MaineDOT

Highway Program

Brad Foley, Program Manager
Rich Crawford & Heath Cowan, Assistant Program Managers
Phone: 624-3480 Fax: 624-3481

Memorandum

To: Jonathan French
From: Karen Gross
Date: 1/23/2012
Subject: Final Geotechnical Information
Brunswick, Rte. 1 @ Durham Rd.
PIN 17241.00
Soils Report No. 2012-106 (supersedes Soils Report No. 2011-109)

==========

The preliminary geotechnical investigations have been completed for the Brunswick project. The purpose of these investigations was to identify bedrock on the proposed Durham Road alignment and the existing pavement structure materials on Route 1 and Durham Road.

INVESTIGATIONS SUMMARY

The investigations consisted of 30 rod soundings, 10 solid stem auger borings, and 5 pavement cores. All soundings and borings were done to a depth of 5 feet below the ground surface unless refusal was encountered at a depth less than 5 feet. A summary of the subsurface information is provided in the Geotechnical Investigations Summary spreadsheet, and boring locations are shown on the Geoplans (both attached at the end of this report). The Maine Surficial Geology map for the Lisbon Falls South Quadrangle, the Cumberland County Soil Survey, and as-built plans (date unknown) were also referenced for these investigations.

Shallow refusals were encountered in most of the probes located on the proposed Durham Road alignment. Refusal depths range from 0.0 feet (at the surface) to 4.2 feet below the existing ground surface. Shallow refusals were also encountered on Route 1 near the immediate intersection with Durham Road. The Maine Surficial Geology map and the Cumberland County Soil Survey both indicate that shallow bedrock is probable on Durham Road, and at the immediate intersection of Durham Road and Route 1. The geology map and soil survey are attached for your reference.

The thickness of the existing asphalt ranges from 6" to 8". The section of Route 1 to the north of the intersection consists of asphalt over concrete (composite pavement). The concrete thickness ranges from 4.8"to 6". As-built plans indicate the underlying concrete pavement consists of two 10' wide, 40' long continuously reinforced slabs, 7" thick at the centerline and tapering to 7 ½ " thick at the outside edge. Concrete was not encountered in the investigations on Durham Road or Route 1 to the south of the intersection.

The existing base/subbase ranges from 22" to 24" on Durham Road and Route 1 to the south of the intersection, and 12"to 18" under the concrete/composite pavement. The existing material has not been tested to determine the gradation, water content or to determine the frost susceptibility rating. Alignment changes will make it necessary to re-base a majority of the project, so the gradation of the existing material may be irrelevant.

The existing subgrade (considered at approximately 30" below the pavement surface) primarily consists of sand with varying amounts of gravel and silt (Glacial Till). The Geology map and Soil Survey also indicate that this type of soil is expected over shallow bedrock within the project limits. Glacial Till makes an excellent roadway foundation, but tends to be frost susceptible if not drained properly. The anticipated depth of frost in this area under a snow-free pavement is approximately 30" to 69".

No groundwater or wet soils were encountered in the soundings or borings. Groundwater elevations typically fluctuate seasonally and with precipitation amounts. Because this summer has had very little precipitation, groundwater levels are probably lower than normal. The Cumberland County Soil Survey indicates that groundwater will not be present above shallow bedrock. However, a high seasonal water table is expected to the north of the intersection in the sag area. Proper drainage provisions to remove both subsurface and surface water are recommended to account for fluctuating groundwater levels and to minimize frost action.

DESIGN CONSIDERATIONS

The following are design considerations based on all the information collected and in relation to the proposed vertical and horizontal alignments:

- **Ledge removal can be expected in cut sections on Durham Road and the western side of Route 1 to the north of the intersection. If ledge will be at the subgrade elevation, it should be fractured to ensure drainage of the pavement structure and to reduce differential frost heaving. Please note that if underground utilities are present, this may not be possible.**

- **The anticipated frost depth is 30" to 69". A total pavement structure thickness of 30" is recommended to reduce frost damage to the pavement structure.**

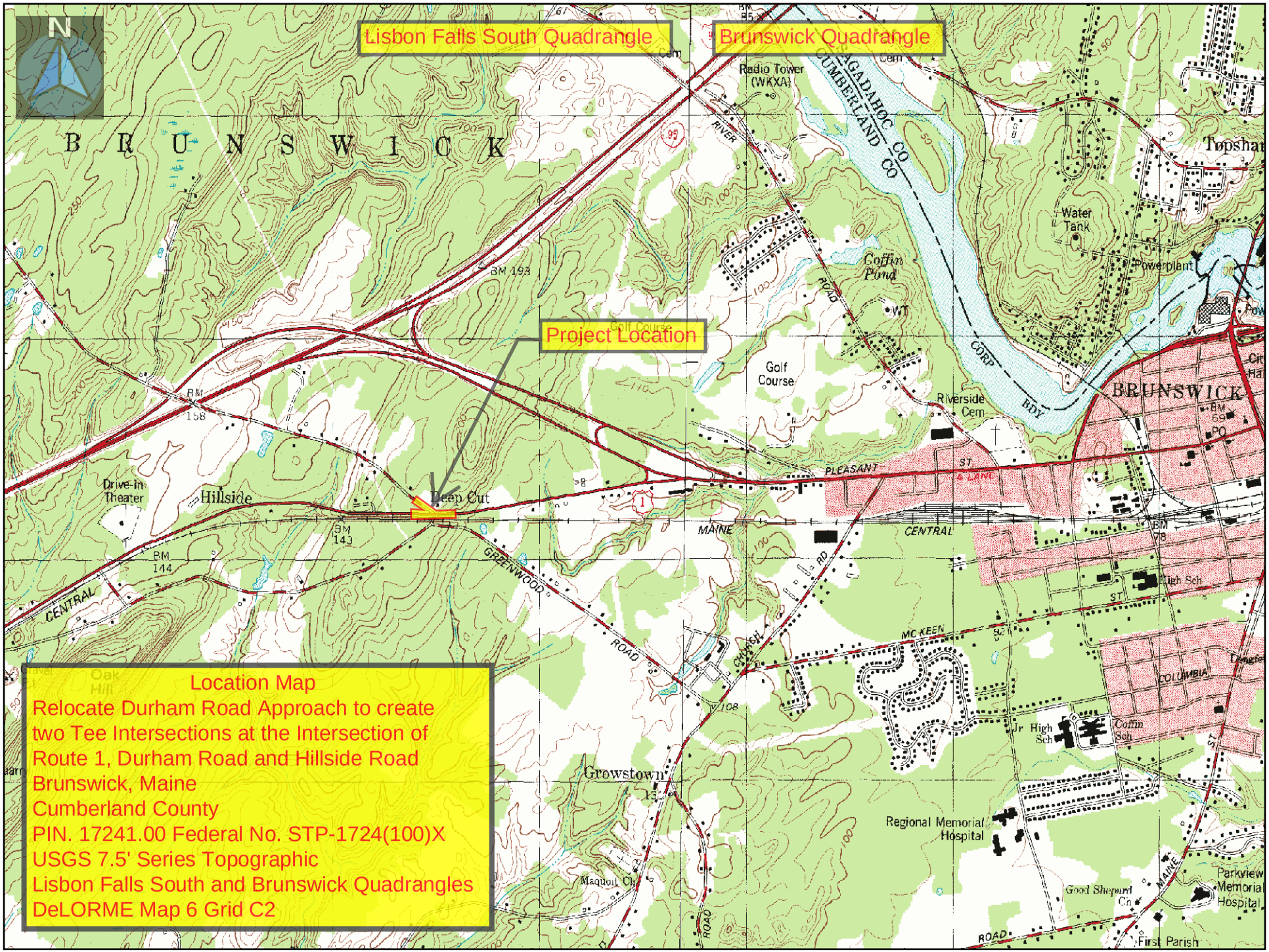
- **The proposed vertical alignment on Route 1 to the north of the intersection will require placing fill material. The existing concrete pavement should be removed or rubblized. Buried concrete slabs (rigid layer) can cause significant stability issues with the overlying gravels and asphalt due to stress distribution. Rigid layers also create an impermeable layer within or under the pavement. The result is a weakened subbase and subgrade soils due to a high water content as well as frost heaving issues.**

- **Drainage provisions to remove both subsurface and surface water are recommended to ensure drainage of the pavement structure and to minimize frost action.**

- **Approximately 3 feet of fill is proposed for correcting the vertical alignment on Route 1 to the north of the intersection with Durham Rd. Minimal settlement of the new embankment is expected.**

- **An appropriate resilient modulus value to use for the pavement design is 4300 psi. This value is based on the assumption that drainage provisions to remove subsurface water will be part of the highway design. The Soils Support chart and Soil Resilient Modulus graph that were used to correlate the soil type to a support value are attached for your reference. Areas with substantial compacted fill depths and fractured ledge will typically have a higher resilient modulus value, but to be conservative, 4300 psi will ensure that the non-fill/ledge areas will meet future design requirements.**

All supporting documentation is attached for your reference and your records. Please let me know if you need any additional information.



Map Scale 1:24000

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

GEOTECHNICAL INVESTIGATIONS SUMMARY
Brunswick, Rte 1 @ Durham Rd., WIN 17241.00

Boring No.	Station	Roadway	Offset (ft)	Direction from CL	Exploration Depth (ft)	Refusal Depth (ft)	Depth to water (ft)	Asphalt Thickness (in)			Subbase Gravel/Fill (in)	Total Pavement Structure Thickness (in)	Subgrade Type	Comments
								HMA	Concrete	Total				
HB-BRUN-101	14+82	US 1	3.9	R	5.0			8.4		8.4	21.6	30	gravelly SAND	
HB-BRUN-102	16+82	US 1	4.0	R	4.0	4.0		7.8		7.8	22.2	30	gravelly SAND	
HB-BRUN-103	18+72	US 1	3.7	R	5.0			7.8		7.8	22.2	30	SAND, some gravel	
RS-29	20+24	US 1	26.8	L	1.8	1.8								
HB-BRUN-104	20+72	US 1	3.8	R	5.0			6.6	5.4	12.0	12.0	24	silty SAND	
HB-BRUN-105	22+62	US 1	3.4	R	5.0			6.0	6.0	12.0	18.0	30	SAND, some gravel	
HB-BRUN-106	24+72	US 1	4.5	R	5.0			7.2	4.8	12.0	12.0	24	SAND, some gravel	
HB-BRUN-110		Durham Rd	3.9	L	4.0	4.0		6.0		6.0	24.0	30	SAND, some gravel	Outside limits
RS-1	32+92	Durham Rd	24.7	L	3.7	3.7								
RS-2	33+17	Durham Rd	26.1	L	1.4	1.4								
RS-3		Durham Rd	24.2	L	0.0	0.0								not plotted
RS-3A	33+41	Durham Rd	22.2	L	1.9	1.9								
HB-BRUN-109	33+50	Durham Rd	14.9	R	3.5	3.5							SAND, some gravel	
RS-4	33+66	Durham Rd	29.0	L	1.0	1.0								
RS-5	33+92	Durham Rd	29.4	L	1.7	1.7								
RS-6	34+17	Durham Rd	33.4	L	1.8	1.8								
RS-7	34+44	Durham Rd	35.4	L	2.8	2.8								
HB-BRUN-108	34+55	Durham Rd	14.7	R	5.0								SAND, some gravel	
RS-28	34+67	Durham Rd	13.1	L	1.8	1.8								
RS-8	34+69	Durham Rd	37.1	L	4.2	4.2								
RS-9	34+95	Durham Rd	38.2	L	5.0									
RS-10	35+22	Durham Rd	40.1	L	5.0									
RS-11	35+46	Durham Rd	39.3	L	5.0									
RS-27	35+69	Durham Rd	16.6	L	5.0									
RS-26	36+15	Durham Rd	9.4	R	5.0									
RS-12	36+26	Durham Rd	36.5	L	5.0									
RS-13	36+51	Durham Rd	33.1	L	3.0	3.0								
RS-25	36+63	Durham Rd	19.5	R	5.0									
RS-14	36+77	Durham Rd	28.7	L	3.0	3.0								
RS-15	36+99	Durham Rd	24.4	L	3.1	3.1								
RS-24	37+17	Durham Rd	26.0	R	2.8	2.8								
RS-16	37+22	Durham Rd	23.6	L	2.1	2.1								
RS-17	37+44	Durham Rd	24.7	L	1.7	1.7								
HB-BRUN-107	37+51	Durham Rd	37.9	R	5.0			6.6		6.6	23.4	30	SAND, some gravel	
RS-18	37+66	Durham Rd	26.7	L	2.0	2.0								
RS-23	37+74	Durham Rd	21.7	R	2.2	2.2								
RS-19	37+89	Durham Rd	27.5	L	3.0	3.0								
RS-20	38+14	Durham Rd	17.5	R	3.9	3.9								
RS-21	38+51	Durham Rd	31.8	L	2.9	2.9								
RS-22	38+75	Durham Rd	31.3	L	3.6	3.6								

