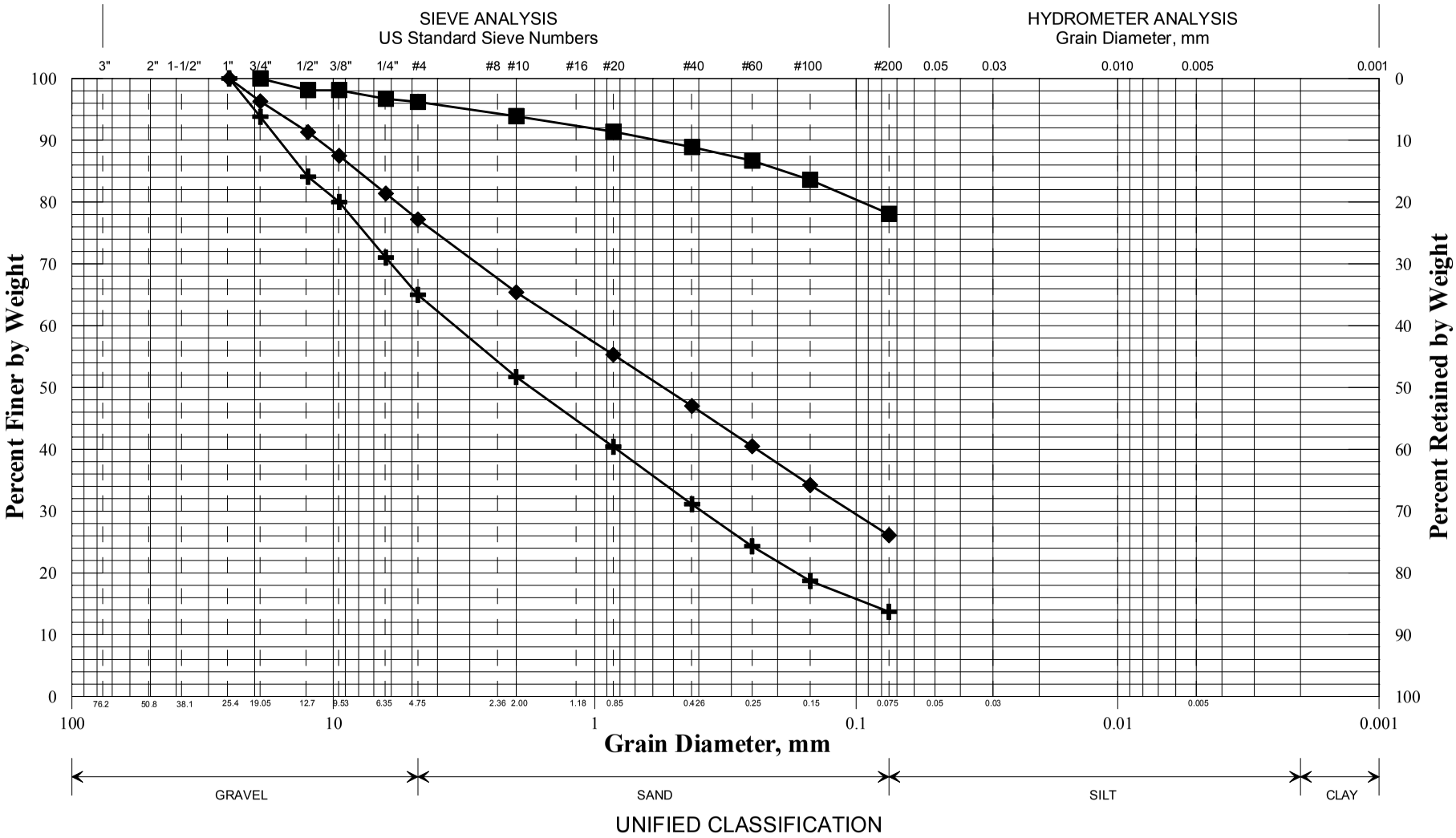
State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-PEMB-106/S6	48+50	8.0 RT	2.4-5.0	SILT with clay, some sand, trace gravel.	23.4			
◆	HB-PEMB-107/S7	62+50	8.0 RT	2.4-5.0	SAND, some gravel, little silt.	2.1			
■	HB-PEMB-108/S8	82+50	8.0 RT	0.25-2.3	Gravelly SAND, little silt.	5.4			
●	HB-PEMB-108/S9	82+50	8.0 RT	2.3-5.0	SILT, with clay, trace sand.	23.0	47	24	23
▲	HB-PEMB-111/S10	101+00	8.0 RT	0.3-2.4	SAND, some gravel, little silt.	5.7			
✖	HB-PEMB-11/S11	101+00	8.0 RT	2.4-5.0	SILT with clay, little sand, trace gravel.	20.2	44	21	23

PIN
17774.10
Town
Dennysville,Pembroke,Whiting
Reported by/Date
WHITE, TERRY A 6/3/2010

