Maine Department of Transportation
Highway Program

GEOTECHNICAL SERIES 100 REPORT

Route 137
Waldo – Belfast, Maine

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Waldo County

PIN 17716.00
Federal Number STP-1771(600)X
March 30, 2010

Soils Report 2010-105

Highway Program

Brad Foley, Program Manager

Memorandum

DATE: March 30, 2010

TO: Shawn Smith **DEPT:** Region 2

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

SUBJECT: Final Soils – Belfast-Waldo Route 137, 17716.00
Report # 2010-105

Site Description

A subsurface investigation has been completed for a 6.2 mile portion of Route 137 in the towns of Waldo and Belfast. The project begins at the junction of Route 137 and Route 131 in the town of Waldo and extends 6.2 miles southeast to the junction of Marsh Road in Belfast.

The investigation included the use of a drill rig and falling weight deflectometer (FWD). Stationing for subsurface explorations was recorded using a distance measuring instrument (DMI). A beginning station of 180+00 was used for the intersection of Route 137 and Route 131.

FWD Results

A summary of the FWD results are included as a separate attachment to this memo. Eighty-Six percent of the project was found to be deficient based upon the existing structural number being less than the future traffic structural number. The subgrade resilient modulus values range between 2857 psi and 9886 psi (shallow rock) with an average value of 4689 psi. The 75^{th} percentile is 5073 psi. A very low (< 3000 psi) subgrade resilient modulus value was encountered at stations 369+34 and 436+40 (See FWD Summary Sheet and Performance Data Summary Sheet). The low subgrade resilient modulus is likely due to the presence of moist to wet silty soils. These areas could be very soft especially during the spring months. Depending on the conditions at the time of construction the use of additional base material may be necessary to support traffic once the existing pavement surface has been removed. Construction operations should take this into consideration.

Note: The FWD results provided in this report have been calculated using the existing pavement thickness, base thickness and base quality as determined from boring information and sample data. The purpose of using the existing pavement and base information is to determine the relative strength or weakness of the existing pavement structure over the length of the project. By identifying significant disparities in the pavement structure, individual design/construction options can be considered if these areas extend for considerable distances. This can potentially provide greater design flexibility and reduce costs by eliminating the over design or under design of large portions of a project. See the attached FWD data and Performance Data Summary for potential performance differences.

Boring Information

A total of 14 power augers borings were conducted along the project (See Boring Logs). Boring locations were determined based upon FWD deflection results and visual observations made during an on-site visit. Soils were described and sampled in the field. Samples of the existing base material and subgrade soils were collected and analyzed in the Bangor lab. Testing results are summarized on the attached Laboratory Testing Summary Sheet.

Pavement Conditions

Pavement conditions are fair to good. However, power auger borings encountered an unbound or highly friable "unbound pavement" layer beneath a solid pavement layer. For a complete listing of pavement measurements refer to boring logs or Performance Data Summary included with this memo. A pavement thickness summary follows:

Range of Solid Pavement (SP) Thickness:	3.6" – 4.8"
Average Solid Pavement Thickness:	4.2"
Range of Unbound Pavement UP) Thickness:	3.0" – 4.8"
Average Unbound Pavement Thickness:	3.8"
Range of Combined (SP+UP) Pavement Thickness:	4.8" – 8.4"
Average Combined Pavement Thickness:	7.2"

Note: Pavement thickness estimates are based upon 14 sample locations. Measurements were taken from sides of boring holes. The maximum sample spacing is 3800 feet. Actual pavement thickness may vary.

Existing Base Material

Existing Base Material Type:	Gravelly Silty Sand
Percent Passing #200:	24% - 31%
Range of Base Material Thickness:	7" – 51"
Quality of Drainage (AASHTO):	Poor
Permeability:	0.4' – 0.9' per day

The existing base generally consists of gravelly silty sand (granular borrow). Because of the high percentage of fines the quality of drainage is poor. An estimated permeability range of 0.4 - 0.9 feet/day has been calculated based upon grain size distribution data obtained from existing base samples. The poor 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.

Subgrade Soils

The subgrade soils underlying this project consist primarily of moist to wet stony sandy silts (till), and moist to wet clay silts (glacial marine). The till soils are very stony and are generally located along the higher elevation areas. Boulders greater than 2 cubic yards could be encountered. The glacial marine soils are extremely silty and are generally located in lower lying areas.

Sandy Silt (Till): The stony sandy silts along the project are represented by samples S2, S4, and S8. This material has 51% - 68 % passing the # 200 sieve. These soils are classified (AASHTO) as an A-4 soil. These soils are highly frost susceptible. These soils are not well drained and will swell and lose much of their stability unless properly compacted and drained. These soils were found to be wet in the vicinity of stations 271+66 and 287+71.

Clay Silt (Glacial Marine): The clay silt soils (S6, S12, S14) have 71% - 97% fines passing the #200 sieve. These soils are classified (AASHTO) as A-4 and A-7-5 soils. It is anticipated that these soils will be plastic and subject to considerable volume change with changing water content. These soils will lose much of their stability unless properly compacted and 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, 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 into the early summer months. These soils can be very soft in the spring and should be drained early in the construction process. A low subgrade resilient modulus was encountered in the vicinity of station 369+34. 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.

A summary of the anticipated subgrade soils is listed below 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	Subgrade Modulus x1000	Ave. RM x1000
180+00 – 230+00	SaSi (Till)	A-4 / ML	S2, S4	51-68	4.2 – 6.4	5.1
230+00 – 258+00	ClSi	A-7-5 / CL-ML	S6	97	3.7 – 4.5	4.0
258+00 – 277+00	SaSi (Till)	A-4 / ML	S8	59	4.2 – 4.6	4.4
277+00 – 282+00	SaSi (Till)/Rock	A-4 / ML	S8	59	5.0	5.0
282+00 – 287+00	SaSi	A-4 / ML	S8	59	4.8	4.8
287+00 – 300+00	SaSi (Till)/Rock	A-4 / ML	S8	59	4.9 – 9.8	7.2
300+00 – 323+00	ClSi	A-4 / CL-ML	S12	71	3.7 – 4.1	3.9
323+00 – 328+00	SaSi (Till)	A-4 / ML	S8	59	4.8	4.8
328+00 – 342+00	SaSi (Till)/Rock	A-4 / ML	S8	59	5.3 – 5.9	5.6
342+00 – 351+00	ClSi	A-7-5 / CL-ML	S14	89		
351+00 – 356+00	SaSi (Till)/Rock	A-4 / ML	S8	59	6.2	6.2
356+00 – 436+00	ClSi	A-7-5 / CL-ML	S14	89	2.8 – 4.6	3.9
436+00 – 507+00	SaSi (Till)	A-2-4 / SM	S15, S17	49	3.4 – 5.5	4.5

Bedrock

It is anticipated that bedrock could be encountered at several locations depending on the proposed vertical grade. At the time of the borings and this report no proposed vertical grade information was available.

Table II.
Possible Shallow Bedrock Areas (<6')

Station	Source of Information
277+00 – 282+00	FWD/Bedrock Outcrops Outcrops present left and right between stations 279+00 – 282+00
288+00 – 294+00	FWD/Boring/Bedrock Outcrops Outcrops present left and right between stations 289+00 – 292+00.
328+00 – 332+00	FWD/Boring/Possible Bedrock Outcrops Possible Outcrops present left and right between stations 328+50 – 330+00. Some of the exposed rock could be large boulders.
337+50 – 340+00	FWD/ Field Observations
351+00 – 354+00 ?	FWD?/Field Observations ? (< 10')
443+00 – 444+00	FWD?/Possible outcrop on right between stations 443+00 – 444+00
499+50 – 500+50	Possible outcrop on right between stations 499+50 – 500+50

Artificially high subgrade resilient modulus values are common in shallow bedrock areas. Contrary to these high values, the pavement structure in shallow bedrock areas have a propensity to be weak due to several factors including limited base thickness, underlying frost susceptible soils, and moist to wet subgrade conditions. Many times, water becomes trapped along the bedrock surface weakening the overlying soils and pavement structure. It is critical that these possible shallow bedrock areas be well drained. An abundance of water was observed along the right shoulder between stations 288+00 and 294+00.

Depending on the vertical grade, bedrock could be encountered above subgrade within the areas listed above. Because of this, differential heaving could become problematic when entering or exiting shallow bedrock areas. Transition zones should be included in the design if bedrock is anticipated in the vicinity of subgrade. (See transition zone schematic in the Recommendation 7).

Recommendations

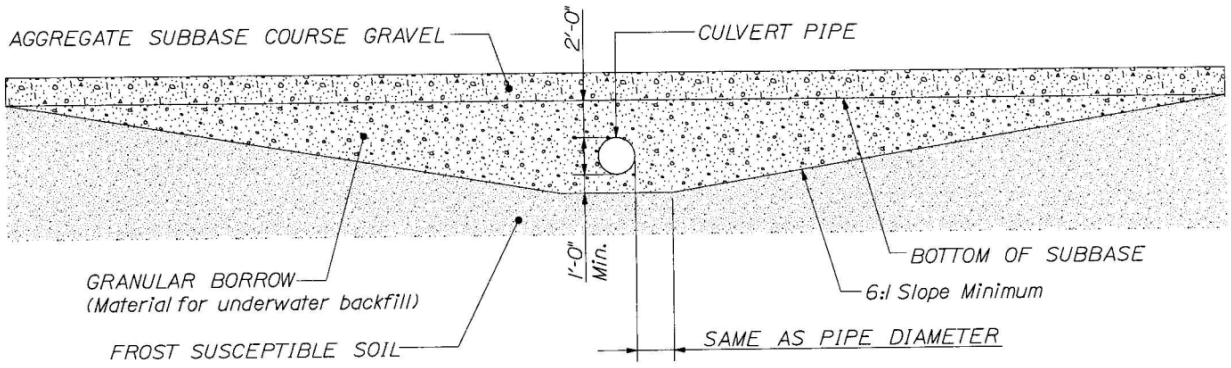
1. Due to the presence of moisture sensitive clay silt subgrade soils, poor existing base quality, and varying base thickness, rebasing and/or variable depth gravel placement is recommended throughout the entire length of this project. A minimum of 18 inches of base material (existing and/or new) is recommended within any area being constructed on clay silt soils.