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Intersection Route 1 and Durham Road
Location: Brunswick, Maine

Boring No.: HB-BRUN-101
PIN: 17241.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/26/10-7/26/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	14+82, 3.9 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WOH = weight of 140lb. hammer
WOR = weight of rods WOC = weight of casing

Definitions:
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-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S1		0.70 - 3.40			SSA	-0.70		PAVEMENT.	
									0.70 — Light brown, damp, gravelly, fine to coarse SAND, trace silt.	
	S2		3.40 - 5.00				-3.40		3.40 — Grey, moist, clay-SILT, trace fine sand.	
5							-5.00		5.00 — **Bottom of Exploration at 5.00 feet below ground surface.** NO REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Intersection Route 1 and Durham Road
Location: Brunswick, Maine

Boring No.: HB-BRUN-102
PIN: 17241.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/26/10-7/26/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	16+82, 4.0 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WOH = weight of 140lb. hammer
WOR = weight of rods WOC = weight of casing

Definitions:
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-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	PC-1		0.65 - 4.00			SSA	-0.65		PAVEMENT, (0.5' Pavement Core). 0.65	
									Light brown, damp, gravelly, fine to coarse SAND, trace silt ≐S1	
							-4.00		4.00	
5									**Bottom of Exploration at 4.00 feet below ground surface.** REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Intersection Route 1 and Durham Road
Location: Brunswick, Maine

Boring No.: HB-BRUN-103
PIN: 17241.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/26/10-7/26/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	18+72, 3.7 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WOH = weight of 140lb. hammer
WOR = weight of rods WOC = weight of casing

Definitions:
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-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S3		0.65 - 3.40			SSA	-0.65		PAVEMENT.	
							0.65		Light brown, damp, fine to coarse SAND, some gravel, trace silt.	
	S4		3.40 - 5.00				-3.40		Brown, damp, gravelly, fine to coarse SAND, trace silt, old pavement, (Fill).	
5							-5.00		**Bottom of Exploration at 5.00 feet below ground surface.** NO REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Intersection Route 1 and Durham Road
Location: Brunswick, Maine

Boring No.: HB-BRUN-104
PIN: 17241.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/26/10-7/26/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	20+72, 3.8 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WOH = weight of 140lb. hammer
WOR = weight of rods WOC = weight of casing

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

Sample Information

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	PC-2		0.00 - 1.00			SSA	-0.55		PAVEMENT, (0.55' Pavement Core). 0.55	
							-1.00		CONCRETE, (0.45' Concrete Core) 1.00	
	S5		2.00 - 5.00				-2.00		Light brown, damp, fine to coarse SAND, some gravel, trace silt. ≅S3 2.00	
									Grey-brown, moist, silty fine to coarse 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:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Intersection Route 1 and Durham Road
Location: Brunswick, Maine

Boring No.: HB-BRUN-105
PIN: 17241.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/26/10-7/26/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	22+62, 3.4 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WOH = weight of 140lb. hammer
WOR = weight of rods WOC = weight of casing

Definitions:
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-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	-0.50		PAVEMENT. 0.50	
							-1.00		CONCRETE. 1.00	
	S6		1.00 - 3.20						Light brown, damp, fine to coarse SAND, some gravel, trace silt.	
	S7		3.20 - 5.00				-3.20		3.20 Grey-brown, damp, 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:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Intersection Route 1 and Durham Road
Location: Brunswick, Maine

Boring No.: HB-BRUN-106
PIN: 17241.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/26/10-7/26/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	24+72, 4.5 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WOH = weight of 140lb. hammer
WOR = weight of rods WOC = weight of casing

Definitions:
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-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	PC-3		0.00 - 1.00			SSA	-0.60		PAVEMENT, (0.6' Pavement Core).	
							-1.00		CONCRETE, (0.4' Concrete Core)	
									Light brown, damp, fine to coarse SAND, some gravel, trace silt. ≅S6	
							-3.00		Grey-brown, damp, silty fine to medium SAND, trace gravel. ≅S7	
5							-5.00		**Bottom of Exploration at 5.00 feet below ground surface.** NO REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Intersection Route 1 and Durham Road
Location: Brunswick, Maine

Boring No.: HB-BRUN-107
PIN: 17241.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/26/10-7/26/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	37+51, 37.9 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WOH = weight of 140lb. hammer
WOR = weight of rods WOC = weight of casing

Definitions:
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-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	PC-4		0.00 - 0.60			SSA	-0.60		PAVEMENT, (0.6' Pavement Core).	
	S8		0.60 - 3.40						0.60 — Light brown, moist, fine to coarse SAND, some gravel, little silt.	
	S9		3.40 - 5.00				-3.40		3.40 — Olive, moist, clayey-SILT, trace fine sand.	
5							-5.00		5.00 — **Bottom of Exploration at 5.00 feet below ground surface.** NO REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Intersection Route 1 and Durham Road
Location: Brunswick, Maine

Boring No.: HB-BRUN-108
PIN: 17241.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/26/10-7/26/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	34+55, 14.7 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WOH = weight of 140lb. hammer
WOR = weight of rods WOC = weight of casing

Definitions:
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-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA			Light brown, moist, fine to coarse SAND, some gravel, little silt. ≅S8	
							-4.00			
	S10		4.00 - 5.00						Dark brown, moist, SILT, some fine to medium sand, trace organics.	
5							-5.00			
									Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Intersection Route 1 and Durham Road
Location: Brunswick, Maine

Boring No.: HB-BRUN-109
PIN: 17241.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/26/10-7/26/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	33+50, 14.9 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WOH = weight of 140lb. hammer
WOR = weight of rods WOC = weight of casing

Definitions:
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-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA			Light brown, moist, fine to coarse SAND, some gravel, little silt. ≅S8	
							-3.50		3.50	
									Bottom of Exploration at 3.50 feet below ground surface. REFUSAL	
5										
10										
15										
20										
25										

Remarks:

Ledge outcrop at 21.0' Lt.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Intersection Route 1 and Durham Road
Location: Brunswick, Maine

Boring No.: HB-BRUN-110
PIN: 17241.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/26/10-7/26/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	30+49, 3.9 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WOH = weight of 140lb. hammer
WOR = weight of rods WOC = weight of casing

Definitions:
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-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	PC-5					SSA	-0.50		PAVEMENT, (0.5' Pavement Core).	
									0.50	
									Light brown, moist, fine to coarse SAND, some gravel, little silt. ≤S8	
							-3.00		3.00	
									Brown, fine to coarse GRAVEL, old pavement, roots, (Fill).	
							-4.00		4.00	
5									**Bottom of Exploration at 4.00 feet below ground surface.** REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Intersection Route 1 and Durham Road
Location: Brunswick, Maine

Boring No.: HB-BRUN-110
PIN: 17241.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/26/10-7/26/10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	30+49, 3.9 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WOH = weight of 140lb. hammer
WOR = weight of rods WOC = weight of casing

Definitions:
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-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	PC-5					SSA	-0.50		PAVEMENT, (0.5' Pavement Core).	
									0.50	
									Light brown, moist, fine to coarse SAND, some gravel, little silt. ≤S8	
							-3.00		3.00	
									Brown, fine to coarse GRAVEL, old pavement, roots, (Fill).	
							-4.00		4.00	
5									**Bottom of Exploration at 4.00 feet below ground surface.** REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

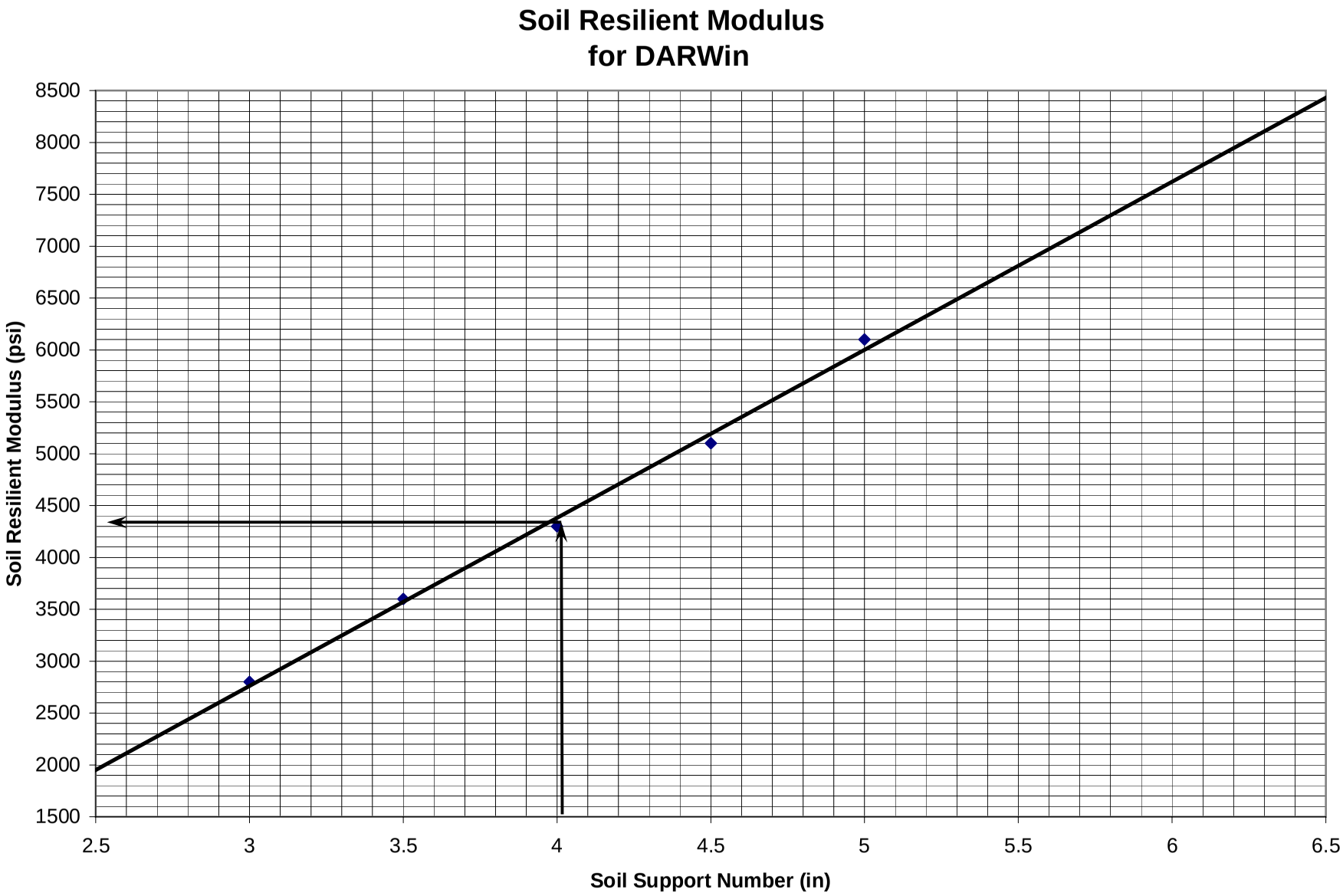
State of Maine - Department of Transportation