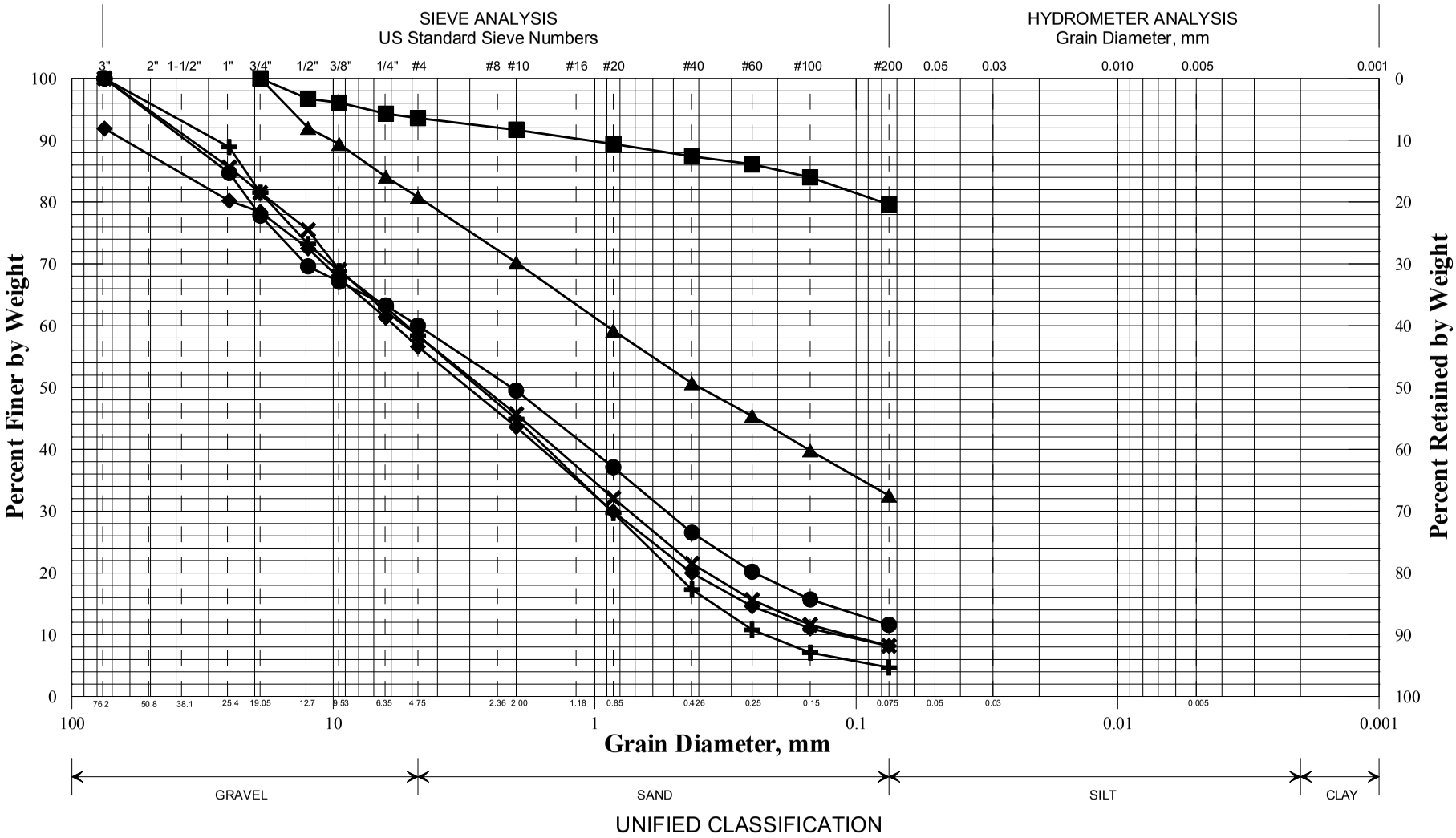
State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-PEMB-113/S12	114+00	7.5 RT	0.25-2.1	SAND, some gravel, little silt.	4.9			
◆	HB-PEMB-113/S13	114+00	7.5 RT	2.1-5.0	SAND, some gravel, some silt.	1.0			
■	HB-PEMB-115/S14	129+00	8.0 RT	2.1-5.0	SILT with clay, little sand, trace gravel.	22.3	35	20	15
●									
▲									
✕									

PIN
17774.10
Town
Dennysville,Pembroke,Whiting
Reported by/Date
WHITE, TERRY A 6/3/2010

State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	TP-1/S3	50+70	14.0 LT	0.17-2.0	Gravelly SAND, trace silt.	0.6			
◆	TP-2/S2	50+70	14.0 RT	0.17-2.0	Gravelly SAND, trace silt.	1.3			
■	TP-2/S1	50+70	14.0 RT	2	SILT with clay, little sand, trace gravel.	24.2			
●	TP-3/S6	84+60	14.0 LT	0.17-2.0	Gravelly SAND, little silt.	1.6			
▲	TP-3/S5	84+60	14.0 LT	2	SAND, some silt with clay, little gravel.	20.1			
✕	TP-4/S4	84+60	14.0 RT	0.17-2.0	Gravelly SAND, trace silt.	1.4			

PIN
17774.10
Town
Dennysville,Pembroke,Whiting
Reported by/Date
WHITE, TERRY A 6/3/2010

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-101
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	12+50, 7.0 Rt.	**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 = 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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S1		0.35 - 2.10				SSA	-0.35		PAVEMENT.	
										0.35	G#237489 A-1-a, SW-SM WC=5.1%
										Brown, damp, gravelly fine to coarse SAND, little silt.	
	S2		2.10 - 5.00					-2.10		2.10	
										Olive-brown, moist, clayey-SILT.	G#237490 A-7-6, CL WC=25.7% LL=45 PL=22 PI=23
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

All Offsets are form Existing Roadway CL.

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: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-102
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	23+00, 6.0 Rt.	**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 = 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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.30		PAVEMENT. 0.30	
										Brown, damp, gravelly fine to coarse SAND, little silt, occasional cobbles. ≅S1	
								-2.40		2.40	
										Olive-brown, moist, clayey-SILT. ≅S2	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

All Offsets are form Existing Roadway CL.

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-103
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	30+00, 8.5 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S3		0.30 - 2.40				SSA	-0.30		PAVEMENT.	
										0.30	G#237491
										Brown, damp, gravelly fine to coarse SAND, little silt.	A-1-a, GW-GM
											WC=3.0%
								-2.40		2.40	
										Weathered ROCK.	
								-3.80		3.80	
										Bottom of Exploration at 3.80 feet below ground surface.	
5										REFUSAL	
10											
15											
20											
25											

Remarks:

All Offsets are form Existing Roadway CL.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-104
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	38+50, 8.0 Rt.	**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 = 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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S4		0.30 - 4.45				SSA	-0.30		PAVEMENT. 0.30	G#237492 A-1-b, SW-SM WC=8.8%
										Brown, wet, gravelly fine to coarse SAND, little silt.	
								-4.50		4.50 **Bottom of Exploration at 4.50 feet below ground surface.** REFUSAL	
5											
10											
15											
20											
25											

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-105
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	45+00, 8.0 Rt.	**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 = 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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.20		PAVEMENT.	
										0.20	
										Brown, damp, gravelly fine to coarse SAND, little silt. ≅S3	
										Cobbles from 2.0-2.4' bgs.	
	S5		2.50 - 5.00					-2.50		2.50	G#237493 A-4. ML WC=16.4%
										Brown, wet, silty fine to medium SAND.	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-106
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	48+50, 8.0 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.25		PAVEMENT.	
										0.25	
										Brown, damp, gravelly fine to coarse SAND, little silt. ≅S3	
	S6		2.40 - 5.00					-2.40		2.40	G#237494
										Grey, moist, silty fine SAND, some clay.	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-107
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	62+50, 8.0 Rt.	**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 = 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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S7		0.30 - 2.40				SSA	-0.30		PAVEMENT.	
										0.30	G#237495 A-1-b, SM WC=2.1%
										Brown, damp, gravelly fine to coarse SAND, little silt.	
								-2.40		2.40	
										Brown, damp, silty fine to medium SAND. ≅S5	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-108
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	82+50, 8.0 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MD = Unsuccessful Split Spoon Sample attempt
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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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S8		0.25 - 2.30				SSA	-0.25		PAVEMENT.	
										0.25	G#237496 A-1-b, SM WC=5.4%
	S9		2.30 - 5.00					-2.30		Brown, damp, gravelly fine to coarse SAND, little silt.	
										2.30	
										Olive-brown, damp, SILT, trace fine sand, trace clay.	G#237497 A-7-6, CL WC=23.0% LL=47 PL=24 PI=23
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-109
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	86+50, 7.5 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.30		PAVEMENT. 0.30	
										Brown, damp, gravelly fine to coarse SAND, little silt. ≅S8	
								-2.40		2.40	
										Olive-brown, moist, SILT, trace fine sand, trace clay. ≅S9	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-110
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	92+00, 7.5 Rt.	**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 = 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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.30		PAVEMENT. 0.30	
										Brown, damp, gravelly fine to coarse SAND, little silt. ≅S8	
								-2.10		2.10	
										Olive-brown, damp, SILT, trace fine sand, trace clay. ≅S9	
								-2.80		2.80	
								-3.20		Weathered ROCK. 3.20	
										Bottom of Exploration at 3.20 feet below ground surface. REFUSAL	
5											
10											
15											
20											
25											