2. If new base material is to be placed directly upon the clay silt, a 6 once, non-woven, needle punched separation geotextile could be placed at subgrade to prevent the intermixing of the base layer with the underlying claysilt subgrade layer.

3. The moist to wet sandy silts and clay silts 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. The new pavement surface should be placed as soon as possible. The areas of greatest concern are those where clay silt is anticipated to be the subgrade soil type (See Anticipated Subgrade Soil, Table I).

4. It is recommended that the entire project area be well drained utilizing deep ditching. Ditches should be constructed with a minimum depth of 3 feet below finished grade when possible. Deep ditching is most critical where clay silt soils are present at subgrade in order to draw down the water table (See Anticipated Subgrade Soil, Table I).

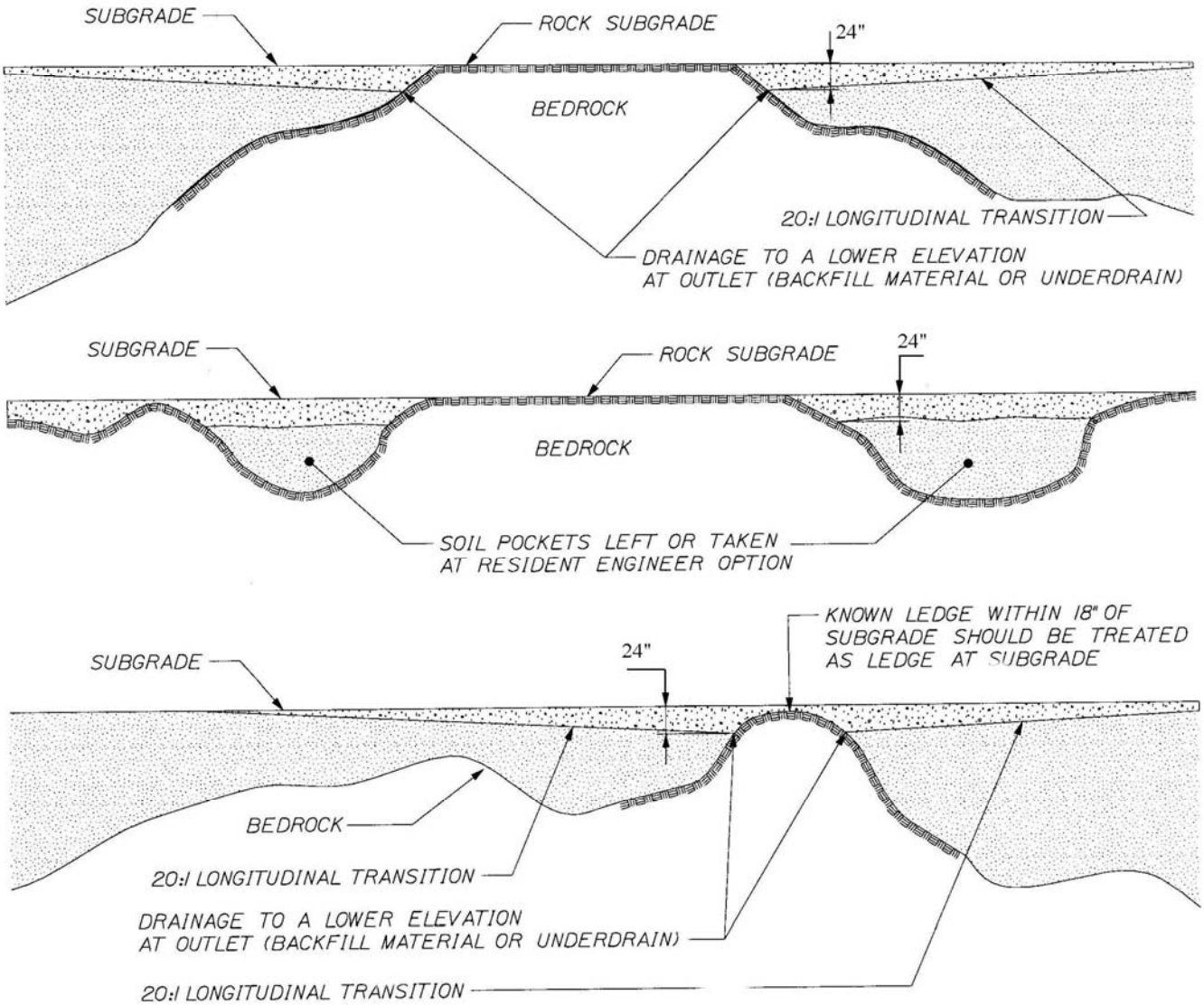
5. It is recommended that all cross pipes be lowered to allow for an adequate ditching depth. Cross pipes should be installed based upon the following design schematic:



6. When till soils are encountered at subgrade, it is recommended that subgrade be scarified a minimum depth of 6 inches to dislodged and remove shallow cobbles that could potentially be pushed into the base member due to frost action. See Table I for a listing of till soil areas.

7. Shallow bedrock is present in several areas. Depending on the elevation of the proposed vertical grade bedrock could be encountered at or above subgrade (See Table II). 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



FROST SUSCEPTIBLE SOIL TO BE UNDERCUT AND REPLACED WITH NON FROST SUSCEPTIBLE MATERIAL

IF A SOIL SECTION BETWEEN LEDGE SUBGRADE IS OF SUCH LENGTH THAT THE TRANSITION FROM EACH EDGE WOULD MEET, IT SHOULD BE TREATED AS AN EARTH POCKET

Performance Data Summary Sheet

Belfast – Waldo Route 137
CHIP
17716.00

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. Existing performance expectations for areas with two or more deficiencies are lower and the risk of failure is potentially higher.

Based upon the Performance Data Summary (PDS) sheet, 32% of the project fails to meet 2 or more of the four minimum performance data criteria. Unbound pavement, base quality, subgrade soil conditions, and the lack of drainage are all concerns with respect to future performance expectations.

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

Performance Data Summary Sheet

Belfast – Waldo Route 137
CHIP
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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				
182+11	1	Pavement Thickness (4 inches)	Base Thickness (18 inches)	Subgrade Modulus (3000 psi)	Structural Number					
189+77	1									
197+69	1					3.6 SP 3.6 UP 28.8	GSiSa A-1-b S1	24 II Moist	GSaSi A-4 S2	51 IV Moist
205+87	1									
211+05	1									
219+07	1					3.6 SP 3.6 UP 19.2	GSiSa A-2-4 S3	31 II Moist	SaSi A-4 S4	68 IV Moist
226+89	2									
234+01	2									
242+52	1					4.2 SP 3.0 UP 21.6	GSiSa A-2-4 S5	28 II Moist	ClSi A-7-5 S6	97 IV Moist
249+00	2									
250+49	2									
257+00	1									
258+67	1									
260+00	2									
263+90	2					4.2 SP 3.0 UP 7.2	GSiSa A-2-4 S7	29 II Moist	SaSi A-4 S8	59 IV Moist
271+66	2					5.4 SP - 7.8	GSiSa A-2-4 S7	29 II Moist	SaSi A-4 S8	59 IV Wet@2.5’
279+79	2									
282+00	2									
287+71	1					4.8 SP - 50.4	GSiSa A-2-4 S10	29 II Moist	GSiSa A-2-4 S10	29 Wet@4.0’ Ref@4.6’
295+63	0									Bedrock
300+00	1									

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SP+UP = Total Pavement Thickness
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Performance Data Summary Sheet

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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				
303+50	1	Pavement Thickness (4 inches)	Base Thickness (18 inches)	Subgrade Modulus (3000 psi)	Structural Number	4.2 SP 3.0 UP 34.8	GSiSa A-2-4 S11	28 II Moist	ClSi A-7-5 S12	
311+42	1									
316+75	1									
323+51	1									
332+33	0					4.8 SP - 25.2	GSiSa A-2-4 S11	28 II Moist	Bedrock Refusal @ 2.5'	
340+51	0									
348+43	0									
356+30	1									
363+90	2									
369+34	3					3.6 SP 4.8 UP 27.6	GSiSa A-2-4 S11	28 II Moist	ClSi A-7-5 S14	89 IV Moist
376+73	2									
385+39	0					4.2 SP 4.2 UP 27.6	GSiSa A-2-4 S11	28 II Moist	ClSi A-7-5 S14	89 IV Moist
390+00	1									
393+10	1									
401+23	0					4.8 SP 3.6 UP 26.4	GSiSa A-2-4 S15	25 II Moist	ClSi A-7-5 S14	89 IV Moist
409+10	1									
420+77	1									
428+64	1									
430+00	2									
436+40	2					4.2 SP 4.2 UP 33.6	GSiSa A-2-4 S15	25 II Moist	GSiSa A-2-4 S15	25 II Moist
444+53	1									
452+45	1									

* SP = Solid Pavement Layer
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SP+UP = Total Pavement Thickness
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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
		Pavement Thickness (4 inches)	Base Thickness (18 inches)	Subgrade Modulus (3000 psi)	Structural Number	**CL**				
457+73	1									
465+65	1									
473+00	2									
474+57	2					3.6 SP 4.8 UP 51.6	GSiSa A-2-4 S15	25 II Moist	GSiSa A-2-4 S15	25 II Moist
481+49	2									
489+41	2									
495+00	1									
497+28	1									
505+25	1					4.2 SP 4.2 UP 27.6	GSiSa A-1-b S16	26 II Moist	SiSa A-4 S17	49 IV Moist