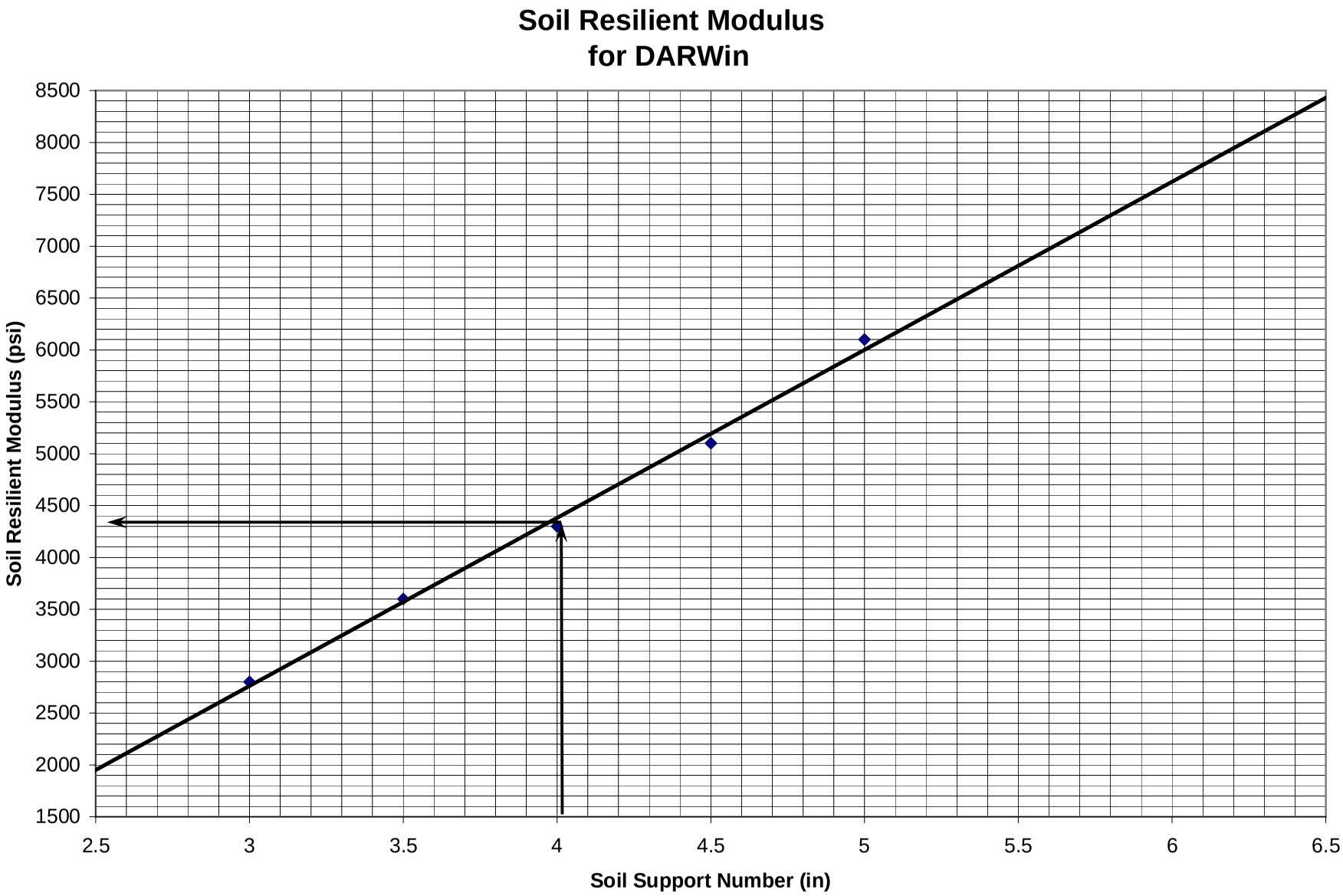
Rod Sounding Summary Sheet

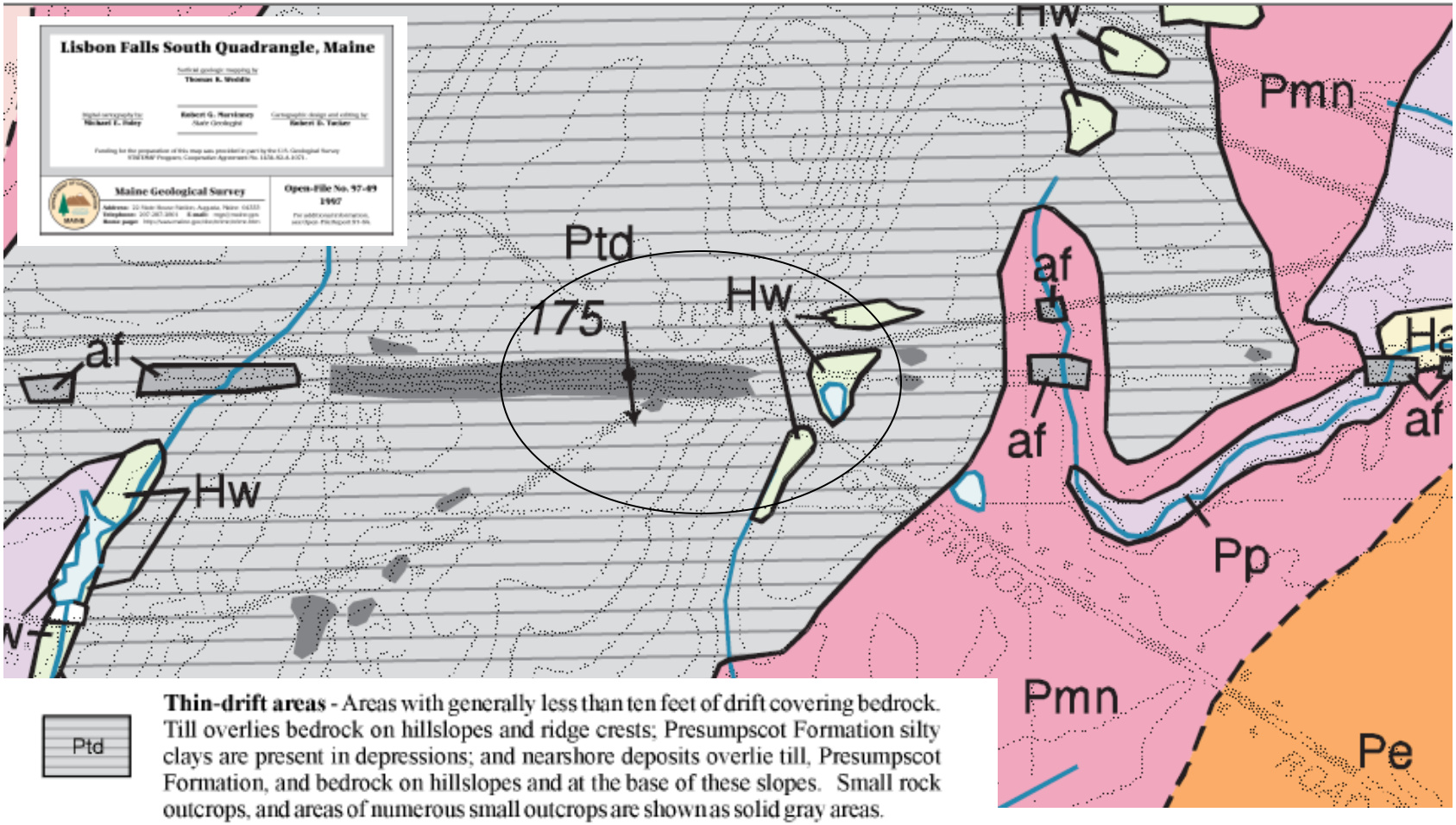
Town(s): Brunswick Project Number: 17241.00

Boring	Station (Feet)	Offset (Feet)	Refusal (Feet)	No Refusal (Feet)	Water (X) = Yes	Comments 7/24/2010
RS-1	32+92	24.7 Lt.	3.7			Durham Road
RS-2	33+17	26.1 Lt.	1.4			
RS-3	33+42	24.2 Lt.				ledge outcrop
RS-3A	33+41	22.2 Lt.	1.9			
RS-4	33+66	29.0 Lt.	1.0			
RS-5	33+92	29.4 Lt.	1.7			
RS-6	34+17	33.4 Lt.	1.8			
RS-7	34+44	35.4 Lt.	2.8			
RS-8	34+69	37.1 Lt.	4.2			
RS-9	34+95	38.2 Lt.		5.0		
RS-10	35+22	40.1 Lt.		5.0		
RS-11	35+46	39.3 Lt.		5.0		
RS-12	36+26	36.5 Lt.		5.0		
RS-13	36+51	33.1 Lt.	3.0			
RS-14	36+77	28.7 Lt.	3.0			
RS-15	36+99	24.4 Lt.	3.1			
RS-16	37+22	23.6 Lt.	2.1			
RS-17	37+44	24.7 Lt.	1.7			
RS-18	37+66	26.7 Lt.	2.0			
RS-19	37+89	27.5 Lt.	3.0			
RS-20	38+14	17.5 Rt.	3.9			
RS-21	38+51	31.8 Lt.	2.9			
RS-22	38+75	31.3 Lt.	3.6			
RS-23	37+74	21.7 Rt.	2.2			
RS-24	37+17	26.0 Rt.	2.8			
RS-25	36+63	19.5 Rt.		5.0		
RS-26	36+15	9.4 Rt.		5.0		
RS-27	35+69	16.6 Lt.		5.0		
RS-28	34+67	13.1 Lt.	1.8			
RS-29	20+24	26.8 Lt.	1.8			Route 1

MaineDOT
Logged By: B. Wilder


Soil Resilient Modulus
for DARWin
Soil Resilient Modulus (psi)
8500
8000
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
2.5
3
3.5
4
4.5
5
5.5
6
6.5
Soil Support Number (in)