Remarks:

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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: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-111
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	101+00, 8.0 Rt.	**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 = 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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S10		0.30 - 2.40				SSA	-0.30		PAVEMENT.	
										0.30	
										Brown, damp, gravelly fine to coarse SAND, trace silt.	G#237498 A-1-b, SM WC=5.7%
	S11		2.40 - 5.00					-2.40		2.40	
										Olive-brown, damp, SILT, little fine sand, little clay.	G#237499 A-7-6, CL WC=20.2% LL=44 PL=21 PI=23
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

All Offsets are form Existing Roadway CL.

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: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-112
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	107+50, 8.5 Rt.	**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 = 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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.30		PAVEMENT. 0.30	
										Brown, damp, gravelly fine to coarse SAND, trace silt. ≅S10	
								-2.40		2.40	
										Olive-brown, damp, SILT, little fine sand, little clay. ≅S11	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

All Offsets are form Existing Roadway CL.

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-113
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	114+00, 7.5 Rt.	**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 = 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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S12		0.25 - 2.10				SSA	-0.25		PAVEMENT.	
										0.25	
										Brown, damp, gravelly fine to coarse SAND, trace silt.	G#237500 A-1-b, SM WC=4.9%
	S13		2.10 - 5.00					-2.10		2.10	
										Light brown, moist, silty fine to coarse SAND, litle gravel.	G#237526 A-2-4, SM WC=1.0%
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

All Offsets are form Existing Roadway CL.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-114
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	120+00, 8.0 Rt.	**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 = 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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.25		PAVEMENT.	
										0.25	
										Brown, damp, gravelly fine to coarse SAND, trace silt, occasional cobbles. ≅S12	
								-3.40		3.40	
										Bottom of Exploration at 3.40 feet below ground surface. REFUSAL	
5											
10											
15											
20											
25											

Remarks:

All Offsets are form Existing Roadway CL.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Boring No.: HB-PEMB-115
PIN: 17774.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/17/10-5/17/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	129+00, 8.0 Rt.	**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 = 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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.25		PAVEMENT.	
										0.25	
										Brown, damp, gravelly fine to coarse SAND, trace silt. ≅S12	
								-2.10		2.10	
	S14		2.10 - 5.00							Olive-brown, damp, SILT, little fine sand, little clay.	G#237527 A-6, CL WC=22.3% LL=35 PL=20 PI=15
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

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Maine Department of Transportation

Test Pit Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Test Pit No.: TP-1
PIN: 17774.10

Contractor:	N/A	**Equipment Type:**	N/A	**Elevation (ft.)**	
Operator:	N/A	**Sampling Method:**	C. Forzetting	**Datum:**	NAVD 88
Logged By:	C. Forzetting	**Test Pit Dimensions (ft):**	Unknown		
Date Start/Finish:	4/26/2010	**Total Depth (ft):**	2.0		
Location:	50+70, 14.0 Lt.	**Water Level* (ft):**	None Observed		

Definitions:
S = Grab Sample
V = Insitu Vane Shear Test
U = Thin Wall Tube Sample

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis

Depth (ft.)	Sample Information: Sample No.	Sample Depth (ft.)	Shear Strength (psf)	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S3			-0.17		Sandy Surface.	G#238249 A-1-a, SW WC=0.6%
						0.2	
						Gravelly Material.	
				-2.00		2.0	
						Bottom of Test Pit at 2.0 feet below ground surface.	
						NO REFUSAL	
5							
10							
15							
20							
25							

Remarks:

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Maine Department of Transportation

Test Pit Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Test Pit No.: TP-2
PIN: 17774.10

Contractor:	N/A	**Equipment Type:**	N/A	**Elevation (ft.)**	
Operator:	N/A	**Sampling Method:**	C. Forzetting	**Datum:**	NAVD 88
Logged By:	C. Forzetting	**Test Pit Dimensions (ft):**	Unknown		
Date Start/Finish:	4/26/2010	**Total Depth (ft):**	2.0		
Location:	50+70, 14.0 Rt.	**Water Level* (ft):**	None Observed		

Definitions:
S = Grab Sample
V = Insitu Vane Shear Test
U = Thin Wall Tube Sample

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis

Depth (ft.)	Sample Information: Sample No.	Sample Depth (ft.)	Shear Strength (psf)	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S2			-0.17		Sandy Surface.	
						0.2	G#238248 A-1-a, SW-SM WC=1.3%
						Gravelly Material.	
	S1			-2.00		2.0	G#238247 A-4, CL-ML WC=24.2%
						Bottom of Test Pit at 2.0 feet below ground surface.	
						Tan colored Clay at base of test pit.	
						NO REFUSAL	
5							
10							
15							
20							
25							

Remarks:

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Maine Department of Transportation

Test Pit Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Test Pit No.: TP-3
PIN: 17774.10

Contractor:	N/A	**Equipment Type:**	N/A	**Elevation (ft.)**	
Operator:	N/A	**Sampling Method:**	C. Forzetting	**Datum:**	NAVD 88
Logged By:	C. Forzetting	**Test Pit Dimensions (ft):**	Unknown		
Date Start/Finish:	4/26/2010	**Total Depth (ft):**	2.0		
Location:	84+60, 14.0 Lt.	**Water Level* (ft):**	See Remarks		

Definitions:
S = Grab Sample
V = Insitu Vane Shear Test
U = Thin Wall Tube Sample

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis

Depth (ft.)	Sample Information: Sample No.	Sample Depth (ft.)	Shear Strength (psf)	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S6			-0.17		Sandy Surface.	
						0.2	G#238211 A-1-a, SW-SM WC=1.6%
						GRAVEL.	
	S5			-2.00		2.0	G#238210 A-2-4, SC-SM WC=20.1%
						Bottom of Test Pit at 2.0 feet below ground surface.	
						Dark brown-grey clay at base of test pit.	
						NO REFUSAL	
5							
10							
15							
20							
25							

Remarks:

Small amount of standing water in ditch.