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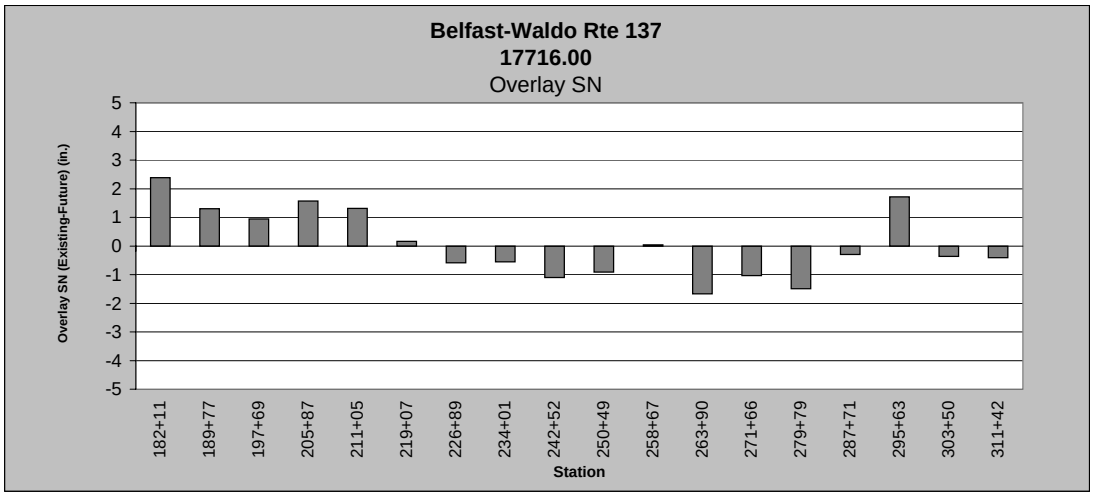
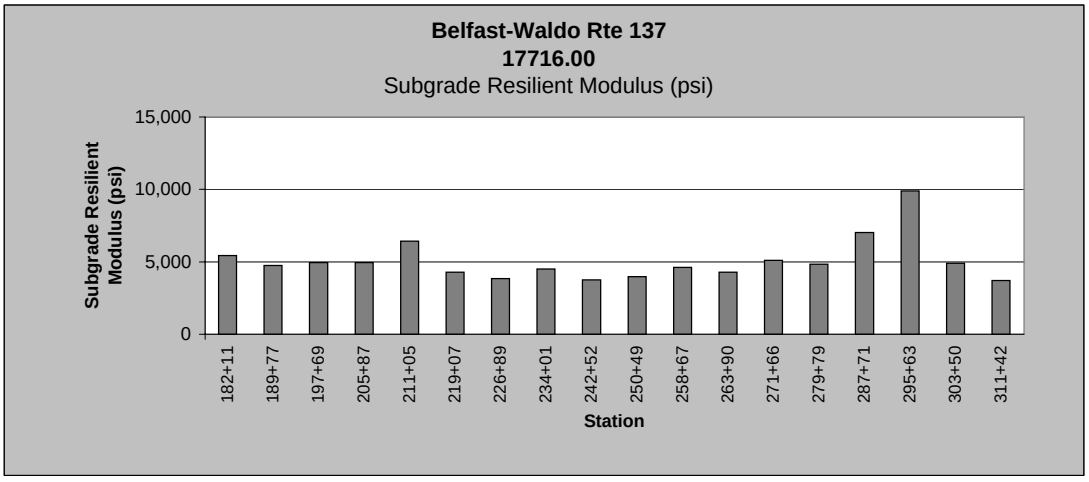
Belfast-Waldo Route 137
17716.00

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)
182+11	6.09	3.71	2.38	-	126,000	5,438	3.6	27
189+77	5.19	3.89	1.3	-	77,869	4,754	3.6	27
197+69	4.77	3.83	0.94	-	60,341	4,943	3.6	27
205+87	5.4	3.83	1.57	-	87,784	4,943	3.6	27
211+05	4.8	3.49	1.31	-	61,550	6,421	3.6	27
219+07	4.19	4.03	0.16	-	164,039	4,286	3.6	17
226+89	3.59	4.18	**-0.59**	**1.34**	102,952	3,833	3.6	17
234+01	3.41	3.96	**-0.55**	**1.25**	88,756	4,508	3.6	17
242+52	3.11	4.21	**-1.1**	**2.5**	56,767	3,750	4.2	18
250+49	3.22	4.13	**-0.91**	**2.07**	62,754	3,985	4.2	18
258+67	3.96	3.92	0.04	-	116,968	4,628	4.2	18
263+90	2.36	4.03	**-1.67**	**3.8**	108,339	4,280	4.8	11
271+66	2.76	3.79	**-1.03**	**2.34**	317,657	5,095	5.4	9
279+79	2.37	3.86	**-1.49**	**3.39**	199,723	4,827	5.4	9
287+71	3.09	3.39	**-0.3**	**0.68**	147,097	7,016	5.4	13
295+63	4.7	2.99	1.71	-	195,682	9,886	4.2	18
303+50	3.48	3.84	**-0.36**	**0.82**	79,342	4,906	4.2	18
311+42	3.82	4.23	**-0.41**	**0.93**	105,128	3,718	4.2	18

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



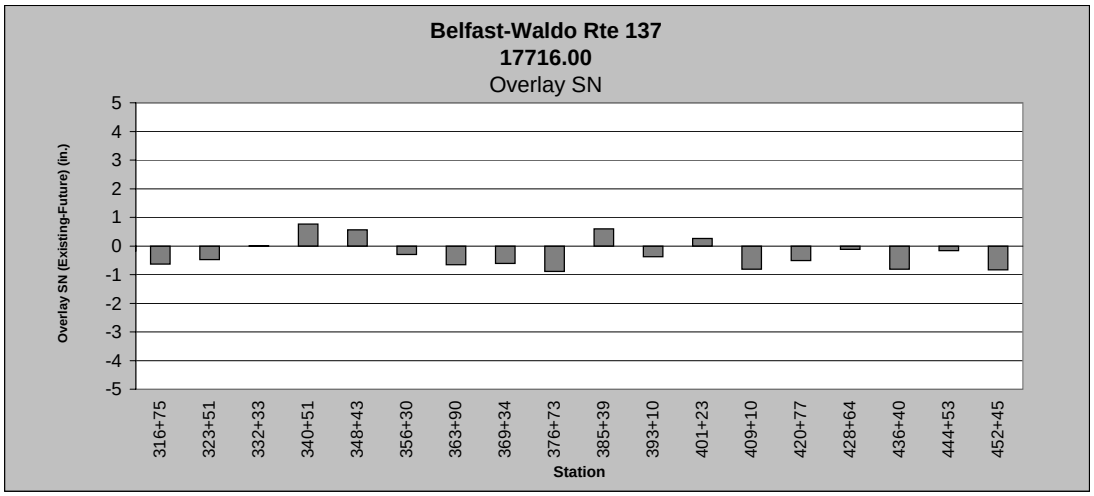


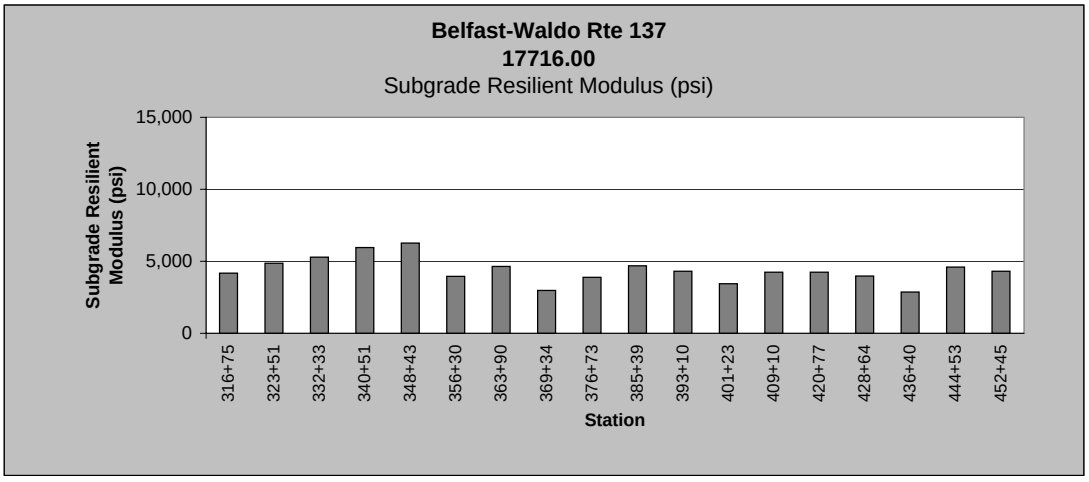
Belfast-Waldo Route 137
17716.00

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)
316+75	3.43	4.06	**-0.63**	**1.43**	76,259	4,173	4.2	18
323+51	3.37	3.85	**-0.48**	**1.09**	71,933	4,874	4.2	18
332+33	3.75	3.74	0.01	-	99,128	5,294	4.2	18
340+51	4.36	3.59	0.77	-	132,329	5,959	3.6	19
348+43	4.09	3.53	0.56	-	109,856	6,259	3.6	19
356+30	3.84	4.14	**-0.3**	**0.68**	90,273	3,955	3.6	19
363+90	3.26	3.91	**-0.65**	**1.48**	55,508	4,652	3.6	19
369+34	3.94	4.55	**-0.61**	**1.39**	98,089	2,969	3.6	19
376+73	3.27	4.16	**-0.89**	**2.02**	55,714	3,884	3.6	19
385+39	4.5	3.9	0.6	-	145,553	4,690	4.2	19
393+10	3.65	4.02	**-0.37**	**0.84**	77,568	4,318	4.2	19
401+23	4.59	4.33	0.26	-	154,762	3,452	4.8	19
409+10	3.23	4.04	**-0.81**	**1.84**	53,723	4,234	4.8	19
420+77	3.71	4.22	**-0.51**	**1.16**	81,951	4,244	4.8	19
428+64	4.19	4.31	**-0.12**	**0.27**	118,082	3,973	4.8	19
436+40	4	4.81	**-0.81**	**1.84**	102,365	2,857	4.2	19
444+53	3.95	4.11	**-0.16**	**0.36**	98,470	4,591	4.2	19
452+45	3.37	4.2	**-0.83**	**1.89**	61,188	4,307	4.2	19

Possible Weak Soils (<3000)
Possible Shallow Bedrock (>8000)