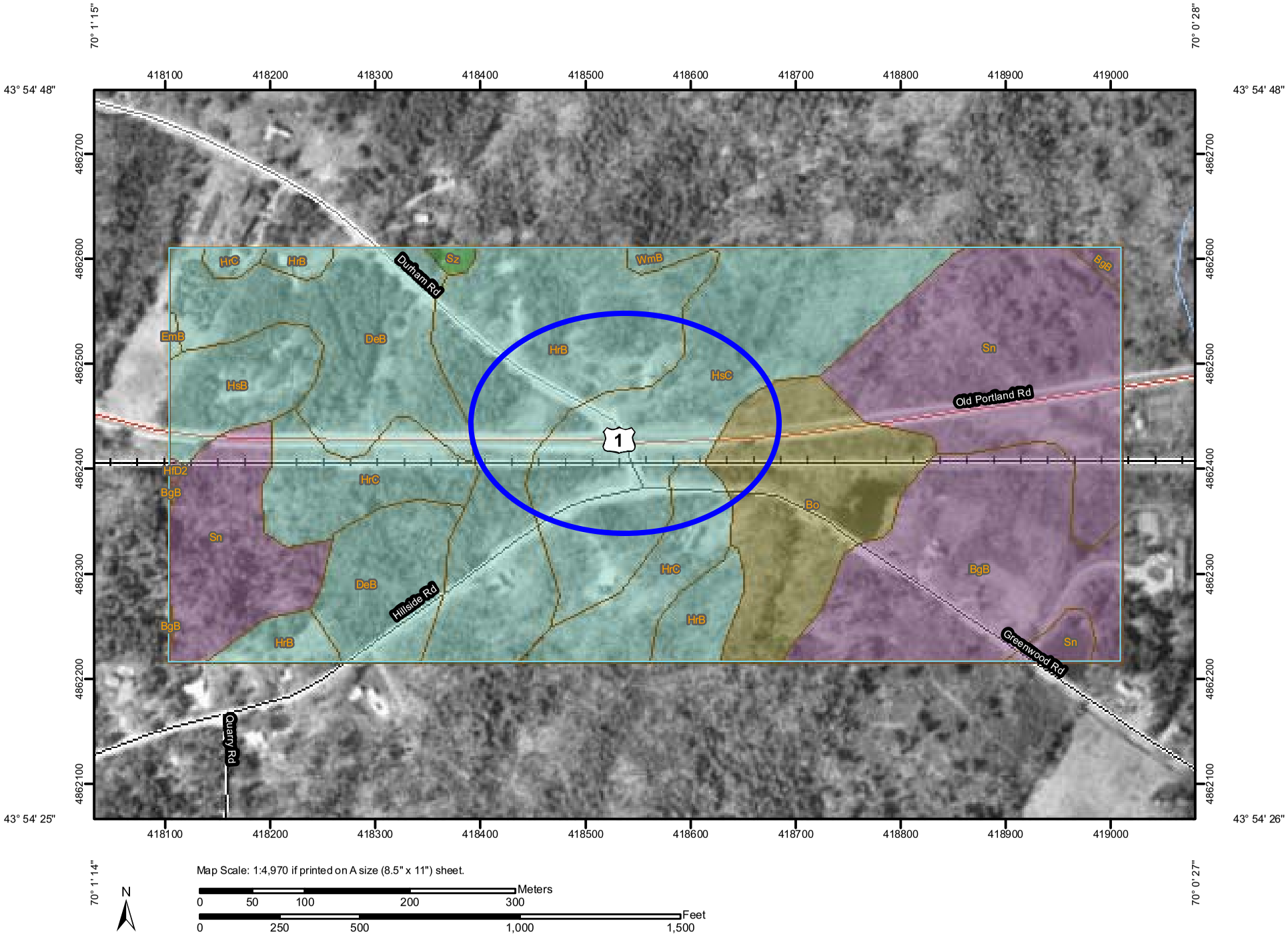

Soil Resilient Modulus
for DARWin
Soil Resilient Modulus (psi)
8500
8000
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
2.5
3
3.5
4
4.5
5
5.5
6
6.5
Soil Support Number (in)



Ptd

Thin-drift areas - Areas with generally less than ten feet of drift covering bedrock. Till overlies bedrock on hillslopes and ridge crests; Presumpscot Formation silty clays are present in depressions; and nearshore deposits overlie till, Presumpscot Formation, and bedrock on hillslopes and at the base of these slopes. Small rock outcrops, and areas of numerous small outcrops are shown as solid gray areas.

Unified Soil Classification (Surface)—Cumberland County and Part of Oxford County, Maine
(Brunswick, PIN 17241.00)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Soil Ratings
- CH
- CL
- CL-A (proposed)
- CL-K (proposed)
- CL-ML
- CL-O (proposed)
- CL-T (proposed)
- GC
- GC-GM
- GM
- GP
- GP-GC
- GP-GM
- GW
- GW-GC
- GW-GM
- MH
- MH-A (proposed)
- MH-K (proposed)
- MH-O (proposed)
- MH-T (proposed)
- ML
- ML-A (proposed)
- ML-K (proposed)
- ML-O (proposed)
- ML-T (proposed)
- OH
- OH-T (proposed)
- OL
- PT
- SC
- SC-SM
- SM
- SP
- SP-SC
- SP-SM
- SW
- SW-SC
- SW-SM
- Not rated or not available

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:4,970 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 19N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 7, Jan 8, 2009

Date(s) aerial images were photographed: 4/29/1998

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Unified Soil Classification (Surface)

Unified Soil Classification (Surface)— Summary by Map Unit — Cumberland County and Part of Oxford County, Maine				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
BgB	Belgrade very fine sandy loam, 0 to 8 percent slopes	ML	11.4	12.9%
Bo	Biddeford silt loam	PT	8.2	9.3%
DeB	Deerfield loamy sand, 3 to 8 percent slopes	SM	11.7	13.3%
EmB	Elmwood fine sandy loam, 0 to 8 percent slopes	SM	0.1	0.1%
HfD2	Hartland very fine sandy loam, 15 to 25 percent slopes, eroded	ML	0.1	0.1%
HrB	Hollis fine sandy loam, 3 to 8 percent slopes	SM	15.9	18.0%
HrC	Hollis fine sandy loam, 8 to 15 percent slopes	SM	7.5	8.5%
HsB	Hollis very rocky fine sandy loam, 3 to 8 percent slope s	SM	3.0	3.4%
HsC	Hollis very rocky fine sandy loam, 8 to 20 percent slop es	SM	12.4	14.1%
Sn	Scantic silt loam	ML	17.4	19.8%
Sz	Swanton fine sandy loam	CL	0.2	0.2%
WmB	Windsor loamy sand, 0 to 8 percent slopes	SM	0.3	0.3%
Totals for Area of Interest			**88.3**	**100.0%**

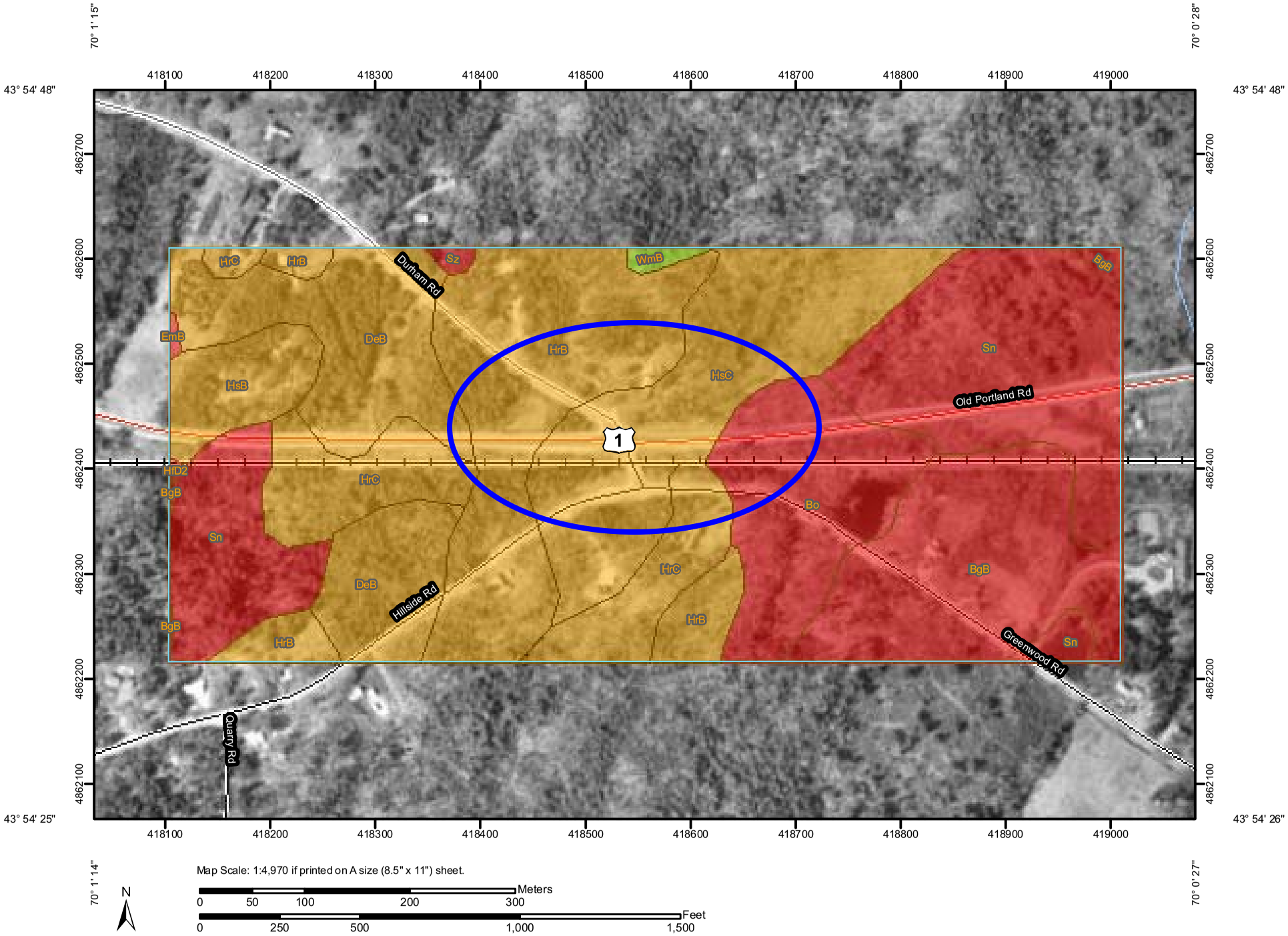
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Layer Options: Surface Layer



Map Scale: 1:4,970 if printed on A size (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1,000 1,500

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Soil Ratings
- High
- Moderate
- Low
- None
- Not rated or not available

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:4,970 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 19N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 7, Jan 8, 2009

Date(s) aerial images were photographed: 4/29/1998

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Frost Action

Frost Action— Summary by Map Unit — Cumberland County and Part of Oxford County, Maine				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
BgB	Belgrade very fine sandy loam, 0 to 8 percent slopes	High	11.4	12.9%
Bo	Biddeford silt loam	High	8.2	9.3%
DeB	Deerfield loamy sand, 3 to 8 percent slopes	Moderate	11.7	13.3%
EmB	Elmwood fine sandy loam, 0 to 8 percent slopes	High	0.1	0.1%
HfD2	Hartland very fine sandy loam, 15 to 25 percent slopes, eroded	High	0.1	0.1%
HrB	Hollis fine sandy loam, 3 to 8 percent slopes	Moderate	15.9	18.0%
HrC	Hollis fine sandy loam, 8 to 15 percent slopes	Moderate	7.5	8.5%
HsB	Hollis very rocky fine sandy loam, 3 to 8 percent slope s	Moderate	3.0	3.4%
HsC	Hollis very rocky fine sandy loam, 8 to 20 percent slop es	Moderate	12.4	14.1%
Sn	Scantic silt loam	High	17.4	19.8%
Sz	Swanton fine sandy loam	High	0.2	0.2%
WmB	Windsor loamy sand, 0 to 8 percent slopes	Low	0.3	0.3%
Totals for Area of Interest			**88.3**	**100.0%**