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

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Maine Department of Transportation

Test Pit Log
US CUSTOMARY UNITS

Project: Route 1
Location: Pembroke, Maine

Test Pit No.: TP-4
PIN: 17774.10

Contractor:	N/A	**Equipment Type:**	N/A	**Elevation (ft.)**	
Operator:	N/A	**Sampling Method:**	C. Forzetting	**Datum:**	NAVD 88
Logged By:	C. Forzetting	**Test Pit Dimensions (ft):**	Unknown		
Date Start/Finish:	4/26/2010	**Total Depth (ft):**	2.0		
Location:	84+60, 14.0 Rt.	**Water Level* (ft):**	See Remarks		

Definitions:
S = Grab Sample
V = Insitu Vane Shear Test
U = Thin Wall Tube Sample

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis

Depth (ft.)	Sample Information: Sample No.	Sample Depth (ft.)	Shear Strength (psf)	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S4			-0.17		Sandy Surface.	G#238250 A-1-a, SW-SM WC=1.4%
						0.2	
						GRAVEL.	
				-2.00		2.0	
						Bottom of Test Pit at 2.0 feet below ground surface.	
						NO REFUSAL	
5							
10							
15							
20							
25							

Remarks:

Small amount of standing water in ditch.

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State of Maine - Department of Transportation

Pavement Core Summary Sheet

Town(s): Dennysville-Pembroke Project Number: 17774.10

Station (Feet)	Offset (Feet)	Pavement Depth (Feet)	Unbound Pavement	PC-Number	Saved Core	Comments / Date 5/17/2010
38+50	CL	0.50		1		
38+50	8.5 Lt.	0.40		2		
62+50	CL	0.35		3		
62+50	8.5 Lt.	0.30		4		

Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237489	**HB-PEMB-101/S1**	**GEOTECHNICAL (DISTURBED)**	**5/17/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **12+50** Offset, ft: **7.0** **RT** Dbfg, ft: **0.35-2.1**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	**100.0**
1 in. [25.0 mm]	**97.7**
¾ in. [19.0 mm]	**97.7**
½ in. [12.5 mm]	**89.5**
⅜ in. [9.5 mm]	**80.4**
¼ in. [6.3 mm]	**71.1**
No. 4 [4.75 mm]	**64.2**
No. 10 [2.00 mm]	**49.0**
No. 20 [0.850 mm]	**35.4**
No. 40 [0.425 mm]	**25.4**
No. 60 [0.250 mm]	**19.9**
No. 100 [0.150 mm]	**15.7**
No. 200 [0.075 mm]	**12.1**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

5.1

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **5/24/2010**

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Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237490	**HB-PEMB-101/S2**	**GEOTECHNICAL (DISTURBED)**	**5/17/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **12+50** Offset, ft: **7.0** **RT** Dbfg, ft: **2.1-5.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	
½ in. [12.5 mm]	**100.0**
⅜ in. [9.5 mm]	**99.6**
¼ in. [6.3 mm]	**99.4**
No. 4 [4.75 mm]	**99.4**
No. 10 [2.00 mm]	**98.9**
No. 20 [0.850 mm]	**98.3**
No. 40 [0.425 mm]	**97.7**
No. 60 [0.250 mm]	**97.3**
No. 100 [0.150 mm]	**96.7**
No. 200 [0.075 mm]	**95.8**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %
45
Plastic Limit (T 90), %
22
Plasticity Index (T 90), %
23
Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %
25.7

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/3/2010**

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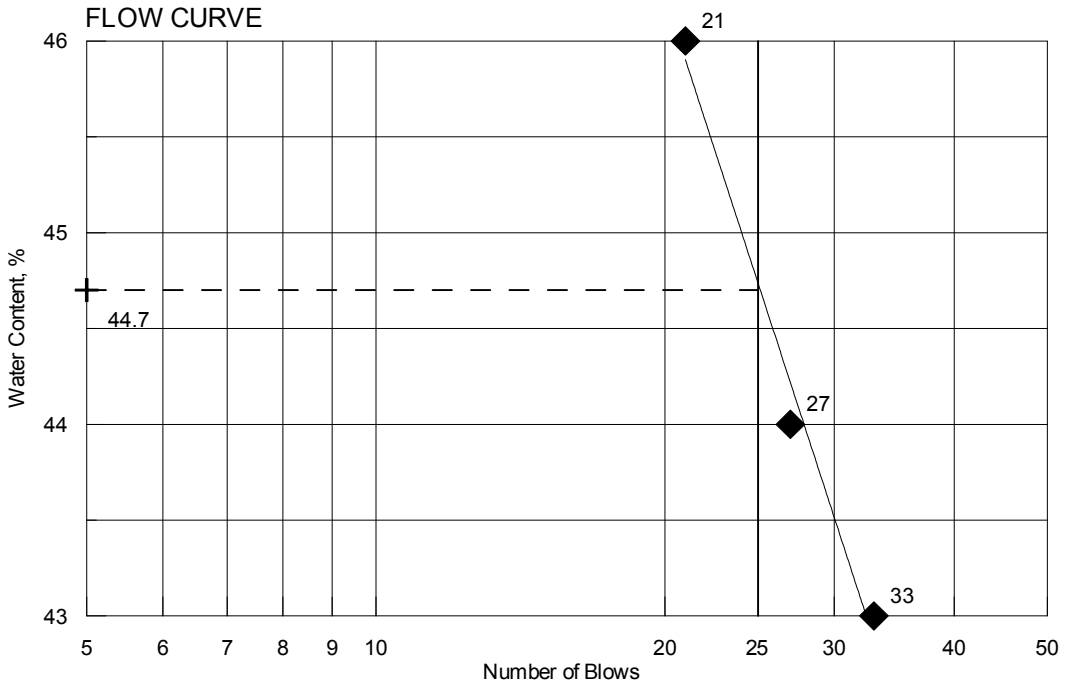
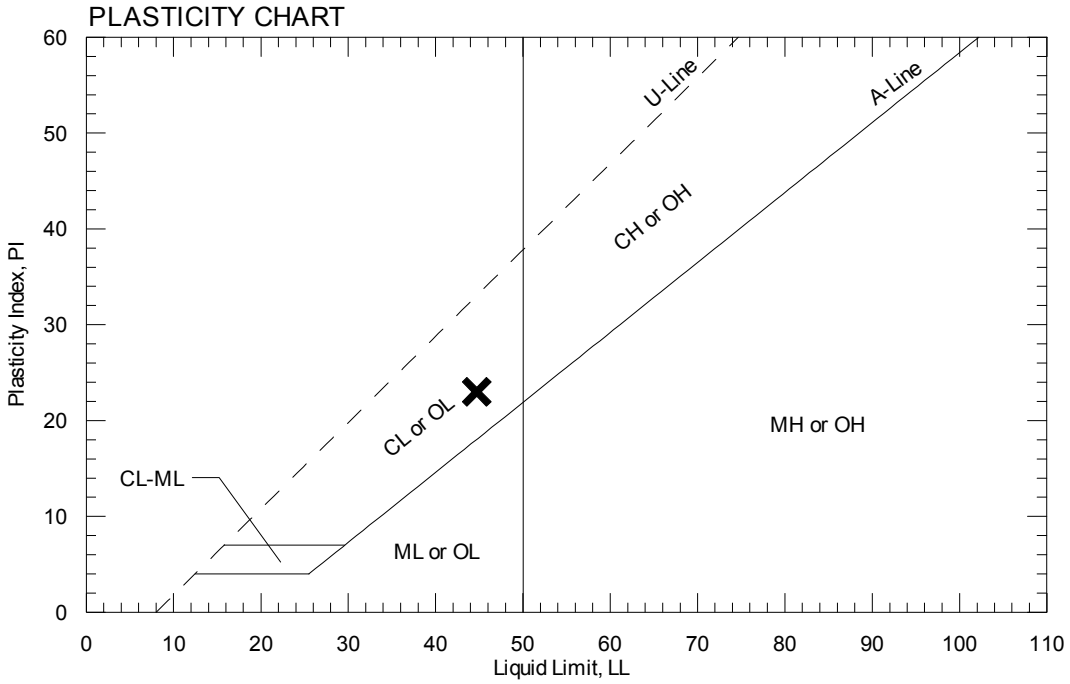
TOWN	Dennysville,Pembroke,Whiting	Reference No.	237490
PIN	017774.00	Water Content, %	25.7
Sampled	5/17/2010	Plastic Limit	22
Boring No./Sample No.	HB-PEMB-101/S2	Liquid Limit	45
Station	12+50	Plasticity Index	23
Depth	2.1-5.0	Tested By	KDRES