For actual Gravel Depths, see logdraft forms





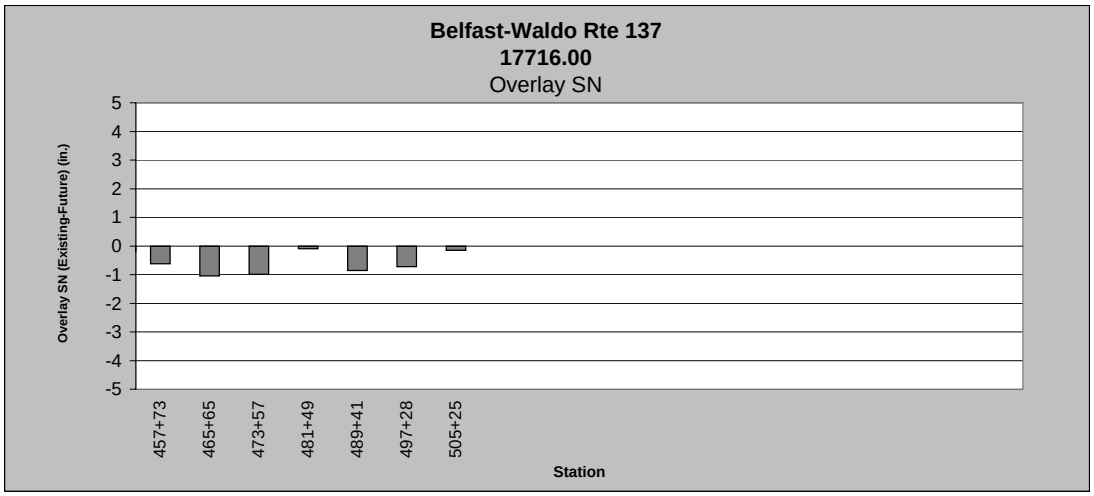
Belfast-Waldo Route 137
17716.00

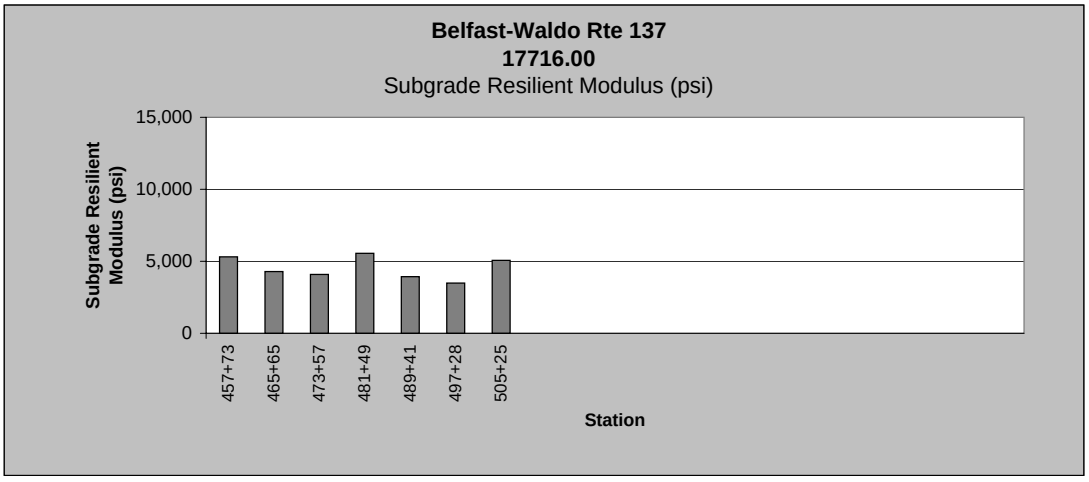
Station (Feet)	Existing Structural Number (in.)	Future Traffic Structural Number (in.)	Overlay Structural Number (Existing - Future)	Recommended Pavement Thickness (in.)	Pavement Modulus (psi)	Subgrade Resilient Modulus (psi)	Pavement Depth (in)	Combined Pavement/Gravel Depth Used for Calculation (in)
457+73	3.29	3.91	**-0.62**	**1.41**	56,823	5,316	4.2	19
465+65	3.16	4.2	**-1.04**	**2.36**	50,477	4,293	4.2	19
473+57	3.28	4.27	**-0.99**	**2.25**	56,338	4,085	3.6	19
481+49	3.75	3.85	**-0.1**	**0.23**	84,064	5,553	3.6	19
489+41	3.47	4.33	**-0.86**	**1.95**	66,616	3,943	3.6	19
497+28	3.79	4.51	**-0.72**	**1.64**	87,360	3,480	3.6	19
505+25	3.82	3.97	**-0.15**	**0.34**	89,038	5,073	4.2	19

Possible Weak Soils (<3000)

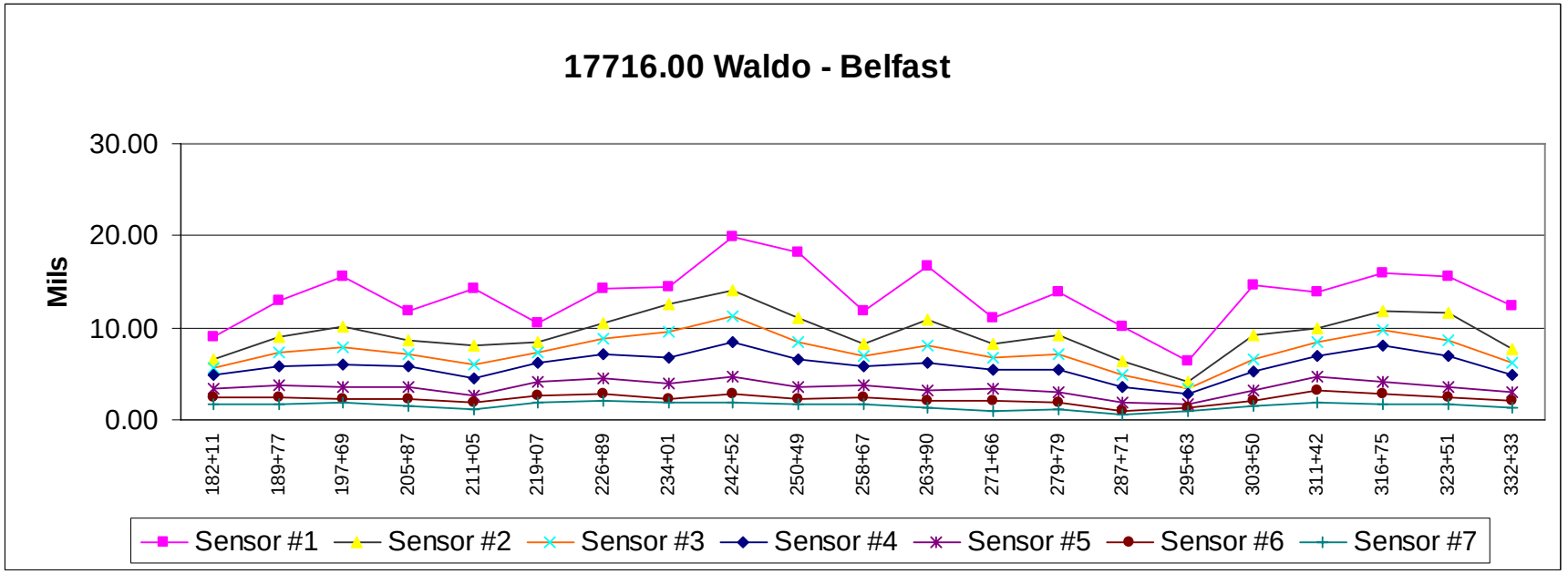
Possible Shallow Bedrock (>8000)

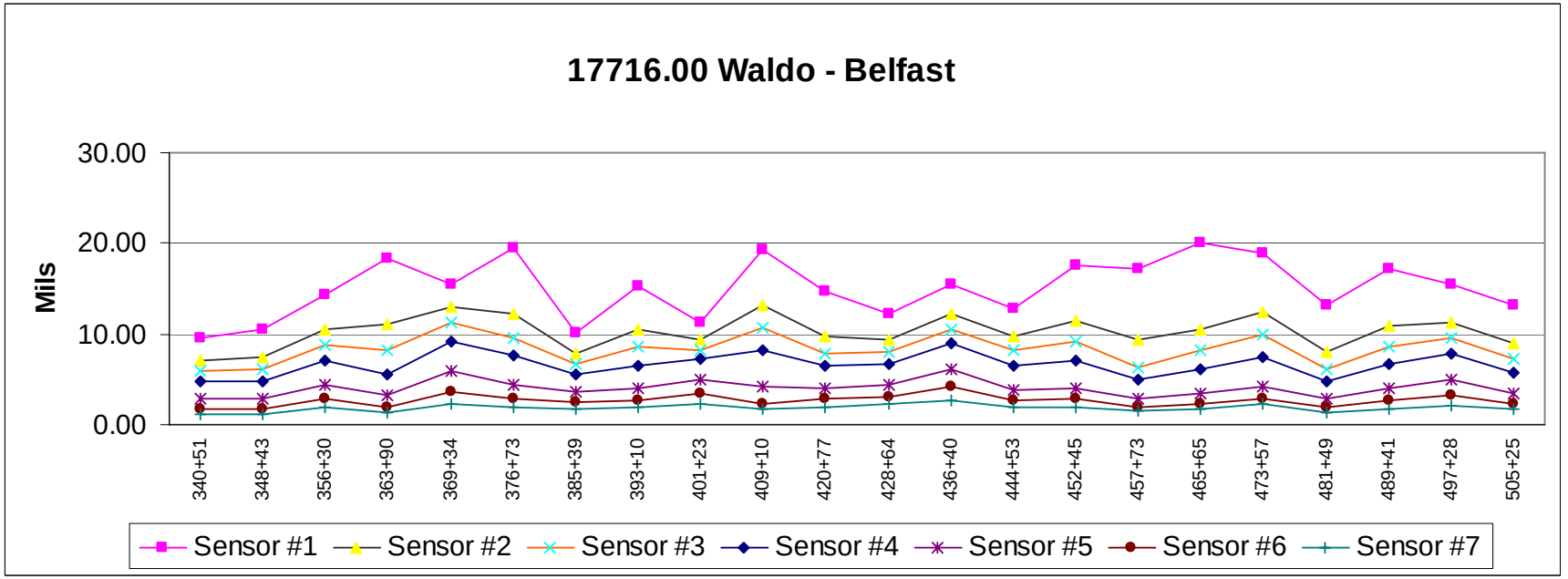
For actual Gravel Depths, see logdraft forms