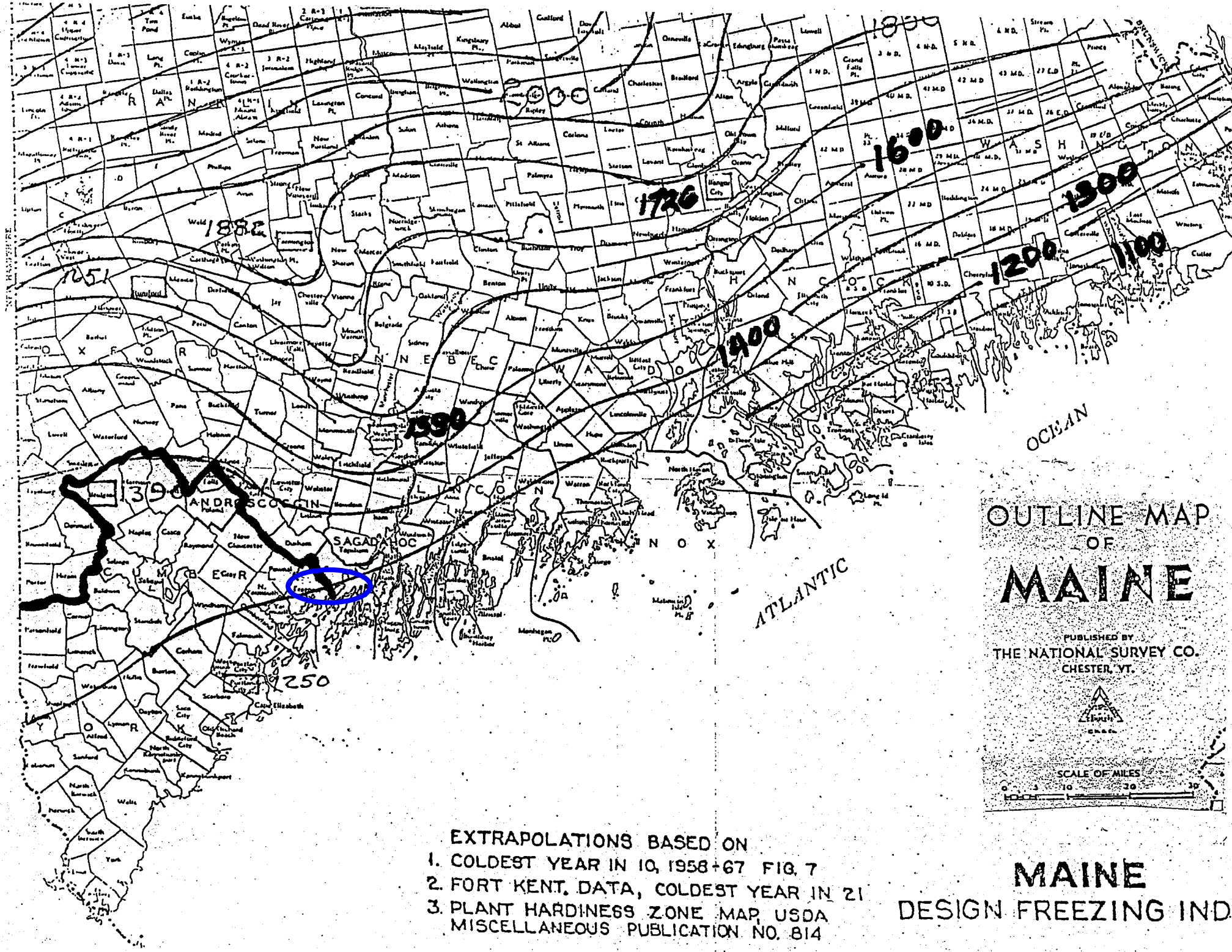
Description

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified


1800
1600
1300
1200
1100
1400
1500
1700
1882
1651
1390
1250
OCEAN
ATLANTIC
OUTLINE MAP
OF
MAINE
PUBLISHED BY
THE NATIONAL SURVEY CO.
CHESTER, VT.
SCALE OF MILES
0 5 10 20 30
EXTRAPOLATIONS BASED ON
1. COLDEST YEAR IN 10, 1958+67 FIG. 7
2. FORT KENT, DATA, COLDEST YEAR IN 21
3. PLANT HARDINESS ZONE MAP, USDA
MISCELLANEOUS PUBLICATION NO. 814
MAINE
DESIGN FREEZING INDE

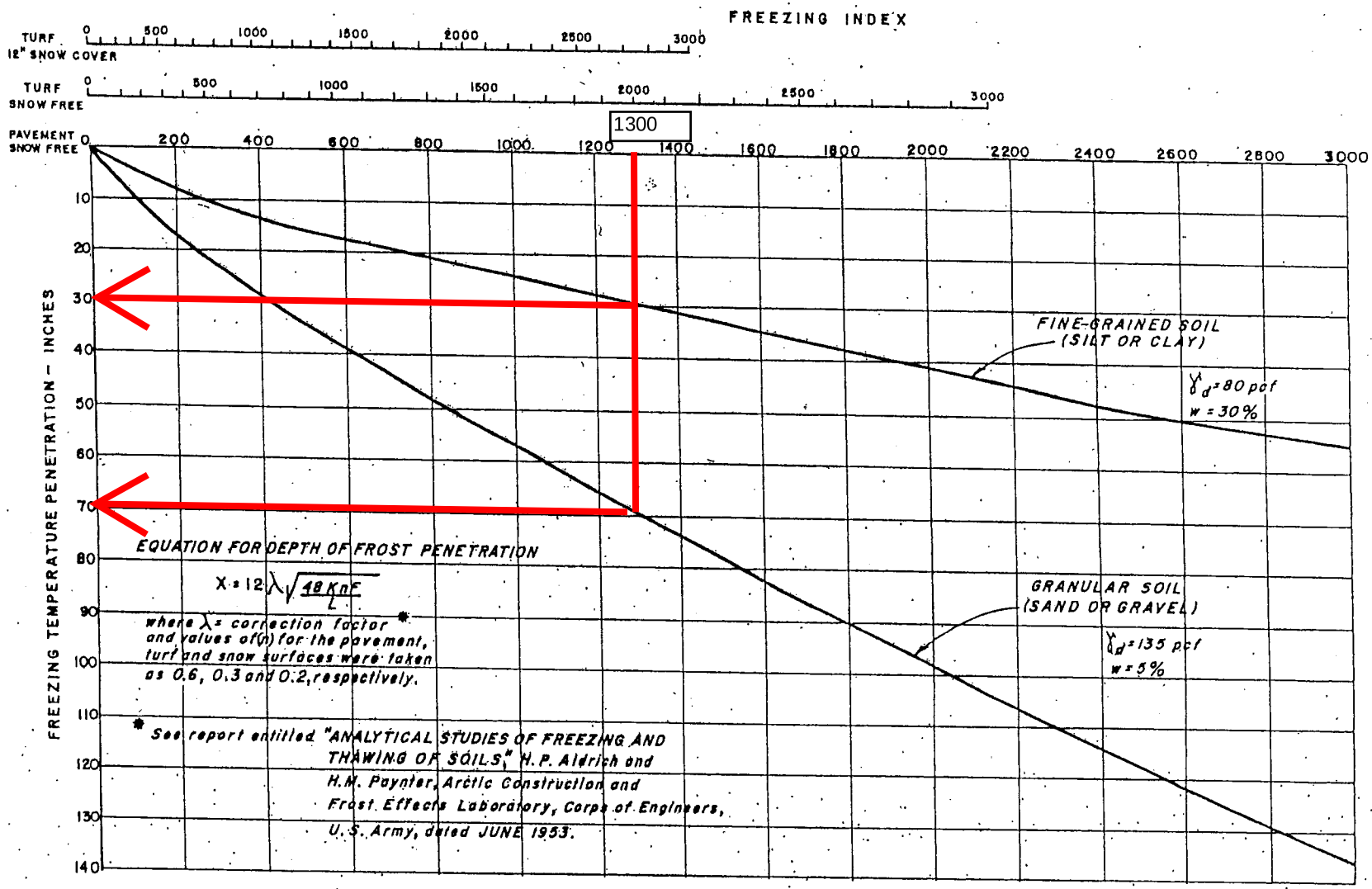
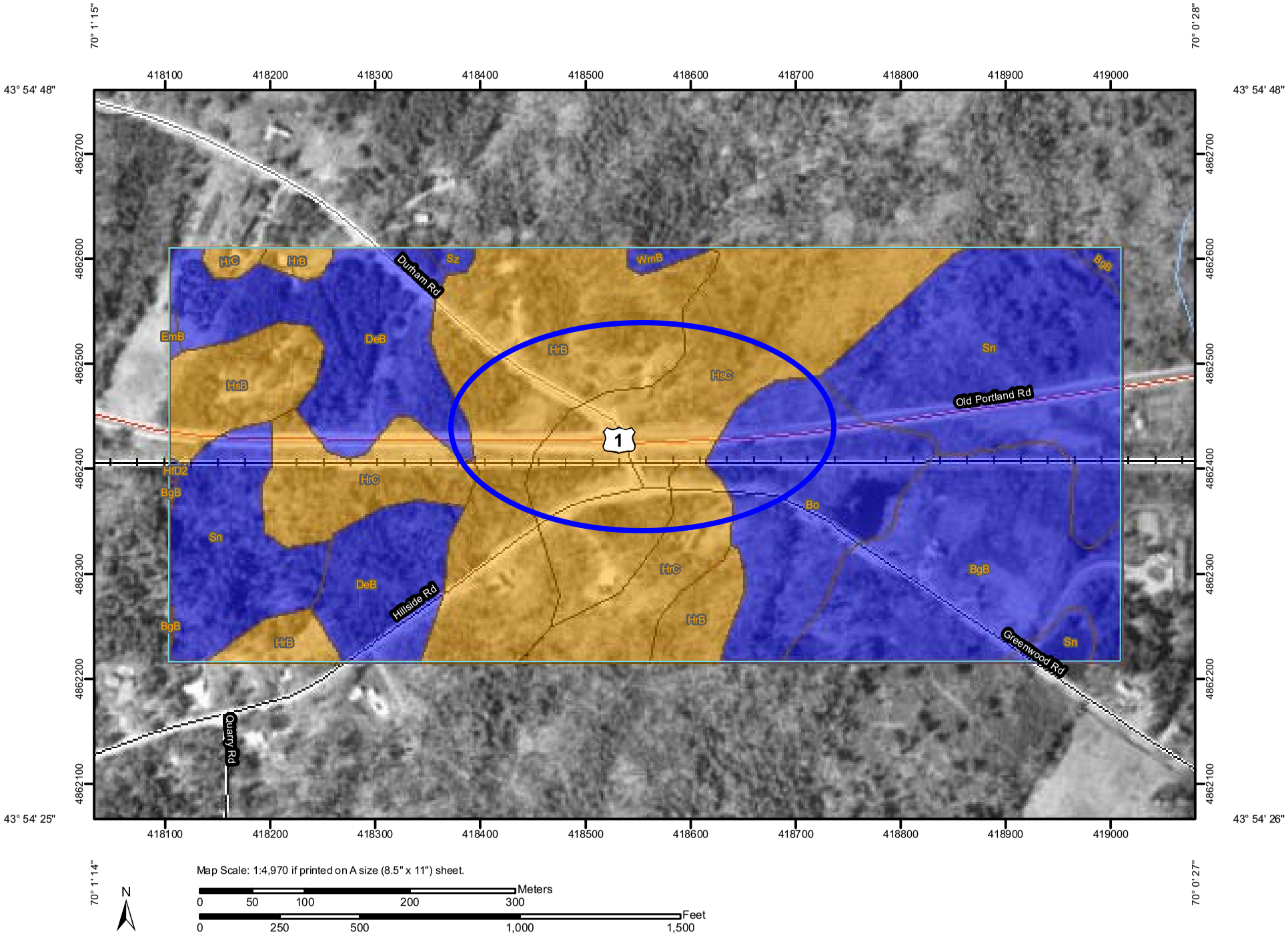


Figure 13-3 RELATIONSHIP BETWEEN FREEZING INDEX AND FREEZING TEMPERATURE PENETRATION FOR VARIOUS SURFACE CONDITIONS FOR GRANULAR AND FINE-GRAINED SOILS.