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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237491	**HB-PEMB-103/S3**	**GEOTECHNICAL (DISTURBED)**	**5/17/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **30+00** Offset, ft: **8.5** **RT** Dbfg, ft: **0.3-2.4**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**74.9**
⅜ in. [9.5 mm]	**60.3**
¼ in. [6.3 mm]	**43.0**
No. 4 [4.75 mm]	**35.8**
No. 10 [2.00 mm]	**24.2**
No. 20 [0.850 mm]	**18.5**
No. 40 [0.425 mm]	**15.0**
No. 60 [0.250 mm]	**12.8**
No. 100 [0.150 mm]	**10.9**
No. 200 [0.075 mm]	**8.0**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

3.0

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **5/24/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237492	**HB-PEMB-104/S4**	**GEOTECHNICAL (DISTURBED)**	**5/17/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **38+50** Offset, ft: **8.0** **RT** Dbfg, ft: **0.3-4.5**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**94.4**
⅜ in. [9.5 mm]	**91.1**
¼ in. [6.3 mm]	**84.7**
No. 4 [4.75 mm]	**79.6**
No. 10 [2.00 mm]	**62.8**
No. 20 [0.850 mm]	**43.7**
No. 40 [0.425 mm]	**28.3**
No. 60 [0.250 mm]	**19.4**
No. 100 [0.150 mm]	**13.4**
No. 200 [0.075 mm]	**9.2**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

8.8

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/1/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237493	**HB-PEMB-105/S5**	**GEOTECHNICAL (DISTURBED)**	**5/17/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **45+00** Offset, ft: **8.0** **RT** Dbfg, ft: **2.5-5.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**97.6**
⅜ in. [9.5 mm]	**96.5**
¼ in. [6.3 mm]	**95.4**
No. 4 [4.75 mm]	**94.9**
No. 10 [2.00 mm]	**93.3**
No. 20 [0.850 mm]	**91.6**
No. 40 [0.425 mm]	**90.1**
No. 60 [0.250 mm]	**88.4**
No. 100 [0.150 mm]	**83.9**
No. 200 [0.075 mm]	**59.4**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

16.4

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/1/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237494	**HB-PEMB-106/S6**	**GEOTECHNICAL (DISTURBED)**	**5/17/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **48+50** Offset, ft: **8.0** **RT** Dbfg, ft: **2.4-5.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**98.4**
⅜ in. [9.5 mm]	**98.4**
¼ in. [6.3 mm]	**97.9**
No. 4 [4.75 mm]	**97.2**
No. 10 [2.00 mm]	**94.7**
No. 20 [0.850 mm]	**92.0**
No. 40 [0.425 mm]	**89.5**
No. 60 [0.250 mm]	**86.7**
No. 100 [0.150 mm]	**81.9**
No. 200 [0.075 mm]	**75.0**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

23.4

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/1/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237495	**HB-PEMB-107/S7**	**GEOTECHNICAL (DISTURBED)**	**5/17/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **62+50** Offset, ft: **8.0** **RT** Dbfg, ft: **2.4-5.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**98.7**
½ in. [12.5 mm]	**94.3**
⅜ in. [9.5 mm]	**85.0**
¼ in. [6.3 mm]	**78.7**
No. 4 [4.75 mm]	**73.5**
No. 10 [2.00 mm]	**61.5**
No. 20 [0.850 mm]	**49.5**
No. 40 [0.425 mm]	**38.5**
No. 60 [0.250 mm]	**30.5**
No. 100 [0.150 mm]	**24.2**
No. 200 [0.075 mm]	**17.2**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

2.1

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **5/24/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237496	**HB-PEMB-108/S8**	**GEOTECHNICAL (DISTURBED)**	**5/17/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **82+50** Offset, ft: **8.0** **RT** Dbfg, ft: **0.25-2.3**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**97.6**
½ in. [12.5 mm]	**85.7**
⅜ in. [9.5 mm]	**77.6**
¼ in. [6.3 mm]	**68.6**
No. 4 [4.75 mm]	**63.3**
No. 10 [2.00 mm]	**50.9**
No. 20 [0.850 mm]	**39.5**
No. 40 [0.425 mm]	**29.9**
No. 60 [0.250 mm]	**23.8**
No. 100 [0.150 mm]	**18.3**
No. 200 [0.075 mm]	**13.3**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

5.4

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **5/24/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237497	**HB-PEMB-108/S9**	**GEOTECHNICAL (DISTURBED)**	**5/17/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **82+50** Offset, ft: **8.0** **RT** Dbfg, ft: **2.3-5.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	
½ in. [12.5 mm]	
⅜ in. [9.5 mm]	
¼ in. [6.3 mm]	
No. 4 [4.75 mm]	**100.0**
No. 10 [2.00 mm]	**99.9**
No. 20 [0.850 mm]	**99.4**
No. 40 [0.425 mm]	**98.6**
No. 60 [0.250 mm]	**97.7**
No. 100 [0.150 mm]	**96.1**
No. 200 [0.075 mm]	**94.1**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %
47
Plastic Limit (T 90), %
24
Plasticity Index (T 90), %
23
Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %
23.0