FWD Deflection Plots





Existing Pavement/Base Conditions Worksheet

Town: Waldo - Belfast Route 137

Pin: 17716.00

Key		
A-1-a		100%
A-1-b		85%
A-2-4		50%
A-4		25%

SiSaG	Silty Sandy Gravel
SiGSa	Silty Gravelly Sand
GSiSa	Gravelly Si Sand
SiSa	Silty Sandy
SaSi	Sandy Silt

Boring Data		**Base and Thickness Calculations**								**FWD Base and Asphalt Calculations**		
Power Auger #	FWD Station	Soil Description	Classification	Pave + Base	Base	% Weight	Wt. Base Thickness	Unbound Thickness	Asphalt Thickness	Total Base (WtB+UP)	Asphalt (SP)	Total Thickness
HB-WABE-101	196+00	GSiSa	A-1-b	30	22.8	0.85	19.4	3.6	3.6 SP	23	3.6	**26.6**
									3.6 UP			
									7.2			
HB-WABE-102	215+00	GSiSa	A-2-4	26.4	19.2	0.5	9.6	3.6	3.6 SP	13.2	3.6	**16.8**
									3.6 UP			
									7.2			
HB-WABE-103	239+00	GSiSa	A-2-4	28.8	21.6	0.5	10.8	3.0	4.2 SP	13.8	4.2	**18**
									3.0 UP			
									7.2			
HB-WABE-104	265+00	GSiSa	A-2-4	14.4	7.2	0.5	3.6	3.0	4.2 SP	6.6	4.8	**11.4**
									3.0 UP			
									7.2			
HB-WABE-105	273+50	GSiSa	A-2-4	13.2	7.8	0.5	3.9		**5.4 SP**	3.9	5.4	**9.3**
HB-WABE-106	291+00	SiGSa	A-2-4	30	25.2	0.5	12.6		**4.8 SP**	12.6		**12.6**
HB-WABE-107	304+00	GSiSa	A-2-4	30	22.8	0.5	11.4	3.0	4.2 SP	14.4	4.2	**18.6**
									3.0 UP			
									7.2			
HB-WABE-108	331+00	GSiSa	A-2-4	30	25.2	0.5	12.6		**4.8 SP**	12.6	4.8	**17.4**

Existing Pavement/Base Conditions Worksheet

Town: Waldo - Belfast Route 137

Pin: 17716.00

Key		
A-1-a		100%
A-1-b		85%
A-2-4		50%
A-4		25%

SiSaG	Silty Sandy Gravel
SiGSa	Silty Gravelly Sand
GSiSa	Gravelly Si Sand
SiSa	Silty Sandy
SaSi	Sandy Silt

Boring Data		**Base and Thickness Calculations**								**FWD Base and Asphalt Calculations**		
Power Auger #	FWD Station	Soil Description	Classification	Pave + Base	Base	% Weight	Wt. Base Thickness	Unbound Thickness	Asphalt Thickness	Total Base (WtB+UP)	Asphalt (SP)	Total Thickness
HB-WABE-109	367+20	GSiSa	A-2-4	30	21.6	0.5	10.8	4.8	3.6 SP	15.6	3.6	**19.2**
									4.8 UP			
									8.4			
HB-WABE-110	382+00	GSiSa	A-2-4	30	21.6	0.5	10.8	4.2	4.2 SP	15	4.2	**19.2**
									4.2 UP			
									8.4			
HB-WABE-111	400+00	GSiSa	A-2-4	30	21.6	0.5	10.8	3.6	4.8 SP	14.4	4.8	**19.2**
									3.6 UP			
									8.4			
HB-WABE-112	436+50	GSiSa	A-2-4	30	21.6	0.5	10.8	4.2	4.2 SP	15	4.2	**19.2**
									4.2 UP			
									8.4			
HB-WABE-113	474+00	GSiSa	A-2-4	30	21.6	0.5	10.8	4.2	3.6 SP	15.6	3.6	**19.2**
									4.8 UP			
									8.4			
HB-WABE-114	504+0	GSiSa	A-2-4	30	21.6	0.5	10.8	4.2	4.2 SP	15	4.2	**19.2**
									4.2 UP			
									8.4			

STATE OF MAINE

FILE: SR 137

INTERDEPARTMENTAL MEMORANDUM

COPY: SR 7

Date of Request: **01/12/2010** Return: **02/26/10**

Latest Date Needed By: **05/01/10**

To: **Ed Hanscom** Dept.: **MDOT, Bureau of Planning**

From: **Sterling Paul** Dept.: **Region 2 Highway Program**

Subject: **Request for Traffic Information** Project Manager: **Shawn Smith**

TOWN(S): **Belfast-Waldo** P.I.N. **017716.00** Consultant Proj ☐

COUNTY: **Waldo** ROUTE: **SR 137**

LOCATION/ DESCRIPTION: Highway Rehabilitation: CHIP rehab existing pavement, gravel shoulders, & pave/replace existing drainage. Runs from junc. w/Marsh Rd, Belfast, 6.23 mi N to SR 131 in Waldo.

	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: JG

Description of Sections	Sec. 1 SR 7 / 137 (Waldo Av.) SE/O Doak Rd., Belfast PROJECT HIGH	Sec. 2 SR 137 (Waterville Rd) SE/O SR 131 (Waldo Rd) Waldo PROJECT LOW	Sec. 3	Sec. 4	Sec. 5
1 Latest AADT (Year)	4880 (2005)	2190 (2008)			
2 Current **2010** AADT	4880	2190			
3 Future **2022** AADT	5470	2450			
4 Future ____ AADT					
5 DHV - % of AADT	10%	9%	%	%	%
6 Design Hourly Volume	547	221			
7 % Heavy Trucks (AADT)	8%	9%	%	%	%
8 % Heavy Trucks (DHV)	7%	5%	%	%	%
9 Direct.Dist. (DHV)	61%	61%	%	%	%
10 18-KIP Equivalent P 2.0	282	152			
11 18-KIP Equivalent P 2.5	269	145			

Notes or Remarks: 18-Kip ESALs 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:

State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

Town(s): Belfast-Waldo Project Number: 17716.00

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-WABE-101, S1	196+00	9.5 Rt.	0.6-3.0	236976	1	6.6	23.5	SM	A-1-b	II
HB-WABE-101, S2	196+00	9.5 Rt.	3.0-5.0	236977	1	24.4	51.2	ML	A-4	IV
HB-WABE-102, S3	215+00	9.0 Rt.	0.6-2.2	236978	1	10.9	31.3	SM	A-2-4	II
HB-WABE-102, S4	215+00	9.0 Rt.	2.2-5.0	236979	1	15.5	68.3	ML	A-4	IV
HB-WABE-103, S5	239+00	7.6 Lt.	0.6-2.4	236980	1	7.4	27.5	SM	A-2-4	II
HB-WABE-103, S6	239+00	7.6 Lt.	2.4-5.0	236981	1	20.9	96.6	CL-ML	A-4	IV
HB-WABE-104, S7	265+00	7.8 Lt.	0.6-1.2	236982	2	7.7	29.0	SM	A-2-4	II
HB-WABE-104, S8	265+00	7.8 Lt.	1.2-5.0	236983	2	14.6	58.8	ML	A-4	IV
HB-WABE-105, S9	273+50	2.0 Lt.	5.5-8.9	236984	2	13.8	25.6	SM	A-2-4	II
HB-WABE-106, S10	291+00	7.0 Rt.	0.4-4.6	236985	2	9.0	29.2	SM	A-2-4	II
HB-WABE-107, S11	304+00	9.0 Rt.	0.6-3.5	236986	2	10.2	28.3	SM	A-2-4	II
HB-WABE-107, S12	304.+00	9.0 Rt.	3.5-5.0	236987	2	21.6	70.6	CL-ML	A-4	IV
HB-WABE-109, S13	367+20	8.0 Rt.	0.3-0.7	236988	3	6.6	7.5	SW-SM	A-1-b	0
HB-WABE-109, S14	367+20	8.0 Rt.	3.0-5.0	236989	3	21.3	88.5	CL-ML	A-4	IV
HB-WABE-111, S15	400+00	8.5 Rt.	0.7-2.9	236990	3	8.3	25.2	SM	A-2-4	II
HB-WABE-114, S16	504+00	9.5 Rt.	0.7-3.0	236991	3	6.3	25.9	SM	A-2-4	II
HB-WABE-114, S17	504+00	9.5 Rt.	3.0-5.0	236992	3	23.6	48.6	SM	A-4	III

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.