Depth to Any Soil Restrictive Layer—Cumberland County and Part of Oxford County, Maine
(Brunswick, PIN 17241.00)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Soil Ratings
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:4,970 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 19N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 7, Jan 8, 2009

Date(s) aerial images were photographed: 4/29/1998

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Depth to Any Soil Restrictive Layer

Depth to Any Soil Restrictive Layer— Summary by Map Unit — Cumberland County and Part of Oxford County, Maine				
Map unit symbol	**Map unit name**	**Rating (centimeters)**	**Acres in AOI**	**Percent of AOI**
BgB	Belgrade very fine sandy loam, 0 to 8 percent slopes	>200	11.4	12.9%
Bo	Biddeford silt loam	>200	8.2	9.3%
DeB	Deerfield loamy sand, 3 to 8 percent slopes	>200	11.7	13.3%
EmB	Elmwood fine sandy loam, 0 to 8 percent slopes	>200	0.1	0.1%
HfD2	Hartland very fine sandy loam, 15 to 25 percent slopes, eroded	>200	0.1	0.1%
HrB	Hollis fine sandy loam, 3 to 8 percent slopes	46	15.9	18.0%
HrC	Hollis fine sandy loam, 8 to 15 percent slopes	46	7.5	8.5%
HsB	Hollis very rocky fine sandy loam, 3 to 8 percent slopes	38	3.0	3.4%
HsC	Hollis very rocky fine sandy loam, 8 to 20 percent slopes	38	12.4	14.1%
Sn	Scantic silt loam	>200	17.4	19.8%
Sz	Swanton fine sandy loam	>200	0.2	0.2%
WmB	Windsor loamy sand, 0 to 8 percent slopes	>200	0.3	0.3%
Totals for Area of Interest			**88.3**	**100.0%**

Description

A "restrictive layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

This theme presents the depth to any type of restrictive layer that is described for each map unit. If more than one type of restrictive layer is described for an individual soil type, the depth to the shallowest one is presented. If no restrictive layer is described in a map unit, it is represented by the "> 200" depth class.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

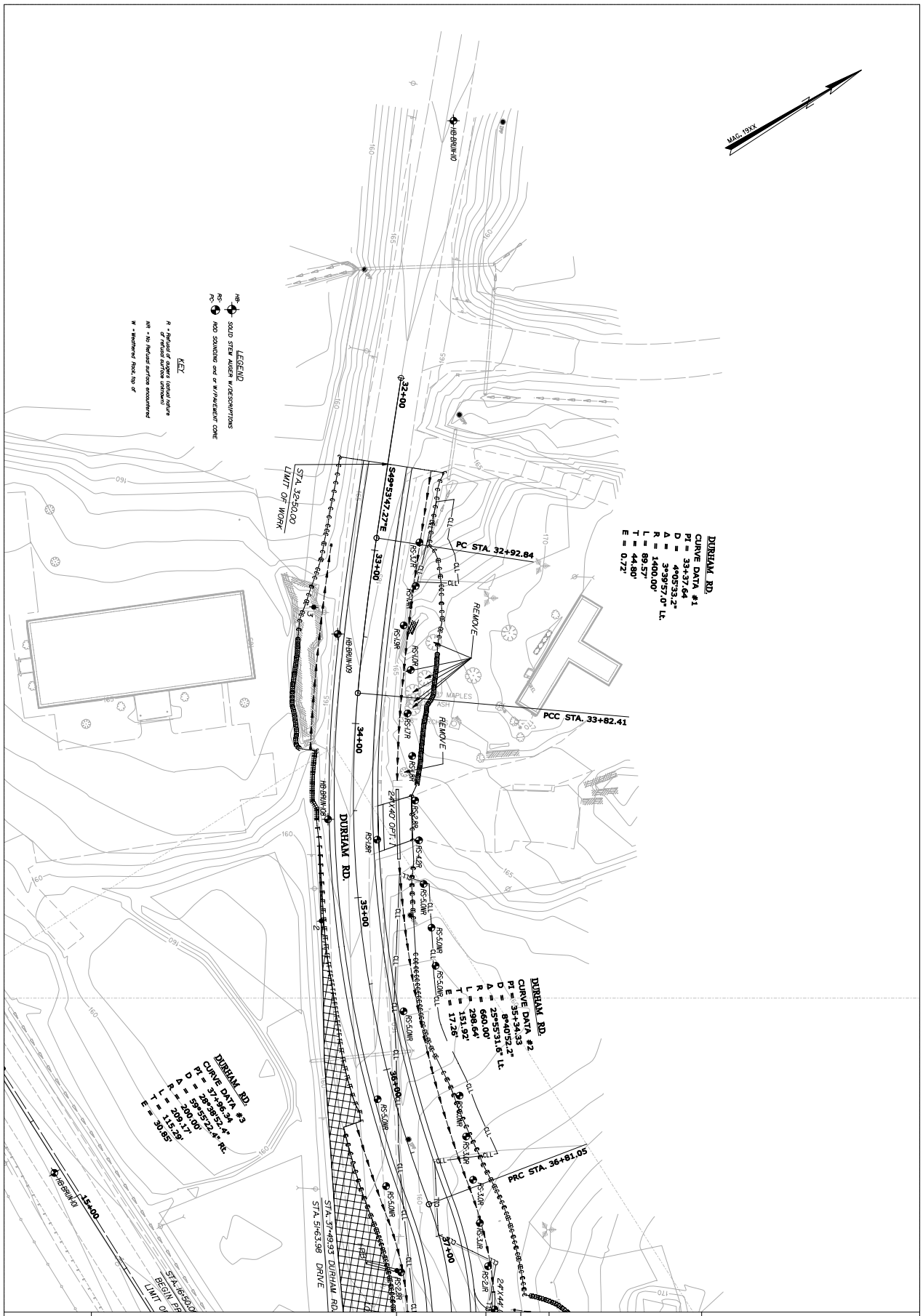
Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Filename: ...\GEOTECH\MSTA\001_Geoplan1.dgn Division: HIGHWAY Username: karen.gross Date:1/23/2012



SHEET NUMBER 1 OF 4

BRUNSWICK
U.S. ROUTE 1\DURHAM ROAD

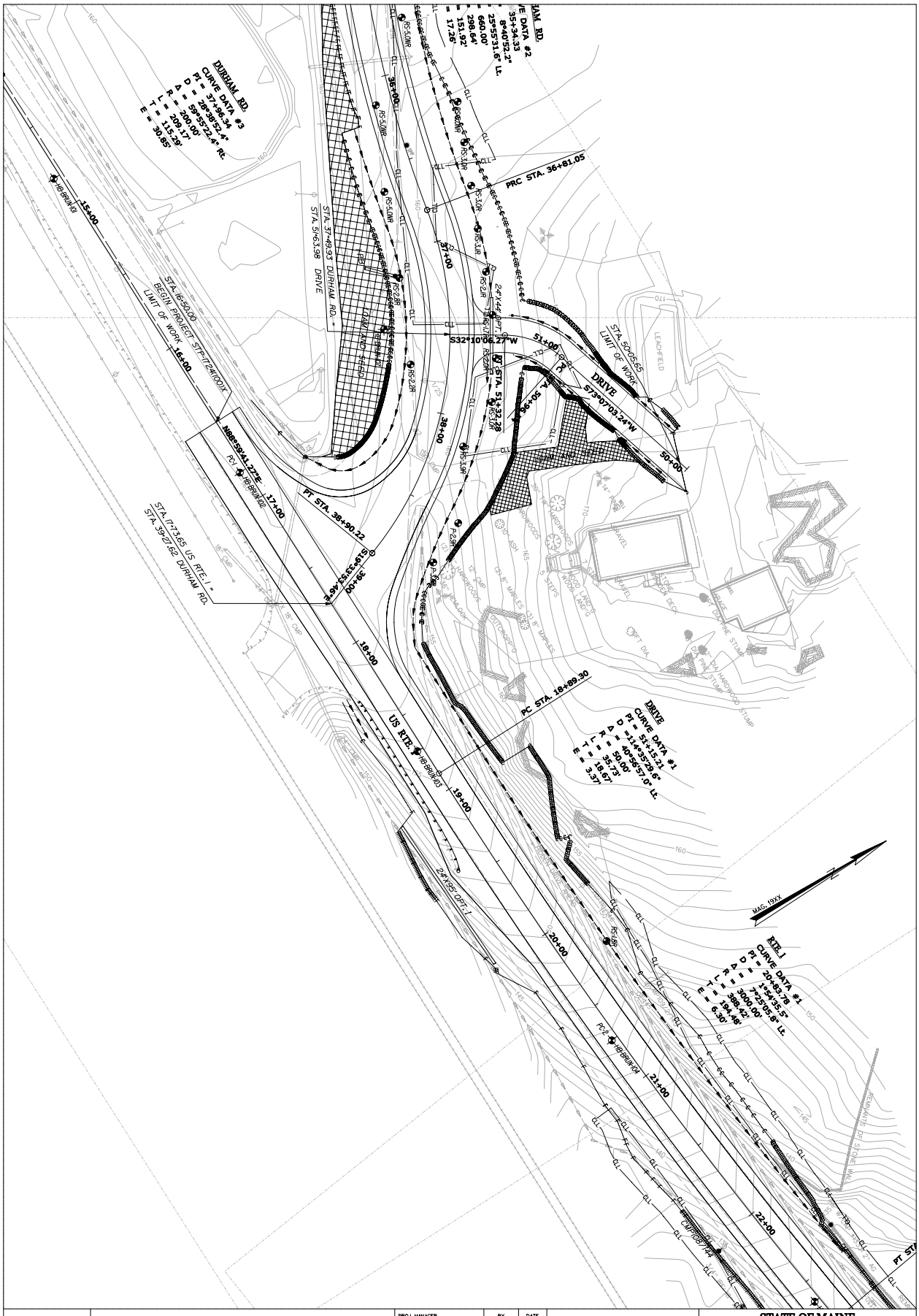
GEOPLANS

PROJ. MANAGER		BY	DATE	
DESIGN-DETAILED	K.GROSS	T.WHITE	AUG 2010	
CHECKED-REVIEWED				SIGNATURE
DESIGN2-DETAILED2				
DESIGN3-DETAILED3				
REVISIONS 1				P.E. NUMBER
REVISIONS 2				
REVISIONS 3				DATE
REVISIONS 4				
FIELD CHANGES				