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/3/2010**

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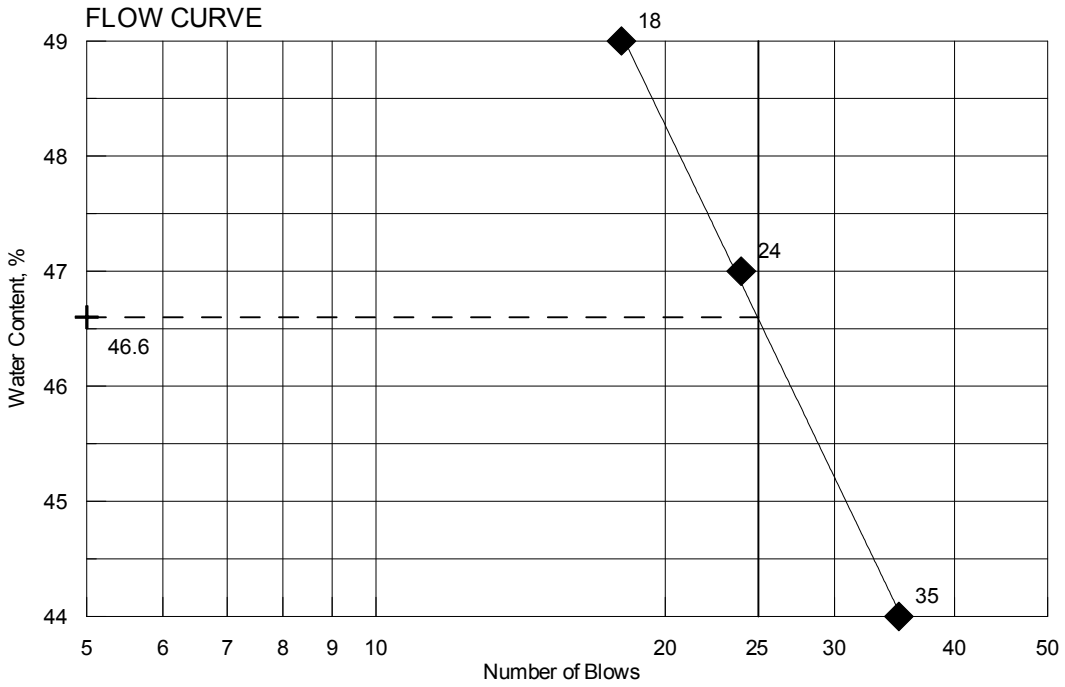
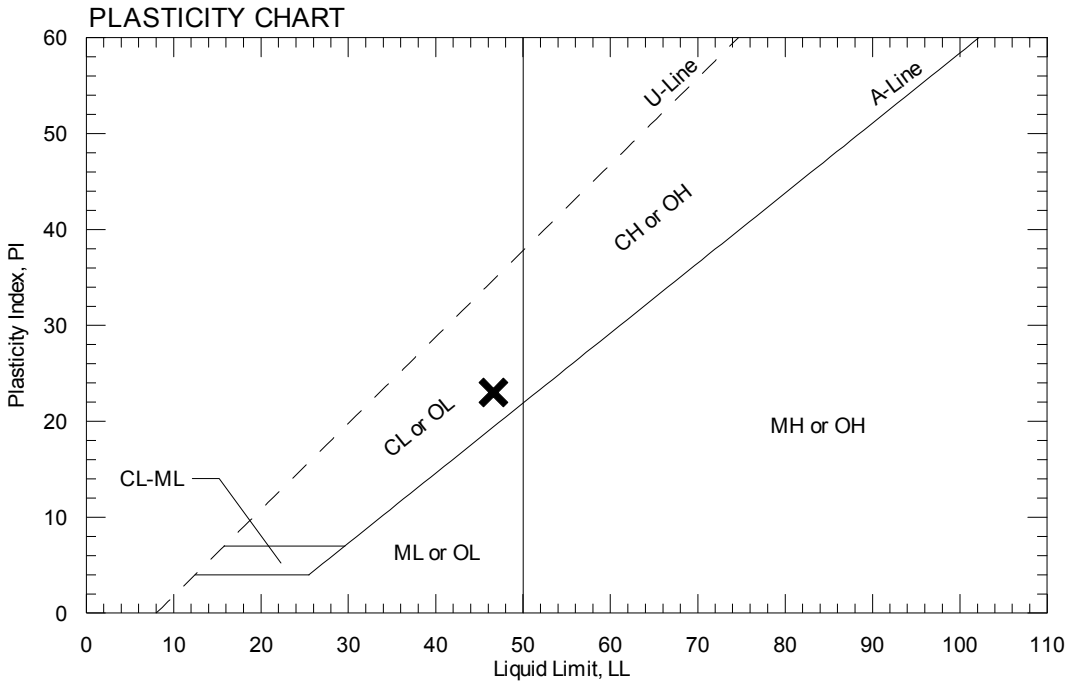
TOWN	Dennysville,Pembroke,Whiting	Reference No.	237497
PIN	017774.00	Water Content, %	23
Sampled	5/17/2010	Plastic Limit	24
Boring No./Sample No.	HB-PEMB-108/S9	Liquid Limit	47
Station	82+50	Plasticity Index	23
Depth	2.3-5.0	Tested By	KDRES





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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237498	**HB-PEMB-111/S10**	**GEOTECHNICAL (DISTURBED)**	**5/17/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **101+00** Offset, ft: **8.0** **RT** Dbfg, ft: **0.3-2.4**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**97.2**
½ in. [12.5 mm]	**85.9**
⅜ in. [9.5 mm]	**81.6**
¼ in. [6.3 mm]	**72.0**
No. 4 [4.75 mm]	**66.3**
No. 10 [2.00 mm]	**53.0**
No. 20 [0.850 mm]	**40.2**
No. 40 [0.425 mm]	**30.9**
No. 60 [0.250 mm]	**25.4**
No. 100 [0.150 mm]	**20.9**
No. 200 [0.075 mm]	**15.4**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %
Plastic Limit (T 90), %
Plasticity Index (T 90), %
Specific Gravity, Corrected to 20°C (T 100)
Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %
5.7