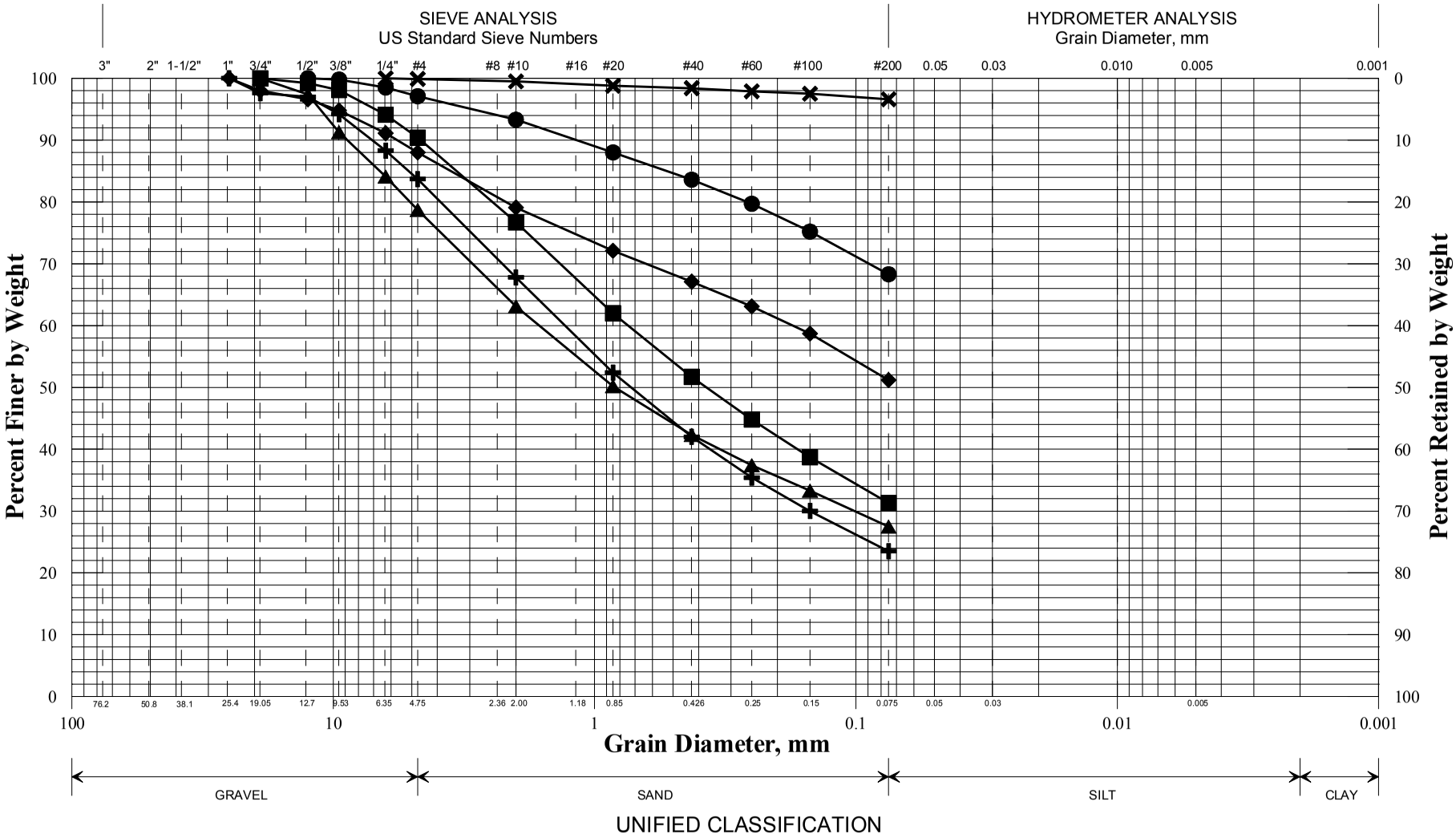
GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-93 (1996) and/or ASTM D 422-63 (Reapproved 1998)

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

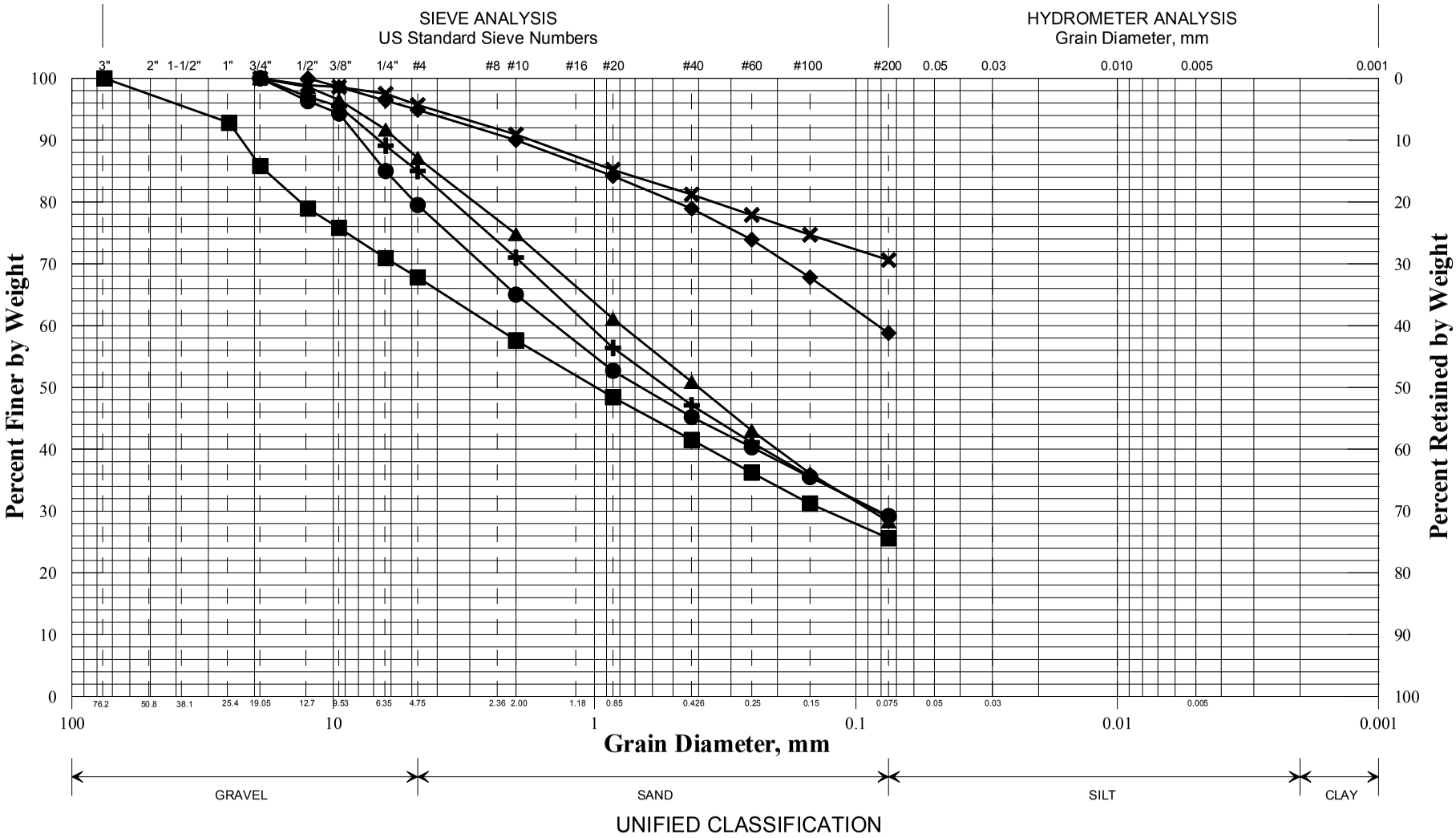
State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-WABE-101/S1	196+00	9.5 RT	0.6-3.0	SAND, some silt, little gravel.	6.6			
◆	HB-WABE-101/S2	196+00	9.5 RT	3.0-5.0	Sandy SILT, little gravel.	24.4			
■	HB-WABE-102/S3	215+00	9.0 RT	0.6-2.2	SAND, some silt, trace gravel.	10.9			
●	HB-WABE-102/S4	215+00	9.0 RT	2.2-5.0	SILT, some sand, trace gravel.	15.5			
▲	HB-WABE-103/S5	239+00	7.6 LT	0.6-2.4	SAND, some silt, some gravel.	7.4			
✖	HB-WABE-103/S6	239+00	7.6 LT	2.4-5.0	SILT, trace sand.	20.9			

PIN
017716.00
Town
Belfast,Waldo
Reported by/Date
WHITE, TERRY A 3/17/2010

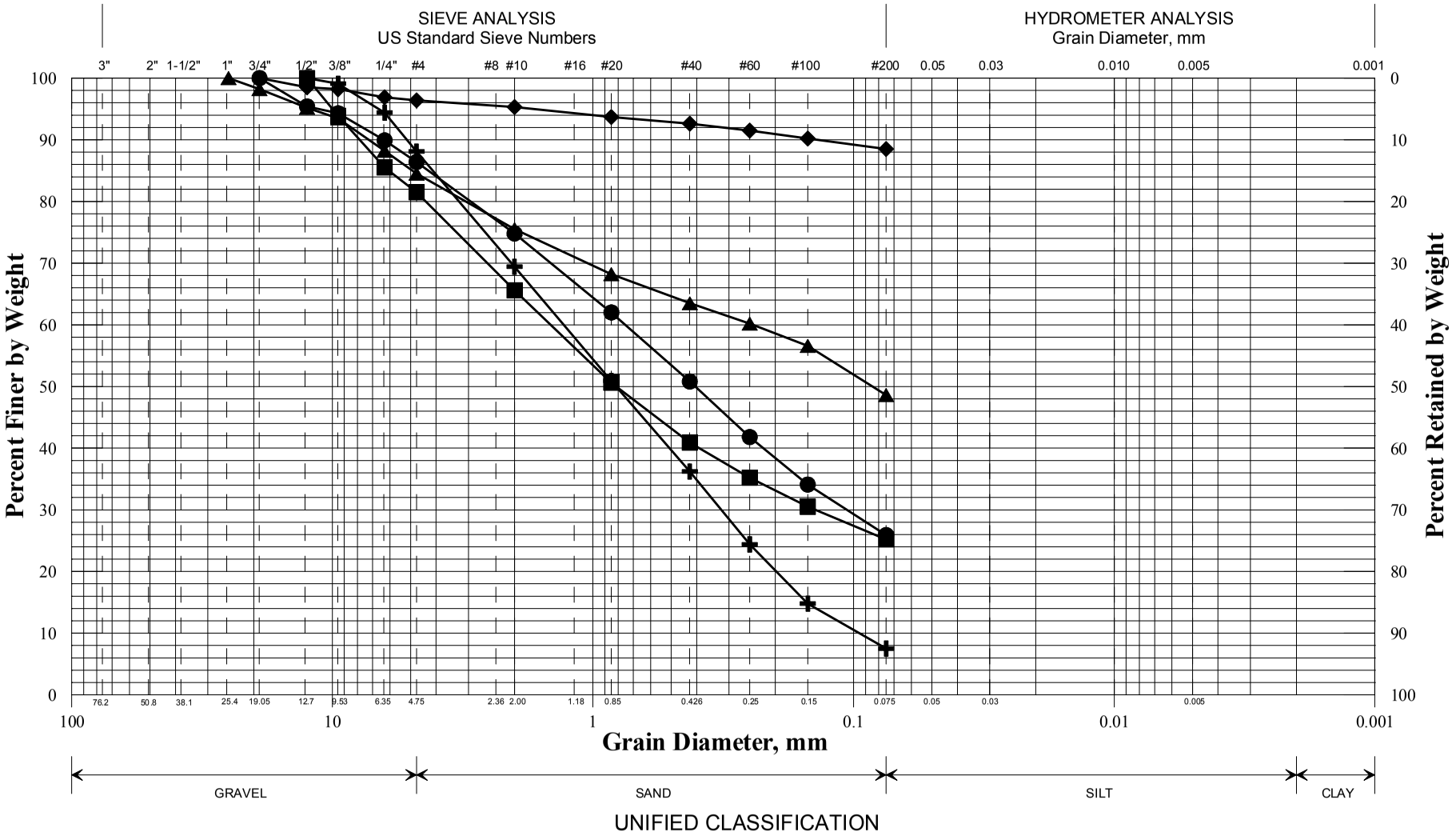
State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-WABE-104/S7	265+00	7.8 LT	0.6-1.2	SAND, some silt, little gravel.	7.7			
◆	HB-WABE-104/S8	265+00	7.8 LT	1.2-5.0	Sandy SILT, trace gravel.	14.6			
■	HB-WABE-105/S9	273+50	2.0 LT	5.5-8.9	SAND, some gravel, some silt.	13.8			
●	HB-WABE-106/S10	291+00	7.0 RT	0.4-4.6	SAND, some silt, little gravel.	9.0			
▲	HB-WABE-107/S11	304+00	9.0 RT	0.6-3.5	SAND, some silt, little gravel.	10.2			
✕	HB-WABE-107/S12	304+00	9.0 RT	3.5-5.0	SILT, some sand, trace gravel.	21.6			