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

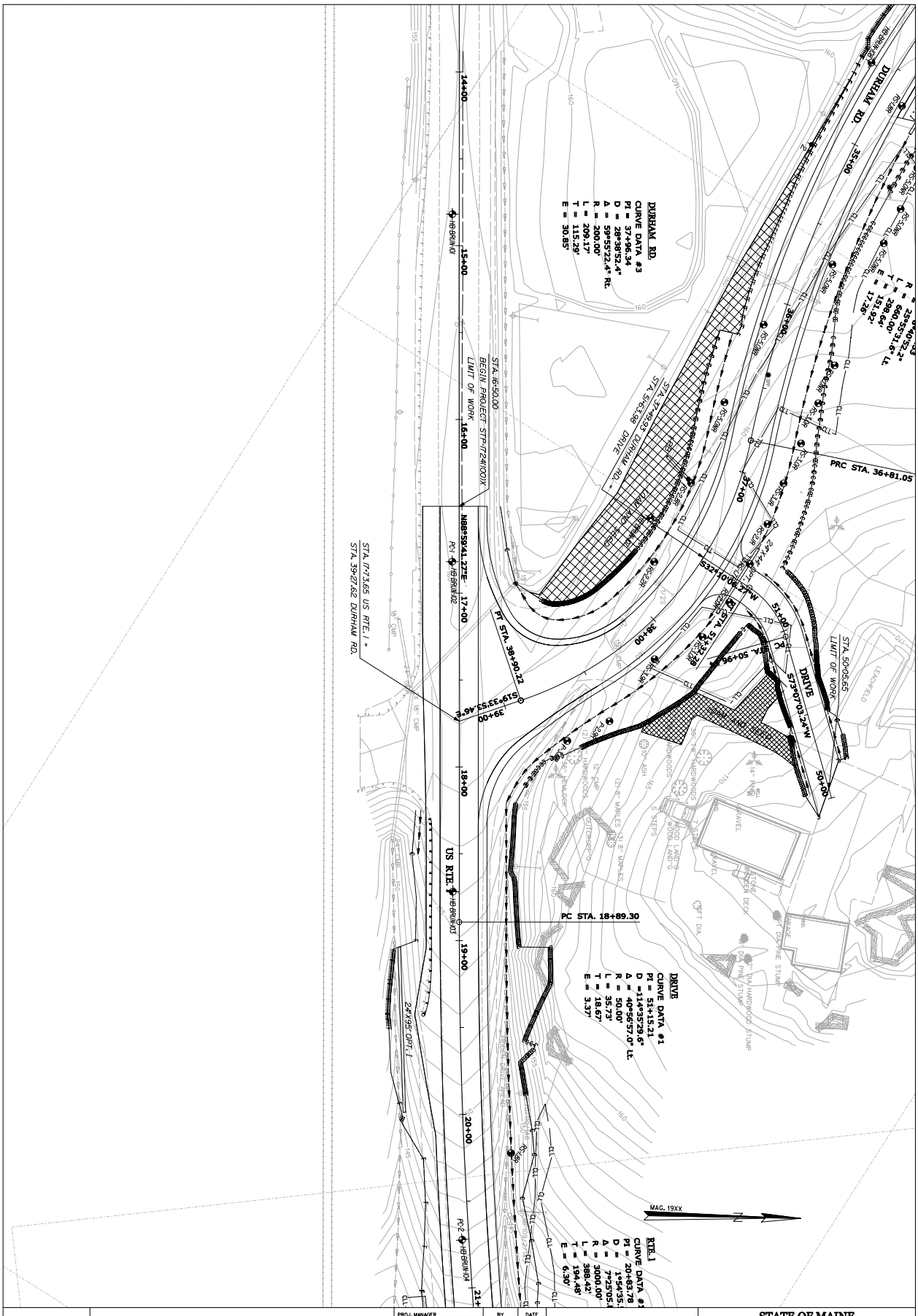
STP-1724(100)X

PIN 17241.00 HIGHWAY PLANS



SHEET NUMBER	BRUNSWICK U.S. ROUTE 1\DURHAM ROAD	PROJ. MANAGER		BY	DATE	STATE OF MAINE DEPARTMENT OF TRANSPORTATION
2 OF 4	GEOPLANS	DESIGN-DETAILED	K.GROSS	T.WHITE	AUG 2010	STP-1724(100)X
		CHECKED-REVIEWED				SIGNATURE
		DESIGN2-DETAILED2				
		DESIGN3-DETAILED3				P.E. NUMBER
		REVISIONS 1				
		REVISIONS 2				
		REVISIONS 3				DATE
		REVISIONS 4				
		FIELD CHANGES				PIN 17241.00 HIGHWAY PLANS

Filename: ...\GEOTECH\MSTA\003_Geoplan3.dgn Division: HIGHWAY Username: karen.gross Date:1/23/2012



PROJ. MANAGER		BY	DATE
DESIGN-DETAILED	K.GROSS	T.WHITE	AUG 2010
CHECKED-REVIEWED			
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

BRUNSWICK
U.S. ROUTE 1\DURHAM ROAD

GEOPLANS

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

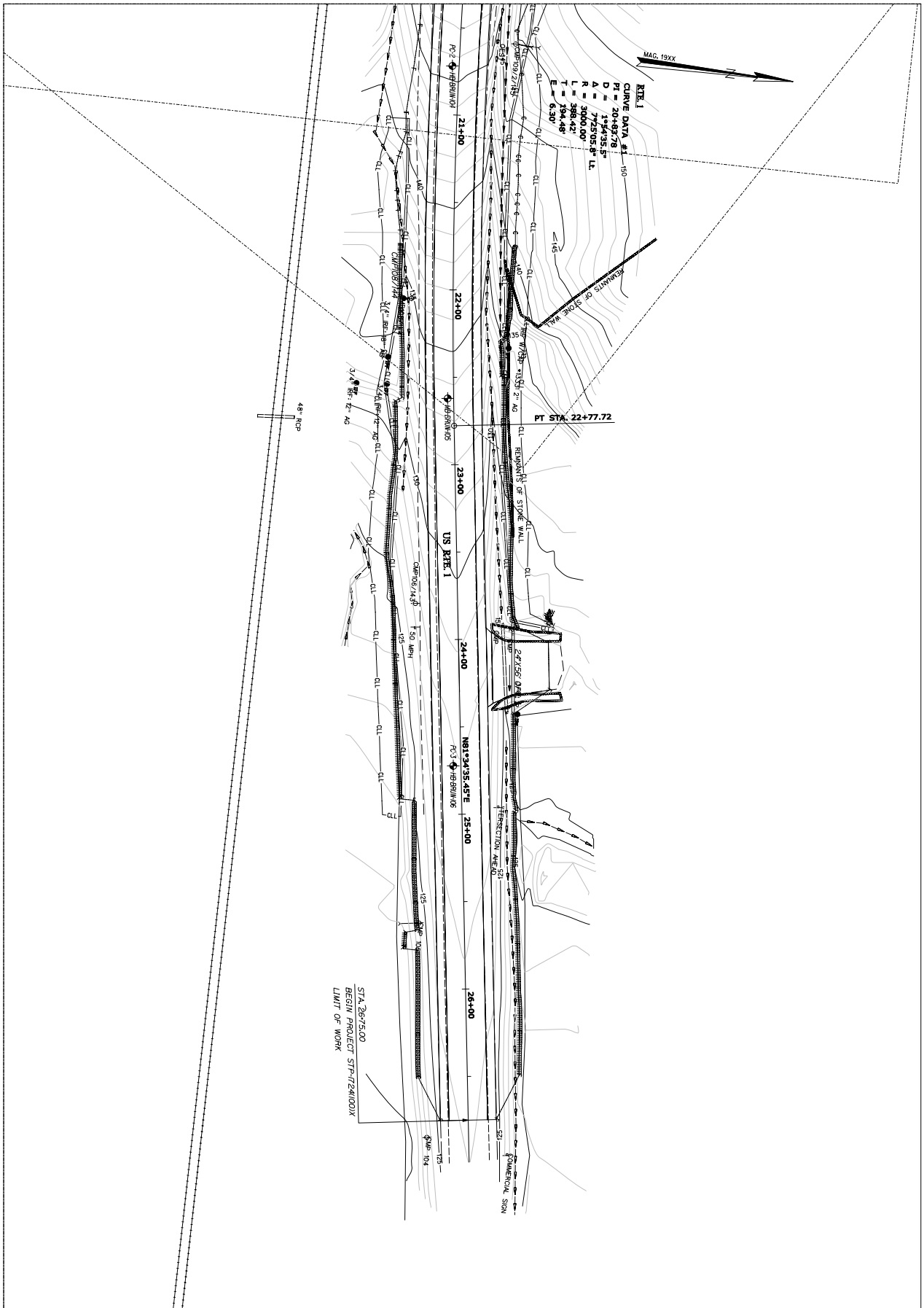
STP-1724(100)X

PIN
17241.00

HIGHWAY PLANS

SHEET NUMBER
3
OF 4

Filename: $file$ Division: $wkgroup$ Username: $user$ Date:$date$



SHEET NUMBER 4 OF 4	BRUNSWICK U.S. ROUTE 1\DURHAM ROAD GEOPLANS	PROJ. MANAGER ____ BY T.WHITE DATE AUG 2010 DESIGN-DETAILED K.GROSS CHECKED-REVIEWED DESIGN2-DETAILED2 DESIGN3-DETAILED3 REVISIONS 1 REVISIONS 2 REVISIONS 3 REVISIONS 4 FIELD CHANGES	SIGNATURE P.E. NUMBER DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1724(100)X

PIN 17241.00 HIGHWAY PLANS

Fed. Proj. No.	County	Prel. Aid Proj. No.	Fiscal Year	Sheet No.	Total Sheets
9				1	38

STATE OF MAINE
STATE HIGHWAY COMMISSION

PLAN AND PROFILE

STATE HIGHWAY PD C 99

BRUNSWICK

CUMBERLAND COUNTY

FEDERAL AID PROJECT NO. 121D

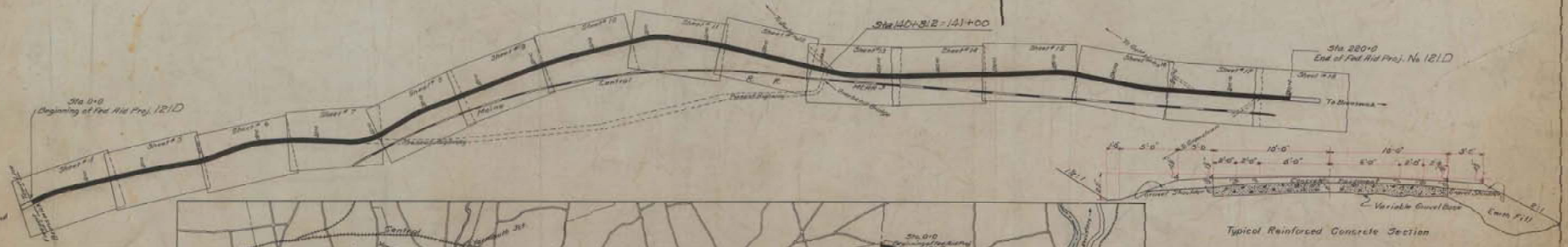
TOTAL LENGTH 4.163 MILES

SCALES: PLAN 1 IN. = 50 FT.; PROFILE (HOR. 1 IN. = 50 FT., VER. 1 IN. = 5 FT.); CROSS SECTIONS 1 IN. = 5 FT.

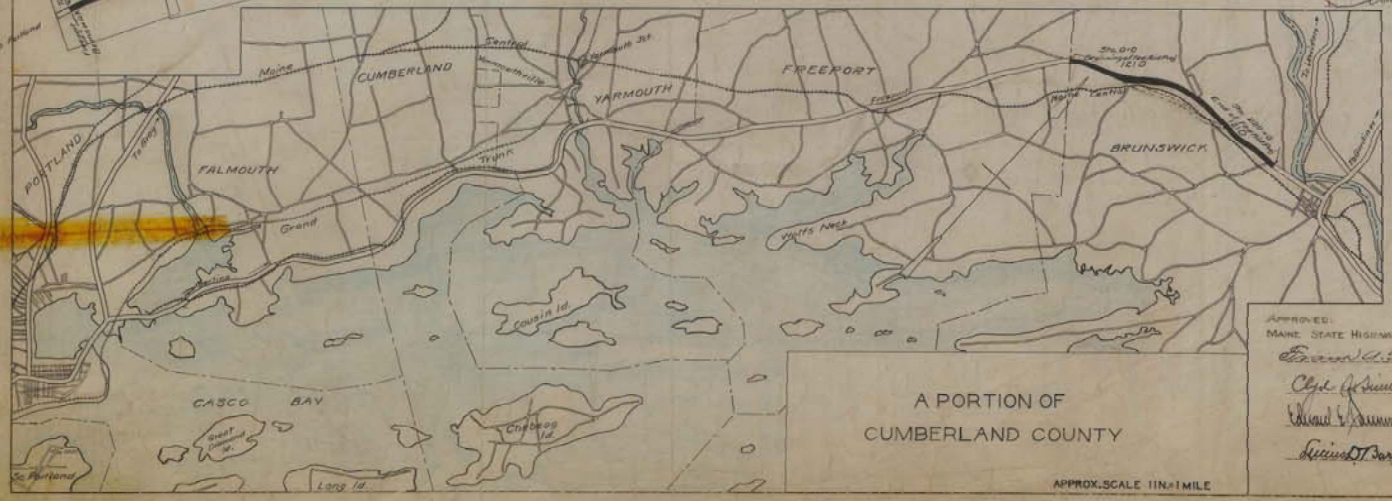
CONVENTIONAL SIGNS

State or National Line		Survey Line	
County Line		Culvert	
Town Line		Drop Inlet	
Unfenced Property		Trolley Pole	
Fence		Power Pole	
Right of Way Line		Tel. Pole	
Traveled Way		Marsh	
Railroad		Trees	
Retaining Wall		Stone Wall	

INDEX OF SHEETS



Typical Reinforced Concrete Section



A PORTION OF CUMBERLAND COUNTY

APPROX. SCALE 1 IN. = 1 MILE

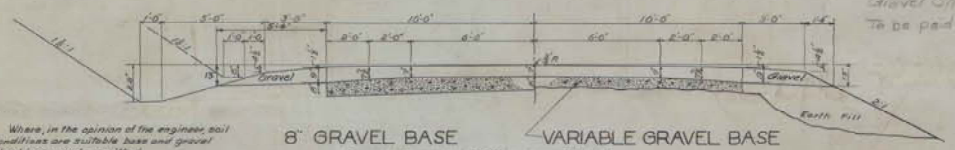
NOTE — ALL WORK CONTEMPLATED UNDER THIS CONTRACT TO BE GOVERED BY AND IN CONFORMITY WITH THE SPECIFICATIONS ADOPTED EXCEPT AS MODIFIED ON THIS PLAN.