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/1/2010**

Paper Copy: Lab File; Project File; Geotech File

Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237499	**HB-PEMB-111/S11**	**GEOTECHNICAL (DISTURBED)**	**5/17/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **101+00** Offset, ft: **8.0** **RT** Dbfg, ft: **2.4-5.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	
½ in. [12.5 mm]	
⅜ in. [9.5 mm]	**100.0**
¼ in. [6.3 mm]	**99.9**
No. 4 [4.75 mm]	**99.7**
No. 10 [2.00 mm]	**99.1**
No. 20 [0.850 mm]	**98.1**
No. 40 [0.425 mm]	**97.1**
No. 60 [0.250 mm]	**96.1**
No. 100 [0.150 mm]	**92.7**
No. 200 [0.075 mm]	**87.8**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %
44
Plastic Limit (T 90), %
21
Plasticity Index (T 90), %
23
Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

20.2

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/3/2010**

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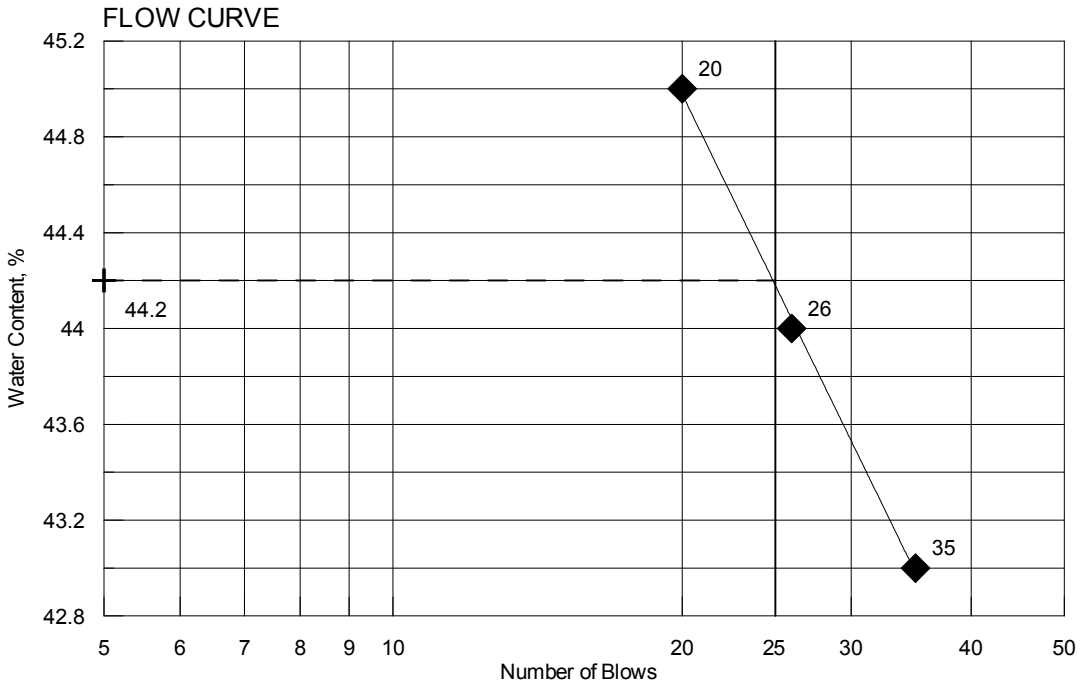
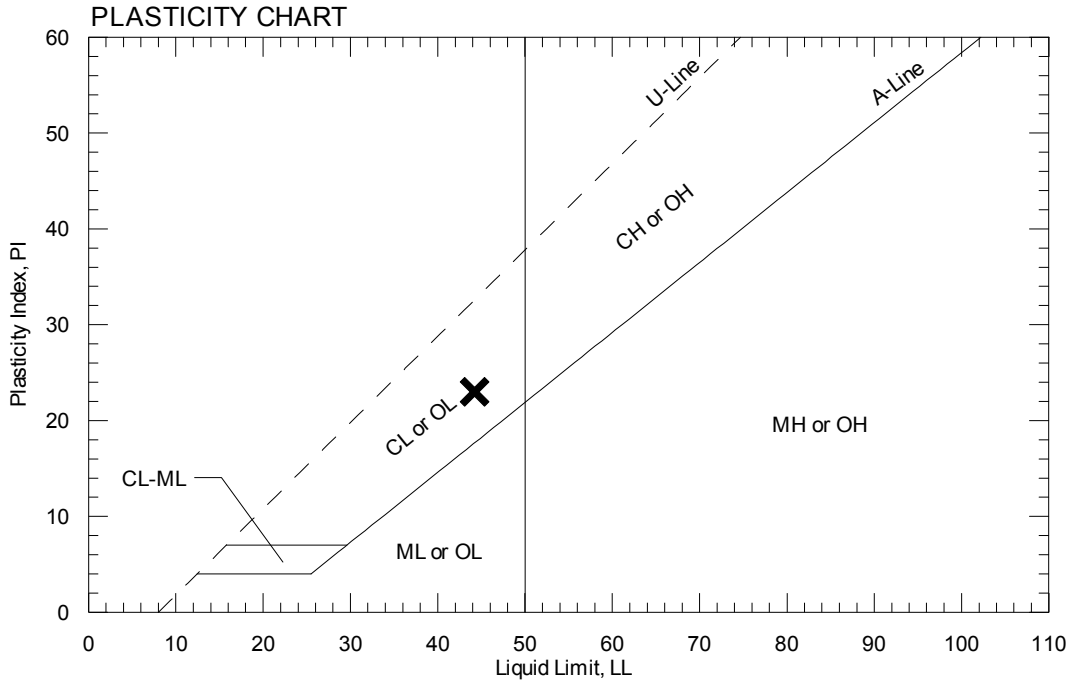
TOWN	Dennysville,Pembroke,Whiting	Reference No.	237499
PIN	017774.00	Water Content, %	20.2
Sampled	5/17/2010	Plastic Limit	21
Boring No./Sample No.	HB-PEMB-111/S11	Liquid Limit	44
Station	101+00	Plasticity Index	23
Depth	2.4-5.0	Tested By	KDRES





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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237500	**HB-PEMB-113/S12**	**GEOTECHNICAL (DISTURBED)**	**5/18/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **114+00** Offset, ft: **7.5** **RT** Dbfg, ft: **0.25-2.1**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**93.8**
½ in. [12.5 mm]	**84.1**
⅜ in. [9.5 mm]	**80.0**
¼ in. [6.3 mm]	**71.0**
No. 4 [4.75 mm]	**65.0**
No. 10 [2.00 mm]	**51.7**
No. 20 [0.850 mm]	**40.4**
No. 40 [0.425 mm]	**31.1**
No. 60 [0.250 mm]	**24.3**
No. 100 [0.150 mm]	**18.7**
No. 200 [0.075 mm]	**13.7**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