PIN
017716.00
Town
Belfast,Waldo
Reported by/Date
WHITE, TERRY A 3/17/2010

State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-WABE-109/S13	367+20	8.0 RT	0.3-0.7	SAND, little gravel, trace silt.	6.6			
◆	HB-WABE-109/S14	367+20	8.0 RT	3.0-5.0	SILT, trace sand, trace gravel.	21.3			
■	HB-WABE-111/S15	400+00	8.5 RT	0.7-2.9	SAND, some silt, little gravel.	8.3			
●	HB-WABE-114/S16	504+00	9.5 RT	0.7-3.0	SAND, some silt, little gravel.	6.3			
▲	HB-WABE-114/S17	504+00	9.5 RT	3.0-5.0	Sandy SILT, little gravel.	23.6			
✖									

PIN
017716.00
Town
Belfast,Waldo
Reported by/Date
WHITE, TERRY A 3/17/2010

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-101
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	196+00, 9.5 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	S1		0.60 - 3.00				SSA	-0.30		PAVEMENT.	
								-0.60		0.30	G#236976 A-2-b, SM WC=6.6%
										Unbound Pavement.	
										0.60	
										Brown, moist, fine to coarse SAND, some gravel, little silt.	
	S2		3.00 - 5.00					-3.00		3.00	G#236977 A-4, ML WC=24.4%
										Olive-brown, moist, fine sandy SILT.	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing CL of Roadway.

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: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-102
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	215+00, 9.0 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	S3		0.60 - 2.20				SSA	-0.30		PAVEMENT.	
								-0.60		0.30	G#236978 A-2-4, SM WC=10.9%
										Unbound Pavement.	
										0.60	
	S4		2.20 - 5.00					-2.20		Brown, moist, fine to medium SAND, some gravel, little silt.	
										2.20	G#236979 A-4, ML WC=15.5%
										Light brown, moist, silty, fine to medium SAND, trace gravel.	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing CL of Roadway.

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: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-103
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	239+00, 7.6 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = 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	S5		0.60 - 2.40				SSA	-0.35		PAVEMENT.	
								-0.60		0.35	G#236980 A-2-4, SM WC=7.4%
										Unbound Pavement.	
										0.60	
	S6		2.40 - 5.00					-2.40		Brown, moist, gravelly, fine to coarse SAND, little silt.	
										2.40	G#236981 A-4, CL-ML WC=20.9%
										Olive, moist, fine sandy SILT, trace clay.	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing CL of Roadway.

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: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-104
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	265+00, 7.8 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = 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		0.60 - 1.20				SSA	-0.35		PAVEMENT.	
								-0.60		0.35	
	S8		1.20 - 5.00					-1.20		Unbound Pavement.	G#236982 A-2-4, SM WC=7.7%
										0.60	
										Brown, moist, gravelly, fine to coarse SAND, little silt.	G#236983 A-4, ML WC=14.6%
										1.20	
										Brown, moist, 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:

Offsets are from Existing CL of Roadway.

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: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-105
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	273+50, 2.0 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	2.5' bgs.
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	-0.45		PAVEMENT.	
										0.45	
								-1.10		Brown, moist, gravelly, fine to coarse SAND, little silt. ≅S7	
										1.10	
										Brown, moist, silty, fine to medium SAND. ≅S8	
5	S9		5.50 - 8.90					-5.50		5.50	G#236984 A-2-4, SM WC=13.8%
										Brown, saturated, silty, fine to coarse SAND, little gravel, (Till?)	
								-8.90		8.90	
10										**Bottom of Exploration at 8.90 feet below ground surface.** REFUSAL	
15											
20											
25											

Remarks:

Offsets are from Existing CL of Roadway.

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: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-106
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	291+00, 7.0 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	4.0' bgs.
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		0.40 - 4.60				SSA	-0.40		PAVEMENT. 0.40	G#236985 A-2-4, SM WC=9.0%
										Brown, moist, gravelly, fine to coarse SAND, little silt. Wetter with depth.	
								-4.60		4.60	
5										**Bottom of Exploration at 4.60 feet below ground surface.** REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing CL of Roadway.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-107
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	304+00, 9.0 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	S11		0.60 - 3.50				SSA	-0.35		PAVEMENT.	
								-0.60		0.35	
										Unbound Pavement.	G#236986 A-2-4, SM WC=10.2%
										0.60	
										Brown, moist, gravelly, fine to coarse SAND, little silt.	
	S12		3.50 - 5.00					-3.50		3.50	
										Olive, wet, fine to medium sandy SILT, trace clay.	G#236987 A-4, CL-ML WC=21.6%
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing CL of Roadway.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-108
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	331+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	-0.40		PAVEMENT. 0.40	
										Brown, moist, gravelly, fine to coarse SAND, little silt. ≅S11	
								-2.50		2.50	
										Bottom of Exploration at 2.50 feet below ground surface. REFUSAL	
5											
10											
15											
20											
25											

Remarks:

Offsets are from Existing CL of Roadway.
Ledge outcrop in left ditch.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-109
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	367+20, 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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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 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	S13		0.30 - 0.70				SSA	-0.30		PAVEMENT.	G#236988 A-1-b, SW-SM WC=6.6%
								-0.70		0.30 Unbound Pavement. 0.70	
										Brown, moist, gravelly, fine to coarse SAND, little silt. ≅S11	
	S14		3.00 - 5.00					-3.00		3.00 Olive, moist, fine sandy SILT, trace clay.	G#236989 A-4, CL-ML WC=21.3%
5								-5.00		5.00 **Bottom of Exploration at 5.00 feet below ground surface.** NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing CL of Roadway.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-110
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	382+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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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	-0.35		PAVEMENT.	
								-0.70		0.35	
										Unbound Pavement.	
										0.70	
										Brown, moist, gravelly, fine to coarse SAND, little silt. ≅S11	
								-3.00		3.00	
										Olive, moist, fine sandy SILT, trace clay. ≅S14	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface.	
										NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing CL of Roadway.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-111
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	400+00, 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	S15		0.70 - 2.90				SSA	-0.40		PAVEMENT.	
								-0.70		0.40	G#236990
										Unbound Pavement.	A-2-4, SM
										0.70	WC=8.3%
										Brown, moist, gravelly, fine to coarse SAND, little silt.	
								-2.90		2.90	
										Olive, moist, fine sandy SILT, trace clay. ≅S14	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface.	
										NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing CL of Roadway.

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: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-112
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	436+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	-0.35		PAVEMENT.	
								-0.70		0.35	
										Unbound Pavement.	
										0.70	
										Brown, moist, gravelly, fine to coarse SAND, little silt, (Fill) ≅S15	
										Layer of old Pavement at 3.5' bgs.	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface.	
										NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing CL of Roadway.

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: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-113
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	474+00, 9.5 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.	
								-0.70		0.30	
										Unbound Pavement.	
										0.70	
										Brown, moist, gravelly, fine to coarse SAND, little silt, (Fill) ≅S15	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface.	
										NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing CL of Roadway.

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: State Route 137
Location: Belfast-Waldo, Maine

Boring No.: HB-WABE-114
PIN: 17716.00

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:	2/4/10-2/4/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	504+00, 9.5 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	S16		0.70 - 3.00				SSA	-0.35		PAVEMENT.	
								-0.70		0.35	
										Unbound Pavement.	G#236991 A-2-4, SM WC=6.3%
										0.70	
										Brown, moist, gravelly, fine to coarse SAND, little silt.	
	S17		3.00 - 5.00					-3.00		3.00	
										Brown, damp to moist, silty, fine to medium SAND.	G#236992 A-4, SM WC=23.6%
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing CL of Roadway.