APPROVED:
MAINE STATE HIGHWAY COMMISSION
Forrest A. Goodwin (Chairman)
Clyde H. Smith
Edward E. Swanton
Lucius O. Barrows

APPROVED:
U. S. BUREAU OF PUBLIC ROADS
[redacted]
DISTRICT ENGINEER
[redacted]
CHIEF ENGINEER
[redacted]
DIRECTOR

STANDARD SECTIONS CONCRETE PAVEMENT

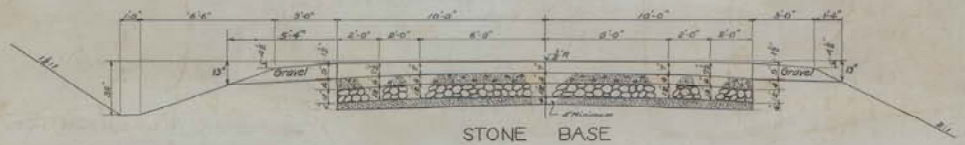
Note
Gravel Shoulders and Gravel Base
To be paid for as Gravel Borrow



Where, in the opinion of the engineer, soil conditions are suitable base and gravel shoulders may be omitted.

8" GRAVEL BASE — VARIABLE GRAVEL BASE

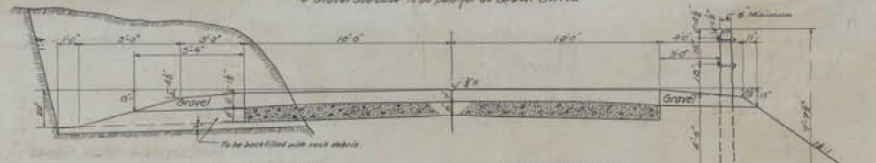
Concrete Pavement 448360 cu yds per 100 lin ft.
6 Gravel Base To be paid for as Gravel Borrow



STONE BASE

Gravel Shoulders to be paid for as Gravel Borrow
Location and depth of ditch to be governed by local conditions.

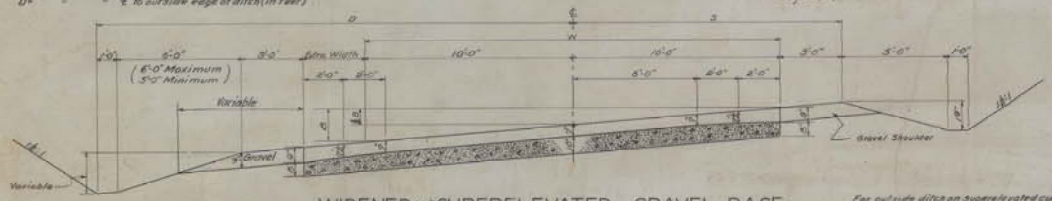
4" Gravel Base To be paid for as Gravel Borrow
18" Stone Base 74.6760 Sq yds per 100 lin ft.
4" Gravel Sub-Base To be paid for as Gravel Borrow



LEDGE GUARD RAIL

4' Gravel Shoulders
To be paid for as Gravel Borrow

Legend.
B = Full bank (in inches) for W
W = Unwidened width of pavement (in feet)
S = Distance from ℄ to edge of shoulder (in feet)
D = " " ℄ to outside edge of ditch (in feet)

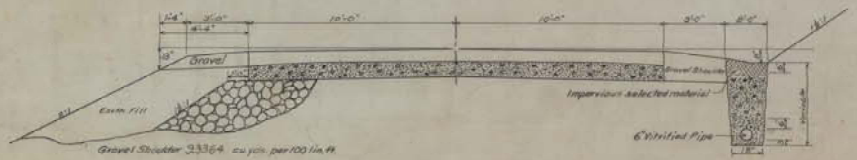


WIDENED AND SUPERELEVATED GRAVEL BASE

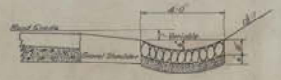
For inside ditch on widened or unwidened superelevated curves. Depth of ditch in inches below center grade equals thickness of section at ℄ plus $\frac{W}{12} \times B$.

For outside ditch on superelevated curves. Depth of ditch in inches below center grade equals thickness of section at ℄ plus $\frac{W}{2}$ minus $\frac{W}{12} \times B$.

Curves of 2° or more to be superelevated.
B equals Degree of Curve x 2" with a minimum of a 6" superelevation. Maximum superelevation equals 1" per foot width of pavement.
All curves to have full superelevation at approximately 50' onto the curve from P.C. & P.T. with a 150' runoff.
Curves of 5° or more to be widened according to formula $\frac{D}{12} + 2$ where "D" equals Degree of Curve.



STONE FILL TILE UNDERDRAIN



COBBLE GUTTER

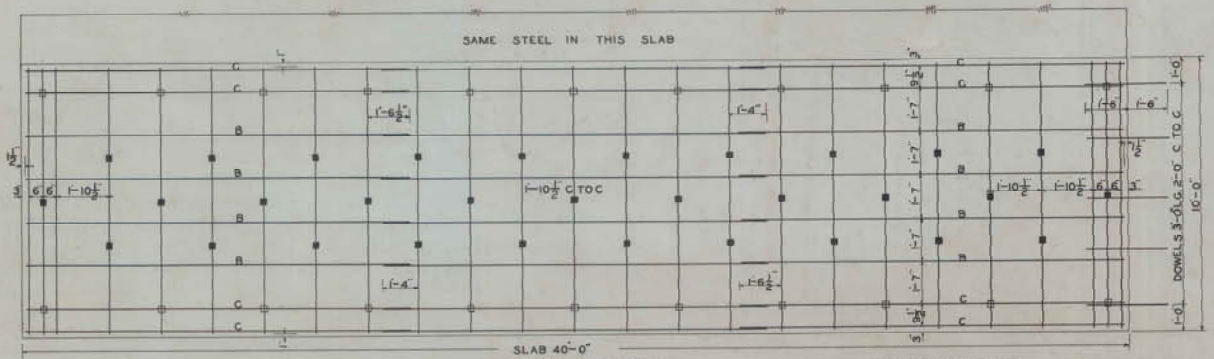
ITEM	DESCRIPTION	AMT.	REMARKS
1F	CLEARING & GRUBBING	1 ACRES	
1EA	EARTH EXCAVATION	1000 CY	
1EB	ROCK EXCAVATION	1 CY	
1EC	TREES REMOVED	10	
1G	EXCAVATION-STRUCTURE	3850 CY	
1TA	COMMON BORROW	100 CY	
1TB	GRAVEL BORROW	3000 CY	
2A	STONE BASE COURSE	100 CY	
3J	CONCRETE PAVEMENT	8960 CY	
3PA	BAR REINF FOR PAVEMENT	582650 LBS	
3BA	CLASS A CONCRETE	70 CY	
3BB	CLASS B CONCRETE	284 CY	
3S	STEEL REINF CONC STR	9600 LBS	
4DA	12" CSP PIPE	200 FT	
4DB	15" CSP PIPE	110 FT	
4DC	18" CONC PIPE	538 FT	
4DD	24" CONC PIPE	122 FT	
4DE	30" CONC PIPE	156 FT	
4PF	48" PIPE	48 FT	
6T	TILE UNDERDRAIN	1336 FT	
8DA	WIRE CABLE GUARD RAIL	6784 FT	
10B	ANCHORAGES FOR W.C.R.	28	

CULVERTS

STA.	KIND	SIZE	LENGTH	REMARKS

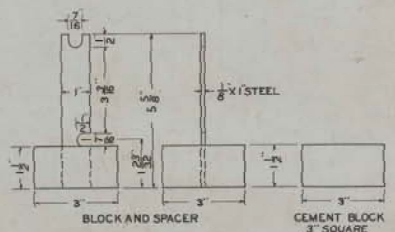
9		1210		3	09

PLAN OF PAVEMENT REINFORCEMENT.



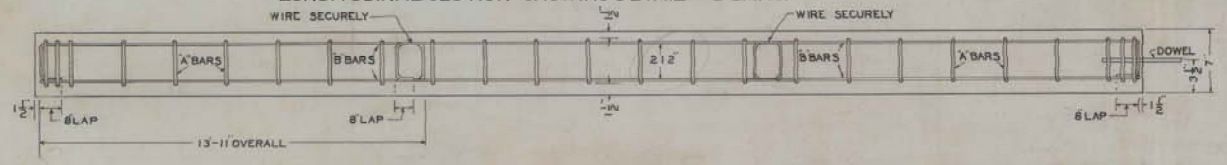
ALL BARS $\frac{3}{8}$ DIAM. DOWELS $\frac{3}{4}$ DIAM.
ALL TRANSVERSE BARS ARE "A" BARS

■ BLOCKS AND SPACERS
□ CEMENT BLOCKS

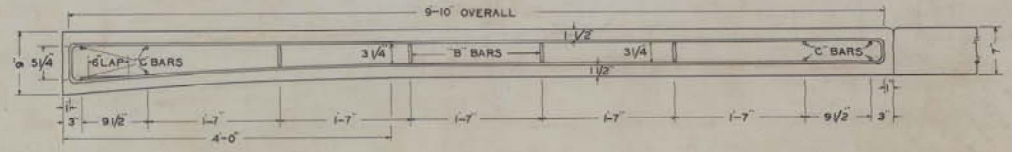


BLOCKS TO BE MADE OF ONE PART PORTLAND CEMENT AND TWO PARTS OF APPROVED SAND AND CURED UNDER COVER FOR SEVEN DAYS.

LONGITUDINAL SECTION SHOWING DETAIL OF "B" BARS.



TRANSVERSE SECTION SHOWING DETAIL OF "A" BARS



REINFORCING DATA
BARS 3/8 DIA. PLAIN STEEL 0.376 LB. PER LIN. FT.
DOWELS 3/4 " " " 1.502 " " " "
DOWELS 3'-0" LG. 1/2 ENCASED IN METAL TUBE.
A BARS BENT 9'-10" OVERALL LAP 6" & WIRED.
B " BENT 13'-11 " " 8" " "
C " STRAIGHT 13'-11" LG. TOP & BOTTOM. ENDS ARE 1 1/2" FROM EDGE OF SLAB.
EACH 10'X40' SLAB CONTAINS-25 A BARS-12 B BARS & 24 C BARS MADE UP IN 3 SECTIONS. EACH SECTION TO BE SECURELY WIRED BEFORE PLACING.
EACH 10'X40' SLAB CONTAINS A MINIMUM OF 22 CEMENT BLOCKS & 31 BLOCK AND SPACERS TO SUPPORT STEEL. SEE DETAIL.
TOTAL WEIGHT OF STEEL INCLUDING DOWELS 10.70 LBS. PER SQ. YD.