4.9

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/1/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237526	**HB-PEMB-113/S13**	**GEOTECHNICAL (DISTURBED)**	**5/18/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **114+00** Offset, ft: **7.5** **RT** Dbfg, ft: **2.1-5.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**96.3**
½ in. [12.5 mm]	**91.3**
⅜ in. [9.5 mm]	**87.5**
¼ in. [6.3 mm]	**81.4**
No. 4 [4.75 mm]	**77.2**
No. 10 [2.00 mm]	**65.4**
No. 20 [0.850 mm]	**55.3**
No. 40 [0.425 mm]	**47.0**
No. 60 [0.250 mm]	**40.5**
No. 100 [0.150 mm]	**34.2**
No. 200 [0.075 mm]	**26.1**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

1.0

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

WHITING

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/1/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
237527	**HB-PEMB-115/S14**	**GEOTECHNICAL (DISTURBED)**	**5/17/2010**	**5/19/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **129+00** Offset, ft: **8.0** **RT** Dbfg, ft: **2.1-5.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**98.1**
⅜ in. [9.5 mm]	**98.1**
¼ in. [6.3 mm]	**96.7**
No. 4 [4.75 mm]	**96.2**
No. 10 [2.00 mm]	**93.9**
No. 20 [0.850 mm]	**91.4**
No. 40 [0.425 mm]	**88.9**
No. 60 [0.250 mm]	**86.7**
No. 100 [0.150 mm]	**83.6**
No. 200 [0.075 mm]	**78.1**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %
35
Plastic Limit (T 90), %
20
Plasticity Index (T 90), %
15
Specific Gravity, Corrected to 20°C (T 100)
Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %
22.3

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/2/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
238249	**TP-1/S3**	**GEOTECHNICAL (DISTURBED)**	**4/26/2010**	**4/27/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **50+70** Offset, ft: **14.0** **LT** Dbfg, ft: **0.17-2.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **FORZETTING, CARMEN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	**100.0**
1 in. [25.0 mm]	**88.9**
¾ in. [19.0 mm]	**81.5**
½ in. [12.5 mm]	**73.2**
⅜ in. [9.5 mm]	**68.8**
¼ in. [6.3 mm]	**63.0**
No. 4 [4.75 mm]	**58.4**
No. 10 [2.00 mm]	**44.9**
No. 20 [0.850 mm]	**29.7**
No. 40 [0.425 mm]	**17.3**
No. 60 [0.250 mm]	**10.8**
No. 100 [0.150 mm]	**7.1**
No. 200 [0.075 mm]	**4.7**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

0.6

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **5/6/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
238247	**TP-2/S1**	**GEOTECHNICAL (DISTURBED)**	**4/26/2010**	**4/27/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **50+70** Offset, ft: **14.0** **RT** Dbfg, ft: **2.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **FORZETTING, CARMEN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**96.7**
⅜ in. [9.5 mm]	**96.1**
¼ in. [6.3 mm]	**94.3**
No. 4 [4.75 mm]	**93.6**
No. 10 [2.00 mm]	**91.7**
No. 20 [0.850 mm]	**89.4**
No. 40 [0.425 mm]	**87.4**
No. 60 [0.250 mm]	**86.1**
No. 100 [0.150 mm]	**84.0**
No. 200 [0.075 mm]	**79.6**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

24.2

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **5/3/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
238248	**TP-2/S2**	**GEOTECHNICAL (DISTURBED)**	**4/26/2010**	**4/27/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **50+70** Offset, ft: **14.0** **RT** Dbfg, ft: **0.17-2.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **FORZETTING, CARMEN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	**91.9**
1 in. [25.0 mm]	**80.2**
¾ in. [19.0 mm]	**78.4**
½ in. [12.5 mm]	**72.5**
⅜ in. [9.5 mm]	**67.7**
¼ in. [6.3 mm]	**61.3**
No. 4 [4.75 mm]	**56.6**
No. 10 [2.00 mm]	**43.6**
No. 20 [0.850 mm]	**29.9**
No. 40 [0.425 mm]	**20.0**
No. 60 [0.250 mm]	**14.6**
No. 100 [0.150 mm]	**11.0**
No. 200 [0.075 mm]	**8.2**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

1.3

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **5/6/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
238210	**TP-3/S5**	**GEOTECHNICAL (DISTURBED)**	**4/26/2010**	**4/27/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **84+60** Offset, ft: **14.0** **LT** Dbfg, ft: **2.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **FORZETTING, CARMEN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**92.0**
⅜ in. [9.5 mm]	**89.4**
¼ in. [6.3 mm]	**84.1**
No. 4 [4.75 mm]	**80.8**
No. 10 [2.00 mm]	**70.2**
No. 20 [0.850 mm]	**59.2**
No. 40 [0.425 mm]	**50.7**
No. 60 [0.250 mm]	**45.4**
No. 100 [0.150 mm]	**39.8**
No. 200 [0.075 mm]	**32.5**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

20.1

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **5/3/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
238211	**TP-3/S6**	**GEOTECHNICAL (DISTURBED)**	**4/26/2010**	**4/27/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **84+60** Offset, ft: **14.0** **LT** Dbfg, ft: **0.17-2.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **FORZETTING, CARMEN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	**100.0**
1 in. [25.0 mm]	**84.7**
¾ in. [19.0 mm]	**77.8**
½ in. [12.5 mm]	**69.6**
⅜ in. [9.5 mm]	**67.1**
¼ in. [6.3 mm]	**63.3**
No. 4 [4.75 mm]	**60.0**
No. 10 [2.00 mm]	**49.5**
No. 20 [0.850 mm]	**37.1**
No. 40 [0.425 mm]	**26.5**
No. 60 [0.250 mm]	**20.2**
No. 100 [0.150 mm]	**15.7**
No. 200 [0.075 mm]	**11.6**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %
Plastic Limit (T 90), %
Plasticity Index (T 90), %
Specific Gravity, Corrected to 20°C (T 100)
Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %
1.6

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **5/6/2010**

Paper Copy: Lab File; Project File; Geotech File

Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
238250	**TP-4/S4**	**GEOTECHNICAL (DISTURBED)**	**4/26/2010**	**4/27/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **84+60** Offset, ft: **14.0** **RT** Dbfg, ft: **0.17-2.0**

PIN: **017774.00** Town: **Dennysville,Pembroke,Whiting** Sampler: **FORZETTING, CARMEN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	**100.0**
1 in. [25.0 mm]	**85.6**
¾ in. [19.0 mm]	**81.5**
½ in. [12.5 mm]	**75.5**
⅜ in. [9.5 mm]	**69.0**
¼ in. [6.3 mm]	**62.3**
No. 4 [4.75 mm]	**58.4**
No. 10 [2.00 mm]	**45.7**
No. 20 [0.850 mm]	**32.1**
No. 40 [0.425 mm]	**21.5**
No. 60 [0.250 mm]	**15.6**
No. 100 [0.150 mm]	**11.6**
No. 200 [0.075 mm]	**8.2**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

1.4

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

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