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 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
236976	**HB-WABE-101/S1**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **196+00** Offset, ft: **9.5** **RT** Dbfg, ft: **0.6-3.0**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**97.0**
⅜ in. [9.5 mm]	**94.2**
¼ in. [6.3 mm]	**88.3**
No. 4 [4.75 mm]	**83.7**
No. 10 [2.00 mm]	**67.8**
No. 20 [0.850 mm]	**52.4**
No. 40 [0.425 mm]	**42.0**
No. 60 [0.250 mm]	**35.4**
No. 100 [0.150 mm]	**30.0**
No. 200 [0.075 mm]	**23.5**

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), %
6.6

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: **3/16/2010**

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
236977	**HB-WABE-101/S2**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **196+00** Offset, ft: **9.5** **RT** Dbfg, ft: **3.0-5.0**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**98.0**
½ in. [12.5 mm]	**96.6**
⅜ in. [9.5 mm]	**94.8**
¼ in. [6.3 mm]	**91.1**
No. 4 [4.75 mm]	**88.0**
No. 10 [2.00 mm]	**79.1**
No. 20 [0.850 mm]	**72.1**
No. 40 [0.425 mm]	**67.1**
No. 60 [0.250 mm]	**63.1**
No. 100 [0.150 mm]	**58.7**
No. 200 [0.075 mm]	**51.2**

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), %
24.4

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: **3/16/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
236978	**HB-WABE-102/S3**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **215+00** Offset, ft: **9.0** **RT** Dbfg, ft: **0.6-2.2**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**99.2**
⅜ in. [9.5 mm]	**98.1**
¼ in. [6.3 mm]	**94.1**
No. 4 [4.75 mm]	**90.4**
No. 10 [2.00 mm]	**76.7**
No. 20 [0.850 mm]	**62.0**
No. 40 [0.425 mm]	**51.7**
No. 60 [0.250 mm]	**44.8**
No. 100 [0.150 mm]	**38.7**
No. 200 [0.075 mm]	**31.3**

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), %

10.9

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: **3/16/2010**

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
236979	**HB-WABE-102/S4**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **215+00** Offset, ft: **9.0** **RT** Dbfg, ft: **2.2-5.0**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**99.8**
¼ in. [6.3 mm]	**98.5**
No. 4 [4.75 mm]	**97.1**
No. 10 [2.00 mm]	**93.3**
No. 20 [0.850 mm]	**88.0**
No. 40 [0.425 mm]	**83.6**
No. 60 [0.250 mm]	**79.7**
No. 100 [0.150 mm]	**75.2**
No. 200 [0.075 mm]	**68.3**

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), %

15.5

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: **3/16/2010**

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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
236980	**HB-WABE-103/S5**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **239+00** Offset, ft: **7.6** **LT** Dbfg, ft: **0.6-2.4**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**97.4**
⅜ in. [9.5 mm]	**91.3**
¼ in. [6.3 mm]	**84.1**
No. 4 [4.75 mm]	**78.7**
No. 10 [2.00 mm]	**63.1**
No. 20 [0.850 mm]	**50.2**
No. 40 [0.425 mm]	**42.3**
No. 60 [0.250 mm]	**37.4**
No. 100 [0.150 mm]	**33.3**
No. 200 [0.075 mm]	**27.5**

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), %

7.4

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: **3/16/2010**

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
236981	**HB-WABE-103/S6**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **239+00** Offset, ft: **7.6** **LT** Dbfg, ft: **2.4-5.0**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**100.0**
No. 4 [4.75 mm]	**99.9**
No. 10 [2.00 mm]	**99.5**
No. 20 [0.850 mm]	**98.8**
No. 40 [0.425 mm]	**98.4**
No. 60 [0.250 mm]	**97.9**
No. 100 [0.150 mm]	**97.5**
No. 200 [0.075 mm]	**96.6**

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), %

20.9

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: **3/16/2010**

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
236982	**HB-WABE-104/S7**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **265+00** Offset, ft: **7.8** **LT** Dbfg, ft: **0.6-1.2**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**97.0**
⅜ in. [9.5 mm]	**95.5**
¼ in. [6.3 mm]	**89.1**
No. 4 [4.75 mm]	**85.0**
No. 10 [2.00 mm]	**71.0**
No. 20 [0.850 mm]	**56.4**
No. 40 [0.425 mm]	**47.1**
No. 60 [0.250 mm]	**41.1**
No. 100 [0.150 mm]	**35.6**
No. 200 [0.075 mm]	**29.0**

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), %

7.7

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: **3/16/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
236983	**HB-WABE-104/S8**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **265+00** Offset, ft: **7.8** **LT** Dbfg, ft: **1.2-5.0**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**98.6**
¼ in. [6.3 mm]	**96.4**
No. 4 [4.75 mm]	**94.9**
No. 10 [2.00 mm]	**90.0**
No. 20 [0.850 mm]	**84.2**
No. 40 [0.425 mm]	**78.9**
No. 60 [0.250 mm]	**73.9**
No. 100 [0.150 mm]	**67.8**
No. 200 [0.075 mm]	**58.8**

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), %

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), %

14.6

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: **3/16/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
236984	**HB-WABE-105/S9**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **273+50** Offset, ft: **2.0** **LT** Dbfg, ft: **5.5-8.9**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**92.8**
¾ in. [19.0 mm]	**85.8**
½ in. [12.5 mm]	**78.9**
⅜ in. [9.5 mm]	**75.8**
¼ in. [6.3 mm]	**70.9**
No. 4 [4.75 mm]	**67.8**
No. 10 [2.00 mm]	**57.6**
No. 20 [0.850 mm]	**48.4**
No. 40 [0.425 mm]	**41.5**
No. 60 [0.250 mm]	**36.2**
No. 100 [0.150 mm]	**31.2**
No. 200 [0.075 mm]	**25.6**

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), %

13.8

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

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GEOTECHNICAL TEST REPORT
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SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
236985	**HB-WABE-106/S10**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **291+00** Offset, ft: **7.0** **RT** Dbfg, ft: **0.4-4.6**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**96.3**
⅜ in. [9.5 mm]	**94.3**
¼ in. [6.3 mm]	**85.0**
No. 4 [4.75 mm]	**79.5**
No. 10 [2.00 mm]	**65.0**
No. 20 [0.850 mm]	**52.7**
No. 40 [0.425 mm]	**45.2**
No. 60 [0.250 mm]	**40.3**
No. 100 [0.150 mm]	**35.5**
No. 200 [0.075 mm]	**29.2**

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), %

9.0

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:

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
236986	**HB-WABE-107/S11**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **304+00** Offset, ft: **9.0** **RT** Dbfg, ft: **0.6-3.5**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**98.6**
⅜ in. [9.5 mm]	**96.5**
¼ in. [6.3 mm]	**91.7**
No. 4 [4.75 mm]	**87.1**
No. 10 [2.00 mm]	**74.8**
No. 20 [0.850 mm]	**61.1**
No. 40 [0.425 mm]	**50.9**
No. 60 [0.250 mm]	**43.0**
No. 100 [0.150 mm]	**36.1**
No. 200 [0.075 mm]	**28.3**

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), %

10.2

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: **3/16/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
236987	**HB-WABE-107/S12**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **304+00** Offset, ft: **9.0** **RT** Dbfg, ft: **3.5-5.0**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**98.9**
⅜ in. [9.5 mm]	**98.6**
¼ in. [6.3 mm]	**97.5**
No. 4 [4.75 mm]	**95.7**
No. 10 [2.00 mm]	**90.9**
No. 20 [0.850 mm]	**85.2**
No. 40 [0.425 mm]	**81.2**
No. 60 [0.250 mm]	**77.9**
No. 100 [0.150 mm]	**74.7**
No. 200 [0.075 mm]	**70.6**

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), %

21.6

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: **3/16/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
236988	**HB-WABE-109/S13**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **367+20** Offset, ft: **8.0** **RT** Dbfg, ft: **0.3-0.7**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**99.1**
¼ in. [6.3 mm]	**94.4**
No. 4 [4.75 mm]	**88.1**
No. 10 [2.00 mm]	**69.4**
No. 20 [0.850 mm]	**50.9**
No. 40 [0.425 mm]	**36.2**
No. 60 [0.250 mm]	**24.4**
No. 100 [0.150 mm]	**14.8**
No. 200 [0.075 mm]	**7.5**

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), %

6.6

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: **3/16/2010**

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GEOTECHNICAL TEST REPORT
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SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
236989	**HB-WABE-109/S14**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **367+20** Offset, ft: **8.0** **RT** Dbfg, ft: **3.0-5.0**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**98.5**
⅜ in. [9.5 mm]	**98.2**
¼ in. [6.3 mm]	**96.9**
No. 4 [4.75 mm]	**96.4**
No. 10 [2.00 mm]	**95.3**
No. 20 [0.850 mm]	**93.7**
No. 40 [0.425 mm]	**92.6**
No. 60 [0.250 mm]	**91.5**
No. 100 [0.150 mm]	**90.2**
No. 200 [0.075 mm]	**88.5**

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), %

21.3

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: **3/16/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
236990	**HB-WABE-111/S15**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **400+00** Offset, ft: **8.5** **RT** Dbfg, ft: **0.7-2.9**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**93.9**
¼ in. [6.3 mm]	**85.5**
No. 4 [4.75 mm]	**81.5**
No. 10 [2.00 mm]	**65.6**
No. 20 [0.850 mm]	**50.6**
No. 40 [0.425 mm]	**40.9**
No. 60 [0.250 mm]	**35.2**
No. 100 [0.150 mm]	**30.5**
No. 200 [0.075 mm]	**25.2**

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), %

8.3

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: **3/16/2010**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
236991	**HB-WABE-114/S16**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **504+00** Offset, ft: **9.5** **RT** Dbfg, ft: **0.7-3.0**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**95.4**
⅜ in. [9.5 mm]	**94.3**
¼ in. [6.3 mm]	**89.9**
No. 4 [4.75 mm]	**86.4**
No. 10 [2.00 mm]	**74.8**
No. 20 [0.850 mm]	**62.0**
No. 40 [0.425 mm]	**50.8**
No. 60 [0.250 mm]	**41.8**
No. 100 [0.150 mm]	**34.1**
No. 200 [0.075 mm]	**25.9**

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), %

6.3

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: **3/16/2010**

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
236992	**HB-WABE-114/S17**	**GEOTECHNICAL (DISTURBED)**	**2/4/2010**	**3/1/2010**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **504+00** Offset, ft: **9.5** **RT** Dbfg, ft: **3.0-5.0**

PIN: **017716.00** Town: **Belfast,Waldo** 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]	**98.2**
½ in. [12.5 mm]	**95.2**
⅜ in. [9.5 mm]	**93.5**
¼ in. [6.3 mm]	**88.2**
No. 4 [4.75 mm]	**84.5**
No. 10 [2.00 mm]	**75.5**
No. 20 [0.850 mm]	**68.2**
No. 40 [0.425 mm]	**63.5**
No. 60 [0.250 mm]	**60.2**
No. 100 [0.150 mm]	**56.6**
No. 200 [0.075 mm]	**48.6**

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), %

23.6

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:

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